

# **BID DOCUMENTS PROJECT MANUAL**

---

FOR

**City of Beavercreek  
Salt Barn & 9-Acre Property  
Site Improvements**

2260 Dayton-Xenia Road  
Beavercreek, Ohio 45434

OWNER

**City of Beavercreek**

789 Orchard Lane  
Beavercreek, Ohio 45434

Book 1 of 1



Minster, OH | Columbus, OH | Indianapolis, IN | Fort Wayne, IN

## TABLE OF CONTENTS

### CITY OF BEAVERCREEK CONTRACT DOCUMENT PACKET

#### DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

00 11 30	ABBREVIATED SCOPE OF WORK
00 31 19	EXISTING CONDITION INFORMATION
00 31 19.01	GEOTECHNICAL REPORT
00 31 19.02	ADDENDUM TO GEOTECHNICAL REPORT
00 63 13	REQUEST FOR INFORMATION FORM

#### DIVISION 01 – GENERAL REQUIREMENTS

01 11 00	SUMMARY
01 20 00	PRICE AND PAYMENT PROCEDURES
01 23 00	ALTERNATES
01 30 00	ADMINISTRATIVE REQUIREMENTS
01 33 23	CONTRACTOR SUBMITTAL FORM
01 43 00	QUALITY ASSURANCE
01 45 25	MASONRY INSPECTION FORM
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 51 00	TEMPORARY UTILITIES
01 60 00	PRODUCT REQUIREMENTS
01 60 00.01	SUBSTITUTION REQUEST FORM
01 70 00	EXECUTION AND CLOSEOUT REQUIREMENTS
01 78 00	CLOSEOUT SUBMITTALS
01 79 00	DEMONSTRATION AND TRAINING

#### DIVISION 02 - EXISTING CONDITIONS

02 41 00	DEMOLITION
----------	------------

#### DIVISION 03 - CONCRETE

03 30 00	CAST-IN-PLACE CONCRETE
----------	------------------------

#### DIVISION 04 - MASONRY

04 05 13	MASONRY MORTARING
04 05 16	MASONRY GROUTING
04 05 19	MASONRY ANCHORAGE & REINFORCING
04 05 23	MASONRY ACCESSORIES
04 20 00	UNIT MASONRY

**DIVISION 05 - METALS**

05 50 00 METAL FABRICATIONS

**DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

06 10 00 ROUGH CARPENTRY

**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

07 42 13.13 FORMED METAL WALL PANELS  
07 54 19 PVC THERMOPLASTIC SINGLE-PLY ROOFING  
07 61 00 SHEET METAL ROOFING  
07 62 00 SHEET METAL FLASHING AND TRIM  
07 71 00 ROOF SPECIALTIES  
07 92 00 JOINT SEALANTS

**DIVISION 08 - OPENINGS**

08 11 13 HOLLOW METAL DOORS AND FRAMES  
08 16 14 FIBERGLASS DOORS  
08 36 13 SECTIONAL DOORS  
08 71 00 DOOR HARDWARE  
08 80 00 GLAZING

**DIVISION 09 - FINISHES**

09 91 13 EXTERIOR PAINTING

**DIVISION 10 - SPECIALTIES**

10 44 00 FIRE PROTECTION SPECIALTIES

**DIVISION 13 - SPECIAL CONSTRUCTION**

13 31 00 FABRIC STRUCTURES

**DIVISION 22 - PLUMBING**

22 05 01 PLUMBING MATERIALS & METHODS  
22 05 19 METERS AND GAGES  
22 10 05 PLUMBING PIPING  
22 10 06 PLUMBING PIPING SPECIALTIES

**DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING HVAC**

23 05 01 MECHANICAL MATERIALS & METHODS  
23 81 01 TERMINAL HEAT TRANSFER UNITS

**DIVISION 26 - ELECTRICAL**

26 01 01	GENERAL PROVISIONS
26 05 05	MINOR ELECTRICAL DEMOLITION
26 05 19	CONDUCTORS
26 05 26	GROUNDING AND BONDING
26 05 29	HANGERS AND SUPPORTS
26 05 33.13	CONDUIT
26 05 33.16	BOXES
26 05 50	BASIC MATERIALS AND METHODS
26 05 53	IDENTIFICATION
26 05 55	CONNECTORS
26 05 83	EQUIPMENT WIRING
26 24 16	PANELBOARDS
26 27 26	WIRING DEVICES
26 28 13	FUSES
26 28 16.16	ENCLOSED SWITCHES
26 51 00	INTERIOR LIGHTING
26 56 00	EXTERIOR LIGHTING

**DIVISION 31 - EARTHWORK**

31 10 00	SITE CLEARING
31 20 00	EARTH MOVING
31 66 13	RAMMED AGGREGATE PIERS

**DIVISION 32 - EXTERIOR IMPROVEMENTS**

32 12 16	ASPHALT PAVING
----------	----------------

**DIVISION 33 - UTILITIES**

33 42 00	STORMWATER CONVEYANCE
----------	-----------------------

**DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT**

43 22 56	SALT BRINE PRODUCTION SYSTEM
----------	------------------------------

**SALT BARN & 9-ACRE PROPERTY SITE  
IMPROVEMENTS**

CONTRACT NUMBER 2308

**CONTRACT DOCUMENTS**

**FOR**

**CITY OF BEAVERCREEK**

**SALT BARN & 9-ACRE PROPERTY SITE**  
**IMPROVEMENTS**

**CITY OF BEAVERCREEK**

**GREENE COUNTY, OHIO**

**OCTOBER 2023**

**PREPARED BY**

**CITY OF BEAVERCREEK  
DEPARTMENT OF ENGINEERING AND INSPECTION  
1368 RESEARCH PARK DRIVE  
BEAVERCREEK, OHIO 45432**

# CONTRACT DOCUMENTS

## TABLE OF CONTENTS

DOCUMENT	PAGE
Legal Advertisement.....	A-1
<b><u>PROPOSAL FORMS</u></b>	
Instructions to Bidders.....	P-1/P-6
Proposal Forms.....	P-7/P-8
Proposal Bid Schedule.....	P-9/P15
Proposal Statement.....	P-16
Experience Statement.....	P-17
Non-Collusion Affidavit.....	P-18
Bid Bond (By Surety Company).....	P-19/P-20
Bid Guaranty (By Check or Letter of Credit).....	P-21/P-22
<b><u>CONTRACT DOCUMENTS</u></b>	
Form Of Contract.....	C-3/C-4
Affidavit For Corporations.....	C-5
Delinquent Taxes Affidavit.....	C-6
Contract Bond.....	C-7/C-8
Escrow Waiver.....	C-9
Maintenance Bond.....	C-10/C-11
<b><u>NOTICES AND FORMS</u></b>	
Notice Of Award.....	F-1
Notice To Proceed.....	F-2
Contractor's Affidavit (Periodical Estimates).....	F-3
Contractor's Affidavit (Final Estimates).....	F-4
Exemption Certification.....	F-5
Waiver Of Lien Material And Labor.....	F-6
<b><u>GENERAL PROVISIONS</u></b>	
General Provisions.....	GP-1/GP-48
<b><u>PREVAILING WAGE RATES</u></b>	
Wage Determinations.....	PW-1/PW-51
<b><u>SPECIAL PROVISIONS</u></b>	
Special Provisions.....	SP-1/SP-10

## **LEGAL ADVERTISEMENT**

Sealed proposals for the SALT BARN AND 9-ACRE PROPERTY SITE IMPROVEMENTS will be received at the Public Service Building, City of Beavercreek, 789 Orchard Lane, Beavercreek, Ohio 45432, until 10:00 am, local time, on THURSDAY, NOVEMBER 02, 2023 and publicly opened and read at that hour and place.

The work for which proposals are invited consists of furnishing all labor, equipment and material for the construction of a new salt barn facility and related site improvements, and all other work as may be necessary to complete the contract in accordance with the plans and specifications.

Contract documents may be purchased from DC Reprographics, 1254 Courtland Ave, Columbus, Ohio 43201; [www.DCplanroom.com](http://www.DCplanroom.com); Phone 614-297-1200. Each Bidder is responsible for shipping cost or providing a shipping number for billing to the bidder's account.

The cost for each set of contract documents will be \$110.00. No refunds will be made. Checks for the purchase of contract documents shall be made payable to the City of Beavercreek.

A pre-bid meeting will be held at 9:00 am on October 20<sup>th</sup>, 2023, at 2260 Dayton-Xenia Road, Beavercreek, Ohio 45432. The pre-bid meeting is not mandatory, but bidders are strongly encouraged to attend.

Each bidder must ensure that all employees and applicants for employment are not discriminated against because of race, color, religion, sex or national origin.

Bidders must comply with the prevailing wage rates on the Public Improvements in City of Beavercreek, Greene County, Ohio as determined by the Ohio Division of Labor and Worker Safety, Wage and Hour Bureau.

Bidders are advised that City of Beavercreek Administrative Policy No. 28 allows for the application of a local bidder credit in determining the award of a contract for this project. The requirements and application of this local bidder credit in determining the award of a contract are explained in the 'Instructions to Bidders' section of the project bid documents.

The City of Beavercreek reserves the right to accept or reject any or all proposals; to waive any informalities in the bidding; and to enter into a contract with the bidder who in their consideration offered the lowest and best proposal. The City also reserves the right to hold all proposals for sixty (60) days.

City of Beavercreek  
Jeffrey K. Moorman, P.E., Public Services Director / City Engineer

Advertised: October 10, 2023  
October 17, 2023  
October 24, 2023



# PROPOSAL FORMS

## INSTRUCTIONS TO BIDDERS

### 1. PROPOSALS

- A. Proposals shall be made on the form hereinafter provided. Such proposals shall be endorsed "City of Beavercreek – "SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS" and addressed to the City Engineer, City of Beavercreek, 1368 Research Park Drive, Beavercreek, Ohio 45432.
- B. Proposals shall contain the full names and be signed by the individuals as specified in Section 102.08 of the General Provisions.
- C. Bids may not be withdrawn after the specified time of opening.
- D. All proposals shall be completed in **BLACK** ink or typewritten. All blank spaces for bid prices must be filled in.
- E. Figures only are satisfactory on the proposal sheets; words are not necessary.

### 2. SUBMITTALS

The following documents must be executed and submitted with the bid in a sealed envelope bearing, on the outside, the name of the bidder, his/her address and the name of the project for which the bid is submitted:

Proposal  
Bid Guaranty  
All Submittals Required in the Special Provisions Section  
Affidavit of Contractor (Non-Collusion)  
Addenda (if any)  
Local Bidder Credit Form

If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified above.

### 3. BONDS:

- A. A bond submitted with the bid must be in form (ORC 153.571) provided with the bidding documents. The amount of this bond shall be one hundred percent (100%) of the bid amount as it is also a contract bond. The bond shall be accompanied by the appropriate power of attorney and by a copy of the Surety's "Certificate of Compliance" from the State of Ohio.

**B.** Alternative forms of bid security are provided for in ORC 153.54 as follows:

- a. Certified check
- b. Cashier's check
- c. Letter of credit

The amount of the above shall be equal to ten percent (10%) of the bid. If a letter of credit is used, it shall be directed to the Owner and shall state specifically what it is for; i.e., bid security for the designated project and to be applied in accordance with ORC 153.54.

#### **4. BIDS**

The City of Beavercreek reserves the right to accept, reject, or waive any informality in any proposal made for the project at any time within sixty (60) days following the date established for the receipt of bids.

#### **5. EXAMINATION**

Bidders are required to satisfy themselves by personal examination at the site of work and by examination and study of the Contract Documents as to the conditions existing and the difficulties likely to be encountered in the construction of the work.

The Contractor will accept full responsibility for all conditions or difficulties that may be encountered in the execution of the work: no plea of ignorance of conditions may be entered at any time. The Contractor will be required to fulfill in every way all the requirements of the contract. No claim for extra compensation or for an extension of time will be accepted based on the failure of the Contractor to make field examinations and investigations, or for omissions made because of lack of familiarization with the Contract Documents.

#### **6. INTERPRETATION OF CONTRACT DOCUMENTS**

If any person, firm or corporation contemplating submitting a bid for this Contract is in doubt as to the true meaning of any part of the Drawings, Specifications or other Contract Documents, he may submit to the Engineer a written request for an interpretation thereof. The person, firm or corporation submitting the request shall be responsible for its prompt delivery. Any interpretations of the proposed documents will be made only by an Addendum duly issued by the Engineer. A copy of such Addendum will be mailed or delivered to each person securing a set of Contract Documents, provided that a sufficient period of time is available for the issuance of such Addendum prior to the receipt of bids. The Owner and the Engineer will be responsible for any other explanations or interpretations of the Contract Documents made prior to the receipt of bids.

#### **7. COMPETENCY OF BIDDERS**

The Owner requires that the bidders shall furnish satisfactory evidence that they have the necessary resources to fulfill the conditions of the Contract Documents. The evidence shall be listed in the form, "Experience Statement".

Contracts shall be awarded only to responsible prospective Contractors who:

- a. Have adequate financial resources or the ability to obtain such resources as required during performance of the Contract.

- b. Have a satisfactory record of performance. Contractors, who are delinquent in current Contract performance, when the number of Contracts and the extent of delinquencies of each are considered, shall in the absence of evidence to the contrary be presumed to be unable to fulfill this requirement.
- c. Conform to the requirements of the Anti-Discrimination Clause.
- d. Are otherwise qualified and eligible to receive an award under applicable laws and regulations.

## **8. AWARD OF CONTRACT**

The Contract shall be considered to have been awarded and binding upon the contracting parties on or after the date of the Notice of Award from the Owner. The Contractor shall, within ten (10) days from the date of the Notice of Award, furnish to the Owner three (3) copies of the required Contract Bond and Proof of Insurance coverage; and shall sign the Form of Contract. The Contract shall be considered as awarded after the Certificate the Fiscal Officer has been signed by the legally authorized representative of the Owner: the Owner is satisfied as to the Surety or Sureties offered by the Contractor, guaranteeing his performance of the Contract; the Proof of Insurance Coverage is satisfactory: and the authorized representative(s) of the Owner have affixed their signature(s) thereto.

## **9. LOCAL BIDDER CREDIT**

City of Beavercreek Administrative Policy Number 28 allows for the application of a credit to local bidders in evaluating proposals in determining the award of a contract. If this credit is granted to a local bidder then the amount of the credit shall be deducted from the amount of the bid when evaluating proposals. The bid amount less any credits may be used by the City of Beavercreek in determining the lowest and best bidder. The amount of credit that may be awarded to a local bidder will be based upon the following criteria:

- A. A credit equal to three (3) percent of the lowest bid will be given to local bidders for projects that have an Engineer's Estimate of fifty thousand dollars (\$50,000), or less.
- B. A credit equal to two (2) percent of the lowest bid will be given to local bidders for projects that have an Engineer's Estimate between fifty thousand and one dollars (\$50,001) and two hundred and fifty thousand dollars (\$250,000).
- C. A credit equal to one (1) percent of the lowest bid will be given to local bidders for projects that have an Engineer's Estimate over two hundred and fifty thousand and one dollars (\$250,001), or ten thousand dollars (\$10,000), whichever is less.

For the purposes of determining bidder eligibility for this credit, a local bidder is defined as an individual or business entity whose principle place of business is located within the corporation limits of the City of Beavercreek, or with the limits of Beavercreek Township as registered with the Secretary of State of Ohio.

A completed Local Bidder Form Credit form is required to be submitted with the contractor's proposal.

**10. PREVAILING WAGES**

The Contractor or Subcontractor will be required to pay to each laborer, workman, or mechanic engaged in work on the project under this contract not less than the minimum basic hourly rate plus certain fringe benefits, as predetermined by the Ohio Department of Industrial Relations in accordance with the Ohio Revised Code. The applicable current schedule of prevailing are included as part of the contract.

**11. FORM OF CONTRACT/AMENDMENTS TO CONTRACTS**

Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein and this Contract shall be read and enforced as though it were included herein and if through mere mistake, or otherwise, any such provision is not inserted, or is not correctly inserted, then upon the application of either party hereto, the Contract shall forthwith be physically amended to make such insertion.

**12. CONTRACTOR S AFFIDAVIT FOR PAYMENT OF CURRENT ESTIMATE**

As a requisite for payment of any current estimate, the Contractor will be required to sign the "Contractor's Affidavit - Periodic Estimates" on the form attached herein, and have the same properly notarized.

**13. CONTRACTOR S AFFIDAVIT FOR FINAL PAYMENT:**

As a requisite for payment of the final estimate, the Contractor will be required to sign the "Contractor's Affidavit" on the form attached herein, and have the same properly notarized.

**14. PROGRESS PAYMENTS**

Progress payments for work associated with this project may be submitted monthly. Partial payments will be subject to retainage at a rate of 8% for the first 50% of the contract, and then reduced to 4% for the second portion of the contract with a net result of a 4% retainage at the completion of the project. Upon successful completion of all work, "punch list" items, submittals and maintenance bond, this retainage will be released to the contractor. Calculated retainage will be held by the City as funds due the contractor and not placed in a designated escrow account. The City reserves the right to make all payments within 90 Calendar days of acceptance by the Engineer.

**15. WAIVER OF LIEN MATERIAL OR LABOR**

Before Final Payment may be issued, the Contractor shall supply to the City a Waiver of Lien Material or Labor for each Subcontractor and/or Supplier which may have claim under Mechanics Lien laws S.B. 338 O.R.C. Sections 1311.25 to 1311.32

**16. NOTICE OF DELINQUENT TAXES**

Bidder is apprised of the following requirements of the Ohio Revised Code.

When any taxing district in the County lets a contract by competitive bid, after the award to the successful bidder and before the contract is entered into, the bidder shall submit an affidavit stating either that he owes no delinquent taxes or that he does owe delinquent taxes and the amount there of.

When the bidder owes such taxes, the taxing district fiscal officer shall send a copy of the statement to the County Treasurer within thirty (30) days. A copy of the statement shall be attached to the Contract. No payment can be made on a contract without such statement.

**17. INCONSISTENCIES**

Any inconsistencies discovered within these Contract Documents shall be brought to the attention of the City Engineer for clarification. The Prospective Bidder or Contractor shall submit such request, in writing. Clarification of the apparent inconsistency shall be made by a written communication issued by the City Engineer. Such communication shall be attached to and become part of these Contract Documents and shall be binding upon all parties thereto. The Contractor shall not proceed with any work, which would be affected by the clarification until such time as he has received the written communication from the City Engineer.

**18. SIGNATURE OF BIDDERS**

The firm, corporate or individual name of the bidder must be signed in ink in the space provided for the signatures on the proposed blanks. In the case of a corporation, the title of the officer signing must be stated and such officer must be thereunto duly authorized and the seal of said corporation duly affixed. In the case of a partnership, the signature of at least one of the partner must follow the firm name, using the term "member of the firm". In the case of an individual, use the terms "doing business as", or "sole owner". The bidder shall further state in his proposal the name and address of each person or corporation interested therein.

**19. FOREIGN CORPORATIONS AND CONTRACTORS**

**A. F□□□□□ C□□□□□□□□□□**

**D□□□□□□□** "Foreign corporation: means a corporation incorporated under the laws of another state. No contract shall be entered into with a foreign corporation until the Secretary of State has certified that such corporation is authorized to do business in Ohio; and until, if the bidder so awarded the Contract is person or partnership, it has filed with the Secretary of State a Power of Attorney designating the Secretary of State as it's agent for the purpose of accepting service of summons in an action brought under Section 153.05 of the Ohio Revised Code or under Sections 4123.01 to 4123.94, inclusive of the Revised Code.

## 20. BIDDING DOCUMENTS

**A. C** Bidders may obtain complete sets of the Bidding Documents from the issuing office designed in the Advertisement or Invitation to Bid for the deposit sum of \$110.00 per copy. All deposits are non-refundable.

Bidding Documents will not be issued directly to Sub bidders or others unless specifically offered in the Advertisement or Invitation to Bid.

Bidders shall use complete sets of Bidding Documents in preparing bids; neither the Owner nor the Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

The Owner in making copies of the Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

# PROPOSAL

To: **CITY OF BEAVERCREEK, OHIO**

For Construction of: SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS

The undersigned \_\_\_\_\_  
having carefully examined the site and location of the work proposed to be performed, also the premises adjacent to the location of the proposed work, and the means of approach to the various parts of the work, and having also carefully examined the "Notice to Contractors", the "Supplemental Specifications and Special Provisions", the "Instructions to Bidders", the "Form of Contract", the "General Provisions", and the Detailed Plans and Specifications which shall govern the construction of the work to be done, NOW PROPOSES to furnish any and all materials, tools, labor, transportation, machinery, appliances, and/or necessary appurtenances, and to prosecute to full completion, the work called for under these contract documents, within **365** \_\_\_\_\_  
\_\_\_\_\_, all upon the terms and under the conditions and provisions set forth in the "Supplemental Specifications and Special Provisions", the "Instructions to Bidders", the "Form of Contract", the "Contract Bond", the "General Provisions", the "Supplemental Specifications", the Detailed Plans and Specifications and this "Proposal"; and in consideration thereof to accept from the Owner as full payment for the completion of each specified item and any required maintenance thereof as hereinafter provided, the price quoted for each item of work completed, the price of labor and materials to be stated separately.

It is understood and agreed that the "Estimated Quantities" upon which this Proposal is based are approximate only; that they shall be used in determining the total amounts of bids for the purpose of determining the lowest and the best bidder; that they may be increased or diminished at the option of the Owner during the term of Contract; and that, if awarded the Contract, the undersigned shall not be entitled to any claim or loss of profits or other damages, should the actual quantities of any or all items prove to be greater or less than that stated in the Column "Estimated Quantities", except as noted in Section 104.02 of the General Provisions.

The undersigned \_\_\_\_\_  
agrees that the Owner reserves the right to reject any or all bids, to waive any informalities or irregularities in the bids received, and to accept that bid which is considered lowest and to the best interest of CITY OF BEAVERCREEK, OHIO.

The undersigned \_\_\_\_\_  
agrees that if this Proposal shall be accepted, he will be prepared to discuss with the Owner in detail any matters relating to special features and the methods he proposes to follow for the general conduct of the work; that he will, within ten (10) days after "Notice of Award", complete the Contact Form with the Owner for the performance of the work and furnish Contract Bond in an amount not less than one hundred percent (100%) of the total bid amount, and with sureties subject to the approval of the Owner, as a guarantee of the faithful performance of this Contract; and that he will also submit the required insurance policies.



The undersigned \_\_\_\_\_ hereby agrees in accordance with the specifications and this Proposal to complete all the work as shown or as specified within **365** \_\_\_\_\_ from the date of "Notice to Proceed", or such extensions thereto as may be approved; and that the Owner may retain from the monies which may be due, an amount of liquidated damages for each and every calendar day the completion of the work may be delayed beyond the time herein stipulated. Bidder further agrees to pay as liquidated damages the sum of \$1,000.00 for each consecutive calendar day thereafter as defined in the section 108.07 of the General Provisions of this contract.

The undersigned \_\_\_\_\_ hereby certifies that no person interested in this Proposal is directly or indirectly interested in or connected with any other bid or proposal for the said work and no member of or any other person in the employ of said \_\_\_\_\_ is directly or indirectly interested therein, or in any portion thereof, and as evidence he will, if required by the Owner, execute and submit from himself as Principal Contractor, and from any Subcontractor, the non-collusion affidavits as provided herein.

The bidder acknowledges receipt of Addendum Number(s) \_\_\_\_\_ to this contract.

If the foregoing Proposal shall be accepted by the City of Beavercreek, and the undersigned shall fail to execute a satisfactory contract as stated in the Instruction to Bidder attached hereto, then the owner, may at their option, determine that the undersigned has abandoned the contract and thereupon this proposal shall be null and void and the bond or certified check accompanying this proposal, or the amount of such check, shall be forfeited to and become the property of the owner; otherwise, the bond or certified check accompanying this Proposal, or the amount of such check, will be returned to the undersigned.

Attached hereto is a bond or certified check on \_\_\_\_\_ for the sum of \_\_\_\_\_ in accordance with the terms of the instructions to bidders.

**PROPOSED BID SCHEDULE  
(MULTIPLE PAGES)**

# PROPOSAL

To: **THE CITY OF BEAVERCREEK, OHIO**

For Construction of: **SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS**

AMOUNT OF BASE BID \$ \_\_\_\_\_

AMOUNT OF ALTERNATE 01 \$ \_\_\_\_\_

AMOUNT OF ALTERNATE 02 \$ \_\_\_\_\_

AMOUNT OF ALTERNATE 03 \$ \_\_\_\_\_

CONSTRUCTION START DATE: **APRIL 1, 2024**  
SUBSTANTIAL COMPLETION DATE: **OCTOBER 1, 2024**

Signed at \_\_\_\_\_

This \_\_\_\_\_ day \_\_\_\_\_ of, 2023.

Firm: \_\_\_\_\_

By: \_\_\_\_\_

(Signature)

\_\_\_\_\_

(Print or Type)

Title: \_\_\_\_\_

(SEAL)

Official Address:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Email Address)

\_\_\_\_\_  
(Telephone Number)

\_\_\_\_\_  
(Fax Telephone Number)



# LOCAL BIDDER CREDIT

City of Beavercreek Administrative Policy No. 28 allows for the application of a credit to local bidders in evaluating proposals in determining the award of a contract. In order to be eligible for this credit, a bidder's principle place of business must be within the corporation limits of the City of Beavercreek, or within the limits of Beavercreek Township as registered with the Secretary of the State of Ohio.

\_\_\_\_\_ I hereby certify that \_\_\_\_\_ qualifies as a local bidder.  
(Contractor)

\_\_\_\_\_ I hereby certify that \_\_\_\_\_ does not qualify as a local bidder.  
(Contractor)

\_\_\_\_\_  
(Contractor)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Printed Name)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Title)



# BID BOND

(BY SURETY COMPANY)

NOTE: If this Bond is provided, a separate Contract is not required.

*KNOW ALL MEN BY THESE PRESENTS*, that we, the undersigned

\_\_\_\_\_ as principals, and \_\_\_\_\_ as sureties, are hereby held and firmly bound unto the **CITY OF BEAVERCREEK, OHIO** as obligee, in the penal sum of the dollar amount of the bid submitted by the principal to the obligee on \_\_\_\_\_ to undertake the project known as **CITY OF BEAVERCREEK – SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS**. The penal sum referred to herein shall be the dollar amount of the principal's and to the obligee, which are accepted by the obligee. In no case shall the penal sum exceed the amount of \_\_\_\_\_ dollars. For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind heirs, our executors, administrators, successors, assigns and ourselves.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 2023.

Now, therefore, if the obligee accepts the bid of the principal and the principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in event the principal pays to the obligee the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid and such larger amount for which the obligee may in good faith contract with the next lowest bidder to perform the work covered by the bid or in the event the obligee does not award the contract to the next lowest bidder and resubmits the project for bidding, the principal pays to the obligee the difference not exceed ten percent of the penalty hereof between the amount specified in the bid, or the costs in connection with the re-submission of printing new contract documents. Required advertising and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect; and the obligee accepts the bid of the principal and he principal, within ten days after the awarding of the contract, enters into a proper contract in the bid, plans, details, specifications, and bills of material, which said contract is made a part of this bond the same as though set forth herein.

# BID BOND



(BY SURETY COMPANY)

Now, also, if the said \_\_\_\_\_ shall well and faithfully do and perform the things agreed by the \_\_\_\_\_ to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialmen or laborer having a just claim as well as for the obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said surety hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of the said contract or in or to the plans or specifications therefore shall in any way affect the obligations of said surety on its bond.

\_\_\_\_\_  
NAME

\_\_\_\_\_  
NAME

\_\_\_\_\_  
ADDRESS

\_\_\_\_\_  
ADDRESS

\_\_\_\_\_  
CITY / STATE  
(Principal)

\_\_\_\_\_  
CITY/STATE  
(Surety)

**NOTE:** All Certified Checks and Letters of Credit offered as surety shall be made payable to the City of Beavercreek, Ohio.



# BID GUARANTEE

(BY CERTIFIED CHECK, CASHIER'S CHECK OR LETTER OF CREDIT)

**NOTE** If this Guarantee is provided, a separate Contract Bond is required.

*KNOW ALL MEN BY THESE PRESENTS*, that we, the undersigned,

\_\_\_\_\_  
as principal and \_\_\_\_\_  
as sureties, are hereby held and firmly bound unto the CITY OF BEAVERCREEK,  
OHIO in the penal sum of \_\_\_\_\_  
(\$ \_\_\_\_\_) dollars, for the payment of which we do well and truly to be made,  
we hereby jointly and severally bind ourselves, our heirs, executors, administrators,  
successors, and assigns.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 2023.

*THE CONDITION OF THE ABOVE OBLIGATION IS SUCH*, that whereas the  
above named principal did on the \_\_\_\_\_ day of \_\_\_\_\_ 2023,  
submit to the City a bid for furnishing labor, material, and equipment for the construction  
of the proposed \_\_\_\_\_, more fully described in said proposal, which proposal is, by reference,  
incorporated in and made part of this instrument.

*NOW, THEREFORE*

- a If the said bid shall be rejected; or
- b If the said bid be accepted, and the principal shall execute and deliver a contract (properly completed in accordance with said bid), and shall furnish a bond for his faithful performance of said contract, and for the payment for all persons performing labor or furnishing materials in connection there with, and shall in all other respects perform the agreement creating by the acceptance of said bid;

then this obligation shall be void, otherwise, the same shall remain in force and effect - it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The surety, for value received, hereby stipulates and agrees that the obligations of said surety and its bond shall be in no way impaired or affected by any extension of the time within which the owner may accept such bid, and surety does hereby waive notice of any such extensions.

*IN WITNESS WHEREOF*, the principal and the surety have hereunto set their hands and seals, and such of them as are corporations, have caused their corporate seals to be hereto affixed, and these present to be signed by their proper officers, the day and year set forth above.

\_\_\_\_\_  
NAME

\_\_\_\_\_  
NAME

\_\_\_\_\_  
ADDRESS

\_\_\_\_\_  
ADDRESS

\_\_\_\_\_  
CITY / STATE  
(Principal)

\_\_\_\_\_  
CITY/STATE  
(Surety)

(Power of Attorney of Surety's Attorney in fact shall be attached)

**CERTIFIED CHECK**

In lieu of the foregoing bid bond, but subject to all the conditions enumerated therein, a certified check (\_\_\_\_), cashier's check (\_\_\_\_), (check one) in the amount of

\_\_\_\_\_  
(in words)  
dollars (\$ \_\_\_\_\_) drawn on \_\_\_\_\_

Bank of \_\_\_\_\_ is deposited herewith.

Company Name \_\_\_\_\_

By: \_\_\_\_\_

**NOTE** All certified checks, Cashiers Checks and Letters of Credit shall be made payable to the CITY OF BEAVERCREEK, OHIO.

# **CONTRACT DOCUMENTS**

# FORM OF CONTRACT

**THIS AGREEMENT**, entered into this \_\_\_\_\_ of JUNE, 2023 by \_\_\_\_\_, hereinafter called the "Contractor," and the **CITY OF BEAVERCREEK**, hereinafter called the "Owner".

**WITNESSETH:** that the said Contractor has agreed and by these presents does agree, with the said Owner for the consideration hereinafter named, to furnish all the materials and do all the work of whatever kind necessary to complete, in a good substantial and workmanlike manner, fully operational ready for use, and in strict accordance with the specifications heretofore prepared therefore, and according to the plans, profiles and drawings on file in the office of the City Engineer and subject to all the terms and conditions of said specifications, and to the approval of said Engineer for the construction of SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS in strict accordance with the Proposal Documents dated MONTH, DAY, 2023, and Addenda thereto numbered and dated for the sum of

□□□□□□,

.

**TIME FOR COMPLETION** The work will be commenced on a date to be specified in a written order of the Owner and shall be completed within **365** □□□□□□□□□□ from and after said date of beginning as specified.

The Owner agrees to pay, and the Contractor agrees to accept as full compensation, satisfaction and discharge for all work done and material furnished, whether mentioned in the Estimated Quantities or not, and also for all costs and expenses incurred and loss or damages sustained by reason of the action of the elements or because of the nature of the work or because of any unforeseen obstruction or difficulty encountered in the prosecution of the work, and also for all expenses incurred by or in consequence of the suspension of the work as herein specified and also for well and faithful completion of the work, and the whole thereof, in accordance with the terms, conditions and provisions of this contract and the instructions, orders and directions of the Engineer there under, and also for maintaining the work in good condition until the final payment is made and for one (1) year after the date of substantial completion, except extra work which shall be paid for as provided in the General Conditions and except as in this Contract otherwise specifically provided, a sum of money equal to the amount of the actual work and materials furnished, as determined by the Engineer, under each item listed in the Proposal multiplied by the unit price applicable to each such item as set forth in the Proposal attached hereto.

The person whose signature appearing below, on behalf of the contractor, has full power and authority to enter into this Contract and bind the Contractor to the conditions, obligations, promises and covenants contained in this Contract.

**IN WITNESS WHEREOF** the parties hereto have executed this agreement and hereunto set their hands and seals.

## CONTRACTOR

Signed in the Presence of:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
(signature)

By:

\_\_\_\_\_  
(print or type name)

Title

\_\_\_\_\_

State of \_\_\_\_\_ SS:

County of \_\_\_\_\_

On the \_\_\_\_\_ day of \_\_\_\_\_, 2023 before me personally appeared

\_\_\_\_\_ The \_\_\_\_\_  
(name) (title)

of \_\_\_\_\_ to me known to be the person who executed the  
(company name)  
foregoing contract and acknowledged to me that he/she has the full power and authority to

execute the foregoing on behalf of \_\_\_\_\_  
(company name)

and intending to bind \_\_\_\_\_  
thereto.  
(company name)

\_\_\_\_\_  
Notary Public

## OWNER

Signed in the Presence of:

\_\_\_\_\_  
\_\_\_\_\_

By

\_\_\_\_\_  
Pete Landrum

Title

\_\_\_\_\_  
City Manager

Approved As To Form \_\_\_\_\_

**F O C**

It is hereby certified that the amount required to meet the contract, agreement, payment or expenditure for the above has been lawfully appropriated for such purpose and is in the Treasury of the City of Beavercreek or in process of collection free from any previous encumbrances

\_\_\_\_\_  
Date

\_\_\_\_\_  
Director of Finance

# AFFIDAVIT FOR CORPORATIONS

(To be filled in and executed if the Contractor is a Corporation)

STATE OF OHIO \_\_\_\_\_ )  
: SS  
COUNTY OF \_\_\_\_\_ )

\_\_\_\_\_, being duly sworn, deposes and says that  
he/she is Secretary of \_\_\_\_\_, a corporation  
organized and existing under and by virtue of the laws of the State of \_\_\_\_\_ and  
having its principal office at

\_\_\_\_\_  
Number and Street  
\_\_\_\_\_  
City Name of County State

Affiant further says that he/she is familiar with the records, minute books and by-laws of

\_\_\_\_\_  
Name of Corporation

Affiant further says that \_\_\_\_\_  
the \_\_\_\_\_  
Name of Officer

\_\_\_\_\_ of the corporation is duly authorized to sign the contract for the  
(Title)  
construction of SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS for the CITY OF  
BEAVERCREEK for said corporation by virtue of

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(State whether a provision of by-laws or a resolution of the Board of Directors. If by resolution, give adoption.)

\_\_\_\_\_  
Corporate Secretary

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
(Notary Public)



# CONTRACT BOND

(Required only if Bid Guaranty is provided and Contract awarded)

**KNOW ALL MEN BY THESE PRESENTS**, That we, the undersigned

\_\_\_\_\_ of \_\_\_\_\_  
CONTRACTOR ADDRESS

the principal, and

\_\_\_\_\_ of \_\_\_\_\_  
SURETY ADDRESS

as surety, are held and firmly bound unto THE CITY OF BEAVERCREEK, OHIO in the penal sum of

\_\_\_\_\_ dollars,

(\$\_\_\_\_\_) for the payment of which will and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

**THE CONDITION OF THE ABOVE OBLIGATIONS IS SUCH**, that whereas the above named principal will on the \_\_\_\_ day of \_\_\_\_\_, 2023, enter into a contract with the CITY OF BEAVERCREEK, OHIO which said contract is made a part of this bond the same as though set forth herein.

**NOW, THEREFORE**, in the event that said proposal is accepted, if the principal within ten days after the awarding of the said contract enter into a proper contract in accordance with the proposal, plans, details, specifications and bill of material, which said proposal and contract are made a part of this Bond the same as though set forth herein; and faithfully perform each and every condition of such contract; and indemnify the OWNER against all damage suffered by failure to perform such contract according to the provisions thereof and in accordance with the plans, details, specifications and bill of material therefore; and pay all lawful claims of subcontractors, materialmen and laborers for labor performed or material furnished in carrying forward, performing or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any subcontractor, materialmen or laborer having a just claim, as well as for the obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said surety hereby stipulated and agreed that no modifications, omissions or additions in or to the terms of said contract or the plans and specifications therefore shall in any way affect the obligation of said surety on this bond and it does hereby waive notice of any such modifications, omissions, or additions to the terms of the contract or to the work or to the specifications.



**CONTRACT BOND**  
**(continued)**

(Required only if Bid Guaranty is provided and Contract awarded)

SIGNED AND SEALED this \_\_\_\_\_ day of \_\_\_\_\_ 2023.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

hereby approve the form and correctness of the foregoing bond.

\_\_\_\_\_  
Owners Legal Officer



# MAINTENANCE AND GUARANTEE BOND

KNOW ALL MEN BY THESE PRESENTS, that;

\_\_\_\_\_ Contractor and,

\_\_\_\_\_ as Surety,  
are held and firmly bound unto the City of Beavercreek, Ohio, hereinafter called the Owner, in the sum of

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_  
\_\_\_\_\_)

good and lawful money of the United States of America, to be paid to said Owner, its legal representatives and assigns, for which payment well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, and each and every one of them jointly and several, firmly by these presents.

**WHEREAS,** the above named Principal has entered into a certain written Contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2023, for construction of work entitled SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS. Contract and Specifications for said work shall be deemed a part hereof as fully as if set out herein.

**NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH,** that by and under said Contract, the above named Principal has agreed with the Owner that for a period of one year from the date of payment of Final Estimate, to keep in good order and repair any defect in all the work done under said Contract either by the Principal or his Subcontractor, or his material suppliers, that may develop during said period due to improper materials, defective equipment, workmanship or arrangements, and any other work affected in making good such imperfections, shall also be made good all without expense to the Owner, excepting only such part or parts of said work as may have been disturbed without the consent or approval of the Principal after the final acceptance of the work, and that whenever directed so to do by the Owner by notice served in writing, either personally or by mail on the Principal at:

\_\_\_\_\_  
STREET ADDRESS  
or legal representatives, or successors at

\_\_\_\_\_  
REPRESENTATIVE'S ADDRESS  
or on the Surety at:

\_\_\_\_\_  
SURETY ADDRESS  
WILL PROCEED at once to make such repairs as directed by said Owner; and in case of failure so to do within one week from the date of service of such notice, or within reasonable time not less than one week, as shall be fixed in said notice, then the Owner shall have the right to purchase such materials and employ such labor and equipment as may be necessary for the purpose, and to undertake, do and make such repairs, and charge the expense here of to, and receive same from said Principal or Surety.

# MAINTENANCE AND GUARANTEE BOND

## (Continued)

If any repair is necessary to be made at once to protect life and property, then and in that case, the Owner may take immediate steps to repair or barricade such defects without notice to the Contractor. In such accounting, the Owner shall not be held to obtain the lowest figures for the doing of the work, or any part thereof, but all sums actually paid, therefore shall be charged to the Principal or Surety. In this connection the judgment of the Owner is final and conclusive. The said principal for a period of one (1) year from the date of payment of Final Estimate, shall keep said work so constructed under said contract in good order and repair, accepting only such part or parts of said Principal after the final acceptance of the same, and shall whenever notice is given as herein before specified, at once proceed to make repair as in said notice directed, or shall reimburse said Owner from all suits and actions for damages of every name and description brought or claimed against it for or on account of any injury or damage to person or property received or sustained by any party or parties, by or from any of the acts or omissions or through the negligence of said Principal, servants, agents, or employees, in the prosecution of the work included in said Contract, the above obligation shall be void, otherwise to remain in full force and effect.

*IN WITNESS WHEREOF*, the parties hereto have caused this instrument to be executed by their respective authorized officers this \_\_\_\_\_ day of \_\_\_\_\_, 2023.

Signed, Sealed and Delivered in the Presence of:

\_\_\_\_\_

(Seal)

\_\_\_\_\_

(Seal)

\_\_\_\_\_

Principal

\_\_\_\_\_

Surety

I hereby approve the form and correctness of the foregoing bond.

\_\_\_\_\_  
Owner's Legal Officer

**NOTICES  
AND  
FORMS**

# NOTICE OF AWARD

To:

Project: City Of Beavercreek – SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS

The Owner has considered the Proposal submitted by you for the above described work in response to its Advertisement for Bids dated MONTH, DAY, 2023, and Information for Bidders.

You are hereby notified that your Bid has been accepted for items in the amount of  
\$ DOLLARS  
(\$)

You are now required by the terms of your Proposal to execute the Agreement and furnish the required Bond and certificates of insurance within ten (10) calendar days from the date of this notice to you.

If you fail to execute said Agreement and to furnish said Bond within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as a forfeiture of your Bid Guaranty. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.  
Dated this day of

**CITY OF BEAVERCREEK, OHIO**

By \_\_\_\_\_  
Title City Manager

## ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged.

By \_\_\_\_\_  
Title \_\_\_\_\_  
Date \_\_\_\_\_

# NOTICE TO PROCEED

To:

Date: , 2023

Project: **CITY OF BEAVERCREEK – SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS**

You are hereby notified to commence work in accordance with the Agreement dated MONTH, DAY, 2023, on or before \_\_\_\_\_, and you are to complete the work within 365 consecutive calendar days thereafter. The date of completion of all work is therefore \_\_\_\_\_

**CITY OF BEAVERCREEK, OHIO**

By \_\_\_\_\_

Title \_\_\_\_\_ CITY MANAGER

**ACKNOWLEDGMENT:**

Receipt of the above Notice to Proceed is hereby acknowledged by

\_\_\_\_\_  
(Contractor)

this the \_\_\_\_\_ day of \_\_\_\_\_, 2023.

By \_\_\_\_\_

Title \_\_\_\_\_

---

Return two acknowledged copies of this Notice to Proceed to the Owner.





# CONTRACTOR S AFFIDAVIT

Final Estimates

STATE OF OHIO \_\_\_\_\_ )  
: SS  
COUNTY OF \_\_\_\_\_ )

The undersigned, \_\_\_\_\_, hereby represents that on MONTH, DAY, 2023 he/she/it was awarded a contract by the **CITY OF BEAVERCREEK, OHIO** hereinafter called the Owner, to construct **SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS** in accordance with the terms and conditions of Contract No. 23XX; and the undersigned further represents that the subject work has now been accomplished and the said contract has now been completed.

The undersigned hereby warrants and certifies that all of his/her/its indebtedness arising by reason of the said contract has been fully paid or satisfactorily secured; and that all claims from subcontractors and other 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/she/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 \_\_\_\_\_, 2023.

\_\_\_\_\_  
Contractor

By \_\_\_\_\_  
\_\_\_\_\_

Title

Sworn to before me and subscribed in my presence this \_\_\_\_\_ day of \_\_\_\_\_ 2023.

\_\_\_\_\_  
Notary Public  
\_\_\_\_\_

# EXEMPTION CERTIFICATE

(Construction Contract)

Identification of contract as will appear on orders to be exempted:

Contract No. 23XX

Date , 2023

Work to be completed: The construction of a new salt barn facility and related site improvements.

### Divided Contract Amount

- a. Tangible Personal Property .....
- b. Labor, etc. ....
- c. Total ..... \$

The undersigned hereby certifies that the articles of tangible personal property purchased under this certificate were purchased for incorporation into:

- (  ) A structure or improvement to real property under a construction contract with the State of Ohio or a political subdivision thereof.
- (  ) A house of public worship or religious education. A building used exclusively for charitable purposes under a construction contract with a non-profit organization operated exclusively for the relief of poverty, the improvement of health through the alleviation of illness, disease of injury, or the promotion of education by an institution of learning which maintains a faculty of qualified instructors, teaches regular continuous courses of study and confers a recognized diploma upon completion of a specific curriculum.
- (  ) A structure or improvement to real property which is accepted for ownership by this state or any of its political subdivisions at the time of completion of such structures or improvements.

This certificate shall be considered a part of each order for the specific contract identified above and shall be retained by the vendor. Both the Contractor and the Owner must sign the certificate.

### CONTRACTOR

Signed \_\_\_\_\_  
By \_\_\_\_\_  
Title \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
Date \_\_\_\_\_

### OWNER

Signed \_\_\_\_\_  
By Pete Landrum  
Title City Manager  
Address 1368 Research Park Dr  
City Beavercreek, Ohio  
Date \_\_\_\_\_

### SUBCONTRACTOR

Signed \_\_\_\_\_  
By \_\_\_\_\_  
Title \_\_\_\_\_  
Address \_\_\_\_\_  
Date \_\_\_\_\_

(show name of political subdivision if improvement is to be accepted by one)

# WAIVER OF LIEN MATERIAL OR LABOR

(To Be Submitted by Subcontractors, Materialmen, and Suppliers prior to the Final Estimate)

State of \_\_\_\_\_ ) Date: \_\_\_\_\_ 2023

County of \_\_\_\_\_ )

To Whom It May Concern:

**WHERE AS;** the undersigned \_\_\_\_\_  
(subcontractor, materialmen or supplier)

has been employed by \_\_\_\_\_  
(general contractor)

to furnish labor and/or materials for \_\_\_\_\_  
(nature of work)

The building and premises known as SALT BARN & 9-ACRE PROPERTY SITE IMPROVEMENTS located in the City Of Beavercreek Ohio.

**NOW THEREFORE, KNOWN YE,** That \_\_\_\_\_  
the undersigned, and in consideration of the sum of \_\_\_\_\_  
Dollars and other good and valuable considerations, the receipt whereof is hereby acknowledged,  
do hereby waive and release any and all lien, or claim or right to lien on said above described  
building or premises under the statutes of the State of Ohio, relating to Mechanics Liens on  
account of labor or materials, or both, furnished or which may be furnished, by the undersigned  
or on account of the said firm or individual therein named for said building or premises.

Given under \_\_\_\_\_ hand \_\_\_\_\_ and seal this day of  
\_\_\_\_\_ A.D. 2023.

witness: \_\_\_\_\_  
(seal)

witness: \_\_\_\_\_  
(seal)

By \_\_\_\_\_  
Title \_\_\_\_\_

Subscribed and sworn to before me this  
\_\_\_\_\_ Day Of \_\_\_\_\_ 2023

My Commission Expires \_\_\_\_\_

# **GENERAL PROVISIONS**

# 100 GENERAL PROVISIONS

## 101 DEFINITIONS AND TERMS

101.01 General. These Construction and Material Specifications are written to the Bidder before award of the Contract and to the Contractor after award of the Contract. The sentences that direct the Contractor to perform Work are written as commands. For example, a requirement to provide cold-weather protection would be expressed as, "Provide cold-weather protection for concrete," rather than "The Contractor shall provide cold-weather protection for concrete." In the Imperative mood, the subject "the Bidder" or "the Contractor" is understood.

All requirements to be performed by others have been written in the active voice. Sentences written in the active voice identify the party responsible for performing the action. For example, "The Engineer will determine the density of the compacted material." Certain requirements of the Contractor may also be written in the active voice, rather than the active voice and imperative mood, if the sentence includes requirements for others in addition to the Contractor. For example, "After the Contractor provides initial written notice, the Engineer will revise the Contract as specified in 104.02."

Sentences that define terms, describe a product or desired result, or describe a condition that may exist are written in indicative mood. These types of sentences use verbs requiring no action. For example, "The characteristics of the soils actually encountered in the subgrade may affect the quality of the cement and depth of treatment necessary."

101.02 Abbreviations. The following abbreviations, when used in the Contract Documents, represent the full text shown.

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
	AC Asphalt Cement (pavement), Alternating Current (traffic)
	Air Cooled Blast Furnace Slag (aggregate)
ACBFACBFS	American Concrete Institute
ACI	Asynchronous Communications Interface Adapter (traffic controller)
ACIA	Average Daily Traffic
ADT	Average Daily Truck Traffic
ADTT	Amps Interrupting Capacity
AIC	American Institute of Steel Construction
AISC	American Iron and Steel Institute
AISI	Ammonium Nitrate and Fuel Oil
ANFO	American National Standards Institute
ANSI	Apparent Opening Size (fabric)
AOS	American Railway Engineering Association
AREA	AASHTO Material Reference Library
AMRL	American Society of Civil Engineers
ASCE	American Society of Mechanical Engineers
ASME	American Society for Testing and Materials
ASTM	Asphalt treated Free Draining Base
ATFDB	American Wire Gauge
AWG	American Wood Preservers' Association
AWPA	American Welding Society
AWS	American Water Works Association
AWWA	Bending Beam Rheometer (asphalt binder test)
BBR	Best Management Practice (erosion)
BMP	Basic Oxygen Furnace (aggregate)
BOF	Bulk Specific Gravity
BSG	Benzene, toluene, ethyl benzene, and xylene (a soil test)
BTEX	Bureau of Underground Storage Tank Regulations (Division of Fire Marshal)
BUSTR	Construction and Material Specifications
C&MS	Case Pile Wave Analysis Program
CAPWAP	Cut Back Asphalt Emulsion
CBAE	Cement and Concrete Reference Laboratory
CCRL	Crushed Carbonate Stone
CCS	Contactors Erosion Control Inspector
CECI	Code of Federal Regulations
CFR	

CIE	Commission Internationale d'Eclairage (illumination)
CPESC	Certified Professional in Erosion and Sediment Control
CRS	Cationic Rapid Set (asphalt emulsion)
CRSI	Concrete Reinforcing Steel Institute
CSS	Cationic Slow Set (asphalt emulsion)
CVN	Charpy V-notch (steel test)
CWT	Hundred Weight (100 lbs.)
DC	Direct Current
DCA /	District Construction Administrator
DDD	District Deputy Director
DET	District Engineer of Tests
DGE	District Geotechnical Engineer
DLS	Data Logging System (traffic markings)
DNR	Department of Natural Resources
DRC	Dry Rodded Condition (asphalt aggregate test)
DSR	Dynamic Shear Rheometer (asphalt binder test)
DZA	Deficient Zone Average (concrete test)
EAF	Electric Arc Furnace
EDA	Earth Disturbing Activity
EEI	Edison Electric Institute
EIA	Electronic Industries Alliance
EPA	Environmental Protection Agency
EQS	Exceptional Quality Solids (compost)
FAA	Fine Aggregate Angularity (asphalt aggregate)
FCM	Fracture Critical Member (steel test)
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration, Department of Transportation
FRP	Fiber Reinforced Polymer
FSS	Federal Specifications and Standards, General Services Administration
GGBFS	Ground Granulated Blast Furnace Slag
GS	Granulated Slag
HDPE	High Density Polyethylene
HFRS	High Float Rapid Setting (emulsion)
HMWM	High Molecular Weight Methacrylate
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IMSA	International Municipal Signal Association
IPCEA	Insulated Power Cable Engineers Association
IPS	International Pipe Standard
ISSA	International Slurry Seal Association
ITE	Institute of Transportation Engineers
IZEU	Inorganic Zinc Epoxy Urethane
JMF	Job Mix Formula
LED	Light Emitting Diode
LWT	Loaded Wheel Test (asphalt test)
MBF	Thousand Board Feet (wood)
MC	Medium Cure (asphalt emulsion)
MCB	Microchannel Bus (traffic controller)
MOV	Metal Oxide Varistor (traffic controller)
MPI	Magnetic Particle Inspection (steel test)
MSDS	Material Safety Data Sheets
MSG	Maximum Specific Gravity (asphalt)
MTD	Maximum Theoretical Density (asphalt)
NACE	National Association of Corrosion Engineers
NCHRP	National Cooperative Highway Research Program
NEMA	National Electrical Manufacturers Association
NHI	National Highway Institute
NIST	National Institute of Standards and Technology
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code
ODOT	Ohio Department of Transportation

OEPA	Ohio Environmental Protection Agency
OH	Open Hearth (aggregate)
DHWM	Ordinary High Water Mark
OMM	Office of Materials Management (the Lab Central Office Laboratory)
OMUTCD	Ohio Manual of Uniform Traffic Control Devices
ORC	Ohio Revised Code
ORDC	Ohio Rail Development Commission
OSHA	Occupational Safety and Health Administration
OTE	Office of Traffic Engineering
OWPCA	Ohio Water Pollution Control Act
OZEU	Organic Zinc Epoxy Urethane
PAT	Project Average Thickness (concrete test)
PAV	Pressure Aging Vessel (asphalt binder test)
PB	Polybutylene (conduit)
PCC	Portland Cement Concrete
PCS	Petroleum Contaminated Soil
PDA	Pile Dynamic Analysis (steel piling)
PE	Polyethylene (conduit)
PG	Performance Grade (asphalt test binder grading system)
pH	Potential of Hydrogen
PLS	Pure Live Seed
PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
QCFS	Quality Control Fabricator Specialist (structures)
QCP	Quality Control Program, or Plan, or Points (steel test)
QCQC	Quality Control Qualification Committee
QPL	Qualified Products List
RACPRAP	Reclaimed Asphalt Concrete Pavement
RAP	Recycled RAS Reclaimed Asphalt Pavement Shingles
RC	Rapid Cure (asphalt emulsion)
REA	Rural Electrification Administration
RFI	Radio Frequency Interference (traffic controller)
RH	Relative Humidity
RMS	Root Mean Square (traffic controller)
RPCC	Recycled Portland Cement Concrete
RPM	Raised Pavement Marker (traffic)
RS	Rapid Set (asphalt emulsion)
RTFO	Rolling Thin-Film Oven (asphalt binder test)
RUS	Rural Utilities Service
SAE	Society of Automotive Engineers
SBA	Styrene Butadiene Amene Amine
SBR	Styrene Butadiene Rubber
SBS	Styrene Butadiene Styrene
SCD	Standard Construction Drawing
SDS	Safety Data Sheets
SF	Standard Fabricated members (structures)
SI	International System of Units (Metric)
SM	AASHTOWare Project Sitemanager™
SMA	Stone Matrix Asphalt
SPD	Surge Protection Device (traffic controller)
SPST	Single Pole / Single Throw (traffic controller)
SS	Slow Set (asphalt emulsion)
SSD	Saturated Surface Dry (aggregate)
SSPC	Society for Protective Coatings
SWPPP	Storm Water Pollution Prevention Plan
TCE	Trichloroethylene
TMPTA	Tri-methylpropane Tri-acrylate (paint)
TNP	Total Neutralizing Power
TODS	Tourist-Oriented Directional Signs
TSEC	Temporary Sediment and Erosion Control
TSR	Tensile Strength Ratio (asphalt mix test)
UF	Unique Fabricated members (structures)

UL	Underwriters' Laboratories, Inc.
USACE	United States Army Corps of Engineers
USC	United States Code
VA	Verification Acceptance
VAC	Volts Alternating Current
VCA	Volume of Coarse Aggregate (asphalt mix test)
VECP	Value Engineering Change Proposal
VMA	Voids in the Mineral Aggregate
VME	Versa Module Eurocard (traffic controller)
WDT	Watchdog Timer
WEAP	Wave Equation Analysis (steel piling)
WFS	Welding Procedure Specification (steel test)
WZRPM	Work Zone Raised Pavement Marker (traffic)
XCU	Explosion, Collapse and Underground

**101.03 Definitions.** The following terms or pronouns, when used in the Contract Documents, are defined as follows:

**Advertisement.** The public announcement, as required by law, inviting Bids for Work to be performed or materials to be furnished.

**Award.** The written acceptance by the Manager of a Bid.

**Bid.** The offer of a Bidder, on the prescribed form properly signed and guaranteed, to perform the Work and to furnish the labor and materials at the prices quoted.

**Bid Documents.** The Bid Documents include the invitation for Bids, Addenda, Proposal, Expedite file, contract form and required bonds, Specifications, Supplemental Specifications, Special Provisions, general and detailed plans, Plan notes, standard construction drawings identified in the Plans, notice to Contractor, and any other document designated by the City of Beavercreek as a Bid Document, all of which constitute one instrument.

**Bidder.** An individual, firm, or corporation submitting a Bid for the advertised Work, acting directly or through the duly authorized representative, and qualified as provided in ORC 5525.02 to 5525.09.

**Bridge.** A structure, including supports, erected over a depression or an obstruction, such as water, a highway, or a railway, and having a track or passageway for carrying traffic or other moving loads and having a length measured along the center of roadway of 10 feet (3.048 m) or more between undercopings of abutments or extreme limits of openings for multiple boxes.

- A. **Length.** The length of a bridge structure is the over-all length measured along the centerline of the roadway surface.
- B. **Roadway Width.** The clear width measured at right angles to the longitudinal centerline of the bridge between the bottom of curbs or guard timbers or, in the case of multiple heights of curbs, between the bottoms of the lower risers. For curb widths of 1 foot (0.3 m) or less, the roadway width is measured between parapets or railings.

**Calendar Day or Day.** Every day shown on the calendar.

**Certified Test Data.** A test report from a manufacturer's or an independent laboratory approved by the Director listing actual test results of samples tested for compliance with specified City of Beavercreek requirements. The City of Beavercreek will accept certified test data from manufacturers' laboratories if their products have been used satisfactorily on prior City of Beavercreek contracts and their test data has been confirmed. Include a statement that the test data furnished is representative of the material furnished to a City of Beavercreek project or to a supplier. The report is identified by number or date and identifies the City of Beavercreek project or supplier to which the material is shipped. Submit reports signed by a person having legal authority to act for the manufacturer or independent laboratory.

**Change Order.** A written order issued by the Manager to the Contractor, covering changes to the terms and conditions, plans and/or quantities, within or beyond the scope of the Contract and establishing the basis of payment and time adjustments for the work affected by the changes.



**Claims.** Disputes that are not settled through Steps 1 and 2 of the Dispute Resolution and Administrative Claim Process. The Dispute becomes a Claim when the Contractor submits a Notice of Intent to File a Claim.

**Completion Date.** The date, as shown in the Contract Documents, on which the Work contemplated shall be completed.

**Construction Limits.** These limits must encompass all Work. This includes removals, room for construction equipment to complete work, site access, etc.

**Contract.** The written agreement between the City of Beavercreek and the Contractor setting forth the obligations of the parties, including, but not limited to, the performance of the Work and the basis of payment.

**Contract Bond.** The approved forms of security, executed by the Contractor and its Sureties, guaranteeing complete execution of the Work as required by the Contract Documents and the payment of all legal debts pertaining to the construction of the Project which security shall comply with and be subject to ORC 5525.16 and 5525.13, and related provisions.

**Contract Documents.** The Contract Documents include the Invitation for Bids, Addenda, Proposal, contract form and required bonds, Specifications, Supplemental Specifications, Special Provisions, general and detailed plans, Plan notes, standard construction drawings identified in the Plans, notice to Contractor, Change Orders, Supplemental Agreements, Extra Work Contracts, and any other document designated by the City of Beavercreek as a Contract Document, all of which constitute one instrument.

**Contract Item (Pay Item).** A specifically described unit of Work for which a price is provided in the Contract.

**Contract Price.** The amount of compensation bid by the Contractor for a Contract Item in the Proposal or the amount of compensation established for a Contract Item added or modified pursuant to the Contract Documents.

**Contract Time.** The number of workdays or calendar days, including authorized adjustments, allowed for completion of the Project. When a specified Completion Date is shown in the Contract Documents instead of the number of workdays or calendar days, completion of the Project shall occur on or before that date. Specified Completion Date and Calendar Day Contracts shall be completed on or before the day indicated even when that date is a Saturday, Sunday, or holiday.

**Contractor.** The individual, firm, or corporation contracting with the City of Beavercreek for performance of prescribed Work, acting directly or through a duly authorized representative and qualified under the provisions of ORC 5525.02 to 5525.09 inclusive, and any amendments thereto.

**County.** The designated county in which the Work specified is to be done.

**Culvert.** Any structure not classified as a Bridge that provides an opening under the roadway.

**Department.** The Department of Transportation, State of Ohio.

**Director.** City Manager, City of Beavercreek, Ohio.

**Disputes.** Disagreements, matters in question and differences of opinion between the City of Beavercreek's personnel and the Contractor.

**District Testing.** The Department's district testing laboratories.

**Engineer.** Duly authorized agent of the City of Beavercreek acting within the scope of its authority for purposes of engineering and administration of the Contract.

**Equipment.** All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the Work.

**Extra Work.** An item of Work not provided for in the Contract as awarded but found essential to the satisfactory completion of the Contract within its intended scope.

**Extra Work Contract.** A Contract concerning the performance of Work or furnishing of materials involving Extra Work. Such Extra Work may be performed at agreed prices or on a force account basis as provided in ORC 5525.14.

**Fabricator.** The individual, firm, or corporation that fabricates structural metals or pre-stressed concrete members as an agent of the Contractor.

**Final Inspector.** An Engineer appointed by the DDD who inspects the completed Work and accepts it if it complies with the Contract Documents.

**Inspector.** The Engineer's authorized representative assigned to make detailed inspections of Contract performance.

**Invitation for Bids.** The invitation for proposals for all Work on which bids are required. Such proposal will indicate with reasonable accuracy the quantity and location of the Work to be done or the character and quality of the material to be furnished and the time and place of the opening of proposals.

**Laboratory.** The testing laboratories of the Department, including the Office of Materials Management (OMM) located at 1600 West Broad Street, Columbus, Ohio, and various District testing facilities.

**Materials.** Any materials or products specified for use in the construction of the Project and its appurtenances.

**Partnering.** A collaborative process for project cooperation and communication meant to achieve effective and efficient contract performance and completion of the Project within budget, on schedule, safely and with requisite quality in accordance with the contract.

**Plans.** The drawings, standard construction drawings and supplemental drawings provided by the City of Beavercreek that show the location, character, dimensions, and details of the Work.

**Pre-bid Question.** A written inquiry submitted by a prospective bidder.

**Profile Grade.** The trace of a vertical plane intersecting the top surface of the proposed wearing surface, usually along the longitudinal centerline of the roadbed. Profile grade means either elevation or gradient of such trace according to the context.

**Project Limits.** Project limits are points on the mainline centerline of construction where the proposed improvement, as described in the project description on the Title Sheet (excluding incidental construction); begins and ends.

**Project Right-of-Way.** That portion of the Right-of-Way between the beginning and end of the Project.

**Project.** The specific section of the highway together with all appurtenances and Work to be performed thereon under the Contract.

**Proposal.** The approved form on which the City of Beavercreek requires bids to be prepared and submitted for the Work.

**Proposal Guaranty.** The security furnished with a bid to guarantee that the bidder will enter into the contract if its bid is accepted.

**Questionnaire.** The specified forms on which the Contractor shall furnish required information as to its ability to perform and finance the Work required under ORC 5525.01.

**Reasonably Close Conformity.** Reasonably close conformity means compliance with reasonable and customary manufacturing and construction tolerances where working tolerances are not specified. Where working tolerances are specified, reasonably close conformity means compliance with such working tolerances. Without detracting from the complete and absolute discretion of the Engineer to insist upon such tolerances as establishing reasonably close conformity, the Engineer may accept variations beyond such tolerances as reasonably close conformity where they will not materially affect the value or utility of the Work and the interests of the City of Beavercreek.

**Registered Engineer.** An engineer registered with the Ohio State Board of Registration for Professional Engineers and Surveyors to practice professional engineering in the State of Ohio.

**Registered Surveyor.** A surveyor registered with the Ohio State Board of Registration for Professional Engineers and Surveyors to practice professional surveying in the State of Ohio.

**Right-of-Way.** A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to a highway.

**Road.** A general term denoting a public way for purposes of vehicular travel, including the entire area within the Right-of-Way, as defined in ORC 5501.01.

**Roadbed.** The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulder.

**Roadside.** The areas between the outside edges of the shoulders and the Right-of-Way boundaries. Unpaved median areas between inside shoulders of divided highways and infield areas of interchanges are included.

**Roadside Development.** Those items necessary to the highway that provide for the preservation of landscape materials and features; the rehabilitation and protection against erosion of all areas disturbed by construction through seeding, sodding, mulching, and the placing of other ground covers; such suitable planting; and other improvements as may increase the effectiveness and enhance the appearance of the highway.

**Roadway.** The portion of a highway within limits of construction.

**Shop Drawings.** The drawings provided by the Contractor or Supplier that describe any portion of the Work that will remain in place permanently.

**Shoulder.** The portion of the roadway contiguous to the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

**Sidewalk.** That portion of the roadway primarily constructed for the use of pedestrians.

**Signatures on Contract Documents.** All signatures on Contract Documents must meet the requirements of 102.06.

**Special Provisions.** Additions and revisions to the standard and Supplemental Specifications covering conditions peculiar to an individual Project.

**Specifications.** The directions, provisions, and requirements contained herein as supplemented by the Supplemental Specifications and Special Provisions.

**State.** The State of Ohio acting through its authorized representative.

**Street.** A general term denoting a public way for purpose of vehicular travel, including the entire area within the Right-of-Way.

**Structures.** Bridges, culverts, catch basins, drop inlets, retaining walls, cribbing, manholes, endwalls, buildings, sewers, service pipes, underdrains, foundation drains, and other features that may be encountered in the Work and not otherwise classed herein.

**Subcontractor.** An individual, firm, or corporation to whom the Contractor sublets part of the Contract to be performed on the job site, who prior to such undertaking receives the written consent of the Manager, and who is qualified under ORC 5525.02 through 5525.09 inclusive.

**Subgrade.** The portion of a Roadbed upon which the pavement structure and shoulders are constructed.

**Substructure.** All of that part of the structure below the bearings of simple and continuous spans, skewbacks of arches, and tops of footings of rigid frames, together with backwalls and wings.

**Superintendent.** The Contractor's authorized representative in responsible charge of the Work.

**Superstructure.** The entire structure except the Substructure.

**Supplement.** A list of requirements for fabrication plants, methods of test, or other miscellaneous requirements that are maintained on file in the Office of the Manager.

**Supplemental Agreement.** A written agreement executed by the Contractor and by the Director covering necessary alterations.

**Supplemental Specifications.** Detailed specifications supplemental to or superseding these Specifications.

**Surety.** The corporation, partnership, or individual, other than the Contractor, executing a bond furnished by the Contractor.

**Titles (or Headings).** The titles or headings of the sections and subsections herein are intended for convenience of reference and shall not be considered as having any bearing on their interpretation.

**Waters of the United States.** Waters that are under the jurisdiction of the Corps of Engineers under the Clean Water Act as defined by 33 CFR Ch. II Part 328, which as applied to Ohio means: the Ohio River and Lake Erie and any other river, stream, creek, lake, pond, or wetland that drains directly or indirectly into the Ohio River or Lake Erie.

**Work.** All labor, materials, equipment, tools, transportation, supplies, and other incidentals and all tasks that comprise the project or any portion thereof, as described by the Contract Documents.

**Work Limits.** Work Limits are the extreme limits of the contractor's responsibility on a project, including all temporary and incidental construction, with the exception of work zone traffic control devices required for maintenance of traffic.

**Workday.** A calendar day that the Contractor normally works.

**Working Drawings.** Stress sheets, shop drawings, erection plans, falsework plans, installation plans, certified drawings, frame work plans, cofferdam plans, bending diagrams for reinforcing steel, or any other supplementary plans or similar data that the Contractor is required to submit.

**101.04 Interpretations.** In order to avoid cumbersome and confusing repetition of expressions in these Specifications, it is provided that whenever anything is, or is to be, done, if, as, or, when, or where "contemplated, required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered, necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected, or condemned," it shall be understood as if the expression were followed by the words "by the Engineer" or "to the Engineer."

## **102 BIDDING REQUIREMENTS AND CONDITIONS**

**102.01 Prequalification of Bidders.** A Bidder must be prequalified by the Department according to ORC Chapter 5525 and the rules and regulations governing prequalification in order to submit a Bid. Upon request, the Department will provide a prequalification application, applicable rules and regulations, and other relevant information. For prospective Bidders that are not yet prequalified, furnish the Department with a properly completed prequalification application at least 30 days before the date specified for the receipt of Bids. The prequalification certificate is the Bidder's license to Bid and perform construction for the Department. For foreign Contractors, refer to ORC 5525.18 and Ohio Administrative Rule 5501:2-3-07.

**102.02 Contents of Bid Documents.** Use the Proposal to prepare and submit Bids for the Work. Upon request, the City of Beavercreek will provide Bid Documents that include or reference the following:

- A. Location and description of the Project.
- B. Estimate of quantities and description of the Work.
- C. Time to complete the Work.
- D. Amount of the Proposal Guaranty.
- E. City of Beavercreek's deadline for receiving a completed Bid.
- F. Schedule of contract items.
- G. Standard Specifications, Special Provisions, Supplemental Specifications, and the Plans.
- H. Proposal.

**102.03 Issuance of Proposals.**

- A. **General.** Upon request, the City of Beavercreek will provide applicable rates and other relevant information for obtaining bidding information and submitting a Bid.
- B. **City of Beavercreek Will Not Issue.** The City of Beavercreek may refuse to sell or issue Bid Documents to a prospective Bidder for any of the following reasons:
  1. The prospective Bidder owes the City of Beavercreek for previously issued plans.
  2. The prospective Bidder has defaulted on previous contracts.
  3. The prospective Bidder is debarred from bidding on and receiving Department contracts.
  4. The prospective Bidder is currently in the debarment process.

**102.04 Interpretation of Quantities In Proposal.** The quantities in the Bid Documents are approximate and the City of Beavercreek uses them for the comparison of Bids only.

The City of Beavercreek will only pay the Contractor for the actual quantities of Work performed and accepted according to the Contract Documents. The City of Beavercreek may increase, decrease, or omit the scheduled quantities of Work as provided in 109.04 without invalidating the Bid prices.

**102.05 Examination of Bid Documents and Project Site and Submission of Prebid Questions.** Carefully examine the Bid Documents and perform a reasonable site investigation before submitting a Bid. Submitting a Bid is an affirmative statement that the Bidder has investigated the Project site and is satisfied as to the character, quality, quantities, and the conditions to be encountered in performing the Work. A reasonable site investigation includes investigating the Project site, borrow sites, hauling routes, and all other locations related to the performance of the Work.

When available, the City of Beavercreek will include in the Contract Documents or provide for the Bidder's review at the Department's offices or website, one or more of the following:

- A. Record drawings.
- B. Available information relative to subsurface exploration, borings, soundings, water levels, elevations, or profiles.
- C. The results of other preliminary investigations.

A reasonable site investigation includes a review of these documents.

Should a question arise at any time during the examination of Bid Documents or investigation of the site the Bidder may seek clarification by submitting a Prebid Question. Submit all Prebid Questions in writing via the Department's website. The Department will post a response on its website to all questions submitted before a deadline of 10:00 am four working days prior to the public opening of Bids. Responses to Prebid Questions posted on the Department's website are not revisions to the Bidding Documents and are not binding. The Department is not obligated to respond to, or otherwise act upon, a Prebid Question submitted after this deadline, but reserves the right to act upon any information received.

**102.06 Preparation of Bids.** Prepare a Bid according to this subsection and the requirements found in the Bid Documents. Properly complete the forms provided, if requested, Excel spreadsheet may be provided to the bidder by the City.

Provide a unit price for each item listed in the Proposal. Calculate and place the products for the respective unit prices and quantities in the "Bid Amount" column. For a lump sum item, place the same price in the "Unit Price" column and in the "Bid Amount" column pertaining to that item. Indicate the total Bid amount by adding the values entered in the "Bid Amount" column for the listed items.

#### ENTITY SUBMITTING PROPOSAL REQUIRED SIGNATURE

Individual	The individual or a duly authorized agent.
Partnership	A partner or a duly authorized agent.
Joint Venture	A member or a duly authorized agent of at least one of the joint venture firms.
Corporation	An authorized officer or duly authorized agent of the corporation. Also, show the name of the state chartering the corporation and affix the corporate seal.
Limited Liability Company	A manager, a member, or a duly authorized agent.

102.07 Duty to Notify of Errors in Bid Documents. Notify the City of Beavercreek of errors and omissions in the Bid Documents. Make notification by submitting a question in the manner described in 102.05. The Contractor's duty to disclose errors and omissions is not only a bidding requirement but is also a legal requirement that cannot be ignored.

Failure to provide the required notification prior to the opening of bids shall constitute a waiver by the Contractor and does not obligate the City of Beavercreek for any costs based upon any apparent or patent ambiguity arising from insufficient data or obvious errors in the Bid documents. Knowingly withholding information regarding an error or omission in the Bid Documents, or intentionally misrepresenting an item of Work for financial or competitive gain may result in civil or criminal penalties in excess of the value of the item bid.

102.08 Unbalanced Bidding. Bid all items correctly and price each quantity as indicated in the Bid Documents. The City of Beavercreek will reject a Mathematically Unbalanced Bid if the Bid is also Materially Unbalanced. A Mathematically Unbalanced Bid is a Bid containing lump sum or unit price items that do not include reasonable labor, equipment, and material costs plus a reasonable proportionate share of the Bidder's overhead costs, other indirect costs, and anticipated profit. A Materially Unbalanced Bid is when the City of Beavercreek determines that an award to the Bidder submitting a Mathematically Unbalanced Bid will not result in the lowest ultimate cost to the City of Beavercreek.

102.09 Proposal Guaranty. The City of Beavercreek will reject a Bid submitted without a Proposal Guaranty in the amount designated and payable to the Manager. Submit the required Proposal Guaranty in one of the following forms:

- A. Properly executed project Bid bond submitted on the City of Beavercreek's form.
- B. Properly executed electronic bid transfer to the City of Beavercreek's account.
- C. Certified check drawn on the account of the Bidder submitting the Bid.
- D. Cashier's check.
- E. Properly executed electronic project Bid bond submitted using the software specified in the Bid Documents.

When submitting a Bid bond, ensure that the Surety is licensed to do business in the State.

If the City of Beavercreek invites alternate Bids and the Bidder elects to Bid more than one alternate, the Bidder may submit one Proposal Guaranty in the amount required for a single alternate. The Proposal Guaranty covers each individual Bid.

If the City of Beavercreek invites combined Bids and the Bidder elects to Bid only on one package, then the Bidder must submit only one Proposal Guaranty. If the Bidder bids on the combined Bid package, the Bidder must submit a Proposal Guaranty in the amount required for the combined Bid. The combined Proposal Guaranty covers each individual Bid.

102.10 Delivery of Bid. The delivery of bids to the City of Beavercreek is solely the responsibility of the bidder. Unless otherwise specified in the instructions to bidders, all bids are to be delivered to the City of Beavercreek Engineer's Office, 1368 Research Park Drive, Beavercreek, OH, 43432. The City of Beavercreek will accept Bids until the time and date designated in the Notice to Bidders. The City of Beavercreek will return Bids received after the designated time to the Bidders unopened. The City of Beavercreek will return all Bids not prepared and submitted in accordance with the Proposal.

102.11 Withdrawal of Bids. After Bids are opened, ORC 5525.01 requires that a Bidder identify a mistake in its Bid within 48 hours of the Bid opening. After Bids are opened the Bidder must provide a written request to withdraw a Bid already filed with the City of Beavercreek. Any Bidder for whom a request to withdraw its Bid is approved by the City of Beavercreek will not be permitted to participate in any manner in a contract awarded for that project for which the Bid was withdrawn.

102.12 Combination Proposals. The City of Beavercreek may elect to issue Bid Documents for projects in combination or separately, so that Bids may be submitted either on the combination or on separate units of the combination. The City of Beavercreek reserves the right to make awards on combination Bids or separate Bids to the best advantage of the City of Beavercreek. The City of Beavercreek will not consider combination Bids, other than those it specifically identifies in the Bid Documents. The City of Beavercreek will write separate Contracts for each individual Project included in the combination.

102.13 Public Opening of Bids. The City of Beavercreek will publicly open Bids at the time and place indicated in the notice to Contractors. The City of Beavercreek will announce the total Bid amount for each Bid.

Bidders or their authorized agent and other interested persons are invited to the opening.

The City of Beavercreek may postpone the receipt of Bid time or the opening of Bids time. If the City of Beavercreek changes the hour or the date of the receipt of Bids or the opening of Bids, it will issue an addendum or public notice to notify prospective Bidders.

**102.14 Disqualification of Bidders.** The City of Beavercreek will declare a Bid nonresponsive and ineligible for award when any of the following occur:

- A. The Bidder lacks sufficient prequalification work types or dollars to be eligible for award.
- B. The Bidder fails to furnish the required Proposal Guaranty in the proper form and amount.
- C. The Bid contains unauthorized alterations or omissions.
- D. The Bid contains conditions or qualifications not provided for in the Bid Documents.
- E. The Proposal is not prepared as specified.
- F. A single entity, under the same name or different names, or affiliated entities submits more than one Bid for the same Project.
- G. The Bidder fails to submit a unit price for each contract item listed, except for lump sum items where the Bidder may show a price in the "Bid Amount" column for that item.
- H. The Bidder fails to submit a lump sum price where required.
- I. The Bidder is debarred from submitting Bids.
- J. The Bidder has defaulted, has had a Contract terminated for cause by the City of Beavercreek, has either agreed not to Bid or has had debarment proceedings initiated against the Bidder's company and/or its key personnel.
- K. The Bidder submits its Bid or Proposal Guaranty on forms other than those provided by the City of Beavercreek.
- L. The Bidder submits a Materially Unbalanced Bid as defined by 102.08.
- M. The Bidder fails to acknowledge addenda.
- N. The City of Beavercreek finds evidence of collusion.
- O. Any other omission, error, or act that, in the judgment of the City of Beavercreek, renders the Bidder's bid non-responsive.

**102.15 Material Guaranty.** Before any Contract is awarded, the City of Beavercreek may require the Bidder to furnish a complete statement of the origin, composition, and manufacture of any or all Materials to be used in the construction of the Work together with samples. The City of Beavercreek may test the samples as specified in these Specifications to determine their quality and fitness for the Work.

**102.16 Certificate of Compliance with Affirmative Action Programs.** Before any Contract is awarded, the City of Beavercreek will require the Bidder to furnish a valid Certificate of Compliance with Affirmative Action Programs, issued by the State EEO Coordinator dated prior to the date fixed for the opening of bids.

**102.17 Drug-Free Safety Program.** During the life of this project, the Contractor and all its Subcontractors, that provide labor on the Project site, must be enrolled in and remain in good standing in the Ohio Bureau of Workers' Compensation ("OBWC") Drug-Free Safety Program ("DFSP") or a comparable program approved by the OBWC.

In addition to being enrolled in and in good standing in an OBWC-approved DFSP or a comparable program approved by the OBWC, the City of Beavercreek requires each Contractor and Subcontractor that provides labor, to subject its employees who perform labor on the project site to random drug testing of 5 percent of its employees. The random drug testing percentage must also include the on-site supervisors of the Contractors and Subcontractors. Upon request, the Contractor and Subcontractor shall provide evidence of required testing to the City of Beavercreek. Each Subcontractor shall require all lower-tier Subcontractors that provides labor on the project site with whom the Subcontractor is in contract for the Work to be enrolled in and be in good standing in the OBWC-approved DFSP prior to a lower tier Subcontractor providing labor at the Site.

The City of Beavercreek will declare a bid non-responsive and ineligible for award if the Contractor is not enrolled and in good standing in the Ohio Bureau of Workers' Compensation's Drug-Free Safety Program (DFSP) Discount Program or a similar program approved by the Bureau of Workers' Compensation within 8 days of the bid opening. Furthermore, the City of Beavercreek will deny all requests to subcontract when the subcontractor does not comply with the provisions of this section.

Failure of the Contractor to require a Subcontractor to be enrolled in and be in good standing in the an OBWC-approved DFSP prior to the time that the Subcontractor provides labor at the Site, shall result in the Contractor being found in breach of the Contract and that breach shall be used in the responsibility analysis of that Contractor

or the Subcontractor who was not enrolled in a program for future contracts with the City of Beavercreek and/or State for five years after the date of the breach.

## 103 AWARD AND EXECUTION OF CONTRACT

**103.01 Consideration of Proposals.** After opening and announcing the Bids, the City of Beavercreek will compare the Bidders' proposed prices. The proposed price is the summation of the products of the estimated quantities shown in the Proposal and the unit Bid prices. If the amount shown for the proposed product differs from the actual product of the unit Bid price and the estimated quantity, then the actual product will govern.

The City of Beavercreek may reject any or all Bids, waive technicalities, or advertise for new Bids without liability to the City of Beavercreek.

**103.02 Award of Contract.** The City of Beavercreek will award a Contract or reject Bids within 60 days after Bid opening. The City of Beavercreek will mail a letter to the address on the Bid notifying the successful Bidder of Bid acceptance and Contract award. The City of Beavercreek will award to the lowest competent and responsible bidder. The City of Beavercreek will not award a Contract until it completes an investigation of the apparent low Bidder.

The City of Beavercreek's estimate for the cost of the improvement is confidential, if the cost of the bid exceeds the Engineer's estimate, the City of Beavercreek may award the Contract according to ORC 5525.15.

**103.03 Cancellation of Award.** The Department may cancel a Contract award at any time before all parties sign the Contract without liability to the Department.

**103.04 Return of Proposal Guaranty.** Immediately after the opening and checking of Bids, the City of Beavercreek will return all Proposal Guaranties provided in the form of a certified check or cashier's check, except to the three lowest Bidders. Within 10 days after opening bids, the City of Beavercreek will return the Proposal Guaranties of the two remaining unsuccessful Bidders. After the successful Bidder submits the signed Contract, Contract Bonds, and other Contract Documents, and after the City of Beavercreek signs the Contract, the City of Beavercreek will return the Proposal Guaranty to the successful Bidder. The City of Beavercreek will not return Bid bonds.

**103.05 Requirement of Contract Bond.** Furnish Contract Bonds within 10 days after receiving notice of award. Furnish Contract Bonds to the Manager on the prescribed form, in the amount of the Contract, and according to ORC 5525.16.

**103.06 Execution of Contract.** Sign and return the Contract, along with the certificate of compliance, Contract Bonds, and other required Contract Documents, within 10 days after notice of award. The State does not consider a proposal binding until the Manager signs the Contract. If the Manager does not sign the Contract within 20 days after receiving the successful Bidder's signed Contract, certificates, Contract Bonds, and other Contract Documents, the successful Bidder may withdraw the Bid without prejudice.

**103.07 Failure to Execute Contract.** If the successful Bidder fails to sign the Contract and furnish the Contract Bonds, the City of Beavercreek will have just cause to cancel the award. The successful Bidder shall forfeit the Proposal Guaranty to the City of Beavercreek, not as a penalty, but as liquidated damages. The City of Beavercreek may award the Contract to the next lowest responsive Bidder, re-advertise the Work, or take any other action decided by the Manager.



## 104 SCOPE OF WORK

**104.01 Intent of the Contract Documents.** The intent of the Contract Documents is to provide for the construction and completion of the Work. Perform the Work according to the Contract Documents.

### 104.02 Revisions to the Contract Documents.

- A. **General.** The City of Beavercreek reserves the right to revise the Contract Documents at any time. Such revisions do not invalidate the Contract or release the Surety, and the Contractor agrees to perform the Work as revised. The provisions of this section are subject to the limitation of ORC 5525.14.
- B. **Differing Site Conditions.** During the progress of the Work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the Contract Documents or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the Work provided for in the Contract Documents, are encountered at the site, notify the Engineer as specified in 108.02.F of the specific differing conditions before they are disturbed or the affected Work is performed.

Upon notification, the Engineer will investigate the conditions and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any Work under the Contract, the Department will make an adjustment and modify the Contract as specified in 108.06 and 109.05. The Engineer will notify the Contractor of the determination whether or not an adjustment of the Contract is warranted.

- C. **Suspension of Work.** If the performance of all or any portion of the Work is suspended or delayed by the Engineer in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the Contractor believes that additional compensation or time is due as a result of such suspension or delay, notify the Engineer as specified in 108.02. Upon receipt of notice, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost or time required for the performance of the Work has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an equitable adjustment (excluding profit) and modify the contract as specified in 108.06 and 109.05. The Engineer will notify the Contractor of its determination whether or not an adjustment to the Contract Documents is warranted. Failure of the Engineer to suspend or delay the Work in writing does not bar the Contractor from receiving a time extension or added compensation according to 108.06 or 109.05.

The Department will not make an adjustment under this subsection in the event that performance is suspended or delayed by any other cause, or for which an adjustment is provided or excluded under any other term or condition of this Contract.

- D. **Significant Changes in Character of the Work.** The Engineer may alter the Work as necessary to complete the Project. The Engineer will make appropriate adjustments according to 108.06 and 109.05, if such alterations significantly change the character of the Work.

If the Contractor disagrees as to whether an alteration constitutes a significant change, use the notification procedures specified in 108.02.G.

The term "significant change" is defined as follows:

1. when the character of the Work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or
2. when the product of the quantity in excess of the estimated quantity of a contract item and the unit price exceeds the limits set forth in Table 104.02-1.

TABLE 104.02-1

Contract Price	Contract Limits
Up to \$500,000	\$25,000
\$500,001 to \$2,000,000	5% of Total Contract Price
Over \$2,000,000	\$100,000

A quantity underrun is defined as follows:

1. the estimated quantity of a contract item exceeds four units, and
2. the decrease in quantity of any unit price Contract item exceeds 25 percent of the estimated quantity, and
3. the total of all such adjustments for all Contract items is more than \$800. Then after the determination of final quantities according to 109.12.C, the Engineer will adjust the unit prices for the affected Contract item by multiplying the bid unit price by the factor obtained from Table 104.02-2.

TABLE 104.02-2

% Decrease	Factor	% Decrease	Factor
25	1.08	67	1.51
26 to 27	1.09	68	1.53
28 to 29	1.10	69	1.56
30 to 31	1.11	70	1.58
32 to 33	1.12	71	1.61
34 to 35	1.13	72	1.64
36	1.14	73	1.68
37 to 38	1.15	74	1.71
39	1.16	75	1.75
40 to 41	1.17	76	1.79
42	1.18	77	1.84
43	1.19	78	1.89
44 to 45	1.20	79	1.94
46	1.21	80	2.00
47	1.22	81	2.07
48	1.23	82	2.14
49	1.24	83	2.22
50	1.25	84	2.31
51	1.26	85	2.42
52	1.27	86	2.54
53	1.28	87	2.67
54	1.29	88	2.83
55	1.31	89	3.02
56	1.32	90	3.25
57	1.33	91	3.53
58	1.35	92	3.88
59	1.36	93	4.32
60	1.38	94	4.82
61	1.39	95	5.76
62	1.41	96	7.00
63	1.43	97	9.08
64	1.44	98	13.25
65	1.46	99	25.00
66	1.49		

A quantity overrun is defined as follow:

1. the estimated quantity of a contract item exceeds four units, and
2. the increase in quantity of any unit price Contract item exceeds 25 percent of the estimated quantity, and
3. the total of all such adjustments for all Contract items is more than \$800. Then after a final determination of final quantities according to 109.12.C, the Engineer will adjust the unit prices for the Contract items exceeding 25 percent of the estimated quantity by multiplying the bid unit price by. The factor obtained from Table 104.02-3 is only applied to the quantity exceeding 125% of the estimated quantity.

TABLE 104.02-3

% Increase	Factor
25 to 28	0.95
29 to 35	0.94
36 to 42	0.93
43 to 51	0.92
52 to 61	0.91
62 to 72	0.90
73 to 85	0.89
86 to 100	0.88
101 to 117	0.87
118 to 138	0.86
139 to 163	0.85
164 to 194	0.84
195 to 233	0.83
234 to 284	0.82
285 to 354	0.81
354 to 400	0.80

When the increase in quantity or decrease in quantity of any unit price contract item does not exceed the limits set forth in Tables 104.02-12 and 104.02-2, there is no significant change in the character of the work and, the change is considered a minor change. The Department will pay for minor changes in the Work at the unit bid price.

**E. Eliminated Items.** The Department may partially or completely eliminate contract items.

The Department will only make an adjustment to compensate the Contractor for the reasonable cost incurred in preparation to perform significantly changed work as set forth in 104.02.D or work completely eliminated prior to the date of the Engineer's written order to significantly change or completely eliminate the Work. The adjustment will be determined according to 109.04 and 109.05. Such payment will not exceed the price of the Contract Item.

The Department will not seek a savings for maintaining traffic, mobilization, and construction layout stakes items for Eliminated Items of Work, unless there is a significant change.

**F. Extra Work.** Perform Extra Work as directed by the Engineer. The Department will pay for Extra Work as specified in 109.05. Time extensions, if warranted, will be determined according to 108.06.

**G. Unilateral Authority to Pay.** The Department has unilateral authority to pay the Contractor sums it determines to be due to the Contractor for work performed on the project. This unilateral authority to pay by the Department does not preclude or limit the rights of the Department and the Contractor to negotiate and agree to the amounts to be paid to the Contractor.

**104.03 Rights in and Use of Materials Found on the Work.** Upon obtaining the Engineer's approval, the Contractor may use material, such as stone, gravel, or sand, found in the plan excavation for another Contract Item. The Department will pay for both the excavation of the material under the corresponding Contract Item and for the placement of the excavated material under the Contract Item(s) for which the excavated material is used. Excavate or remove material only from within the grading limits, as indicated by the slope and grade lines.

Obtain written permission from the Engineer according to 107.11.A.

**104.04 Cleaning Up.** Maintain the Project in a presentable condition. Remove all rubbish, layout stakes, and sediment control devices as directed by the Engineer, excess material, temporary structures, and equipment, including stream channels and banks within the Right-of-Way at drainage structures, and all borrow and waste areas, storage sites, temporary plant sites, haul roads, and other ground occupied by the Contractor in connection with the Work. Establish suitable vegetative cover in these areas by seeding and mulching according to Item 659, except for cultivated fields. Leave the Project site in an acceptable condition as determined by the Engineer. The cost of cleanup is incidental to all contract items. The City of Beavercreek may withhold 10 percent of the Bid amount for the mobilization contract item, if included, until performance under this section is complete. See 624.04.

## 105 CONTROL OF WORK

**105.01 Authority of the Engineer.** The Engineer will decide questions concerning all of the following:

- A. The quality and acceptability of Materials furnished.
- B. The quantity of Work performed.
- C. The Contractor's rate of progress.
- D. The interpretation of the Contract Documents.
- E. Acceptable fulfillment of the Contract.
- F. Contractor compensation.

The Engineer may suspend all or part of the Work when the Contractor fails to correct conditions that are unsafe for the workers or the general public, fails to comply with the Contract Documents, or fails to comply with the Engineer's orders.

The Engineer may suspend the Work due to adverse weather conditions, conditions considered adverse to the prosecution of the Work, or other conditions or reasons in the public interest.

The Engineer's acceptance does not constitute a waiver of the City of Beavercreek's right to pursue any and all legal remedies for defective work or work performed by the Contractor in an un-workmanlike manner.

**105.02 Plans and Working Drawings.** The Plans show details of structures, the lines and grades, typical cross-sections of the Roadway, and the location and design of structures. Keep at least one set of Plans at the Project at all times.

Prepare working drawings when required by the Contract Documents and after verifying applicable field and plan elevations, dimensions, and geometries. Where Work consists of repairs, extension, or alteration of existing structures, take measurements of existing structures to accurately join old and new Work.

Unless otherwise indicated, the City of Beavercreek will review working drawing submittals to ensure conformance with the Contract and to provide the Contractor a written response to document the results of its review as follows:

- A. "ACCEPTED." The City of Beavercreek accepts the submittal for construction, fabrication, or manufacture.
- B. "ACCEPTED AS NOTED." The City of Beavercreek accepts the submittal for construction, fabrication, or manufacture, subject to the Contractor's compliance with all City of Beavercreek comments or corrections to the submittal. If also marked "RESUBMIT," the City of Beavercreek still accepts the submittal, but requires the Contractor to provide a corrected submittal to the City of Beavercreek.
- C. "NOT ACCEPTED." The City of Beavercreek does not accept the submittal. The submittal does not conform to Contract requirements. Do not begin construction, fabrication, or manufacture of Work included in the submittal. Revise the submittal to comply with City of Beavercreek comments or corrections and Contract requirements and provide the revised submittal to the City of Beavercreek for another review.

The City of Beavercreek's acceptance will not relieve the Contractor of responsibility to complete the Work according to the Contract. Include the cost of furnishing working drawings in the cost of the Work they cover.

**105.03 Conformity with Contract Documents.** Perform all Work and furnish all Materials in reasonably close conformity with the lines, grades, cross-sections, dimensions, and material requirements as shown on the Plans and as specified.

If the DCA determines the Work is not in reasonably close conformity with the Contract Documents and determines the Contractor produced reasonably acceptable Work, the DCA may accept the Work based on engineering judgment. The DCA will document the basis of acceptance in a Change Order that provides for an appropriate adjustment to the Contract Price of the accepted Work or Materials. If the DCA determines the Work is not in reasonably close conformity with the Contract Documents and determines the Work is inferior or unsatisfactory, remove, replace, or otherwise correct the Work at no expense to the City of Beavercreek.

**105.04 Coordination of the Contract Documents.** The Contract Documents are those defined in 101.03. A requirement appearing in one of these documents is as binding as though it occurs in all. The Engineer will resolve discrepancies using the following descending order of precedence:

- A. Addenda.

- B. Proposal and Special Provisions.
- C. Plans.
- D. Supplemental Specifications.
- E. Standard Construction Drawings.
- F. Standard Specifications.

Immediately notify the Engineer upon discovering any latent error or omission in the Contract Documents.

**105.05 Cooperation by Contractor.** The City of Beavercreek will supply the Contractor with two sets of the Contract Documents, except for the standard construction drawings, which will only be supplied if requested. The City of Beavercreek will provide only one copy of these Specifications.

Provide the constant attention necessary to progress the Work according to the Contract Documents. Cooperate with the Engineer, inspectors, and all other Contractors on or adjacent to the Project.

**105.06 Superintendent.** Provide a Superintendent for the Project that is available and responsive at all times and is responsible for all aspects of the Work, irrespective of the amount of subcontract Work. The Superintendent must be capable of reading and understanding the Contract Documents and experienced in the type of Work being performed. The Superintendent shall receive instructions from the Engineer or the Engineer's authorized representatives. The Superintendent shall promptly execute the Engineer's orders or directions and promptly supply the required materials, equipment, tools, labor, and incidentals.

**105.07 Cooperation with Utilities.** Unless otherwise provided for by the Contract Documents, the City of Beavercreek will direct the utility owners to relocate or adjust water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all other utility appurtenances within the limits of the proposed construction at no cost to the Contractor.

If the Contractor is directed by a utility company to perform any work not specifically contained in this note, the City of Beavercreek will not compensate the Contractor for this work unless the City of Beavercreek approves the request in writing before the work begins. If the work is not preapproved by the City of Beavercreek, the Contractor will be responsible for obtaining reimbursement for its work from the utility company which directed the Contractor to perform the work. In the event that the Contractor requests that additional work, not specifically contained in this note, be performed by a utility company, the Contractor will be responsible for reimbursing the utility company for the additional work unless the City of Beavercreek has agreed in writing to pay for the additional work before the work begins.

The Contract Documents will indicate various utility items and indicate a time frame or date when the City of Beavercreek expects the owners to complete utility relocation or adjustment. Provide utility owners adjusting facilities during construction with adequate notification of the scheduled Work to prevent conflict with the Contractor's schedule of operations.

When bidding, consider all permanent and temporary utility appurtenances in present and relocated positions as shown in the Contract Documents.

According to ORC 153.64 and at least 2 Workdays prior to commencing construction operations in an area that may affect underground utilities shown on the Plans, notify the Engineer, the registered utility protection service, and the owners that are not members of the registered utility protection service.

The owner of the underground utility shall, within 48 hours, excluding Saturdays, Sundays, and legal holidays, after notice is received, start staking, marking, or otherwise designating the location, course, 2 feet (0.6 m), together with the approximate depth of the underground utilities in the construction area.

If the utility owners fail to relocate or adjust utilities as provided for in the Contract Documents and the Contractor sustains losses that could not have been avoided by the judicious handling of forces, equipment, and plant, or by reasonable revisions to the schedule of operations, then the Engineer will adjust the Contract according to 108.06 and 109.05.

**105.08 Cooperation Between Contractors.** At any time, the City of Beavercreek may contract for other work on or near the Project.

Separate Contractors working within the limits of the Project shall conduct their work without interfering with or hindering the progress or completion of Work being performed by other Contractors and shall cooperate with each other as directed by the Engineer.

**105.09 Authority and Duties of the Inspector.** Inspectors are authorized to inspect the Work and the preparation, fabrication, or manufacture of materials. Inspectors are not authorized to alter or waive requirements of the Contract Documents. Inspectors are authorized to notify the Contractor of Work that does not conform to the Contract; reject materials that do not conform to Specification requirements; and until the issue is decided by the Engineer, suspend portions of the Work if there is a question regarding the Contract Documents, use of unapproved material, or safety. Inspectors are not obligated or authorized to provide direction, superintendence, or guidance to the Contractor, its crew, its subcontractors, or suppliers to accomplish the Work.

Any action or inaction of the Inspector does not constitute a waiver of the City of Beavercreek's right to pursue any and all legal remedies for defective work or work performed by the Contractor in an un-workmanlike manner.

**105.10 Inspection of Work.** The Engineer may inspect materials and the Work. Provide the Engineer or the Engineer's representative access to the Work, information, and assistance necessary to conduct a complete inspection. Notify the Engineer at least 24 hours prior to all required inspections.

When directed by the Engineer, remove or uncover completed Work to allow inspection. After the Engineer's inspection, restore the Work according to the requirements of the Contract Documents. If the inspected Work conformed to the requirements of the Contract Documents, the City of Beavercreek will pay for uncovering or removing and restoring the Work as Extra Work according to 109.05. If the inspected Work did not conform to the Contract Documents, the City of Beavercreek will not pay for uncovering or removing and restoring the Work.

The City of Beavercreek shall have the discretion to dictate the level of inspection for any item of work. The Contractor bears sole responsibility for the quality of work and compliance with the contract regardless of the City of Beavercreek's level of inspection.

The City of Beavercreek's failure to identify defective Work or material shall not, in any way, prevent later rejection when defective Work or material is discovered, or obligate the City of Beavercreek to grant acceptance under 109.11 or 109.12.

Inspection of Work may include inspection by representatives of other government agencies or railroad corporations that pay a portion of the cost of the Work. This inspection will not make other government agencies or railroad corporations a party to the Contract and will not interfere with the rights of the Contractor or City of Beavercreek.

**105.11 Removal of Defective and Unauthorized Work.** Work that does not conform to the requirements of the Contract is defective. Unless the City of Beavercreek formally accepts defective Work according to 105.03, immediately remove and replace defective Work.

Unauthorized Work is Work done contrary to the instructions of the Engineer, beyond the plan lines, or any extra work done without the City of Beavercreek's permission. The City of Beavercreek will not pay for unauthorized Work. The Engineer may order the

Contractor to remove or replace unauthorized Work at no expense to the City of Beavercreek.

If the Contractor fails to comply with the Engineer's orders under the provisions of this subsection, the DCA may correct or remove and replace defective or unauthorized Work and deduct the costs from the Contract Price.

**105.12 Load Restrictions.** Comply with all legal load restrictions when hauling materials on public roads.

Operate equipment of a weight or so loaded as to not cause damage to structures, to the roadway, or to other types of construction. Comply with subsection 501.05.B.6 for allowed loads on bridges.

Do not use off road vehicles on bases or pavements unless permitted by the DCA in writing.

Do not haul on concrete pavement, base, or structures before the expiration of the curing period.

Do not exceed the legal load limits in this section unless permitted by the Manager in writing.

**105.13 Haul Roads.** Prior to hauling equipment or materials, provide written notification to the Engineer of the specific roads or streets on the haul route. If the haul route includes roads and streets that are not under the jurisdiction and control of the State and the DCA determines that State controlled roads are not available or practical for a haul route, the Contractor may use local roads and streets that are not restricted by local authorities.

If the DCA determines that state controlled roads are available and practical for a haul route, revise the proposed haul route provided in the original written notification and resubmit to the DCA.

If the Engineer determines that haul route roads were properly used during construction to haul equipment and materials and that the haul route roads were damaged, then the Engineer may order the Contractor to perform immediate and practical repairs to ensure reasonably normal traveling conditions. The Engineer will pay for repairs according to applicable provisions of 109.04 and 109.05.

The Contractor shall not file a claim for delays or other impacts to the Work caused by disputes with the local authorities regarding the use of local roads or streets as haul routes. The Contractor shall save the State harmless for any closures or hauling restrictions outside the Project limits beyond the control of the City of Beaver Creek.

**105.14 Maintenance During Construction.** Maintain the Work during construction and until Final Inspector accepts the work under 109.12, except for portions of the Work accepted under 109.11. The Contractor is responsible for damage done by its equipment.

Maintain the previous courses or subgrade during all construction operations, when placing a course upon other courses of embankment, base, subgrade, concrete or asphalt pavement, or other similar items previously constructed. This maintenance includes, but is not limited to draining, re-compacting, re-grading, or if destroyed, the removal of Work previously accepted by the City of Beaver Creek.

Maintain the Post Construction Storm Water Best Management Practice (BMP) features. Prevent sediment laden surface water from coming in contact with the BMP features during construction.

Maintain the Work during construction and before acceptance of the Work under 109.12, except for portions of the Work accepted under 109.11. The City of Beaver Creek will not provide additional compensation for maintenance work.

**105.15 Failure to Maintain Roadway or Structure.** If the Contractor, at any time, fails to comply with the provisions of 105.14, the Engineer will immediately notify the Contractor of such noncompliance. If the Contractor fails to remedy unsatisfactory maintenance within 24 hours after receipt of such notice, the Engineer may immediately proceed to maintain the Project, and deduct the entire cost of this maintenance from monies due or to become due the Contractor on the Contract.

**105.16 Borrow and Waste Areas.** Prior to beginning borrow or wasting operations, obtain the Engineer's written approval of a detailed operation plan that addresses the following concerns:

- A. Control of drainage water.
- B. Cleanup, shaping, and restoration of disturbed areas.
- C. Disposal of regulated materials.
- D. Avoidance of regulated areas.
- E. Excavation and filling of waste and borrow areas.
- F. Saving of topsoil.
- G. Temporary Sediment and Erosion Control BMPs required for compliance under the Clean Water Act, Ohio Water Pollution Control Act, (OWPCA) (ORC Chapter 6111) and the NPDES permit.

Perform all engineering necessary to ensure long term stability of all side slopes and foundations of all borrow and waste areas. Furnish a certification by a Registered Engineer attesting to the stability of all borrow and waste areas. All damage resulting from the instability of borrow and waste areas, the removal of borrow materials, the placement of waste materials, or the hauling of material to and from these areas is the sole responsibility of the Contractor. Repairs to approved haul roads will be made in accordance with 105.13.

Perform all engineering, including any field investigation, necessary to ensure long term stability of all side slopes and foundations of all borrow and waste areas. Ensure that all side slopes of all waste areas do not reduce horizontal sight distance as defined by the current version of the Department's *Location and Design Manual*.

Have the proposed borrow and waste areas reviewed by an environmental consultant that is pre-qualified by the Department for ecological work. Have the environmental consultant certify that the proposed borrow and waste operations will not impact the "Waters of the United States" or an isolated wetland. If consultant certification is not provided, obtain the 404/401 permits necessary to perform the operations as proposed. Have the environmental consultant certify that the work conforms to the requirements of the permit(s). Provide all

documentation submitted to obtain the appropriate permit(s) and a copy of the permit(s) to the City of Beaver Creek's Office of Environmental Services.

If burning is permitted under the OAC-3745-19 and ORC 1503.18, submit a copy of the Ohio EPA permit and the Ohio DNR permit to the Engineer and copies of all information used to obtain the permit.

Prior to the disposal of waste materials, submit to the City of Beaver Creek an executed copy of the Contract or permission statement from the property owner. The Contract or permission statement must indicate that the waste materials are not the property of the City of Beaver Creek. Further, it must expressly state that the City of Beaver Creek is not a party to the Contract or permission statement and that the Contractor and property owner will hold the City of Beaver Creek harmless from claims that may arise from their contract or permission statement.

Restoration of all borrow or waste areas includes cleanup, shaping, replacement of topsoil, and establishment of vegetative cover by seeding and mulching according to 104.04 and Item 659. Ensure the restored area is well drained unless approval is given by the Engineer to convert a pit area into a pond or lake, in which case confine restoration measures to the disturbed areas above the anticipated normal water level.

The cost of work described herein is incidental to the Contract. For waste sites shown on the plan, the plan will indicate if the clearances have or have not been obtained for the project right-of-way locations. No extension of time or additional compensation will be paid for any delays due to not having the written permit(s) to waste in a floodplain.

The allowed use of Project Right-of-Way and other City of Beaver Creek property for borrow and waste is detailed in 104.03 and 107.11.

Borrow and Waste Area shall adhere to 107.10.

**105.17 Construction and Demolition Debris.** OAC-3745-37, OAC-3745-400, and ORC Chapter 3714 regulates the use and disposal of construction and demolition debris. Notify the local Board of Health or the local Ohio EPA office 7 days before placing Clean Hard Fill off the Right-of-Way. Submit copies of this notification to the Engineer.

Legally dispose of debris containing wood, road metal, or plaster at a licensed construction and demolition debris site.

Under the regulations cited above the disposal of brush, trees, stumps, tree trimmings, branches, weeds, leaves, grass, shrubbery, yard trimmings, crop residue, and other plant matter is restricted. If allowed by the Contract Documents, the

Contractor may waste brush, trees, stumps, tree trimmings, branches, weeds, leaves, grass, shrubbery, yard trimmings, crop residue, and other plant matter within the Right-of-Way. Otherwise, submit a plan and any required permits to legally dispose of these materials off the Right-of-Way to the Engineer. Provide all documents submitted to obtain this permit to the Engineer.

If the Project contains garbage or solid and hazardous waste, the Contract Documents will detail the removal of these items.

When washing PCC, mix the PCC with at least 30 percent natural soil to construct an inner core in the waste area. Cover this inner core with 3 feet (1.0 m) of natural soil on the top and 8 feet (2.4 m) on the side slopes. Place and compact the material according to 203.06.D to prevent future settlement and sliding.

When the washing of clean hard fill is allowed, comply with all the requirements of this subsection and 105.16. Clean Hard Fill consisting of reinforced or non-reinforced concrete, asphalt concrete, brick, block, tile or stone that is free of all steel as per 703.16 shall be managed in one or more of the following ways:

1. Recycled into a usable construction material.
2. Disposed in licensed construction and demolition debris facility.
3. Used in legitimate fill operations on the site of generation according to 105.16.
4. Used in legitimate fill operations on a site other than the site of generation to bring a site up to grade.

A Beneficial Reuse Certification form needs to be properly executed by the Recipient prior to any material leaving the project.

**105.18 Acceptance.** The City of Beaver Creek will accept Work according to 109.12 or completed sections of the Project according to 109.11.



**106.19 Value Engineering Change Proposals.** The City of Beavercreek will Partner with the Contractor by considering the Contractor's submission of a Value Engineering Change Proposal (VECP) which will reduce construction costs and possibly time on projects that do not contain Design Build provisions or incentive provisions based on time. The purpose of this provision is to encourage the use of the Ingenuity and expertise of the Contractor in arriving at alternate plans, specifications or other requirements of the contract. Savings in construction costs and possibly time will be shared equally between the Contractor and the City of Beavercreek.

The Contractor's costs for development, design and implementation of the VECP are not eligible for reimbursement. The VECP must not impair any of the essential functions and characteristics of the project such as service life, reliability, economy of operation, ease of maintenance, safety and necessary standardized features. The submission of the value engineering change proposal shall conform with Supplement 1113. Acceptance of a VECP is at the sole discretion of the Manager.

The City of Beavercreek will not approve VECPs with any of the following characteristics:

- A. Consist only of non-performing items of work contained in the plans.
- B. Include plan errors identified by the Contractor as part of the cost reduction.
- C. The VECP designer/consultant for the Contractor is also the designer of record for ODOT.
- D. Changes to any special architectural or aesthetic treatments.
- E. Requires concrete beams to be installed with less than 17' vertical clearance over a state highway.
- F. Changes the type or buildup of permanent pavement.
- G. Compromises controlling design criteria or would require a design exception as discussed in Volume I, Section 100, of the Location and Design Manual.
- H. Proposes a time savings for any project which has an Incentive / Disincentive clause, which was awarded based on A+B Bidding or Lane Rental.

Engineering and drawing development and implementation costs for the VECP are not recoverable. The Contractor shall have no claim against the City of Beavercreek for any costs or delays due to the City of Beavercreek's review or rejection of the Initial VECP.

If the City of Beavercreek already is considering revisions to the contract which are subsequently proposed as a VECP, the City of Beavercreek may reject the Contractor's initial VECP or portions thereof and may proceed with such revisions without any obligations to the Contractor.

## 106 CONTROL OF MATERIAL

**106.01 Source of Supply and Quality Requirements.** Notify the Engineer of the proposed sources of supply before the delivery of materials. The Engineer may approve materials at the source of supply before delivery. If the proposed sources of supply cannot produce the specified material, then furnish materials from alternate sources without adjustment to the Contract Price or Completion Date.

**106.02 Samples, Tests, and Cited Specifications.** The Engineer will inspect and determine whether the materials comply with the specified requirements before they are incorporated into the Work. The City of Beavercreek may sample and test materials or require certifications. Unless specified, the City of Beavercreek will pay for and test materials according to AASHTO, ASTM, or the methods on file in the office of the Engineer. A qualified representative of the City of Beavercreek will take test samples according to City of Beavercreek's procedures. Read any reference to other specifications or testing methods to mean the version in effect at the pertinent Project Advertisement date. All materials being used are subject to inspection, test, or rejection at any time before their incorporation into the Work. The City of Beavercreek will furnish copies of the tests to the Contractor's representative upon request. Furnish the required samples and specified material certifications at no expense to the City of Beavercreek other than provided in 109.03.

Equip all transports and distributors hauling asphalt material with an approved submerged asphalt material sampling device.

**106.03 Small Quantities and Materials for Temporary Application.** The Engineer may accept small quantities and materials for temporary application that are not intended for permanent incorporation in the Work. The Engineer may accept these small quantities and materials for temporary application in either of the following cases:

- A. Where similar materials from the same source have recently been approved.
- B. Where the materials, in the judgment of the Engineer, will serve the intended purpose.

**106.04 Plant Sampling and Testing Plan.** The Engineer may undertake the inspection of materials at the source. In the event plant sampling and testing is undertaken, the Contractor and its material provider shall meet the following conditions:

- A. Cooperate and assist the Engineer with the inspection of materials. Provide full entry to the Engineer at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished. Agree to all documentation and inspection requirements of the TE-24 plant sampling and testing plan.
- B. If required by the Engineer, arrange for the inspector to use an approved building on site. The building should be located near the plant and independent of any building used by the material producer.
- C. Maintain and provide adequate safety measures at the plant at all times.

The City of Beavercreek reserves the right to retest all materials that have been tested and accepted at the source of supply before their incorporation into the Work. After the approved materials have been delivered to the site, the City of Beavercreek may reject all materials that when retested do not meet the requirements of the Contract Documents.

**106.05 Storage of Materials.** Properly store all materials to ensure the preservation of their quality and fitness for the Work. The Engineer may re-inspect stored materials before their incorporation into the Work, even though they were approved before storage. Locate stored materials to facilitate their prompt inspection. The Contractor may use approved portions of the Project Right-of-Way for storage; however, if any additional space is required, the Contractor must provide it at the Contractor's expense. Do not use private property for storage purposes without written permission from the owner or lessee, if requested by the Engineer, furnish copies of the written permission. Restore all storage sites to their original condition at no expense to the City of Beavercreek. The Contractor and property owner will hold the City of Beavercreek harmless from claims that may arise from their contract or permission statement. This subsection does not apply to the stripping and storing of topsoil, or to other materials salvaged from the Work.

Areas used to Store Materials shall conform to 107.10.

**106.06 Handling Materials.** Handle all materials in such manner as to preserve their quality and fitness for the Work. Transport aggregates from the storage site to the project site in vehicles constructed to prevent loss or segregation of materials after loading and measuring. Ensure that there are no inconsistencies in the quantities of materials loaded for delivery and the quantities actually received at the place of operations.

**106.07 Unacceptable Materials.** Unacceptable materials are all materials not conforming to the requirements of these Specifications at the time they are used. Immediately remove all unacceptable materials from the project site unless otherwise instructed by the DCA. The DCA will determine if unacceptable materials may remain conforming to Supplement 1102. The DCA must approve the use of previously identified unacceptable materials that have been corrected or repaired. If the Contractor fails to comply immediately with any order of the DCA made under the provisions of this subsection, the DCA will have authority to remove and replace defective materials and to deduct the cost of removal and replacement from any monies due or to become due to the Contractor.

**106.08 City of Beavercreek-Furnished Material.** Furnish all materials required to complete the Work, except when otherwise provided in the Proposal.

The City of Beavercreek will deliver the City of Beavercreek-furnished materials to the Contractor at the points specified in the Contract Documents.

Include the cost of handling and placing of all City of Beavercreek-furnished materials in the contract price for the contract item for which they are used.

The City of Beavercreek will hold the Contractor responsible for all material upon delivery of the materials to the Project site. The City of Beavercreek will make deductions from any monies due the Contractor to make good any shortages and deficiencies, for any cause whatsoever, and for any damage that may occur after such delivery, and for any demurrage charges.

**106.09 Steel and Iron Products Made in the United States.** Furnish steel and iron products that are made in the United States according to the applicable provisions of Federal regulations stated in 23 CFR 635.410 and

State of Ohio laws, and ORC 163.011 and 5525.21. "United States" means the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

**A. Federal Requirements.** All steel or iron products incorporated permanently into the Work must be made of steel or iron produced in the United States and all subsequent manufacturing must be performed in the United States. Manufacturing is any process that modifies the chemical content; physical shape or size; or final finish of a product. Manufacturing begins with the initial melting and mixing, and continues through the bending and coating stages. If a domestic product is taken out of the United States for any process, it becomes a foreign source material.

**B. State Requirements.** All steel products used in the Work for load-bearing structural purposes must be made from steel produced in the United States. State requirements do not apply to iron.

**D. Applications.**

1. When the Work is federally funded both the Federal and State requirements apply. This includes all portions of the Work, including portions that are not federally funded.
2. When the Work has no Federal funds, only the State requirements apply.

**E. Exceptions.** The Director may grant specific written permission to use foreign steel or iron products in bridge construction and foreign iron products in any type of construction. The Director may grant such exceptions under either of the following conditions:

1. The cost of products to be used does not exceed 0.1 percent of the total Contract cost, or \$2,500, whichever is greater. The cost is the value of the product as delivered to the project.
2. The specified products are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet the requirements of the Contract Documents. The Director may require the Contractor to obtain letters from three different suppliers documenting the unavailability of a product from a domestic source, if the shortage is not previously established.

**F. Manufactured Products.** In order for a manufactured product to be subject to Federal requirements, the product must consist of at least 90% steel or iron content when it is delivered to the job site for installation.

Examples of products subject to Federal requirements include, but are not limited to, the following:

1. Steel or iron products used in pavements, bridges, tunnels or other structures, which include, but are not limited to, the following: fabricated structural steel, reinforcing steel, piling, high strength bolts, anchor bolts, dowel bars, permanently incorporated sheet piling, bridge bearings, cable wire/strand, pre-stressing/post-tensioning wire, motor/machinery brakes and other equipment for moveable structures;
2. Guardrail, guardrail posts, end sections, terminals, cable guardrail;
3. Steel fencing material, fence posts;
4. Steel or iron pipe, conduit, grates, manhole covers, risers;
5. Mast arms, poles, standards, trusses, or supporting structural members for signs, luminaires, or traffic control systems; and
6. Steel or iron components of precast concrete products, such as reinforcing steel, wire mesh and pre-stressing or post-tensioning strands or cables

The miscellaneous steel or iron components, subcomponents and hardware necessary to encase, assemble and construct the above components (or manufactured products that are not predominately steel or iron) are not subject to Federal requirements. Examples include, but are not limited to, cabinets, covers, shelves, clamps, fittings, sleeves, washers, bolts, nuts, screws, tie wire, spacers, chairs, lifting hooks, faucets, door hinges, etc.

**F. Proof of Domestic Origin.** Furnish documentation to the Engineer showing the domestic origin of all steel and iron products covered by this section, before they are incorporated into the Work. Products without a traceable domestic origin will be treated as a non-domestic product.

**106.10 Qualified Products List.** The Department may use Qualified Product Lists (QPL) for approval of manufactured materials. The Office of Materials Management (OMM) will maintain the QPL and the standard

procedure for the QPL process. Inclusion of a material onto the QPL will be determined by OMM with support from other Department offices. To be kept on the QPL, manufacturers must recertify their material according to the Department's standard procedure by January 1 of each year. When a material requires QPL acceptance, only provide materials listed on the QPL at the time of delivery of the material to the project. Provide the Engineer documentation according to the Department's standard procedure that, at the time of delivery, the material provided is on the QPL.

## 107 LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

**107.01 Laws to be Observed.** Stay fully informed of all Federal and State laws, all local laws, ordinances, and regulations, and all orders and decrees of authorities having any jurisdiction or authority that affect those engaged or employed on the Work, or that affect the conduct of the Work. Observe and comply with all such laws, ordinances, regulations, orders, and decrees. The Contractor shall protect and indemnify the State and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees, subcontractors, or agents.

The Contractor, under Title VI of the Civil Rights Act and related statutes, agrees that in the hiring of employees for the performance of Work under this Contract or any subcontract hereunder, neither the Contractor, the subcontractor, nor any person acting on behalf of such Contractor or subcontractor shall, by reasons of race, religion, color, sex, national origin, disability or age, discriminate against any citizen of the United States in the employment of labor or workers, who is qualified and available to perform the Work to which the employment relates.

Neither the Contractor, the subcontractor, nor any person on their behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of Work under this Contract on account of race, religion, color, sex, national origin, disability or age.

Comply with OAC-4123:1-3, entitled "Specific Safety Requirements of the Industrial Commission of Ohio Relating to Construction," as amended, and with the Federal Occupational Safety and Health Act of 1970 and Code of Federal Regulations, Title 29, Chapter XVII, Part 1926 and as amended.

**107.02 Permits, Licenses, and Taxes.** Procure all permits and licenses; pay all charges, fees, and taxes; and provide all notices necessary and incidental to the due and lawful prosecution of the Work.

**107.03 Patented Devices, Materials, and Processes.** Before employing any design, device, material, or process covered by letters of patent or copyright, provide for its use by suitable legal agreement with the patentee or owner. The Contractor and the Surety shall indemnify and save harmless the State, any affected third party, or political subdivision from any and all claims for infringement of patented design, device, material, process, or any trademark or copyright, and shall indemnify the State for any costs, expenses, and damages that it may be obliged to pay by reason of any infringement, at any time during the prosecution or after the completion of the Work.

**107.04 Restoration of Surfaces Opened by Permit.** The Manager may grant to the municipality in which the Work is performed a reservation of rights to construct or reconstruct any utility service in the highway or street or to grant permits for same, at any time.

Any individual, firm, or corporation wishing to make an opening in the highway must secure a permit. Allow parties bearing such permits, and only those parties, to make openings in the highway. When ordered by the Engineer, make in an acceptable manner all necessary repairs due to such openings. The necessary repairs will be paid for as Extra Work, or as provided in the Contract Documents, and will be subject to the same conditions as the original Work performed.

**107.05 Federal-Aid Provisions.** When the United States Government pays for all or any portion of the Project's cost, the Work is subject to the inspection of the appropriate Federal agency.

Such inspections will not make the Federal Government a party to this Contract. The inspections will in no way interfere with the rights of either party to the Contract.

**107.06 Sanitary Provisions.** Provide and maintain sanitary accommodations in a neat condition for the use of employees and City of Beavercreek representatives that comply with the requirements of the State and local Boards of Health, or of other authorities having jurisdiction over the Project.

**107.07 Public Convenience and Safety.** At all times, ensure that the Work interferes as little as possible with the traffic. Provide for the safety and convenience of the general public and the residents along the highway and the protection of persons and property. Do not close any highways or streets unless specifically allowed by the Contract.

**107.08 Bridges Over Navigable Waters.** Conduct all Work on navigable waters so that it does not interfere with free navigation of the waterways and that it does not alter the existing navigable depths, except as allowed by permit issued by the U.S. Coast Guard. Work within the flood plain of a navigable stream may require a permit from the U.S. Army Corps of Engineers. If an U.S. Army Corps of Engineers permit is required, provide all documentation submitted to obtain the permit(s) and a copy of the permit(s) to the City of Beavercreek.

**107.09 Use of Explosives.** When the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property, including new Work. The Contractor is responsible for all damage resulting from the use of explosives.

Obtain written permission to perform in-stream blasting from the Chief of the Division of Wildlife, Ohio DNR according to ORC 1533.58. Provide the Engineer with all documentation submitted to obtain this permit and with a copy of the permit.

The Contractor agrees, warrants, and certifies that it will observe State laws and local ordinances and regulations relative to the use and storing of explosives kept on the Project site.

Perform all blasting operations according to Item 208.

**107.10 Protection and Restoration of Property.** The Contractor is responsible for the preservation of all public and private property impacted by the Contractor's operations.

The Contractor is responsible for all damage or injury to property, during the prosecution of the Work, resulting from any act, omission, neglect, defective work or materials, or misconduct in the manner or method of executing the Work. The

Contractor will remain responsible for all damage and injury to property until the Project is accepted under 109.12, except for portions of the Work accepted under 109.11.

If the Contractor causes any direct or indirect damage or injury to public or private property by any act, omission, neglect, or misconduct in the execution or the non-execution of the Work, then it must restore, at its own expense, the property to a condition similar or equal to that existing before the damage or injury.

If mail boxes, road, or street name signs and supports interfere with the Work, then remove and erect them in a temporary location during construction in a manner satisfactory to and as directed by the Engineer. After completion of the Work and before final acceptance of the Project, erect the mailboxes, road, or street name signs and supports in their permanent locations according to the plans unless otherwise directed by the Engineer. Consider the cost of this Work as incidental to the affected items.

Cooperate with the Engineer in protecting and preserving survey monuments that are affected by the Work as required by ORC 5518.05. At the beginning of the Work, verify the position of all survey monuments in the area to be improved, according to 623. If survey monuments not shown in the Contract Documents are unexpectedly encountered, then protect, reference, and preserve them in the same manner as survey monuments that are shown in the Contract Documents.

Do not create staging areas, store materials and equipment, or borrow or waste materials in areas labeled as an environmental resources areas in the Contract Documents. All properties to be utilized by the Contractor outside the project Right-of-Way Work Limits must be cleared for all environmental resource impacts prior to the beginning of work. Environmental resources include but may not be limited to:

1. Cultural Resources
  - a. Buildings, structures, objects, and sites eligible for or listed on the National Register of Historic Places
  - b. Historic or prehistoric human remains, cemeteries, and/or burial sites (pursuant with ORC 2909.05 and 2927.11)
2. Ecological Resources
  - a. Wetlands
  - b. Streams
  - c. Wooded areas with trees to be removed in excess of 8 inches diameter at breast height
3. Public Lands

- a. Lands meeting the criteria of 49 U.S.C. 303, 23 CFR 771.135; 4(f).
- b. Lands meeting the criteria of 16 U.S.C. 4601-4, 36 CFR 59.1; 6(f).
- 4. FEMA Mapped 100 year Floodplains
- 5. Hazardous Waste Areas

Except for locations utilized specifically for:

- 1. Parking of equipment between workdays for maintenance type projects:
- 2. Reuse of Clean Hard Fill as described in CA-EW-20 (ODOT Beneficial Reuse Form). Prior to transferring Clean Hard Fill from the project, fully execute form CA-EW-20 and provide appropriate documentation to the Engineer as described for each reuse option.

All areas proposed to be utilized by the Contractor outside the project construction limits and not described above shall be reviewed by environmental Contractor(s) that are prequalified by the Department for each environmental resource. Exception (1.) noted above only applies to projects with "maintenance" in the project description. Have the consultant(s) certify that the proposed site to be utilized for the Contractor will not impact:

- 1. Cultural Resources
- 2. Ecological Resources
- 3. Public Lands
- 4. FEMA Mapped 100 year Floodplains
- 5. Hazardous Waste Areas

Provide all documentation and the consultant certification to the Office of Environmental Services with a copy to the Engineer.

Should the areas proposed for use by the Contractor outside the project right of way limits contain environmental resources the Contractor is responsible to the Department for all environmental clearances and permits prior to the beginning of work.

**107.11 Contractor's Use of the Project Right-of-Way or Other City of Beaver Creek-Owned Property.**

- A. Disposal of Waste Material and Construction Debris and Excavation of Borrow on the Project Right-of-Way or on Other City of Beaver Creek-Owned Property. Dispose of waste material according to 105.16 and dispose of construction debris according to 105.17. In addition to the rights granted in 104.03, the Contractor's use of the Project Right-of-Way or other City of Beaver Creek-owned property for the disposal of waste material and construction debris and excavation of borrow material is restricted as follows:

- 1. If the Contract Documents identify locations for the disposal of waste material and construction debris or excavation of borrow material within the Project Right-of-Way or on other City of Beaver Creek-owned property, then only perform these operations in these designated locations.
- 2. If the Contract Documents do not identify locations for the disposal of waste material and construction debris or excavation of borrow material within the Project Right-of-Way or on other City of Beaver Creek-owned property, then do not Bid assuming that the City of Beaver Creek will make such locations available.

If the Contractor's request to use locations within the Project Right-of-Way or on other City of Beaver Creek-owned property is approved by the Engineer, then the City of Beaver Creek may allow the Contractor to dispose of waste material and construction debris or excavate borrow material for a fee of \$0.50 per cubic yard.

- B. Contractor's Use of Portable Plants Within the Project Right-of-Way or on Other City of Beaver Creek-Owned Property. The Contractor's use of portable plants within the Project Right-of-Way or on other City of Beaver Creek-owned property is limited as follows:

- 1. If the Contract Documents identify locations within the Project Right-of-Way or on other City of Beaver Creek-owned property to place a portable plant, then only place a portable plant in these designated locations subject to the requirements of 107.11.C.

2. If the Contract Documents do not identify locations within the Project Right-of-Way or on other City of Beavercreek-owned property to place a portable plant, then do not bid assuming that the City of Beavercreek will make such locations available.

However, the City of Beavercreek will consider a Value Engineering Change Proposal (VECP) for the placement of a portable plant within the Project Right-of-Way or on other City of Beavercreek-owned property and, if accepted, may allow the use of a particular site on its property subject to the requirements of 107.11.C.

- C. **Placement of a Portable Plant within the Project Right-of-Way or on Other City of Beavercreek-Owned Property.** To place a portable plant within the Project Right-of-Way or on other City of Beavercreek-owned property, comply with the following requirements:
  1. Local noise ordinances.
  2. Obtain any necessary EPA permits for the operation of the plant. Provide the City of Beavercreek with a copy of the information submitted to obtain the permit and a copy of the permit.
  3. Provide the Engineer written certification that the plant will supply material only for the Project for which it was approved. Do not use the plant to supply any other project or to sell materials commercially.
  4. Submit a traffic control plan to the Engineer for approval that details the anticipated truck movements and provides acceptable protection, warning, and guidance to motorists, pedestrians, and the workers.
- D. **Equipment Storage and Staging.** The Contractor may use, fee-free, any portion of the Project within the Project Right-of-Way for staging, equipment storage, or an office site with the approval of the Engineer, provided such usages do not interfere with the Work and are not prohibited by the Contract Documents. Do not bid in anticipation of using any properties within the Project Right-of-Way or City of Beavercreek-owned property outside the Project Right-of-Way for equipment storage or staging.
- E. **Equipment Removal and Site Restoration.** Remove all Contractor equipment and completely restore all utilized sites used as required by 104.04 before Final Acceptance as provided in 109.12.

**107.12 Responsibility for Damage Claims and Liability Insurance.** The Contractor shall indemnify and save harmless the State and all of its representatives, municipalities, counties, public utilities, any affected railroad or railway company, and any fee owner from whom a temporary Right-of-Way was acquired for the Project from all suits, actions, claims, damages, or costs of any character brought on account of any injuries or damages sustained by any person or property on account of any negligent act or omission by the Contractor or its subcontractors or agents in the prosecution or safeguarding of the Work.

The Contractor shall procure and maintain insurance for liability for damages imposed by law and assumed under this Contract, of the kinds and in the amounts hereinafter provided from insurance companies authorized to do business in the State by the Ohio Department of Insurance. The cost of insurance is incidental to all contract items. Before the execution of the Contract by the Director, furnish to the Department a certificate or certificates of insurance in the form satisfactory to the Department demonstrating compliance with this subsection. Provide an insurance certificate or certificates that show that the Contractor's liability and auto policies coverage are not reduced, restricted, or canceled until 30 days written notice has been given to the Department by the insurer. Mail all certificates and notices to:

Administrator, Office of Contracts, Ohio Department of Transportation,  
1980 West Broad Street,  
Columbus, Ohio 43223.

Upon request, the Contractor shall furnish the Department with a certified copy of each policy, including the provisions establishing premiums.

The types and minimum limits of insurance are as follows:

- A. **Workers' Compensation Insurance.** Comply with all provisions of the laws and rules of the Ohio Bureau of Workers' Compensation covering all operations under Contract with the Department whether performed by it or its subcontractors. In addition, if a portion of the Work is performed from a barge or ship or requires unloading material from a barge or ship on a navigable waterway of the United States, it is the responsibility of the Contractor to arrange coverage for that portion of the Work under the Longshore and Harborworkers' Compensation Act [33 USC Section 901 *et seq.*] and the Jones Act [46 USC Section 751 *et seq.*] and provide proof of coverage to the Department.
- B. **Commercial General Liability Insurance.** The minimum limits for liability insurance are as follows:

General Aggregate Limit	\$2,000,000
Products -	Completed Operations
Aggregate Limit	\$2,000,000
Personal and Advertising Injury Limit	\$1,000,000
Each Occurrence Limit	\$1,000,000

Obtain the above minimum coverages through primary insurance or any combination of primary and umbrella insurance. In addition, the Department will require the General Aggregate Limit on a per project basis. Ensure that the Commercial General Liability Insurance policy names the State of Ohio, Department of Transportation, its officers, agents, and employees as additional insureds with all rights to due notices in the manner set out above. Obtain Explosion, Collapse, and Underground (XCU) coverage at the same limits as the commercial general liability insurance policy. In addition, if blasting is to be performed, obtain XCU coverage providing a minimum Aggregate Limit of \$5,000,000 and Each Occurrence Limit of \$1,000,000. Submit proof of insurance, endorsements, and attachments to the Engineer prior to starting the Work.

- C. **Comprehensive Automobile Liability Insurance.** The Comprehensive Automobile Liability policy shall cover owned, non-owned, and hired vehicles with minimum limits as follows:

Bodily Injury and Property Damage	Liability Limit
Each Occurrence	\$1,000,000

Insurance coverage in the minimum amounts set forth neither relieves the Contractor from liability in excess of such coverage, nor precludes the Department from taking such other actions as are available to it under any other provisions of this Contract or otherwise in law.

Clearly set forth all exclusions and deductible clauses in all proof of insurance submitted to the Department. The Contractor is responsible for the deductible limit of the policy and all exclusions consistent with the risks it assumes under this Contract and as imposed by law.

If the Contractor provides evidence of insurance in the form of certificates of insurance, valid for a period of time less than the period during which the Contractor is required by terms of this Contract, then the Department will accept the certificates, but the Contractor is obligated to renew its insurance policies as necessary. Provide new certificates of insurance from time to time, so that the Department is continuously in possession of evidence that the Contractor's insurance is according to the foregoing provisions.

If the Contractor fails or refuses to renew its insurance policies or the policies are canceled or terminated, or if aggregate limits have been impaired by claims so that the amount available is under the minimum aggregate required, or modified so that the insurance does not meet the requirements of 107.12.C, the Department may refuse to make payment of any further monies due under this Contract or refuse to make payment of monies due or coming due under other contracts between the Contractor and the Department. The Department in its sole discretion may use monies retained pursuant to this subsection to renew or increase the Contractor's insurance as necessary for the periods and amounts referred to above. Alternatively, should the Contractor fail to comply with these requirements, the Department may default the Contractor and call upon the Contractor's Surety to remedy any deficiencies. During any period when the required insurance is not in effect, the Engineer may suspend performance of the Contract. If the Contract is so suspended, the Contractor is not entitled to additional compensation or an extension of time on account thereof.



Nothing in the Contract Documents and insurance requirements is intended to create in the public or any member thereof a third party beneficiary hereunder, nor is any term and condition or other provision of the Contract intended to establish a standard of care owed to the public or any member thereof.

**107.13 Reporting, Investigating, and Resolving Motorist Damage Claims.** The Contractor and the City of Beavercreek are required to report, investigate, and resolve motorist damage claims according to 107.10 and 107.12 and as follows.

When a motorist reports damage to its vehicle either verbally or in writing to the Contractor, the Contractor shall within 3 days make and file a written report to the District's construction office in the event that the City of Beavercreek directly receives the motorist's claim, the City of Beavercreek shall within 3 days send the claim report to the Contractor. In the event the Contractor has not agreed to resolve the motorist claim, the District's construction office shall forward the report to the City of Beavercreek's Court of Claims Coordinator who, as a co-insured party, may then contact the Contractor's insurance company and request that the insurance company investigate and resolve the claim. If the Contractor or their insurance company does not resolve the claim in a timely manner, the City of Beavercreek may advise the motorist of the option of pursuing the claim in the Ohio Court of Claims.

In the event of a lawsuit filed against the City of Beavercreek in the Ohio Court of Claims by the motorist, the City of Beavercreek, as co-insured party, may request the Contractor's insurance company to defend this lawsuit and hold the City of Beavercreek harmless according to 107.12.

If the lawsuit claim amount is \$2,500 or less and the Court of Claims Coordinator determines that the Contractor is responsible for the claimed damages then the City of Beavercreek's Court of Claims Coordinator may, after notifying the Contractor, determine that it would be in the best interest of the City of Beavercreek to settle the claim.

Any settlement amount including court costs may be assessed to the Contractor and deducted from the project. The Engineer will notify the Contractor prior to executing the deduction. The Contractor or the Contractor's insurance company may within 14 days appeal the assessment decision of the Court of Claims Coordinator to the District Construction Engineer. The decision of the DCA will be made within 14 days and will be administratively final.

**107.14 Opening Sections of Project to Traffic.** The Engineer may order the Contractor to open a section of the Work to the safe use of traffic at any time. The City of Beavercreek will make an adjustment according 108.06 and 109.05 to compensate the Contractor for the added costs and delay, if any, resulting from such an opening.

**107.15 Contractor's Responsibility for Work.** Until the Final Inspector accepts the Work during the Final Inspection according to 109.12.A, the Contractor is responsible for the Project and will take every precaution against injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. Rebuild, repair, restore, and make good all injuries or damages to any portion of the Work occasioned by any of the above causes before final acceptance. Bear the expense of the repairs except when damage to the Work was due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including. Unforeseeable causes include but are not restricted to weather; (a) earthquake, floods, tornados, high winds, lightning or other catastrophes proclaimed a disaster or emergency, (b) slides, (c) civil disturbances, or (d) governmental acts.

In the event that the Engineer determines that damage to completed permanent items of Work results from traffic using a substantially completed section of Roadway, the City of Beavercreek may compensate the Contractor for repair of the damage as authorized by Change Order. To receive compensation for the damage the Contractor must meet the following requirements.

- A. Notify the Engineer of each occurrence of damage in writing within 10 Calendar Days.
- B. Contact the local law enforcement agency to determine if the accident was investigated and a report filed. If an accident report was filed, obtain the report and notify the motorist, and copy their insurance company, via registered mail that the motorist is responsible for the cost of damage repairs. If the motorist does not respond within 30 days, make a second attempt to contact the motorist and copy the insurance company via registered mail.
- C. If no response is received from the motorist or insurance company within 30 days, send a letter to the Engineer within eighteen months of the event and include documentation of good faith effort to seek recovery from responsible parties.

- D. The City of Beavercreek will make an adjustment according to 108.06 and 109.05 to compensate the Contractor for the added costs and delays, if any, resulting from repairing damaged Work.

If there is no accident report on file and no means of identifying the guilty motorist, the Contractor will likewise be compensated to repair the damaged Work.

In case of suspension of Work by the Contractor or under the provisions of 105.01, the Contractor is responsible for the Project and shall take necessary precautions to prevent damage to the Project; provide for normal drainage; and erect any necessary temporary structures, signs, or other facilities at its expense. During such period of suspension of Work, properly and continuously maintain in an acceptable growing condition all living material in newly established plantings, seedings, and soddings furnished under the Contract, and take adequate precautions to protect new tree growth and other important vegetative growth against injury.

The Engineer may direct the Contractor to remove graffiti any time during the Work. The City of Beavercreek will make an adjustment according to 108.06 and 109.05 to compensate the Contractor for the added costs and delays, if any, resulting from all ordered graffiti removal.

**107.16 Contractor's Responsibility for Utility Property and Services.** At points where the Contractor's operations are adjacent to properties of railway, cable, telephone, and power companies, or are adjacent to other property, and any damage to their property may result in considerable expense, loss, or inconvenience, do not commence with the operation until all arrangements necessary for the protection of the property have been made.

Cooperate with the owners of any underground or overhead utility lines in their removal and rearrangement operations to ensure these operations progress in a reasonable manner, that duplication of rearrangement Work may be reduced to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.

In the event interruption to underground or overhead utility services results from an accidental breakage or from being exposed or unsupported, immediately alert the occupants of nearby premises as to any emergency that the accidental breakage may create at or near such premises. Then notify the Engineer and the owner or operator of the utility facility of the disruption and cooperate with the said utility owner or operator in the restoration of service. If water service is interrupted, perform the repair work continuously until the service is restored unless the repair work is performed by the local governmental authority. Do not begin Work around fire hydrants until the local fire authority approves provisions for continued service.

**107.17 Furnishing Right-of-Way.** The City of Beavercreek is responsible for securing all necessary Right-of-Way in advance of construction. The Bid Documents will indicate any exceptions. The City of Beavercreek will notify all prospective Bidders in writing before the date scheduled for receipt of Bids regarding the specific dates certain parcels will be made available to the Contractor.

**107.18 No Waiver of Legal Rights.** The following City of Beavercreek actions do not waive the City of Beavercreek's rights or powers under the Contract, or any right to damages herein provided:

- A. Inspection by the Engineer or by any of Engineer's duly authorized representatives.
- B. Any order, measurements, or certificate by the Manager, or City of Beavercreek representatives.
- C. Any order by the Manager or City of Beavercreek representatives for the payments of money or the withholding of money.
- D. Acceptance of any Work.
- E. Any extension of time.
- F. Any possession taken by the State or its duly authorized representatives.

The City of Beavercreek will not consider any waiver of a breach of this Contract to be a waiver of any other subsequent breach.

**107.19 Environmental Protection.** Comply with all Federal, State, and local laws and regulations controlling pollution of the environment. Avoid polluting streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, sediments, or other harmful materials, and avoid polluting the atmosphere with particulate and gaseous matter.

By execution of this contract, the Contractor, will be deemed to have stipulated as follows:

- A. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
- B. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.
- C. That the firm shall promptly notify the City of Beavercreek and the Department of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.
- D. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

Fording of streams is prohibited. Causeways for stream and river crossings or for Work below a bridge are permitted provided:

- A. The causeway is constructed according to 207.03.B.8.b.
- B. The causeway complies with the requirements of the 404 Permit the Department obtained for the Project.
- C. The Contractor obtains a 404 Permit from the U.S. Army Corps of Engineers if the Department has not obtained such a permit. Obtain the 404 Permit prior to beginning construction of the causeway. The Department does not guarantee that the Contractor will be able to obtain a 404 Permit.

Comply with all current provisions of the Ohio Water Pollution Control Act, (OWPCA), and (ORC Chapter 6111). The Department will obtain a storm water permit under the OWPCA provisions when the plan work acreage requires a permit.

The storm water permit will not cover the Contractor's work outside the Project limits shown on the Plans. Apply for a permit to cover operations outside the Project limits shown on the plans as required by the OWPCA provisions. When the Department has not applied for a permit on the Project and a permit is required under the provisions of the OWPCA because of the total area of the Contractor's work, apply for, obtain, and comply with the required permit for both the Work within Project limits and the Contractor's work.

The Department has obtained the required permits from the U.S. Army Corps of Engineers and Ohio EPA for Work in the "Waters of the United States" and Isolated wetlands under ORC Chapter 6111. Comply with the requirements of these permits.

When equipment is working next to a stream, lake, pond, or reservoir, appropriate spill response equipment is required in the event of a hydraulic leak. Do not stockpile fine material next to a stream, lake, pond, or reservoir.

Take precautions to avoid demolition debris and discharges associated with the excavation and hauling of material from entering the stream. Remove any material that does fall into the stream as soon as possible.

When excavating in or adjacent to streams, separate such areas from the main stream by a dike or barrier to keep sediment from entering the stream. Take care during the construction and removal of such barriers to minimize sediment entering the stream.

Accomplish control of ground water and water in excavations in a manner that prevents the degradation of the water quality of any surface water. Install wells and well points with suitable screens and filters where necessary to prevent the continuous pumping of fines. Pump sediment-laden water in a manner to prevent degradation of streams, lakes, ponds, or other areas of water impoundment. Such prevention may involve but is not limited to the means and methods described in Item 207. Use the current version of the *Sediment and Erosion Control Handbook* to plan this work. Use the methods necessary to prevent adverse effects to surface waters as provided in OAC-3745-1-04. The cost of constructing and maintaining these measures is incidental to the Contract.

Contain, collect, characterize and legally dispose of all liquid waste water and sludge generated during the work. Do not mix waste water wastes with storm water. Do not discharge any liquid waste water without the appropriate regulatory permits. Manage liquid waste water and sludge in accordance with ORC Chapter 6111 and all other laws, regulations, permits and local ordinances relating to this waste. Waste water Liquid waste management is incidental to the Work unless otherwise specified in the contract.

Control the fugitive dust generated by the Work according to OAC-3745-17-07(B), OAC-3745-17-08, OAC-3745-15-07, and OAC-3745-17-03 and local ordinances and regulations. Prior to the initiation of abrasive coating removal, pavement cutting or any other construction operation that generates dust, demonstrate to the Engineer that construction related dust will be controlled with appropriate Reasonable Available Control Measures (RACM) as described in OEPA Engineering Guide #57 (<http://epa.ohio.gov/dapc/engineer/eguides.aspx>).

In addition, use dust control measures when fugitive dust creates unsafe conditions as determined by the Engineer. Perform this work without additional compensation except for Item 616.

Perform open burning according to 105.16.

**107.20 Civil Rights.** Comply with Federal, State, and local laws, rules, and regulations that prohibit unlawful employment practices including that of discrimination because of race, religion, color, sex, national origin, disability or age and that define actions required for Affirmative Action and Disadvantaged Business Enterprise (DBE) programs.

**107.21 Prompt Payment.** In accordance with ORC 4113.51, make payment to each subcontractor and supplier within 10 Calendar Days after receipt of payment from the Department for Work performed or materials delivered or incorporated into the Project, provided that the pay estimate prepared by the Engineer includes Work performed or materials delivered or incorporated into the public improvement by the subcontractor or supplier. Promptly release any retainage held, as set forth in any subcontractor or supplier agreement, within 10 days of Department's acceptance of the work involving the subcontractor or supplier from whom retainage has been held. For the sole purpose of establishing a time frame for the release of the subcontractor or supplier retainage, acceptance of subcontractor or supplier work will occur when the subcontractor or supplier has complied with the requirements of 109.12.A, B and C.

Also require that this contractual obligation be placed in all subcontractor and supplier contracts that it enters into and further require that all subcontractor and suppliers place the same payment obligation in each of their lower tier contracts. If the Contractor, subcontractors, or supplier subject to this provision fail to comply with the 10 Calendar Day requirement, the offending party shall pay, in addition to the payment due, interest in the amount of 18 percent per annum of the payment due, beginning on the eleventh Calendar Day following the receipt of payment from the Department and ending on the date of full payment of the payment due plus interest.

Repeated failures to pay subcontractors and suppliers timely pursuant to this subsection will result in a finding by the Department that the Contractor is in breach of Contract and subject to all legal consequences that such a finding entails. Further, repeated failures to pay timely pursuant to this subsection will result in a lower evaluation score for the Contractor and those subcontractors who are subject to evaluation by the Department.

## 108 PROSECUTION AND PROGRESS

**108.01 Subletting of the Contract.** Perform Work amounting to not less than 50 percent of the Contract Price with its own organization, unless otherwise approved by the Manager. The phrase "its own organization" includes

only workers employed and paid directly, inclusive of employees who are employed by a lease agreement acceptable to the City of Beavercreek, and equipment owned or rented with or without operators by the Contractor. The phrase does not include employees or equipment of a subcontractor, assignee, or agent of the Contractor. Obtain the Manager's written consent to subcontract, sublet, sell, transfer, assign, or otherwise relinquish rights, title, or interest in the Work. Provide the Manager with a copy of all Disadvantaged Business Enterprise subcontracts.

The Contractor's percentage of the total Contract Price includes the cost of materials and manufactured products purchased by the Contractor, but not the cost of materials and manufactured products purchased by subcontractors.

The Manager will calculate the Contractor's percentage based on the quantities shown in the Proposal and the unit prices of the contract items to be performed by the Contractor's organization. If the Contractor performs only a portion of a contract item, then the Manager will determine the proportional value administratively on the same basis. The Manager will follow this procedure even when the part not subcontracted consists only of the procurement of materials. However, if a firm both sells the materials to the Contractor and performs the Work of incorporating the materials into the Project, then the City of Beavercreek will consider these two phases in combination and as a single subcontract. If an affiliate of the firm either sells the materials or performs the Work, the City of Beavercreek may refuse approval. An affiliate is one who has some common ownership or other close relation to said firm.

Use actual subcontract prices for calculating compliance with any Disadvantaged Business Enterprise (DBE) percentage subcontracting obligations. If only a part of a contract item is sublet, then determine its proportional value administratively on the same basis. The Manager will follow this procedure even when the part not sublet consists only of procuring materials. However, if a firm both sells the materials to the Contractor and performs the work of incorporating the materials into the Project, then the City of Beavercreek will consider these two phases in combination and as a single subcontract. If an affiliate of the firm either sells the materials or performs the Work, the City of Beavercreek may refuse approval.

**108.02 Partnering.** It is the intent of the City of Beavercreek to partner every project. The purpose of Partnering is to develop a proactive effort and spirit of trust, respect, and cooperation among all stakeholders in a project. Partnering does not affect the terms and conditions of the Contract. The Partnering process in this section is Self-facilitated Partnering performed by the Project personnel. Costs associated with the Self-facilitated Partnering process are incidental to the Contract.

- A. **Preconstruction Meeting.** Meet with the Engineer for a Preconstruction Meeting before beginning the Work. At or before the meeting, submit the initial progress schedule to the DCA. Prepare the schedule according to 108.03.

Furnish a list of proposed subcontractors and material suppliers at or before the Preconstruction Meeting. If the Contractor fails to provide the required submissions at or before the Preconstruction Meeting, the Engineer may order the meeting suspended until they are furnished. Do not begin the Work until the meeting is reconvened and concluded or the Engineer gives specific written permission to proceed.

- C. **Initial Partnering Session.** In conjunction with the Engineer, determine whether the Initial Partnering Session will be conducted as part of the Preconstruction Meeting or as a separate meeting. Partnering shall have its own agenda with specific time set aside to develop the necessary partnering protocols. Develop the Partnering agenda with the Engineer.

Identify and invite all stakeholders necessary to make the Project successful including utility companies, other transportation entities (i.e., railroads), community leaders, all Project participants including subcontractors.

During the Initial Partnering Session, consider developing Partnering teams consisting of City of Beavercreek and Contractor senior personnel and Project personnel. Consider the following items for discussion:

1. Identifying and developing a consensus on project goals consistent with the contractual obligations, including specific goals concerning safety, quality, schedule, and budget.
2. Deciding how the teams will measure progress on Project goals.

3. Identifying any potential risks to the Project's success, mitigation strategies and an implementation plan for the appropriate strategies.
  4. Defining key issues, project concerns, joint expectations, roles of key partnership leaders, lines of decision making authority, and share relevant information to help determine the scope of the Partnering efforts.
  5. Identifying any opportunities for project enhancement, enhancement strategies and a specific action plan for implementing strategies.
  6. Developing a communication protocol to enhance communication on the Project
  7. Developing an issue identification and resolution process that identifies and attempts to resolve issues at the level closest to the work. The issue identification and resolution process will develop all the necessary steps for issue elevation including Notice and Mitigation defined in 108.02.F and the Dispute Resolution and Administrative Claims Process defined in 108.02.G.
- C. **Progress Meetings.** Hold monthly Progress Meetings unless the frequency is otherwise determined at the Preconstruction Meeting. Coordinate with the Engineer to determine agenda topics prior to each meeting. The purpose of Progress Meetings is to keep open communication between the Contractor and the Engineer. The senior personnel team is encouraged to participate in all Progress Meetings. Include Partnering as an agenda item at the Progress Meetings.
- D. **Post-milestone Meeting.** In conjunction with the Engineer, determine whether the Post-milestone Meeting will be conducted as part of the Progress Meeting or as a separate meeting for multi-year, multi-phase, or projects with critical items of work or milestone dates. Consider discussing and updating items from the Initial Partnering Session in addition to items specific to the Project. All stakeholders should be invited to attend.
- E. **Partnering Monitoring.** Monitor the progress of the Partnering relationship based on the goals decided during the Initial Partnering Session. On-line surveys of Project participants may be used to monitor progress on Project goals and help identify issues as they arise. The on-line surveys are consistent with the Department's Partnering Project Rating Form which is located on the Division of Construction Management's Partnering website:
- <http://www.dot.state.oh.us/Divisions/ConstructionMgt/Pages/Partnering.aspx>
- F. **Mitigation and Notice.** Mitigation of any issue, whether caused by the City of Beavercreek, Contractor, third-party or an intervening event, is a shared contract and legal requirement. Mitigation efforts include, but are not limited to, re-sequencing work activities, acceleration, and substitution of materials. The Contractor and Engineer must explore and discuss potential mitigation efforts in a timely manner.
1. **Contractor Initial Oral Notification.** Provide immediate oral notification to the Engineer upon discovering a circumstance that may require a revision to the Contract Documents or may result in a dispute. Upon notification, the Engineer will attempt to resolve the identified issue as quickly as possible.
  2. **Contractor Written Early Notice.** If the Engineer has not resolved the identified issue within two (2) working days after receipt of oral notification, provide written notice to the Engineer of any circumstance that may require a revision to the Contract Documents or may result in a dispute. This early notice must be given by the end of the second working day following the occurrence of the circumstance.

The Engineer and Contractor shall maintain records of labor, equipment, and materials used on the disputed work or made necessary by the circumstance. Such records will begin when early notice is received by the Engineer. Tracking such information is not an acknowledgement that the City of Beavercreek accepts responsibility for payment for this disputed work.

If an issue is not resolved through the initial mitigation efforts, either abandon or escalate to the Dispute and Administrative Claims Process defined in 108.02.G.

- G. **Dispute Resolution and Administrative Claims Process.** Whenever an issue is elevated to a dispute, the parties shall exhaust the City of Beavercreek's Dispute Resolution and Administrative Claim process as set forth below prior to as a condition precedent to filing an action in the Ohio Court of Claims. The following procedures do not otherwise compromise the Contractor's right to seek relief in any Ohio Court of Claims with legal jurisdiction.

All parties to the dispute must adhere to the Dispute Resolution and Administrative Claim process. Do not contact City of Beavercreek personnel who are to be involved in a Step 2 or Step 3 review until a decision has been issued by the previous tier. City of Beavercreek personnel involved in Step 2 or Step 3 reviews will not consider a dispute until the previous tier has properly reviewed the dispute and issued a decision.

Failure to meet any of the timeframes outlined below or to request an extension may/will terminate further review of the dispute and may serve as a waiver of the Contractor's right to file a claim. Disputes and claims by subcontractors and suppliers may be pursued by the Contractor on behalf of subcontractors or suppliers. Disputes and claims by subcontractors and suppliers against the City of Beavercreek but not supported by the Contractor will not be reviewed by the City of Beavercreek. Disputes and claims of subcontractors and suppliers against the Contractor will not be reviewed by the City of Beavercreek. Continue with all Work during the Dispute Resolution and Administrative Claims process, including that which is in dispute. The City of Beavercreek will continue to pay for Work.

The City of Beavercreek will not make the adjustments allowed by 104.02.B, 104.02.C, and 104.02.D if the Contractor did not give notice as specified in 108.02.F.1 and 108.02.F.2. This provision does not apply to adjustments provided in Table 104.02-2.

1. **Step 1 (On-Site Determination).** The Engineer will meet with the Contractor's superintendent within two (2) working days of receipt of the Contractor Written Early Notice set forth in 108.02.F.2. They will jointly review all pertinent information and contract provisions and negotiate in an effort to reach a resolution according to the Contract Documents. The Engineer will issue a written Step 1 decision of Step 1 within fourteen (14) calendar days of the meeting. If the dispute is not resolved, either abandon or escalate the dispute to Step 2.
2. **Step 2 (District Dispute Resolution Committee).** Each District will establish a District Dispute Resolution Committee (DDRC) which will be responsible for hearing and deciding disputes at the Step 2 level. The DDRC will consist of the District Deputy Director, District Construction Administrator and the Planning and Engineering Administrator or designees (other than the project personnel involved in the dispute).

Within seven (7) calendar days of receipt of the Step 1 decision, either abandon the dispute or submit a written request for a Step 2 meeting to the District Construction Administrator (DCA). The DCA will assign the dispute a dispute number. Within fourteen (14) calendar days of receipt of submitting the request for a Step 2 meeting, submit three (3) complete copies of the Dispute Documentation to the DCA as follows:

- DCA.
- a) Submit three (3) complete copies of the documentation of the dispute to the
  - b) Identify the Dispute on a cover page by county, project number, Contractor name, subcontractor or supplier if involved in the dispute, and the dispute number.
  - c) Clearly identify each item for which additional compensation end/or time is requested.
  - d) Provide a detailed narrative of the disputed work or project circumstance at issue. Include the dates of the disputed work and the date of early notice.
  - e) Reference the applicable provisions of the plans, specifications, proposal, or other contract documents in dispute. Include copies of the cited provisions in the Dispute Documentation.

- f) Include the dollar amount of additional compensation and length of contract time extension requested.
- g) Include supporting documents for the requested compensation stated in number six (6) above.
- h) Provide a detailed schedule analysis for any dispute involving additional contract time, actual or constructive acceleration, or delay damages. At a minimum, this schedule analysis must include the Schedule Update immediately preceding the occurrence of the circumstance alleged to have caused delay and must comply with accepted industry practices. Failure to submit the required schedule analysis will result in the denial of that portion of the Contractor's request.
- i) Include copies of relevant correspondence and other pertinent documents.

Within fourteen (14) calendar days of receipt of the Contractor's Dispute Documentation, the Engineer will provide the Contractor with all documentation it intends to rely on at the DDRC meeting to rebut the Contractor's dispute.

After allowing at least fourteen (14) calendar days for the Contractor to review the Engineer's Dispute Documentation, the DDRC will conduct the Step 2 meeting with Contractor personnel who are authorized to resolve the dispute. The DDRC will issue a written Step 2 decision of Step 2 to the Contractor and the Dispute Resolution Coordinator within fourteen (14) calendar days of the meeting. If the dispute is not resolved, either abandon or escalate the dispute to Step 3.

- 3 Step 3 (Manager's Claims Board Hearing or Alternative Dispute Resolution). Submit a written Notice of Intent to File a Claim to the Dispute Resolution Coordinator in the Division of Construction Management within fourteen (14) calendar days of receipt of the Step 2 decision. The dispute becomes a claim when the Dispute Resolution Coordinator receives the Notice of Intent to File a Claim. Include the Contractor's request for either: 1) a Manager's Claim Board hearing on the claim or 2) an acceptable Alternative Dispute Resolution (ADR) practice. The dispute becomes a claim when the Dispute Resolution Coordinator receives the Notice of intent to File a Claim.

- a) Manager's Claims Board Hearing. The Manager's Claims Board (the "Board") will consist of the Deputy Manager of the Division of Construction Management, Deputy Director of Engineering and a District Construction Engineer Administrator from a district not involved in the claim, or their designees. A representative from the Division of Chief Legal Counsel and Equal Opportunity may be present to observe the hearing. The Director or designee will be responsible for deciding claims.

- (1) Submit six (6) complete copies of the Claim Documentation to the Dispute Resolution Coordinator within thirty (30) calendar days of receipt of the Notice of Intent to File a Claim. This timeframe may be extended upon mutual agreement of the parties and with approval of the Dispute Resolution Coordinator.

In addition to the documentation submitted at Step 2:

- (a) Enhance the narrative to include sufficient description and information to enable understanding by a third party who has no knowledge of the dispute or familiarity with the project.
- (b) Certify the claim in writing and under oath using the following certification:

*"I, (Name and Title of an Officer of the Contractor) certify that this claim is made in good faith, that all supporting data is accurate and complete to the best of my knowledge and belief, and that the claim amount accurately reflects the contract amendment for which (Contractor Company name) believes the City of Beavercreek is liable."*



Sign and date this claim certification and have the signature notarized pursuant to the laws of the State of Ohio. The date the Dispute Resolution Coordinator receives the certified claim documentation is the date of the City of Beavercreek's Receipt of the Certified Claim for the purpose of the calculation of interest as defined in 108.02.G.4. The Dispute Resolution Coordinator will forward one (1) complete copy of this documentation to the District.

(2) Within thirty (30) calendar days of the District's receipt of the Contractor's Claim Documentation, the District will submit six (6) complete copies of its Claim Documentation to the Dispute Resolution Coordinator. This timeframe may be extended with approval from the event that the Contractor is granted a time extension for the submission of its Claim Documentation, the District will be granted an equal time extension for submission of its Claim Documentation. Dispute Resolution Coordinator. At a minimum, the District's Claim Documentation should include:

- (a) An overview of the project.
- (b) A narrative of the disputed work or project circumstance at issue with sufficient description and information to enable understanding by a third-party who has no knowledge of the dispute or familiarity with the project.
- (c) The dates of the disputed work and the date of early notice.
- (d) References to the applicable provisions of the plans, specifications, proposal, or other contract documents. Copies of the cited provisions shall be included in the claim document.
- (e) Response to each argument set forth by the Contractor.
- (f) Any counterclaims, accompanied by supporting documentation, the District wishes to assert.
- (g) The status of the negotiations of the Claim that have occurred to-date, including the amount of any offers and counteroffers made by the parties.
- (h) Copies of relevant correspondence and other pertinent documents.

(3) Within fourteen (14) calendar days of receipt of the District's Claim Documentation, the Dispute Resolution Coordinator will forward one (1) complete copy to the Contractor and will schedule a hearing on the dispute.

Once a hearing date has been established, both the Contractor and District shall provide the Dispute Resolution Coordinator with a list of names of persons who may be presenting information at the hearing. Unless otherwise permitted by the Board, the exchange of documentation and all disclosures specified in this step of the process shall be completed at least fourteen (14) calendar days prior to the hearing.

Upon request or at the Board's discretion, the Board may delay the hearing one (1) time to allow more time for preparation and review and, to fulfill requests for more documentation.

The Board will hear the entire claim on behalf of the Manager. The Board may have its own technical advisors at the hearing for consultation and assistance in reviewing the claim. The Contractor and District will each be allowed adequate time to present their respective positions before the Board. The Contractor and District will also each be allowed adequate time for one (1) rebuttal, limited to the scope of the opposing party's presentation. The Board may suspend any portion of a presentation or rebuttal if it deems to be argumentative, repetitive, or irrelevant to the claim. The Contractor's position will be presented by a one or more of the Contractor's representative who is thoroughly knowledgeable of the claim. The Contractor may have legal counsel present during the hearing to observe or for private consultation. Similarly, the District's position will be presented by one or more District representatives who are thoroughly knowledgeable of the claim. Each party may have others assist in the presentation.

The Board may, on its own initiative, request information of the Contractor in addition to that submitted for the hearing. If the Contractor fails to reasonably comply with such request, the Board may render its decision without such information.

Upon completion of the hearing and following consideration of any additional information submitted upon request, the Board will submit a written recommendation on the disposition of the claim to the Manager. The Manager or designee will ratify, modify, or reject the recommendation of the Board and render a decision within sixty (60) calendar days of the hearing. Within thirty (30) calendar days of receipt of the Board's decision, either accept or reject the decision in writing.

In the event the Contractor fails to do so, the Board may revoke any offers of settlement contained in the decision.

The decision of the Manager is the final step of the City of Beavercreek's Dispute Resolution Process and may not be appealed within the City of Beavercreek. The Manager is not bound by any offers of settlement or findings of entitlement made during Steps 1 and 2 of the Dispute Resolution Process.

- b) Alternative Dispute Resolution (ADR). In lieu of the Manager's Claim Board hearing, the Contractor may opt to proceed through an Alternative Dispute Resolution (ADR) Process. The City of Beavercreek will then choose either binding arbitration as defined by ORC 5525.23 or mediation in the manner in which those methods are practiced by the City of Beavercreek and allowed by law.

The Dispute Resolution Coordinator will coordinate the agreement of the parties to the ADR method, and the selection of a neutral third-party or technical expert. The fees of the neutral third-party or technical expert will be shared equally between the City of Beavercreek and the Contractor. The Dispute Resolution Coordinator will obtain a written agreement, signed by both parties, that establishes the ADR process. The neutral third-party or technical expert will have complete control of the claim upon execution of the ADR agreement.

3. Interest on Claims. The City of Beavercreek will pay interest in accordance with ORC Section 5703.47 on any amount ultimately found due on a claim which is not paid within 30 days of the Dispute Resolution Coordinator's Receipt of the Certified Claim.

- H. Post Construction Meeting. The District will conduct a Post Construction Meeting with the Contractor prior to the project finalization. The District will invite the design agency and any other stakeholders deemed necessary including utility companies, other transportation entities (i.e. railroads), community leaders, all Project participants including subcontractors performing critical work to attend this meeting.

Consider the following items for discussion:

1. Project Safety.
2. How were the goals evaluated or measured?
3. How were foreman/ workers involved in the Partnering process?
4. How were the subcontractors involved in the Partnering process?
5. How were relationships with key stakeholders managed?
6. Teambuilding activities or unique motivational activities.

- H. Partnering Close-Out Survey. Complete the final Partnering evaluation to get participants' feedback and improve the Partnering process. The Partnering Close-Out Survey is located on the Division of Construction Management's Partnering website:

<http://www.dot.state.oh.us/Divisions/ConstructionMgt/Pages/Partnering.aspx>

108.03 Prosecution and Progress. Start the Work according to 108.02. Notify the Engineer at least 24 hours before starting the Work. If the prosecution of the Work is suspended, notify the Engineer a minimum of 24 hours in advance of resuming operations.

Pursue the Work diligently and continuously as to complete the Project by the Completion Date.

A. Progress Schedule.

1. General. Furnish a bar chart progress schedule to the District Construction Engineer for review at or before the Preconstruction Meeting. The Engineer will review the schedule and within 14 calendar days of receipt, will either accept the schedule or provide the Contractor with comments. Acceptance of the schedule does not revise the Contract Documents. Provide clarification or any needed additional information within 10 days of a written request by the Engineer. The City of Beavercreek will withhold Estimates until the Engineer accepts the schedule. The Engineer will not measure or pay for the preparation of the schedule and schedule updates directly, but the cost of preparing and updating the schedule is incidental to all Contract Items.

a. Include the following Administrative Identifier Information:

- (1) Project Number
- (2) County
- (3) Route Number
- (4) FHWA Number
- (5) PID Number
- (6) Contract Number
- (7) Date of Contract
- (8) Completion Date
- (9) Contractor's Name
- (10) Contractor's Dated Signature
- (11) ODOT's Dated Acceptance Signature

Provide a working day schedule that shows the various activities of Work in sufficient detail to demonstrate a reasonable and workable plan to complete the Project by the Completion Date. Show the order and the sequence for accomplishing the Work. Describe all activities in sufficient detail so that the Engineer can readily identify the Work and measure the progress of each activity. The bar chart schedule must reflect the scope of work, required phasing, maintenance of traffic requirements, interim completion dates, the Completion Date, and other project milestones established in the Contract Documents. Include activities for submittals, working and shop drawing preparation, submittal review time for the City of Beavercreek, material procurement and fabrication, and the delivery of materials, plant, and equipment, and other similar activities. The schedule must be detailed on letter or legal sized paper.

b. Activity requirements are discussed in further detail as follows:

- (1) Activity Description. Assign each activity an unambiguous descriptive word or phrase. For example, use "Excavate Area A," not "Start Excavation."
- (2) Activity Original Duration. Indicate a planned duration in calendar days for each activity. Do not exceed a duration of 20 working days for any activity unless approved by the Engineer. Do not represent the maintenance of traffic, erosion control, and other similar items as single activities extending to the Completion Date. Break these Contract Items into component activities in order to meet the duration requirements of this paragraph.

3. Early Completion Schedule. An Early Completion Schedule is defined as a baseline schedule or update schedule which anticipates completion of all work prior to the Completion Date established by the contract documents and the Contractor submits as an Early Completion Schedule. In the event that an Early Completion Schedule is accepted, the Engineer will initiate a change order amending the Completion Date to the finish date shown on the accepted Early Completion Schedule. The amended Completion Date will be effective upon execution of that change order and all contract

provisions concerning the Completion Date such as Incentives, disincentives, excusable delays, compensable delays, and liquidated damages will be measured against the amended Completion Date. The Contractor may elect not to execute the change order amending the Completion Date; however, in so doing, the Contractor waives its rights to delay damages in meeting the projected early Completion Date.

4. Updated Progress Schedule. Submit an updated progress schedule when ordered by the Engineer. The Engineer may request an updated progress schedule when progress on the work has fallen more than 14 calendar days behind the latest accepted progress schedule. Information in the updated schedule must include a "% work completed" value for each activity.
5. Recovery Schedule. If the progress schedule projects a finish date for the Project more than 14 calendar days later than the Completion Date, submit a revised schedule showing a plan to finish by the Completion Date. The City of Beavercreek will withhold Estimates until the Engineer accepts the revised schedule. The Engineer will use the schedule to evaluate time extensions and associated costs requested by the Contractor.

**108.04 Limitation of Operations.** Limit operations to prevent unnecessary inconvenience to the traveling public. If the Engineer concludes that the extent of the Contractor's Work unnecessarily inconveniences the public or concludes limiting operations are necessary to protect the existing or new construction from damage, the Engineer will require the Contractor to finish portions of Work in progress before starting new Work.

**108.05 Character of Workers Methods and Equipment.** Provide personnel with sufficient skills and experience to perform assigned tasks.

Ensure that no debarred individuals listed on the Federal website: [www.epis.gov](http://www.epis.gov) or State debarment list at the website: [www.dot.state.oh.us/divisions/contractadmin/](http://www.dot.state.oh.us/divisions/contractadmin/) act in any ownership, leadership, managerial, or other similar position that could influence the operations of an entity doing business with the City of Beavercreek. If the Engineer gives written notification that specific Contractor or subcontractor personnel are improperly performing the Work, intemperate, disorderly, or creating a hostile work environment, remove the identified personnel from the Project. Do not allow removed personnel to return to the Project without the Engineer's approval.

The Engineer may suspend the Work by written notice under this subsection for the following reasons:

- A. The Contractor does not furnish sufficient skilled and experienced personnel to complete the Project by the Completion Date.
- B. The Contractor does not remove personnel from the Project as directed in writing by the Engineer.

Use equipment of sufficient size and mechanical condition to complete the Project by the Completion Date. Ensure that the equipment does not harm the roadway, adjacent property, other highways, workers, or the public. If the Contract Documents do not prescribe the methods and equipment required to accomplish the Work, determine the methods or equipment necessary to complete the Work according to the Contract.

If the Contract Documents specify methods and equipment to perform the Work, use such methods and equipment, unless others are authorized by the Engineer. Obtain the Engineer's written approval before substituting alternate methods or equipment. To obtain the Engineer's approval, submit a written description of the alternate methods and equipment proposed and an explanation of the reasons for making the change. The Engineer's approval of the substitute methods and equipment does not relieve the Contractor of the obligation to produce Work according to 105.03. If after trial use of the substituted methods or equipment, the Engineer determines that the Work does not conform to the Contract Documents, then complete the remaining Work using the specified methods and equipment.

Remove all deficient Work and replace it according to the Contract Documents, or take such other corrective action as directed by the Engineer. The Engineer's authorization to substitute alternate methods and equipment will not change the basis of payment for the construction items involved or the Contract Time.

**108.06 Determining a Time Extension to the Completion Date and Payment for Excusable Delays.**

- A. General. The City of Beavercreek will only extend the Completion Date if an excusable delay, as specified in 108.06.B or 108.06.D, delays Work on the critical path shown on the accepted progress schedule and impacts the Completion Date. The critical path is defined as; the longest path of activities in the project that determines the project schedule completion date. The activities that make-up the critical path of activities are the "Critical Activities." Any extension of the Completion Date will be executed by a change order.

Mitigation of any delay, whether caused by the City of Beavercreek, Contractor, third-party or an intervening event, is a shared contract and legal requirement. Mitigation efforts include, but are not limited to, re-sequencing work activities, acceleration, and continuation of work through an otherwise planned shutdown period. The Contractor and Engineer must explore and discuss potential mitigation efforts in a timely manner.

The City of Beavercreek will not evaluate a request for extension of the Completion Date unless the Contractor notifies the Engineer as specified in 108.02.F. Notification shall be in writing to the Engineer within 30 days following the termination of the event giving rise to the request and shall be accompanied by supporting analysis and documentation.

The Engineer will evaluate the Contractor's analysis and determine the time extension due, if any. The Engineer will measure all time extensions in Calendar Days. For delays measured in Workdays, the Engineer will convert Workdays to Calendar Days by multiplying by 1.4 for a 5-day work week or less; 1.2 for a 6-day work week; and 1 for a 7-day work week; and extend the Completion Date by the resulting number of Calendar Days plus any holidays the Contractor does not normally work that occur in the extension period. When the conversion of Workdays to Calendar Days results in a decimal of 0.5 or greater, the Engineer will round the number of Calendar Days to the next highest whole number. When the conversion results in a decimal less than 0.5, the Engineer will delete the decimal portion of the Calendar Days.

The Engineer will not grant an extension of time for delays incurred from December 1 to April 30 unless the Contractor's accepted progress schedule depicts work on the critical path occurring during this period.

The Engineer may order the Contractor to continue Work after November 30 and compensate the Contractor for costs incurred due to cold weather Work.

The Contractor's plea that insufficient time was specified is not a valid reason for an extension of time.

The City of Beavercreek will relieve the Contractor from associated liquidated damages, as specified in 108.07, if the Engineer extends the Completion Date under 108.06.A.

The extended Completion Date shall then have the same standing and effect as though it was the original Completion Date.

If the Contractor contends that an excusable delay is also compensable, as specified in 108.06.D, submit a detailed cost analysis of the requested additional compensation along with the request for extension of Completion Date.

- C. Excusable, Non-Compensable Delays. Excusable, non-compensable delays are delays that are not the Contractor's or the City of Beavercreek's fault or responsibility. The Engineer will not grant additional payment for excusable, non-compensable delays. The following are excusable, non-compensable delays:

1. Delays due to floods, tornadoes, lightning strikes, earthquakes, or other cataclysmic phenomena of nature.
2. Delays due to weather as specified in 108.06.C.
3. Extraordinary delays in material deliveries the Contractor or its suppliers cannot foresee or avoid resulting from freight embargoes, government acts, or area wide material shortages. Delays due to the Contractor's, subcontractor's, or supplier's insolvency or mismanagement are not excusable.

4. Delays due to civil disturbances.
5. Delays from fires or epidemics.
6. Delays from labor strikes that are beyond the Contractor's, subcontractor's, or supplier's power to settle and are not caused by improper acts or omissions of the Contractor, subcontractor, or supplier.
7. Added quantities that delay an activity on the critical path.
8. All other delays not the Contractor's and City of Beavercreek's fault or responsibility.

D. **Extension to the Completion Date for Weather or Seasonal Conditions.** A weather day is defined as a workday that weather or seasonal conditions reduced production by more than 50 percent on items of work on the critical path. Submit the dates and number of weather days in writing to the Engineer at the end of each month. In the event the Contractor fails to submit weather days at the end of each month the Engineer will determine the dates and number of weather days from project records.

Delays caused by weather and seasonal conditions should be anticipated and will be considered as the basis for an extension of time when the Contractor's accepted progress schedule depicts Work on the critical path and the actual workdays lost exceeds the number of work days lost each month as determined by Table 108.06-1.

TABLE 108.06-1

Month	Number of Workdays Lost Due to Weather
January	8
February	8
March	7
April	6
May	5
June	5
July	4
August	4
September	5
October	6
November	6
December	6

This table applies to the duration between contract execution and original completion date. Extensions for weather days beyond the original completion date will be for the actual workdays lost each month.

The Engineer will not consider weekends and holidays as lost workdays unless the Contractor normally works those days or unless the Engineer directs the Contractor to work those days.

- E. **Excusable, Compensable Delays.** Excusable, compensable delays are delays that are not the Contractor's fault or responsibility, and are the City of Beavercreek's sole responsibility or are determined by judicial proceeding to be the City of Beavercreek's sole responsibility or are the fault and responsibility of a local government. For the following excusable, compensable delays, the Engineer will extend the Completion Date if the conditions specified in 108.06.A are met:

1. Delays due to revised Work as specified in 104.02.B, 104.02.D, or 104.02.F.
2. Delays due to utility or railroad interference within the Project limits.
3. Delays due to an Engineer-ordered suspension as specified in 104.02.C.
4. Delays due to acts of the government or a political subdivision other than the City of Beavercreek; however, these compensable delay costs are limited to escalated labor and material costs only, as allowed in 109.05.D.2.b and 109.05.D.2.d.
5. Delays due to the neglect of the City of Beavercreek or its failure to act in a timely manner.

Compensation for excusable, compensable delays will be determined by the Engineer according to 109.05.D.

- F. **Non-Excusable Delays.** Non-excusable delays are delays that are the Contractor's fault or responsibility. All non-excusable delays are non-compensable.
- G. **Concurrent Delays.** Concurrent delays are separate critical delays that occur at the same time. When a non-compensable delay is concurrent with a compensable delay, the Contractor is entitled to additional time but not entitled to additional compensation.

**108.07 Failure to Complete on Time.** If the Contractor fails to complete the Work by the Completion Date, then the Manager, if satisfied that the Contractor is making reasonable progress, and deems it in the best interest of the public, may allow the Contractor to continue in control of the Work. The City of Beavercreek will pay the Contractor for Work performed on the Project less any liquidated damages incurred.

If the Work is not completed by the Completion Date and the Manager permits the Contractor to remain in control, prosecute the Work at as many different places, at such times, and with such forces as the Manager requests. Provide a written plan for the completion of the Work.

For each calendar day that Work remains uncompleted after the Completion Date, the City of Beavercreek will deduct the sum specified herein from any money due the Contractor, not as a penalty, but as liquidated damages. The Manager will adjust the Completion Date or other contractually mandated dates for delays specified in 108.06.B.7 and 108.06.D.

Permitting the Contractor to continue and complete the Work or any part of the Work after the Completion Date, or after extensions to the Completion Date, will in no way operate as a waiver on the part of the City of Beavercreek of any of its rights under the Contract.

The Manager may stop deducting liquidated damages when:

- A. The Work is substantially complete and the project is available for use as Intended by the contract.
- B. The Contractor is diligently pursuing the remaining Work.
- C. The Work remaining will not interfere with the intended use of the project and will not impact traffic. For the limited purposes of assessing liquidate damages, the closing of a shoulder is not considered an impact upon traffic.
- D. All contract safety items are complete and operational. These safety items include but are not limited to signs, pavement markings, guardrail, attenuators, and signals. Raised pavement markers (RPM) are required safety items if the roadway section involved had RPMs before the project started.
- E. Deemed reasonable and appropriate by the District Deputy Director.

TABLE 108.07-1 SCHEDULE OF LIQUIDATED DAMAGES

Original Contract Amount (Total Amount of the Bid)		Amount of Liquidated Damages to be Deducted for each Calendar Day of Overrun In Time
From More Than	To and Including	
\$0.00	\$500,000	\$500
\$500,000	\$2,000,000	\$1,000
\$2,000,000	\$10,000,000	\$1,500
\$10,000,000	\$50,000,000	\$2,500
Over \$50,000,000		\$3,200

108.08 Unsatisfactory Progress and Default of Contractor. The Manager will notify the Contractor in writing of unsatisfactory progress for any of the following reasons:

- A. The Contractor has not commenced the Work by the dates established in the schedule.
- B. The Contractor does not proceed with the Work in a manner necessary for completion of the Project by the Completion Date.
- D. The Contractor is performing the Work improperly.
- E. The Contractor abandons, fails, or refuses to complete the Work.
- F. Any other reason the Manager believes jeopardizes completion of the Work by the Completion Date.

If the Contractor does not respond to the satisfaction of the Manager, the Manager may declare the Contractor in default and may notify the Contractor and Surety that the responsibility to complete the Work is transferred to the Surety. Upon receipt of this notification, the Contractor's right to control and supervise the Work will immediately cease. In such a case, the Manager will proceed as specified in ORC 5525.17. The defaulted Contractor will not be compensated for costs resulting from the default and is not eligible to be retained by the Surety to complete the Work. If it is determined that the City of Beavercreek's default of the Contractor according to 108.08 is wrongful, then the default will revert to a termination of the Contract according to 108.09.



**108.09 Termination of the Contract for Convenience of the City of Beavercreek.** The Manager may terminate the Contract at any time for the convenience of the City of Beavercreek. The City of Beavercreek will compensate the Contractor according to 109.04 and 109.05 for termination of the Contract for the convenience of the City of Beavercreek. This subsection is subject to the provisions of ORC 5525.14.

**108.10 Payroll Records.** Keep payroll records as specified in ORC 4115.07 or as required by Federal law. Authorized representatives of the Director may inspect the certified payroll and other payroll records. Upon completion of the Work and before receiving the final estimate and when required by ORC 4115.07, submit an affidavit stating that wages have been paid according to the minimum rates specified in the Contract Documents.

## **109 ACCEPTANCE, MEASUREMENT, AND PAYMENT**

**109.01 Measurement of Quantities.** The City of Beavercreek will measure the quantities of Work and calculate payments based on the method of measurement and basis of payment provisions provided in these Specifications. When the following units of measure are specified, the City of Beavercreek will measure quantities as described below unless otherwise specified in the Contract Documents. The accuracy of individual pay item estimate payments will be one decimal more accurate than the unit of measure denoted for the pay item.

**Lump Sum.** Not measured. Describes payment as reimbursement for all resources necessary to complete the Work. When a complete structure or structural unit is specified as the unit of measurement, the unit will include all necessary fittings and accessories.

**Each.** Measured by the number of individual items of Work completed.

**Foot (Meter).** Measured parallel to the longitudinal base or foundation upon which items are placed, or along the longitudinal surface of the item. Measured vertically to the nearest 0.1 foot (0.01 m), with a minimum vertical measurement of 1 foot (0.10 m), at each unit.

**Square Yard or Square Foot (Square Meter).** Measured by a two-dimensional area method on the surface of the item.

**M Square Feet.** One thousand square feet.

**Cubic Yard (Cubic Meter).** Measured by a three-dimensional volume method. Measure all "loose material" or material "measured in the vehicle" by the cubic yard (cubic meter). Haul material "measured in the vehicle" in approved vehicles and measure in the vehicle at the point of delivery. For this purpose, use approved vehicles of any type or size satisfactory to the Engineer, provided the vehicle's bed is of such type that the actual contents are readily and accurately determined. Unless all approved vehicles on a job are of uniform capacity, each approved vehicle must bear a legible identification mark indicating the specific approved capacity. The Inspector may reject all loads not hauled in such approved vehicles. Cubic Yard (Cubic Meter) for Asphalt Concrete. Measure as specified in 401.21.

**Acre (Hectare).** Measured by a two-dimensional area method on the surface to the nearest 0.1 acre (0.05 ha).

**Pound (Kilogram).** Measured by actual item net weight avoirdupois (mass).

**Ton (Metric Ton).** The term "ton" means the short ton consisting of 2000 pounds avoirdupois. The term "metric ton" means 1000 kilograms. Weigh all materials that are proportioned by weight on accurate and approved scales that are operated by competent, qualified personnel at locations approved by the Engineer. However, car weights will not be acceptable for materials to be passed through mixing plants. If trucks are used to haul material being paid for by weight, weigh the empty truck at least once daily and as the Engineer directs and only if the weight of the truck is used in determining the ticket weight. Place a plainly legible identification mark on each truck bearing the weight of the truck.

For Work on a tonnage basis, file with the Engineer receipted freight bills for railroad shipments and certified weight-bills when materials are received by any other method, showing the actual tonnage used. For Work on a volume basis, itemize evidence of the volume used.

**Gallon (Liter).** Measured by actual item liquid volume. The City of Beavercreek will measure the following materials by the gallon (liter) at the following temperatures:

Temperatures	Items
60 °F (16 °C)	Creosote for Priming Coat, Creosote Oil, Creosote Solutions for Timber Preservatives, Asphalt Primer for Water-proofing, and Liquefier
100 °F (38 °C)	RC, MC Asphalt Emulsions, CBAE, Primer 20, and Primer 100
300 °F (149 °C)	Asphalt Binder

Measure tank car outage of asphalt material at its destination before any material has been removed from the tank car according to Supplement 1060.

Convert the net weight of asphalt material shipments to gallons (liters) at the specified pay temperature according to Supplement 1060.

Convert the gallons (liters) at the measured temperature to gallons (liters) of asphalt material at the specified pay temperature according to Supplement 1060.

**M Gallon.** One thousand gallons.

**Thousand Board Feet, MBF (Cubic Meter).** Measure timber by MBF (cubic meter) actually incorporated in the structure. Base the measurement on nominal widths, thicknesses, and the extreme length of each piece.

**Standard Manufactured Items.** When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by size, unit weight, section dimensions, etc., such identification will be to nominal weights or dimensions set by the industry.

**109.02 Measurement Units.** The City of Beavercreek will measure using either English or metric units as indicated in the Contract Documents. Use the Tables 109.02-1 and 109.02-2 to convert units when required. If Tables 109.02-1 and 109.02-2 do not provide a required factor, then use the appropriate factor provided in the IEEE/ASTM SI 10.

**TABLE 109.02-1 ENGLISH TO SI (METRIC) CONVERSION FACTORS**

Symbol	When You Know	Multiply By	To Find	Symbol
		<b>Length</b>		
Mil	mils	25.4	micrometers	µm
In	inches	25.4	millimeters	mm
ft	feet	0.3048	meters	m
yd	yards	0.9144	meters	m
mi	miles	1.609347	kilometers	km
		<b>Area</b>		
in <sup>2</sup>	square inches	646.16	square millimeters	mm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09290304	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8361274	square meters	m <sup>2</sup>
ac	acres	0.4046873	hectares	ha
ac	acres	4046.873	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.589988	square kilometers	km <sup>2</sup>
		<b>Volume</b>		
fl oz	fluid ounces	29.57353	milliliters	mL
gal	gallons	3.785412	liters	L
ft <sup>3</sup>	cubic feet	0.02831685	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.7645549	cubic meters	m <sup>3</sup>
		<b>Mass</b>		
oz	ounces	28.34952	grams	g
lb	pounds	0.4535924	kilograms	kg
T	2000 pounds	0.9071847	metric tons	t
		<b>Temperature</b>		
°F	Fahrenheit	$C = (F-32)/1.8$	Celsius	°C
		<b>Illumination</b>		
fo	foot-candles	10.76391	lux	lx
fl	foot-lamberts	3.426259	candelas per square meter	cd/m <sup>2</sup>
		<b>Force and Pressure or Stress</b>		
lbf ft	pounds-force foot	1.355818	newton meter	Nm
lbf	pounds force	4.448222	newtons	N
lbf/ft <sup>2</sup> (psf)	pounds force per square foot	47.88026	pascals	Pa
lbf/in <sup>2</sup> (psi)	pounds force per square inch	0.006894757	megapascals	MPa

**TABLE 109.02-2 SI (METRIC) TO ENGLISH CONVERSION FACTORS**

Symbol	When You Know	Multiply By	To Find	Symbol
		<b>Length</b>		
µm	micrometers	0.03937	mils	mil
mm	millimeters	0.03937	inches	in
m	meters	3.28084	feet	ft
m	meters	1.093613	yards	yd
km	kilometers	0.62137	miles	mi
		<b>Area</b>		
mm <sup>2</sup>	square millimeters	0.00155	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	10.76391	square feet	ft <sup>2</sup>
m <sup>2</sup>	square meters	1.19599	square yards	yd <sup>2</sup>
ha	hectares	2.4710437	acres	ac
m <sup>2</sup>	square meters	0.000247	acres	ac
km <sup>2</sup>	square kilometers	0.3861	square miles	mi <sup>2</sup>
		<b>Volume</b>		
mL	milliliters	0.033814	fluid ounces	fl oz
L	liters	0.264172	gallons	gal
m <sup>3</sup>	cubic meters	35.31466	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.30795	cubic yard	yd <sup>3</sup>
		<b>Mass</b>		
g	grams	0.035274	ounces	oz
kg	kilograms	2.204622	pounds	lb
t	metric tons	1.1023114	2000 pounds	T
		<b>Temperature</b>		
°C	Celsius	$F = 1.8C + 32$	Fahrenheit	°F
		<b>Illumination</b>		
lx	lux	0.09290304	foot-candles	fo
cd/m <sup>2</sup>	candelas per square meter	0.29186362	foot-lamberts	fl
		<b>Force and Pressure or Stress</b>		
Nm	newton meters	0.7375621	pounds-foot force	lbf ft
N	newtons	0.22480892	pound force	lbf
Pa	pascals	0.02088543	pounds force per square foot	lbf/ft <sup>2</sup> (psf)
MPa	megapascals	145.03774	pounds force per square inch	lbf/in <sup>2</sup> (psi)

109.03 Scope of Payment. Payment of the Contract Price is full compensation for all resources necessary to complete the Contract Item and maintain the Work. Assume liability for risk, loss, damage, or expense resulting from the Work. The

Contract Price and Contract Time shall only be changed by written Change Order or as determined by the City of Beavercreek in writing in accordance with the contract documents.

109.04 Compensation for Altered Quantities, Eliminated Items or Termination of the Contract for Convenience of the City of Beavercreek. If the agreed quantities of contract items vary from the quantities in the Contract, the City of Beavercreek will make payment at the original Contract unit prices for the agreed quantities of Work.

- A. If an item is eliminated in accordance with 104.02.E or the contract is terminated in accordance with 108.09 the City of Beavercreek will pay the following in addition to that provided by 104.02.D:
1. Restocking charges supported by paid invoices and an additional 5 percent markup on the compensation for overhead and profit.
  2. The cost of material transferred to the City of Beavercreek or a local government agency in lieu of restocking or disposal. The allowed compensation is the paid invoice cost plus 15 percent markup, but no more than the unit bid price for the reference number involved.
  3. Hauling costs, if not included in restocking charges, for returned material and for material delivered to the City of Beavercreek.
- B. If the project is terminated for convenience of the City of Beavercreek, the City of Beavercreek will negotiate compensation with the Contractor for actual costs incurred as a result of the termination. The City of Beavercreek will pay for Extra Work as stipulated in approved Extra Work Change Orders or written authorizations subject to the limitations set forth in ORC 5525.14. Such authorizations for emergencies and to avoid Project delays are in advance of an approved Extra Work Change Order and commit the City of Beavercreek only to the terms of the authorizations. The City of Beavercreek will pay for Extra Work after the approval of the subsequent Change Order.

#### 109.05 Changes and Extra Work.

- A. General. If the City of Beavercreek revises the Contract under: 104.02, 105.07, 105.10, 105.13, 107.10, 107.14, 107.15, 108.09, 109.06, or 109.07, the City of Beavercreek will pay for changes and Extra Work with a Change Order using the sequence specified in 109.05.B through 109.05.E.

In establishing the method of payment for contract changes or extra work orders, force account procedures shall only be used when strictly necessary, such as when agreement cannot be reached with the Contractor on the price of a new work item, or when the extent of work is unknown or is of such character that a price cannot be determined to a reasonable degree of accuracy. The reason or reasons for using force account procedures shall be documented.

Unless otherwise stated in 109.05, the compensation provided in 109.05.B through 109.05.E constitutes payment in full for all changes and Extra Work completed by original Contract Price, agreed unit price, agreed lump sum price, and for work performed on a force account basis, including:

1. Administration.
2. Superintendence.
3. Project and field office overhead.
4. Home office overhead.
5. Use of tools and equipment for which no rental is allowed.
6. Profit.
7. Taxes other than sales tax.
8. Premiums on insurance including additional premiums for Commercial General Liability Insurance required by 107.12.B and any additional coverage carried by the Contractor or subcontractor, excluding pollution and railroad General Liability Insurance. The City of Beavercreek will pay the Contractor's pollution and railroad liability insurance premiums, if required by the contract, by a separate Change Order for the cost of the

premium without any markup. When the Contractors or subcontractors basic rate for General Commercial Liability Insurance required by 107.12.B is greater than 5 percent of payroll, the City of Beavercreek will pay directly without markup the portion of the premium in excess of 5 percent and provide copies of paid premiums.

Sales tax will not be allowed on any item for which tax exemption was obtained.

**B. Negotiated Prices.** Negotiated prices for changes and Extra Work shall be comparable to prices that would have resulted from a competitive bid contract. The Engineer and Contractor will negotiate agreed unit or lump sum prices using one or more of the following methods:

1. Original Contract prices for similar work but adjusted for:
  - a. increased or decreased material costs specified in 109.05.C.3.
  - b. increased or decreased labor costs specified in 109.05.C.2
  - c. increased or decreased equipment costs specified in 109.05.C.4

Adjustments of these prices for inflation or markup for subcontractor work is not allowed.

2. State-wide average unit price awarded for the item or items as listed in the City of Beavercreek's annual "Summary of Contracts Awarded." These prices may be adjusted for inflation using factors issued by the Office of Construction Administration. No markup for subcontractor work is allowed.
3. Average price awarded on three different projects of similar work and quantity. These prices may be adjusted for inflation using factors issued by the Office of Construction Administration. No markup for subcontractor work is allowed.
4. Prices computed by the Office of Estimating.
5. Cost analysis of labor, material, equipment, and markups as allowed in 109.05.C.
6. For the cost of compensable delays as defined in 108.06, prepare a cost analysis as allowed by 109.05.D.

Provide proposed pricing and cost justification for changes or Extra Work within 5 business days after the City of Beavercreek's request. The City of Beavercreek will respond within 5 business days after receipt of the Contractor's proposal. The City of Beavercreek and the Contractor can mutually agree to extend these 5-day time limits. If the City of Beavercreek negotiates with the Contractor but does not agree on a price adjustment, the Engineer may direct the Contractor to perform all or part of the revised Work under force account.

**C. Force Account.**

1. **General.** The Engineer may direct the Contractor to perform the revised Work under force account. Submit a written proposal and estimated costs for the Work, including the planned equipment, materials, labor, and a work schedule. The City of Beavercreek will pay the Contractor as specified in 109.05.C as full compensation for performing the force account Work. The Project and Contractor personnel will document the labor and equipment used on the force account work on a Daily Force Account Record. At the end of each Workday, the Project and Contractor personnel will compare and sign the Daily Force Account Record. The City of Beavercreek will make no force account payment before the Contractor submits an itemized statement of the costs for that work. The Engineer will examine and, if found to be acceptable, approve all rates and costs submitted by the Contractor.

Provide the following content in itemized statements for all force account work:

- a. Name, classification, date, daily hours, total hours, rate, and amount for all labor.

- b. Designation, dates, dally hours, total hours of actual operation and idle time, Blue Book rate with reference or category, and amount for each unit of equipment and the applicable Blue Book hourly operating cost for each unit of equipment and invoices for all rental equipment. The designation includes the manufacturer's name or trademark, model number, and year of manufacture.
- c. Quantities of materials and prices.
- d. Transportation charges on materials, free on board (F.O.B.) at the job site.
- e. Cost of workers' compensation insurance premiums, all applicable insurance premlums, unemployment insurance contributions, and social security tax and fees or dues required by a collective bargaining agreement. Express each of these items of cost as a percentage of payroll, except fees or dues, which should be expressed as a cost per hour.
- f. Documentation showing payment for all surveying, professional, or similar speclalized Work not normally a part of a City of Beavercreek contract.
- g. If materials are taken from Contractor's stock and original receipted invoices for the materials and transportation charges do not exist, provide an affidavit and certify all of the following:
  - (1) The materials were taken from the Contractor's stock.
  - (2) The quantity shown was actually used for the force account work.
  - (3) The price and transportation costs represent the actual cost to the Contractor.
- h. Documentation showing payment to trucking firms and owner-operators. Submit documentation showing owner-operations status. When the trucking is subject to prevalling wage, submit payroll and equipment usage records according to 109.05.C.1.a, 109.05.C.1.b, and 109.05.C.1.e.
- i. Provide "receipted invoices" for all costs substantiated by an invoice.

If only part of the expenditure represented by an invoice is applicable to force account work, or if the invoice represents expenditure for more than one item of work, clearly indicate the actual amount of expenditure applicable to each item of work.

- 2. Labor. The City of Beavercreek will pay the wages and fringe benefits currently in effect for each hour the Work is performed by all labor employed in the Work and all foremen in direct charge of the specific operation. The City of Beavercreek will pay an additional 15 percent markup on these wages and benefits. "Fringe benefits" are the actual costs paid to, or on behalf of, workmen by reason of health and welfare benefits, pension fund benefits, or other benefits, when such amounts are required by prevailing wage laws or by a collective bargaining agreement or other employment contracts generally applicable to the classes of labor employed on the Project.

The City of Beavercreek will pay the actual itemized cost, without markup, of the following payroll taxes and legally required insurances:

- a. Social Security Tax.
- b. Medicare Tax.
- c. Ohio Workers' Compensation Premlums.
- d. State and Federal Unemployment Insurance.
- e. Longshore and Harborworkers' Compensation Insurance for work from a barge or ship, or unloading material from a barge or ship.

Provide Itemized statements in addition to the documentation requirements for all labor including the name, classification, date, daily hours, total hours, rate, and amount. If any person is paid more than the one rate, a separate listing shall be made for that person for each rate paid. Provide itemized statements for Ohio Workers' Compensation Insurance premiums, all applicable insurance premiums, State and Federal Unemployment Insurance contributions, and Social Security Tax and fees or dues required by a collective bargaining agreement. Express each of these items of cost as a percentage of payroll, except fees or dues, which shall be expressed as a cost per hour.

Instead of itemizing the cost of Social Security Tax, Ohio Workers' Compensation, and State and Federal Unemployment Insurance, the Contractor may elect to receive as compensation for these payroll taxes and premiums, an amount equal to 22 percent of the paid wages. If the Contractor pays fringes directly to the worker in lieu of paying into a fringe benefit program, then the City of Beavercreek will treat these fringe payments as paid wages when calculating the allowed 22 percent compensation.

The City of Beavercreek will pay, without markup, the actual itemized cost of fees and dues paid to labor unions or to business associations when they are based on payroll hours and required by a collective bargaining agreement.

The City of Beavercreek will not pay for wages or benefits for personnel connected with the Contractor's forces above the classification of foreman that have only general supervisory responsibility for the force account work.

If the foreman or timekeeper is employed partly on force account work and partly on other work, the Contractor shall prorate the number of hours between the force and non-force account work according to the number of people on each task as shown on payrolls.

The City of Beavercreek will pay the prevailing wage and fringe rates that apply to the Project for the classifications required for Extra Work. The Contractor must provide payroll records for pay rates higher than the prevailing wages and establish that the higher than prevailing rates are paid for original Contract Work. The City of Beavercreek will pay for foremen and time keepers not covered by prevailing wages not more than the salaried rate they receive when engaged in original Contract Work.

The City of Beavercreek will pay actual costs for subsistence and travel allowances when such payments are required by the collective bargaining agreement or other employment contracts applicable to the classes of labor employed on the Project. The City of Beavercreek will not pay a percent markup on these costs.

3. Materials. The City of Beavercreek will pay the Contractor's actual invoice costs, including applicable taxes and actual freight charges, for Engineer approved materials the Contractor uses in force account Work. The City of Beavercreek will pay an additional 15 percent markup on these costs.

Freight or hauling costs charged to the Contractor and not included in unit prices shall be itemized and supported by invoices. The cost of owned or rented equipment used to haul materials to the project is not part of the materials cost. Such equipment, when used for hauling materials, shall be listed under cost of equipment.

Provide itemized statements in addition to the documentation requirements for all equipment including the quantity and price of each material and transportation charges free on board (F.O.B.) at the job site. Attach invoices to support the quantities of materials used, unit prices paid and transportation charges. If the Contractor uses materials from the Contractor's stock and original receipted invoices for the materials and transportation charges do not exist, the City of Beavercreek and the Contractor will agree on a price that represents the actual cost to the Contractor. Provide an affidavit and certify all of the following:

- a. The materials were taken from the Contractor's stock.
- b. The quantity shown was actually used for the force account work.

c. The price and transportation costs represent the actual cost to the Contractor.

Do not incorporate materials into the Work without a price agreement.

4. Equipment.

a. **General.** The City of Beavercreek will pay the Contractor's costs for equipment the Engineer deems necessary to perform the force account work for the time directed by the Engineer or until the Contractor completes the force account Work, whichever happens first. The City of Beavercreek will pay the Contractor the established rates for equipment only during the hours that it is operated, except as otherwise allowed elsewhere in these Specifications. The City of Beavercreek will pay for non-operating hours at the idle equipment rate as specified in 109.05.C.4.c. Report equipment hours to the nearest 1/2 hour. The established equipment rates in these Specifications include compensation for overhead and profit except as otherwise specified.

The City of Beavercreek will pay for use of Contractor-owned equipment the Engineer approves for force account Work at established rates. The City of Beavercreek will pay the rates, as modified in 109.05.C.4.b, given in the Rental Rate Blue Book for Construction Equipment (Blue Book) published by Equipment Watch, a unit of Interec Publishing, a PRIMEDIA Company.

Provide, and the Engineer will confirm, the manufacturer's ratings and manufacturer-approved modifications required to classify equipment for rental rate determination. For equipment with no direct power unit, use a unit of at least the minimum recommended manufacturer's rating.

The City of Beavercreek will not pay rental for small tools or equipment that show a daily rate less than \$5.00 or for unlisted equipment that has a value of less than \$400.

Tool trucks will be allowed for compensation if they are used at the force account site. Only the tools used from the tool truck will be allowed for compensation. Tools in the tool truck that are not used in the force account work will not be compensated. A tool trailer that remains at the Contractor's office or yard will not be allowed on the force account work. Tool trailers that are taken to the force account site will be allowed for compensation along with the tools used on the force account work that were taken from the trailer.

Treat traffic control devices used in Maintaining Traffic and owned by the Contractor as owned equipment. Allowed rates for common traffic control devices and concrete barrier that are not listed in the Blue Book will be as determined by the City of Beavercreek.

Use Engineer approved equipment in good working condition and providing normal output or production. The Engineer may reject equipment not in good working condition or not properly sized for efficient performance of the Work. For each piece of equipment used, whether owned or rented, provide the Engineer with the following information:

- (1) Manufacturer's name or trademark.
- (2) Equipment type.
- (3) Year of manufacture.
- (4) Model number.
- (5) Type of fuel used.
- (6) Horsepower rating.
- (7) Attachments required, together with their size or capacity.
- (8) All further information necessary to determine the proper rate.
- (9) Dates, daily hours, total hours of actual operation and idle time.
- (10) Blue Book rate with reference or category.
- (11) Amount
- (12) Applicable Blue Book hourly operating cost
- (13) Invoices for all rental equipment.



- b. **Hourly Owned Equipment Rates.** The base rate for the machine and attachments represent the major cost of equipment ownership, such as depreciation, interest, taxes, insurance, storage, and major repairs. The hourly operating rate represents the major costs of equipment operation, such as fuel and oil lubrication, field repairs, tires, expendable parts, and supplies.

For all equipment used on force account work, determine, and have the City of Beavercreek confirm, the hourly owned equipment rates as follows:

$$\text{HOER} = [\text{RAF} \times \text{ARA} \times (\text{R} / 176)] + \text{HOC}$$

Where:

HOER = hourly owned equipment rate

RAF = regional adjustment factor shown in the Blue Book

ARA = age rate adjustment factor shown in the Blue Book

R = current Blue Book monthly rate

HOC = estimated hourly operating cost shown in the Blue

Book

However, compensation for equipment normally used on a 24 hours per day basis will not exceed the monthly rate plus adjustments and operating costs.

The rate adjustment factor assigned to any attachment will be the yearly factor as determined for the base equipment.

When multiple attachments are included with the rental equipment, only the attachment having the highest rental rate will be eligible for payment, provided that the attachment has been approved by the Engineer as being necessary to the force account Work.

When a piece of owned equipment is not listed in the Blue Book, use the rate for similar equipment found in the Blue Book or use 6 percent of the purchase price as the monthly rate (R) and add the hourly operating rate found in the Blue Book for similar equipment of the same horsepower.

For equipment brought to the Project exclusively for force account-work and on the Project for less than a month, multiply the monthly rate (R) by the factor listed below:

TABLE 109.05-1

Working Hours	Factor
Less than or equal to 8.0	2.00
8.1 to 175.9	2.048 - (hours/168)
176 or greater	1.00

The term "WORKING HOURS," as used in Table 109.05-1, includes only those hours the equipment is actually in operation performing force account work; apply the factor, as determined above, to these actual working hours only. Calculate compensation for any idle time according to 109.05.C.4.c without application of the factor.

The City of Beavercreek will pay as working equipment for the entire Workday equipment used intermittently during the Workday. The following criteria qualify for intermittently used equipment:

- (1) Equipment dedicated to the force account exclusively all day and not used on bid work.
- 2) Equipment works before and after the intermittent idle period and its total working time during the Workday is at least 2 hours.

Equipment that is captive to the force account work (i.e. it must remain at the force account site), but does not qualify for intermittently used owned equipment, is paid as idle equipment according to C&MS Section 109.05.C.4.c. for the time it is not working.

- c. **Hourly Idle Equipment Rate.** For equipment that is in operational condition, on site, and necessary for force account Work, but is idle, the City of Beavercreek will pay an hourly idle equipment rate. The procedure to determine the hourly idle equipment rate for Contractor owned equipment is as follows:

$$\text{HIER} = \text{RAF} \times \text{ARA} \times (\text{R} / 176) \times (1/2)$$

Where:

HIER = Hourly idle equipment rate.

RAF = Regional adjustment factor shown in the Blue Book.

ARA = Age rate adjustment factor shown in the Blue Book.

R = Current Blue Book monthly rate.

If rented equipment necessary for force account work is idle, the City of Beavercreek will pay the Contractor for the actual invoiced rates prorated for the duration of the idle period. The actual invoiced rates must be reasonably in line with the Blue Book rates and approved by the Engineer. The City of Beavercreek will pay a 15 percent markup for overhead and profit for the actual invoiced rates during the idle period.

The City of Beavercreek will not pay idle owned equipment costs for more than 8 hours in a 24-hour day or 40 hours in a week.

The City of Beavercreek will not pay for inoperable equipment.

The Engineer may order specific equipment to the site up to 5 days before its planned usage. If this equipment is not used for other work, the City of Beavercreek will pay for it as idle equipment until used.

The City of Beavercreek will pay for the cost of idle owned or rented equipment when the Work was suspended for the convenience of the State. The City of Beavercreek will not pay the cost of idle equipment when the Work was suspended by the Contractor for the Contractor's own reasons.

The City of Beavercreek will only pay for the number of Calendar Days during the existence of the suspension. The City of Beavercreek will not compensate the Contractor for days that the Engineer determined were lost to weather.

The City of Beavercreek will only pay for equipment physically located at the Project site that was received to prosecute the scheduled work during the delay. Compensation for idle equipment will stop at the completion of the force account Work or at the end of the suspension of Work.

- d. **Rented Equipment.** The City of Beavercreek will pay a 15 percent markup for overhead and profit for all rented equipment, its corresponding Blue Book hourly operating costs, and State and Local sales taxes.

(1) **Equipment Rented Solely for Force Account Work.** If the Contractor rents or leases equipment from a third party exclusively for force account Work, the City of Beavercreek will pay the actual invoiced amount. The actual invoiced rates must be reasonably in line with the Blue Book and approved by the Engineer. The City of Beavercreek will pay a 15 percent markup for overhead and profit for all rented equipment paid for by the actual invoices. Add the Blue Book hourly operating cost to the marked up actual invoiced rates.

(2) **Equipment Rented for Original Contract Work, but Used for Force Account Work.** If the Contractor uses rented equipment currently on the Project for original Contract Work to perform force

account Work, then determine the hourly outside-rented equipment rate as follows:

$$\text{HRER} = (\text{HRI} \times 115\%) + \text{HOC}$$

Where:

HRER = hourly rented equipment rate

HRI = hourly rental invoice costs prorated for the actual number of hours that rented equipment is operated solely on force account work. Use a monthly invoice rate divided by 176, a weekly invoice rate divided by 40, or a daily invoice rate divided by 8.

HOC = hourly operating cost shown in the Blue Book

The City of Beavercreek will not compensate for rental rates that exceed the Blue Book rates unless approved in advance of the Work by the Engineer.

- e. **Moving of Equipment.** The City of Beavercreek will also pay for the time required to move needed equipment to the location of the force account work and to return it to its original location. The City of Beavercreek will pay for loading and transportation costs instead of moving time if equipment is moved by means other than its own power. Moving time back to the original location or loading and transportation costs will not be allowed if the equipment is used at the site of the force account work on contract items or related work.

The City of Beavercreek will consider the actual cost of transferring the equipment to the Project and returning it to the original location as an additional expense and pay for it as specified, for equipment moved on the Project exclusively for force account work.

The Engineer will confirm the original location of the equipment before the Contractor moves and uses it for force account work.

If the equipment is transported by a common carrier, the allowance is the invoiced amount paid for the freight plus 15 percent. However, if the Contractor's forces transport the equipment, the allowable compensation will be Blue Book rate of the hauling unit and hourly Blue Book operating cost plus the driver's wages and the cost of loading and unloading the equipment calculated according to 109.05.C.2.

5. **Foreman's Transportation.** The City of Beavercreek will pay the Blue Book rate for every hour the foreman's truck is on the force account site or moving to or from the site. This rate includes equipment cost, fuel and lubricants, overhead, profit, and mobile phone or two-way radios.
6. **Subcontract Work.** For Work performed by an approved subcontractor, the City of Beavercreek will pay an amount to cover administrative costs of 8% on the first \$10,000 of work and 5% for work in excess of \$10,000 as provided in 109.05.C.2 through 109.05.C.5. No additional mark-up is allowed for work of a sub-subcontractor or trucking services employed by a subcontractor.
7. **Final Adjustment to Premium for Contract Bonds.** The final bond premium amount for the payment and performance bonds will be computed based on the actual final contract value. For the purpose of computing a bond premium adjustment the actual final contract value is defined as the whole sum of money, excluding any bond premium adjustment, which is passed from the City of Beavercreek to the Contractor as a result of the completion of the Work. If the actual final contract value is different from the original contract value, the premium shall be adjusted accordingly; either by refund of part of the original bond premium by the Contractor if the original contract value is larger than the actual final contract value; or by payment of additional bond premium by the City of Beavercreek if the original contract value is smaller than the actual final

contract value. Additional payment by the City of Beavercreek or refund by the Contractor will be based on the difference between the Invoiced bond premium for the original contract value and the Invoiced bond premium for the actual final contract value without any markup. A final bond premium adjustment will not be made when the actual final contract value differs from the original contract value by less than \$ 40,000.00.

8. **Trucking.**

- a. Trucking firms and owner operators not subject to prevailing wage will be paid at the Invoiced cost plus 8% on the first \$10,000 of trucking and 5% for trucking in excess of \$10,000 to cover administrative costs.
- b. Trucking that is subject to the prevailing wage law will be compensated according to 109.05.C.1, 109.05.C.2, 109.05.C.4, 109.05.C.6, 109.05.C.10, and 109.05.C.11.

Provide documentation showing payment to trucking firms and owner-operators and owner-operations status. When the trucking is subject to prevailing wage, submit payroll and equipment usage records according to 109.05.C.2 and 109.05.C.4.

8. **Professional and Specialized Work.** The following work, when performed by a firm hired by the Contractor, is paid at the reasonable and fair market Invoiced cost plus 8% on the first \$10,000 and 5% for work in excess of \$10,000.

- a. Surveying.
- b. Engineering design.
- c. Specialized work that is not normally part of a City of Beavercreek Contract and is not normally subject to prevailing wage.
- d. Installation, periodic maintenance, and removal of traffic control devices under Item 614 performed by a traffic control service or rental company, provided the workers are not on the Project full-time. Maintenance of Traffic services performed by LEO.
- e. Other professional or specialized work not contemplated at the time of Bid.

Provide documentation showing payment for professional and specialized Work.

9. **Payment for Force Account Work.** Submit an analysis of estimated cost prepared in accordance with 109.05C for work that will be performed on a force account basis. Attach an original affidavit to the analysis stating:

*"Labor rates shown are the actual rates paid for labor, unit prices for materials and rates for owned and rented equipment have been estimated on the basis they are not in excess of those charged in the area in which the work will be performed."*

The Engineer will process an Estimated Cost of Force Account (ECFA) if the amount of the force account work is likely to be greater than \$100,000 and is expected to take more than two weeks to complete. The Engineer will process an Actual Cost of Force Account (ACFA) to make any necessary adjustment between the ECFA and the final itemized costs for the force account work.

For force account work estimated to be less than \$100,000 and anticipated to require less than two weeks to perform, the Engineer will process an Actual Cost of Force Account (ACFA) at the conclusion of the work.

Submit biweekly itemized statement of costs prepared from the Daily Force Account Records to the Engineer as the work is being performed. The Engineer will process estimates as the force account work is performed. Payment will only be made upon receipt of the Contractor's itemized statement of costs.

Upon conclusion of the work performed by an ECFA or work performed by an ACFA submit an itemized statement of the actual costs prepared from the Daily Force Account Record and utilizing the City of Beavercreek's electronic template titled "Electronic Force Account." Submit a compact disk (CD), labeled with the Contractor's name and

the project number, and a hard copy of the "Electronic Force Account." The "Electronic Force Account" template can be downloaded from the following website:

[www.dot.state.oh.us/divisions/construction/mot/admin/pages/default.aspx](http://www.dot.state.oh.us/divisions/construction/mot/admin/pages/default.aspx)

The Engineer may approve an alternative electronic template provided all calculations and printouts are equivalent to those generated by the "Electronic Force Account" template. Attach an original affidavit to the hard copy stating:

*"The name, classification, total hours worked and rates paid each person listed on the Summary of Actual Cost are substantiated by actual records of persons employed on the force account work. All unit prices for materials and rates for owned and rented equipment listed on the Summary of Actual Costs are substantiated by actual records of materials and equipment actually used in performance of the force account work and the price of any owned equipment not previously agreed upon does not exceed prices charged for similar equipment in the area in which the work was performed."*

Daily Force Account Records signed by both the City of Beavercreek and Contractor will govern over other City of Beavercreek and Contractor records subject to the following:

- a. When the Contractor is subject to a Union Contract that requires a minimum number of paid hours, the compensation will be for the verified contract minimum hours.
- b. Material quantity disagreements will be resolved by field measurements of the installed quantities or the Engineer's estimate of the amount of temporary or un-measurable material used. The Engineer may also review and consider the Contractor's material invoices and material certifications to make the final determination.

In the event the Contractor declines to sign the Daily Force Account Record, the City of Beavercreek's records shall govern. Any resulting dispute must be pursued in accordance with 108.06.G.

**D. Delay Costs.**

1. **General.** If the City of Beavercreek agrees that it has caused a delay, the City of Beavercreek will pay for the costs specified in 109.05.D as allowed by 108.06.D, unless these costs have been previously paid as listed in 109.05.B or 109.05.C. Such payment constitutes full compensation for any and all delay costs. The City of Beavercreek will make no payment for delays occurring during the period from December 1 to April 30 unless the Contractor's approved progress schedule depicts critical Work occurring throughout this period.

The City of Beavercreek will not pay for delay costs until the Contractor submits an itemized statement of those costs. Provide the content specified in 109.05.C.1, for the applicable items in this statement and as follows:

- a. Proof of cost of Superintendent, or other project staff salaries, wages, and payroll taxes and insurance.
  - b. Proof of cost of office rent, utilities, land rent, and office supplies.
  - c. Proof of escalated cost for labor and material.
  - d. Proof of material storage costs.
2. **Allowable Delay Costs**
    - a. **Extended Labor.** Compute labor costs during delays as specified in 109.05.C.2 for all non-salaried personnel remaining on the Project as required under collective bargaining agreements or for other Engineer-approved reasons.
    - b. **Escalated Labor.** To receive payment for escalated labor costs, demonstrate that the City of Beavercreek-caused delay forced the Work to be performed during a period when labor costs were higher than planned at the time of Bid.

Provide adequate support documentation for the costs, allowances, and benefits specified in 109.05.C.2. The City of Beavercreek will pay wages and fringes with a 20 percent mark-up to cover administrative costs.

- c. **Idle Equipment or Equipment Demobilization.** The City of Beavercreek will pay the Contractor according to 109.05.C.4.c for idle equipment, other than small tools, that must remain on the Project during the delays. The City of Beavercreek will pay the Contractor's transportation costs to remove and return equipment not required on the Project during the delays. No other equipment costs are recoverable as a result of delay.
- d. **Material Escalation or Material Storage.** The City of Beavercreek will pay the Contractor for increased material costs or material storage costs due to the delay. Obtain the Engineer's approval before storing materials due to a delay. Payment will be based upon the accepted quantity of work performed during the period for which escalated costs have been approved. The City of Beavercreek will pay increased material costs with an 8 percent mark-up to cover administrative costs and any material waste inherent to the Work.
- e. **Field Overhead.** The City of Beavercreek will pay any Contractor or subcontractor for field overhead costs which include the cost of supervision, field office and office supplies, and utilities for which payment is not provided for in 109.05.D.2.f, during a delay period provided all of the following criteria are met:
  - (1) The Contractor or subcontractor has incurred an excusable, compensable delay that delays the Work at least 10 Calendar Days beyond the original Completion Date. These days are cumulative throughout the project.
  - (2) The delay for which payment of field overhead is sought is only due to delays defined in 108.06.D.2, 108.06.D.3, 108.06.D.5 or for delays due to revised Work as specified in 104.02.B or 104.02.F.

The City of Beavercreek will pay the salary and fringes plus a 5 percent markup for field personnel identified in Table 109.05-4.

TABLE 109.05-4	
Original Contract Amount Up to \$5,000,000	Field Personnel One Superintendent
\$5,000,001 to \$50,000,000	One Superintendent, One Assistant Superintendent or One Engineer, One Clerk
Over \$50,000,000	One Superintendent, One Assistant Superintendent, One Engineer, One Clerk

Superintendent's transportation is compensable at the same rate allowed for foreman's transportation in Section 108.05.C.5, which includes the cost of mobile communication devices. The allowed hours are when the superintendent is at the project site.

Superintendent's subsistence, provided this is the company's terms of compensation to such employees, as documented by the Contractor's written company policy or contracts with their employees.

The Contractor's or subcontractor's field office costs include field office trailers, tool trailers, office equipment rental, temporary toilets, and other incidental

facilities and supplies. Compute these costs on a Calendar Day basis. Owned trailers are paid at the Blue Book rate. Rented trailers are paid at the invoiced cost plus a 15 percent markup. Rented office space, toilets, and office equipment are allowed a 5 percent markup. Purchased office supplies are allowed a 5 percent markup.

Office utilities include, but are not limited to, telephone, electric, water, and natural gas. Compute these costs on a Calendar Day basis and allow a 5 percent markup.

f. Home Office Overhead. The City of Beavercreek will pay the Contractor for home office overhead, unabsorbed home office overhead, extended home office overhead, and all other overhead costs for which payment is not provided for in 109.05.D.2.e, including overhead costs that would otherwise be calculated using the Eichleay formula or some other apportionment formula, provided all of the following criteria are met:

- (1) The Contractor has incurred an excusable, compensable delay that delays the Work at least 10 Calendar Days beyond the original Completion Date. These days are cumulative throughout the project.
- (2) The delay for which payment of home office overhead is sought is only due to delays defined in 108.06.D.2, 108.06.D.3 and 108.06.D.5. Any subcontractor that has approved C-92's for subcontracted work totaling \$4,000,000 or more is eligible for reimbursement of home office overhead provided the criteria set forth in 109.05.D.2.f.(1) and 109.05.D.2.f.(2) are met.

Payment will be made for every eligible day beyond the original contract completion date at the rate determined by 109.05.D.2.f.i. Payment for eligible days occurring during an unanticipated construction period will be calculated in accordance with 109.05.D.2.f.ii. Payment for eligible days occurring during an unanticipated winter period will be calculated in accordance with 109.05.D.2.f.iii.

(i) Home Office Overhead Daily Rate  
Calculate the home office overhead daily rate using the following formula:  
Daily HOOP = (A x C)/B

Where:

A = original contract amount  
B = contract duration in Calendar Days  
C = value from Table 109.05-5

TABLE 109.05-5

Original Contract Amount

C	
Up to \$5,000,000	0.08
\$5,000,001 to \$25,000,000	
0.06	
Over \$25,000,000	
0.05	

Daily HOOP = home office overhead daily rate

Contract duration term, B, includes every Calendar Day from the execution of the Contract, unless otherwise specified by the Manager, to the original Contract Completion Date.

When the Contractor requests home office overhead compensation for a subcontractor, use the above formula to

calculate the subcontractor's Daily HOOP; however, in the subcontractor calculation, A is equal to the subcontractor's portion of the original contract amount as determined by the sum of all approved C-92's issued for the subcontracted work.

- (ii) **Home Office Overhead Payment for an Unanticipated Construction Period** Calculate the home office overhead payment for an unanticipated construction period occurring between May 1 and November 30 using the following formula:

$$\text{CP HOOP} = \text{Daily HOOP} \times D$$

Where:

D = sum of all excusable, compensable delays in Calendar Days minus the sum of all delays due to 108.06.D.1 and 108.06.D.4 in Calendar Days

Daily HOOP = daily home office overhead rate

CP HOOP = home office overhead payment for an unanticipated construction period occurring between May 1 and November 30

The excusable, compensable delay term, D, is the additional, unanticipated extended period for work performed between May 1 and November 30 in Calendar Days.

- (iii) **Home Office Overhead Payment for an Unanticipated Winter Period** Calculate the payment for home office overhead for an unanticipated winter period occurring between December 1 and April 30 using the following formula:

$$\text{WP HOOP} = \text{Daily HOOP} \times F \times D/E$$

Where:

D = sum of all excusable, compensable delays in Calendar Days minus the sum of all delays due to 108.06.D.1 and 108.06.D.4 in Calendar Days

E = sum of all excusable, compensable delays in Calendar Days plus the sum of all excusable, non-compensable delays in Calendar Days

F = 151 for a non-leap year or 152 for a leap year

Daily HOOP = daily home office overhead rate

WP HOOP = home office overhead payment for an unanticipated winter period occurring between December 1 and April 30 Payment for Home Office Overhead for an unanticipated winter period will not be made when the value of the remaining work is below the lesser of \$500,000.00 or 10 percent of the estimated final contract value.

- (iv) **Total Home Office Overhead Payment** Calculate the total home office overhead payment using the following formula:

$$\text{Total HOOP} = \text{CP HOOP} + \text{WP HOOP}$$

Where:

CP HOOP = home office overhead payment for an unanticipated construction period occurring between May 1 and November 30



WP HOOP = home office overhead payment for an unanticipated winter period occurring between December 1 and April 30

Total HOOP = total home office overhead payment

- g. **Subsistence and Travel Allowance.** The City of Beavercreek will pay costs for subsistence and travel allowances for labor that must remain on the Project during the delays, when such payments are required by the collective bargaining agreement or other employment contracts applicable to the classes of labor employed on the project.

Overnight lodging will be reimbursed if the person is at a location greater than forty-five miles from their residence up to a maximum of \$108 per day. Meals and incidental expenses will be reimbursed up to a maximum of \$56 per day. The City of Beavercreek will not pay a percent markup on these costs.

- D. **Changes In Materials.** Changes in material specifications that result in increased cost to the Contractor are compensated by lump sum adjustment to the reference number. The allowed compensation is equal to the invoice supported material cost increase plus 15 percent markup for profit and overhead.

Material cost savings resulting from a specification change shall be credited to the project by a lump sum adjustment to the reference number plus a 15 percent markup if the originally specified material has not been ordered.

If the original material was ordered before the Contractor was informed of the change, the savings markup allowed is 2.5 percent in order to exclude profit on the original bid price and pay only for incurred overhead.

**109.06 Directed Acceleration.** The Engineer may order the Contractor to accelerate the Work to avoid delay costs or to complete the Project early. The Manager and the Contractor will negotiate acceleration costs.

**109.07 Inefficiency.** The City of Beavercreek will compensate the Contractor for inefficiency or loss of productivity resulting from 104.02 Revisions to the Contract Documents. Use the Measured Mile analysis comparing the productivity of work impacted by a change to the productivity of similar work performed under unimpacted conditions to prove and quantify the inefficiency.

**109.08 Unrecoverable Costs.** The Contractor is not entitled to additional compensation for costs not specifically allowed or provided for in 109.05 including, but not limited to, the following:

- A. Loss of anticipated profit.
- B. Consequential damages, including loss of bonding capacity, loss of bidding opportunities, insolvency, and the effects of force account work on other projects, or business interruption.
- C. Indirect costs.
- E. Attorney's fees, claim preparation expenses, and the costs of litigation.

**109.09 Estimates.** If satisfactory progress is being made, the Contractor will receive monthly payments equaling the Work and materials in place. The monthly payment is approximate, and all partial estimates and payments are subject to correction in the Final Estimate and payment. Payment for Work and materials shall not, in any way, prevent later rejection when defective Work or material is discovered, or constitute acceptance under 109.11 or 109.12.

Except for estimates generated during Project finalization, the City of Beavercreek will not pay an estimate until the Contractor certifies to the Engineer that the work for which payment is being made was performed in accordance with the contract.

Certification will be made on forms provided by the City of Beavercreek.

The City of Beavercreek may pay estimates twice each month if the Engineer concludes the amount of work performed is sufficient.

No estimate or payment shall be construed as acceptance of defective Work or improper materials. The City of Beavercreek will not pay the adjusted final estimate until the Contractor remedies all defective Work and accepted Work damaged by the Contractor's operations.

Interest will be paid in accordance with ORC 126.30 when warranted.

**109.10 Payment for Delivered Materials.** The City of Beavercreek will pay, up to 75 percent of the applicable contract item, for the invoiced cost of the delivered and approved materials before they are incorporated in the Work, if the approved materials are delivered, accepted, and properly stored on the project or stored in acceptable storage places in the vicinity of the Project.

The City of Beavercreek will pay for the cost of approved materials before they are incorporated in the Work when asked by the Contractor, if the Engineer determines that it is not practical to deliver the material to the Project site. This provision applies only to bulky materials that are durable in nature and represent a significant portion of the project cost, such as aggregates, steel, and precast concrete. The City of Beavercreek will pay for un-fabricated structural steel if the following requirements are met:

1. The Contractor has provided both the Engineer and the Office of Materials Management an itemized invoice from the steel mill for the steel for which reimbursement is requested
2. Project structural Steel design plans are complete with no forthcoming revisions. For design build projects, Contractor accepted show drawings per 501.04, will need to be provided.
3. Contractor accepted certified test data for all steel in question along with mill shipping notices have been received by the Office of Materials Management per 501.06.
4. The steel is properly stored to allow inspection by the Office of Materials Management. It shall also be properly set apart from other material and identified as belonging to ODOT.
5. The Contractor will provide the Engineer a written statement that under 106, the Contractor is responsible for the steel that has been paid for until the actual steel is erected and accepted in the field.
6. Payment shall only be authorized after all the aforementioned documentation has been received by the Office of Materials Management and the steel has been inspected by the Office of Materials Management to verify that all steel listed in the itemized invoice has been received by the fabricator and properly stored. The amount to be paid shall be equivalent to the itemized invoice from the steel mill, but shall not exceed 50% of the bid price for the structural steel.

The City of Beavercreek will not pay delivered materials on small warehouse items or for plant materials.

**109.11 Partial Acceptance.** Upon completion of a portion of the Work, the Contractor may request acceptance of a completed portion of the Work.

- A. An inspection may be performed on a completed portion of the project roadway section provided:
  1. All safety items are in place including permanent pavement markings.
  2. Traffic is in its final pattern.
  3. A completed portion of the project constitutes a completed geographic section of the project or a direction of traffic on a divided highway.
  4. Is in accordance with other contract provisions.

- B. An inspection may be performed on a completed bridge provided:
1. All work on the bridge and approaches are complete, including all safety items and permanent pavement markings.
  2. The Contractor will not return to the bridge for any work except as allowed in 4.
  3. Traffic is in its final pattern.
  4. Painting of structural steel is either completed or scheduled to be performed.
  5. Is in accordance with other contract provisions.

The Final Inspector will grant written partial acceptance for that portion of the Work or reject the Contractor's request. Such written partial acceptance will designate what portion of the Work is accepted, the date of acceptance, and the warranty provisions started by the partial acceptance.

Partial acceptance will relieve the Contractor of maintenance responsibility for the designated portion of the Work. This does not relieve the Contractor of responsibility to correct defective Work or repair damage caused by the Contractor or waive any other remedy to which the City of Beavercreek is entitled at law or in equity.

#### 109.12 Final Acceptance.

- A. **Final Inspection.** The City of Beavercreek will perform a Final Inspection for the sole purpose of relieving the Contractor of maintenance responsibility for the Work.

The Final Inspection shall be a limited visual review of the Work and shall only serve as the City of Beavercreek's verification that the Work appears substantially complete. Final inspection does not waive any available rights or remedies of the

City of Beavercreek, nor divest the Contractor of any responsibility for compliance with the contract or liability for damages.

Notify the Engineer when the Project is complete and all of the Engineer's punch list items are complete. If the Engineer agrees the Project is complete, then within 10 business days the District Final Inspector will inspect the Work and categorize it as one of the following:

1. Unacceptable or not complete.
2. Substantially complete with punch list items found by the Final Inspector.
3. Substantially complete.

If the Final Inspector finds the Work substantially complete or substantially complete with punch list items, then the Contractor's maintenance responsibilities end on the day of the Final Inspection, except for any maintenance related to unfinished punch list items. This does not relieve the Contractor of responsibility to correct defective Work or repair damage caused by the Contractor or waive any other remedy to which the City of Beavercreek is entitled at law or in equity. The Final Inspector will issue a Final Inspection Report that will document the findings of the inspection and start any warranty period.

- B. **Punch List.** The Final Inspector will issue to the Contractor a written punch list of work required as a condition of acceptance. The Final Inspector's punch list will stipulate a reasonable time to complete the required Work. Failure of the Contractor to complete the punch list items by the stipulated time will result in the assessment of fifty percent of the Liquidated Damages according to 108.07 for each Calendar Day for every day beyond the stipulated time the punch list work remains incomplete and beyond the revised Completion Date.
- C. **Finalization.** The Contractor shall accept the final quantities as determined by the Engineer or provide a written notice indicating the reason for disagreement within 30 Calendar Days of receiving the Engineer's list of final quantities. The prescribed 30 Calendar Day period can be modified by mutual agreement of the Contractor and the District Construction Engineer. If no notice of disagreement is received, then the final payment will be based on the Engineer's list of final quantities.

Supply all documents necessary for Project finalization within 60 Calendar Days from the date that the Work is physically complete. These documents include:

1. Delinquent material certifications.
2. Delinquent certified payrolls or required revised payrolls.
3. Wage affidavit required by ORC Chapter 4115 on projects without any Federal funding.
4. Delinquent force account records.
5. If applicable, DBE affidavits.
6. Any other document required to complete finalization of the project.

Failure to submit these acceptably completed documents will result in an administrative fee of \$100 per Calendar Day for every day that any of the required documents remain delinquent, starting 30 Calendar Days after receipt of written notification from the Engineer of a document deficiency.

D. Final Payment. Final payment is based on:

1. The agreed final quantities or as determined by the Engineer if agreement is not possible, no compensation for unauthorized work is allowed.
2. Finding of substantial completion by the Final Inspector.
3. Receipt of acceptable finalization documents.
4. Contractor certification that the Work was performed in accordance with the contract.

F. Completion of Contract and Continuation of Contractor's Responsibility.

The Contract is complete, except for items covered by the required bonds, when the Contractor receives final payment. The DCA will issue a letter confirming completion of the contract, noting any exception as provided in Items 659 and 661 and any warranty. The date the final payment is approved by the District constitutes acceptance for the purpose of ORC 5525.16. Neither Completion of the Contract nor substantial completion relieves the Contractor of any responsibilities to properly perform or correct the Work or to repair damage or waives any remedies to which the City of Beaver Creek is entitled at law or in equity.

**PREVAILING  
WAGE  
RATES**

## Prevailing Wage Determination Cover Letter

County: GREENE ✓  
Determination Date: 07/28/2023  
Expiration Date: 10/28/2023

THE FOLLOWING PAGES ARE PREVAILING RATES OF WAGES ON PUBLIC IMPROVEMENTS FAIRLY ESTIMATED TO BE MORE THAN THE AMOUNT IN O.R.C. SEC. 4115.03 (b) (1) or (2), AS APPLICABLE.

Section 4115.05 provides, in part: "Where contracts are not awarded or construction undertaken within ninety days from the date of the establishment of the prevailing wages, there shall be a redetermination of the prevailing rate of wages before the contract is awarded." The expiration date of this wage schedule is listed above for your convenience only. This wage determination is not intended as a blanket determination to be used for all projects during this period without prior approval of this Department.

Section 4115.04, Ohio Revised Code provides, in part: "Such schedule of wages shall be attached to and made a part of the specifications for the work, and shall be printed on the bidding blanks where the work is done by contract..."

The contract between the letting authority and the successful bidder shall contain a statement requiring that mechanics and laborers be paid a prevailing rate of wage as required in Section 4115.06, Ohio Revised Code.

The contractor or subcontractor is required to file with the contracting public authority upon completion of the project and prior to final payment therefore an affidavit stating that he has fully complied with Chapter 4115 of the Ohio Revised Code.

The wage rates contained in this schedule are the "Prevailing Wages" as defined by Section 4115.03, Ohio Revised Code (the basic hourly rates plus certain fringe benefits). These rates and fringes shall be a minimum to be paid under a contract regulated by Chapter 4115 of the Ohio Revised Code by contractors and subcontractors. The prevailing wage rates contained in this schedule include the effective dates and wage rates currently on file. In cases where future effective dates are not included in this schedule, modifications to the wage schedule will be furnished to the Prevailing Wage Coordinator appointed by the public authority as soon as prevailing wage rates increases are received by this office.

"There shall be posted in a prominent and accessible place on the site of work a legible statement of the Schedule of Wage Rates specified in the contract to the various classifications of laborers, workmen, and mechanics employed, said statement to remain posted during the life of such contract." Section 4115.07, Ohio Revised Code.

Apprentices will be permitted to work only under a bona fide apprenticeship program if such program exists and if such program is registered with the Ohio Apprenticeship Council.

Section 4115.071 provides that no later than ten days before the first payment of wages is due to any employee of any contractor or subcontractor working on a contract regulated by Chapter 4115, Ohio Revised Code, the contracting public authority shall appoint one of his own employees to act as the prevailing wage coordinator for said contract. The duties of the prevailing wage coordinator are outlined in Section 4115.071 of the Ohio Revised Code.

Section 4115.05 provides for an escalator in the prevailing wage rate. Each time a new rate is established, that rate is required to be paid on all ongoing public improvement projects.

A further requirement of Section 4115.05 of the Ohio Revised Code is: "On the occasion of the first pay date under a contract, the contractor shall furnish each employee not covered by a collective bargaining agreement or understanding between employers and bona fide organizations of Labor with individual written notification of the job classification to which the employee is assigned, the prevailing wage determined to be applicable to that classification, separated into the hourly rate of pay and the fringe payments, and the identity of the prevailing wage Coordinator appointed by the public authority. The contractor or subcontractor shall furnish the same notification to each affected employee every time the job classification of the employee is changed."

Work performed in connection with the installation of modular furniture may be subject to prevailing wage.

**THIS PACKET IS NOT TO BE SEPARATED BUT IS TO REMAIN COMPLETE AS IT IS SUBMITTED TO YOU. (Reference guidelines and forms are included in this packet to be helpful in the compliance of the Prevailing Wage law.)**

wh1500

# PREVAILING WAGE THRESHOLD LEVELS

## IMPORTANT NOTICE

Before advertising for bids, contracting, or undertaking construction with its own forces, to construct a public improvement, the Public Authority shall have the Ohio Department of Commerce-Division of Industrial Compliance, Bureau of Wage and Hour Administration determine the prevailing rates of wages for workers employed on the public improvement. The wage determination must be included in the project specifications and printed on the bidding blanks where work is done by contract.

<b>“New” construction threshold for <i>Building Construction</i>:</b>	<b>\$250,000</b>
---	------------------

<b>“Reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting” threshold level for <i>Building Construction</i>:</b>	<b>\$75,000</b>
---	-----------------

---

<b>As of January 1, 2022:</b>	
<b>“New” construction that involves <i>roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction</i> threshold level has been adjusted to:</b>	<b>\$96,091</b>
<b>“Reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting” that involves <i>roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction</i> threshold level has been adjusted to:</b>	<b>\$28,789</b>

- A) Thresholds are to be adjusted biennially by the Director of the Ohio Department of Commerce.
- B) Biennial adjustments to threshold levels are made according to the Building Cost for Skilled Labor Index published by McGraw-Hill’s Engineering News-Record, but may not increase or decrease more than 3% for any year.

If there are questions concerning this notification, please contact:

Ohio Department of Commerce  
Division of Industrial Compliance  
Bureau of Wage and Hour Administration  
6606 Tussing Road, PO Box 4009  
Reynoldsburg, Ohio 43068-9009  
Phone: 614-644-2239  
Fax: 614-728-8639  
[www.com.ohio.gov](http://www.com.ohio.gov)







Affidavit of Compliance

Prevailing Wages

I, \_\_\_\_\_ (Name of person signing affidavit) (Title)

do hereby certify that the wages paid to all employees of

\_\_\_\_\_ (Company Name)

for all hours worked on the

\_\_\_\_\_ (Project name and location)

project, during the period from \_\_\_\_\_ to \_\_\_\_\_ are in (Project Dates)

compliance with prevailing wage requirements of Chapter 4115 of the Ohio Revised Code. I further certify that no rebates or deductions have been or will be made, directly or indirectly, from any wages paid in connection with this project, other than those provided by law.

\_\_\_\_\_ (Signature of Officer or Agent)

Sworn to and subscribed in my presence this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_ (Notary Public)

The above affidavit must be executed and sworn to by the officer or agent of the contractor or subcontractor who supervises the payment of employees. This affidavit must be submitted to the owner (public authority) before the surety is released or final payment due under the terms of the contract is made.

# PREVAILING WAGE NOTIFICATION TO EMPLOYEE

Project Name:		Job Number:	
Contractor:			
Project Location:			
Jobsite posting of prevailing wage rates located:			
Prevailing Wage Coordinator		Employee	
Name:		Name:	
Street:		Street:	
City:		City:	
State / Zip:		State / Zip:	
Phone:		Phone:	
<p>You will be performing work on this project that falls under these classifications. You will be paid the appropriate rate for the type of work you are performing.</p>			
Classification	Prevailing Wage Rate Total Package	Minus Your Fringe Benefits	Your Hourly Base Rate
Hourly fringe benefits paid on your behalf by this company.			
Fringe	Amount	Fringe	Amount
Health Insurance		Health Insurance	
Life Insurance		Holiday	
Pension		Sick Pay	
Bonus		Training	
Other		<b>TOTAL HOURLY FRINGES</b>	
Contractor's Signature:		Date:	
Employee's Signature:		Date:	

# Preparing Certified Payroll Reports



[Expand All Sections](#)

## General



Contractors and subcontractors are required by law to submit certified payroll reports for work on projects covered by Ohio's Prevailing Wage Law. This form meets the reporting requirements established by Ohio Revised Code Chapter 4115.

**Note:** The use of this particular form is not mandatory, employers may submit their own forms that are approved by the public authority contracting for the project, provided that all of the required information is included.

## Certified Payroll Heading



- **Employer name and address:** Company's full name and address. Indicate if the company is a subcontractor, if so list the name of the General or Prime.
- **Project:** Name and location of the project, including county.
- **Contracting Public Authority:** Name and address of the contracting public authority.
- **Week Ending:** Month, day, and year for last day of reporting period.
- **Payroll # :** Indicates first, second, third, etc. payroll filed by the company for the project.
- **Page indicator:** number of pages included in the report.
- **Project Number:** Determined by the public authority. If there is no number leave blank.

## Information by Column



1. **Employee Name, Address and Social Security number:** This information must be provided for all employees that perform physical labor on the project. Corporate officers, partners, and salaried employees are considered employees and must be paid the prevailing rate. Individual sole proprietors do not have to pay themselves prevailing rate but must report their hours on the project.
2. **Work Class:** List classification of work actually performed by employee. If unsure of work classification, consult the Ohio department of Commerce, Wage and Hour Bureau. Employees working more than one classification should have separate line entries for each classification. Indicate what year/level for Apprentices. Be specific when using laborer and operator classifications; for example, Backhoe Operator or Asphalt Laborer.
3. **Hours Worked, Day & Date:** In the first row of column 3 enter days of pay period example; M T W T H F S S. The second row is for the date that corresponds with each day for the pay period. In the employee information section enter the number of hours worked on the prevailing wage project and which day the hours were worked. Separate rows are labeled for (ST) straight time hours and (OT) overtime hours. All hours worked after 40, must be paid at the appropriate overtime rate.
4. **Project Total Hours:** Total the hours entered for pay period.
5. **Base Rate:** Enter actual rate per hour paid to the employee. The overtime hourly rate is time and one-half the base rate listed in the prevailing wage schedule plus fringe benefits at straight time rate. The prevailing wage schedule lists the base rate plus fringe benefit amounts. These

amounts added together equal the total prevailing wage rate. Employers must pay this total amount in one of three ways.

- Total rate may be paid in entirety in the base rate to the employee; in which case, the cash designation will be checked for fringe benefits.
- Total rate may be paid as listed in prevailing wage rate schedule with total fringe amounts paid approved plans.
- Total rate may be paid with a combination of base rate and fringe payments to approved plans in amounts other than those listed in schedule.

6. **Project Gross:** Enter total gross wages earned on the project for straight time and overtime. Project hours X base rate should equal project gross.

7. **Fringes:** If fringe benefits are paid in the hourly base rate, indicate this by marking the cash space. If fringe benefits are paid to approved plans as listed in the prevailing wage rate schedule, mark the space Approved Plans. If fringe benefits are paid partially in the base rate and partially to approved plans, mark the space Cash & Approved plans. List the hourly amount paid to approved plans for each fringe. If payments are not made on a per hour basis, calculate the hourly fringe credit by dividing the yearly employer contribution by the lesser of: hours actually worked in the year (these must be documented) or 2080. Fringe benefits include: Employer's share of health insurance, life insurance, retirement plan, bonus/profit sharing, sick pay, holiday pay, personal leave, vacation, and education/training programs.

8. **Total Hours All Jobs:** Total all hours worked during the pay period including non-prevailing wage jobs.

9. **Total Gross All Jobs:** Gross amount earned in the pay period for all hours worked.

10. Self explanatory.

11. Self explanatory.

12. Self explanatory.

# Prevailing Wage Contractor Responsibilities



*This is a summary of prevailing wage contractors' responsibilities. For more detailed information please refer to [Chapter 4115 of the Ohio Revised Code](#)*

Collapse All Sections

## General Information



Ohio's prevailing wage laws apply to all public improvements financed in whole or in part by public funds when the total overall project cost is fairly estimated to be more than \$250,000 for new construction or \$75,000 for reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting.

Ohio's prevailing wage laws apply to all public improvements financed in whole or in part by public funds when the total overall project cost is fairly estimated to be more than \$91,150 for new construction that involves roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction or \$27,309 for reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting of a public improvement that involves roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction.

a. Thresholds are to be adjusted biennially by the Administrator of Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration

b. Biennial adjustments to threshold levels are made according to the Price Deflator for Construction Index, United States Department of Commerce, Bureau of the Census\*, but may not increase or decrease more than 3% for any year

## Penalties for violation



Violators are to be assessed the wages owed, plus a penalty of 100% of the wages owed.

## Intentional Violations



If an intentional violation is determined to have occurred, the contractor is prohibited from contracting directly or indirectly with any public authority for the construction of a public improvement. Intentional violation means "a willful, knowing, or deliberate disregard for any provision" of the prevailing wage law and includes but is not limited to the following actions:

- Intentional failure to submit payroll reports as required, or knowingly submitting false or erroneous reports.
- Intentional misclassification of employees for the purpose of reducing wages.
- Intentional misclassification of employees as independent contractors or as apprentices.
- Intentional failure to pay the prevailing wage.
- Intentional failure to comply with the allowable ratio of apprentices to skilled workers as required by the regulations established by Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration.

- Intentionally employing an officer, of a contractor or subcontractor, that is known to be prohibited from contracting, directly or indirectly, with a public authority.

## Responsibilities



A. Pay the prevailing rate of wages as shown in the wage rate schedules issued by the Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration, for the classification of work being performed.

1. Wage rate schedules include all modifications, corrections, escalations, or reductions to wage rates issued for the project.
2. Overtime must be paid at time and one-half the employee's base hourly rate. Fringe benefits are paid at straight time rate for all hours including overtime.
3. Prevailing wages must be paid in full without any deduction for food, lodging, transportation, use of tools, etc.; unless, the employee has voluntarily consented to these deductions in writing. The public authority and the Director of Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration - must approve these deductions as fair and reasonable. Consent and approval must be obtained before starting the project.

B. Use of Apprentices and Helpers cannot exceed the ratios permitted in the wage rate schedules.

1. Apprentices must be registered with the U.S. Department of Labor Bureau of Apprenticeship and Training.
2. Contractors must provide the Prevailing Wage Coordinator a copy of the Apprenticeship Agreement for each apprentice on the project.

C. Keep full and accurate payroll records available for inspection by any authorized representative of the Ohio Department of Commerce, Division of Industrial Compliance, and Labor, Bureau of Wage and Hour Administration or the contracting public authority, including the Prevailing Wage Coordinator. Records should include but are not limited to:

1. Time cards, time sheets, daily work records, etc.
2. Payroll ledger\journals and canceled checks\check register.
3. Fringe benefit records must include program, address, account number, & canceled checks.



4. Records made in connection with the public improvement must not be removed from the State for one year following the completion of the project.

5. Out-of-State Corporations must submit to the Ohio Secretary of State the full name and address of their Statutory Agent in Ohio.

D. Prevailing Wage Rate Schedule must be posted on the job site where it is accessible to all employees.

E. Prior to submitting the initial payroll report, supply the Prevailing Wage Coordinator with your project dates to schedule reporting of your payrolls.

F. Supply the Prevailing Wage Coordinator a list of all subcontractors including the name, address, and telephone number for each.

1. Contractors are responsible for their subcontractors' compliance with requirements of Chapter 4115 of the Ohio Revised Code.

G. Before employees start work on the project, supply them with written notification of their job classification, prevailing wage rate, fringe benefit amounts, and the name of the Prevailing Wage Coordinator for the project. A copy of the completed signed notification should be submitted to Prevailing Wage Coordinator.

H. Supply all subcontractors with the Prevailing Wage Rates and changes.

I. Submit certified payrolls within two (2) weeks after the initial pay period. Payrolls must include the following information:

1. Employees' names, addresses, and social security numbers.

a. Corporate officers/owners/partners and any salaried personnel who do physical work on the project are considered employees. All rate and reporting requirements are applicable to these individuals.

2. Employees' work classification.

a. Be specific about the laborers and/or operators (Group)

b. For all apprentices, show level/year and percent of journeyman's rate

3. Hours worked on the project for each employee.

a. The number of hours worked in each day and the total number of hours worked each week.

4. Hourly rate for each employee.

a. The minimum rate paid must be the wage rate for the appropriate classification. The Department's Wage Rate Schedule sets this rate.

b. All overtime worked is to be paid at time and one-half for all hours worked more than forty (40) per week.

5. Where fringes are paid into a bona fide plan instead of cash, list each benefit and amount per hour paid to program for each employee.
    - a. When the amount contributed to the fringe benefit plan and the total number of hours worked by the employee on all projects for the year are documented, the hourly amount is calculated by dividing the total contribution of the employer by the total number of hours worked by the employee.
    - b. When the amount contributed to the fringe benefit is documented but not the total hours worked, the hourly amount is calculated by dividing the total yearly contribution by 2080.
  6. Gross amount earned on all projects during the pay period.
  7. Total deductions from employee's wages.
  8. Net amount paid.
- J. The reports shall be certified by the contractor, subcontractor, or duly appointed agent stating that the payroll is correct and complete; and that the wage rates shown are not less than those required by the O.R.C. 4115.
- K. Provide a Final Affidavit to the Prevailing Wage Coordinator upon the completion of the project.

## Certified Payroll Report

**Report for:** \_\_\_\_\_  Check if Subcontractor<sup>1)</sup> Contract No: \_\_\_\_\_ Payroll No: \_\_\_\_\_  
 Company:<sup>1)</sup> \_\_\_\_\_ If Sub, GC/Prime Contractor Name: \_\_\_\_\_  
 Address: \_\_\_\_\_ Project Name & Location: \_\_\_\_\_ Week Ending: \_\_\_\_\_  
 City, State, Zip \_\_\_\_\_ Public Authority (Owner): \_\_\_\_\_ Sheet:<sup>2)</sup> \_\_\_\_\_ of \_\_\_\_\_  
 Phone No: \_\_\_\_\_

1. Employee Name, Address, & SS# (Last 4 digits if permitted)	2. Work Class <sup>3)</sup>	3. Prevailing Wage Project Hours Worked - Day & Date							4. Total Hours	5. Base Rate	6. Project Gross	7. Fringes: <input type="checkbox"/> Cash <input type="checkbox"/> Approved Plans <input type="checkbox"/> Cash & Approved Plans						Weekly Payroll Amount			
		Fringe Rate Your Company Pays Per Hour						8. Total Hrs for all Jobs				9. Total Gross on All Jobs	10. Total Deductions	11. Net Pay on All Jobs							
		H&W	Pens	Vac	Hol	Other	Total														
	OT																				
	ST																				
	OT																				
	ST																				
	OT																				
	ST																				
	OT																				
	ST																				
	OT																				
	ST																				

1.) By signing below, I certify that: (1) I pay, or supervise the payment of the employees shown above; (2) during the pay period reported on this form, all hours worked on this project have been paid at the appropriate prevailing wage rate for the class of work done; (3) the fringe benefits have been paid as indicated above; (4) no rebates or deductions have been or will be made, directly or indirectly from the total wages earned, other than permissible deductions as defined in ORC Chapter 4115; and (5) apprentices are registered with the U.S. Dept. of Labor, Bureau of Apprenticeship and Training. I understand that the willful falsification of any of the above statements may subject the Contractor or Subcontractor to civil or criminal prosecution.

Type or Print Name and Title \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Date \_\_\_\_\_

I, \_\_\_\_\_ (Name of Signatory Party) \_\_\_\_\_ (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

\_\_\_\_\_ on the \_\_\_\_\_ (Contractor or Subcontractor)

\_\_\_\_\_ ; that during the payroll period commencing on the \_\_\_\_\_ (Building or Work)

\_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, and ending the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_,

all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

\_\_\_\_\_ from the full \_\_\_\_\_ (Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

- in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

- Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE
----------------	-----------

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 3729 OF TITLE 31 OF THE UNITED STATES CODE.

# Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter Millwright Local 1090 SW Zone II

Change # : LCN01-2023ibLoc1090SW2

Craft : Carpenter Effective Date : 09/20/2023 Last Posted : 09/20/2023

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Millwright	\$33.50		\$8.13	\$6.95	\$0.62	\$0.00	\$7.47	\$0.18	\$0.00	\$0.00	\$56.85	\$73.60
Apprentice	Percent											
1st 6 months	60.00	\$20.10	\$8.13	\$4.27	\$0.62	\$0.00	\$4.48	\$0.18	\$0.00	\$0.00	\$37.78	\$47.83
2nd 6 months	65.00	\$21.78	\$8.13	\$4.61	\$0.62	\$0.00	\$4.86	\$0.18	\$0.00	\$0.00	\$40.17	\$51.06
3rd 6 months	70.00	\$23.45	\$8.13	\$4.94	\$0.62	\$0.00	\$5.23	\$0.18	\$0.00	\$0.00	\$42.55	\$54.28
4th 6 months	75.00	\$25.12	\$8.13	\$5.28	\$0.62	\$0.00	\$5.60	\$0.18	\$0.00	\$0.00	\$44.94	\$57.50
5th 6 months	80.00	\$26.80	\$8.13	\$5.61	\$0.62	\$0.00	\$5.98	\$0.18	\$0.00	\$0.00	\$47.32	\$60.72
6th 6 months	85.00	\$28.47	\$8.13	\$5.95	\$0.62	\$0.00	\$6.35	\$0.18	\$0.00	\$0.00	\$49.71	\$63.94
7th 6 months	90.00	\$30.15	\$8.13	\$6.28	\$0.62	\$0.00	\$6.72	\$0.18	\$0.00	\$0.00	\$52.08	\$67.16
8th 6 months	95.00	\$31.82	\$8.13	\$6.62	\$0.62	\$0.00	\$7.10	\$0.18	\$0.00	\$0.00	\$54.47	\$70.39

**Special Calculation Note :** Other (\$0.18) \$0.13 National Fund and \$0.05 for National Millwright Fund.

**Ratio :**  
3 Journeymen to 1 Apprentice

**Jurisdiction ( \* denotes special jurisdictional note ) :**  
CHAMPAIGN, CLARK, DARKE, GREENE, LOGAN, MIAMI,  
MONTGOMERY, PREBLE, SHELBY

**Special Jurisdictional Note :**

**Details :**

# Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter & Pile Driver  
SW Zone 1

**Change # : LCN01-2023ibLoc136SWZone1**

**Craft : Carpenter Effective Date : 06/07/2023 Last Posted : 06/07/2023**

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter	\$30.22		\$8.00	\$6.95	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$48.52	\$63.63
Pile Driver	\$30.22		\$8.00	\$6.95	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$48.52	\$63.63
Apprentice	Percent											
1st 3 Months	60.00	\$18.13	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$18.13	\$27.20
2nd 3 Months	60.00	\$18.13	\$8.00	\$0.00	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$29.48	\$38.55
2rd 6 Months	60.00	\$18.13	\$8.00	\$0.00	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$29.48	\$38.55
3th 6 Months	65.00	\$19.64	\$8.00	\$0.00	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$30.99	\$40.81
4th 6 Months	65.00	\$19.64	\$8.00	\$0.00	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$30.99	\$40.81
5th 6 Months	70.00	\$21.15	\$8.00	\$6.95	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$39.45	\$50.03
6th 6 Months	75.00	\$22.66	\$8.00	\$6.95	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$40.97	\$52.30
7th 6 Months	80.00	\$24.18	\$8.00	\$6.95	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$42.48	\$54.56
8th 6 Months	85.02	\$25.69	\$8.00	\$6.95	\$0.60	\$0.00	\$2.60	\$0.15	\$0.00	\$0.00	\$43.99	\$56.84

**Special Calculation Note : Other is for UBC National Fund**

**Ratio :**  
1 Journeyman to 1 Apprentice

**Jurisdiction (\* denotes special jurisdictional note) :**  
CHAMPAIGN, CLARK, DARKE, GREENE, LOGAN, MIAMI, MONTGOMERY, PREBLE, SHELBY

**Special Jurisdictional Note :**

**Details :**

Carpenter duties shall include but not limited to: Pile driving, milling, fashioning, joining, assembling, erecting, fastening, or dismantling of all material of wood, plastic, metal, fiber, cork, and composition, and all other substitute materials: pile driving, cutting, fitting, and placing of lagging, and the handling, cleaning, erecting, installing, and dismantling of machinery, equipment, and erecting pre-engineered metal buildings. Pile Drivers work but not limited to: unloading, assembling, erection, repairs, operation, signaling, dismantling, and reloading all equipment that is used for pile driving including pile butts. pile butts is defined as sheeting or scrap piling. Underwater work that may be required in connection with the installation of piling. The diver and his tender work as a team and shall arrive at their own financial arrangements with the contractor. Any configuration of wood, steel, concrete, or composite that is jetted, driven, or vibrated onto the ground by conventional pile driving equipment for the purpose of supporting a future load that may be permanent or temporary. Driving bracing, plumbing, cutting off and capping of all piling whether wood, metal, pipe piling or composite. loading, unloading, erecting, framing, dismantling, moving, and handling of pile driving equipment. piling used in the construction and repair of all wharves, docks, piers, trestles, caissons, cofferdams, and the erection of all sea walls and breakwaters. All underwater and marine work on 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. Rate shall include carpenters, acoustic, and ceiling installers, drywall installers, pile drivers, and floorlayers.

# Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter & Pile Driver SW District HevHwy

Change # : LCN01-2023ibCarpSWHevHwy

Craft : Carpenter Effective Date : 05/03/2023 Last Posted : 05/03/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Journeyman	\$33.28		\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$53.99	\$70.63
Apprentice	Percent											
1st 6 Months	60.00	\$19.97	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$40.68	\$50.66
2nd 6 Months	65.00	\$21.63	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$42.34	\$53.16
3rd 6 Months	70.00	\$23.30	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$44.01	\$55.65
4th 6 Months	75.00	\$24.96	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$45.67	\$58.15
5th 6 Months	80.00	\$26.62	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$47.33	\$60.65
6th 6 Months	85.00	\$28.29	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$49.00	\$63.14
7th 6 Months	90.00	\$29.95	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$50.66	\$65.64
8th 6 Months	95.00	\$31.62	\$8.44	\$6.95	\$0.60	\$0.00	\$4.57	\$0.15	\$0.00	\$0.00	\$52.33	\$68.13

**Special Calculation Note :** Other is UBC National Fund.

**Ratio :**

1 Journeyman to 1 Apprentice

**Jurisdiction (\* denotes special jurisdictional note) :**

BROWN, BUTLER, CHAMPAIGN, CLARK, CLERMONT, CLINTON, DARKE, GREENE, HAMILTON, LOGAN, MIAMI, MONTGOMERY, PREBLE, SHELBY, WARREN

An employer shall have the right to employ one (1) Apprentice for one (1) Journeyman Carpenter in its employment for the first Apprentice employed, and 1 (1) Apprentice for two (2) Journeyman Carpenter for additional Apprentices employed.

Thereafter, every third additional carpenter hired shall be an apprentice, if available, and if practical for the type of work being performed.

**Special Jurisdictional Note :**

**Details :**

Highway Construction, Airport Construction, Heavy Construction but not limited to:(tunnels,subways,drainage projects,flood control,reservoirs). Railroad Construction,Sewer Waterworks & Utility Construction but not limited to: (storm sewers, waterlines, gaslines). Industrial & Building Site, Power Plant, Amusement Park, Athletic Stadium Site, Sewer and Water Plants.

When the Contractor furnishes the necessary underwater gear for the Diver, the Diver shall be paid one and one half (1&1/2) times the journeyman rate for the time spent in the water.

# Prevailing Wage Rate Skilled Crafts

Name of Union: Cement Mason Local 132 (Dayton)

Change # : LCN01-2023ibLoc132

Craft : Cement 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												
Cement Mason	\$28.32		\$8.05	\$7.35	\$0.85	\$0.00	\$2.35	\$0.06	\$0.00	\$0.00	\$46.98	\$61.14
Apprentice	Percent											
1st Six Months	70.00	\$19.82	\$8.05	\$7.35	\$0.85	\$0.00	\$2.35	\$0.06	\$0.00	\$0.00	\$38.48	\$48.40
2nd Six Months	80.00	\$22.66	\$8.05	\$7.35	\$0.85	\$0.00	\$2.35	\$0.06	\$0.00	\$0.00	\$41.32	\$52.64
3rd Six Months	90.00	\$25.49	\$8.05	\$7.35	\$0.85	\$0.00	\$2.35	\$0.06	\$0.00	\$0.00	\$44.15	\$56.89

**Special Calculation Note :** No special calculations for this skilled craft wage rate are required at this time. \*Other is International Training

**Ratio :**  
2 Journeymen to 1 Apprentice

**Jurisdiction ( \* denotes special jurisdictional note ) :**  
CHAMPAIGN, CLARK, CLINTON, DARKE, GREENE, MIAMI, MONTGOMERY, PREBLE, SHELBY

**Special Jurisdictional Note :**

**Details :**

Other: Is Industry Promotion: Cement Masons on outrigger, swing, scaffolds, manlifts -\$ .75 per hour above scale up to (25) feet and \$.75 per hour for each additional (25) feet or part of same. A Cement Mason operating a grinder- \$.30 per hour above the journeyman scale.



# Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 82 Inside

Change # : LCN01-2022ibLoc82in

Craft : Electrical Effective Date : 12/05/2022 Last Posted : 11/23/2022

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Electrician	\$34.25		\$7.45	\$9.63	\$0.58	\$0.00	\$3.60	\$0.00	\$0.00	\$0.00	\$55.51	\$72.63
Apprentice	Percent											
1st period 0 - 1000 hrs	42.00	\$14.39	\$4.07	\$0.63	\$0.24	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$19.32	\$26.52
2nd period 1001-2000 hrs	42.00	\$14.39	\$4.07	\$0.63	\$0.24	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$19.32	\$26.52
3rd period 2001-3500 hrs	47.00	\$16.10	\$6.92	\$4.52	\$0.27	\$0.00	\$1.69	\$0.00	\$0.00	\$0.00	\$29.50	\$37.55
4th period 3501-5000 hrs	52.00	\$17.81	\$6.97	\$5.00	\$0.30	\$0.00	\$1.87	\$0.00	\$0.00	\$0.00	\$31.95	\$40.85
5th period 5001-6500 hrs	62.02	\$21.24	\$7.07	\$5.97	\$0.36	\$0.00	\$2.23	\$0.00	\$0.00	\$0.00	\$36.87	\$47.49
6th period 6501-8000 hrs	77.00	\$26.37	\$7.22	\$7.41	\$0.45	\$0.00	\$2.77	\$0.00	\$0.00	\$0.00	\$44.22	\$57.41

**Special Calculation Note :** No special calculations for this skilled craft wage rate are required at this time.

**Ratio :**

1 to 3 Journeymen to 3 Apprentices  
4 to 6 Journeymen to 6 Apprentices  
per job site

**Jurisdiction ( \* denotes special jurisdictional note ) :**

CLINTON, DARKE, GREENE, MIAMI, MONTGOMERY,  
PREBLE, WARREN\*

**Special Jurisdictional Note :** The following townships in Warren County are included: Clearcreek, Franklin and Wayne.

**Details :**

Only correction made on 6-19-19 was the 5th year Apprentice fb.

# Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 82 Lightning Rod

Change # : LCN02-2022ibLoc82

Craft : Electrical Effective Date : 12/05/2022 Last Posted : 11/23/2022

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lightning Rod Technican	\$32.79	\$7.45	\$9.58	\$0.00	\$0.00	\$3.50	\$0.00	\$0.00	\$0.00	\$53.32	\$69.71

**Special Calculation Note :** No Apprentice approved by OSAC.

**Ratio :**

**Jurisdiction ( \* denotes special jurisdictional note ) :**  
 CLINTON, DARKE, GREENE, MIAMI, MONTGOMERY,  
 PREBLE, WARREN\*

**Special Jurisdictional Note :** The following townships in Warren County are included: (Clearcreek, Franklin and Wayne)

**Details :**

# Prevailing Wage Rate Skilled Crafts

Name of Union: Ironworker Local 290

Change # : LCN01-2021fbLoc290

Craft : Ironworker Effective Date : 01/27/2021 Last Posted : 01/27/2021

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate	
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)			
Classification												
Ironworker Structural	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Welder	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Fence Erector	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Reinforcing Rods	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Machinery Mover	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Sheeter	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Metal Building Erector	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Rigger & Erector	\$29.68	\$8.30	\$9.50	\$0.65	\$0.00	\$4.45	\$0.02	\$0.00	\$0.00	\$52.60	\$67.44	
Apprentice	Percent											
1st year	65.05	\$19.31	\$8.30	\$9.50	\$0.65	\$0.00	\$2.95	\$0.02	\$0.00	\$0.00	\$40.73	\$50.38
2nd year	75.07	\$22.28	\$8.30	\$9.50	\$0.65	\$0.00	\$2.95	\$0.02	\$0.00	\$0.00	\$43.70	\$54.84
3rd year	85.05	\$25.24	\$8.30	\$9.50	\$0.65	\$0.00	\$2.95	\$0.02	\$0.00	\$0.00	\$46.66	\$59.28
4th year	95.05	\$28.21	\$8.30	\$9.50	\$0.65	\$0.00	\$2.95	\$0.02	\$0.00	\$0.00	\$49.63	\$63.74

Special Calculation Note : Other is for Industry Fund.

**Ratio :**

3 Journeymen to 1 Apprentice

**Jurisdiction ( \* denotes special jurisdictional note ) :**

ALLEN\*, AUGLAIZE, BUTLER\*, CHAMPAIGN\*, CLARK, CLINTON, DARKE, FAYETTE\*, GREENE, HARDIN\*, HIGHLAND\*, LOGAN\*, MADISON\*, MERCER\*, MIAMI, MONTGOMERY, PREBLE, SHELBY, VAN WERT\*, WARREN\*

**Special Jurisdictional Note :** Allen County Twps included are: Auglaize, Perry, Shawnee, Amanda, Spencer, Marion, Sugar Creek, American, Bath, Jackson. Butler County Twps included are: Milford, Wayne, Madison, Lemon. Champaign Cnty Twps included are: Union, Urbana, Jackson, Concord, Salem, Mad River, Johnson, Harrison, Adams. Fayette County Twps included are: Green, Jasper, Concord, Jefferson. Hardin County Twps included are: Round Head, Marion, Liberty. Highland County Twps included are: Fairfield, Penn, Union, Marshall, Liberty, Paint, Brush Creek. Logan County Twps included are: Richland, Stokes, Bloomfield, Washington, Harrison, McArthur, Lake, Liberty, Pleasant, Miami. Madison County Twps included are: Stokes. Mercer County Twps included are: Dublin, Washington, Jefferson, Recovery, Gibson, Union, Liberty, Butler, Granville, Center, Hopewell, Franklin, Marion. VanWert County Twps included are: Jennings. Warren County Twps included are: Franklin, Clear Creek, Turtle Creek, Wayne, Massie, Washington, Salem, Union.

**Details :**

Structural Iron Work but not limited to:field fabrication, all loading to and including the erecting,rigging,assembly,dismantling, placing, temporary and permanent securing by any means of all structural iron,steel,ornamental lead,bronze,brass,copper,aluminum,glass all ferrous and non ferrous metal and composite material, precast prestressed and post-stressed concrete structures. Bridges and bridge rails,bridge viaducts,bucks bulkheads,bumper and bumper post,canopies and unistrut canopies,corrugated ferrous and non ferrous sheets when attached to steel frames,columns,beams,bar-joists,trusses,grinders,roof decking,electrical supports,elevator cars,elevator fronts and enclosures,erection of steel towers,flag poles, gymnasium equipment,stadium and arena seating,jail cell work,jail cell beds,benches,bunks,chairs,tables,mirrors,jail cell access doors,rigging and installation of machinery and equipment(erecting,aligning,anchoring and dismantling, erection and dismantling of tower cranes,derrick monorail systems, Chicago booms,overhead cranes,gantries,material and personnel hoists,tanks,hoppers and

conveyors. All pre-engineered metal buildings and their entirety including siding, roofing, gutters, downspouts and erection of all.

Ornamental Iron Work but not limited to: all work in connection with field fabrication, handling including loading/off loading, sorting, cutting, fastening, anchoring, bending, hoisting, placing, burning, welding, and tying, dismantling of all materials used in miscellaneous iron or steel, for stairs, hand railings, rolling doors, rolling gates, rolling shutters, fence, windows, curtain wall, erection and welding of all metal, sash, architectural and ornamental treatments, but not necessarily limited to all sizes and types of ornamental, steel iron, lead, bronze, brass, copper, aluminum, all ferrous and non ferrous metals and composite materials

Fence Erector Iron Worker but not limited to: All work in connection with the field fabrication and erection of chain link fence, which includes but not limited to the loading and of the fence fabric and posts also the installation of the above.

# Prevailing Wage Rate Skilled Crafts

Name of Union: Labor Local 1410 Building

Change # : LCN01-2023ibLoc1410

Craft : Laborer Effective Date : 04/05/2023 Last Posted : 04/05/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Laborer Group 1	\$30.35		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$43.10	\$58.28
Group 2	\$30.95		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$43.70	\$59.17
Group 3	\$31.45		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.20	\$59.92
Apprentice												
Percent												
Building Laborer 1-1000 hrs	60.00	\$18.21	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$30.96	\$40.07
1001-2000	70.02	\$21.25	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$34.00	\$44.63
2001-3000	80.00	\$24.28	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$37.03	\$49.17
3001-4000	89.99	\$27.31	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$40.06	\$53.72
More than 4000 hrs	100.00	\$30.35	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$43.10	\$58.28

Special Calculation Note : \$0.10 LECET is for Labor Management.

**Ratio :**

1 Journeymen to 1 Apprentice  
4 Journeymen to 1 Apprentice

**Jurisdiction ( \* denotes special jurisdictional note ) :**

CHAMPAIGN, CLARK, DARKE, GREENE, LOGAN, MIAMI, MONTGOMERY, PREBLE

**Special Jurisdictional Note :**

**Details :**

**Group 1**

Building & Construction Laborer, Railroad Laborer, Asbestos & Hazardous Waste (Levels A,B,C, & D), Concrete Crew, Form Setter, Pipelayer, Bottom Man, Burner (Cutting Torch), Welder Helper, All Machine & Power Driven Tools, Sandblaster Yardman-Landscaping, Sewer Jet, Waterperson, Tool Cage Laborer, Unloading Furniture & Fixtures, Final Clean-Up Watchman, Residential Construction, Signal Men

**Group 2**

Mason Tender For Bricklayers, Flexcore, Firebrick Tender (Blast Furnaces, Soaking Pits, Stoves & Stacks), Plasterer Tenders & Lathers

**Group 3**

Tender Operator

**Asbestos, Lead and Hazardous Material:**

The removal, abatement or encapsulation of asbestos, lead and/or toxic and hazardous waste or materials is defined as all work included in the erection, moving servicing and dismantling of all enclosures, scaffolding, barricades, etc. and the operation of all tools and equipment (including generators, compressors and vacuums) normally used in the removal or abatement or asbestos, lead and toxic and hazardous waste or materials; the labeling, bagging, cartoning, crating or otherwise packaging of materials for disposal; as well as the clean-up of the work site and all other work incidental to the removal, abatement or encapsulation of asbestos, lead or toxic and hazardous waste materials.

**Level A**

Protective equipment is required when the area has been determined to contain extremely toxic contaminants or contaminants unknown but may be expected to be extremely toxic and/or immediately dangerous to life and health. This ensemble includes a fully encapsulated chemical suit, self contained breathing apparatus (SCBA) or airline fed respirator, and various types and numbers of boots and gloves.

**Level B**

Protective equipment includes 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.

Level C

Protective equipment includes a protective suit and an air purifying respirator (APR) with the appropriate filter canisters.

Level D

To be worn only in established "safe zones" may consist of, from normal work clothes to normal skin protection such as gloves, face shields goggles, coveralls and occasionally respiratory protection.

# Prevailing Wage Rate Skilled Crafts

Name of Union: Labor HevHwy 3

Change # : LCN01-2023ibLocalHevHwy3

Craft : Laborer Group 1 Effective Date : 05/01/2023 Last Posted : 04/26/2023

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate	
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)			
Classification												
Laborer Group 1	\$34.62	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$48.42	\$65.73	
Group 2	\$34.79	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$48.59	\$65.98	
Group 3	\$35.12	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$48.92	\$66.48	
Group 4	\$35.57	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$49.37	\$67.15	
Watch Person	\$27.35	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$41.15	\$54.83	
Apprentice		Percent										
0-1000 hrs	60.00	\$20.77	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$34.57	\$44.96
1001-2000 hrs	70.00	\$24.23	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$38.03	\$50.15
2001-3000 hrs	80.00	\$27.70	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$41.50	\$55.34
3001-4000 hrs	90.00	\$31.16	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$44.96	\$60.54
More than 4000 hrs	100.00	\$34.62	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$48.42	\$65.73

**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), Yarner, 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, Gunitite 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: Operating Engineers - Building Local 18 - Zone III

Change # : LCN01-2023ibLoc18zone3

Craft : Operating Engineer Effective Date : 05/01/2023 Last Posted : 04/26/2023

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate	
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)			
Classification												
Operator Group A	\$41.49	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.74	\$78.48	
Operator Group B	\$41.37	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.62	\$78.30	
Operator Group C	\$40.33	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$56.58	\$76.74	
Operator Group D	\$39.15	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$55.40	\$74.97	
Operator Group E	\$33.69	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.94	\$66.78	
Master Mechanic	\$41.74	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.99	\$78.86	
Cranes & Mobile Concrete Pumps 150'-180'	\$41.99	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$58.24	\$79.23	
Cranes & Mobile Concrete Pumps 180'-249'	\$42.49	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$58.74	\$79.98	
Cranes & Mobile Concrete Pumps 249' and over	\$42.74	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$58.99	\$80.36	
Apprentice	Percent											
1st Year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37
2nd Year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59
3rd Year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81
4th Year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04
Field Mechanic Trainee												
1st Year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37
2nd Year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59
3rd Year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81
4th Year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04

**Special Calculation Note :** Other: Education & Safety \$0.09; \*Misc is 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

**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,

not be subject to the apprenticeship ratios in this collective bargaining agreement 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; Gunite 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); Signalperson, 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

# Prevailing Wage Rate Skilled Crafts

Name of Union: Operating Engineers - HevHwy Zone II

Change # : LCN01-2023ibLoc18hevhwyl

Craft : Operating Engineer Effective Date : 05/01/2023 Last Posted : 04/26/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate		
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)	
Classification													
Operator Class A	\$41.49		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.74	\$78.48	
Operator Class B	\$41.37		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.62	\$78.30	
Operator Class C	\$40.33		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$56.58	\$76.74	
Operator Class D	\$39.15		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$55.40	\$74.97	
Operator Class E	\$33.69		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.94	\$66.78	
Master Mechanic	\$41.74		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.99	\$78.86	
Apprentice													
		Percent											
1st Year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37	
2nd Year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59	
3rd Year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81	
4th Year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04	
Field Mech Trainee Class 2													
1st year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37	
2nd year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59	
3rd year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81	
4th year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04	

**Special Calculation Note :** Other: Education & Safety Fund is \$0.09 per hour. \*Misc is 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); Signalperson; Survey Rodmen or Chairmen; Tire Repairmen; VAC/ALLS.  
Master Mechanic - Master Mechanic

# Prevailing Wage Rate Skilled Crafts

Name of Union: Plumber Pipefitter Local 162

Change # : LCN01-2023ibLoc162

Craft : Plumber/Pipefitter Effective Date : 08/30/2023 Last Posted : 08/30/2023

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
<b>Classification</b>											
Plumber Pipefitter	\$40.00	\$11.75	\$10.87	\$0.90	\$0.00	\$3.35	\$0.00	\$0.00	\$0.00	\$66.87	\$86.87
<b>Apprentice Indentured AFTER 6/1/2002</b>											
<b>Percent</b>											
1st Year	51.00	\$20.40	\$11.75	\$3.26	\$0.50	\$0.00	\$0.00	\$0.00	\$0.00	\$35.91	\$46.11
2nd Year	55.90	\$22.36	\$11.75	\$5.69	\$0.54	\$0.00	\$0.00	\$0.00	\$0.00	\$40.34	\$51.52
3rd Year	60.80	\$24.32	\$11.75	\$8.53	\$0.58	\$0.00	\$0.00	\$0.00	\$0.00	\$45.18	\$57.34
4th Year	72.45	\$28.98	\$11.75	\$10.63	\$0.66	\$0.00	\$0.00	\$0.00	\$0.00	\$52.02	\$66.51
5th Year	80.40	\$32.16	\$11.75	\$10.87	\$0.74	\$0.00	\$3.35	\$0.00	\$0.00	\$58.87	\$74.95

**Special Calculation Note :**

**Ratio :**

- 1 Journeyman to 1 Apprentice
- 2 - 4 Journeymen to 2 Apprentices
- 5 - 7 Journeymen to 3 Apprentices
- 8 - 10 Journeymen to 4 Apprentices

**Jurisdiction ( \* denotes special jurisdictional note ) :**

CHAMPAIGN, CLARK, CLINTON, DARKE, FAYETTE, GREENE, MIAMI, MONTGOMERY, PREBLE

**Special Jurisdictional Note :**

**Details :**

Wage rate covers: all plumbing, pipefitting, heating, refrigeration and air conditioning work.

# Prevailing Wage Rate Skilled Crafts

Name of Union: Roofer Local 75

Change # : LCN01-2022sksLoc75

Craft : Roofer Effective Date : 08/26/2022 Last Posted : 08/26/2022

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate	
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)			
Classification												
Roofer	\$25.63	\$8.73	\$8.78	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$45.70	\$58.51	
Slate and Tile	\$25.85	\$8.73	\$8.78	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$45.92	\$58.85	
Apprentice	Percent											
1st term 1000 hrs	66.32	\$17.00	\$2.50	\$0.50	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$22.56	\$31.06
2nd term 1000 hrs	70.22	\$18.00	\$8.58	\$1.32	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$30.46	\$39.46
3rd term 1000 hrs	74.12	\$19.00	\$8.58	\$2.20	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$32.34	\$41.84
4th term 1000 hrs	78.02	\$20.00	\$8.58	\$3.07	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$34.21	\$44.20
5th term 1000 hrs	81.95	\$21.00	\$8.58	\$3.95	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$36.09	\$46.60
Tradesman	79.00	\$20.25	\$5.00	\$1.58	\$0.76	\$0.00	\$0.00	\$1.80	\$0.00	\$0.00	\$29.39	\$39.51

Special Calculation Note : Other is for National Roofing Industry Pension Plan.

**Ratio :**  
3 Journeymen to 2 Apprentices

**Jurisdiction ( \* denotes special jurisdictional note ) :**  
ALLEN, AUGLAIZE, CLARK, CLINTON, DARKE, GREENE,  
MERCER, MIAMI, MONTGOMERY, PREBLE, SHELBY, VAN  
WERT

**Special Jurisdictional Note :**

**Details :**

# 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 # : LCN01-2023ibBldgHevHwy

Craft : Truck Driver Effective Date : 05/01/2023 Last Posted : 04/26/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
<b>Classification</b>												
Truck Driver CLASS 1 4 wheel service, dump, and batch trucks; drivers on tandems; truck sweepers (not to include power sweepers & scrubbers)	\$31.24		\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.39	\$64.01
<b>Apprentice Percent</b>												
First 6 months	80.00	\$24.99	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.14	\$54.64
7-12 months	85.00	\$26.55	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.70	\$56.98
13-18 months	90.00	\$28.12	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.27	\$59.32
19-24 months	95.00	\$29.68	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.83	\$61.67
25-30 months	100.00	\$31.24	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.39	\$64.01

**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 :**

# Prevailing Wage Rate Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 2  
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCN01-2023ibBldgHevHwy

Craft : Truck Driver Effective Date : 05/01/2023 Last Posted : 04/26/2023

Classification	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
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)	\$31.66		\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.81	\$64.64
<b>Apprentice</b>	<b>Percent</b>											
First 6 months	80.00	\$25.33	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.48	\$55.14
7-12 months	85.00	\$26.91	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.06	\$57.52
13-18 months	90.00	\$28.49	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.64	\$59.89
19-24 months	95.00	\$30.08	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$47.23	\$62.27
25-30 months	100.00	\$31.66	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.81	\$64.64

**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 # : LCN01-2023ibBldgHevHwy3

Craft : Truck Driver Effective Date : 05/01/2023 Last Posted : 04/26/2023

	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)	\$32.66		\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.81	\$66.14
Apprentice	Percent											
First 6 months	80.00	\$26.13	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.28	\$56.34
7-12 months	85.00	\$27.76	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.91	\$58.79
13-18 months	90.00	\$29.39	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.54	\$61.24
19-24 months	95.00	\$31.03	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.18	\$63.69
25-30 months	100.00	\$32.66	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.81	\$66.14

**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 :**

**SECTION 00 11 30 - ABBREVIATED SCOPE OF WORK**

**THE FOLLOWING IS AN ABBREVIATED SCOPE OF WORK INTENDED TO PROVIDE POTENTIAL BIDDERS WITH INFORMATION AS TO THE SIZE AND NATURE OF THE PROJECT. BIDDERS ARE TO REFER TO THE DRAWINGS AND SPECIFICATIONS FOR THE COMPLETE SCOPE OF WORK.**

**P** 21062.00 **C** **B** **S** **B** **& 9-A** **P** **S** **I**  
**2260 D**-**X** **R**  
**B**, **O** **45432**  
**GM P** **N** **21062.00**  
**B** **C** **L** **S** **G** **C**

**PROJECT SCOPES OF WORK**

**G** **C**

Includes demolition of an existing concrete and wood framed salt barn on site. New construction includes a concrete and tension fabric structure salt barn, a wood framed cold storage shed and a small concrete masonry unit shed to house brine production equipment that is attached to the salt barn concrete walls.

**S** **W**

The project consists of reinforced concrete walls to support the pre-engineering canopy structure. The reinforced walls are cast on reinforced concrete foundation walls and footings. The entire structure will be placed on improved soils consisting of rammed aggregate piers. The interior concrete slab for the salt structure is an 8-inch thick, 4000 PSI unreinforced slab. A bid alternate for site storage bays is also constructed using the same structural system. A wood framed shed structure will also be constructed on the northwest corner of the salt barn. This shed structure will also be supported by a concrete foundation system on improved rammed aggregate piers.

**S** **W**

Includes removal of existing asphalt paving, excavation and embankment, removal of fencing, poles, existing storm sewer, trees and undergrowth. Provide new storm sewers, new water service, building pad construction, site grading, pavement base preparation, new entry gates, seed and mulch.

**F** **P** **W**

No work required.

**P** **W**

Provide domestic water main, backflow preventer, floor drains, storm piping, brine system piping, fittings and valves as needed to install the brine system.

**HVAC W**

Provide electric unit heaters where shown on the drawings.

**E** **W**

Includes the following: the electrical service to be rerouted to the new building, the existing meter, meter socket, and panel will be relocated to the new building. All equipment associated with the brine system to be relocated to the new building. New LED exterior and interior lighting, receptacles, and HVAC equipment connections required. Refer to plans for additional information.

T□□□□□□□□ W□□□

No work required.

**END OF SECTION**

**SECTION 00 31 19  
EXISTING CONDITION INFORMATION**

**PART 1 GENERAL**

**1.01 EXISTING CONDITIONS**

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:
- B. Geotechnical Report: Entitled, Geotechnical Engineering and Drilling Services Report, dated March 30, 2022.
  - 1. Original copy is available for inspection at Owner's offices during normal business hours.
- C. Geotechnical Report: Entitled, Addendum Letter of Geotechnical Findings, dated March 9, 2023.
  - 1. Original copy is available for inspection at Owner's offices during normal business hours.

**PART 2 PRODUCTS NOT USED**

**PART 3 EXECUTION NOT USED**

**END OF SECTION**

March 30, 2022

City of Beavercreek  
1368 Research Park Drive  
Beavercreek, OH 45432

Attention: Mr. Joey Shope

Reference: **Geotechnical Engineering and Drilling Services Report**  
**Beavercreek New Salt Storage Building**  
2260 Dayton-Xenia Road  
Beavercreek, OH – Greene County  
CTL Project No. 22050003WAP

Mr. Shope:

CTL Engineering, Inc. has completed the subsurface exploration for the above referenced project. Enclosed is a portable document format (pdf) copy of the report.

Thank you for the opportunity to be of service to you on this project. If you have any questions, please contact our office.

Respectfully Submitted,  
**CTL ENGINEERING, INC.**

A handwritten signature in blue ink, appearing to read "Frederick Schoen".

Frederick Schoen, P.E.  
Project Manager

## **I. PROJECT LOCATION AND DESCRIPTION**

The project involves the new construction of a salt storage building at the City of Beavercreek's materials recycling yard located at 2260 Dayton-Xenia Road in Beavercreek, Ohio. The project site currently has an existing building being used for salt storage. It is understood that the existing building will be demolished and the new building constructed within portions of the former building's footprint. Details of the new salt storage building are unknown.

## **II. SITE EXPLORATION**

Six (6) soil test borings, designated as B-01-22 through B-06-22 were performed for this exploration. Borings B-01-22 through B-04-22 were drilled at spot locations surrounding the existing building and within or adjacent to the proposed building footprint to a depth of 20 feet below existing grades. Borings drilled within proposed pavement areas, B-05-22 and B-06-22, were extended to a depth of 10 feet below existing grades. Boring positions were selected by Garmann Miller (GM), and staked in the field by personnel from CTL Engineering, Inc. (CTL) at the approximate locations shown on the Boring Location Plan presented in *Appendix A* of this report. Boring locations were measured relative to existing site features and boring coordinates (degrees Latitude and Longitude) were obtained from Google Earth web-based software. Ground surface elevations at boring locations were interpolated from elevation contour lines of topographic mapping from the Greene County, Ohio GIS web-based viewer.

Borings were performed by Envirocore Ltd., under the direction of CTL, with a track-mounted Geoprobe Model 7822 drill rig utilizing 2.25-inch, inside diameter hollow stem augers on February 8, 2022. Standard Penetration Tests (SPT) were conducted with the test borings using a 140-pound automatic hammer falling 30 inches to drive 2-inch O.D. split-barrel (split-spoon) samplers for 18 inches. The hammer system used on the rig was assumed as having an energy ratio of 80.0 percent.

Split-spoon soil samples obtained from the drilling operation were visually classified in the field, preserved and labeled in glass jars, and delivered to CTL for laboratory testing and analysis. Each sample was subjected to laboratory moisture content and hand penetrometer testing. Selected, representative soil samples were subjected to additional laboratory testing of Atterberg Limits, grain size distribution, and loss-on-ignition testing methods.

Results from field and laboratory test are shown on the enclosed test boring records, soil profile sheet, and laboratory test results found in the *Appendices B, C, and D* respectively. Laboratory testing was performed in CTL's accredited laboratories by trained technicians.

**Table 1 - Boring Labels, Elevations, Coordinates, and Depths**

<b>Boring No.</b>	<b>Approximate Surface Elevation (ft.)</b>	<b>Latitude (Degree North Parallel)</b>	<b>Longitude (Degree East Meridian)</b>	<b>Boring Depth (feet)</b>
B-01-22	807.5	39.713591	-84.018787	20
B-02-22	810.0	39.713455	-84.018355	20
B-03-22	810.0	39.713213	-84.018488	20
B-04-22	809.0	39.713410	-84.018881	20
B-05-22	809.0	39.713355	-84.019266	10
B-06-22	807.5	39.713668	-84.018253	10

### **III. FINDINGS**

#### **A Visual Observations**

The project area is currently a recycled material yard, salt storage yard, and equipment storage yard for the City. A rather large, wood framed building for housing road salt reserves occupies the property. Several small, single-story sheds are also noted on property. It is understood that these structures will be removed with the development of the property. The property includes numerous small soil and aggregate stockpiles, and sections where road signage, trailers, and road maintenance equipment are stored.

Dayton-Xenia Road allows access to the site. The roadway is several feet higher in elevation than a majority of the site. The site is relatively flat, with downward sloping gradients towards the northern portion of the site. Separating the road and the level surface of the site is a steeply sloping hillslope covered with brush and vegetation. To the north and east of the site, the land appears to be poor draining marshland (possible wetlands). By observations of the site and reviewed of geographic imagery, the project area is thought to have originally been lower in elevation than its current topography and has been filled upon in creating its current grades.

In conversation with a city employee with years of seniority with the City, it was relayed that portions of the site near boring B-06-22 was subject to large boulder fill materials.

At the time of our site visits, the ground surface was mostly covered with snow and ice.

## **B. Geology**

The project site lies within the Southern Ohio Loamy Till Plain section of the Central Lowlands Physiographic Province of Ohio; this section is characterized by having loamy, high-lime Wisconsinan-age till, outwash, and loess over generally deeply buried Paleozoic-age carbonate rocks and shales. Before and during the Pleistocene Epoch, several glacial events occurred in southwest Ohio; the youngest two events are recognized as the “Illinoian”, and the later “Wisconsinan” glaciations. The Wisconsinan Ice Sheet covered all of Greene County, and most of northern Ohio. As the ice moved over the upland, it deposited a thick layer of glacial sediment. This sediment is found in the form of moraines, outwash, and kames/esters.

The project site is located in a geologic setting where alluvial deposits associated with Beaver Creek transitions to the edge of a glacial kame. The site is underlain by alluvial deposits of silts, sands, and organic soils. Dayton-Xenia Road has been constructed on to an existing kame.

According to web-based mapping from United States Department of Agriculture, Natural Resources Conservation Service, the project site contains the following soil units:

- Southern Portion of Site (including existing salt storage building): Casco-Eldean Loams (CcD2), 12 to 18 percent slopes, moderately eroded. This map unit is described as well drained with a medium runoff class. The capacity of the most limiting layer to transmit water is described as moderately high to high.
- Northern Portion of Site: Sloan Silty Clay Loam (So). This map unit is described as very poorly drained with a low runoff class. The capacity of the most limiting layer to transmit water is described as moderately high to high.

According to the Bedrock Geology Map of Ohio (2006), bedrock directly underlying the project site is Cincinnati Group of Ordovician Age. This rock is reported to consist of interbedded limestone and shale with various shades of gray in color and thin to medium bedded. Rock is expected to be encountered at depths greater than 200 feet beneath the ground surface at the project site.

Given the depth to rock, karst is unlikely to be a concern at the project site. Several suspected karst features have been noted within ten miles of the site (Karst Interactive Map, ODNR), and probable karst areas are shown near the northern border of Greene County (distant from the project site) on the Ohio Karst Areas map (ODNR). No underground mine related incidents exist at the subject property (Mines of Ohio, ODNR). Several surface sand and gravel quarries may be found in the localized area.



### C. **Subsurface Materials**

The following paragraphs summarize the descriptions of the subsurface materials encountered in the test borings along with their Unified Soil Classification System (USCS) designation in parentheses. The descriptions and USCS designations are based on the laboratory testing and visual review of the samples recovered during the field exploration.

#### **Proposed Salt Storage Building Area**

Borings B-01-22 through B-04-22 were drilled within or adjacent to the proposed building footprint. Borings B-01-22 and B-04-22 did not exhibit any surface materials and borings B-02-22 and B-03-22 encountered approximately 12 inches of gravel at their surface.

Existing fill materials were encountered in each of these four borings. The existing fill materials extended to depths of approximately 5.5 to 12.0 feet below the existing ground surface. The existing fill soils were visually and mechanically classified as well-graded sand with gravel and varying amounts of silt (SW-SM), silty sand with gravel (SM), clayey sand (SC), and lean clay with varying amounts of sand (CL). SPT  $N_{60}$ -values of the fills ranged from 3 to 72 blows per foot (bpf), with moisture contents of 3 to 23 percent.

Coarse-grained granular soils were encountered beneath the fill materials to depths of 20 feet. These native granular materials were classified as silty sand with varying amounts of gravel (SM), clayey sand (SC), and well-graded sand with varying amounts of silt and gravel (SW-SM). They exhibited SPT  $N_{60}$ -values of 11 to 44 bpf, and natural moisture contents of 3 to 20 percent.

As exception to the descriptions above, boring B-01-22, at depths of 12.0 to 17.0 feet below grades, encountered highly organic clay (OL) with wood. This layer of soil exhibited a SPT  $N_{60}$ -value of 8 bpf, with a natural moisture content of 48 percent.

Also, an exception to the above paragraphs is a sandy silty clay (CL-ML) layer in boring B-03-22 at a depth of 12.0 to 17.0 feet. This layer of soil exhibited a SPT  $N_{60}$ -value of 17 bpf, with a natural moisture content of 11 percent.

Bedrock was not encountered in the test borings drilled for this exploration.

#### **Proposed Pavement Areas**

Borings B-05-22 and B-06-22 were drilled within the proposed pavement areas. Boring B-05-22 encountered 3 inches of asphalt at the surface that was underlain by 15 inches of subbase, and B-06-22 encountered 12 inches of gravel at the surface.

Existing fill materials were encountered in each of the two borings beneath the existing surface materials. These soils extended to a depth of 8.0 feet below the existing ground surface in boring B-05-22 and the boring termination depth of 10.0 feet below the existing ground surface in boring B-06-22. The existing fill soils were classified as poorly-graded gravel with sand (GP), silty clayey sand (SC-SM), sandy lean clay (CL), and well-graded sand with gravel (SW). These materials exhibited moisture contents of 10 to 17 percent. SPT  $N_{60}$ -values of the fills ranged from 9 to 16 bpf.

Within the existing fills, boring B-06-22 encountered a moderately organic silt (OL) layer below a depth of 4.3 feet. This organic silt may have once been native soil deposits that has since been mixed with fill materials and wood fragments, slag, and glass fragments. SPT of this layer showed little resistance to the weight of the sampling equipment (one blow to advance SS-3 and 0 blows to advance SS-4).

Fine-grained cohesive soil was encountered between 8.0 feet to 10.0 feet in boring B-05-22. The fine-grained material was classified as lean clay with sand (CL) and exhibited a SPT  $N_{60}$ -value of 9 bpf, with a natural moisture content of 26 percent.

**D. Laboratory Test Results**

Grain-Size Distribution and Atterberg Limits, tests were performed on select soil samples obtained during our exploration. Laboratory test results are summarized in *Table 2*.

***Table 2 – Atterberg Limits and Grain-Size Distribution Test Results***

Boring No.	Sample No.	Depth (ft.)	USCS	Atterberg Limits (%)		Grain-Size Distribution (%)		
				LL	PI	Sa/Gr	Silt	Clay
B-02-22	SS-3	6.0	SM	NP	NP	83	10	7
B-04-22	SS-3	6.0	SC	27	12	66	20	14

*% Sa/Gr = Combined percentage of sand and gravel defined as material larger than 0.075 mm*  
*% Silt = Defined as material particle size smaller than the 0.075 mm and larger than 0.005 mm*  
*% Clay = Defined as material particle size smaller than 0.005 mm*  
*NP = Non-Plastic*

Soil samples that were visually suspected to contain organic material were subjected to Loss-on-Ignition (LOI) testing to determine the material’s organic content. Typically, soils with organic contents between 2 and 4 percent are considered slightly organic; between 4 and 10 percent are moderately organic, and those above 10 percent are considered highly organic. Laboratory test results are tabulated in *Table 3*.



**Table 3 – Loss-on-Ignition Test Results**

Boring No.	Sample No.	Sample Depth (ft.)	Organic Content (%)
B-01-22	SS-5	13.5 – 15.0	10.1
B-06-22	SS-3	6.0 – 7.5	7.3
B-06-22	SS-4	8.5 – 10.0	5.1

**E. Groundwater**

Groundwater was encountered in borings drilled to depths greater than 15.0 feet below existing surface grades. Depths and elevations when groundwater was encountered and borehole cave-in depths are presented in *Table 4*.

The depths to groundwater were recorded during drilling, prior to backfilling of the boreholes. The depth to borehole cave-in was also determined prior to backfilling of the boreholes. The boreholes were backfilled immediately subsequent to drilling and field testing operations due to safety concerns.

**Table 4 - Depths and Elevations of Groundwater and Cave-In Depths**

Boring	Groundwater Levels (Feet) Encountered at Drilling		Borehole Cave-in Depth (Feet)
	Depth	Elevation	
B-01-22	18.0	789.5	16.5
B-02-22	15.0	795.0	16.0
B-03-22	19.8	790.2	17.3
B-04-22	18.0	791.0	15.5
B-05-22	--	--	--
B-06-22	“Dry”	--	8.5

It should be noted that fluctuations in groundwater levels should be expected over time due to variations in precipitation. Static groundwater levels can only be determined through observations made in cased holes over a long period of time. Borings indicate that groundwater levels are at or below elevation 765.0 feet, at the time of our exploration. Groundwater levels typically are the highest during the spring months.

**IV. ANALYSIS AND RECOMMENDATIONS**

At the time this report was prepared, the overall schematic details of the project had not been provided for review. It is based on these unknowns that the analyses and recommendations discussed in the subsequent sections of this report were performed. Should a more detailed geotechnical analysis be required, CTL will require additional information on the project design and should be allowed the opportunity to re-evaluate our recommendations.



Based on the subsurface information collected from the test borings and our knowledge and experience with local soil conditions; CTL's evaluation is that the site is suitable for the proposed development. However, conditions were encountered which should be addressed prior to completion of the final design of the proposed facility. These concerns and their implications are addressed throughout the subsequent sections of this report.

### **Undocumented Fill Materials and Organic Soils**

Details associated with the new salt storage building finish floor elevation is unknown and it has been assumed as elevation 810.0 feet (approximately the surface grade of the existing site). Existing fill materials were encountered across the project site to depths of 5.5 to 12.0 feet below ground surface. The underlying fill, on the majority, exhibited very soft/loose to medium dense/stiff soil conditions. These soils are considered less than ideal for building support.

Although the fill materials appear to have been subjected to some degree of compactive effort, the records for this fill placement were not provided to CTL. Furthermore, it is suspected that the uniformity of the fill and the degree of compaction for the existing fill may vary across the project site. Portions of the new building will be positioned where the existing salt storage building is currently located. The fill materials beneath this existing building has experienced higher loading than the soils outside of the existing building due to the stockpiling of salt over the years and its surcharge loads acting onto the existing fill. Such variability with the loading condition across the proposed building pad is likely cause of differential settlements with the newly constructed building, if foundations are placed into the existing fills.

Furthermore, organic, very soft soils were encountered in two of the six borings drilled for this exploration. Such materials, given their depth below the ground surface, may not be of significant concern for pavement support, but are a higher concern when supporting buildings with foundations bearing above or into these organic soils. Excessive settlements are a likely result of doing so.

#### **A. Site Preparation and Earthwork**

Recommendations for the preparation and earthwork of onsite materials are provided in the following paragraphs.

1. All topsoil and vegetative matter encountered within the proposed construction limits should be removed from the site. Topsoil may be stockpiled separately for use in future landscaping areas.
2. Any underground utilities and existing foundations/structures located within the construction limits should be removed or relocated. All underground utilities should be removed from within the proposed construction limits.

3. Care should be taken while excavating adjacent to existing utilities, sidewalks, paths, roadways, or structures to avoid undermining the existing support. The effect of the excavation on any adjacent structures should be considered. Depending upon the type of foundation system of nearby structures, underpinning may be required.
4. During earthwork operations, care should be taken to provide adequate drainage on the surface of exposed soils. Absorption of heavy rainfall, accumulations of water, or heavy construction traffic or a combination of these conditions may result in softening of these soils, hence, severely weakening the strength of the subgrade soils.
5. Portions of the near-surface soils are cohesive clays. Air-drying of these clayey soils may be difficult, particularly during the winter months and the wet season (from October to May).
6. Subsequent to any unsuitable material removal and prior to any fill placements, all exposed soil surfaces should be proofrolled with an approved loaded, tandem-axle truck in the presence of the Geotechnical Engineer or their appointed representative, if possible.
7. Following acceptance of the exposed surfaces, all fill materials required to raise the grade should consist of clean, inorganic, non-frozen soils. Fill materials should have a Liquid Limit less than 40, a Plasticity Index less than 25, a standard maximum dry density of at least 100 pcf, a maximum particle size of 3 inches, and less than 4 percent (by weight) organic matter.
8. Additional acceptable fill materials may consist of crushed limestone or sand and gravel. Topsoil, frozen, and/or organically contaminated soils are not considered suitable for use as fill. All fill materials should be observed, tested, and approved by the Geotechnical Engineer or their appointed representative.
9. Engineered fill should be placed in layers not to exceed 8 inches in loose thickness, with each layer compacted to 100 percent of the maximum dry density as determined by ASTM D-698 Standard Proctor method (AASHTO T-99) and  $\pm 3\%$  of its optimum moisture content in structural or pavement areas, or as otherwise directed by the Geotechnical Engineer.
10. Fill placement should extend beyond the limits of the proposed building footprint a minimum horizontal distance equal to the height of fill or 5 feet, whichever is greater.

11. Temporary excavations in excess of 4 feet in depth should be sloped, benched, or shored in accordance with OSHA regulations. Excavation sidewalls may exhibit cave-in particularly if granular soils, soft/loose fills, and/or groundwater seepage are encountered. In excavations that are 20 feet or less in depth, OSHA regulations allow the following slope rates based on the given soil type.

**Table 5 – Slope Rates for Temporary Excavations**

Soil Type	Unconfined Compression	Slope Rate (H :V)	Approximate Degree
Stable Rock	n/a	Vertical	90
Type A Soils	Greater Than 3.0 ksf	¾ : 1	53
Type B Soils	1.0 ksf to 3.0 ksf	1 : 1	45
Type C Soils	Less Than 1.0 ksf	1½ : 1	34

Temporary soil must be placed no closer than 2 feet from the surface edge of the excavation, measured from the nearest base of the spoil to the cut, based on OSHA regulations. The width of trenches deeper than 4.0 feet can be reduced with the use of vertical trench walls and a support or shield system as specified in OSHA Standard 1926. All excavation sidewalls should be observed and approved by the Geotechnical Engineer.

12. Depending upon the time of year and the precipitation rates preceding construction, ground water may be encountered. Groundwater was encountered in test borings at elevations below 795± feet. Excavations that extend below these depths and encounter groundwater may require extensive pumping to provide a dry excavation. Dewatering wells and/or sumps pumps located inside excavations may be necessary to control ground water

It is recommended that groundwater, if encountered, should be maintained at an elevation at least a minimum of 3 feet below the deepest anticipated bottom of excavation during construction. The groundwater level should be maintained at this level until backfill has been placed in the excavation. Care should be taken to avoid over-pumping and removal of soil fines which may cause adverse settlement of the site, and also adjacent properties and/or structures.

13. Nearby structures and other surface supported features should be monitored on a daily basis to evaluate the effect of the excavation and any dewatering. Results of the monitoring should be provided to the Project Engineer on a daily basis. The Project Engineer should determine acceptable limits of lateral and vertical deflections prior to excavation. In the event that excessive lateral or vertical movement is noted, the Project Engineer should be notified immediately.

14. Cobbles, or possibly boulders, should be expected during construction, especially within portions of the existing fill materials.

**B. Settlement Analyses**

For the purpose of discussion, the settlement analyses presented assume that the salt storage building would bear into the existing fills and organic soils, the foundations for support of the building would consist of spread footings, and the building will have reinforced concrete slab which will support the majority of the load from the salt stockpile. An applied bearing pressure of 2,000 pounds per square foot was utilized in the settlement calculations. Results of our settlement analyses are provided below in *Table 6*.

***Table 6 – Calculated Settlements\* if Building Placed into Existing Fills***

<b>Parameter</b>	<b>At Ex. Bldg.</b>	<b>At B-01-22</b>	<b>At B-04-22</b>	<b>Differential</b>
Building Loads	Minor	±1.9 in.	±1.2 in.	0.7 to 1.9 in.
Salt Surcharge	Minor	±3.6 in.	±0.7 in.	2.9 to 3.6 in.
Totals	--	±5.5 in.	±1.9 in.	3.6 to 5.5 in.

*\* Please note that settlement values are calculated estimates based on limited data and regional experience. For a highly detailed analysis, additional field and laboratory testing is needed.*

The allowable settlement tolerances for the design of the structure are unknown. It is suspected that the values presented in *Table 6* are excessive for its design, and these estimated settlement values are considered unsuitable for the construction of the proposed building. Given these assumptions, it is assumed that Rammed Aggregate Piers (Geopiers) or a deep foundation system will be considered in the design of the building.

**C. Foundation Support**

Placement of large quantities of salt in the new storage building will result in large loads applied to the existing soils. Design loads are large enough to require mass excavations and replacement of soils for conventional spread footing design, soil improvement methods, or a deep foundation system.

**Mass Excavation for Shallow Foundations**

Existing fill materials and the weak organic soils are considered unsuitable for foundation support in their existing conditions. For foundation design to include conventional shallow foundations, the existing fill and organic soils must be improved. It is recommended that the existing fills be mass excavated down to elevation of 798.0 feet for most of the building pad and horizontally beyond the building perimeter a minimum of 10 feet, and to elevation 790.0 feet in the vicinity of boring B-01-22. These elevations will result in excavations of 12 to 20 feet deep,



some possibly being below the groundwater level of the site. It is assumed that such an endeavor is considered impractical and this option for building design dismissed of consideration. The weak fills and organic soils at depth are cause of the high settlement rates for the proposed building, if left unaddressed.

### **Shallow Foundations on Rammed Aggregate Piers**

Under this alternative the underlying soils can be improved by installing rammed aggregate piers (RAP) such as Geopiers, Controlled Modulus Columns (CMC), or other similar stone column type systems. These RAP systems should be designed by an approved specialty contractor, who should also determine the allowable bearing capacity and the estimated settlement associated with their system and design. These RAP systems are expected to extend through the existing fill and soft organic soils, down into the underlying dense soils. Based on our experience, it is estimated that the shallow foundations may then be proportioned using an allowable bearing capacity value in the range of 6.0 to 8.0 Ksf. CTL should be provided an opportunity to review and confirm the proposed RAP system design, once the design is completed by the contactor.

The proposed building may then be supported onto shallow foundations constructed onto the RAP system. All footing bearing surfaces should be observed and approved by the Geotechnical Engineer prior to concrete placement.

### **Deep Foundations**

The proposed building may be constructed onto drilled shafts (caissons), Auger Cast In-Place (ACIP) piles, driven piles, micro-piles, or similar deep foundation type system which foundations extend through the upper fill and soft organic soils and into the underlying native soils. With this alternative, the floor system would require similar support, or the floor be designed separate of the building foundations as to allow the settlement of the floor slab to be independent of the building. If the floor slab is designed independent of the building, slab settlements are expected to be several inches and the loads from the salt will impose downdrag loads onto the deep foundations of the building. Should deep foundations be considered for building design, CTL should be consulted for further evaluation and discussion.

When considering the use of driven piles and possibly ACIP piles to support structures at the site, the effects of vibrations, noise, and the potential encounter of large cobbles and boulders should be evaluated. If these piles are being considered, it is recommended that additional time be included in the construction schedule to accommodate vibration and noise monitoring, redesign of pile caps, additional pile installation, etc. It is also recommended that a contingency be set up to cover potential costs for the additional design, pile installation, and pile load vs. settlement testing, etc.



**D. Floor Slab Support**

The foundation design utilized will affect the support mechanism for the floor slabs. As a minimum and based on an assumed finish floor elevation near 810.0 feet, it is recommended that the building pad be excavated to a minimum elevation of 807.5 feet and backfilled with approved, newly-placed engineered fill. It is recommended that the entire building subgrade soils be proofrolled under the supervision of the Geotechnical Engineer prior to placement of any fill materials. Soft or loose soils, if encountered, should be mechanically aerated, dried, and re-compacted, or undercut and replaced with compacted engineered fill, or as otherwise determined by the Geotechnical Engineer.

1. Future floor slabs should be supported directly on a base of course granular soils placed on top of a proofrolled and approved soil subgrade.
2. The granular base should be a minimum of 6 inches thick to provide adequate support and to act as a capillary moisture break.
3. The floor slab may be designed using a Modulus of Subgrade Reaction value not exceeding 120 pci.

**E. Seismic Considerations**

Based upon Section 1613 of the Ohio Building Code (OBC), a Site Class D is recommended for seismic design. This Site Class was determined using the information obtained in test borings as well as published information in the vicinity of the project site.

**F. Pavement Support**

Existing subgrade soils consist of mixed fill materials which vary throughout the project area. Subgrade soils are anticipated to exhibit signs of instability during construction, particularly during the wetter months of the year. Surface soils vary from moderately plastic lean clay to granular sandy/gravelly soils. Air-drying of the clayey soils may be difficult, particularly during the winter months and the wet season (from October to May). Soft or loose soils, if encountered, should be mechanically aerated, dried and re-compacted, or undercut and replaced with compacted engineered fill, with or without using a geotextile or geogrid, or as otherwise determined by the Geotechnical Engineer. A drying/stabilizing (chemical) agent such as lime may also be added to the soils to facilitate drying and/or stability.

If instability is identified during proof rolling, the following options to stabilize the soils may be considered. Please note, these options are meant as guidelines and not intended to be an absolute solution for every situation encountered. Please note that recommended subgrade treatments may vary for building, pavement subgrade, engineered fill subgrade, and landscaped areas. **The Geotechnical Engineer should be consulted for each area identified as being unstable and a location specific plan of action be established.**

1. Drying of the underlying soils can be accomplished by scarifying the moist soils and allowing the soil to dry. This method is only practical in less than severe cases that exhibit minimal instability initially. The soils must be recompacted once dried.
2. Undercutting the unstable soils to an acceptable depth, typically one to several feet and backfilling the undercut with approved engineered fill consisting of the following:
  - on-site or borrowed soils with moisture contents within  $\pm 2\%$  of its optimum moisture content. In severe cases, a geotextile fabric may be required between underlying weak soils and new fill.
  - borrowed crushed aggregate, typically conforming to the material gradation requirements of ASTM D2940. In severe cases, an approved multi-axial geogrid may be used as added support in pavement areas. The geogrid type, aggregate sizing, and undercut depths are usually site specific and should be evaluated for each area identified.
3. Alternatively, the use of a chemical additive such as cement may be applied to the unstable soils. It is estimated that an application rate of 6% of cement may be used to a depth of 14-inches. Chemical stabilization work should not be performed during wet or unsuitable weather as well as in temperatures less than 40 degrees Fahrenheit. Alternative application rates may be considered if field verification of subgrade stability is performed. It is recommended that an experienced contractor who specializes in chemical stabilization be consulted for the subgrade treatments

The subgrade of paved areas should be observed and approved by the Geotechnical Engineer. Soils with a maximum dry weight of less than 100 pounds per cubic foot are unsuitable for use in the upper 12 inches of subgrade. Such soils should be replaced with other suitable soils or granular material.

Based on the soil types found within the upper several feet of the existing soil profiles and as identified with laboratory testing, an untreated soil CBR value of the clayey soils is 4.0 percent.

Surficial soils are high-plasticity cohesive soils and will be affected by their moisture contents. Therefore, it is highly recommended that any surface and subsurface water be permanently and quickly drained from the area to limit the weakening of the subgrade soil used for pavement support. Without drainage, any modification/ stabilization procedure that is undertaken should be considered temporary.

It is recommended that a drainage system be designed to permanently dewater the subbase aggregate and associated subgrade soils and direct the water into the site's storm sewer system or away from any buildings and pavement. Finger drains should be installed in the area of the catch basins.

All pavement materials should conform to State of Ohio, Department of Transportation, Construction and Material Specifications.

## **V. CHANGED CONDITIONS AND LIMITATIONS**

The evaluations, conclusions, and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the exploration, our understanding of the project, and our experience with similar sites and subsurface conditions using generally accepted geotechnical engineering practices. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates drilled, they are not necessarily representative of the subsurface conditions between boring locations or subsurface conditions during other seasons of the year.

In the event that changes in the project are proposed, additional information becomes available, or if it is apparent that subsurface conditions are different from those provided in this report, CTL Engineering should be notified so that our recommendations can be modified, if required.

The site features presented on the plan sheets are for informational purposes only and no representation is made as to the accuracy or completeness of this information. It is recommended that a practicing geotechnical engineering professional be contacted prior to conducting verification drilling or excavating activities.

## **VI. TESTING AND OBSERVATION**

During the design process, it is recommended that CTL Engineering work with the project designers to confirm that the geotechnical recommendations are properly incorporated into the final plans and specifications, and to assist with establishing criteria for the construction observation and testing.



CTL Engineering is not responsible for independent conclusions, opinions, and recommendations made by others based on the data and recommendations provided in this report. It is recommended that CTL be retained to provide construction quality control services on this project. If CTL Engineering is not retained for these services, CTL shall assume no responsibility for compliance with the design concepts or recommendations provided.

## **VII. CLOSING**

The letter report was prepared by CTL Engineering, Inc. (Consultant) solely for the use of the Client in accordance with an executed contract. The Client's use of or reliance on this report is limited by the terms and conditions of the contract and by the qualifications and limitations stated in the report. It is also acknowledged that the Client's use of and reliance on this report is limited for reasons which include: actual site conditions may change with time; hidden conditions, not discoverable within the scope of the assessment, may exist at the site; and the scope of the investigation may have been limited by time, budget, and other constraints imposed by the Client.

Neither the report, nor its contents, conclusions, nor recommendations are intended for the use of any party other than the Client. The Consultant and the Client assume no liability for any reliance placed on this report by such party. The rights of the Client under contract may not be assigned to any person or entity, without the consent of the Consultant which consent shall not be unreasonably withheld.

This geotechnical report does not address the environmental conditions of the site. The Consultant is not responsible for consequences or conditions arising from facts that were concealed, withheld, or not fully disclosed at the time the assessment was conducted.

To the fullest extent permitted by law, the Consultant and Client agree to indemnify and hold each other, and their officers and employees, harmless from and against claims, damages, losses, and expenses arising out of unknown or concealed conditions. Furthermore, neither the Consultant, nor its employees, shall be liable to the Owner in an amount in excess of the available professional liability insurance coverage of the Consultant. In addition, Client and Consultant agree neither shall be liable for any special, indirect, or consequential damages of any kind or nature.

The Consultant's services have been provided consistent with its professional standard of care. No other warranties are made, either expressed or implied.

Specific design and construction recommendations have been provided in this report. Therefore, the report should be used in its entirety.



We thank you for the opportunity to be of service to you on this project. If you have any questions, please contact our office.

Respectfully Submitted,  
**CTL ENGINEERING, INC.**



James Whitt, P.G.  
Project Geologist




Frederick Schoen, P.E.  
Geotechnical Project Manager

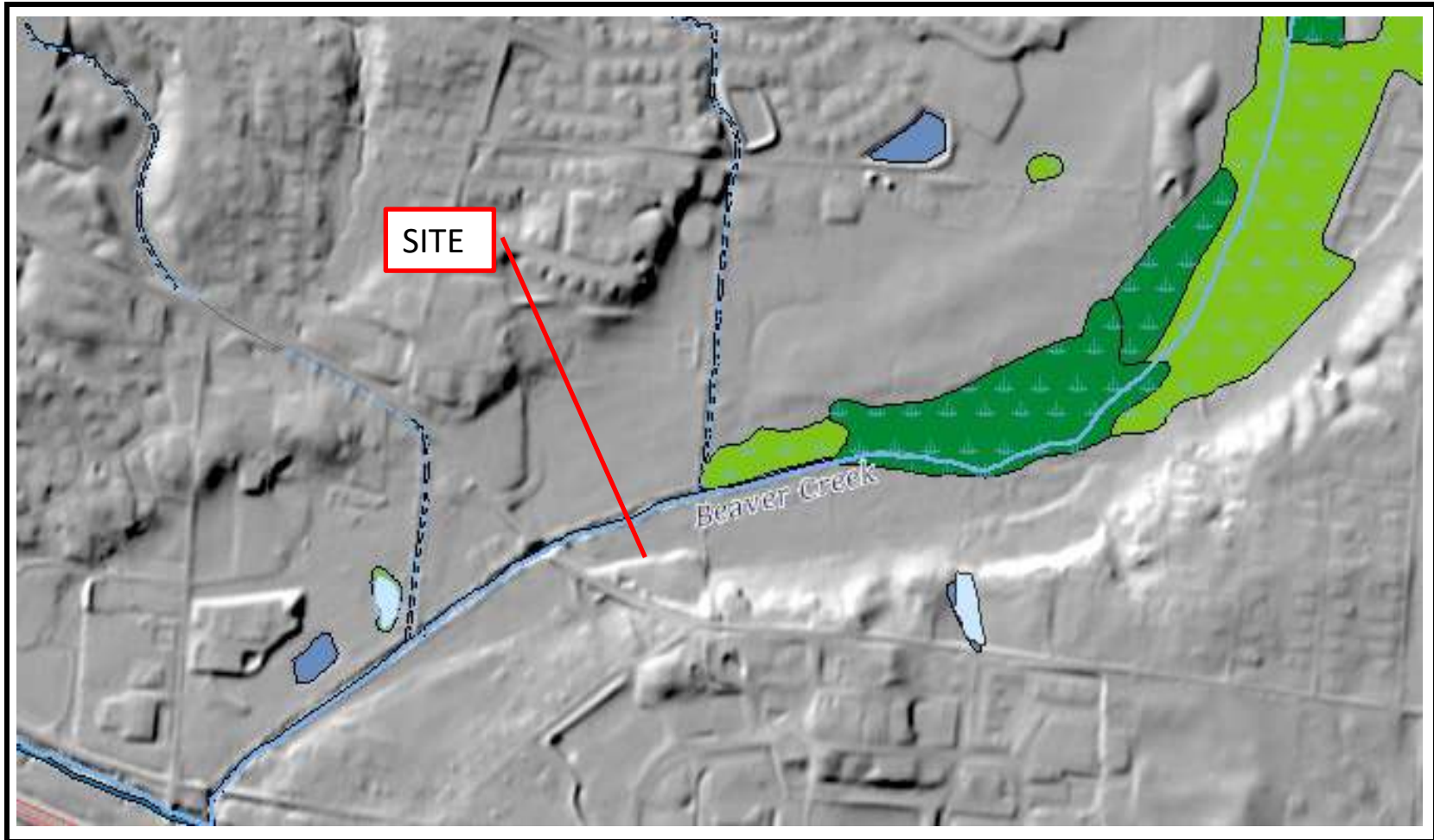



Terry Muhlenkamp, P.E.  
Reviewer

**APPENDIX A**  
**BORING LOCATION PLANS**




		<b>PROJECT SITE LOCATION PLAN</b>			
 <b>CTL ENGINEERING, INC.</b> GEOTECHNICAL ENGINEERS TESTING * INSPECTION LABORATORY SERVICES	Date	City of Beavercreek			
	3/16/2022	New Salt Storage Building			
	Scale	2260 Dayton-Xenia Road			
	None	Beavercreek, OH – Greene County			
	Drawn By	Reviewed By	Page	Project No.	
	JW	FS	1 of 2	22050003WAP	

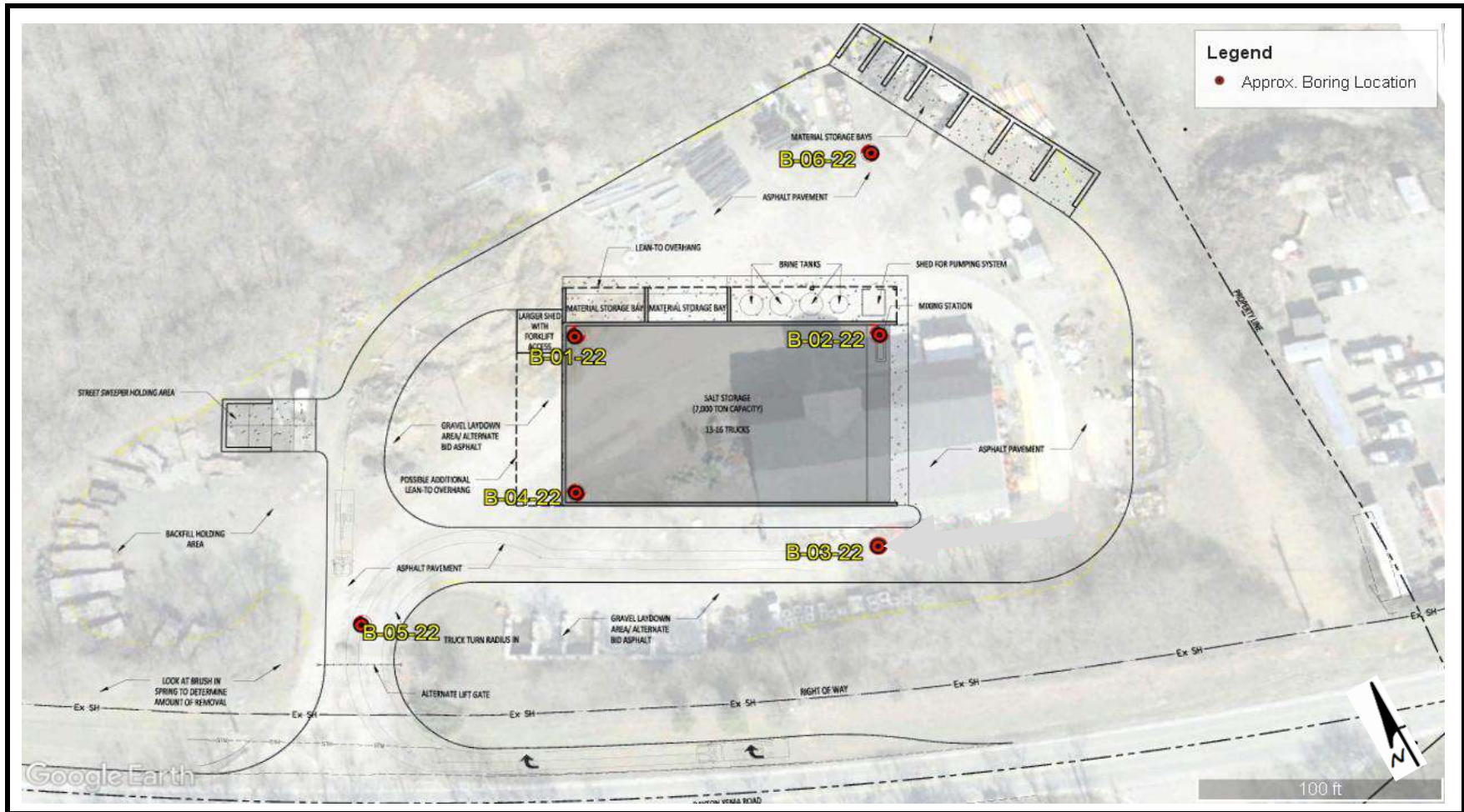



		<b>PROJECT SITE LOCATION PLAN</b>			
 <b>CTL ENGINEERING, INC.</b> GEOTECHNICAL ENGINEERS TESTING * INSPECTION LABORATORY SERVICES	<b>Date</b>	City of Beavercreek			
	3/16/2022	New Salt Storage Building			
	<b>Scale</b>	2260 Dayton-Xenia Road			
	None	Beavercreek, OH – Greene County			
	<b>Drawn By</b>	<b>Reviewed By</b>	<b>Page</b>	<b>Project No.</b>	
	JW	FS	1 of 2	22050003WAP	






		<b>BORING LOCATION PLAN</b>			
 <b>CTL ENGINEERING, INC.</b> GEOTECHNICAL ENGINEERS TESTING * INSPECTION LABORATORY SERVICES		<b>Date</b>	City of Beavercreek		
		3/16/2022	New Salt Storage Building		
		<b>Scale</b>	2260 Dayton-Xenia Road		
		None	Beavercreek, OH – Greene County		
		<b>Drawn By</b>	<b>Reviewed By</b>	<b>Page</b>	<b>Project No.</b>
		JW	FS	1 of 3	22050003WAP



		<b>BORING LOCATION PLAN</b>			
 <p><b>CTL ENGINEERING, INC.</b>            GEOTECHNICAL ENGINEERS            TESTING * INSPECTION            LABORATORY SERVICES</p>	<b>Date</b>	City of Beavercreek New Salt Storage Building 2260 Dayton-Xenia Road Beavercreek, OH – Greene County			
	3/16/2022				
	<b>Scale</b>				
	None	<b>Drawn By</b>	<b>Reviewed By</b>	<b>Page</b>	<b>Project No.</b>
	JW	FS	2 of 3	22050003WAP	



		<b>BORING LOCATION PLAN</b>					
 <b>CTL ENGINEERING, INC.</b> GEOTECHNICAL ENGINEERS TESTING * INSPECTION LABORATORY SERVICES		Date	City of Beavercreek New Salt Storage Building 2260 Dayton-Xenia Road Beavercreek, OH – Greene County				
		3/16/2022					
		Scale	None				
Drawn By	JW	Reviewed By	FS	Page	3 of 3	Project No.	22050003WAP

**APPENDIX B**  
**BORING TEST RECORDS**

# EXPLANATION OF TERMS AND SOIL DESCRIPTIONS

## (ASTM D2487 & ASTM D2488)

### CONSISTENCY AND RELATIVE DENSITY DESCRIPTIONS

Descriptors for soil consistency used in this report are based upon the Standard Penetration Test (SPT), ASTM D 1587, with the penetration (N) values corrected to  $N_{60}$ , based upon the efficiency of the SPT Hammer (Energy Ratio) used for the soil sampling.

<u>NON-COHESIVE SOILS</u>		<u>COHESIVE SOILS</u>	
<u>Consistency</u>	<u>SPT-<math>N_{60}</math> (bpf)</u>	<u>Consistency</u>	<u>SPT-<math>N_{60}</math> (bpf)</u>
Very Loose	0 – 4	Very Soft	0 – 1
Loose	5 – 10	Soft	2 – 4
Medium Dense	11 – 30	Medium Stiff	5 – 8
Dense	31 - 50	Stiff	9 – 15
Very Dense	Over 50	Very Stiff	16 – 30
		Hard	Over 30

### COMPONENT MODIFIERS

<u>ASTM D2488 (Visual-Manual)</u>		<u>ASTM D2487 (USCS)</u>	
<u>Modifier</u>	<u>% by Weight</u>	<u>Modifier</u>	<u>% by Weight</u>
Trace of	0 – 1	with sand or gravel	15 – 29
Traces of	2 – 10	Sandy or Gravelly	30
Little	11 – 20	with silt or clay	5 – 12
Some	20 – 35	Silty or Clayey	> 12
“And”	35 – 50	Organic	$LL_{oven}/LL_{air} < 0.75$

### MOISTURE DESCRIPTIONS

<u>Terms</u>	<u>Non-Cohesive Soils</u>	<u>Cohesive Soils</u>
Dry	Moisture Absent	Powdery
Damp	Some Moisture	Below Plastic Limit
Moist	Damp to the Touch	Between Plastic and Liquid Limits
Wet	Visible Water	Above Liquid Limit





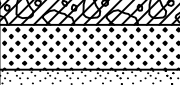
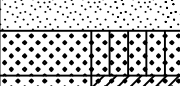


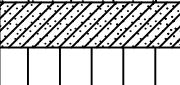

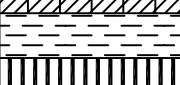
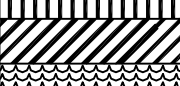

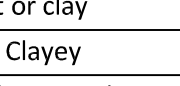
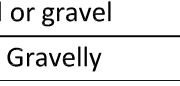







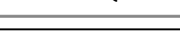
### PARTICLE SIZE DESCRIPTIONS

<u>Component</u>	<u>USCS Particle Size</u>
Boulders	12-in. (300 mm)
Cobbles	< 12-in. (300 mm) to 3-in. (75 mm)
Gravel	< 3-in. (75 mm) to #4 Sieve (4.75 mm)
Sand	< #4 Sieve (4.75 mm) to #200 Sieve (0.074 mm)
Silt	#200 Sieve (0.074 mm) to 0.005 mm
Clay	< 0.005 mm

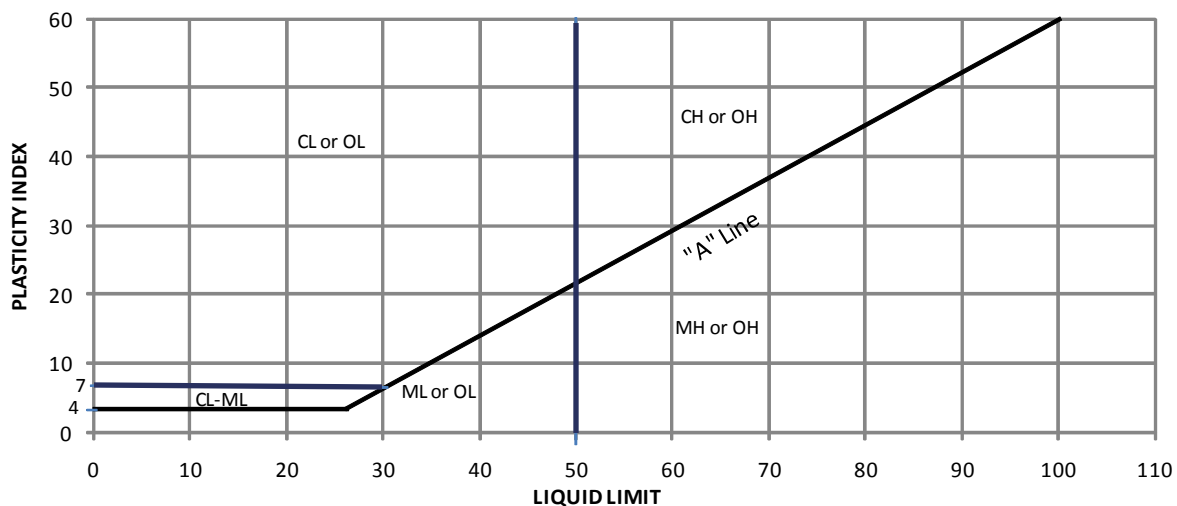


# SOIL DESCRIPTIONS BASED ON THE UNIFIED SOIL CLASSIFICATION SYSTEM

## ASTM D 2487 and D 2488

Major Division		Group Symbol	Letter Symbol	Group Name*	
Coarse Grained Soils Less Than 50 Percent Passing the # 200 Sieve	Gravel - Percent GRAVEL > percent SAND	Gravel with < 5% Fines		GW	Well Graded GRAVEL
		Gravel with < 5% Fines		GP	Poorly Graded GRAVEL
		Gravel with Between 5 and 15% Fines		GW-GM	Well Graded GRAVEL with silt
				GW-GC	Well Graded Gravel with clay
				GP-GM	Poorly Graded GRAVEL with silt
				GP-GC	Poorly Graded GRAVEL with clay
	Gravel with ≥ 15% Fines		GM	Silty GRAVEL	
			GC	Clayey GRAVEL	
	Sand - Percent SAND ≥ percent GRAVEL	Sand with < 5% Fines		SW	Well Graded SAND
		Sand with < 5% Fines		SP	Poorly Graded SAND
		Sand with Between 5 and 15% Fines		SW-SM	Well Graded SAND with silt
				SW-SC	Well Graded SAND with clay
				SP-SM	Poorly Graded SAND with silt
				SP-SC	Poorly Graded SAND with clay
Sand with ≥ 15% Fines		SM	Silty SAND		
		SC	Clayey SAND		
Fine Grained Soils 50 percent or more Passing the # 200 Sieve	SILT and CLAY	Liquid Limit Less Than 50		ML	SILT
				CL	Lean CLAY
				CL-ML	SILTY CLAY
			OL	Organic SILT, CLAY, or SILTY CLAY	
	Liquid Limit 50 or Greater		MH	Elastic SILT	
			CH	Fat CLAY	
Highly Organic Soils			OH	Organic SILT or CLAY	
Highly Organic Soils			PT	Peat	
* Additional Modifiers	Coarse Grained Soils	with silt or clay	5 to 12 % Silt or Clay by weight		
		Silty or Clayey	more than 12 % Silt or Clay by weight		
	Fine Grained Soils	with sand or gravel	15 to 29 % Sand or Gravel by weight		
		Sandy or Gravelly	30 % or more Sand or Gravel by weight		

### "A" LINE GRAPH



# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-01-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : <u>807.5 Feet</u>	RIG TYPE : <u>Geoprobe 7822</u>	DRILLER : <u>AJ &amp; TB</u>
LATITUDE : <u>39.713591</u>	CASING DIA. : <u>2.25" I.D.</u>	TEMPERATURE : _____
LONGITUDE : <u>-84.018787</u>	CORE SIZE : <u>N/A</u>	WEATHER : <u>Cold, Sunny</u>
DEPTH : <u>20.0 Feet</u>	HAMMER : <u>Automatic</u>	
BORING METHOD: <u>HSA</u>	ENERGY RATIO : <u>80</u>	

GROUNDWATER: Encountered at 18.0' Caved in at 16.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
799.5	5	Medium Dense to Loose, Brown <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , Damp (FILL)	8.0	SS-1	9 9 6	20	78	3						
795.5	10	Soft, Brown <b>SANDY LEAN CLAY (CL)</b> , Little Gravel, Moist (FILL)	12.0	SS-2	3 4 4	11	22	6						
790.5	15	Medium Stiff, Grayish Black, <b>ORGANIC CLAY (OL)</b> , Traces of Sand, with Wood Fragments, Highly Organic (LOI = 10.1%), Moist	17.0	SS-3	5 4 3	9	22	7						
787.5	20	Medium Dense, Gray <b>SILTY SAND (SM)</b> , Traces of Gravel, Wet	20.0	SS-4	2 1 1	3	33	16		5.0*				
		<b>BOTTOM OF BORING</b>		SS-5	4 3 3	8	67	48		2.0*				
				SS-6	7 7 8	20	100	12						

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 3/25/22

 <p>102 Commerce Drive                  P.O. Box 44                  Wapakoneta, Ohio 45895                  Telephone: 419-738-1447                  Fax: 419-738-7670                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a></p>	<p><b>BORING METHOD</b></p> <p>HSA - Hollow Stem Auger                  SFA - Solid Flight Auger                  RC - Rock Coring                  MD - Mud Drilling                  WD - Wash Drilling                  HA - Hand Auger</p>	<p><b>SAMPLING METHOD</b></p> <p>SS - Split Spoon Sample                  ST - Shelby Tube Sample                  CR - Rock Core Sample                  BS - Bag Sample</p>	<p><b>ABBREVIATIONS</b></p> <p>* - Hand Penetrometer                  LL - Liquid Limit                  PL - Plastic Limit                  PI - Plasticity Index                  SPT - Standard Penetration Test                  N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER</p>
---	--	---	---

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-02-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : 810.0 Feet LATITUDE : 39.713455 LONGITUDE : -84.018355 DEPTH : 20.0 Feet BORING METHOD: HSA	RIG TYPE : Geoprobe 7822 CASING DIA. : 2.25" I.D. CORE SIZE : N/A HAMMER : Automatic ENERGY RATIO : 80	DRILLER : AJ & TB TEMPERATURE : WEATHER : Cold, Sunny
--	--	---

GROUNDWATER: Encountered at 15.0' Caved in at 16.0'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
809.0		<b>GRAVEL</b>	1.0											
807.0		Very Stiff, Grayish Brown <b>SANDY LEAN CLAY (CL)</b> , Traces of Gravel, Moist ( <b>FILL</b> )	3.0	SS-1	9 7 10	23	100	20		8.5*				
	5			SS-2	2 2 3	7	44	8		5.0*				
		Loose to Very Loose, Grayish Brown <b>SILTY SAND with GRAVEL (SM)</b> , Moist ( <b>FILL</b> )		SS-3	2 3 2	7	44	5			NP	NP	NP	
	10			SS-4	2 1 1	3	44	14		1.5*				
799.0			11.0											
		Medium Dense, Brown and Gray <b>SILTY SAND (SM)</b> , Little Gravel, Moist		SS-5	6 9 8	23	72	10						
	15													
793.0			17.0											
		Dense, Brownish Gray <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , Wet		SS-6	9 15 14	39	83	8						
790.0	20	<b>BOTTOM OF BORING</b>	20.0											

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 3/25/22

 102 Commerce Drive P.O. Box 44 Wapakoneta, Ohio 45895 Telephone: 419-738-1447 Fax: 419-738-7670 Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a>	<b>BORING METHOD</b>	<b>SAMPLING METHOD</b>	<b>ABBREVIATIONS</b>
	HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	* - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER



# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-03-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : 810.0 Feet LATITUDE : 39.713213 LONGITUDE : -84.018488 DEPTH : 20.0 Feet BORING METHOD: HSA	RIG TYPE : Geoprobe 7822 CASING DIA. : 2.25" I.D. CORE SIZE : N/A HAMMER : Automatic ENERGY RATIO : 80	DRILLER : AJ & TB TEMPERATURE : WEATHER : Cold, Sunny
--	--	---

GROUNDWATER: Encountered at 19.8' Caved in at 17.3'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
809.0		<b>GRAVEL</b>	1.0											
		Very Dense, Brownish Gray <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , Damp (FILL)	3.0	SS-1	15 33 21	72	56	3						
807.0		Medium Dense, Brownish Gray <b>WELL-GRADED SAND with GRAVEL (SW)</b> , Damp (FILL)	5.5	SS-2	5 9 12	28	44	3						
804.5	5	Medium Dense to Dense, Brown <b>WELL-GRADED SAND with SILT (SW-SM)</b> , Little Gravel, Damp	12.0	SS-3	6 12 9	28	44	3						
	10	Very Stiff, Gray <b>SANDY SILTY CLAY (CL-ML)</b> , Traces of Gravel, Moist	17.0	SS-4	11 12 14	35	56	4						
798.0		Dense, Gray <b>SILTY SAND (SM)</b> , Moist to Wet	20.0	SS-5	5 6 7	17	100	11		8.5*				
793.0	15			SS-6	6 12 21	44	100	20		3.5*				
790.0	20	<b>BOTTOM OF BORING</b>												

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 3/25/22

 <p>           102 Commerce Drive            P.O. Box 44            Wapakoneta, Ohio 45895            Telephone: 419-738-1447            Fax: 419-738-7670            Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-04-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : 809.0 Feet LATITUDE : 39.713410 LONGITUDE : -84.018881 DEPTH : 20.0 Feet BORING METHOD: HSA	RIG TYPE : Geoprobe 7822 CASING DIA. : 2.25" I.D. CORE SIZE : N/A HAMMER : Automatic ENERGY RATIO : 80	DRILLER : AJ & TB TEMPERATURE : WEATHER : Cold, Sunny
--	--	---

GROUNDWATER: Encountered at 18.0' Caved in at 15.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
808.7		<b>BROKEN ASPHALT (1") over GRAVEL (3")</b>	0.3											
		Stiff, Brown and Gray <b>LEAN CLAY with SAND (CL)</b> , Traces of Gravel with Asphalt Fragments, Moist ( <b>FILL</b> )		SS-1	7 6 4	13	67	20		4.0*				
806.0			3.0											
	5	Medium Stiff, Brown and Gray <b>LEAN CLAY with SAND (CL)</b> , Traces of Gravel, Moist ( <b>FILL</b> )		SS-2	4 2 2	5	33	23		3.5*				
803.5			5.5											
		Loose, Brown and Gray <b>CLAYEY SAND with GRAVEL (SC)</b> , Moist ( <b>FILL</b> )		SS-3	3 2 2	5	33	14		3.5*	27	15	12	
800.0			9.0											
	10	Medium Dense, Grayish Brown <b>CLAYEY SAND (SC)</b> , Traces of Gravel, Moist		SS-4	4 4 4	11	78	16		6.0*				
797.0			12.0											
	15	Medium Dense, Grayish Brown <b>SILTY SAND with GRAVEL (SM)</b> , Moist to Wet		SS-5	17 12 10	29	72	7						
789.0	20	<b>BOTTOM OF BORING</b>	20.0	SS-6	8 8 10	24	39	10						

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 3/25/22

 <p>           102 Commerce Drive            P.O. Box 44            Wapakoneta, Ohio 45895            Telephone: 419-738-1447            Fax: 419-738-7670            Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

# TEST BORING RECORD


CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP

BORING NO.: **B-05-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : <u>809.0 Feet</u> LATITUDE : <u>39.713355</u> LONGITUDE : <u>-84.019266</u> DEPTH : <u>10.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>Geoprobe 7822</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>80</u>	DRILLER : <u>AJ &amp; TB</u> TEMPERATURE : _____ WEATHER : <u>Cold, Sunny</u>
---	---	---

GROUNDWATER: Encountered at == Caved in at ==

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
808.8		ASPHALT (3")	0.3											
808.0		SUBBASE (9")	1.0											
807.5		Loose, White and Brown POORLY-GRADED GRAVEL with SAND (GP), Moist (FILL)	1.5	SS-1	7 4 3	9	6	2						
	5	Medium Dense, Dark Gray SILTY CLAYEY SAND (SC-SM), Traces of Gravel, with Asphalt/Slag Fragments, Moist (FILL)		SS-2	10 8 4	16	72	12		2.5*				
801.0			8.0	SS-3	2 50/2"		17	14						
		Stiff, Brown and Dark Gray LEAN CLAY with SAND (CL), Traces of Gravel, Moist		SS-4	5 4 3	9	67	26		7.0*				
799.0	10	BOTTOM OF BORING	10.0											

 <p>                 102 Commerce Drive                  P.O. Box 44                  Wapakoneta, Ohio 45895                  Telephone: 419-738-1447                  Fax: 419-738-7670                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 3/25/22

# TEST BORING RECORD


CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP

BORING NO.: **B-06-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : <u>807.5 Feet</u> LATITUDE : <u>39.713668</u> LONGITUDE : <u>-84.018253</u> DEPTH : <u>10.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>Geoprobe 7822</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>80</u>	DRILLER : <u>AJ &amp; TB</u> TEMPERATURE : _____ WEATHER : <u>Cold, Sunny</u>
---	---	---

GROUNDWATER: Encountered at 'Dry' Caved in at 8.5'

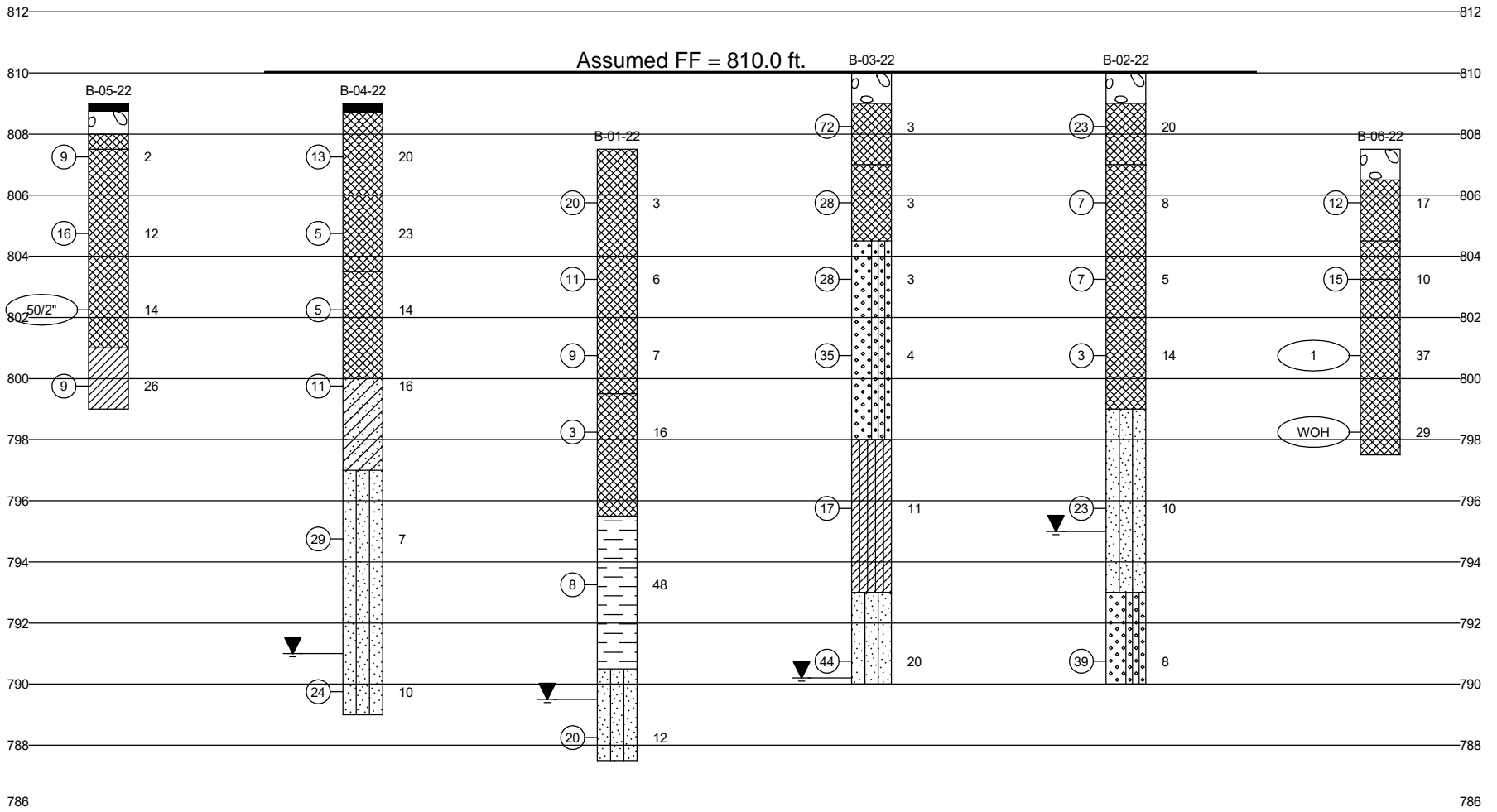
STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
806.5		<b>GRAVEL</b>	1.0											
		Stiff, Brown and Gray <b>SANDY LEAN CLAY (CL)</b> , Traces of Gravel, Moist ( <b>FILL</b> )		SS-1	5 4 5	12	94	17		7.0*				
804.5		Medium Dense, Gray <b>WELL-GRADED SAND with GRAVEL (SW)</b> , Damp ( <b>FILL</b> )	3.0											
803.3			4.3	SS-2	22 9 2	15	44	10		5.5*				
	5													
		Very Soft, Dark Gray to Black <b>ORGANIC SILT (OL)</b> , Traces of Sand, MIXED with Wood Fragments, with Slag and Glass Fragments, Moderately Organic (LOI = 5.1% to 7.3%), Moist ( <b>FILL</b> )		SS-3	WOH WOH 1		22	37		3.0*				
				SS-4	WOH WOH WOH		33	29		1.0*				
797.5	10	<b>BOTTOM OF BORING</b>	10.0											
	15													
	20													

 <p>                 102 Commerce Drive                  P.O. Box 44                  Wapakoneta, Ohio 45895                  Telephone: 419-738-1447                  Fax: 419-738-7670                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

TEST BORING - WAPAK 22050003WAP.GPJ NEW CTL WITH N60.GDT 3/25/22

**APPENDIX C**

**SOIL PROFILE SHEETS**



TOPSOIL	GP-GM	SP	SC	CH	LIMESTONE
ASPHALT	GP-GC	SW-SM	SC-SM	MH	FILL
GW	GM	SW-SC	ML	OH	
GP	GC	SP-SM	CL	PT	
GW-GM	GC-GM	SP-SC	CL-ML	SHALE	
GW-GC	SW	SM	OL	SILTSTONE	

### LEGEND

- GROUND WATER DURING DRILLING
- GROUND WATER AT COMPLETION OF DRILLING
- GROUND WATER AT "N" HOURS AFTER COMPLETION
- MOISTURE CONTENT IN PERCENT (w)
- CORRECTED STANDARD PENETRATION IN BLOWS PER FOOT (N60)

102 Commerce Drive  
P.O. Box 44  
Wapakoneta, OH 45895  
Telephone: 419-738-1447  
Fax: 419-738-7670  
Email: ctwapak@ctleng.com

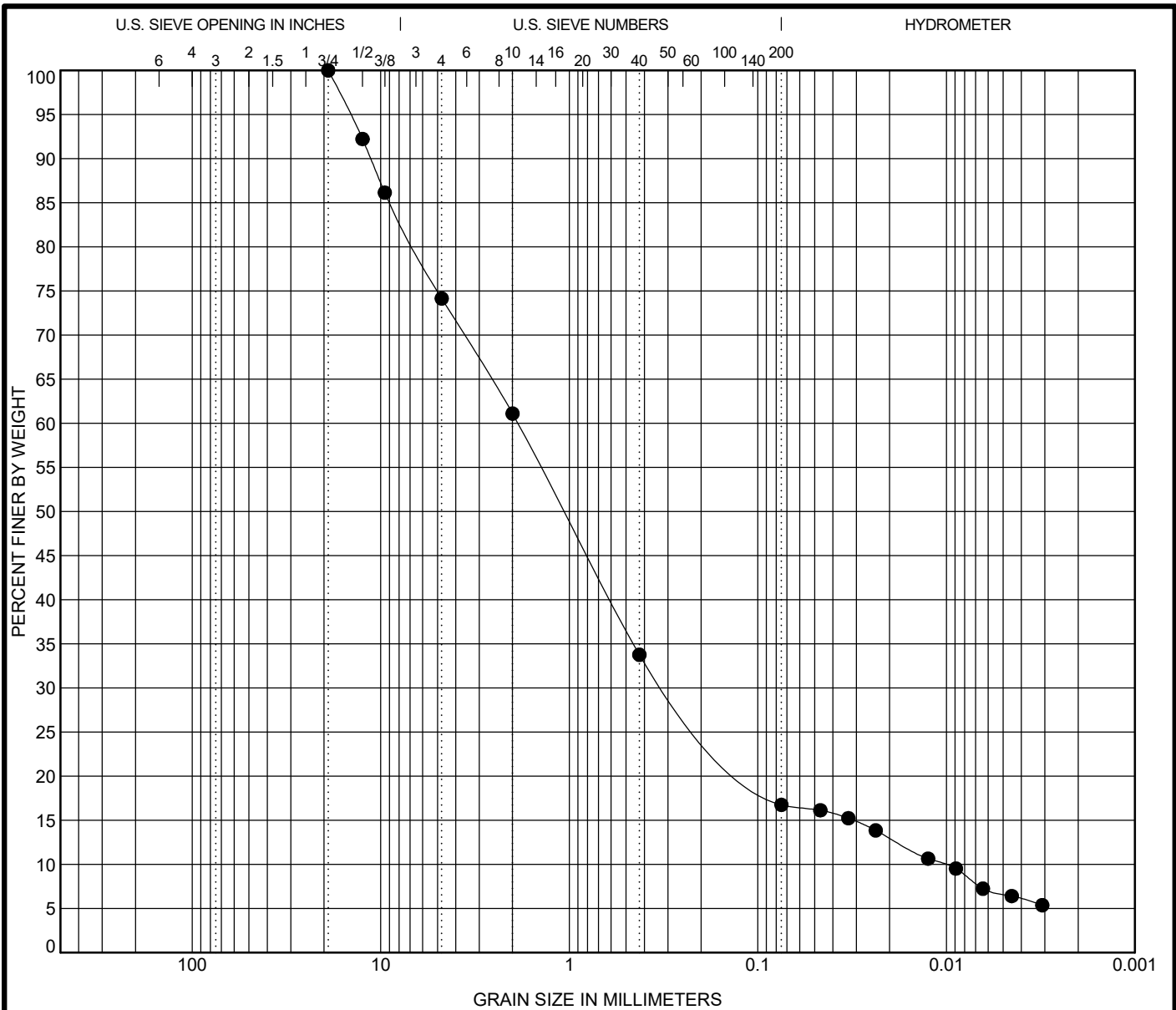
### SOIL PROFILE

City of Beavercreek  
Salt Storage Building  
Beavercreek, Ohio

DATE 3/15/2022	PAGE 1 OF 1	PROJECT NUMBER 22050003WAP
SCALE AS SHOWN		
DRAWN BY SB		

## **APPENDIX D**

### **LABORATORY TEST RESULTS**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Sample	Depth	Classification	%MC	LL	PL	PI	Cc	Cu
● B-02-22	SS-3	6.0	<b>SILTY SAND with GRAVEL(SM)</b>	<b>5</b>	<b>NP</b>	<b>NP</b>	<b>NP</b>	<b>4.34</b>	<b>182.84</b>

Boring No.	Sample	Depth	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-02-22	SS-3	6.0	<b>19</b>	<b>1.88</b>	<b>1.067</b>	<b>0.29</b>	<b>0.01</b>	<b>26</b>	<b>57</b>	<b>10</b>	<b>7</b>

GRADATION - WAPAK 22050003WAP.GPJ NEW CTL WITH N60.GDT 3/15/22

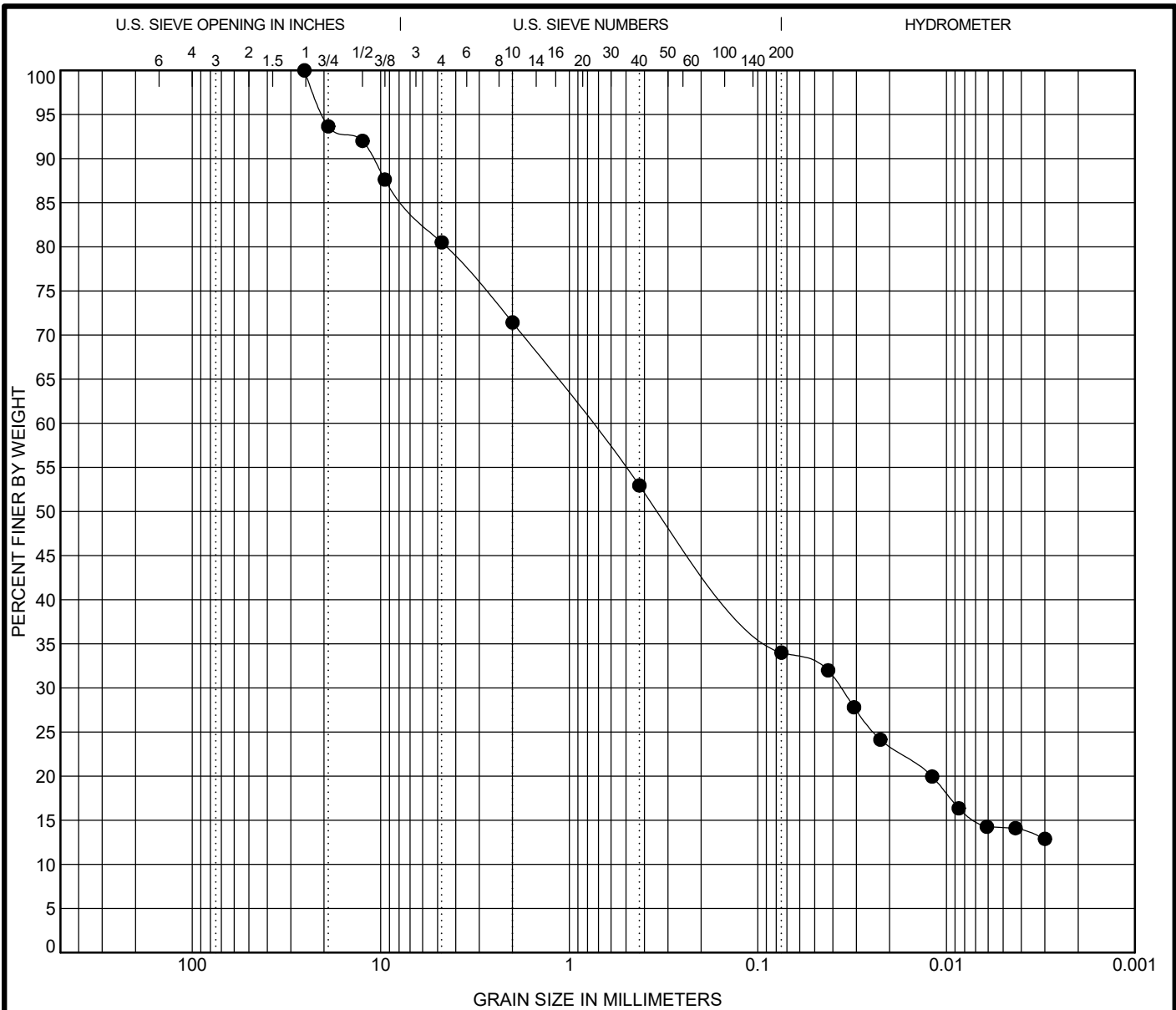


CTL Engineering  
 102 Commerce Dr., P.O. Box 44  
 Wapakoneta, OH 45895  
 Telephone: (419) 738-1447  
 Fax: (419) 738-7670

**GRAIN SIZE DISTRIBUTION**

Project: Salt Storage Building  
 Location: Beavercreek, Ohio  
 CTL Project Number: 22050003WAP





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Sample	Depth	Classification					%MC	LL	PL	PI	Cc	Cu
● B-04-22	SS-3	6.0	<b>CLAYEY SAND with GRAVEL(SC)</b>					<b>14</b>	<b>27</b>	<b>15</b>	<b>12</b>		

Boring No.	Sample	Depth	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-04-22	SS-3	6.0	<b>25.4</b>	<b>0.768</b>	<b>0.324</b>	<b>0.036</b>		<b>19</b>	<b>47</b>	<b>20</b>	<b>14</b>

GRADATION - WAPAK 22050003WAP.GPJ NEW CTL WITH N60.GDT 3/15/22



CTL Engineering  
 102 Commerce Dr., P.O. Box 44  
 Wapakoneta, OH 45895  
 Telephone: (419) 738-1447  
 Fax: (419) 738-7670

### GRAIN SIZE DISTRIBUTION

Project: Salt Storage Building  
 Location: Beavercreek, Ohio  
 CTL Project Number: 22050003WAP

# SOIL ORGANIC CONTENT

ASTM D-2974, Method C

City of Beavercreek

**New Salt Storage Building**

Beavercreek, OH - Greene County

CTL Project No.: 22050003WAP

Technician: M. Hughes

Date: February 16, 2022

---

## LOSS-ON-IGNITION TEST RESULTS

Boring No.	Sample No.	Loss on Ignition (%)
B-01-22	SS-5	10.1
B-06-22	SS-3	7.3
B-06-22	SS-4	5.1



March 9, 2023

City of Beavercreek  
1368 Research Park Drive  
Beavercreek, OH 45432

Attention: Mr. Joey Shope

Reference: Addendum Letter of Geotechnical Findings  
Beavercreek New Salt Storage Building  
2260 Dayton-Xenia Road  
Beavercreek, OH – Greene County  
CTL Project No. 22050003WAP

Mr. Shope:

In accordance with our agreement, CTL Engineering, Inc. (CTL) performed supplemental geotechnical test borings to collect additional subsurface information for the design and construction of a proposed Rammed Aggregate Piers (RAP) soil improvement system. This addendum report is intended to summarize the services performed by CTL.

In addition to the soil test borings included with CTL's Geotechnical Engineering and Drilling Services Report dated March 30, 2022; three (3) additional soil test borings, designated as B-07-23, B-08-23, and B-09-23, and two offset borings, B-08A-23 and B-08B-23, were performed for this secondary exploration. Recent borings were drilled in the vicinity of the proposed building, at locations spaced between previously drilled borings B-01-22, B-02-22, and B-04-22. Boring positions were selected and staked in the field by personnel from CTL at the approximate locations shown on the Boring Location Plan presented as an appendix of this report. Boring locations were measured relative to existing site features and boring coordinates (degrees Latitude and Longitude) were obtained from Google Earth web-based software. Ground surface elevations at boring locations were interpolated from elevation contour lines of topographic mapping from the Greene County, Ohio GIS web-based viewer.

Borings were performed by CTL, with a truck-mounted rotary drill rig utilizing 2.25-inch, inside diameter hollow stem augers on February 24, 2023. Standard Penetration Tests (SPT) were conducted with the test borings using a 140-pound automatic hammer falling 30 inches to drive 2-inch O.D. split-barrel (split-spoon) samplers for 18 inches. The hammer system used on the rig was calibrated as having an energy ratio of 76.4 percent.

Borings B-07-23, B-08-3, and B-09-23 were "blank drilled" or augered without sampling to a depth of 15.0 feet below existing surface grades. At depths below 15.0 feet, the borings were subject to SPT and split-spoon sampling. Split-spoon soil samples obtained from the drilling operation were visually classified in the field, preserved and labeled in glass jars, and delivered to CTL for laboratory testing and analysis. Each sample was subjected to laboratory moisture content and cohesive samples subjected to hand penetrometer testing.

Boring B-07-23 was advanced to a depth of 40.0 feet below existing grades. Boring B-08-23 encountered auger refusal at a depth of 29.5 feet. In response to the auger refusal, boring B-08A-23 was offset about 5 feet from B-08-23 and “blank drilled” to a depth of 28.5 feet and sampled. Again, at a depth of 29.5 feet, boring B-08A-23 encountered auger refusal. A third attempt was made to advance the boring. Boring B-08B-23 was offset about 20 feet and “blank drilled” to a depth of 28.5 feet. Boring B-08B-23 was successful in advancing beyond a depth of 29.5 feet, to a termination depth of 40.0 feet. Boring B-09-23 was advanced to a depth of 35.0 feet below existing grades.

**Table 1 - Boring Labels, Elevations, Coordinates, and Depths**

<b>Boring No.</b>	<b>Approximate Surface Elevation (ft.)</b>	<b>Latitude (Degree North Parallel)</b>	<b>Longitude (Degree East Meridian)</b>	<b>Boring Depth (feet)</b>
B-01-22	807.5	39.713591	-84.018787	20.0
B-02-22	810.0	39.713455	-84.018355	20.0
B-03-22	810.0	39.713213	-84.018488	20.0
B-04-22	809.0	39.713410	-84.018881	20.0
B-05-22	809.0	39.713355	-84.019266	10.0
B-06-22	807.5	39.713668	-84.018253	10.0
B-07-23	809.2	39.713518	-84.018578	40.0
B-08-23	807.8	39.713521	-84.018907	29.5
B-08A-23	808.0	39.713515	-84.018881	29.5
B-08B-23	808.5	39.713502	-84.018816	40.0
B-09-23	810.2	39.713331	-84.018686	35.0

Results from field and laboratory test are shown on the enclosed test boring records and soil profile sheet found in the appendices of this addendum report.

**Subsurface Materials**

The following paragraphs summarize the descriptions of the subsurface materials encountered in the test borings along with their Unified Soil Classification System (USCS) designation in parentheses. The descriptions and USCS designations are based on the laboratory testing and visual review of the samples recovered during the field exploration.

Existing fill or possible fill materials were encountered borings B-08-23 and B-08A-23. The existing fill materials extended to a depth of approximately 29.5 feet below the existing ground surface where auger refusal was encountered. At depths of 28.5 to 29.5 feet in B-08A-23, fragments of asphalt pavement were identified in the split-spoon sample. The existing fill soils



above 29.5 feet were visually classified as well-graded sand with silt and/or with gravel (SW-SM). SPT N<sub>60</sub>-values of the fills ranged from 34 to 51 blows per foot (bpf), with moisture contents of 12 to 45 percent.

Coarse-grained granular soils were encountered below a depth of 15.0 feet in B-07-23 and B-09-23, and below a depth of 29.5 feet in B-08B-23. These native granular materials were classified as silty sand with varying amounts of gravel (SM), poorly-graded sand with varying amounts of silt and gravel (SP-SM), and well-graded sand with varying amounts of silt and gravel (SW-SM). They exhibited SPT N<sub>60</sub>-values of 32 to 89 bpf, and natural moisture contents of 7 to 22 percent.

As exception to the descriptions above, boring B-09-23 encountered layers of sandy lean clay (CL) and silt with sand (ML). These layers exhibited SPT N<sub>60</sub>-values of 29 to 56 bpf, with natural moisture contents of 12 to 21 percent.

Cobbles were encountered in borings drilled.

Bedrock was not encountered in the test borings drilled for this exploration.

### **Groundwater**

The depths to groundwater were recorded during drilling, prior to backfilling of the boreholes. The depth to borehole cave-in was also determined prior to backfilling of the boreholes. The boreholes were backfilled immediately subsequent to drilling and field-testing operations due to safety concerns and time constraints.

***Table 2 - Depths and Elevations of Groundwater and Cave-In Depths***

Boring	Reading Date	Groundwater Levels (Feet) Encountered at Drilling		Borehole Cave-in Depth (Feet)
		Depth	Elevation	
B-01-22	2/8/2022	18.0	789.5	16.5
B-02-22	2/8/2022	15.0	795.0	16.0
B-03-22	2/8/2022	19.8	790.2	17.3
B-04-22	2/8/2022	18.0	791.0	15.5
B-05-22	2/8/2022	--	--	--
B-06-22	2/8/2022	'Dry'	--	8.5
B-07-23	2/24/2023	17.2	792.0	22.5
B-08-23	2/24/2023	18.5	789.3	11.5
B-08A-23	2/24/2023	'Dry'	'Dry'	9.5
B-08B-23	2/24/2023	27.0	781.5	17.5
B-09-23	2/24/2023	17.0	793.2	23.4



It should be noted that fluctuations in groundwater levels should be expected over time due to variations in precipitation. Static groundwater levels can only be determined through observations made in cased holes over a long period of time. Borings indicate that groundwater levels are at or below elevation 795.0 feet, at the time of our exploration. Groundwater levels typically are the highest during the spring months.

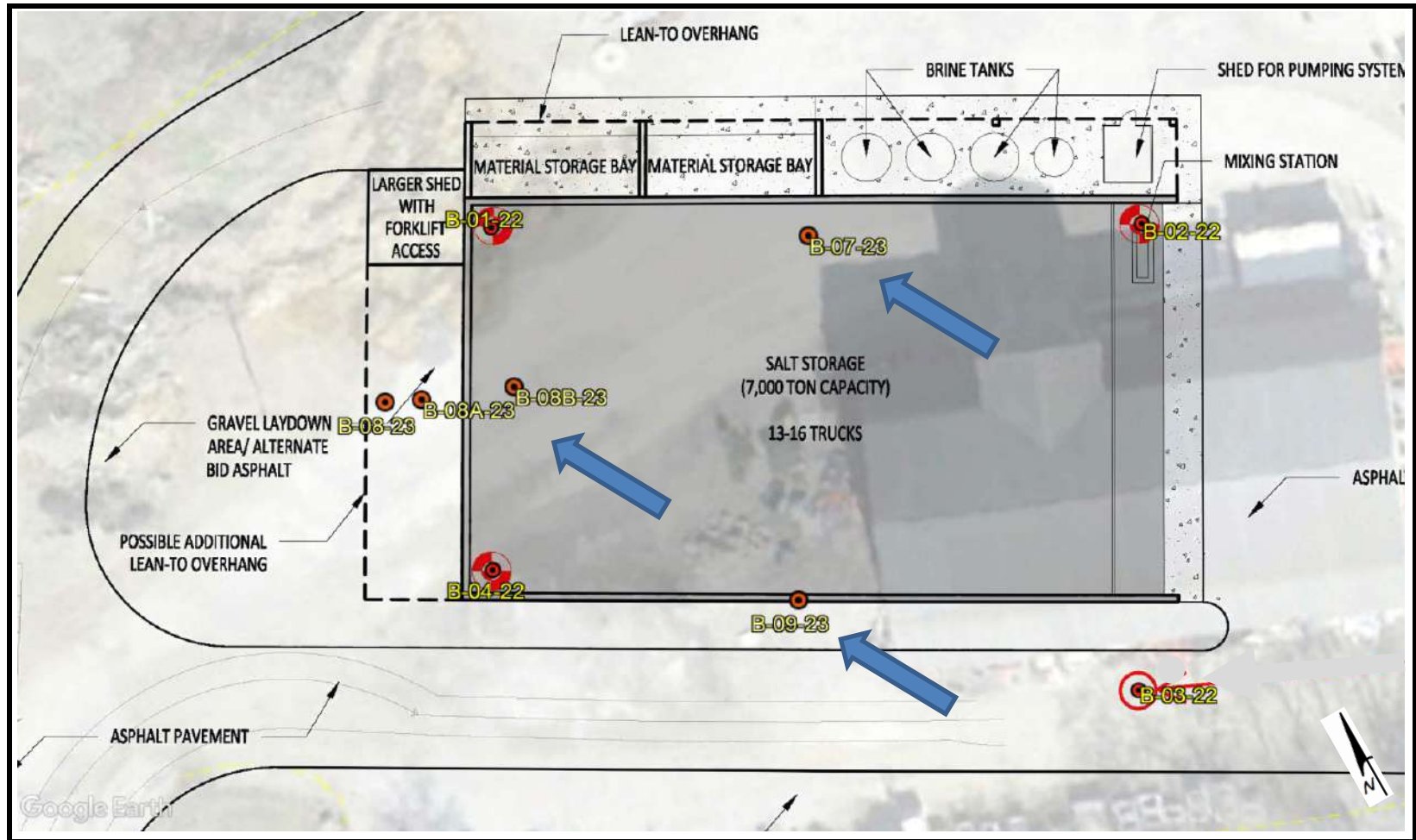
We thank you for the opportunity to be of service to you on this project. If you have any questions, please contact our office.


Respectfully submitted,  
**CTL ENGINEERING, INC.**

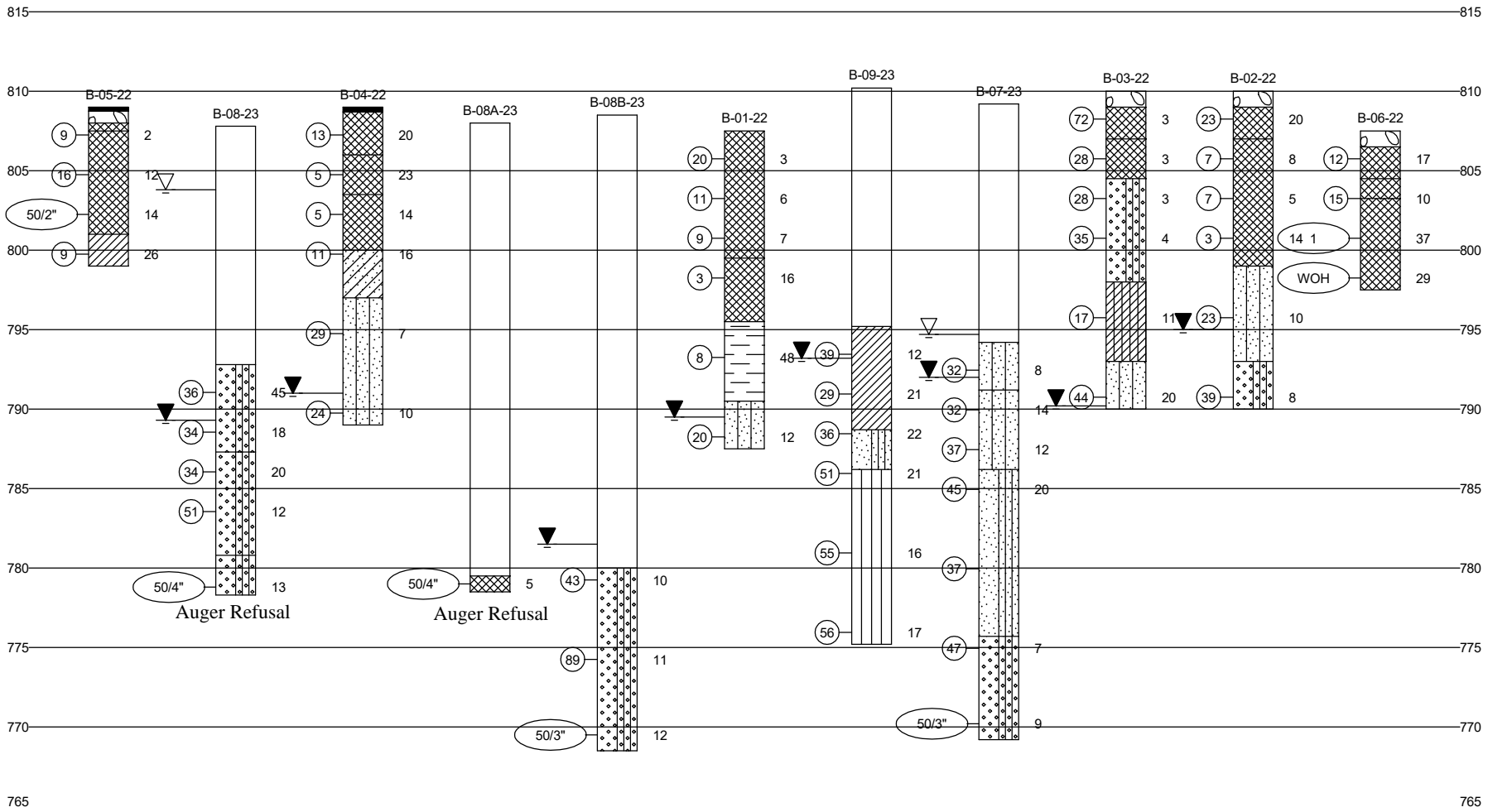


Frederick L. Schoen, P.E.  
Project Manager/Engineer





		<b>ADDENDUM REPORT - BORING LOCATION PLAN</b>				
 <b>CTL ENGINEERING, INC.</b> GEOTECHNICAL ENGINEERS TESTING * INSPECTION LABORATORY SERVICES	<b>Date</b>	City of Beavercreek New Salt Storage Building 2260 Dayton-Xenia Road Beavercreek, OH – Greene County				
	3/9/2023	<b>Scale</b>	None			
	<b>Drawn By</b>	JW	<b>Reviewed By</b>	FS	<b>Page</b>	1
					<b>Project No.</b>	22050003WAP



	TOPSOIL		GP-GM		SP		SC		CH		LIMESTONE
	ASPHALT		GP-GC		SW-SM		SC-SM		MH		FILL
	GW		GM		SW-SC		ML		OH		
	GP		GC		SP-SM		CL		PT		
	GW-GM		GC-GM		SP-SC		CL-ML		SHALE		
	GW-GC		SW		SM		OL		SILTSTONE		

### LEGEND

- GROUND WATER DURING DRILLING
- GROUND WATER AT COMPLETION OF DRILLING
- GROUND WATER AT "N" HOURS AFTER COMPLETION
- MOISTURE CONTENT IN PERCENT (w)
- CORRECTED STANDARD PENETRATION IN BLOWS PER FOOT (N60)

**GTL ENGINEERING**  
 102 Commerce Drive  
 P.O. Box 44  
 Wapakoneta, OH 45895  
 Telephone: 419-738-1447  
 Fax: 419-738-7670  
 Email: ctwapak@ctleng.com

### SOIL PROFILE

DATE 2/28/2023	City of Beavercreek	
SCALE AS SHOWN	Salt Storage Building Beavercreek, Ohio	
DRAWN BY SB	PAGE 1 OF 1	PROJECT NUMBER 22050003WAP



# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-01-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : <u>807.5 Feet</u> LATITUDE : <u>39.713591</u> LONGITUDE : <u>-84.018787</u> DEPTH : <u>20.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>Geoprobe 7822</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>80</u>	DRILLER : <u>AJ &amp; TB</u> TEMPERATURE : _____ WEATHER : <u>Cold, Sunny</u>
---	---	---

GROUNDWATER: Encountered at 18.0' Caved in at 16.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
799.5	5	Medium Dense to Loose, Brown <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , Damp (FILL)	8.0	SS-1	9 9 6	20	78	3						
795.5	10	Soft, Brown <b>SANDY LEAN CLAY (CL)</b> , Little Gravel, Moist (FILL)	12.0	SS-2	3 4 4	11	22	6						
790.5	15	Medium Stiff, Grayish Black, <b>ORGANIC CLAY (OL)</b> , Traces of Sand, with Wood Fragments, Highly Organic (LOI = 10.1%), Moist	17.0	SS-3	5 4 3	9	22	7						
787.5	20	Medium Dense, Gray <b>SILTY SAND (SM)</b> , Traces of Gravel, Wet	20.0	SS-4	2 1 1	3	33	16		5.0*				
		<b>BOTTOM OF BORING</b>		SS-5	4 3 3	8	67	48		2.0*				
				SS-6	7 7 8	20	100	12						

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

 <p>                     102 Commerce Drive                      P.O. Box 44                      Wapakoneta, Ohio 45895                      Telephone: 419-738-1447                      Fax: 419-738-7670                      Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<p><b>BORING METHOD</b></p> <p>HSA - Hollow Stem Auger                      SFA - Solid Flight Auger                      RC - Rock Coring                      MD - Mud Drilling                      WD - Wash Drilling                      HA - Hand Auger</p>	<p><b>SAMPLING METHOD</b></p> <p>SS - Split Spoon Sample                      ST - Shelby Tube Sample                      CR - Rock Core Sample                      BS - Bag Sample</p>	<p><b>ABBREVIATIONS</b></p> <p>* - Hand Penetrometer                      LL - Liquid Limit                      PL - Plastic Limit                      PI - Plasticity Index                      SPT - Standard Penetration Test                      N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER</p>
---	--	---	---

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-02-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : <u>810.0 Feet</u> LATITUDE : <u>39.713455</u> LONGITUDE : <u>-84.018355</u> DEPTH : <u>20.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>Geoprobe 7822</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>80</u>	DRILLER : <u>AJ &amp; TB</u> TEMPERATURE : _____ WEATHER : <u>Cold, Sunny</u>
---	---	---

GROUNDWATER: Encountered at 15.0' Caved in at 16.0'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
809.0		<b>GRAVEL</b>	1.0											
807.0		Very Stiff, Grayish Brown <b>SANDY LEAN CLAY (CL)</b> , Traces of Gravel, Moist ( <b>FILL</b> )	3.0	SS-1	9 7 10	23	100	20		8.5*				
	5			SS-2	2 2 3	7	44	8		5.0*				
		Loose to Very Loose, Grayish Brown <b>SILTY SAND with GRAVEL (SM)</b> , Moist ( <b>FILL</b> )		SS-3	2 3 2	7	44	5			NP	NP	NP	
	10			SS-4	2 1 1	3	44	14		1.5*				
799.0			11.0											
		Medium Dense, Brown and Gray <b>SILTY SAND (SM)</b> , Little Gravel, Moist		SS-5	6 9 8	23	72	10						
	15													
793.0			17.0											
		Dense, Brownish Gray <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , Wet		SS-6	9 15 14	39	83	8						
790.0	20	<b>BOTTOM OF BORING</b>	20.0											

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

 <p>                     102 Commerce Drive                      P.O. Box 44                      Wapakoneta, Ohio 45895                      Telephone: 419-738-1447                      Fax: 419-738-7670                      Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-03-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : 810.0 Feet	RIG TYPE : Geoprobe 7822	DRILLER : AJ & TB
LATITUDE : 39.713213	CASING DIA. : 2.25" I.D.	TEMPERATURE :
LONGITUDE : -84.018488	CORE SIZE : N/A	WEATHER : Cold, Sunny
DEPTH : 20.0 Feet	HAMMER : Automatic	
BORING METHOD: HSA	ENERGY RATIO : 80	

GROUNDWATER: Encountered at 19.8' Caved in at 17.3'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
809.0		<b>GRAVEL</b>	1.0											
		Very Dense, Brownish Gray <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , Damp (FILL)	3.0	SS-1	15 33 21	72	56	3						
807.0		Medium Dense, Brownish Gray <b>WELL-GRADED SAND with GRAVEL (SW)</b> , Damp (FILL)	5.5	SS-2	5 9 12	28	44	3						
804.5	5	Medium Dense to Dense, Brown <b>WELL-GRADED SAND with SILT (SW-SM)</b> , Little Gravel, Damp	12.0	SS-3	6 12 9	28	44	3						
	10	Very Stiff, Gray <b>SANDY SILTY CLAY (CL-ML)</b> , Traces of Gravel, Moist	17.0	SS-4	11 12 14	35	56	4						
798.0		Dense, Gray <b>SILTY SAND (SM)</b> , Moist to Wet	20.0	SS-5	5 6 7	17	100	11		8.5*				
793.0	15			SS-6	6 12 21	44	100	20		3.5*				
790.0	20	<b>BOTTOM OF BORING</b>												

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

 <p>102 Commerce Drive                  P.O. Box 44                  Wapakoneta, Ohio 45895                  Telephone: 419-738-1447                  Fax: 419-738-7670                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a></p>	<p><b>BORING METHOD</b></p> <p>HSA - Hollow Stem Auger                  SFA - Solid Flight Auger                  RC - Rock Coring                  MD - Mud Drilling                  WD - Wash Drilling                  HA - Hand Auger</p>	<p><b>SAMPLING METHOD</b></p> <p>SS - Split Spoon Sample                  ST - Shelby Tube Sample                  CR - Rock Core Sample                  BS - Bag Sample</p>	<p><b>ABBREVIATIONS</b></p> <p>* - Hand Penetrometer                  LL - Liquid Limit                  PL - Plastic Limit                  PI - Plasticity Index                  SPT - Standard Penetration Test                  N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER</p>
---	--	---	---

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-04-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : 809.0 Feet LATITUDE : 39.713410 LONGITUDE : -84.018881 DEPTH : 20.0 Feet BORING METHOD: HSA	RIG TYPE : Geoprobe 7822 CASING DIA. : 2.25" I.D. CORE SIZE : N/A HAMMER : Automatic ENERGY RATIO : 80	DRILLER : AJ & TB TEMPERATURE : WEATHER : Cold, Sunny
--	--	---

GROUNDWATER: Encountered at 18.0' Caved in at 15.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
808.7		<b>BROKEN ASPHALT (1") over GRAVEL (3")</b>	0.3											
		Stiff, Brown and Gray <b>LEAN CLAY with SAND (CL)</b> , Traces of Gravel with Asphalt Fragments, Moist ( <b>FILL</b> )		SS-1	7 6 4	13	67	20		4.0*				
806.0		Medium Stiff, Brown and Gray <b>LEAN CLAY with SAND (CL)</b> , Traces of Gravel, Moist ( <b>FILL</b> )	3.0	SS-2	4 2 2	5	33	23		3.5*				
803.5	5	Loose, Brown and Gray <b>CLAYEY SAND with GRAVEL (SC)</b> , Moist ( <b>FILL</b> )	5.5	SS-3	3 2 2	5	33	14		3.5*	27	15	12	
800.0		Medium Dense, Grayish Brown <b>CLAYEY SAND (SC)</b> , Traces of Gravel, Moist ( <b>POSSIBLE FILL</b> )	9.0	SS-4	4 4 4	11	78	16		6.0*				
797.0		Medium Dense, Grayish Brown <b>SILTY SAND with GRAVEL (SM)</b> , Moist to Wet	12.0	SS-5	17 12 10	29	72	7						
789.0	20	<b>BOTTOM OF BORING</b>	20.0	SS-6	8 8 10	24	39	10						

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

 <p>           102 Commerce Drive            P.O. Box 44            Wapakoneta, Ohio 45895            Telephone: 419-738-1447            Fax: 419-738-7670            Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

# TEST BORING RECORD


CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP

BORING NO.: **B-05-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : <u>809.0 Feet</u>	RIG TYPE : <u>Geoprobe 7822</u>	DRILLER : <u>AJ &amp; TB</u>
LATITUDE : <u>39.713355</u>	CASING DIA. : <u>2.25" I.D.</u>	TEMPERATURE : _____
LONGITUDE : <u>-84.019266</u>	CORE SIZE : <u>N/A</u>	WEATHER : <u>Cold, Sunny</u>
DEPTH : <u>10.0 Feet</u>	HAMMER : <u>Automatic</u>	
BORING METHOD: <u>HSA</u>	ENERGY RATIO : <u>80</u>	

GROUNDWATER: Encountered at == Caved in at ==

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
808.8		<b>ASPHALT (3")</b>	0.3											
808.0		<b>SUBBASE (9")</b>	1.0											
807.5		Loose, White and Brown <b>POORLY-GRADED GRAVEL with SAND (GP)</b> , Moist (FILL)	1.5	SS-1	7 4 3	9	6	2						
	5	Medium Dense, Dark Gray <b>SILTY CLAYEY SAND (SC-SM)</b> , Traces of Gravel, with Asphalt/Slag Fragments, Moist (FILL)		SS-2	10 8 4	16	72	12		2.5*				
801.0			8.0	SS-3	2 50/2"		17	14						
	10	Stiff, Brown and Dark Gray <b>LEAN CLAY with SAND (CL)</b> , Traces of Gravel, Moist (POSSIBLE FILL)		SS-4	5 4 3	9	67	26		7.0*				
799.0		<b>BOTTOM OF BORING</b>	10.0											

 <p>102 Commerce Drive                  P.O. Box 44                  Wapakoneta, Ohio 45895                  Telephone: 419-738-1447                  Fax: 419-738-7670                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a></p>	<b>BORING METHOD</b>	<b>SAMPLING METHOD</b>	<b>ABBREVIATIONS</b>
	HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	* - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

# TEST BORING RECORD


CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP

BORING NO.: **B-06-22**  
 SHEET 1 OF 1  
 DATE STARTED : 02-08-22  
 DATE COMPLETED : 02-08-22

BORING ELEVATION : <u>807.5 Feet</u> LATITUDE : <u>39.713668</u> LONGITUDE : <u>-84.018253</u> DEPTH : <u>10.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>Geoprobe 7822</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>80</u>	DRILLER : <u>AJ &amp; TB</u> TEMPERATURE : _____ WEATHER : <u>Cold, Sunny</u>
---	---	---

GROUNDWATER: Encountered at 'Dry' Caved in at 8.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
806.5		<b>GRAVEL</b>	1.0											
		Stiff, Brown and Gray <b>SANDY LEAN CLAY (CL)</b> , Traces of Gravel, Moist ( <b>FILL</b> )		SS-1	5 4 5	12	94	17		7.0*				
804.5		Medium Dense, Gray <b>WELL-GRADED SAND with GRAVEL (SW)</b> , Damp ( <b>FILL</b> )	3.0											
803.3			4.3	SS-2	22 9 2	15	44	10		5.5*				
	5													
		Very Soft, Dark Gray to Black <b>ORGANIC SILT (OL)</b> , Traces of Sand, MIXED with Wood Fragments, with Slag and Glass Fragments, Moderately Organic (LOI = 5.1% to 7.3%), Moist ( <b>FILL</b> )		SS-3	WOH WOH 1		22	37		3.0*				
				SS-4	WOH WOH WOH		33	29		1.0*				
797.5	10	<b>BOTTOM OF BORING</b>	10.0											
	15													
	20													

 <p>                     102 Commerce Drive                      P.O. Box 44                      Wapakoneta, Ohio 45895                      Telephone: 419-738-1447                      Fax: 419-738-7670                      Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP

BORING NO.: **B-07-23**  
 SHEET 1 OF 2  
 DATE STARTED : 02-24-23  
 DATE COMPLETED : 02-24-23


BORING ELEVATION : <u>809.2 Feet</u> LATITUDE : <u>39.713518</u> LONGITUDE : <u>-84.018578</u> DEPTH : <u>40.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>CME 55 Truck</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>76.4</u>	DRILLER : <u>CW &amp; CB</u> TEMPERATURE : <u>20 to 40 F</u> WEATHER : <u>Cold, Clear</u>
---	--	---

GROUNDWATER: Encountered at 17.2' At completion 14.5' Caved in at 22.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
	5	BLANK DRILLED TO 15.0'												
794.2	15			15.0										
			Dense, Brownish Gray <b>SILTY SAND with GRAVEL (SM)</b> , Damp		SS-1	10 11 14	32	61	8					
791.2				18.0										
			Dense, Gray <b>SILTY SAND (SM)</b> , Traces of Gravel, Wet		SS-2	9 13 12	32	100	14					

*Continued on next page*

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

 <p>                     102 Commerce Drive                      P.O. Box 44                      Wapakoneta, Ohio 45895                      Telephone: 419-738-1447                      Fax: 419-738-7670                      Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<b>BORING METHOD</b> HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	<b>SAMPLING METHOD</b> SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	<b>ABBREVIATIONS</b> * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER
---	---	--	---

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building

BORING NO.: **B-07-23**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
786.2		Dense, Gray <b>SILTY SAND (SM)</b> , Traces of Gravel, Wet	23.0	SS-3	10 12 17	37	100	12						
	25			SS-4	14 17 18	45	100	20						
	30	Dense, Gray <b>POORLY-GRADED SAND with SILT (SP-SM)</b> , Wet		SS-5	10 13 16	37	100							
775.7			33.5	SS-6	13 17 20	47	89	7						
	35													
	40	Dense, Gray <b>WELL-GRADED SAND with GRAVEL (SW-SM)</b> , Wet		SS-7	31 50/3"		100	9						
769.2		<b>BOTTOM OF BORING</b>	40.0											
	45													

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23



102 Commerce Drive  
 P.O. Box 44  
 Wapakoneta, Ohio 45895  
 Telephone: 419-738-1447  
 Fax: 419-738-7670  
 Email: [ctl@ctleng.com](mailto:ctl@ctleng.com)

BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER



# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-08-23**  
 SHEET 1 OF 2  
 DATE STARTED : 02-24-23  
 DATE COMPLETED : 02-24-23

BORING ELEVATION : <u>807.8 Feet</u> LATITUDE : <u>39.713521</u> LONGITUDE : <u>-84.018907</u> DEPTH : <u>29.5 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>CME 55 Truck</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>76.4</u>	DRILLER : <u>CW &amp; CB</u> TEMPERATURE : <u>30 to 40 F</u> WEATHER : <u>Cold, Clear</u>
---	--	---

GROUNDWATER: Encountered at 18.5' At completion 4.0' Caved in at 11.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
5		<b>BLANK DRILLED TO 15.0'</b>												
10														
15	15.0	Dense, Gray <b>WELL-GRADED SAND</b> with <b>SILT and GRAVEL (SW-SM)</b> , Moist ( <b>POSSIBLE FILL</b> )												
15				SS-1	12 14 14	36	100	45						
20	20.5			SS-2	7 12 15	34	100	18						
792.8	15													
787.3	20													

*Continued on next page*

<p>                 102 Commerce Drive                  P.O. Box 44                  Wapakoneta, Ohio 45895                  Telephone: 419-738-1447                  Fax: 419-738-7670                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p> 	<p style="text-align: center;"><b>BORING METHOD</b></p> <p>                 HSA - Hollow Stem Auger                  SFA - Solid Flight Auger                  RC - Rock Coring                  MD - Mud Drilling                  WD - Wash Drilling                  HA - Hand Auger             </p>	<p style="text-align: center;"><b>SAMPLING METHOD</b></p> <p>                 SS - Split Spoon Sample                  ST - Shelby Tube Sample                  CR - Rock Core Sample                  BS - Bag Sample             </p>	<p style="text-align: center;"><b>ABBREVIATIONS</b></p> <p>                 * - Hand Penetrometer                  LL - Liquid Limit                  PL - Plastic Limit                  PI - Plasticity Index                  SPT - Standard Penetration Test                  N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER             </p>
---	--	---	---


TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building

BORING NO.: **B-08-23**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
780.8	25	Dense to Very Dense, Gray <b>WELL-GRADED SAND with SILT (SW-SM)</b> , Traces of Gravel, Wet ( <b>POSSIBLE FILL</b> )	27.0	SS-3	7 13 14	34	100	20						
				SS-4	11 17 23	51	100	12						
778.3	30	Very Dense, Gray <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , with Cobbles, Wet <b>AUGER REFUSAL @ 29.5'</b>	29.5	SS-5	23 50/4"		92	13						
	35													
	40													
	45													

 <p>102 Commerce Drive                  P.O. Box 44                  Wapakoneta, Ohio 45895                  Telephone: 419-738-1447                  Fax: 419-738-7670                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a></p>	<b>BORING METHOD</b>	<b>SAMPLING METHOD</b>	<b>ABBREVIATIONS</b>
	HSA- Hollow Stem Auger SFA- Solid Flight Auger RC - Rock Coring MD - Mud Drilling WD - Wash Drilling HA - Hand Auger	SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample	* - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23



# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building

BORING NO.: **B-08A-23**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS		
											LL	PL	PI
	25	<b>BLANK DRILLED TO 28.5'</b>											
779.5		Very Dense, Gray and Black <b>WELL-GRADED SAND with SILT and GRAVEL (SW-SM)</b> , with Asphalt Fragments, Moist (FILL) <b>AUGER REFUSAL @ 29.5'</b>	28.5	SS-6	43 50/4"		92	5					
778.5	29.5												
	30												
	35												
	40												
	45												

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23



102 Commerce Drive  
 P.O. Box 44  
 Wapakoneta, Ohio 45895  
 Telephone: 419-738-1447  
 Fax: 419-738-7670  
 Email: [ctl@ctleng.com](mailto:ctl@ctleng.com)

BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-08B-23**  
 SHEET 1 OF 2  
 DATE STARTED : 02-24-23  
 DATE COMPLETED : 02-24-23

BORING ELEVATION : <u>808.5 Feet</u> LATITUDE : <u>39.713502</u> LONGITUDE : <u>-84.018816</u> DEPTH : <u>40.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>CME 55 Truck</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>76.4</u>	DRILLER : <u>CW &amp; CB</u> TEMPERATURE : <u>30 to 40 F</u> WEATHER : <u>Cold, Clear</u>
---	--	---

GROUNDWATER: Encountered at 27.0' At completion 'Dry' Caved in at 17.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS		
											LL	PL	PI
	5	BLANK DRILLED TO 28.5'											
	10												
	15												
	20												

*Continued on next page*

<p>                     102 Commerce Drive                      P.O. Box 44                      Wapakoneta, Ohio 45895                      Telephone: 419-738-1447                      Fax: 419-738-7670                      Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p> 	<p style="text-align: center;"><b>BORING METHOD</b></p> <p>                     HSA - Hollow Stem Auger                      SFA - Solid Flight Auger                      RC - Rock Coring                      MD - Mud Drilling                      WD - Wash Drilling                      HA - Hand Auger                 </p>	<p style="text-align: center;"><b>SAMPLING METHOD</b></p> <p>                     SS - Split Spoon Sample                      ST - Shelby Tube Sample                      CR - Rock Core Sample                      BS - Bag Sample                 </p>	<p style="text-align: center;"><b>ABBREVIATIONS</b></p> <p>                     * - Hand Penetrometer                      LL - Liquid Limit                      PL - Plastic Limit                      PI - Plasticity Index                      SPT - Standard Penetration Test                      N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER                 </p>
---	--	---	---

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23


# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building

BORING NO.: **B-08B-23**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS		
											LL	PL	PI
	25	<b>BLANK DRILLED TO 28.5'</b>											
780.0	30	Dense to Very Dense, Gray <b>WELL-GRADED SAND</b> with <b>SILT</b> and <b>GRAVEL (SW-SM)</b> , Wet	28.5	SS-7	11 15 19	43	72	10					
	35				SS-8	22 33 37	89	100	11				
	40				SS-9	26 50/3"		100	12				
768.5	40	<b>BOTTOM OF BORING</b>	40.0										
	45												

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23



102 Commerce Drive  
 P.O. Box 44  
 Wapakoneta, Ohio 45895  
 Telephone: 419-738-1447  
 Fax: 419-738-7670  
 Email: [ctl@ctleng.com](mailto:ctl@ctleng.com)

BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building  
 LOCATION : Beavercreek, Ohio  
 PROJECT NO. : 22050003WAP


BORING NO.: **B-09-23**  
 SHEET 1 OF 2  
 DATE STARTED : 02-24-23  
 DATE COMPLETED : 02-24-23

BORING ELEVATION : <u>810.2 Feet</u> LATITUDE : <u>39.713331</u> LONGITUDE : <u>-84.018686</u> DEPTH : <u>35.0 Feet</u> BORING METHOD: <u>HSA</u>	RIG TYPE : <u>CME 55 Truck</u> CASING DIA. : <u>2.25" I.D.</u> CORE SIZE : <u>N/A</u> HAMMER : <u>Automatic</u> ENERGY RATIO : <u>76.4</u>	DRILLER : <u>CW &amp; CB</u> TEMPERATURE : <u>30 to 40 F</u> WEATHER : <u>Cold, Clear</u>
---	--	---

GROUNDWATER: Encountered at 17.0' At completion 'Dry' Caved in at 23.4'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
	5	BLANK DRILLED TO 15.0"												
	10													
795.2	15	Hard to Very Stiff, Brown <b>SANDY LEAN CLAY (CL)</b> , with Interbedded Sand Seams, Moist	15.0	SS-1	12 13 18	39	100	12		3.5*				
	20				SS-2	9 11 12	29	100	21		3.0*			

*Continued on next page*

<p>                     102 Commerce Drive                      P.O. Box 44                      Wapakoneta, Ohio 45895                      Telephone: 419-738-1447                      Fax: 419-738-7670                      Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p> 	<p style="text-align: center;"><b>BORING METHOD</b></p> <p>                     HSA - Hollow Stem Auger                      SFA - Solid Flight Auger                      RC - Rock Coring                      MD - Mud Drilling                      WD - Wash Drilling                      HA - Hand Auger                 </p>	<p style="text-align: center;"><b>SAMPLING METHOD</b></p> <p>                     SS - Split Spoon Sample                      ST - Shelby Tube Sample                      CR - Rock Core Sample                      BS - Bag Sample                 </p>	<p style="text-align: center;"><b>ABBREVIATIONS</b></p> <p>                     * - Hand Penetrometer                      LL - Liquid Limit                      PL - Plastic Limit                      PI - Plasticity Index                      SPT - Standard Penetration Test                      N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER                 </p>
---	--	---	---

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

# TEST BORING RECORD

CLIENT : City of Beavercreek  
 PROJECT : Salt Storage Building

BORING NO.: **B-09-23**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS				
											LL	PL	PI		
788.7		Dense, Gray <b>POORLY-GRADED SAND with SILT (SP-SM)</b> , Wet	21.5	SS-3	12 13 15	36	100	22							
786.2	25		24.0	SS-4	6 15 25	51	100	21		2.0*					
		Hard, Gray <b>SILT with SAND (ML)</b> , Moist to Damp		SS-5	16 19 24	55	100	16		8.5*					
	30														
775.2	35	<b>BOTTOM OF BORING</b>	35.0	SS-6	16 21 23	56	100	17		9.0*					
	40														
	45														

TEST BORING - WAPAK 22050003WAP.GPJ\_NEW CTL WITH N60.GDT 2/28/23

102 Commerce Drive  
 P.O. Box 44  
 Wapakoneta, Ohio 45895  
 Telephone: 419-738-1447  
 Fax: 419-738-7670  
 Email: [ctl@ctleng.com](mailto:ctl@ctleng.com)

BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER



# EXPLANATION OF TERMS AND SOIL DESCRIPTIONS

## (ASTM D2487 & ASTM D2488)

### CONSISTENCY AND RELATIVE DENSITY DESCRIPTIONS

Descriptors for soil consistency used in this report are based upon the Standard Penetration Test (SPT), ASTM D 1587, with the penetration (N) values corrected to  $N_{60}$ , based upon the efficiency of the SPT Hammer (Energy Ratio) used for the soil sampling.

<u>NON-COHESIVE SOILS</u>		<u>COHESIVE SOILS</u>	
<u>Consistency</u>	<u>SPT-<math>N_{60}</math> (bpf)</u>	<u>Consistency</u>	<u>SPT-<math>N_{60}</math> (bpf)</u>
Very Loose	0 – 4	Very Soft	0 – 1
Loose	5 – 10	Soft	2 – 4
Medium Dense	11 – 30	Medium Stiff	5 – 8
Dense	31 - 50	Stiff	9 – 15
Very Dense	Over 50	Very Stiff	16 – 30
		Hard	Over 30

### COMPONENT MODIFIERS

<u>ASTM D2488 (Visual-Manual)</u>		<u>ASTM D2487 (USCS)</u>	
<u>Modifier</u>	<u>% by Weight</u>	<u>Modifier</u>	<u>% by Weight</u>
Trace of	0 – 1	with sand or gravel	15 – 29
Traces of	2 – 10	Sandy or Gravelly	30
Little	11 – 20	with silt or clay	5 – 12
Some	20 – 35	Silty or Clayey	> 12
“And”	35 – 50	Organic	$LL_{oven}/LL_{air} < 0.75$

### MOISTURE DESCRIPTIONS

<u>Terms</u>	<u>Non-Cohesive Soils</u>	<u>Cohesive Soils</u>
Dry	Moisture Absent	Powdery
Damp	Some Moisture	Below Plastic Limit
Moist	Damp to the Touch	Between Plastic and Liquid Limits
Wet	Visible Water	Above Liquid Limit



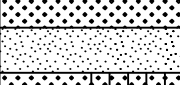


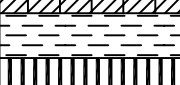
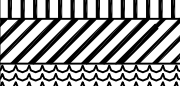

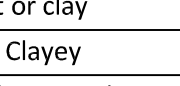
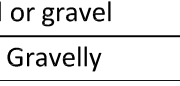


### PARTICLE SIZE DESCRIPTIONS

<u>Component</u>	<u>USCS Particle Size</u>
Boulders	12-in. (300 mm)
Cobbles	< 12-in. (300 mm) to 3-in. (75 mm)
Gravel	< 3-in. (75 mm) to #4 Sieve (4.75 mm)
Sand	< #4 Sieve (4.75 mm) to #200 Sieve (0.074 mm)
Silt	#200 Sieve (0.074 mm) to 0.005 mm
Clay	< 0.005 mm

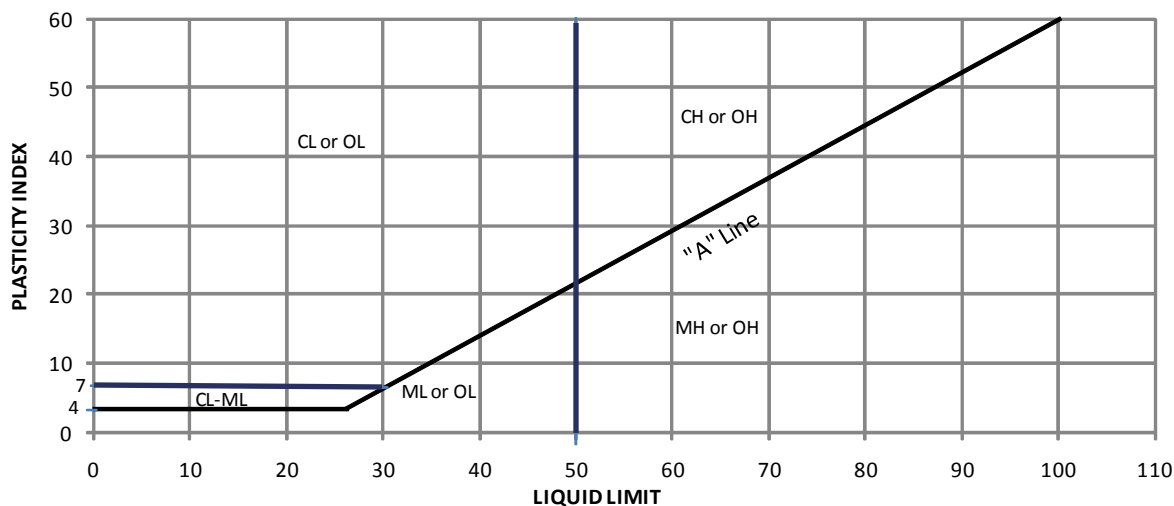


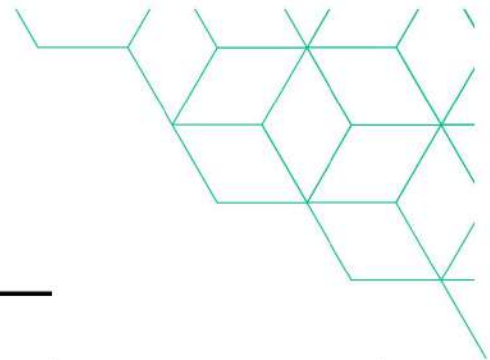
# SOIL DESCRIPTIONS BASED ON THE UNIFIED SOIL CLASSIFICATION SYSTEM

## ASTM D 2487 and D 2488

Major Division		Group Symbol	Letter Symbol	Group Name*	
Coarse Grained Soils Less Than 50 Percent Passing the # 200 Sieve	Gravel - Percent GRAVEL > percent SAND	Gravel with < 5% Fines		GW	Well Graded GRAVEL
		Gravel with Between 5 and 15% Fines		GP	Poorly Graded GRAVEL
		Gravel with ≥ 15% Fines	GW-GM	Well Graded GRAVEL with silt	
			GW-GC	Well Graded Gravel with clay	
			GP-GM	Poorly Graded GRAVEL with silt	
			GP-GC	Poorly Graded GRAVEL with clay	
	Sand - Percent SAND ≥ percent GRAVEL	Sand with < 5% Fines		SW	Well Graded SAND
		Sand with Between 5 and 15% Fines		SP	Poorly Graded SAND
		Sand with ≥ 15% Fines	SW-SM	Well Graded SAND with silt	
			SW-SC	Well Graded SAND with clay	
			SP-SM	Poorly Graded SAND with silt	
			SP-SC	Poorly Graded SAND with clay	
		SM	Silty SAND		
		SC	Clayey SAND		
Fine Grained Soils 50 percent or more Passing the # 200 Sieve	SILT and CLAY	Liquid Limit Less Than 50		ML	SILT
		Liquid Limit 50 or Greater		CL	Lean CLAY
				CL-ML	SILTY CLAY
				OL	Organic SILT, CLAY, or SILTY CLAY
			MH	Elastic SILT	
			CH	Fat CLAY	
			OH	Organic SILT or CLAY	
Highly Organic Soils			PT	Peat	
* Additional Modifiers	Coarse Grained Soils	with silt or clay	5 to 12 % Silt or Clay by weight		
		Silty or Clayey	more than 12 % Silt or Clay by weight		
	Fine Grained Soils	with sand or gravel	15 to 29 % Sand or Gravel by weight		
		Sandy or Gravelly	30 % or more Sand or Gravel by weight		

### "A" LINE GRAPH





**Request for Information**

FORM 00 63 13

Project name \_\_\_\_\_  
Project location \_\_\_\_\_  
Contractor \_\_\_\_\_  
A/E contact \_\_\_\_\_

**RFI no.** \_\_\_\_\_

GM project no. \_\_\_\_\_  
Drawing sheet no. \_\_\_\_\_  
Specification section \_\_\_\_\_  
Date answer requested \_\_\_\_\_

**Description of interpretation or clarification needed**

Date received \_\_\_\_\_

Name \_\_\_\_\_ Phone number \_\_\_\_\_  
Signature \_\_\_\_\_ Date released \_\_\_\_\_

**A/E Response**

Date received \_\_\_\_\_

Name \_\_\_\_\_ Phone number \_\_\_\_\_  
Signature \_\_\_\_\_ Date released \_\_\_\_\_

**Contractor receipt**

Upon review of the A/E's response we anticipate the potential contract adjustments indicated to the right:

Date in \_\_\_\_\_ Date out \_\_\_\_\_

Name \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

- No change in cost or time
- Decrease in cost of approx. \$ \_\_\_\_\_
- Increase in cost of approx. \$ \_\_\_\_\_
- Decrease in time of \_\_\_\_\_ days
- Increase in time of \_\_\_\_\_ days

@ creategm.com

Minster, OH | Columbus, OH | Indianapolis, IN | Fort Wayne, IN



**SECTION 01 11 00  
SUMMARY OF WORK**

**PART 1 GENERAL**

**1.01 PROJECT**

- A. Project Name: 21062.00 City of Beavercreek Salt Barn & 9-Acre Property Site Improvements
- B. Owner's Name: City of Beavercreek.
- C. Architect's Name: Garmann / Miller & Associates Inc..
- D. The Project consists of the construction of a new salt barn and storage building
  
- E. The project is a signature project for the Owner and construction of the highest quality facility is vitally important in this respect, each contractor assumes a position of trust confidence in the performance of its duties to the Owner and shall perform its work on the project with the highest degree of competence, diligence, cooperation and workmanship.

**1.02 CONTRACT DESCRIPTION**

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 50 00 - Contracting Forms and Supplements.

**1.03 OWNER OCCUPANCY**

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Schedule the Work to accommodate Owner occupancy.

**1.04 WORK SEQUENCE**

- A. The owner intends to award contracts soon after the receipt of bids.
- B. Coordinate construction schedule and operations with Owner.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 20 00  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Procedures for preparation and submittal of application for final payment.

**1.02 RELATED REQUIREMENTS**

- A. Section 00 50 00 - Contracting Forms and Supplements: Forms to be used.
- B. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

**1.03 SCHEDULE OF VALUES**

- A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values electronically within 15 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Including:
  - 1. Bonds
  - 2. Insurances
  - 3. Permits
  - 4. Allowances
  - 5. Mobilization
  - 6. Project Closeout (punch lists, attic stock, project record drawings, training, final cleaning).
- F. Each line item number shall list the material and labor cost.
- G. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- H. Revise schedule to list approved Change Orders, with each Application For Payment.

**1.04 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
  - 1. AIA G702 shall be an original and the most recent version of the form issued by the American Institute of Architects.
  - 2. AIA G703 - Continuation Sheet: Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Present required information on electronic media printout or in typewritten form.
- E. Execute certification by signature of authorized officer.
- F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- H. Submit electronic copy of each Application for Payment.
- I. Include the following with the application:
  - 1. Transmittal letter as specified for submittals in Section 01 30 00.
  - 2. Partial release of liens from major subcontractors and vendors.
  - 3. Affidavits attesting to off-site stored products.

#### **1.05 MODIFICATION PROCEDURES**

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
- C. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710 or written form.
- D. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
  - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  - 2. Promptly execute the change.
- E. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid Contractor shall prepare and submit a fixed price quotation within 15 days.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
  - 1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
  - 2. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
- G. Formula for Changes in the Contract Sum
  - 1. Definitions
    - a. Labor - All field labor shall be priced at the current base rate, excluding fringe benefits. The payroll is based on straight time only and is to include number of hours as rate of pay for each classification of worker.
    - b. Fringes - All established payroll taxes, assessment of fringe benefits labor. This may include, but is not limited to. FICA, Federal and State Unemployment, Health and Welfare, Pension Funds, Worker's Compensation and Apprentice Funds.
    - c. Equipment Rentals - All charges for certain non-owned heavy or specialized equipment at up to 100 percent of the documented rental cost. No rental charges will be allowed for hand tools, minor equipment, simple scaffold, etc.
    - d. Owned Equipment - All charges for certain owned, heavy or Specialized equipment at up to 100 percent of the cost listed by the Associated Equipment Dealers Blue Book. No recovery will be allowed for hand tools, minor equipment, simple scaffold etc.
    - e. Trucking - A reasonable delivery charge or per mile trucking charges for delivery of require materials or equipment. Charges for use of a pickup truck will not be allowed.

- f. Materials
  - 1) All materials purchased by the contractor and incorporated into the changed Work, showing costs, quantities, or Unit Prices of all items. Reimbursement of material cost shall only be allowed in the amount the Contractor's actual cost, including any and all discounts, rebates or related credits.
  - 2) One third (33 percent) of the cost of reusable materials for each use, such as formwork lumber, shoring or temporary enclosures.
- g. Overhead - Includes, but not limited to, telephone, telephone charges, facsimile, telegrams, postage, photos, photocopying, hand tools, simple scaffold, tool breakage, tool repair, tool replacement, tool blades, tool bits, home office estimating and expediting, home office clerical and accounting support, home office labor, legal services, supervision, travel and parking expenses.
- h. Subcontractor - The reasonable cost for all labor and material provided by a Subcontractor whose pricing is included and complies with these pricing guidelines.
- 2. The cost of Change Orders shall be:
  - a. For each change over \$ 500.00, the contractor shall furnish a detailed, written proposal itemized according to these pricing guidelines. Any subcontractor or material supplier pricing shall be itemized according to these pricing guidelines.
  - b. For extra work completed by the contractor with his own forces: The sum of Labor, Fringes, Equipment Rentals, Owned Equipment, Trucking and Material plus 15 percent of the sum for overhead and profit.
  - c. For extra work completed by Subcontractor of the Contractor: The Subcontractor cost plus 10 percent of the Subcontractor cost for overhead and profit.
- 3. Miscellaneous:
  - a. The following items are allowable at the cost of the Work with no overhead and profit:
    - 1) The cost of extending the Bond and the cost of extending liability, property damage, builder's risk or specialty coverage insurance
    - 2) Fees for permits, licenses, inspection, test, etc.
  - b. Cost which will not be reimbursed for Change Order Work include the following:
    - 1) Employee Profit Sharing Plans - regardless of how defined or described, the Contractor will pay these charges from Contractor profit.
    - 2) Voluntary Employee - examples are United Way and U.S. Bonds, etc.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- K. Promptly enter changes in Project Record Documents.

#### **1.06 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 01 70 00.
  - 2. Closeout submittals in Section 01 78 00 including but not limited to:
    - a. Waiver of Liens
    - b. Record Drawings
    - c. Operation and Maintenance Data

- d. Warranties and Bonds
- e. Certifications indicating no asbestos and lead solder in potable water systems have been incorporated into the work.
- f. Sign in sheet for Demonstrations and Instructions
- g. Signed receipt for Maintenance Materials (attic stock)
- h. Complete items of work determined by Garmann/Miller & Associates Inc.'s final inspection (completed punch list)

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 23 00  
ALTERNATES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Sum and Contract Time.

**1.02 GENERAL**

- A. Required alternatives are worded briefly. Refer to Specification Sections and Drawings for additional requirements. Claims for additional compensation will not be granted because of omissions or discrepancies due to the brevity.
- B. Bidders shall indicate the addition or deduction amount from the base bid for each alternative requested in the space provided on the bid form.
- C. The cost indicated on the bid form shall include material and labor as may be necessary for the identified alternative.

**1.03 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

**1.04 SCHEDULE OF ALTERNATES**

- A. **A** 01 **L** Addition to the Salt Barn as noted and detailed in the drawings and specifications. **S** **B**
- B. **A** 02 **C** concrete divider walls at the storage bays as noted and detailed in the drawings and specifications. **D** **W** **S** **B**
- C. **A** 03 **O** on-site asphalt paving noted and detailed in the drawings and specifications. **A** **P**

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Preinstallation meetings.
- F. Construction progress schedule.
- G. Coordination drawings.
- H. Submittal schedule.
- I. Submittals for review, information, and project closeout.
- J. Number of copies of submittals.
- K. Submittal procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 33 23 - Contractor Submittal Form
- B. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

**1.03 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
  - 1. Requests for Interpretation (RFI).
  - 2. Requests for substitution.
  - 3. Shop drawings, product data, and samples.
  - 4. Test and inspection reports.
  - 5. Design data.
  - 6. Manufacturer's instructions and field reports.
  - 7. Applications for payment and change order requests.
  - 8. Progress schedules.
  - 9. Coordination drawings.
  - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
  - 11. Closeout submittals.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRECONSTRUCTION MEETING**

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect.

3. Contractor.
  4. All Major Subcontractors.
- C. Agenda:
1. Execution of Owner-Contractor Agreement.
  2. Submission of executed bonds and insurance certificates.
  3. Distribution of Contract Documents.
  4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
  5. Designation of personnel representing the parties to Contract.
  6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders, and contract closeout procedures.
  7. Scheduling.
  8. Scheduling activities of Special Inspector required by the Authority having Jurisdiction.
- D. Record minutes and distribute electronic copies within two days after meeting to participants, with an electronic copy to Architect, Owner, participants, and those affected by decisions made.

### **3.02 SITE MOBILIZATION MEETING**

- A. Attendance Required:
1. Contractor.
  2. Owner.
  3. Architect.
  4. Contractor's superintendent.
  5. Major subcontractors.
- B. Agenda:
1. Use of premises by Owner and Contractor.
  2. Owner's requirements.
  3. Construction facilities and controls provided by Owner.
  4. Temporary utilities provided by Owner.
  5. Survey and building layout.
  6. Security and housekeeping procedures.
  7. Schedules.
  8. Demolition and/or construction waste management and disposal procedures.
  9. Application for payment procedures.
  10. Procedures for testing.
  11. Procedures for maintaining record documents.
  12. Requirements for start-up of equipment.
  13. Inspection and acceptance of equipment put into service during construction period.
- C. Record minutes and distribute electronic copies within two days after meeting to participants, with an electronic copy to Architect, Owner, participants, and those affected by decisions made.

### **3.03 PROGRESS MEETINGS**

- A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
1. Contractor.
  2. Owner.
  3. Architect.
  4. Contractor's superintendent.
  5. Major subcontractors.
- C. Agenda:

1. Review minutes of previous meetings.
  2. Review of work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems that impede, or will impede, planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Review of RFIs log and status of responses.
  7. Review of off-site fabrication and delivery schedules.
  8. Maintenance of progress schedule.
  9. Corrective measures to regain projected schedules.
  10. Planned progress during succeeding work period.
  11. Coordination of projected progress.
  12. Maintenance of quality and work standards.
  13. Effect of proposed changes on progress schedule and coordination.
  14. Scheduling activities of Special Inspector required by the Authority having Jurisdiction
  15. Other business relating to work.
- D. Record minutes and distribute electronic copies within 5 days after meeting to participants, with an electronic copy to Architect, Owner, participants, and those affected by decisions made.

#### **3.04 PRE-INSTALLATION MEETINGS CONFERENCE**

- A. A pre-installation meeting will be schedule at Project Site before construction activity that requires coordination with other construction and as indicated in the Contract Documents.
- B. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
- C. Review conditions of installation, preparation and installation procedures and coordination of related work including:
  1. Review of scope of work
  2. Review of approved submittals
  3. Manufacturers installation recommendations
  4. Deliveries
  5. Possible conflicts
  6. Compatibility problems
  7. Time schedules
  8. Environmental considerations
    - a. Implementation of indoor air quality management plan procedures (LEED)
  9. Warranty requirements
  10. Acceptability of substrates
  11. Inspections and testing requirements
  12. Mockup Review
- D. Do not proceed with installation if the conference cannot be successfully concluded. Resolve impediments to performance of the work and reconvene a the conference at the earliest feasible date

#### **3.05 CONSTRUCTION PROGRESS SCHEDULE**

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. Within 10 days after joint review, submit complete schedule.
- C. Submit updated schedule with each Application for Payment.

### **3.06 COORDINATION DRAWINGS**

- A. Review drawings prior to submission to Architect.
- B. As-Built Site Survey is required and all as-built notes shall be assembled in electronic form and turned into the Architect so that they are able to combine all changes into one set of documents for the Owner and the County.

### **3.07 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
  - 1. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  - 2. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

### **3.08 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Submittals will be marked as follows: Contractor to take the following action for each respective marking.
  - 1. No Exceptions Taken:
    - a. Procurement/Fabrication may proceed.
    - b. Copies to be distributed as scheduled.
  - 2. Note Markings and Confirm
    - a. Procurement/Fabrication may proceed based on marks.
    - b. Confirm compliance with markings with a letter on company letter head or resubmitted shop drawings.
  - 3. Note Markings, Revise and Resubmit:
    - a. Correct markings on submittal.
    - b. Corrected shop drawings shall be resubmitted before final procurement and fabrication.
    - c. Do not use drawings marked 'resubmit' to be use in conjunction with installation of work.
  - 4. Rejected/Incomplete Submittal: Correct submittal and resubmit in its entirety. No Procurement/Fabrication shall start until shop drawings have been completely revised, resubmitted and marked No Exceptions Taken or Note Markings and Confirm.
    - a. Correct submittal and resubmit in its entirety.
    - b. No Procurement/Fabrication shall start until shop drawings have been completely revised, resubmitted and marked No Exceptions Taken or Note Markings and Confirm.
- D. Samples will be reviewed for aesthetic, color, or finish selection.
- E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

### **3.09 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

### **3.10 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
  1. Project record documents.
  2. Operation and maintenance data.
  3. Warranties.
  4. Warranties and Bonds.
  5. Certifications indicating no asbestos and lead solder in potable water systems have been incorporated into the work.
  6. Sign in sheet for Demonstrations and Instructions
  7. Signed receipt for Maintenance Materials (attic stock)
  8. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.11 SUBMITTAL PROCEDURES**

- A. General Requirements:
- B. Shop Drawing Procedures:
  1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
  2. Do not reproduce the Contract Documents to create shop drawings.
  3. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
- C. Transmit each submittal with a copy of approved submittal form.
  1. See Section 01 33 32 Contractor Submittal Form
  2. Electronic copy for use in conjunction with this project is available upon request.
- D. Sequentially number the submittal form. Number revised submittals with original number and a sequential alphabetic suffix.
- E. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- F. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- G. Schedule submittals to expedite the Project, and coordinate submission of related items.
- H. For each submittal for review, allow 15 business days excluding delivery time to and from the Contractor.
- I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

- J. Provide space for Contractor and Architect review stamps.
- K. When revised for resubmission, identify all changes made since previous submission.
- L. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- M. Submittals not requested will not be recognized or processed.

### **3.12 ELECTRONIC FILES**

- A. Architects' Electronic Digital Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by the Architect for Contractor's use in preparing submittals. The Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings through an electronic digital file agreement.
  - 1. Electronic Digital Agreement: Electronic Digital files will be distributed to Contractors upon completion of AIA Document C106 - 2013, Digital Data Licensing Agreement as modified by the Architect for this project.

**END OF SECTION**



38 South Lincoln Drive  
P.O. Box 71  
Minster, Ohio 45865

1156 Dublin Road  
Suite 102  
Columbus, Ohio 43215

275 Veterans Way  
Suite 200  
Carmel, Indiana 46032

1690 Broadway  
Suite 19-455  
Ft. Wayne, Indiana 46802

[creategm.com](http://creategm.com)

Project name : \_\_\_\_\_

Contractor name : \_\_\_\_\_

Contact name : \_\_\_\_\_

Phone : \_\_\_\_\_

Subcontractor

Company : \_\_\_\_\_

Contact name : \_\_\_\_\_

Phone number : \_\_\_\_\_

Submittal # : \_\_\_\_\_

Date : \_\_\_\_\_

Description : \_\_\_\_\_

Specification section(s) : \_\_\_\_\_

- Product data
- LEED MR form
- Shop drawings
- Samples
- VOC compliance form
- Warranty
- Maintenance data
- Other : \_\_\_\_\_

Contractor stamp

Architect stamp

Consultant stamp



**SECTION 01 43 00  
QUALITY ASSURANCE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Control of installation.
- F. Mock-ups.
- G. Manufacturers' field services.
- H. Defect Assessment.

**1.02 RELATED REQUIREMENTS**

- A. Section 00 31 19 - Existing Condition Information: Soil investigation data.
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- C. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

**1.03 REFERENCE STANDARDS**

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants 2008 (Reapproved 2023).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry 2023.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2021.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components 2016.
- H. IAS AC89 - Accreditation Criteria for Testing Laboratories 2010.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.

- i. Results of test/inspection.
  - j. Compliance with Contract Documents.
  - k. When requested by Architect, provide interpretation of results.
- C. Masonry Inspection
- 1. Provide masonry inspection of concrete or brick masonry walls as required to insure that masonry construction is in conformance with the Contract Documents.
  - 2. The masonry inspector shall prepare a written report or reports for each day of inspection. Masonry Inspection report.
    - a. Masonry Inspection report attached to this Section.
  - 3. The masonry inspector shall be present and observe all grouting operations in wall requiring inspection. The masonry inspector shall be present at the project site with in sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. Periodically the masonry inspector shall be present during the placement of masonry units and reinforcement.
  - 4. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for grouting operation.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
- 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
  - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
- 1. Submit report in duplicate within 30 days of observation to Architect for information.
- G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.

## **1.05 QUALITY ASSURANCE**

- A. Testing Agency Qualifications:
- 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  - 3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

## **1.06 REFERENCES AND STANDARDS**

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

### **1.07 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Testing and Inspection Agency:
  1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
  2. Laboratory: Authorized to operate in State in which Project is located.
  3. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
  4. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION**

#### **3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

#### **3.02 MOCK-UPS**

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. General:

1. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
  2. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
  3. Accepted mock-ups shall be a comparison standard for the remaining Work.
  4. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.
- D. Metal Roof Mock up
1. Install roof system mock up to demonstrate aesthetic effects and set quality standards for materials, execution, and workmanship.
  2. Build mockup of a typical roof system as shown on the drawings a minimum of 12 panels wide including vapor barrier, insulation, underlayment, flashings, gutters, fascias, pipe flashings and associated attachments.
  3. Observation and evaluation of the mock-up shall be by:
    - a. The Architect
    - b. Construction Manager
    - c. Ohio Facilities Construction Commission Project Administrator
    - d. General Trades Contractor

### **3.03 TESTING AND INSPECTION**

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  2. Perform specified sampling and testing of products in accordance with specified standards.
  3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
  5. Perform additional tests and inspections required by Architect.
  6. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.
  3. Agency may not assume any duties of Contractor.
  4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.

5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
  - F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

#### **3.04 MANUFACTURERS FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

#### **3.05 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.

**END OF SECTION**

**SECTION 01 45 25  
MASONRY INSPECTION FORM**

**INSERT FROM DOCUMENT FILE**

**END OF SECTION**

**SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary sanitary facilities.
- B. Temporary Controls: Barriers.
- C. Vehicular access and parking.
- D. Waste removal facilities and services.
- E. Field offices.

**1.02 TEMPORARY UTILITIES - SEE SECTION 01 51 00**

**1.03 TELECOMMUNICATIONS SERVICES**

- A. Job Superintendent to be on site and available via cell phone when work is performed.

**1.04 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

**1.05 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.06 VEHICULAR ACCESS AND PARKING**

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Coordinate allowed locations for construction parking with owner.

**1.07 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site when containers are full.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

**1.08 FIELD OFFICES**

- A. Coordinate location with owner.

**1.09 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.

**PART 2 PRODUCTS - NOT USED**  
**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 51 00  
TEMPORARY UTILITIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary Utilities: Electricity, lighting, and water.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 50 00 - Temporary Facilities and Controls:
  - 1. Temporary telecommunications services for administrative purposes.
  - 2. Temporary sanitary facilities required by law.

**1.03 TEMPORARY ELECTRICITY**

- A. Cost:
  - 1. Electrical Contractor to pay to connect and disconnect to the utilities service, provide temporary lighting and power distribution system for each area and/or floor of the project, and service to General Contractor field office.
  - 2. General Contractor to pay for cost of energy used.
- B. Cost of electricity used: By Owner.
- C. Connect to Owner's existing power service.
  - 1. Do not disrupt Owner's need for continuous service.
  - 2. Exercise measures to conserve energy.
- D. Provide temporary electric feeder from existing building electrical service at location as directed.
- E. Complement existing power service capacity and characteristics as required.
- F. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- G. Permanent convenience receptacles may be utilized during construction.
- H. With the exception of General Contractor field office, wiring of Contractor's offices, trailers, storage facilities and the like used during construction shall be the responsibility of the individual contractor requiring the same.

**1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES BY ELECTRICAL CONTRACTOR**

- A. Permanent building lighting may be utilized during construction.

**1.05 TEMPORARY WATER SERVICE**

- A. Cost of Water Used: By Owner.
- B. Connect to existing water source.
  - 1. Exercise measures to conserve water.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 60 00  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 11 00 - Summary of Work: Lists of products to be removed from existing building.
- B. Section 01 30 00 - Administrative Requirements
- C. Section 01 43 00 - Quality Assurance: Product quality monitoring.
- D. Section 01 60 00 Substitution Request Form
- E. Section 22 05 13 - Common Motor Requirements for Plumbing Equipment: Motors for plumbing equipment.

**1.03 REFERENCE STANDARDS**

- A. NEMA MG 1 - Motors and Generators 2018.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 SUBMITTALS**

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
  - 1. Submit within 15 days after date of Agreement.
  - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

**PART 2 PRODUCTS**

**2.01 GENERAL**

- A. The Specifications and Drawings are complementary, and what is required by one shall be as if required by all.

- B. The Drawings govern dimensions, details and location of Work. The Drawings shall not be scaled.
- C. Specifications govern quality of materials and workmanship.
- D. In an event of inconsistencies within or between the Drawings and Specifications, the Contractor shall provide the better quality or greater quantity of Work and shall comply with the stricter requirements.

**2.02 EXISTING PRODUCTS**

- A. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
- B. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
  - 1. See Section 01 11 00 for list of items required to be salvaged for reuse and relocation.
  - 2. If reuse of other existing materials or equipment is desired, submit substitution request.

**2.03 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
  - 1. Made outside the United States, its territories, Canada, or Mexico.
  - 2. Made using or containing CFC's or HCFC's.
  - 3. Made of wood from newly cut old growth timber.
  - 4. Containing lead, cadmium, or asbestos.
- C. Where other criteria are met, Contractor shall give preference to products that:
  - 1. Are extracted, harvested, and/or manufactured closer to the location of the project.
  - 2. Have longer documented life span under normal use.
- D. Provide interchangeable components of the same manufacture for components being replaced.
- E. Motors: Refer to Section 22 05 13 - Common Motor Requirements for Plumbing Equipment, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.
- F. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.
- G. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

**2.04 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

**2.05 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

## **PART 3 EXECUTION**

### **3.01 SUBSTITUTION LIMITATIONS**

- A. Garmann/Miller & Associates Inc. will consider request for substitutions up to ten (10) calendar days prior to bid opening.
- B. Proposed substitutions received by Garmann/Miller & Associates Inc., less than ten (10) days to the bid opening, may not be considered.
- C. Submit request using Section 01 60 00.01 - Substitution Request Form.
  - 1. Submit one copy of request for substitution for consideration. Limit each request to one proposed substitution.
  - 2. Hard Copy Submission: Deliver submittal to Garmann/Miller & Associates Inc. business office.
  - 3. Electronic Submission: Forward via email to Garmann/Miller & Associates Inc.'s Project Manager, Mandy Niekamp; mniekamp@creategm.com.
- D. Substitutions will be considered after bid opening when a product, through no fault of the Contractor, becomes unavailable or unsuitable due to regulatory change.
- E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- F. A request for substitution constitutes that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Agrees to provide the same or better warranty for the substitution product as there is for the specified product.
  - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- H. Time Frame for Request. When a Substitution Request is received by the office of Garmann / Miller & Associates, Inc, during a normal business day, Architect will have a maximum of three (3) working days to respond to the Substitution Request.
  - 1. Weekends and holidays are not included in the three (3) day response period.
  - 2. Normal working day is considered between 8 AM and 5 PM.
  - 3. Request received between 5 PM and 8 AM may be considered received on the following business day.

### **3.02 OWNER-SUPPLIED PRODUCTS**

- A. Owner's Responsibilities:
  - 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
  - 2. Arrange and pay for product delivery to site.
  - 3. On delivery, inspect products jointly with Contractor.
  - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
  - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:

1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

### **3.03 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### **3.04 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- K. Prevent contact with material that may cause corrosion, discoloration, or staining.
- L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**

**SECTION 01 60 00.01 - SUBSTITUTION REQUEST FORM  
DURING BIDDING PHASE**

To: Garmann/Miller Associates Inc, Minster, Ohio

Date: \_\_\_\_\_

Project: 21062.00 City of Beavercreek Salt Barn & 9-Acre Property Site Improvements

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section	Section Name	Article/Paragraph	Specified Item

Proposed Substitution: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

Submit with request all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.

Does the Substitution affect dimensions shown on Drawings

Yes \_\_\_\_ No \_\_\_\_ If yes, clearly indicate changes:

\_\_\_\_\_

Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution

Yes \_\_\_\_ No \_\_\_\_ If no, fully explain:

What affect does substitution have on other Contracts or other trades

\_\_\_\_\_

What affect does substitution have on the delivery and construction schedule

\_\_\_\_\_

Differences between proposed substitution and specified item.

\_\_\_\_\_

Manufacturer's warranties of the proposed and specified items are:

Same: \_\_\_\_\_ Different: \_\_\_\_\_ Explain on an Attachment

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item.

Submitted by		For use by Garmann/Miller	
Signature		Accepted	
Title		Not Accepted	
Firm		Accepted as Noted	
Address		Received Too Late	
email		Insufficient Data	
Telephone		By	
Fax		Date	

**END OF SECTION**

**SECTION 01 70 00  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- G. General requirements for maintenance service.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- B. Section 01 43 00 - Quality Assurance: Testing and inspection procedures.
- C. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- D. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- E. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- F. Individual Product Specification Sections:
  - 1. Advance notification to other sections of openings required in work of those sections.

**1.03 REFERENCE STANDARDS**

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. On request, submit documentation verifying accuracy of survey work.
  - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
  - 3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.



## 1.05 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in Ohio and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

## 1.06 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
  - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
  - 1. Minimize amount of bare soil exposed at one time.
  - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
  - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
  - 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

## 1.07 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

## **1.08 PROHIBITED MATERIAL AND PRACTICES**

- A. Contractors are advised that the following materials and practices are prohibited in this project. Each Prime Contractor will be held responsible for compliance by his personnel and the personnel of each of his subcontractors.
  - 1. Use of tobacco products on school property is strictly prohibited.
  - 2. Use of marking pens of any type on surfaces to remain exposed to view in finished building.
  - 3. Penetrations of roof membrane without prior coordination with Roofing Contractor.
  - 4. Burning of any trash or rubbish is prohibited.
  - 5. Use of cabinetry countertops or other equipment as a work surface, walking surface or any other purpose which could result in damage to countertops or equipment.
  - 6. Suspension of systems (acoustical ceilings, piping, ductwork, conduits etc) from joist bridging and deck. Each system shall be supported from the building structure (beams, joist, etc).

## **PART 2 PRODUCTS**

### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Cut, move, or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ducts and piping to prevent condensation in exposed areas.

- E. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.
- F. Clean substrate surfaces prior to applying next material or substance.
- G. Seal cracks or openings of substrate prior to applying next material or substance.
- H. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

**3.03 LAYING OUT THE WORK**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

**3.04 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

**3.05 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove items indicated on drawings.
  - 2. Relocate items indicated on drawings.
  - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.

4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
    - c. A minimum of 3 days notice must be given the CM for any planned utility outages. See Section 02 41 00
  4. Verify that abandoned services serve only abandoned facilities.
  5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated:
- H. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
- I. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

### **3.06 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  1. Complete the work.

2. Fit products together to integrate with other work.
  3. Provide openings for penetration of mechanical, electrical, and other services.
  4. Match work that has been cut to adjacent work.
  5. Repair areas adjacent to cuts to required condition.
  6. Repair new work damaged by subsequent work.
  7. Remove samples of installed work for testing when requested.
  8. Remove and replace defective and non-complying work.
- D. Each trade is responsible for cutting and patching for their work unless otherwise noted.
- E. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- F. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- G. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- H. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- I. Restore work with new products in accordance with requirements of Contract Documents.
- J. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- K. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
- L. Patching:
  1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  2. Match color, texture, and appearance.
  3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
- M. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- N. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

### **3.07 PROGRESS CLEANING BY EACH CONTRACTOR**

- A. Contractors shall provide daily cleanup and removal of rubbish/refuse resulting from their operations including but not limited to bulky debris, packaging, containers, unused material.
- B. Remove pile of debris from the building daily. No pile of debris shall be left in the building overnight.
- C. At reasonable intervals during the progress of Work, not less than once a week, perform a cleaning of dirt, dust and debris. Broom clean floor and paved surfaces and raked clean other surfaces of ground.
- D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  1. Do not burn or bury rubbish and waste material on project site.

2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

E. Roadway shall remain clear.

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.09 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.10 FINAL CLEANING**

- A. Each Contractor shall perform his respective final clean up and shall leave the Work of the completed project in a clean neat condition.
- B. Execute final cleaning prior to final project assessment.
  1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- C. Each Contractor shall perform shall perform his respective final clean up and shall leave the Work of the completed project in a clean neat condition including the following:
  1. Conduct an inspection of sight-exposed interior and exterior surfaces and work areas, to verify that the entire Work is left in broom clean condition.
  2. Tunnels and closed off spaces shall be cleaned of packing boxes, wood frame members and other waste materials used in the construction.
  3. The entire system of piping and equipment shall be cleaned internally. The Contractor installing those item shall open all direct pockets and strainers, completely blowing down as required and clean strainer screens of all accumulated debris
  4. Tanks, fixtures and pumps shall be drained and proved free of sludge and accumulated matter.
  5. Temporary labels, stickers etc., shall be removed from fixtures and equipment (Do not remove permanent nameplates, equipment model numbers, rating etc.)
  6. Use cleaning materials that are nonhazardous.
  7. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
  8. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
  9. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
  10. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- D. The General Contractor will do final cleaning which will consist of the following to a degree acceptable to the Architect.

1. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign material from sight-exposed interior and exterior surfaces.
2. Vacuum all carpeting. Clean and wax VCT floors including a minimum of three (3) coats of wax or the number of coats specified by the manufacturers which ever is greater. Wax to be approved by the Owner prior to waxing.
3. Wash and shine glazing and mirrors.
4. Polish glossy surfaces to a clear shine.
5. Dust cabinets work and remove markings
6. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
7. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
8. Clean site; sweep paved areas, rake clean landscaped surfaces.
9. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.11 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  1. Provide copies to Architect.
- B. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- D. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- F. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- G. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

### **3.12 MAINTENANCE**

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

### **END OF SECTION**

**SECTION 01 78 00  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

**1.03 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
  - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
  - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
  - 5. Submit two electronic sets of final documents in final form within 10 days after final inspection. Electronic format shall be PDF's on CD's or USB flash drives.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- D. Certifications:
  - 1. Submit copies of the certifications listed in this section:
    - a. Certification stating that no flux or solder used for drinking water piping .
    - b. Certification stating that asbestos containing material was not incorporated into the Work.
- E. Receipts:
  - 1. Submit copies of the receipt signed by owner for completed training sessions.
    - a. See individual specifications sections for training required.
  - 2. Submit copies of the receipt signed by owner for maintenance material (attic stock).
    - a. See individual specifications sections for maintenance material (attic stock) required.



## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Addenda.
  - 3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 2. Field changes of dimension and detail.
  - 3. Details not on original Contract drawings.

### **3.02 OPERATION AND MAINTENANCE DATA**

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### **3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  - 1. Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.
- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### **3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Additional Requirements: As specified in individual product specification sections.

**3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 3 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
  - 1. Project Directory.
  - 2. Table of Contents, of all volumes, and of this volume.
  - 3. Operation and Maintenance Data: Arranged by system, then by product category.
    - a. Source data.
    - b. Product data, shop drawings, and other submittals.
    - c. Operation and maintenance data.
    - d. Field quality control data.
    - e. Photocopies of warranties and bonds.
  - 4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

- K. One (1) electronic copy of the Operation and Maintenance Manuals shall be placed on a CD, Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.

### **3.06 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

**END OF SECTION**

**SECTION 01 79 00  
DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
  - 1. Items specified in individual product Sections.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.
- B. Other Specification Sections: Additional requirements for demonstration and training.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit not less than four weeks prior to start of training.
  - 2. Revise and resubmit until acceptable.
  - 3. Provide an overall schedule showing all training sessions.
  - 4. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.
    - d. Intended audience, such as job description.
    - e. Objectives of training and suggested methods of ensuring adequate training.
    - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    - g. Media to be used, such as slides, hand-outs, etc.
    - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
  - 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
  - 1. Identification of each training session, date, time, and duration.
  - 2. Sign-in sheet showing names and job titles of attendees.
- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
  - 1. Format: DVD Disc.
  - 2. Label each disc and container with session identification and date.

**1.04 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
  - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 TRAINING - GENERAL**

- A. Conduct training on-site unless otherwise indicated.
- B. Provide training in minimum two hour segments.
- C. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- D. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  - 3. Typical uses of the O&M manuals.
- E. Product- and System-Specific Training:
  - 1. Review the applicable O&M manuals.
  - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
  - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  - 6. Discuss common troubleshooting problems and solutions.
  - 7. Discuss any peculiarities of equipment installation or operation.
  - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  - 10. Review spare parts and tools required to be furnished by Contractor.
  - 11. Review spare parts suppliers and sources and procurement procedures.
- F. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

**END OF SECTION**

**SECTION 02 41 00  
DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of built site elements.
- C. Abandonment and removal of existing utilities and utility structures.
- D. Salvage of designated building elements.
- E. Protection of designated vegetation.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 11 00 - Summary of Work: Limitations on Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- D. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- E. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.
- F. Section 31 20 00 - Earth Moving

**1.03 REFERENCE STANDARDS**

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  - 1. Vegetation to be protected.
  - 2. Areas for temporary construction and field offices.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Fill Material: As specified in Section 31 23 23 - Fill.
  - 1. Recyclable Fill: Concrete and masonry products from on site demolition:
    - a. Remove reinforcing and separate to salvaged metals.
    - b. Remove brick and clay masonry.
    - c. Crush concrete and masonry waste to less than 3 inch in each direction.
    - d. Material subject to the approval by representative of the testing agency.
- B. Aggregates: As specified in Section 32 1123 Aggregate Base and Surfacing
  - 1. Recyclable Aggregate: Concrete and masonry products from on site demolition:
    - a. Remove reinforcing and separate to salvaged metals.
    - b. Remove brick and clay masonry.
    - c. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.

- d. Crush concrete and masonry waste with at least four (4) parts of specified aggregate for each part of concrete waste.
- e. Material subject to the approval by representative of the testing agency.
- 2. Use of Reclaimed Base:
  - a. Contractor may use a blend of new material in combination with reclaimed aggregate material.
  - b. Material subject to the approval by representative of the testing agency.

## **PART 3 EXECUTION**

### **3.01 SCOPE**

- A. Remove paving and curbs as required to accomplish new work.
- B. Remove all other paving and curbs within site boundaries.
- C. Within area of new construction, remove foundation walls and footing in their entirety.
- D. Outside area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.
- E. Remove concrete slabs on grade within site boundaries.
- F. Remove manholes and manhole covers, curb inlets and catch basins.
- G. Remove other items indicated, for salvage, relocation, and recycling.
- H. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 22 00.

### **3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Comply with applicable requirements of NFPA 241.
  - 3. Use of explosives is not permitted.
  - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 5. Provide, erect, and maintain temporary barriers and security devices.
  - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 8. Do not close or obstruct roadways or sidewalks without permit.
  - 9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  - 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Protect existing structures and other elements that are not to be removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.

- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- G. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- H. Perform demolition in a manner that maximizes salvage and recycling of materials.
  - 1. Dismantle existing construction and separate materials.
  - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

### **3.03 EXISTING UTILITIES**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### **3.04 SALVAGE BY CONTRACTOR**

- A. Contractor shall remove and deliver items shown on the drawings to be salvaged for reuse/reinstallation or delivery to the owner.
  - 1. Obtain sign receipt when salvaged items have been delivered to the owner.

### **3.05 PROTECTION OF EXISTING TO REMAIN**

- A. Protect designated items to remain as indicated on the drawings.
- B. Protect vegetation including trees and shrubbery as indicated on the drawings.
- C. Perform cutting to accomplish removals neatly.

### **3.06 DAMAGED WORK**

- A. Restoration: If work to remain is damaged or destroyed due to subsequent construction/demolition operations, compensate or replace at no cost to Owner.
- B. Vegetation Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction/demolition operations, compensate or replace at no cost to Owner.
  - 1. Trees and vegetation will be considered dead when main leader has died back or when 25 percent or more of crown has died .



2. If a tree is deemed damaged or dead by the owner's representative, \$500 per caliper inch of tree will be assessed.

### **3.07 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Recycling, Salvage, and Reuse:
  1. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
  2. Recyclable Fill: Concrete and masonry products from on site demolition:
    - a. Remove reinforcing and separate to salvaged metals.
    - b. Remove brick and clay masonry.
    - c. Crush concrete and masonry waste to less than 3 inch in each direction.
    - d. Material subject to the approval by representative of the testing agency.
  3. Recyclable Aggregate: Concrete and masonry products from on site demolition:
    - a. Remove reinforcing and separate to salvaged metals.
    - b. Remove brick and clay masonry.
    - c. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.
    - d. Material subject to the approval by representative of the testing agency.
  4. Use of Reclaimed Asphalt Base:
    - a. Material subject to the approval by representative of the testing agency.
  5. Reclaimed Pavement:
    - a. As specified in Section 32 1216 Asphalt Paving
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

SECTION 03 30 00 –  
CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
  - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete Subcontractor.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - 1. Location of construction joints is subject to approval of the Architect.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and testing agency.
- B. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Form materials and form-release agents.
  - 4. Steel reinforcement and accessories.
  - 5. Waterstops.
  - 6. Curing compounds.
  - 7. Bonding agents.
  - 8. Adhesives.
  - 9. Vapor retarders.
  - 10. Semirigid joint filler.
  - 11. Joint-filler strips.
  - 12. Repair materials.
- C. Material Test Reports: For the following, from a qualified testing agency:
  - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
  - 1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- E. Field quality-control reports.
- F. Minutes of preinstallation conference.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

## 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## 1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301 (ACI 301M).

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
  2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

## 2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), ASTM A 706/A 706M, deformed bars, assembled with clips.
- C. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- D. Deformed-Steel Wire: ASTM A 1064/A 1064M.
- E. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

## 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Zinc Repair Material: ASTM A 780/A 780M.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
  - 1. Portland Cement: ASTM C 150/C 150M, Type I, Type II, Type III gray.
  - 2. Fly Ash: ASTM C 618, Class F or C.
  - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
  - 4. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Water: ASTM C 94/C 94M and potable.

## 2.6 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513 for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
  - 1. Profile: Ribbed with center bulb.
  - 2. Dimensions: 6 inches by 3/8 inch thick (150 mm by 10 mm thick); nontapered.
- B. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.

1. Profile: [Ribbed with center bulb.
2. Dimensions: 6 inches by 3/8 inch thick (150 mm by 10 mm thick), nontapered.

C. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Profile: Ribbed with center bulb.
2. Dimensions: 6 inches by 3/8 inch thick (150 mm by 10 mm thick); nontapered.

## 2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

## 2.8 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

## 2.9 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

## 2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.



## 2.11 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
  4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 25 percent.
  2. Combined Fly Ash and Pozzolan: 25 percent.
  3. Slag Cement: 50 percent.
  4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
  5. Silica Fume: 10 percent.
  6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
  4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

## 2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
  2. Maximum W/C Ratio: .55.
  3. Slump Limit: 4 inches (100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
- B. Foundation Walls: Normal-weight concrete.
1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
  2. Maximum W/C Ratio: 0.45.
  3. Slump Limit: 4 inches (100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
  4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
- C. Slabs-on-Grade: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  2. Maximum W/C Ratio: 0.50.
  3. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).
  4. Slump Limit: 4 inches (100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
  5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- D. Suspended Slabs: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  2. Maximum W/C Ratio: 0.50.
  3. Minimum Cementitious Materials Content: 520 lb/cu. yd. (309 kg/cu. m).

4. Slump Limit: 4 inches (100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

E. Building Walls: Normal-weight concrete.

1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Slump Limit: 4 inches (100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).

## 2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## PART 3 - EXECUTION

### 3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
  - 2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
  1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 (ACI 318M) and ACI 301 (ACI 301M) for design, installation, and removal of shoring and reshoring.
  1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

### 3.5 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

### 3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.8 WATERSTOP INSTALLATION

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

### 3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

### 3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.



- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
  - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

- a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
  3. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).
- C. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.12 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
  2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
  3. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
  5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
  6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

### 3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.14 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
  1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  2. Do not apply to concrete that is less than 14 days' old.
  3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

### 3.15 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.16 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.17 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
1. Verification of use of required design mixture.
  2. Concrete placement, including conveying and depositing.
  3. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
  2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
6. Compression Test Specimens: ASTM C 31/C 31M.
  - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
  - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
  - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
  - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

### 3.18 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000



**SECTION 04 05 13  
MASONRY MORTARING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Mortar for masonry.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 05 16 - Masonry Grouting
- B. Section 04 05 19 - Masonry Anchorage & Reinforcing
- C. Section 04 05 23 - Masonry Accessories
- D. Section 04 20 00 - Unit Masonry

**1.03 REFERENCE STANDARDS**

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022, with Errata.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement 2023.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2023.
- D. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- E. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- F. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar 2023.
- G. ASTM C476 - Standard Specification for Grout for Masonry 2023.
- H. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- I. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2023.
- J. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2022.
- K. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry 1995 (Reapproved 2013).
- L. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).
- M. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2023a.
- N. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength 2009.
- O. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council Current Edition.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

#### **1.05 QUALITY ASSURANCE**

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

#### **1.06 PRECONSTRUCTION TESTING**

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.

1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

#### **1.08 FIELD CONDITIONS**

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Hot Weather Requirements: Comply with IMIAWC (HW) .

### **PART 2 PRODUCTS**

#### **2.01 MORTAR APPLICATIONS**

A. At Contractor's option, mortar may be field-mixed from packaged dry materials or made from factory premixed dry materials with addition of water only.

B. Mortar Color: Natural gray unless otherwise indicated.

C. Mortar Mix Designs: ASTM C270, Proportion Specification.

1. Masonry below grade and in contact with earth: Type S.

a. Color: Natural gray color for non colored block

2. Exterior, Loadbearing Masonry: Type S.

a. Color: Natural Gray

3. Exterior, Non-loadbearing Masonry: Type N.

a. Color: Natural Gray

#### **2.02 MATERIALS**

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.

1. Type: Types as scheduled in this section.

2. Color:

a. Natural Gray

B. Portland Cement: ASTM C150/C150M.

1. Type: Type I - Normal; ASTM C150/C150M.

2. Color: Standard gray.

C. Masonry Cement: ASTM C91/C91M.

D. Water: Clean and potable.

E. Cold Weather Admixture: Non chloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M Type C.

1. Acceptable Manufacturers:
  - a. Euclid Chemical: ACCELGUARD 80
  - b. Sika: SikaSet NC
  - c. Master Builders Solutions: MasterSet FP 20
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Bonding Agent: Latex type.
- G. Integral Water Repellent Admixture: Polymeric liquid admixture added to mortar at the time of manufacture.
  1. Performance of Mortar with Integral Water Repellent:
    - a. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
    - b. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
    - c. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
  2. Use only in combination with masonry units produced with integral water repellent admixture.
  3. Manufacturers:
    - a. GCP Applied Technologies: DRY-BLOCK Mortar Admixture
    - b. Rheomix: Master Builders, Inc., Cleveland, Ohio
    - c. Moxie International: Moxie Shield 1800 Admixture
    - d. Krete Industries, Inc.: Krete Gard Mortar Mix
    - e. SPEC MIX: IWR Integral Water Repellent Mortar
    - f. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.03 MORTAR MIXING**

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.
- F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.
- G. Do not use calcium chloride in mortar.

### **2.04 PRECONSTRUCTION TESTING**

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
  1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Apply bonding agent to existing concrete surfaces.

### **3.02 INSTALLATION**

- A. Install mortar to requirements of section(s) in which masonry is specified.
- B. Remove excess mortar from grout spaces.

**3.03 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. The owner will employ services of an independent testing agency to perform specified testing and inspections
- C. All mortar shall meet the "proporttion specification" of ASTM C-270 and be made with portland cement/lime (non air-entrained). The use of masonry cement mortar is strictly prohibited. Use Type 'S' for walls below grade and Type 'N' for all other walls.

**END OF SECTION**

**SECTION 04 05 16  
MASONRY GROUTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Grout for masonry

**1.02 RELATED REQUIREMENTS**

- A. Section 04 05 13 - Masonry Mortaring
- B. Section 04 05 19 - Masonry Anchorage & Reinforcing
- C. Section 04 05 23 - Masonry Accessories
- D. Section 04 20 00 - Unit Masonry
- E. Section 08 11 13 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

**1.03 REFERENCE STANDARDS**

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022, with Errata.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement 2023.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2023.
- D. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- E. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- F. ASTM C476 - Standard Specification for Grout for Masonry 2023.
- G. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry 2020.
- H. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2022.
- I. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).
- J. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2023a.
- K. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength 2009.
- L. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry 2022.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used.
- C. Reports: Submit reports on grout indicating compliance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**1.05 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

**1.06 PRECONSTRUCTION TESTING**

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.

- B. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
  - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

### **1.08 FIELD CONDITIONS**

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIAWC (HW).

## **PART 2 PRODUCTS**

### **2.01 GROUT APPLICATIONS**

- A. At Contractor's option, grout may be field-mixed from packaged dry materials or made from factory premixed dry materials with addition of water only.
- B. Grout Mix Designs:
  - 1. Bond Beams and Lintels: 2,500 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
    - a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
    - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
  - 2. Engineered Masonry: 2,500 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
    - a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
    - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

### **2.02 MATERIALS**

- A. Portland Cement: ASTM C150/C150M.
  - 1. Type: Type I - Normal; ASTM C150/C150M.
  - 2. Color: Standard gray.
- B. Grout Materials:
  - 1. Portland Cement: ASTM C150, Type I
  - 2. Grout Aggregate: ASTM C 404.
    - a. Fine Aggregates: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.
    - b. Coarse Aggregates: Clean, uncoated, pea gravel containing no clay, mud, loam, or foreign matter. Maximum aggregate size 3/4 inch.
  - 3. Flyash: ASTM C618-89a, Type C or F may be substituted for up to 20 percent of the total cementitious materials in the grout mix.
- C. Grout Coarse Aggregate: Maximum 3/8 inch size
- D. Water: Clean and potable.
- E. Cold Weather Admixture: Non chloride, noncorrosive, accelerating admixture complying with ASTM C 494 Type C.
  - 1. Acceptable Manufacturers:
    - a. Substitutions: See Section 01600 - Product Requirements.
- F. Bonding Agent: Latex type.
- G. Integral Water Repellent Admixture: Polymeric liquid admixture added to mortar at the time of manufacture.
  - 1. Performance of Mortar with Integral Water Repellent:

- a. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
- b. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
- c. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
- 2. Use only in combination with masonry units produced with integral water repellent admixture.
- 3. Manufacturers:
  - a. GCP Applied Technologies: DRY-BLOCK Mortar Admixture
  - b. Rheomix: Master Builders, Inc., Cleveland, Ohio
  - c. Moxie International: Moxie Shield 1800 Admixture
  - d. Krete Industries, Inc.: Krete Gard Mortar Mix
  - e. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.03 GROUT MIXING**

- A. Grout Mixes shall be plant mix or factory blended (dry mix with water added at the site)
- B. Mix grout in accordance with ASTM C94/C94M.
- C. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.
  - 1. Grout Proportions (by volume): Comply with Table 1, ASTM C476.
    - a. Fine Grout: 1 part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 to 3 parts fine aggregate.
    - b. Coarse Grout: 1 part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 parts fine aggregate, 1 to 2 parts coarse aggregate.
  - 2. Grout Slump: Properly proportioned grout shall have a slump of 8 to 10 inches.
- D. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- E. Do not use anti-freeze compounds to lower the freezing point of grout.
- F. Do not use calcium chloride in grout.

### **2.04 PRECONSTRUCTION TESTING**

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
  - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Apply bonding agent to existing concrete surfaces.

### **3.02 INSTALLATION**

- A. Install grout to requirements of section(s) in which masonry is specified.
- B. Do not install grout in lifts greater than 16 inches without mechanically consolidating.
- C. Do not displace reinforcement while placing grout.
- D. Remove excess mortar from grout spaces.

### **3.03 GROUTING**

- A. Use low-lift grouting techniques subject to other limitations of Contract Documents.

### **3.04 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 43 00 - Quality Assurance.

- B. The owner will employ services of an independent testing agency to perform specified testing and inspections
- C. Test and evaluate grout using the Unit Strength Method (ASTM C1019) or the masonry assembly using the Prism Test Method (ASTM C1314).
  - 1. Unit Strength Method: Test and evaluate grout in accordance with ASTM C 1019 procedures.
    - a. Sampling and testing for field quality control will be performed by the Contractor's testing laboratory during the placement of each type of grout fill, as follows:
      - 1) Sampling Fresh Grout Fill: ASTM C 172.
      - 2) Slump: ASTM C 143; one test for each grout load at point of discharge; and one for each set of compressive strength specimens.
      - 3) Air Content: ASTM C 231; one for every other grout load at point of discharge, or when required by an indication of change.
      - 4) Compressive Strength Tests: ASTM C 1019; one set of compression cubes for each 50 cubic yards or fraction thereof, of each mix design placed in any one day or for each 2,500 square feet of surface area placed, whichever provides more cubes.
        - (a) Specimens:
          - (1) One (1) specimen tested at 7 days.
          - (2) Two (2) specimens tested at 28 days
          - (3) One (1) specimen tested at the direction of the Architect.
          - (4) ASTM C 109; the testing laboratory will take a minimum of one set of 4 standard cubes for each compressive strength test, unless otherwise directed by the Architect.
        - (b) Adjust mix if test results are unsatisfactory and resubmit for review.
        - (c) Grout which does not meet the strength requirements is subject to rejection and removal from the Work at the expense of the Contractor.
        - (d) The Contractor shall provide all samples and conduct testing as required at no cost to the Owner. See Section 01410 for additional information.
      - 5) Grout Temperature: Test hourly when air temperature is 40 degrees F and below, and when 80 degrees F and above; and each time a set of compression test specimens is made. Comply with the requirements of Section 03300, Cast-In-Place Concrete for Cold and Hot Weather Placement.
      - 6) Evaluation of Quality Control Tests:
        - (a) Do not use grout delivered to the final point of placement which has slump, temperature, or total air content outside the specified values.
        - (b) If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests will be considered deficient in strength and subject to removal, replacement, reconstruction, or to other action required by the Architect, all at the Contractor's expense.
    - b. Prism Test Method: Test masonry for compressive strength in accordance with ASTM C1314, perform tests and evaluate results as specified in individual masonry sections.

**END OF SECTION**



**SECTION 04 05 19  
MASONRY ANCHORAGE & REINFORCING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Masonry Reinforcement and Anchorage.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 05 13 - Masonry Mortaring
- B. Section 04 05 16 - Masonry Grouting
- C. Section 04 05 23 - Masonry Accessories
- D. Section 04 20 00 - Unit Masonry
- E. Section 04 43 13 - Stone Masonry Veneer
- F. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
- G. Section 06 10 00 - Rough Carpentry: Nailing strips built into masonry.
- H. Section 07 21 13 - Board Insulation: Insulation for cavity spaces.
- I. Section 07 84 00 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- J. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- B. ASTM A580/A580M - Standard Specification for Stainless Steel Wire 2023.
- C. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2022.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.
- F. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022, with Errata.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by all relevant installers, architect and structural engineer.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for specified items.
- C. Shop Drawings: Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
  - 1. Provide elevations of shear wall reinforcing.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

**1.06 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

## 1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIAWC (HW).

## PART 2 PRODUCTS

### 2.01 MORTAR AND GROUT MATERIALS

- A. Masonry Mortaring as specified in Section 04 05 13.
- B. Masonry Grouting as specified in Section 04 05 16.

### 2.02 REINFORCEMENT AND ANCHORAGE

- A. General:
  - 1. Joint Reinforcement, General ASTM A 951
  - 2. Fabricate from cold-drawn steel wire complying with ASTM A 82, with deformed or embossed continuous side rods and plain cross-rods, with unit width of 1 1/2 to 2 inches less than thickness of wall or partition.
- B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) deformed billet steel bars; uncoated.
  - 1. Size and spacing as indicated on the drawings.
  - 2. Use #3 space bars at 48 inch spacing connected to longitudinal reinforcing bars in concrete masonry bond beams to hold bars in proper location.
  - 3. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.
  - 4. Shop fabricate bars requiring hooks or bends
- C. Caging Devices and Centering Clips: Nine (9) gauge hot dip galvanized steel wire caging device.
  - 1. Use in hollow concrete masonry cores or cavities to be reinforced with vertical reinforcing steel bars and filled with grout using high-lift grouting.
  - 2. Manufacturers:
    - a. Hohmann & Barnard, Inc: RB Rebar Positioner: [www.h-b.com](http://www.h-b.com).
    - b. Wirebond: Figure 8 Rebar Positioners: [www.wirebond.com](http://www.wirebond.com).
    - c. Heckman Building Products Inc.: Product #376: [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- E. Single Wythe Joint Reinforcement: Ladder type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch (9 gauge) side rods 0.1483 inch (9 gauge) cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
  - 1. Manufacturers:
    - a. Hohmann & Barnard, Inc (Dur-O-Wall); Product 220 Ladder Mesh Series: [www.h-b.com](http://www.h-b.com).
    - b. Masonry Reinforcing Corporation of America (Wire Bond); Product 200 Series: [www.wirebond.com](http://www.wirebond.com).
    - c. Heckman Building Products Inc.: Product 1100 Series: [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Adjustable Multiple Wythe Joint Reinforcement: Ladder type with adjustable ties or tabs spaced at 16 in on center and fabricated with moisture drip; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1875 inch (3/16 inch) side

rods with 0.1483 inch (9 gauge) cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.

1. Eyes to be 3/16 inch
  2. Plinth (Legs) to be double leg 3/16 inch diameter with compressed legs and designed to secure insulation against outer face of inner wythe of masonry.
  3. Vertical adjustment: Not less than 2 inches.
  4. Manufacturers:
    - a. Hohmann & Barnard, Inc (Dur-O-Wall); Product Lox All 270-EH with compressed 2X hook: [www.h-b.com](http://www.h-b.com).
    - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Ladder and Eye with HT hook: [www.wirebond.com](http://www.wirebond.com).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
  2. Manufacturers:
    - a. Hohmann & Barnard, Inc (Duro-O-Wall).; Product 359 weld on tie -301W anchor: [www.h-b.com](http://www.h-b.com).
    - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Type I Weld on Anchor 1200 Beam Tie: [www.wirebond.com](http://www.wirebond.com).
    - c. Heckmann Building Products, Inc.; Product 315 weld on anchor rod - 318 web tie: [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Intersecting Masonry Wall Joint Reinforcing (Wire Mesh Reinforcing).
1. Wire mesh wall ties for of 1/2 inch mesh by 16 gauge hot dip mill-galvanized wire, 1 inch less than the width of wall.
  2. Manufacturers:
    - a. Hohmann & Barnard, Inc (Duro-O-Wall).; Product MWT - Mesh Wall Tie: [www.h-b.com](http://www.h-b.com).
    - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Mesh Wall Tie #1900: [www.wirebond.com](http://www.wirebond.com).
    - c. Heckmann Building Products, Inc.; Product #269 Wire Mexh Wall Tie: [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive anchorages and reinforcing.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### **3.02 PREPARATION**

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### **3.03 INSTALLATION GENERAL**

- A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns, and offsets.
- B. Thickness: Build masonry walls to the full thickness shown except single width walls to be nominal unit thickness.
- C. Cut masonry units with motor driven saw designed to cut masonry with clean sharp unchipped edges.

### **3.04 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY**

- A. Horizontal Joint Reinforcing
  - 1. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
  - 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
  - 3. Place continuous joint reinforcement in first and second joint below top of walls.
  - 4. Lap joint reinforcement ends minimum 6 inches.
  - 5. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
  - 6. Provide continuity at corners and walls intersections by use of prefabricated 'L' and 'T' sections.
  - 7. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 16 inches vertically.
- B. Vertical Joint Reinforcing
  - 1. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.
    - a. Secure vertical bar locations by use of caging devices and centering clips.
    - b. Welding of splices is not permitted.
  - 2. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
- C. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry units or saw to accommodate reinforcement.

### **3.05 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY**

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

### **3.06 BUILT-IN WORK**

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Fill cores in hollow concrete masonry units with grout 3 course (24 inches) under bearing plates beams posts and similar items, unless otherwise indicated.
- E. Do not build into masonry construction organic materials that are subject to deterioration.

### **3.07 TOLERANCES**

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- C. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- D. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- E. SOURCE QUALITY CONTROL
- F. Masonry Contractor shall water test cavity to verify all water is draining to the exterior through the weeps before continuing with exterior wythe before capping wall.
  1. Contractor shall perform tests in the presence of, A/E, testing lab representative, and General Contractor.
    - a. Do not proceed more than 3 veneer courses above flashing without testing, observation, and picture documentation by testing lab representative.
  2. Contractor shall hold water hose and with standard water pressure force water into the cavity at a cell vent so water can be observed coming out adjacent weeps for a period of at least 5 minutes. Contractor shall continue down the wall to the next cell vent where a weep did not indicate water wicking out and continue this process until the entire length of flashing is tested.
  3. Where water is observed inside the building or outside the building away from the weeps, masonry units shall be removed and flashing re-inspected and repaired.
  4. Water test shall be re-performed where flashing was repaired.

### **3.08 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
  1. The owner is to engage and compensate the on site testing agency.

### **3.09 PROTECTION**

- A. Protect installed units from splashing, stains, mortar, and other damage.
- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**

**SECTION 04 05 23  
MASONRY ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Masonry Accessories
- B. Flashings

**1.02 RELATED REQUIREMENTS**

- A. Section 04 05 13 - Masonry Mortaring
- B. Section 04 05 16 - Masonry Grouting
- C. Section 04 05 19 - Masonry Anchorage & Reinforcing
- D. Section 06 10 00 - Rough Carpentry: Nailing strips built into masonry.
- E. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2023.
- C. ASTM A580/A580M - Standard Specification for Stainless Steel Wire 2023.
- D. ASTM C55 - Standard Specification for Concrete Building Brick 2022.
- E. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2023.
- F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.
- G. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2023.
- H. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- I. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
- J. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022, with Errata.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by all relevant installers, architect and structural engineer.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for specified items.
- C. Shop Drawings: Include material samples and installation instructions.

**1.06 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

## **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, handle, and store accessories by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store ceramic glazed masonry units and pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

## **1.08 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIAWC (HW).

## **PART 2 PRODUCTS**

### **2.01 MORTAR AND GROUT MATERIALS**

- A. Masonry Mortaring as specified in Section 04 05 13
- B. Masonry Grouting as specified in Section 04 05 16

### **2.02 FLASHINGS**

- A. Stainless Steel Flashing - Self-Adhering: ASTM A240/A240M; 2 mil type 304 stainless steel sheet with butyl adhesive and a removable release liner.
  - 1. Manufacturers:
    - a. York Flashings; York 304 SA: [www.yorkflashings.com](http://www.yorkflashings.com).
    - b. Wire-Bond; Bond-N-Flash SA: [www.wirebond.com](http://www.wirebond.com).
    - c. Homann & Barnard; Mighty-Flash-SA: [www.h-b.com](http://www.h-b.com).
    - d. Wall Guardian; Self Adhering Stainless Steel Flashing: [www.stscoatings.com](http://www.stscoatings.com).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Single-Wythe Flashing: High-density polypropylene composition molded into a 5/8 inch thick flashing pan with 5/16 inch perimeter flanges with integral weep spout and insect guard, no visible drip edge.
  - 1. Manufacturers:
    - a. Mortar Net Solutions: Blockflash
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Flashing Termination Bar: Stainless Steel 1/8 inch thick x 1 inch wide with holes at 16 inches on center. Hole size is 5/16 inch (8mm) diameter
  - 1. Manufacturers:
    - a. Advanced Building Products Inc: Stainless Steel Termination Bar
    - b. Hohmann and Barnard Inc.: T1
    - c. Heckmann Building Products: Termination Bar
    - d. Masonry Reinforcing Corporation of America, Wire Bond: Termination Bar
    - e. Substitutions: See Section 01 60 00 - Product Requirements
- D. Flashing End Dams and Corners:
  - 1. Stainless Steel Flashing: ASTM A 666, Type 304, soft temper; 26 gauge thick; finish 2B to 2D.
  - 2. Solder joints to ensure seal.
  - 3. Application: At thru wall flashing end dam, inside corner and outside corner
- E. Sheet Metal Cavity Bridge:
  - 1. Stainless Steel Flashing: ASTM A 666, Type 304, soft temper; 26 gauge thick; finish 2B to 2D.
  - 2. Application: To support thru wall flashing at air spaces and cavity wall insulation.
- F. Sheet Metal Drip Edge:

1. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D.
2. Depth: Equal the masonry unit.
3. Application: Where drip edge is required per recommendations of NCMA-Tek 19-4

### **2.03 ACCESSORIES**

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints to be used with standard sash block.
  1. Manufacturers:
    - a. Hohmann & Barnard, Inc; RS Series: [www.h-b.com/sle](http://www.h-b.com/sle).
    - b. Masonry Reinforcing Corporation of America, Wire Bond; Product 2901 Control Joint [www.wirebond.com](http://www.wirebond.com).
    - c. Bio Metals Inc. Rubber Control Joint [www.bometals.com](http://www.bometals.com)
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Joint Filler: Closed cell neoprene sponge; oversized 50 percent to joint width; self expanding; 3/8 inch thick x width of brick x by maximum lengths available.
  1. Manufacturers:
    - a. Hohmann & Barnard, Inc; NS Close Cell Neoprene Sponge: [www.h-b.com/sle](http://www.h-b.com/sle).
    - b. Masonry Reinforcing Corporation of America, Wire Bond; Product Vertical Expansion Joint: [www.wirebond.com](http://www.wirebond.com).
    - c. Bio Metals Inc. Closed Cell Neoprene Sponge Rubber Joint Filler, [www.bometals.com](http://www.bometals.com)
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cavity Mortar Control (Cavity Mortar Diverter): Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
  1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
  2. Thickness: The same thickness of the air space in the cavity. Material should touch both sides of air space (insulation and masonry)
  3. Height: The minimum height is 10 inches.
  4. Manufacturers:
    - a. Mortar Net USA Limited: Product, Mortar Net
    - b. Hohman & Barnard, Inc.; Product Mortar Trap
    - c. Advanced Building Products Inc; Mortar Break: [www.advancedflashing.com/#sle](http://www.advancedflashing.com/#sle).
- D. Nailing Strips: Softwood lumber, preservative treated; as specified in Section 06 10 00.
- E. Cavity Vents (Weeps): Molded PVC grilles, insect resistant.
  1. Size: 3/8 inch by 3 5/8 inch by height of masonry unit
  2. Color: To be selected by the Architect
- F. Column Isolation: 3/8 inch thick foam expansion joint filler
  1. Manufacturer:
    - a. W R Meadows Inc.: Product, Ceramar Flexible-Foam
    - b. Williams Products Inc.
    - c. Illinois Products Corporation
    - d. Substitutions: See Section 01 6000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.



### **3.02 PREPARATION**

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### **3.03 COLD AND HOT WEATHER REQUIREMENTS**

- A. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.
- B. Cold Weather Construction: Comply with whichever is the more stringent:
  - 1. The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature falls below 40 degrees F (4 degrees C)
  - 2. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
  - 3. Frozen Materials and Work:
    - a. Do not use frozen materials mixed or coated with ice or frost.
    - b. Do not build on frozen work.
    - c. Remove and replace masonry work damaged by frost or freezing.
- C. Hot Weather Construction: Comply with whichever is the more stringent:
  - 1. Hot Weather Construction: The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature exceeds 100 degrees F (37.8 degrees C), or 90 degrees F (32.2 degrees C) with a wind velocity greater than 8 mph (3.58 m/s).
  - 2. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

### **3.04 PLACING AND BONDING**

- A. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Interlock intersections and external corners.
- D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
  - 1. Cut masonry units with a motor -driven saw designed to cut masonry.
- F. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, or cavity insulation vapor barrier adhesive is applied.
- G. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

### **3.05 WEEPS/CAVITY VENTS**

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

- B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

### **3.06 CAVITY MORTAR CONTROL**

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

### **3.07 SINGLE WYTHE FLASHING**

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. General: Installed embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- C. Install in accordance to manufacturers' recommendations.
- D. Install with weep spouts flush with the face of the foundation or concrete masonry unit course. Use the reference lip on the bottom of the weep spout to properly position the pan on the foundation or concrete masonry units.
- E. Install with standard mortar spreading techniques with mortar lapped.
- F. Install mesh strips in concrete masonry unit core cavity immediately above each flashing location with the mesh aligned against the outside and inside faces of the block and with each mesh strip touching the flashing pan below it to prevent clogging from mortar and grout droppings.
- G. Remove obstructions from weep spouts, but do not remove the factory-installed insect guards.

### **3.08 CONTROL AND EXPANSION JOINTS**

- A. Install control and expansion joints
  1. Where shown on the drawings
  2. In accordance with the Brick Industry Association (BIA) recommendations.
  3. In accordance with the National Concrete Masonry Association (NCMA) recommendations.
- B. Do not continue horizontal joint reinforcement through control or expansion joints.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not shown, 3/8 inch wide and deep.
- E. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with expansion joint filler sheets (column isolation). Secure sheets with light gauge wire.

### **3.09 BUILT-IN WORK**

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
  1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Fill cores in hollow concrete masonry units with grout 3 course (24 inches) under bearing plates beams posts and similar items, unless otherwise indicated.

- E. Do not build into masonry construction organic materials that are subject to deterioration.

### **3.10 TOLERANCES**

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- C. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- D. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

### **3.11 CUTTING AND FITTING**

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

### **3.12 SOURCE QUALITY CONTROL**

- A. Masonry Contractor shall water test cavity to verify all water is draining to the exterior through the weeps before continuing with exterior wythe before capping wall.
  - 1. Contractor shall perform tests in the presence of, A/E, testing lab representative, and General Contractor.
    - a. Do not proceed more than 3 veneer courses above flashing without testing, observation, and picture documentation by testing lab representative.
  - 2. Contractor shall hold water hose and with standard water pressure force water into the cavity at a cell vent so water can be observed coming out adjacent weeps for a period of at least 5 minutes. Contractor shall continue down the wall to the next cell vent where a weep did not indicate water wicking out and continue this process until the entire length of flashing is tested.
  - 3. Where water is observed inside the building or outside the building away from the weeps, masonry units shall be removed and flashing re-inspected and repaired.
  - 4. Water test shall be re-performed where flashing was repaired.

### **3.13 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
  - 1. The owner is to engage and compensate the on site testing agency.
- B. Masonry Inspection
  - 1. Provide masonry inspection of concrete or brick masonry walls as required to insure that masonry construction is in conformance with the Contract Documents.
  - 2. The masonry inspector shall prepare a written report or reports for each day of inspection. Masonry Inspection report that follows Section 01 4000 shall be used for the reports.
  - 3. The masonry inspector shall be present and observe all grouting operations in wall requiring inspection. The masonry inspector shall be present at the project site with in sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. Periodically the masonry inspector shall be present during the placement of masonry units and reinforcement.
  - 4. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for grouting operation.

### **3.14 PROTECTION**

- A. Protect installed units from splashing, stains, mortar, and other damage.

- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**

SECTION 04 22 00 –  
CONCRETE UNIT MASONRY

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. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry-joint reinforcement.
5. Embedded flashing.
6. Miscellaneous masonry accessories.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
  1. Masonry units.

- a. Include data on material properties, material test reports substantiating compliance with requirements.
    - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include name of manufacturer, brand name, and type.
  - 3. Mortar admixtures.
  - 4. Grout mixes. Include description of type and proportions of ingredients.
  - 5. Reinforcing bars.
  - 6. Joint reinforcement.
  - 7. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
- 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
  - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

## 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.9 FIELD CONDITIONS

- A. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
  - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

## 2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
  - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

## 2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3050 psi (21.0 MPa).
  - 2. Density Classification: Normal weight unless otherwise indicated.
  - 3. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

## 2.5 MASONRY LINTELS

- A. General: Provide one of the following:
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

## 2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
  - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.



- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91/C 91M.
- E. Mortar Cement: ASTM C 1329/C 1329M.
- F. Aggregate for Mortar: ASTM C 144.
  - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  - 2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
- G. Aggregate for Grout: ASTM C 404.
- H. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- I. Water: Potable.

## 2.7 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
  - 1. Interior Walls: Hot-dip galvanized carbon steel.
  - 2. Wire Size for Side Rods: 0.148-inch (3.77-mm diameter).
  - 3. Wire Size for Cross Rods: 0.148-inch (3.77-mm diameter).
  - 4. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
  - 5. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

## 2.8 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into masonry but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
  - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.

- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, hot-dip galvanized steel.
  - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm diameter, hot-dip galvanized steel.
  
- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- (1.52-mm-) thick steel sheet, galvanized after fabrication.
    - a. 0.064-inch- (1.63-mm-) thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.
  - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized steel wire
  
- E. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
  
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
  
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

## 2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime mortar unless otherwise indicated.
  - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
  - 1. For reinforced masonry, use Type S.
  - 2. For mortar parge coats, use Type S.
  - 3. For exterior, above-grade, load-bearing and non load-bearing walls and parapet walls; for interior load-bearing walls; for interior non load-bearing partitions; and for other applications where another type is not indicated, use Type N.
  - 4. For interior non load-bearing partitions, Type O may be used instead of Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
  - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2500 psi (14 MPa).
  - 3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm as measured according to ASTM C 143/C 143M).
- E. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.
  - 1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
  - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

### 3.3 TOLERANCES

#### A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

#### B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

#### C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches (100 mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
  - 3. Wedge non load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
  - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- E. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

### 3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
  - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
  - 2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

### 3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
  - 1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
  - 3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

### 3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
  - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
  - 2. Install preformed control-joint gaskets designed to fit standard sash block.
  - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.

4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

### 3.9 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

### 3.10 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
  1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

### 3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
  1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.

- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

### 3.12 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Protect nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 4. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

### 3.13 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042200



**SECTION 05 50 00  
METAL FABRICATIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Shop fabricated steel items including:
  - 1. Pipe bollard
  - 2. Loose steel lintels
  - 3. Loose bearing and leveling plates
  - 4. Miscellaneous framing and supports

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 04 2000 - Unit Masonry: Placement of lintels in masonry.
- D. Section 09 91 13 - Exterior Painting: Paint finish.

**1.03 REFERENCE STANDARDS**

- A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus. 2019
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- E. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- G. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- I. SSPC-SP 2 - Hand Tool Cleaning 2018.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- 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.
- C. Samples
  - 1. Submit samples as requested by the Architect during the course of construction.

**1.05 QUALITY ASSURANCE**

- A. The work of this section shall be coordinated with the work of other Sections.
  - 1. Verify the dimensions and work of other trades adjoining items of this Section before fabrication and installation.

- B. Furnish to the pertinent trades items included in this Section that are built into the work of other Sections.
- C. Welding shall be performed by qualified welders and shall conform to the applicable AWS welding code.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation
- B. Repair items which have become damaged to the satisfaction of the Architect prior to incorporating them into the work. Replace damaged items if repair cannot be done to the satisfaction of the Architect.

#### **1.07 PROJECT SITE REQUIREMENTS**

- A. Field measurements shall be taken at the job site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS - STEEL**

- A. Steel Angles, Channels, and S Shapes: ASTM A 36/A 36M - ASTM 992 (FY = 50ksi)
- B. Steel W Shapes: ASTM A 992/A 992M (FY = 50ksi).
- C. Rolled Steel Structural Shapes: ASTM A 992/A 992M (FY = 50ksi).
- D. Plates and Bar: ASTM A 36, unless otherwise noted.
- E. Pipe: ASTM A 53/A 53M Grade B Schedule 40, black and hot-dip galvanized finish as indicated.
- F. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

#### **2.02 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
  - 1. Properly mark and match mark materials for field assembly
  - 2. Use connections that maintain structural values of joined pieces
- B. Fabricate items with joints tightly fitted and secured.
  - 1. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise shown.
  - 2. Form bent-metal corners to smallest radius possible without causing grain separation of otherwise impairing work.
- 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. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

- G. Cut, reinforce, drill and tap miscellaneous metal work as required to receive finish hardware, screws, and similar items.

### **2.03 FABRICATED ITEMS**

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
  - 1. Contractor's option:
    - a. Hand form concrete top  
or
    - b. Provide pipe bollard cap finish with a class A formed finish having a symmetrical domed utilizing a minimum of 5000 psi fiber reinforced cementitious material.  
Product TopGard by Top Gard LLC; [www.topgardcap.com](http://www.topgardcap.com)
- B. Lintels: As detailed; prime paint finish unless otherwise noted/scheduled.
  - 1. Fabricate loose structural-steel from steel angles and shapes indicated on the drawings.
  - 2. Weld adjoining members together to form a single unit.
  - 3. Size loose lintels to provide bearing at each side of opening equal to one-twelfth of the clear span, but not less than 8 inches.
  - 4. Galvanize after fabrication for use in exterior walls.
- C. Loose Bearing and Leveling Plates
  - 1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete. Plates to be free from twist and warps and of required thickness and bearing area. Drill plates for receive anchor bolts and grouting.
  - 2. Galvanize after fabrication for use in exterior walls.
- D. Miscellaneous Framing and Supports
  - 1. Provide steel framing and supports that are not part of the structural steel framework as necessary to complete the Work.
  - 2. Fabricate miscellaneous units to sizes, shapes, profiles indicated and necessary to receive adjacent work or work to be retained by framing and supports. Fabricate from structural steel shapes, plates and steel bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, supports, attachments and similar items

### **2.04 FINISHES - STEEL**

- A. Prime paint steel items.
  - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for galvanized finish.
  - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
  - 3. Exception: Galvanized items to be embedded in exterior walls or surfaces
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

### **2.05 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**

**3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

**3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

**3.03 INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions and surfaces not shop primed or galvanized , except surfaces to be in contact with concrete.

**END OF SECTION**

**SECTION 06 10 00  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural dimension lumber framing.
- B. Rough opening framing for doors, windows, and roof openings.
- C. Sheathing.
- D. Roofing nailers.
- E. Preservative treated wood materials.
- F. Miscellaneous framing and sheathing.
- G. Concealed wood blocking, nailers, and supports.
- H. Miscellaneous wood nailers, furring, and grounds.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 04 20 00 - Unit Masonry
- C. Section 07 62 00 - Sheet Metal Flashing and Trim

**1.03 REFERENCE STANDARDS**

- A. ANSI A208.1 - American National Standard for Particleboard 2016.
- B. AFPA WCD No.1 - Manual for Wood Frame Construction; American Forest and Paper Association; 2001.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood 2021.
- F. PS 1 - Structural Plywood 2009 (Revised 2019).
- G. PS 20 - American Softwood Lumber Standard 2021.
- H. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.
- I. SPIB (GR) - Grading Rules 2014.
- J. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.
- K. WWPA G-5 - Western Lumber Grading Rules 2021.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

## **PART 2 PRODUCTS**

### **2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
  - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://www.alsc.org)) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.
- C. Provide sustainably harvested wood; see Section 01 60 00 - Product Requirements for requirements.

### **2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing (2 by 2 through 2 by 6 ):
  - 1. Species: Any allowed under referenced grading rules.
  - 2. Grade: No. 2.
- D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 ):
  - 1. Machine stress-rated (MSR) as follows:
    - a. Fb-single (minimum extreme fiber stress in bending): 1350 psi.
    - b. E (minimum modulus of elasticity): 1,300,000 psi.
  - 2. Species: Any allowed under grading rules.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

### **2.03 CONSTRUCTION PANELS**

- A. Roof Sheathing: APA PRP-108, Structural I Rated Sheathing, Exterior Exposure Class 1, and as follows:
  - 1. Grade: Structural 1 Sheathing.
  - 2. Bond Classification: Exposure 1.
  - 3. Performance Category: 5/8 PERF CAT.
  - 4. Span Rating: 40/20.
  - 5. Edges: Square.
  - 6. Trademark: Furnish construction panels that are each factory-marked with a certification mark evidencing compliance with grade requirements
- B. Wall Sheathing: APA PRP-108, Structural I Rated Sheathing, Exterior Exposure Class 1, and as follows:
  - 1. Thickness: As noted on drawings and as required to complete the work.
  - 2. Span Rating: 24/0.
  - 3. Trademark: Furnish construction panels that are each factory-marked with a certification mark evidencing compliance with grade requirements
- C. Other Applications:
  - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
  - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.

3. Other Locations: PS 1, C-D Plugged or better.

## **2.04 ACCESSORIES**

- A. Fasteners and Anchors:
  1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
  3. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

## **2.05 FACTORY WOOD TREATMENT**

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Preservative Treatment:
  1. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      - 1) Treat lumber exposed to weather.
    - b. Treat lumber in contact with roofing, flashing, or waterproofing.
    - c. Treat lumber in contact with masonry or concrete.
    - d. Treat lumber less than 18 inches above grade.
  2. Preservative Pressure Treatment of Plywood Above Grade: AWWA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
    - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
    - b. Treat plywood in contact with roofing, flashing, or waterproofing.
    - c. Treat plywood in contact with masonry or concrete.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Provide the following specific non-structural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Wall paneling and trim.
  - 9. Joints of rigid wall coverings that occur between studs.

### **3.04 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

### **3.05 INSTALLATION OF CONSTRUCTION PANELS**

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
  - 1. At long edges use sheathing clips where joints occur between roof framing members.
  - 2. Nail panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
  - 1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.
  - 2. Provide inlet diagonal bracing at corners.
  - 3. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

### **3.06 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

### **3.07 TOLERANCES**

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.



**3.08 CLEANING**

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

**SECTION 07 42 13.13  
FORMED METAL WALL PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured metal panels for exterior wall panels and subgirt framing assembly, with related flashings and accessory components.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 30 00 - Administrative Requirements
- B. Section 06 10 00 - Rough Carpentry: Wall panel substrate.
- C. Section 07 92 00 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.
- D. Section 07 61 00 - Sheet Metal Roofing

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.
- C. Shop Drawing: Sub framing system: Indicate dimensions, layout, construction details, method of anchorage
- D. Samples: Submit two samples of wall panel and soffit panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.
- E. Manufacturer's Qualification Statement.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Manufacturer's Qualifications: Wall system manufacturer has been engaged in the fabrication of metal wall systems for at least ten years.
  - 1. The Manufacturer shall be a member of the Metal Building Manufacturer's Association (MBNA).
  - 2. The American Institute of Steel Construction (AISC) currently certifies the Manufacturer for Category MB.
  - 3. The Manufacturer maintains a certified installer program for its products and maintains an up to date authorized roofing contractor list.
  - 4. The Manufacturer has a written warranty covering durability, color and weather tightness of its roof system.
  - 5. Manufacturer shall produce the metal panels on fixed equipment operated by the manufacturer.
- C. Installer Qualifications: Company specializing in performing sheet metal installations with minimum 5 years of experience on projects of similar size and scope.
  - 1. Contractor shall follow the Manufacturer's installation details without exception unless written authorization from the manufacturer and architect are provided on an installation

detail revision.

#### **1.06 PRE-INSTALLATION MEETING**

- A. Convene two weeks before starting work of this section.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver system components to the project site in Manufacturer's unopened original containers.
- B. Protect system components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.
- C. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- D. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- E. Prevent contact with materials that may cause discoloration or staining of products.
- F. Damaged materials will be rejected and removed from the site.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents
- C. Standard Manufacturer Warranty: Provide a written warranty, with monetary limitation, signed by manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:
  - 1. Warranty Period: 20 Years from the date of Substantial Completion
- D. Finish Warranty: Furnish panel manufacturer's written warranty for twenty (20) years covering the finish of exposed coated metal surfaces against blistering, peeling, cracking, flaking, checking, chipping, rusting, and chalking and color change during the warranty period.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Basis of Design: R Panel WPRP, manufactured by Dimensional Metals.
  - 1. Product: R Panel WPRP, exposed fasteners, vertical installation.
- B. Other Acceptable Manufacturers:
  - 1. Architectural Metal Systems, Alpharetta Ga
  - 2. Berridge Manufacturing, Houston Tx
  - 3. Centria.
  - 4. McElroy Metal, Inc. Bossier City La
  - 5. MBCI.
  - 6. Petersen, Pac-Clad

#### **2.02 MANUFACTURED METAL PANELS**

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
  - 1. Provide exterior wall panels.
  - 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
  - 3. Design Pressure: In accordance with applicable codes.
  - 4. Maximum Allowable Deflection of Panel:  $L/180$  for length(L) of span.
  - 5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when

subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.

6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
  7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
  8. Corners: Factory-fabricated in one continuous piece with minimum 2 inch returns.
- B. Exterior Wall Panel:
1. Profile: Vertical; style as indicated.
    - a. 36 inch wide panel, 1 1/4 inch deep,
  2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
  3. Material: Precoated steel sheet, 24 gage, .0276 inch minimum thickness.
  4. Panel Width: 36 inches.
  5. Color: As selected by Architect from manufacturer's standard line.
- C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- D. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system.
- E. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- F. Anchors: Stainless steel.

### 2.03 MATERIALS

- A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

### 2.04 SUB FRAMING

- A. Manufacturer:
1. Cascadia Windows LTD: Cascadia Clip; [www.cascadia.com](http://www.cascadia.com)
  2. Acceptable Manufacturer/System:
    - a. Knight Wall System MFI-Systems; [www.knightwallsystems.com](http://www.knightwallsystems.com)
    - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Sub-framing Thermal Spacer: 100 % Pultruded glass fibre and thermoset polyester resin insulation clip.
- C. Thermal Spacer thickness for top, base and web: 3/16 inches nominal.
1. Thermal spacer depth: 2 inches nominal.
    - a. Depth tolerance:  $\pm 0.005$  inches.
  2. Spacer Fasteners: High hex head washer head with sharp twin lead threaded design of heat treated corrosion resistant coated steel..
  3. Fastener: as recommended by manufacturer
- D. Girts
1. 2x wood framing between studs and flush with face of stud.

### 2.05 ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Sealants:
1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
  2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

- C. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
  - 1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.
- D. Field Touch-up Paint: As recommended by panel manufacturer.

## **2.06 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest practicable lengths.
- C. Fabricate corners in one continuous piece with minimum 18 inch returns.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that building framing members are ready to receive panels.

### **3.02 PREPARATION**

- A. Install sub framing perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.
  - 1. Install in accordance to manufacturers recommendations.
  - 2. Thermal Spacer Installation: Clip thermal spacer to girt and fasten girt directly to substrate.
  - 3. Installation sequence for spacers, sub-framing, and insulation
    - a. Pre-punch or pre-drill holes in Z-girts and tracks to accommodate fasteners.
    - b. Position Z-girts directly over thermal spacer before installation of fasteners.
    - c. Completely install spacers, screws and sub-framing, prior to installing insulation.
    - d. Friction fit insulation in place.

### **3.03 INSTALLATION**

- A. Install panels on walls in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Provide expansion and control joints where indicated by manufacturer.
- F. Use concealed fasteners unless otherwise approved by Architect.
- G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

### **3.04 CLEANING**

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

**END OF SECTION**

**SECTION 07 54 19  
PVC THERMOPLASTIC SINGLE-PLY ROOFING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fully Adhered system with PVC thermoplastic roofing membrane.
- B. Membrane flashings.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 30 00 - Administrative Requirements
- B. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings.
- D. Section 07 71 00 - Roof Specialties: Prefabricated roofing expansion joint flashing.

**1.03 REFERENCE STANDARDS**

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM D4434/D4434M - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing 2021.
- C. NRCA (RM) - The NRCA Roofing Manual 2023.
- D. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.
  - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's written information listed below.
  - 1. Product data indicating membrane materials, flashing materials, fasteners, and adhesive.
  - 2. Preparation instructions and recommendations.
- C. Samples for Selection: Submit two samples 12 by 12 inches in size illustrating colored coating.
- D. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- E. Warranty:
  - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
  - 2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section:
  - 1. Approved by membrane manufacturer.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

- B. Protect products in weather protected environment, clear of ground and moisture.

#### **1.08 FIELD CONDITIONS**

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

#### **1.09 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within 20 years after installation.
- C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind with wind speeds up to 55 mph or other natural causes.
  - 1. Warranty Term: 20 years.
  - 2. For repair and replacement include costs of both material and labor in warranty.
- D. Roofing Contractor Warranty: Contractor shall guarantee for 2 years, from the date of substantial completion, at their cost to make necessary repairs to the roof system resulting from faults or defects caused due to workmanship. Guarantee shall include but is not limited to the following: roof membrane, flashings, insulation, fasteners, walkways, expansion joints, pipe flashings and boots.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Carlisle SynTec
- B. Duro-Last Roofing, Inc
- C. Johns Manville
- D. Sarnafil, Inc
- E. GAF Materials Corporation
- F. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 ROOFING APPLICATIONS**

- A. PVC Membrane Roofing: Single ply membrane, fully adhered.
- B. Roofing Assembly Performance Requirements and Design Criteria:
  - 1. Roof Covering External Fire Resistance Classification: Class A when tested per UL 790.
  - 2. Wind Uplift:
    - a. Designed to withstand wind uplift forces calculated with ASCE 7.

#### **2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS**

- A. Single Source Responsibility: Provide and install products from single source.
- B. Membrane:
  - 1. Material: Polyvinyl chloride (PVC) complying with ASTM D4434/D4434M.
  - 2. Reinforcing: Internal fabric.
  - 3. Thickness: 60 mils (0.060 inch), minimum.
  - 4. Sheet Width: Factory fabricated into largest sheets possible.
  - 5. Color: To be selected from manufacturer's standard color range.

- 6. Product:
  - a. Carlisle: SureFlex PVC. 60 mil
  - b. Duro-Last: 60 mil, Duro-Last
  - c. Johns Manville: 60 mil, JM SD Plus
  - d. Sarnafil: 60 mil, S 327-60 EnergySmart
- C. Seaming Materials: As recommended by membrane manufacturer.
- D. Flexible Flashing Material: Same material as membrane.

#### **2.04 ACCESSORIES**

- A. Prefabricated Flashing Accessories:
  - 1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
  - 2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
  - 3. Miscellaneous Flashing: Non-reinforced PVC membrane; 80 mils (0.080 inch) thick, in manufacturer's standard lengths and widths.
- B. Membrane Adhesive: As recommended by membrane manufacturer.
- C. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- D. Sealants: As recommended by membrane manufacturer.
- E. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.
- F. Primer: Manufacturer's recommended product.
- G. Edgings and Terminations: As specified in Section 07 72 00 - Roof Specialties.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

#### **3.02 PREPARATION, GENERAL**

- A. Clean substrate thoroughly prior to roof application.

#### **3.03 INSTALLATION - GENERAL**

- A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.



**3.04 MEMBRANE APPLICATION**

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application:
  - 1. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints.
  - 2. Fully adhere one roll before proceeding to adjacent rolls.
- D. Seam Welding:
  - 1. Overlap edges and ends and seal seams by heat welding, minimum 2 inches.
  - 2. Cover all seams with manufacturer's recommended joint covers.
  - 3. Probe all seams once welds have thoroughly cooled. (Approximately 30 minutes.)
  - 4. Repair all deficient seams within the same day.
  - 5. Seal cut edges of reinforced membrane after seam probe is complete.
- E. At intersections with vertical surfaces:
  - 1. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

**3.05 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for general requirements for field quality control and inspection.
- B. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

**3.06 CLEANING**

- A. Remove wrappings, empty containers, paper, and other debris from the roof daily. Dispose of debris in compliance with local, State, and Federal regulations.
- B. Remove bituminous markings from finished surfaces.
- C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- D. Repair or replace defaced or damaged finishes caused by work of this section.

**3.07 PROTECTION**

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

**END OF SECTION**

**END OF SECTION**

**SECTION 07 61 00  
SHEET METAL ROOFING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Complete preformed, roof system, including all materials, associated flashings, trim, closures, fasteners, framing, supports, sealants and underlayment required.
- B. Counterflashings.
- C. Underlayment
- D. Integral fascias.
- E. Sealants for joints within sheet metal fabrications.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 20 00 - Unit Masonry
- B. Section 09 90 00 - Painting and Coatings: Paint downspout shoe

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM B32 - Standard Specification for Solder Metal 2020.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2014.
- D. ASTM E 1646 - Standard Specification for Water Infiltration.
- E. ASTM E 1680 - Standard Specification for Air Infiltration
- F. AISC Category MB Certification
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene two weeks before starting work of this section.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Engineered Drawings: Manufacturer of the roofing system, shall provide engineer stamped drawings certifying that the roof system is designed specifically for this project and will meet all State of Ohio Building Codes. Engineer shall be certified in the State of Ohio.
- C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- G. Product Data: Provide data on metal types, finishes, characteristics .
  - 1. Flashing materials
  - 2. Insulation
  - 3. Fasteners
  - 4. Pre-manufactured pipe flashing
  - 5. Accessories

- H. Installation Samples: Submit two samples illustrating metal roofing mounted on plywood backing illustrating typical seam.
- I. Submit three samples illustrating metal finish color.

#### **1.06 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise noted.
- B. Manufacturer's Qualifications: Roof system manufacturer has been engaged in the fabrication of metal roof systems for at least ten years.
  - 1. The Manufacturer shall be a member of the Metal Building Manufacturer's Association (MBNA).
  - 2. The American Institute of Steel Construction (AISC) currently certifies the Manufacturer for Category MB.
  - 3. The Manufacturer maintains a certified installer program for its products and maintains an up to date authorized roofing contractor list.
  - 4. The Manufacturer has a written warranty covering durability, color and weather tightness of its roof system.
  - 5. Manufacturer shall produce the metal roof panels on fixed equipment operated by the manufacturer. Portable roll forming shall not be permitted except for special applications and shall be licensed and operated by the Manufacturer in a permanent manufacturing facility.
  - 6. Manufacturing facilities shall be currently under inspection by Underwriters Laboratory personal to verify compliance that the products fabricated are in accordance with the specifications of the products which were originally tested
  - 7. Manufacturer's Field Services: Manufactures Technical Representative Inspection: Minimum of three visits to the jobsite to inspect and monitor the installation of the metal roof system. After each inspection provide the installer with a detailed written report communicating issues and progress of the roof inspection. All inspections must be performed by a technical field representative. A copy of the report shall be forwarded to the Architect for information purposes.
    - a. Should the roofing system not be approved by the manufacturer's technician, correcting the defective work shall be done by the contractor until the roofing system satisfactorily meets all the specifications and manufacturer's requirements.
- C. Installer Qualifications: Company specializing in performing sheet metal roof installations with minimum 10 years of experience on projects of similar size and scope.
  - 1. Roofing Contractor shall be certified by the Manufacturer to install Manufacturer's roof system.
  - 2. Roofing Contractor shall follow the Manufacturer's installation details without exception unless written authorization from the manufacturer and architect are provided on an installation detail revision.
  - 3. Roofing Contractor shall have no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
  - 4. Roofing Contractor shall have not filed for protection from creditors under any state or federal insolvency or debtor relief status or codes.
  - 5. Roofing Contractor shall execute 100% of the roof system installation, utilizing full time employees of the Roofing Contractor. Second and third tier sub-contractors for the installation work in this section are not permitted.

#### **1.07 MOCK-UP**

- A. See Section 01 40 00 Quality Requirements
- B. Mockup: Install roof system mock up to demonstrate aesthetic effects and set quality standards for materials, execution, and workmanship.

1. Build mockup of a typical roof system as shown on the drawings a minimum of 12 panels wide including vapor barrier, insulation, underlayment, flashings, gutters, fascias, pipe flashings and associated attachments.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

A. Deliver roof system components to the project site in Manufacturer's unopened original containers.

B. Protect roof system components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.

C. Provide strippable plastic film on all painted surfaces between contact areas to prevent abrasion during shipping, storage, and handling.

D. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Store materials off the ground, under protective cover. Slope metal sheets to ensure drainage.

E. Prevent contact with materials that could cause discoloration or staining.

F. Damaged materials will be rejected and removed from the site.

#### **1.09 WARRANTY**

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. **General Warranty:** The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents

C. **Standard Manufacturer Roof Warranty:** Provide a written warranty, with no monetary limitation, signed by roofing manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:

1. Warranty Period: 20 Years from the date of Substantial Completion

D. **Weathertightness Warranty:** Provide manufacturer's written weathertightness warranty for a minimum of 20 years against leaks in roof panel arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Warranty shall be signed by both the roofing system manufacturer and the roofing system contractor.

E. **Finish Warranty:** Furnish panel manufacturer's written warranty for twenty (20) years covering the finish of exposed coated metal surfaces including but not limited to roof panels, counterflashings, gutters, downspouts, fascias and trim flashings against blistering, peeling, cracking, flaking, checking, chipping, rusting, and chalking and color change during the warranty period.

F. **Roofing Contractor Warranty:** The roofing contractor will guarantee, from the date of Substantial Completion, at his cost and expense make or cause to make such repairs to the roof resulting from faults or defects in material or workmanship as necessary to maintain the roof in a watertight condition. Guarantee shall include, but is not limited, roof panels, flashing, roof insulation, fasteners, valleys, fascia, gutters, downspouts, trim flashings and roof joints. (Copy of the Warranty is included at the end of this Section.)

1. Guarantee shall include, but is not limited, roof membrane, flashing, roof insulation, fasteners, walkways, and roof expansion joints.

2. Warranty Period: 2 Years from the date of Substantial Completion

3. Repairs required, either permanent or temporary, to the roofing or roof flashing under this guarantee shall be made within 3 days after notice of the need for repair. Should the contractor fail to make such repairs within the time period, the Owner may have the

- repairs made and the cost paid by the Contractor.
4. Copy of the warranty is include at the end of this section.

## **PART 2 PRODUCTS**

### **2.01 ROOF SYSTEM**

- A. Dimensional Metal Inc., 58 Klema Drive, Reynoldsburg, Ohio 43068
  1. Product: R Panel WPRP, exposed fasteners
  2. Acceptable Manufacturer's
    - a. Architectural Metal Systems, 570 Ashleaf Place, Alpharetta, Ga. 30005: Loc Seam 360.
    - b. McElroy Metal, Inc., Bossier City La, 71111: Maxima
    - c. Berridge Manufacturing, 1720 Maury Street, Houston, TX 77026
    - d. MBCI Metal Roof and Wall Systems, 1780 McCall Drive, Shelbyville, In 46176: SuperLok.
    - e. Centria.
    - f. Petersen, Pac-Clad.
    - g. Substitutions: No substitutions permitted without express written approval.
- B. Roof panel 36 inch wide x 1 1/4 inch deep, double-interlocked, tight-fitting, sealed with continuous gaskets, exposed fastener.
- C. Sheet Materials
  1. Roof panels: 24 gauge (.027"), 50 ksi steel sheet Galvalume Aluminum-Zinc Alloy Coated Steel Grade C meeting ASTM A792
    - a. Prepainted by the coil coating process to comply with ASTM A755
  2. Trim, Gutters, Downspouts etc: 20 gauge, 50 ksi steel sheet Galvalume Aluminum-Zinc Alloy Coated Steel Grade C meeting ASTM A792
    - a. Prepainted by the coil coating process to comply with ASTM A755
  3. Panel continuous length without seam except where noted on the drawings.
  4. Finish: Premium fluoropolymer coating - Kynar 500 or Hylar 5000
    - a. 2-coat fluoropolymer, 70 percent PDVF resin.

### **2.02 ACCESSORIES**

- A. General: Provide trim/flashing, fascias, ridge, valley, closures, gutters, gutter hangers and other related required items to provide a complete system
- B. Clip: One piece floating clip with 3 1/2" x 6" x 18 ga. bearing plates screwed into metal deck at 36 inches on center of per roof manufacturer's requirements.
- C. Fasteners:
  1. Use long life fasteners for all interior and exterior applications
  2. Provide fasteners with a factory applied coating in a color to match metal roof system.
  3. Provide neoprene washers under heads of exposed fasteners.
- D. Fascia:
  1. Formed to size and configuration as indicated on drawings.
  2. Fascia shall be 20 gauge or heavier and same finish as roof panel.
- E. Vapor Barrier:
  1. ASTM C 1136-06
  2. Maximum permeance rating of 0.13 perm.
  3. Manufacturers:
    - a. Griffolyn Type-65; Reef Industries, Houston, Texas
    - b. DURA-SKRIM 6WW; Raven Industries, Sioux Falls, South Dakota
    - c. WMP-VR; Lamtec Corporation, Mount Bethel, Pennsylvania

- F. Fasteners: Galvanized steel, with soft neoprene washers.
- G. Protective Backing Paint: Zinc molybdate alkyd.
- H. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.
- I. Sealant to be Exposed in Completed Work: {rs\#1} elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.
- J. Underlayment (Eave Protection Sheet): Rubberized asphalt bonded to sheet polyethylene, 40 mil total thickness, with strippable treated release paper.
  - 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
  - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
  - 3. Manufacturer:
    - a. W.R. Grace Construction Products, Ultra
    - b. Protecto Wrap, Safe Seal 6640
    - c. Dimensional Metal Inc, Dynaclad Ultra HT
    - d. Substitutions: See Section 01 6000 - Products Requirements
- K. Solder: {rs\#1}; Sn50 (50/50) type.

### **2.03 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet, thickness to match roofing sheet, and at least \_\_\_\_ inch wide, interlockable with sheet.
- C. Fabricate starter strips, interlockable with sheet.
- D. Form pieces in longest practical lengths.
- E. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- F. Form material with standing seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

### **PART 3 EXECUTION**

#### **3.01 GENERAL REQUIREMENTS**

- A. Install roofing and flashing in accordance with approved shop drawings and manufacturer's product data, within specified tolerances.
- B. Isolate dissimilar metals, masonry and concrete from metal roof system with bituminous coating.
- C. Anchorage shall allow for thermal expansion and contraction without stress or elongation of panels, clips or anchors.
- D. Coordinate flashing and sheet metal work to provide watertight conditions at roof terminations. Fabricate and install in accordance with standards set forth in the SMACNA Manual using continuous cleats at all exposed edges.

#### **3.02 EXAMINATION**

- A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains.
- B. Verify deck is dry and free of snow or ice.
- C. Verify correct placement of wood nailers and insulation positioning between nailers.

- D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.
- E. Verify roofing termination and base flashings are in place, sealed, and secure.

### **3.03 PREPARATION**

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels; seal top of reglets with sealant.
- C. Back paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.
- D. Place eave edge and gable edge metal flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 16 inches OC.

### **3.04 INSTALLATION - ROOFING**

- A. Apply underlayment over entire roof area.
  - 1. Apply in single layer laid perpendicular to slope; weather lap edges 4 inches
- B. Install metal roof system in accordance to manufacturer's instructions and shop drawings.
  - 1. Install metal roof system so that it is weather tight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
  - 2. Provide concealed anchors at all panel attachment locations
  - 3. Install panels plumb, level and straight with seams and parallel, conforming to design indicated.
- C. Flash around roof mounted equipment. This will become part of the roofing warranty
- D. Install pipe flashing at all pipe penetrations.
- E. Cleat and seam all joints.
- F. Use plastic cement for joints between metal and bitumen and for joints between metal and felts.
- G. Provide fascias.

### **3.05 INSTALLATION - FLASHINGS**

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by roof panel manufacturer's recommendations and details.
- B. Comply with SMACNA (ASMM) details.
- C. Insert flashings into reglets to form tight fit.
  - 1. Seal flashings into reglets with sealant.
- D. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- E. Cleat and seam all joints.
- F. Apply plastic cement compound between metal flashings and felt flashings.
- G. Fit flashings tight in place, and make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- H. Seal metal joints watertight.

### **3.06 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Inspection: Roofing manufacturer's technical representative and roofing contractor shall conduct all required inspections. Submit all required drawings, details, and completed questionnaires to the roofing manufacturer before obtaining the specified warranty. After an

authorized Technical Representative has inspected the roof for determining acceptability for warranty issuance, any deficiencies on the final inspection report shall be corrected by the contractor/applicator and made ready for reinspection within five (5) working days.

- C. Warranty: Upon receipt of required materials, certifying inspection, and acceptance of the roofing system by the roofing manufacturer, the warranty shall be duly executed and issued to the Owner. Date of Warranty will be the date of Substantial Completion.

### **3.07 PROTECTION**

- A. Do not permit traffic over unprotected roof surface.

**END OF SECTION**



**SECTION 07 62 00  
SHEET METAL FLASHING AND TRIM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, and exterior penetrations.
- B. Sealants for joints within sheet metal fabrications.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 20 00 - Unit Masonry: Metal flashings embedded in masonry.
- B. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- C. Section 07 61 00 - Sheet Metal Roofing.
- D. Section 07 71 00 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.
- E. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- D. CDA A4050 - Copper in Architecture - Handbook current edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

**1.06 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

**1.08 WARRANTY**

- A. Provide a 20 year warranty for manufacturer approved 70 percent Kynar colors for the painted finish covering color fade, chalk, and film integrity.

## **PART 2 PRODUCTS**

### **2.01 ACCESSORIES**

- A. Pre-Finished Aluminum: ASTM B 209 (ASTM B 209M); 0.050 inch thick; plain finish shop pre coated with fluoropolymer coating of color as selected.
  - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.
- B. General: Provide trim/flashing, fascias, ridge, valley, closures, gutters, gutter hangers and other related required items to provide a complete system
- C. Fasteners: Same metal as flashing/sheet metal or other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed fasteners the same as the material being fastened.
- D. Epoxy Seam Sealer: Two (2) part noncorrosive metal seam cementing compound for exterior and interior nonmoving joints.
- E. Metal Accessories: Provide sheet metal flashings, clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed.

### **2.02 SHEET MATERIALS**

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.
- B. Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; anodized finish of color as selected.

### **2.03 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

### **3.02 PREPARATION**

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

### **3.03 INSTALLATION**

- A. Comply with manufacturers installation instructions, manufacturers recommendations and SMACNA 'Architectural Sheet Metal Manual'
- B. Install in accordance with manufacturer's installation instructions.
- C. Install work with provisions for thermal expansion of flashings, gravel stops, fascia, copings, reglets, and other items exposed for more than 20 feet of continuous length. Maintain as watertight installation at expansion seams.
- D. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- E. Apply plastic cement compound between metal flashings and felt flashings.
- F. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- G. Seal metal joints watertight.

### **3.04 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

### **3.05 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for field inspection requirements.

**END OF SECTION**

**SECTION 07 71 00  
ROOF SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured roof specialties, including counterflashings, scuppers fascias.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 20 00 - Unit Masonry
- B. Section 07 54 19 - PVC Thermoplastic Single-Ply Roofing
- C. Section 07 61 00 - Sheet Metal Roofing
- D. Section 07 62 00 - Sheet Metal Flashing and Trim

**1.03 REFERENCE STANDARDS**

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. AAMA 2605 - Voluntary Specification , Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2005.
- C. NRCA (RM) - The NRCA Roofing Manual 2023.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- D. Samples: Submit two samples, illustrating component shape, finish, and color.
- E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Roof Edge Flashings and Copings:
  - 1. Architectural Products Co: [www.archprod.com/](http://www.archprod.com/)
  - 2. ATAS International, Inc; Rapid-Lok Fascia: [www.atas.com/](http://www.atas.com/)
  - 3. Metal-Era Inc: [www.metalera.com/](http://www.metalera.com/)
  - 4. Metal Roofing Systems, Inc; Rapid Lock Coping: [www.metalroofingsystems.biz/](http://www.metalroofingsystems.biz/)
  - 5. MM Systems Corp.; Product FWC Wall Cap.

**2.02 COMPONENTS**

- A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
  - 1. Configuration: Fascia, and edge securement for roof membrane.
  - 2. Material: Formed steel sheet, galvanized, 22 gage, 0,03 inch thick, minimum.
  - 3. Finish: 70 percent polyvinylidene fluoride.

**2.03 PREFABRICATED FASCIA ROOF EDGE**

- A. Manufacturer:
  - 1. Metal Era, Waukesha, Wisconsin:

2. Acceptable Manufacturers:
  - a. MM Systems Company, Tucker, Georgia
  - b. W.P. Hickman, Asheville, North Carolina
  - c. Substitutions: See Section 01 60 00 - Product Requirements
- B. Anchor-Tite: Decorative metal fascia with continuous extruded aluminum bar. The system shall be watertight with no exposed fasteners. Model shall be: ABF-80. The rise above the nailer 2".
  1. Extruded bar shall lock membrane, prevent wind pullback.
  2. Injection molded EPDM splices to allow thermal expansion of extruded aluminum anchor bar.
  3. Fascia shall freely thermal cycle on extruded bar, preventing periodic maintenance.
- C. Fascia metal gauge: .040" thick formed aluminum with Kynar 500 finish.
  1. Color to be selected by the Architect from manufacturer's standards
- D. Fascia: standard 12'-0" (3.65 m) lengths.
- E. Extruded bar: Shall be continuous 6063-T6 alloy aluminum at 12'-0" (3.65 m) standard lengths. All bar miters are welded.
- F. Fasteners: # 9 x 2" stainless steel fasteners provided with drivers. No exposed fasteners permitted.
- G. Exterior fascia finishes: Kynar 500 from manufacturer's standard colors.
- H. Accessories:
  1. Miters, downspout scuppers, spillout scuppers shall be fabricated by manufacturer.
  2. Welded base assembly shall be used to maintain watertight integrity.
  3. Provide matching brick wall cap, downspout, extenders, or other special fabrications as detailed.

#### **2.04 FINISHES**

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

#### **2.05 ACCESSORIES**

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

#### **3.02 INSTALLATION**

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

**END OF SECTION**

**SECTION 07 92 00  
JOINT SEALANTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Provide labor, materials and equipment necessary to complete sealant work, both interior and exterior of the Project.
- B. Nonsag gunnable joint sealants.
- C. Self-leveling pourable joint sealants.
- D. Joint backings and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- B. Section 08 80 00 Glazing: Glazing sealants and accessories.
- C. Section 23 31 00 - HVAC Ducts and Casings: Duct sealants.

**1.03 REFERENCE STANDARDS**

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015 (Reapproved 2022).
- B. ASTM C834 - Standard Specification for Latex Sealants 2017.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2018.
- F. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with other sections referencing this section.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
  - 5. Substrates for which use of primer is required.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

#### **1.07 MOCK-UP**

- A. Provide mock-up of sealant joints in conjunction with window, wall, and air barrier system under provisions of Section 01 43 00 - Quality Requirements.
- B. Construct mock-up with specified sealant types and with other components noted.
- C. Locate where directed.
- D. Mock-up may not remain as part of the Work.

#### **1.08 FIELD CONDITIONS**

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.
- C. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

#### **1.09 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two (2) year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

### **PART 2 PRODUCTS**

#### **2.01 JOINT SEALANT APPLICATIONS**

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
    - d. Openings below ledge angles in masonry.
    - e. Joints and intersections in concrete paving.
    - f. Joints and intersections between dissimilar materials that do not fit together with a hairline joint.
    - g. Intersections of equipment that do not fit together or against adjoining material with a hairline joint.
    - h. Other joints indicated below.
  - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. Joints and intersections between dissimilar materials that do not fit together with a hairline joint.
    - c. Intersections of equipment that do not fit together or against adjoining material with a hairline joint.
    - d. Other joints indicated below.
  - 3. Do not seal the following types of joints.
    - a. Intentional weepholes in masonry.
    - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.

- c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
  - d. Joints where installation of sealant is specified in another section.
  - e. Joints between suspended panel ceilings/grid and walls.
- B. General Project Recommendations
- 1. Type 1 - Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
  - 2. Type 2 - Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
  - 3. Type 4 - Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
  - 4. Type 5 - Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
  - 5. Type 6 - In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
- C. Interior Wet Areas: Bathrooms, restrooms, and food service areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

## 2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.
- B. Single source responsibility for joint sealers materials: Obtain joint sealer materials from a single manufacturer.
- C. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and experience.

## 2.03 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 50 percent, minimum.
  - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
  - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
  - 4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
  - 5. Color: To be selected by Architect from manufacturer's standard range.
  - 6. Service Temperature Range: Minus 20 to 180 degrees F.
  - 7. Applications: Use for:
    - a. Metal to metal joint.
    - b. Glass to glass joints.
    - c. Sheet metal flashing, coping, preformed metal caps, fascia, extenders trim and panels.
    - d. Glass to metal joints.
    - e. Concrete to concrete, including precast panels
  - 8. Manufacturers:
    - a. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: [consumer.dow.com/en-us/industry/ind-building-construction.html/](http://consumer.dow.com/en-us/industry/ind-building-construction.html/)
    - b. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): [www.pecora.com/](http://www.pecora.com/)
    - c. Sika Corporation; Sikasil WS-290: [www.usa-sika.com/](http://www.usa-sika.com/)
    - d. Tremco, Inc.; Product Spectrum 2: [www.tremcosealants.com.](http://www.tremcosealants.com.)
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 50 percent, minimum.



2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  3. Color: To be selected by Architect from manufacturer's standard range.
  4. Service Temperature Range: Minus 40 to 180 degrees F.
  5. Applications: Use for:
    - a. Control, expansion, and soft joints in masonry.
    - b. Joints between concrete and other materials.
    - c. Joints between metal frames and other materials.
    - d. Other exterior joints for which no other sealant is indicated.
  6. Manufacturers:
    - a. Pecora Corporation; DynaTrol II: [www.pecora.com/](http://www.pecora.com/)
    - b. Pecora Corporation; DynaTrol II General Purpose Two Part Polyurethane Sealant: [www.pecora.com](http://www.pecora.com).
    - c. Sika Corporation; Sikaflex-1a: [www.usa-sika.com/](http://www.usa-sika.com/)
    - d. Sika Corporation; Sikaflex-2c NS: [www.usa-sika.com/](http://www.usa-sika.com/)
    - e. Tremco Global Sealants; Dymonic FC (single component); [www.tremcosealants.com](http://www.tremcosealants.com)
    - f. Tremco Global Sealants; Dymonic 240FC (multi component); [www.tremcosealants.com](http://www.tremcosealants.com)
    - g. BASF Construction Chemicals-Building Systems; Sonolastic NP 1 (single component); [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
    - h. BASF Construction Chemicals-Building Systems; Sonolastic NP 2 (multi component) [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
    - i. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: To be selected by Architect from manufacturer's standard range.
  2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
  3. Applications: Use for:
    - a. Interior wall and ceiling control joints.
    - b. Joints between door and window frames and wall surfaces.
    - c. Other interior joints for which no other type of sealant is indicated.
  4. Manufacturers:
    - a. Pecora Corporation; AC-20 +Silicone: [www.pecora.com/](http://www.pecora.com/)
    - b. Tremco Global Sealants: [www.tremcosealants.com](http://www.tremcosealants.com).; Acrylic Latex 834
    - c. BASF Construction Chemicals-Building Systems; Sonolac: [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.04 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
  1. Movement Capability: Plus and minus 50 percent, minimum.
  2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
  3. Color: To be selected by Architect from manufacturer's standard range.
  4. Service Temperature Range: Minus 40 to 180 degrees F.
  5. Applications: Use for:
    - a. Joints in sidewalks and vehicular paving.
  6. Manufacturers:
    - a. Pecora Corporation: [www.pecora.com/](http://www.pecora.com/)
    - b. Sika Corporation; Sikaflex-1c SL: [www.usa-sika.com/](http://www.usa-sika.com/)

- c. BASF Construction Chemicals-Building Systems; Sonlastic SL 1: [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
  - 1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
  - 2. Color: Concrete gray.
  - 3. Joint Width, Minimum: 1/8 inch.
  - 4. Joint Width, Maximum: 3/4 inch.
  - 5. Joint Depth: Provide product suitable for joints from 1/8 inch to 1 inch in depth excluding space for backer rod.
  - 6. Application: Use for
    - a. Joint filler for concrete slab saw cuts and narrow cracks.
  - 7. Manufacturers:
    - a. Adhesives Technology Corporation; Crackbond JF-311: [www.atcepoxy.com/](http://www.atcepoxy.com/)
    - b. ARDEX Engineered Cements; ARDEX ArdiSeal: [www.ardexamericas.com](http://www.ardexamericas.com).
    - c. Nox-Crete; DynaFlex JF-85: [www.nox-crete.com/](http://www.nox-crete.com/)
    - d. Sika Corporation - Sika Loadflex - Load Bearing Semi Rigid Polyurea Joint Filler; [www.sika-usa.com](http://www.sika-usa.com).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

### 3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

### **3.04 CLEANING**

- A. Clean adjacent soiled surfaces.

### **3.05 PROTECTION**

- A. Protect sealants until cured.

**END OF SECTION**

**SECTION 08 11 13  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Accessories, including glazing, louvers, and matching panels.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 71 00 - Door Hardware.
- B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 91 13 - Exterior Painting: Field painting.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2018.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- I. BHMA A156.115 - Hardware Preparation In Steel Doors And Steel Frames 2016.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- K. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).
- L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- N. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
  - 1. Provide hollow metal frames from SDI Certified manufacturer.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

#### **1.07 PROJECT CONDITIONS**

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com)
  - 2. Curries, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com)
  - 3. Mesker, dormakaba Group: [www.meskeropeningsgroup.com](http://www.meskeropeningsgroup.com)
  - 4. Republic Doors, an Allegion brand: [www.republicdoor.com](http://www.republicdoor.com)
  - 5. MPI Custom Steel Doors and Frames: [www.metalproductsinc.com](http://www.metalproductsinc.com)
  - 6. Steelcraft, an Allegion brand: [www.allegion.com](http://www.allegion.com)
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 PERFORMANCE REQUIREMENTS**

- A. Requirements for Hollow Metal Doors and Frames:
  - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
    - a. Steel top cap on exterior doors.
  - 4. Door Edge Profile: Manufacturers standard for application indicated.
  - 5. Typical Door Face Sheets: Flush.
  - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
  - 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
    - a. Prepare doors and frames to receive mortised and concealed door hardware, including cutouts, reinforcing, drilling, and tapping, in accordance with final door

hardware and templates provided by hardware supplier. Comply with ANSI A115 Specifications for door and frame preparation".

8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
  - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### **2.03 HOLLOW METAL DOORS**

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors
  1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless, Epoxy filled edge (Extra Heavy Duty, 16 gauge).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 - Seamless.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
  2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
  3. Door Thickness: 1-3/4 inch, nominal.
  4. Top Closures for Outswinging Doors: Flush with top of faces and edges.
  5. Weatherstripping: Refer to Section 08 71 00.
  6. Verify with Section 08 71 00 - Door Hardware, undercut requirements for exterior doors with thresholds. Standard undercut will not be acceptable for low profile handicap thresholds.

### **2.04 HOLLOW METAL FRAMES**

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. General:
  1. Comply with the requirements of grade specified for corresponding door, except:
    - a. Frames for interior openings: ANSI A250.8 Level 3 Doors: 16 gage frames.
    - b. Frames for exterior openings: ANSI A250.8 Level 3 Doors: 16 gage frames.
- C. Exterior Door Frames: Full profile/continuously welded type.
  1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
  2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
  3. Frame Finish: Factory primed and field finished.
  4. Weatherstripping: Separate, see Section 08 71 00.
- D. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- E. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

## **2.05 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

## **2.06 ACCESSORIES**

- A. Glazing: As specified in Section 08 80 00, factory installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- D. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.
- F. Closed-cell polyurethane spray foam insulation:
  - 1. Foam Sealant: A one-component, minimal expanding, low pressure-build, flexible polyurethane foam formulated to seal the air gap around door frame and the rough opening. The foam is to expand and generate an effective seal, and will not to distort or bow door frames.
  - 2. Foam insulation required in exterior applications between all door head, and jamb.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

### **3.02 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- E. Install door hardware as specified in Section 08 71 00.
- F. Comply with glazing installation requirements of Section 08 80 00.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Install magnetic hold open devices on doors supplied by Division 28.
- I. Touch up damaged factory finishes.

### **3.04 TOLERANCES**

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

**3.05 ADJUSTING AND CLEANING**

A. Adjust for smooth and balanced door movement.

B. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.

**END OF SECTION**



**SECTION 08 16 14  
FIBERGLASS DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiberglass reinforced polyester (FRP) flush doors with aluminum frames.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 20 00 - Unit Masonry
- B. Section 07 90 05 - Joint Sealers
- C. Section 08 71 00 - Door Hardware.
- D. Section 08 80 00 - Glazing
- E. Section 09 90 00 - Painting and Coatings

**1.03 REFERENCES**

- A. AAMA 1503-98 - Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- B. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
- C. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.
- D. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- E. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- F. ASTM D 256 - Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
- G. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents.
- H. ASTM D 570 - Water Absorption of Plastics.
- I. ASTM D 638 - Tensile Properties of Plastics.
- J. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- K. ASTM D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
- L. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.
- M. ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- N. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- O. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
- P. ASTM D 3029 – Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.
- Q. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
- R. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- S. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- T. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

- U. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- V. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- W. ASTM F 476 - Security of Swinging Door Assemblies.
- X. SFBC PA 201 - Impact Test Procedures.
- Y. SFBC PA 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- Z. SFBC 3603.2 (b)(5) - Forced Entry Resistance Test.

#### **1.04 PERFORMANCE REQUIREMENTS**

- A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
- B. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
- C. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- D. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.
- E. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- F. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
- G. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
  - 1. Flame Spread: Maximum of 200, Class C.
  - 2. Smoke Developed: Maximum of 450, Class C.
- H. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
  - 1. Flame Spread: Maximum of 25.
  - 2. Smoke Developed: Maximum of 450.
- I. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
- J. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
- K. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- L. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- M. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- N. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 3029: 120 in-lb.
- O. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
- P. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
- Q. Chemical Resistance, ASTM D 543. Excellent rating.
  - 1. Acetic acid, Concentrated.
  - 2. Ammonium Hydroxide, Concentrated.

3. Citric Acid, 10%.
  4. Formaldehyde.
  5. Hydrochloric Acid, 10%
  6. Sodium hypochlorite, 4 to 6 percent solution.
- R. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.
  - S. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.
  - T. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.
  - U. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

#### **1.05 SUBMITTALS**

- A. Comply with Section 01 30 00 - Administrative Requirements.
- B. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
- C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
- D. Samples:
  1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
  2. Color: Submit manufacturer's samples of standard colors of doors and frames.
  3. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
  4. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
  5. Warranty: Submit manufacturer's standard warranty.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications:
  1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 5 years successful experience.
  2. Door and frame components from same manufacturer.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finish from damage during handling and installation.

#### **1.08 COORDINATION**

- A. Contractor shall be responsible for coordinating and obtaining necessary information from Hardware and Frame manufacturers to provide door supplier with approved hardware and frame schedules with templates.

#### **1.09 WARRANTY**

- A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
- B. Warranty Period: Ten years starting on date of substantial completion.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURER**

- A. Special-Lite, Inc., Decatur, Michigan 49045 [www.special-lite.com](http://www.special-lite.com).
  - 1. Product: Series SL-17 with SpecLite fiberglass reinforced polyester (FRP) face sheets..
  - 2. Acceptable Manufacturers.
    - a. Assa Abloy, Ceco Door Fiberglass Reinforced Polyester Door (FRP)
    - b. Vale FRP Doors, Collingsale, PA: [www.valedoors.com](http://www.valedoors.com)
    - c. Commercial Door Systems, Mensalem PA: [www.commercialdoorsystems.com](http://www.commercialdoorsystems.com)
    - d. Kawneer
    - e. Substitutions: See Section 01 60 00 - Product Requirements

### **2.02 FIBERGLASS FLUSH DOORS**

- A. Door Opening Size: As indicated on the Drawings.
- B. Construction:
  - 1. Door Thickness: 1-3/4 inches.
  - 2. Stiles and Rails: Aluminum Alloy 6063-T5, minimum of 2-5/16-inch depth.
  - 3. Corners: Mitered.
  - 4. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom as standard tubular shaped stiles and rails reinforced to accept hardware as specified.
  - 5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery.
  - 6. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
  - 7. Extrude top and bottom rail legs for interlocking continuous weather bar.
  - 8. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.
- C. Face Sheet:
  - 1. Material: SpecLite3 FRP, 0.120-inch thickness, finish color throughout. Abuse-resistant engineered surface.
    - a. Standard face sheets shall be manufactured using a corrosion resistant resin system with light stabilizing additives. The resin shall be reinforced with fiberglass, 40% by weight.
  - 2. Texture: Pebble.
  - 3. Color: As selected by Architect from manufacturers standard color line.
- D. Core:
  - 1. Material: Poured-in-place polyurethane foam.
  - 2. Density: Minimum of 5 pounds per cubic foot.
  - 3. R-Value: Minimum of 9.
- E. Cutouts:
  - 1. Manufacture doors with cutouts for required vision lites, louvers, and panels.
  - 2. Factory install vision lites, louvers, and panels.
- F. Hardware:
  - 1. Hardware Preparation: To be fabricated at factory according to hardware templates provided.
  - 2. Hardware Installation: To factory install all applicable and supplied hardware to doors and frames.
  - 3. Hardware Reinforcement: To provide necessary reinforcement for proper longevity and hardware function; ASTM B 209 and/or ASTM 308.

4. Doors shall have:
  - a. 1 each continuous hinge by Section 08 87 00
  - b. 1 each exit device or push/pull by Section 08 87 00
  - c. 1 each closer by Section 08 87 00
  - d. 1 each threshold by this section

### **2.03 MATERIALS**

- A. Aluminum Members:
  1. Extrusions: ASTM B 221.
  2. Sheet and Plate: ASTM B 209.
  3. Components: Door and frame components from same manufacturer.
  4. Fasteners:
    - a. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
    - b. Compatibility: Compatible with items to be fastened.
    - c. Exposed Fasteners: Screws with finish matching items to be fastened.

### **2.04 FABRICATION**

- A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.
- B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.
- C. Assembly:
  1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
  2. Remove burrs from cut edges.
- D. Welding: Welding of doors or frames is not acceptable.
- E. Fit:
  1. Maintain continuity of line and accurate relation of planes and angles.
  2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

### **2.05 ALUMINUM DOOR FRAMING SYSTEMS**

- A. Tubular Framing:
  1. Size and Type: As indicated on the Drawings.
- B. Materials: Aluminum Alloy 6063-T5, 1/8-inch minimum wall thickness.
- C. Applied Door Stops: 0.625-inch high, with screws and weatherstripping. Door stop shall incorporate pressure gasketing for weathering seal. Counter punch fastener holes in door stop to preserve full metal thickness under fastener head.
- D. Frame Members: Box type with 4 enclosed sides.
- E. Joints:
  1. Secure joints with fasteners.
  2. Provide hairline butt joint appearance.
- F. Hardware:
  1. Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and hardware schedule.
  2. Factory install hardware.
- G. Anchors:
  1. Anchors appropriate for wall conditions to anchor framing to wall materials.
  2. Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.
  3. Secure head and sill members of transom, side lites, and similar conditions.

**2.06 ALUMINUM FINISHES**

- A. Anodized Finish: Class I finish, 0.7 mils thick.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use.
- B. Do not proceed with installation until unsatisfactory conditions are corrected.

**3.02 PREPARATION**

- A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

**3.03 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions.
- B. Install doors plumb, level, square, true to line, and without warp or rack.
- C. Anchor frames securely in place.
- D. Separate aluminum from other metal surfaces with bituminous coatings.
- E. Install exterior doors to be weathertight in closed position.

**3.04 ADJUSTING**

- A. Adjust doors, hinges, and locksets for smooth operation without binding.

**3.05 CLEANING**

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that would damage finish.

**3.06 PROTECTION**

- A. Protect installed doors to ensure that doors will be without damage or deterioration at time of substantial completion.

**END OF SECTION**

**SECTION 08 36 13**  
**SECTIONAL DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

**1.02 RELATED REQUIREMENTS**

- A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.
- B. Section 08 71 00 - Door Hardware: Lock cylinders.
- C. Section 08 8000 - Glazing: Glazing for door lights.
- D. Section 26 05 33.13 - CONDUIT: Conduit from electric circuit to operator and from operator to control station.
- E. Section 26 05 83 - EQUIPMENT WIRING.

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).
- C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- D. DASMA 102 - American National Standard Specifications for Sectional Doors 2018.
- E. ITS (DIR) - Directory of Listed Products Current Edition.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- G. NEMA MG 1 - Motors and Generators 2021.
- H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL (DIR) - Online Certifications Directory Current Edition.
- K. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.
- C. Comply with applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

### **1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's finish warranty against rust though for 10 years after the Date of Substantial Completion.
- D. Delamination Warranty: Provide manufacturer's delamination warranty for 10 years after the Date of Substantial Completion.
- E. Warranty: Include coverage for electric motor and transmission.
- F. Provide two year manufacturer warranty for electric operating equipment.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis of Design: Clopay Building Products Company, Inc; Product 520:  
[www.clopaycommercial.com](http://www.clopaycommercial.com).
- B. Other Acceptable Manufacturers:
  - 1. C.H.I. Overhead Doors: [www.chiohd.com](http://www.chiohd.com).
  - 2. Overhead Door Company
  - 3. Wayne-Dalton, a Division of Overhead Door Corporation: [www.wayne-dalton.com](http://www.wayne-dalton.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 STEEL DOORS**

- A. Steel Doors: Stile and rail steel with solid panels; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
  - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
  - 2. Door Nominal Thickness: 2 inches thick.
  - 3. Air Leakage Rate: Less than 0.40 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.
  - 4. Exterior Finish: Factory finished with polyester baked enamel; color as selected by Architect.
  - 5. Interior Finish: Factory finished with polyester baked enamel; color as selected from manufacturers standard line.
  - 6. Electric Operation: Electric control station.
- B. Door Construction:
  - 1. Steel Skins: Formed from roll formed commercial quality steel sheet, hot-dip galvanized per ASTM A 924/A 924M and ASTM A 653/A 653M, pre-painted with primer and baked-on



- polyester topcoat; sections formed to create weather tight tongue-in-groove meeting joint.
- a. Steel Skin Thickness: Minimum 27 gauge 0.016 inch (0.40 mm) exterior; minimum 27 gauge 0.016 inch (0.40 mm) interior.
  - b. End Stiles: Galvanized steel end stiles, engineered for easy hardware attachment through pre-punched holes. Minimum 18 gauge, 0.045 inch (1.14 mm) thick for single end hinge style and 16 gauge .056 inch (1.42 mm) minimum for double end hinge style.
  - c. Finish: Stucco embossed texture with shallow U ribbed pattern.
2. Reinforcing: Galvanized and primed steel reinforcement located under each hinge location, pre-punched for hinge attachment.
  3. Handle: High impact polymer step plate/lift handle on bottom panel section.
- C. Door Panels: Stile and rail construction, of steel sheet 0.058 inch minimum thickness, with welded joints; rabbeted weather joints at meeting rails.

### **2.03 COMPONENTS**

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
  1. Ten-ball steel roller to be full-floating ball bearing in case hardened steel cases and mounted to fit the taper of the track.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
- D. Spring Counterbalance: Torsion spring counterbalance mechanism sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable with minimum 7 to 1 safety factor.
  1. High Cycle Spring: 25,000 cycles.
- E. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- F. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- G. Head Weatherstripping: EPDM rubber seal, one piece full length.
- H. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- I. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

### **2.04 MATERIALS**

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G40/Z120 coating, stucco embossed surface.
- B. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

### **2.05 ELECTRIC OPERATION**

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
- B. Electric Operators:
  1. Mounting: Side mounted on cross head shaft.
  2. Motor Enclosure:
    - a. Interior Doors: NEMA MG 1, Type 1; open drip proof.

3. 3/4 hp ; manually operable in case of power failure, transit speed of 12 inches per second.
  4. Motor Voltage: 120 volts, single phase, 60 Hz.
  5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  6. Controller Enclosure: NEMA 250, Type 1.
  7. Opening Speed: 12 inches per second.
  8. Brake: Adjustable friction clutch type, activated by motor controller.
  9. Manual override in case of power failure.
  10. Refer to Section 26 05 83 for electrical connections.
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
1. 24 volt circuit.
  2. Recess mounted, within line of sight of door, but not within reach of door.
  3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    - a. Primary Device: Provide NEMA 1 photo eye sensors as required with momentary-contact control device.
- E. Disconnect Switch: Factory mount disconnect switch in control panel.
- F. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
1. Basis of Design:
    - a. Chamberlain Group, Inc.: LiftMaster Model DJ
  2. Other Acceptable Manufacturers:
    - a. Overhead Door Company: [www.overheaddoor.com](http://www.overheaddoor.com).
    - b. Wayne-Dalton Corporation: [www.waynedalton.com](http://www.waynedalton.com).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Safety Photo Eyes: Safety photo eyes shall be installed for each opening.
1. Manufacturers
    - a. Lift Master, CPS-UN4

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

### **3.02 PREPARATION**

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

### **3.03 INSTALLATION**

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Photo eyes shall be located 6 inches above finished floor elevation.
- G. Photo eyes shall be wired to reverse the door upon the light beam being disrupted.
- H. Install perimeter trim.

**3.04 ADJUSTING**

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

**3.05 CLEANING**

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

**3.06 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

**END OF SECTION**

**SECTION 08 71 00  
DOOR HARDWARE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Hardware for hollow metal and fiberglass doors.
- B. Thresholds.
- C. Weatherstripping, seals and door gaskets.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 16 13 - Fiberglass Doors

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - 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.
- C. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
- D. Keying Schedule: Submit for approval of Owner.
- E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
  - 1. Submit manufacturer's parts lists and templates.
- G. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.
- H. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

**1.05 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for door closers.
- C. Provide 5 year warranty for locksets and panic/exit devices

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Provide door hardware specified, or as required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide items of a single type of the same model by the same manufacturer.

- C. Provide products that comply with the following:
  1. Applicable provisions of federal, state, and local codes.
  2. Accessibility: ADA Standards and ICC A117.1.
  3. Applicable provisions of NFPA 101, Life Safety Code.
  4. Fire-Rated Doors: NFPA 80.
  5. Hardware on Fire-Rated Doors, Except Hinges: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
  6. Hardware for Smoke and Draft Control Doors(Indicated as "S" on Drawings): Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.
  7. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
- D. Finishes: Identified in schedule.
- E. Fasteners:
  1. Mineral Core Wood Doors: Sex bolts.
  2. Concrete and Masonry Substrates: Stainless steel machine screws and lead expansion shields.

## 2.02 LOCKS AND LATCHES

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
  1. If no hardware set is indicated for a swinging door provide an classroom lockset.
  2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
  3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Lock Cylinders: Manufacturer's standard tumbler type, seven-pin standard core.
  1. Provide cams and/or tailpieces as required for locking devices required.

## 2.03 KEYING

- A. Hardware supplier and/or lock company representative(s) shall meet with the owner to establish key system. Prepare schedule, review schedule with the owner and submit for approval.
- B. Keying: Grand master keyed.

## 2.04 HINGES

- A. Hinges: Provide hinges on every swinging door.
  1. Provide five-knuckle full mortise butt hinges for interior doors unless otherwise indicated.
  2. Provide continuous hinges for exterior doors unless otherwise indicated.
  3. Provide ball-bearing hinges at all doors having closers.
  4. Provide hinges in the quantities indicated.
  5. Provide non-removable pins on outswinging doors.
  6. Where electrified hardware is mounted in door leaf, provide power transfer hinges.
- B. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7; standard weight, unless otherwise indicated.
- C. Manufacturers - Hinges:
  1. Assa Abloy Brands; Rockwood: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Bommer Industries, Inc: [www.bommer.com](http://www.bommer.com).
  3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  4. Stanley Black & Decker: [www.stanleyblackanddecker.com](http://www.stanleyblackanddecker.com).
  5. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Manufacturers - Continuous Hinges:

1. Assa Abloy McKinney: [www.assaabloydss.com](http://www.assaabloydss.com).
2. Bommer Industries, Inc: [www.bommer.com](http://www.bommer.com).
3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
4. Stanley Hardware: [www.stanleyworks.com](http://www.stanleyworks.com).
5. Select Products Limited: [www.select-hinges.com](http://www.select-hinges.com).
6. Substitutions: See Section 01 6000 - Product Requirements.

## 2.05 PUSH/PULLS

- A. Push/Pulls: Comply with BHMA A156.6.
  1. On solid doors, provide matching push plate and pull plate on opposite faces.
- B. Manufacturers - Push/Pulls:
  1. Burns Manufacturing Inc.: [www.burnsmfg.com](http://www.burnsmfg.com)
  2. Assa Abloy Brands; Rockwood: [www.assaabloydss.com](http://www.assaabloydss.com).
  3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  4. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  5. Trimco Hardware: [www.trimcohardware.com](http://www.trimcohardware.com).
  6. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.06 MORTISE LOCKSETS

- A. Locking Functions: As defined in BHMA A156.13, and as follows:
  1. Passage: F01.
  2. Privacy: F19, or F02 with retraction of deadbolt by use of inside lever/knob.
  3. Office: F04, key not required to lock, remains locked upon exit.
- B. Manufacturers - Mortise Locksets:
  1. Assa Abloy Sargent: [www.assaabloydss.com](http://www.assaabloydss.com). 8200 Series
  2. Best Access Systems, division of Stanley Security Solutions; 45 Series: [www.bestlock.com](http://www.bestlock.com).
  3. DORMA USA, Inc; M9000 Series: [www.dorma.com](http://www.dorma.com)
  4. Schlage: [www.schlage.com](http://www.schlage.com). L9000 Series
  5. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.07 FLUSHBOLTS AND COORDINATORS

- A. Flushbolts: Lever extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
  1. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
  2. Floor Bolts: Provide dustproof strike except at metal thresholds.
- B. Manual Flushbolts: Provide lever extensions for top bolt at over-size doors.
- C. Automatic Flushbolts: Automatically latch upon closing of door; automatic retraction of bolts when active leaf is opened.
- D. Coordinators: Provide on doors having closers and self-latching or automatic flushbolts to ensure that leaves close in proper order.
- E. Manufacturers - Flushbolts:
  1. Assa Abloy Brands, McKinney; \_\_\_\_\_: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Burns Manufacturing Inc.: [www.burnsmgf.com](http://www.burnsmgf.com)
  3. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  4. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  5. Trimco Hardware: [www.trimcohardware.com](http://www.trimcohardware.com).
  6. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.08 EXIT DEVICES

- A. Locking Functions: Functions as defined in BHMA A156.3.
- B. Manufacturers - Exit Devices:
  - 1. Assa Abloy Corbin Russwin or Sargent: [www.assaabloydss.com](http://www.assaabloydss.com). 80 Series
  - 2. DORMA Group North America: [www.dorma-usa.com/usa](http://www.dorma-usa.com/usa). 9000 Series
  - 3. Precision/Stanley Security Solutions.
  - 4. Von Duprin, an Allegion brand; 99 Series: [www.allegion.com/us](http://www.allegion.com/us).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.09 CLOSERS

- A. Manufacturers - Surface Mounted Closers:
  - 1. Assa Abloy Sargent: [www.assaabloydss.com](http://www.assaabloydss.com). 351 Series
  - 2. DORMA Group North America: [www.dorma-usa.com/usa](http://www.dorma-usa.com/usa). 8900 Series
  - 3. LCN: [www.lcnclosers.com](http://www.lcnclosers.com). 4041 Series
  - 4. Stanley Security Solutions

## 2.10 STOPS AND HOLDERS

- A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
  - 1. Provide wall stops, unless otherwise indicated.
  - 2. If wall stops are not practical, due to configuration of room or furnishings, provide overhead stop.
  - 3. 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 specifically so stated.
- B. Manufacturers - Overhead Holders/Stops:
  - 1. Assa Abloy Brands; Rockwood: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. DORMA USA, Inc; 900 Series: [www.dorma.com](http://www.dorma.com).
  - 3. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 4. Burns Manufacturing Inc.: [www.burnsmfg.com](http://www.burnsmfg.com).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Manufacturers - Wall and Floor Stops/ Holders:
  - 1. Burns Manufacturing Inc.: [www.burnsmfg.com](http://www.burnsmfg.com)
  - 2. Assa Abloy Brands; Rockwood: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 3. Ives, an Allegion brand: [www.allegion.com/us](http://www.allegion.com/us).
  - 4. Hiawatha, Inc, division of Activar Construction Products Group, Inc; \_\_\_\_\_: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 5. Trimco Hardware: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.11 GASKETING AND THRESHOLDS

- A. Gaskets: Complying with BHMA A156.22.
  - 1. On each door in smoke partition, provide smoke gaskets; top, sides, and meeting stile of pairs. If fire/smoke partitions are not indicated on drawings, provide smoke gaskets on each door identified as a "smoke door" and 20-minute rated fire doors.
  - 2. On each exterior door, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
    - a. Where exterior door is also required to have fire or smoke rating, provide gaskets functioning as both smoke and weather seals.
  - 3. On each exterior door, provide door bottom sweep, unless otherwise indicated.

- B. Thresholds: Complying with BHMA A156.21.
  - 1. At each exterior door, provide a threshold unless otherwise indicated.
  - 2. Field cut threshold to frame for tight fit.
- C. Manufacturers - Gasketing and Thresholds:
  - 1. National Guard Products, Inc: [www.ngpinc.com](http://www.ngpinc.com).
  - 2. Pemko Manufacturing Co: [www.pemko.com](http://www.pemko.com).
  - 3. Zero International, Inc: [www.zerointernational.com](http://www.zerointernational.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.12 PROTECTION PLATES AND ARCHITECTURAL TRIM**

- A. Drip Guard: Provide projecting drip guard over all exterior doors unless they are under a projecting roof or canopy.
- B. Manufacturers - Protection Plates and Architectural Trim:
  - 1. Assa Abloy Brands; Rockwood: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Hager Companies: [www.hagerco.com](http://www.hagerco.com).
  - 3. Hiawatha, Inc, division of Activar Construction Products Group, Inc: [www.activarcpg.com/hiawatha](http://www.activarcpg.com/hiawatha).
  - 4. Trimco Hardware: [www.trimcohardware.com](http://www.trimcohardware.com).
  - 5. Burns Manufacturing Inc.: [www.burnsmfg.com](http://www.burnsmfg.com).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.13 KEY CONTROLS**

- A. Key Management System: For each keyed lock on project, provide two sets of consecutively numbered duplicate key tags with hanging hole and snap catch.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- D. Mounting heights for hardware from finished floor to center line of hardware item. As indicated in the following list; unless noted otherwise in Door Hardware Sets Schedule or on the drawings.
  - 1. For steel doors and frames: Comply with DHI (LOCS) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames".
  - 2. For Wood Doors: Comply with DHI WDHS.3 "Recommended Locations for Architectural Hardware for Flush Wood Doors".
- E. Set exterior door thresholds with full-width bead of elastomeric sealant on each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

### **3.02 FIELD QUALITY CONTROL**

- A. Provide an Architectural Hardware Consultant to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

### **3.03 CLEANING**

- A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.



**3.04 PROTECTION**

- A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

**END OF SECTION**

**SECTION 08 80 00  
GLAZING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

**1.03 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- E. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2021.
- F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- G. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2010.
- H. GANA (GM) - GANA Glazing Manual 2008.
- I. GANA (SM) - GANA Sealant Manual 2008.
- J. GANA (LGRM) - Laminated Glazing Reference Manual 2019.
- K. ITS (DIR) - Directory of Listed Products Current Edition.
- L. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2017.
- M. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2014, with Errata (2017).
- N. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2017.
- O. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by each of the affected installers.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify

available colors.

- D. Samples: Submit two samples 12 by 12 inch in size of glass units.
- E. Certificates: Certify that products meet or exceed specified requirements.
- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.06 QUALITY ASSURANCE**

- A. Perform Work in accordance with GANA (GM), GANA (SM), and GANA (LGRM) for glazing installation methods. Maintain one copy on site.
- B. Provide labels showing glass manufacturer's , type of glass, thickness, and quality. Labels shall remain on glass until it has been seen approved by the Architect.
- C. Thermal Performance Properties:
  - 1. Solar Heat Gain Coefficient :  $NFCR\ 200 \leq 0.40$ .
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

#### **1.07 FIELD CONDITIONS**

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Glass Fabricators:
  - 1. AGC Glass North America [www.agcglass.com](http://www.agcglass.com)
  - 2. Cardinal Glass Industries, [www.cardinalcorp.com](http://www.cardinalcorp.com)
  - 3. GGI - General Glass International: [www.generalglass.com/](http://www.generalglass.com/)
  - 4. Guardian Glass, LLC, [www.guardianglass.com](http://www.guardianglass.com)
  - 5. JE Berkowitz, LP: [www.jeberkowitz.com/#sle](http://www.jeberkowitz.com/#sle)
  - 6. Pilkington North America, [www.pilkington.com](http://www.pilkington.com)
  - 7. Standard Bent Glass Corp: [www.standardbent.com/](http://www.standardbent.com/)
  - 8. Trulite Glass & Aluminum Solutions, LLC: [www.trulite.com/](http://www.trulite.com/)
  - 9. Viracon, Inc: [www.viracon.com/](http://www.viracon.com/)
  - 10. Vitro Architectural Glass, [www.vitroglazing.com](http://www.vitroglazing.com)
  - 11. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES**

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  - 1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  - 2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  - 3. Glass thicknesses listed are minimum.

- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
  - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
  - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 3. Solar Optical Properties: Comply with NFRC 300 test method.

### 2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  - 1. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

### 2.04 INSULATING / EXTERIOR GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
  - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
  - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
  - 3. Spacer Color: Black.
  - 4. Edge Seal:
    - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
    - b. Color: Black.
  - 5. Purge interpane space with dry air, hermetically sealed.
- B. EG-1: Insulating Glass Units: Vision glass, double glazed.
  - 1. Applications: Exterior glazing unless otherwise indicated.
  - 2. Space between lites filled with argon.
  - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
    - b. Coating: Low-E (solar control type), on #2 surface.
      - 1) PPG SolarBan 70XL
      - 2) Substitutions; See Section 01 60 00 - Product Requirements
  - 4. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
  - 5. Total Thickness: 1 inch.
  - 6. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal.
  - 7. Visible Light Transmittance (VLT): 42 percent, nominal.
  - 8. Solar Heat Gain Coefficient (SHGC): 28 percent, nominal.
  - 9. Glazing Method: Dry glazing method, gasket glazing.

### 2.05 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

- B. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

### **PART 3 EXECUTION**

#### **3.01 VERIFICATION OF CONDITIONS**

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

#### **3.02 PREPARATION**

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

#### **3.03 INSTALLATION, GENERAL**

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

#### **3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)**

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

#### **3.05 INSTALLATION - PRESSURE GLAZED SYSTEMS**

- A. Application - Exterior Glazed: Set glazing infills from exterior side of building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install pressure plates without displacing glazing gasket; exert pressure for full continuous contact.

#### **3.06 FIELD QUALITY CONTROL**

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

### **3.07 CLEANING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove non-permanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

### **3.08 PROTECTION**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**

**SECTION 09 91 13  
EXTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Floors, unless specifically indicated.
  - 6. Glass.
  - 7. Concealed pipes, ducts, and conduits.

**1.02 RELATED REQUIREMENTS**

- A. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- B. Section 23 37 00 - Air Outlets and Inlets
- C. Section 23 37 10 - Exterior Wall Louvers

**1.03 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).
- C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- E. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- F. SSPC-SP 2 - Hand Tool Cleaning 2018.
- G. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- H. SSPC-SP 13 - Surface Preparation of Concrete 2018.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

- C. Samples: Submit three paper samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
  - 3. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
  - 3. Label each container with color in addition to the manufacturer's label.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.

### **1.06 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
  - 1. If a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
  - 2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
  - 3. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
- B. Paints:
  - 1. Behr Process Corporation: [www.behr.com](http://www.behr.com).
  - 2. PPG Paints: [www.ppgpaints.com](http://www.ppgpaints.com).
  - 3. Pratt & Lambert Paints: [www.prattandlambert.com](http://www.prattandlambert.com).
  - 4. Sherwin-Williams Company: [www.sherwin-williams.com/](http://www.sherwin-williams.com/).
- C. Substitutions: See Section 01 60 00 - Product Requirements.



## 2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
  - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at [www.paintinfo.com](http://www.paintinfo.com), for specified MPI categories, except as otherwise indicated.
  - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
  - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
  - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

## 2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete, concrete masonry units, brick, fiber cement siding, primed wood, and primed metal.
  - 1. Two top coats and one coat primer.
  - 2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
    - a. Products:
      - 1) Behr Marquee Exterior Satin Enamel [No. 9450]. (MPI #15)
      - 2) PPG Paints Acry-Shield Max Exterior Latex, 739-10 Series, Satin.
      - 3) Rodda Protector Satin, 532201. (MPI #15)
      - 4) Sherwin-Williams Resilience, Satin. (MPI #15)
  - 3. Top Coat(s): Exterior Light Industrial Coating, Water Based; MPI #161, 163, or 164.
    - a. Products:
      - 1) Behr Premium Interior/Exterior Direct-To-Metal Paint Gloss [No. 8200]. (MPI #164)
      - 2) PPG Paints Pitt-Tech Plus DTM Industrial Enamel, 90-1310 Series, Gloss.
- B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
  - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
  - 2. Semi-gloss: Two coats of latex enamel.

## 2.04 PRIMERS

- A. Primers: Provide the primer as required or recommended by manufacturer of top coats.

## 2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.

#### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete:
  - 1. Clean concrete according to ASTM D4258. Allow to dry.
  - 2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- G. Masonry:
  - 1. Prepare surface as recommended by top coat manufacturer.
- H. Galvanized Surfaces:
  - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  - 2. Prepare surface according to SSPC-SP 2.
- I. Ferrous Metal:
  - 1. Solvent clean according to SSPC-SP 1.
  - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
  - 3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

#### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

**3.04 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

**3.05 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

**SECTION 10 44 00  
FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 20 00 - Unit Masonry
- B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

**1.03 REFERENCE STANDARDS**

- A. FM (AG) - FM Approval Guide Current Edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers 2022.
- C. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

**1.05 FIELD CONDITIONS**

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fire Extinguishers:
  - 1. JL Industries, Inc: [www.jlindustries.com](http://www.jlindustries.com).
  - 2. Larsen's Manufacturing Co: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 3. Potter-Roemer: [www.potterroemer.com](http://www.potterroemer.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
  - 1. JL Industries, Inc: [www.jlindustries.com](http://www.jlindustries.com).
  - 2. Larsen's Manufacturing Co: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 3. Potter-Roemer: [www.potterroemer.com](http://www.potterroemer.com).

**2.02 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
  - 1. Stored Pressure Operated: Deep Drawn.
  - 2. Class: A:B:C type.
  - 3. Size: 10 pound.
  - 4. Finish: Baked polyester powder coat red color.
  - 5. Temperature range: -65 degrees F to 120 degrees F.

6. Location: All locations unless otherwise indicated

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install brackets on walls. Reference drawings for mounting heights and also coordinate with requirements on authorities having jurisdiction.
- C. Install cabinets plumb and level in wall openings. Reference details on drawings and coordinate with requirements of authorities having jurisdiction to confirm mounting heights and cabinet locations.
- D. Secure rigidly in place.
- E. Place extinguishers in cabinets and on wall brackets.

**3.03 ADJUSTMENT**

- A. Adjust cabinet doors to achieve smooth operation.

**3.04 CLEANING**

- A. Clean all surfaces.
- B. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

**3.05 PROTECTION**

- A. Protect installed products from damage during construction in accordance.

**END OF SECTION**

**SECTION 13 31 00  
FABRIC STRUCTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Custom fabric structure, including fabric, structural steel supporting members, fittings, and accessories.
- B. The fabric membrane shall be tensioned over the framework to form a water tight seal. At no time shall the membrane come into contact with the steel framing system.
- C. The buildings system shall also include accessories and items required and necessary for the scope and intended use and as specified; including ventilation (louvers or mesh, per manufacturer's calculations) and support for lighting.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete foundations.
- B. Section 26 56 00 - EXTERIOR LIGHTING: Lighting under canopy.

**1.03 REFERENCE STANDARDS**

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures 2010, with 2013 Supplements and Errata.

**1.04 PREINSTALLATION MEETINGS**

- A. Pre-installation Meeting: Convene a pre-installation meeting at least two (2) weeks before start of installation of tensioned fabric structure.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data, including test reports on fabric showing compliance with specified properties.
- C. Shop Drawings: Submit construction drawings including plans, elevations, details, dimensions, support steel sizing, cables and hardware, clamp/corner plates, fittings, fabric, fabric layout seams, and the following:
  - 1. Exact interface geometry determination and definitions.
  - 2. Coordination between fabric and structural supports
  - 3. Interfaces to foundation supports.
  - 4. Design loads used in structural calculations.
  - 5. Foundation reaction loads.
  - 6. Stamp or seal of design engineer.
- D. Samples for Initial Selection: Submit 6-inch by 6-inch samples of fabric of each available color from manufacturer's full range.
- E. Submit color charts of the colors available for all painting. Submit samples of roof panel configuration and pattern.
- F. Samples for Verification: Submit samples of fabric
- G. Fabricator Test Reports: Submit documentation that structural steel Fabricator is certified by AISC or another independent 3rd party inspection agency approved by the Building Official.
  - 1. If steel fabricator is certified by AISC, special inspections may be reduced and performed by the fabricator. Reference IBC section 1704.2.5.1 and AISC 360 Chapter N.
  - 2. If steel fabricator is not certified, provide special inspections on the premises of the fabricator's shop paid for by the Fabricator or Contractor. Include the inspections at the site of steel fabricator in the special inspection schedule. Submit a copy of special

inspections.

- H. Maintenance Data: For tensioned membrane structures to include maintenance manuals.
- I. Erection/Stressing Plan: Submit a compressive erection and stressing plan, including drawings and sketches that clearly show the proposed erection procedure for the fabric roof elements, cables, and structural steel during each stage of construction.
- J. Quality Control: Submit outline of manufacturer's Quality Control Program.
- K. Safety Program: Submit copy of manufacturer's safety manual for installation.
- L. Operating and Maintenance Data: Manufacturer's instructions for fabric repair, re-tensioning cables, and cleaning fabric.
- M. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- N. Professional Engineer's Certificate: All fabrication documents are to be prepared, signed and sealed by a Professional Engineer, legally authorized to practice in the State of Ohio, verifying that the structural framing and covering panels meet indicated loading requirements and codes.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Firm that is capable of assuming complete responsibility for design, engineering, fabrication, delivery, preparation, installation, adjusting, cleaning of structure, and the following:
  - 1. Having minimum of five years experience in design and fabrication of tensioned fabric structures of similar size and complexity to that specified.
  - 2. Employing a licensed professional engineer with minimum of five years experience in tensioned fabric structures using large displacement finite element techniques to perform or supervise the structural design.
  - 3. Source Limitations: Obtain tensioned fabric structure components through one source from a single manufacturer.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in accordance with manufacturer's instructions, in a clean, dry, well ventilated area, above ground on blocking, and do not allow materials to become wet, stained, or dirty.
- C. Handle materials so as to protect materials, coatings, and finishes during handling and installation to prevent damage or staining.
  - 1. Handle fabric in accordance with manufacturer's instructions.
  - 2. Use care in handling of fabric to avoid damage to fabric material and coating.
  - 3. Do not damage, crush, or kink cables.

#### **1.08 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual field conditions by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Exterior Dimension: The structure shall have the dimensions as indicated on the documents.
- C. Clear Interior Volume: Each interior bay of the structure shall provide as a minimum a clear unobstructed interior as indicated on the documents.

#### **1.09 COORDINATION**

- A. Coordinate installation of anchorages for building system. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor delta, and items with integral anchors, that are to be embedded in concrete. Deliver such items to Project site in time for installation.

## 1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Industrial Fabric Cover and Component Finish Warranty: Warranty period for industrial fabric cover is 15 years after the date of Substantial Completion. Furnish the Industrial Fabric Cover manufacturer's written warranty, covering failure of the product within the warranty period.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Tensioned Fabric Structures:
  - 1. Britespan Building Systems Inc: [www.britespanbuildings.com](http://www.britespanbuildings.com)
  - 2. Legacy Building Solutions[<>]: [www.legacybuildingsolutions.com](http://www.legacybuildingsolutions.com)
  - 3. Rubb Building Systems: [www.rubbusa.com](http://www.rubbusa.com)
  - 4. ClearSpan [<>]: [www.clearspan.com](http://www.clearspan.com)
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 FABRIC STRUCTURES

- A. Tensioned Fabric Structure: Provide a custom tensioned fabric structure consisting of fabric stretched on steel structural supports, with the following characteristics:
  - 1. Capable of withstanding loads specified in ASCE 7 and local building code without damage or failure. Project design categories such as wind speed and exposure category are calculated after the bid is awarded.
  - 2. Capable of maintaining structural integrity in event of a tear propagating in fabric, without endangering occupants.
  - 3. Shape geometry selected for equilibrium based on stress in fabric.
  - 4. Having a smooth uniform fabric surface with even curved edges and interfaces and without wrinkles, cuts, abrasions, stains, marks, surface defects, or seaming aberrations.
  - 5. Configuration as indicated on drawings.
  - 6. Made of prefabricated components ready for installation.

### 2.03 MATERIALS

- A. All materials used in the structure shall be new, without defects and free of repairs. The quality of the materials used shall be such that the structure is in conformance with the performance requirements specified herein.
- B. Fabric: Manufacturer's option, with expected life span of 25-30 years and minimum warranty period of 15 years.
  - 1. Fabric: Polyvinyl Chloride (PVC) and polyester fabric with 100 percent acrylic top coating. The fabric needs to be by an approved and reputable supplier with demonstrated long term performance. Laminated materials are not acceptable for use on the outer weather membrane. The PVC coated membrane fabric shall be waterproof and free from defects. All roofs, end walls and connecting sections shall be weather tight.
  - 2. Fabric: High density polyethylene (HDPE) coated polyester fabric manufactured by an approved and reputable supplier with demonstrated long term performance. Laminated materials are not acceptable for use on the outer weather membrane. The HDPE coated membrane fabric shall be waterproof and free from defects. All roofs, end walls and connecting sections shall be weather tight. The material will be selected from the manufacturer's standard colors.
  - 3. Color: From manufacturer's standard range of colors.
  - 4. Safety Factor: The fabric membrane shall be designed to allow a factor of safety at design loads of at least three (3) times the theoretical design strength of the fabric material.
  - 5. The structure membrane shall not be designed to function as a structural member such that, should any damage to or penetrations of the membrane occur, the integrity of the structural framework shall not be affected.



6. Exterior fabric is not an integral part of the structural system. Exterior fabric will deflect under load, therefore, all building accessories must be located beneath the inner chord of the truss. Anything above the inner chord must be reviewed and approved in writing by the building manufacturer. Severe damage to the building and accessories may result from failure to comply with this requirement.

## 2.04 FASTENERS

- A. Stainless steel and non-corrosive coating systems to be used at Salt Building.
- B. Anchor Bolts
  1. The building anchor bolts shall resist the maximum column reactions resulting from the specified combinations of loadings. The quantities and diameters shall be specified by foundation design engineer. Anchor bolt embedment and foundations shall be adequately designed by a qualified foundation engineer to support the building reactions and other loads which may be imposed by the building use. The design shall be based on the specific soil conditions of the building site. Building supplier assumes no responsibility for the integrity of the foundation.
  2. Anchor bolt diameters are determined in accordance with ASTM F-1554 Standard
  3. Anchor bolt projections based on no grout are as follows: 2" minimum
  4. The foundation must be level, square (at right angles); and smooth. Anchor bolts must be accurately placed as shown on the roof manufacturer's drawings.
  5. Drill-in expansion anchors are permitted.
- C. Structural Bolts
  1. All bolts used in primary splices shall be ASTM A325 as required by design
  2. Bolts in connections not subject to tension loads or where loosening due to vibration or load fluctuations are not design considerations need only be snug tightened, which is defined as the tightness that occurs when all pieces in a joint are in firm contact.
  3. All bolts larger than 1" diameter conform to ASTM A325.
  4. All other bolts conform to SAE GR5 or equivalent.
  5. All bolts shall be plated with galvanized coating.
  6. All bolt references require both bolt, washer, and nut.
  7. Bolts in connections with tension loads require pre-tensioning to minimum tension.
- D. Structural Coatings
  1. Zinc rich epoxy/epoxy paint - Dual coat two component paint finish (EpoxxiShield COR Pro or approved equivalent) for the Salt Building
    - a. Surface Prep – All Steel must be cleaned of foreign matter and loose mill scale using abrasive blasting as per requirements of the Structural Steel Painting Council cleaning specification SSPC SP 6 (Commercial Blast) or be inline galvanized and clean prior to paint.
    - b. Tube prep – All tubes must be sealed prior to paint to eliminate internal corrosion using custom fit insert plugs or welded steel plate sealing off the interior of the tube prior to paint.
    - c. Shop Applied 3 Component Zinc Rich Paint – Immediately post surface prep, all structural steel members shall have one coat of PPG Amercoat 68 HS (3 mil thickness) zinc rich epoxy paint, and one coat of PPG Amercoat 370 (5 mil thickness) epoxy paint, for an 8 mil total thickness two component high performance zinc rich epoxy/ epoxy paint finish or approved equal.
    - d. Building supplier shall furnish 1 gallon of PPG Amercoat 370 (or approved equal) to be used for site touch up post installation.
    - e. Alternative a through d for Equipment Storage Buildings- Truss framework tubing shall be Hot Dipped Galvanized after fabrication as per Building Product requirements stated herein. The Hot Dip Galvanizing must meet ASTM 123-12 as per the building code. Acceptable products:

- 1) Hot Dip Galvanized Product, galvanized inside and out after fabrication is completed
  - 2) Aluminum
  - f. Structural bolts, nuts, and washers must be hot dip galvanized to ASTM A153
  - g. Non-Structural bolts, nuts, washers, cables, and other accessories must have a zinc or hot dip galvanized finish.
- E. Steel specifications
- 1. Structural plate conforms to the following specifications:
    - a. ASTM A 1011, Grade 55
    - b. ASTM A 572, Grade 55
    - c. ASTM A 529, Grade 55
  - 2. Steel used for end-wall HSS sections and purlins shall meet the physical and chemical properties of ASTM A500 Grade B,  $F_y=46$  KSI.
  - 3. Alternative tubing specs for Equipment Storage Buildings:
    - a. All steel tubing used in the structure must have the following minimum structural and mechanical properties (ASTM A-500):
      - 1) Tube: ASTM A500/CSA G-40.21 (350W) Tensile 61,000 PSI Yield 45,700 PSI
      - 2) Plate: ASTM A500/Gr 50 CSA G40.21-50W Tensile 65,000 PSI Yield 50,000 PSI
    - b. All steel flat bar, truss components shall be fabricated and hot dipped galvanized post fabrication to ASTM A123-12 meeting ASTM Standard B6 zinc coatings.
  - 4. Coatings of structural plates are done in-line, hot dipped galvanized to a nominal coating Zinc weight 2.0 Oz./SF.
  - 5. Coatings of tubes are done in-line, hot dipped galvanized to a nominal Zinc weight 0.6 Oz./SF.
  - 6. Steel finishing - Post fabrication, hot dipped galvanized.

## 2.05 ROOF AND WALL COVERING

- A. Roof, sidewall, and gable wall material
  - 1. Roof to Gable Wall Connection: The structure membrane shall form a continuous, weather tight shell over the framework. To provide for a good finished appearance and to ensure weather tightness, the gable wall fabric cladding shall be manufactured to be connected to the adjacent side wall and roof cladding without the use of catenary cables, winches, belting or PVC pipes.
  - 2. Sidewall and Roof Panels: The sidewall fabric panels must be completely independent of the roof fabric panels to reduce the opportunity for large scale failure and provide a stronger fabric attachment method.

## 2.06 FABRIC PANEL DESCRIPTION

- A. Fabric panels shall be pre-fabricated panels. Each panel shall cover one bay width.
- B. Panel Length: All fabric wall panels shall be continuous from sill to eave line and all roof panels shall be continuous from eave to eave except where length becomes prohibitive for handling purposes.
- C. A certain amount of wrinkles may exist in the flat portion of the panel under the tension pocket. Minor wrinkles of the panel are not sufficient cause for rejection. Minor wrinkling does not affect the structural integrity of the fabric panel.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine area to receive structure; notify Architect if area is not acceptable, and do not begin installation until unacceptable conditions have been corrected.

- B. Examine foundations and anchor bolts for location and elevation; notify Architect of inaccuracies, and do not begin installation until unacceptable conditions have been corrected.

### **3.02 PREPARATION**

- A. Prepare an erection plan for all structural and fabric installation activity, including a detailed sequence of the work.
- B. Prepare a clear, flat, smooth, and clean layout area on ground of sufficient size for assembly of fabric panels; prepare area adjacent to location of structure installation.
- C. Check contact surfaces to remove sharp objects, dirt, grease, oil, and other causes for rips, scratching, or other damage to fabric panels during installation.
- D. Use temporary ground sheets where fabric panels are to be dragged across a surface to prevent chaffing or other damage to fabric panel surface.

### **3.03 INSTALLATION**

- A. Comply with pre-established erection plan.
- B. Do not undertake erection of fabric during inclement weather conditions; installer has sole responsibility to determine when conditions are safe for erection.
- C. Install structure in accordance with manufacturer's instructions at location indicated on drawings.
- D. Handling: The installation contractor shall be responsible for unloading, field storage, protection and transfer to the work area of all materials and equipment required to perform work. At no time shall materials be dropped, thrown or dragged over the transport equipment or the ground. Damage to any piece under its own superimposed weight shall be cause for repair or replacement. Material shall be protected from standing water.
- E. Short, Damaged or Excess Materials: Installation contractor shall inspect, count and verify quantities based on the shipping documents.
- F. Foundation Design
  - 1. The building manufacturer shall provide the purchaser with a copy of the foundation/anchoring requirements and if applicable, the anchor bolt plan, truss and leg truss line location and reactions. The anchor bolt plan shall show the anchor bolt(s), material, number, size location, embedment, projection and spacing. Design of the foundation and/or anchoring systems for the building shall be based on the maximum column/truss reactions as determined and provided by the building manufacturer.
- G. Set structural frame plumb and aligned. Level base plates true to plane with full bearing on concrete bases.
- H. Fasten frame system to concrete bases per manufacturer's standard design utilizing stainless steel components only.

### **3.04 ADJUSTING**

- A. Make final adjustments to structure as required for structural integrity, geometric shape, and free from objectionable wrinkles when viewed from the normally occupied space.

### **3.05 CLEANING**

- A. Clean structure in accordance with fabric manufacturer's instructions.

**END OF SECTION**

**SECTION 22 05 01  
PLUMBING MATERIALS & METHODS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping specialties
- B. Lubrication and packing
- C. Installation requirements common to piping systems and equipment specification sections
- D. Concrete Housekeeping Pads.
- E. Emergency repairs or operation
- F. Provisions for later installations
- G. Final completion
- H. Project Conditions
- I. Quality Assurance
- J. Warranty
- K. Supervision and cooperation
- L. Maintenance and operating manuals
- M. Record drawings

**1.02 RELATED REQUIREMENTS**

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1 and 2, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to Section 07 8400 - Firestopping. Electrical Contractor shall provide submittals for fire stopping based on Section 07 8400.
- C. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.
- D. The Drawings prepared for this Project are an outline to show where pipes, and apparatus must go in order to harmonize with the building and installations of the various trades. Work must be installed in accordance with the Drawings insofar as possible. Drawings shall be carefully checked during the course of bidding and construction. If discrepancies, errors, or omissions are discovered prior to or during the construction phase, notify the Engineer immediately for interpretation or correction. Take necessary measurements and be responsible for same, including clearances for equipment that is to be furnished. The Architect/Engineer shall reserve the right to make minor location changes of piping and equipment where such adjustments are deemed desirable from an appearance or operational standpoint. Such changes will be anticipated sufficiently in advance to avoid extra work or unduly delay progress on the Project.
- E. The general building drawings shall be used to obtain dimensions and exact locations and as a check with other Contractors to avoid interferences with their Work. Refer to applicable Drawings on branches of the Work where other trades are involved on the Project so that added field work and job delays resulting from conflicts between crafts can be avoided. Piping that is prefabricated before coordinating with the other trades may have to be redone at no additional cost if conflicts are encountered.

**1.03 SUMMARY**

- A. The Contractor(s) shall provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.

- B. The Contractor(s) shall arrange and pay for permits and inspections required in connection with the Work. The Contractor shall apply for and pay for meters, regulators, recorders, and gauges required. The Contractor must present to the Owner through the Architect/Engineer, properly signed certificates of final inspection by the governing authorities when they become due and shall not cover up Work until approved by those authorities.
- C. The Contractor(s) shall make arrangements for connection of the permanent utilities (gas); include connection costs as part of the Work under this Contract. Verify exact requirements of the utility with regard to such service; and include in the Work costs related to same.
- D. Materials or labor obviously required to fully complete the Work shall be included, even though each item necessarily involved is not specifically mentioned or shown. Such Work and materials shall be furnished and shall be of the same grade or quality as the parts actually specified and shown. Should there be a conflict between the plans and Specifications, the greater quantity and better quality shall be furnished.
- E. Should an overlap of Work between the various trades become evident, the Engineer shall be notified. Such an event shall not relieve the Contractor of the responsibility for the Work called for under his branch of the Specifications until a written clarification or directive is issued concerning the matter.
- F. Related Work Specified Elsewhere
  - 1. Firestopping is Work of this Section though fire barrier sealants (firestopping) for walls and floors are specified in Section 07 8400. Contractors are responsible for proper sizing of their sleeves and core-drilled holes so that they are at least 1-1/2 inches larger in diameter than the penetrating items. Schedule 40 steel sleeves and core-drilled holes made excessively large or made and not used, will be firestopped and charged to the Contractor who was responsible.
- G. Related Work by Others
  - 1. Motors which are shipped loose from the mechanical equipment shall be installed as Work under Division 26, Electrical, or other trades as may be required, at the expense of the Contractor furnishing the loose motor(s).
  - 2. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
  - 3. Electric power wiring shall be included as Work under the electrical wiring section of Division 26, Electrical, except as follows:
    - a. Control wiring regardless of voltage shall be included as Work under specific Sections of Division 22.
    - b. Internal package type wiring as specified under specific Sections of Division 22.
- H. Cutting of water lines, electric conduit, or similar service lines in the course of Work performed under this Section shall be immediately repaired as part of the Work of this Section.

#### **1.04 REFERENCE STANDARDS**

- A. Standards are described by reference to various associations. These are in addition, but not limited to, to those listed in:
  - 1. AGA American Gas Association
  - 2. ANSI American National Standards Institute
  - 3. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
  - 4. ASME American Society of Mechanical Engineers
  - 5. ASPE American Society of Plumbing Engineers
  - 6. AWS American Welding Society
  - 7. AWWA American Water Works Association
  - 8. CISPI Cast Iron Soil Pipe Institute
  - 9. NFPA National Fire Protection Association

10. OSHA Occupational Safety and Health Act
  11. SMACNA Sheet Metal and Air Conditioning Contractors National Association
  12. UL Underwriters' Laboratories, Inc.
- B. Work shall be in complete accordance with codes, rules, and ordinances, regulations of authorities, bodies, associations, and governments, having proper or legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
  2. Ohio Plumbing Code, 2017 Edition
  3. ASHRAE 90.1-2010; Energy Standard for Buildings Except Low Rise Residential Buildings
  4. NFPA 54 - National Fuel Gas Code
  5. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017 applicable requirements.
  6. National Board of Fire Underwriters
  7. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
  8. Other Codes and Standards as specifically noted in each Section of the Specifications.
  9. Americans with Disabilities Act (ADA)
- C. References made to codes and standards, in these Specifications or on the Drawings, shall be taken to mean the latest edition, amendment, or revision of such reference in effect as of the date indicated on the Bid Documents unless otherwise noted.

#### **1.05 SUBMITTALS**

- A. Submit capacity requirements, catalog cuts, and illustrations in accordance with requirements of specifications and as required by specific Sections of this Specification.
- B. Shop Drawings shall be prepared by the Contractor or supplier.
  1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply, and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, piping, ductwork, and the like, and its relation to the building so there will be no irregularities or interferences. Shop drawings shall be prepared in coordination with other Contractors and other trades.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.06 QUALITY ASSURANCE**

- A. Instruments used by the Contractor shall be accurately calibrated and maintained in good working condition.
- B. Products and test instruments used shall be subject to approval of Architect/Engineer.
- C. Products and test instruments used shall be provided by each respective Contractor.
- D. Note that systems involved under this Contract heading shall be in accordance with applicable requirements listed in NFPA Standard 90A.
- E. Materials used in this Contract shall be those specified herein unless proposals for the use of alternate materials have been submitted and accepted in writing, as provided hereinbefore. Materials shall be strictly first grade of their kind and shall be new and in first-class condition when installed. Damaged materials will be rejected and must be replaced by proper and acceptable materials. Materials shall be similar and in accordance with the provisions of this Specification.
- F. No materials or equipment may be installed under this contract heading which do not meet the approval of the authorities having jurisdiction. Specific materials may have certain restrictions or exclusions as to their usage, including where they may not be located. Such regulations shall

be adhered to where applicable. The requirements and regulations of the local and state building codes and regulations currently adopted shall be adhered to.

- G. Piping systems shall be installed by workmen having skills acquired by working at the trade which is recognized as necessary for competency.
- H. Pressure piping systems installed shall conform to the requirements of the State piping and welding codes where applicable.

### **1.07 PROJECT CONDITIONS**

- A. Unless otherwise stipulated under a particular heading, the following rules relative to responsibilities of the several Contractors and subcontractors will apply.
  - 1. Each Contractor shall install roughing-in work pertaining to his trade for connection of Work performed under other Sections of these Specifications.
- B. Certain areas will be designated for the storage of materials and equipment and cooperation with the Owner in minimizing interference with existing operations will be mandatory.
  - 1. Where possible, store materials inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
  - 2. Follow manufacturer's instructions for receiving, inspecting, handling, storage, and protection of products prior to final installation
- C. Equipment Clearances and Requirements
  - 1. For many items of equipment described in these Specifications, several manufacturers are listed. The manufacturer listed on the drawings is the make on which the layout was based and on which clearances, service required electrical, and plumbing characteristics, etc., have been checked. Additional manufacturers listed are considered acceptable.
  - 2. Due to the possibility of restrictions imposed by space limitations, the responsibility for resolving conflicts resulting from the use of equipment other than first named shall rest with the equipment supplier and the Contractor. Submittals for this equipment will be considered as a statement that clearances for access, service, maintenance, etc., have been checked and found adequate.
  - 3. Alternate equipment or the equipment of additional manufacturers named in these documents shall meet Base Bid Specifications. In the event such equipment or any equipment which the bidder proposes to furnish, deviates from the requirements of equipment first named regarding electric service, power wiring, control wiring, plumbing or piping, sound attenuation, or vibration damping, it shall be the responsibility of the bidder to include in his price a sufficient sum to cover additional costs or charges resulting therefrom.
- D. In general, the piping shown on the Drawings shall be considered as diagrammatic for clearness in indicating the general run and connections required, and may not be shown in its true position. The piping and equipment may have to be offset, lowered or raised, as required, or as directed at the site in order to accommodate field conditions.

### **1.08 SUPERVISION AND COOPERATION**

- A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start, and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.
- B. A Pre-Installation meeting shall convene one week before starting work of this section.

### **1.09 WARRANTY**

- A. See Section 01 7000 - Closeout Procedures, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Provide motors and starter/disconnect switches having the voltage and electrical characteristics of the service available and where denoted on Drawings or as required.
  - 1. All motors shall be high efficiency type.

### **2.02 ESCUTCHEONS AND PLATES**

- A. Provide approved plates around each pipe passing through walls, floors, partitions, and ceilings when piping is exposed to view and on exterior of building. Plates shall be chrome-plated metal and sized to cover exposed ends of pipe insulation and pipe sleeves.
- B. Floor plates shall be split-type, heavy chrome-plated and securely attached to the pipe.

### **2.03 PIPE SLEEVES**

- A. Steel pipe sleeves shall be fabricated from Schedule 40 galvanized steel pipe.
- B. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Lubrication and Packing
  - 1. Rotating and reciprocating equipment requiring lubrication shall be lubricated with the correct grade, type, and quantity of lubricant before being placed in service.
  - 2. Each shaft containing a packing gland shall be checked for condition by backing the packing gland off and examining for proper grade, amount, and type of packing as recommended by the manufacturer. Upgrade to proper standards as required.
  - 3. Maintain lubrication gaskets and packing during construction and assure that at the time of acceptance by the Owner are in first-class operating conditions.
- B. Motors, Starters, Controls, and Wiring
  - 1. Alignment of motors, that are factory coupled or mounted and field coupled and mounted, shall be performed by the equipment manufacturer and shall be rechecked after connections have been made and after 48 hours of operation in designed service.
  - 2. Starter/disconnects, controls, and wiring shall be coordinated with the appropriate Contractors and completed as required by these Documents.
- C. Cutting and Patching
  - 1. Cutting and drilling of walls, slabs, and structural members, required in conjunction with Work under this Section, shall be done under the supervision of the Architect/Engineer. Work shall be neatly done, removing no unnecessary material. Holes, openings, etc., shall be located where they will not weaken the structure. No beams, joists, etc., shall be cut without the written consent of the Architect/Engineer.
  - 2. Cutting of holes in masonry and concrete shall be performed with a core drill to minimize spalling, and limit damage to wall. Locations shall be accurately determined and checked, and the appropriate drill bit shall be used to minimize hole size.
  - 3. Sleeves or thimbles for holes as well as escutcheons and trim plates shall be provided. Installation shall permit free movement of pipe.
  - 4. Patching of work, where necessary, is to be done by a mechanic of the appropriate trade. Unless otherwise noted, patching for Work performed under this Section shall be immediately repaired as part of the Work of this Section.
- D. Pipe Sleeves: Install pipe sleeves where piping passes through walls, floors, ceilings, and roofs.



1. Do not install sleeves through structural members of work, except as detailed on Drawings, or as reviewed and approved by Architect/Engineer.
2. Install sleeves accurately centered on pipe runs.
3. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run.
4. Where insulation includes vapor barrier jacket, provide sleeve with sufficient clearance for installation.
5. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves.
6. Extend floor sleeves 1/4 inch above level floor finish, and 3/4 inch above floor finish sloped to drain unless otherwise noted.
7. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.
8. Where insulated piping passes through fire barriers, stop insulation at barrier for fire barrier penetration seal.
9. Where piping passes through non-fire rated, or non-waterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
10. Do not install sleeves through suspended ceilings.
11. Caulk non-fire rated sleeves with sealant.

E. Protection

1. Provide proper protection to the building during the execution of Work involved under this contract heading.
2. This protection shall include covering apparatus, building surfaces, and other materials to protect same from dirt; adequate temporary connections to protect apparatus from damage and required shielding to protect finished parts of the building. The following shall apply where applicable:
  - a. Protect finished floors from chips and cutting oil by the use of metal chip receiving pans and oilproof floor covers.
  - b. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
  - c. Protect equipment and finished surfaces from paint droppings, insulation adhesive, and sizing droppings, etc., by use of drop cloths.
3. Pumps, motors, fans, and other rotating/reciprocating equipment stored for this Project shall be adequately protected with openings, bearings, etc., covered to exclude dust and moisture. Stock piled pipe, valves, fittings, ductwork, etc., shall be placed on dunnage and protected from weather and from entry of foreign material.
4. During installation and until final connections are made, piping and ductwork shall be protected against entry of foreign matter. Equipment connections shall be carefully sealed until the actual time of system tie-in.

F. Accessibility

1. Provide a union or flange in the piping at each screwed or welded valve, device, or item of equipment, and elsewhere as required for accessibility of repair. Each union shall be so installed as to permit the removal of item without disconnection of any piping except at the union.

### 3.02 CONCRETE HOUSEKEEPING PADS

- A. Contractor shall refer to Specification Section 03 3000 for requirements of concrete housekeeping pads.

### **3.03 EMERGENCY REPAIRS OR OPERATION**

- A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

### **3.04 PROVISIONS FOR LATER INSTALLATIONS**

- A. Where work cannot be installed as the structure is being erected, the Contractor for such work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.
- B. The Contractor shall be responsible for becoming informed of the nature and arrangement of the materials and construction to which his work attached or passes through.

### **3.05 FINAL COMPLETION**

- A. Work shall be cleaned prior to Substantial Completion of the Work.
- B. Retouch or repaint factory painted prime and finish coats where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.
- C. The Contractor shall clean equipment; restore damaged materials, remove grease, oil chemical, paint spots, and stains; and leave the Work in condition acceptable to Owner and Architect/Engineer.
- D. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay cost for such removal and disposition.
- E. Contractor shall explain all components of the plumbing system and demonstrate their operation and maintenance to the owner's representative.
  - 1. All demonstrations and training shall be video-taped by the Division 22 Plumbing Contractor. Two copies shall be turned over to the owner's representative.

### **3.06 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS**

- A. Comply with Section 01 7800 and the following:
- B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder with each section separated by tabbed dividers. Material to be assembled as follows:
  - 1. First Page --Title of Job, Owner, Address, Date of submittal, Name of Contractor, and Name of Architect/Engineer. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
  - 2. Second page--Index
  - 3. Sections--Each section shall include a subsection with a tab divider. The tab shall list the contents of the the divided section. There shall be a subsection that contains the following information:
    - a. Written list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
    - b. A copy of the approved shop drawing for all systems, equipment, and components (clearly marked for item furnished).
    - c. A copy of each manufacturer's operating instructions with an index at the beginning of the section.

- d. A list of equipment used on the job, Contractor's purchase order numbers, supplier's name, and address.
4. Maintenance and operating manuals and instructions shall be also forwarded in electronic format via USB flash drive. Folders shall be created for each section and subfolder for each fixture and/or equipment required for the project.

### **3.07 RECORD DRAWINGS**

- A. The Contractor shall keep a running record of each change and deviation from the Drawings. Record shall be kept clean and undamaged upon a set of Drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to the Architect/Engineer one complete set of drawings which have been corrected to show deviations plus "Project Record Drawing" and the Contractor's letterhead type information. With the submittal shall be 2 sets of prints made from the corrected drawings.
  1. CADD drawing option may be used by Contractor. Disks with specific Drawings are available from Architect/Engineer.
- B. Record Drawings shall show:
  1. Size, type, and capacity of materials, devices, or pieces of equipment.
  2. Location of devices or pieces of equipment.
  3. Routing of piping (above and below grade), or other building services.
- C. These drawings shall also record the location of concealed piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
- D. Record drawings must be complete and accurate with regard to concealed piping, like equipment, or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.

**END OF SECTION**

**SECTION 22 05 19  
METERS AND GAGES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pressure gauges and pressure gauge taps.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 3329 - Sustainable Design Reporting
- B. Section 22 1005 - Plumbing Piping

**1.03 REFERENCE STANDARDS**

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments 2022.
- B. ASME MFC-3M - Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi 2004 (Reaffirmed 2017).
- C. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers 2014 (Reapproved 2020).
- D. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers 2014 (Reapproved 2021).
- E. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

**PART 2 PRODUCTS**

**2.01 PRESSURE GAUGES**

- A. Manufacturers:
  - 1. Trerice.
  - 2. Ashcroft.
  - 3. Weiss.
  - 4. Dwyer Instruments, Inc: [www.dwyer-inst.com](http://www.dwyer-inst.com).
  - 5. Moeller Instrument Company, Inc: [www.moellerinstrument.com](http://www.moellerinstrument.com).
  - 6. Omega Engineering, Inc: [www.omega.com](http://www.omega.com).
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Pressure Gauges: ASME B40.100, UL 393 drawn stainless steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
  - 1. Case: Steel with brass bourdon tube.
  - 2. Size: 4-1/2 inch diameter.
  - 3. Mid-Scale Accuracy: One percent.
  - 4. Scale: Psi.
  - 5. Range: 0-100 psi.
  - 6. Gauges shall have 1/4 inch NPT bottom connection. Each gauge shall have a Trerice #735-2 or approved equal Brass Needle Valve 1/4 inch NPT for positive shut-off. #872-2 or approved equal Trerice Pressure Snubber 1/4 inch NPT must be installed wherever pulsation occurs.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- C. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- D. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- E. Locate test plugs and pressure gauges.
  - 1. Plumbing: Pressure Gauges shall be installed with range up to 150 psi at the following locations:
    - a. At inlet and outlet of main Reduced Pressure Backflow Preventer.

**END OF SECTION**

**SECTION 22 10 05  
PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Flanges, unions, and couplings.
  - 4. Pipe hangers and supports.
  - 5. Valves.
  - 6. Water pressure reducing valves.
  - 7. Strainers.
- B. Testing and Repair
- C. Disinfection of Domestic Water Piping System
- D. Service Connections

**1.02 RELATED REQUIREMENTS**

- A. Section 31 2316 - Excavation.
- B. Section 31 2323 - Fill.
- C. Section 31 2316.13 - Trenching.
- D. Section 33 1300 - Disinfecting of Water Utility Distribution.
- E. Section 07 84 00 - Firestopping.
- F. Section 08 31 00 - Access Doors and Panels.
- G. Section 09 91 23 - Interior Painting.
- H. Section 22 05 53 - Plumbing Identification.
- I. Section 22 07 19 - Plumbing Piping Insulation.
- J. Section 31 23 16 - Excavation.
- K. Section 33 01 10.58 - DISINFECTON OF WATER DISTRIBUTION.

**1.03 REFERENCE STANDARDS**

- A. ASME B31.2 - Fuel Gas Piping; The American Society of Mechanical Engineers; 1968.
- B. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers 2023.
- C. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
- D. ASSE 1003 - Water Pressure Reducing Valves for Potable Water Distribution Systems 2023.
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
- F. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- G. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- H. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2021a.

- I. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping 2020.
- J. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).
- K. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- L. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- M. NSF 372 - Drinking Water System Components - Lead Content 2022.
- N. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- O. ANSI/ASME Section 9, AWS D10.9 and D1.1 National Certified Pipe Welding Bureau.
- P. ANSI B16.18 - Soldering Procedures.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves and pipe routings above ceiling and below floor.

#### **1.05 QUALITY ASSURANCE**

- A. Maintain one copy of drawings on project site to mark pipe routings and valve locations.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- F. All piping shall be American made and shall comply with the Buy American Provision of the ARRA.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Perform Work in accordance with State of Ohio plumbing code.
- B. Conform to applicable code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

#### **1.08 FIELD CONDITIONS**

- A. Do not install underground piping when bedding is wet or frozen.

## **PART 2 PRODUCTS**

### **2.01 SANITARY SEWER AND VENT PIPING**

- A. PVC Pipe: Schedule 40 solid wall, ASTM D1785, ASTM D2665 or ASTM D3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
  - 3. Joints: No Hub, CISPI-310 compression type with ASTM C 564 neoprene gaskets and stainless steel clamp and shield assembly.

### **2.02 DOMESTIC WATER PIPING**

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B).
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. All fittings shall be lead free and conform to NSF-61-G.
  - 2. Joints: ASTM B32, alloy Sn95 solder.
  - 3. Joints: Grooved Pipe. Fittings to conform to ASTM B75 or ASTM B-152.
  - 4. Joints: Copper press fittings. Fittings to conform to ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. All fittings shall be lead free and conform to NSF-61-G.
  - 5. Solders and flux: ASTM B828, ASTM B813, containing 0.2% lead or less.
- B. Copper Press Fittings:
  - 1. Material:
    - a. Press Fittings: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM. All fittings shall be lead free and conform to NSF-61-G.
  - 2. Installation: Copper press fittings shall be made in accordance with the manufacturers installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fittings alignment shall be checked against the mark on the tubing to assure the tubing is fully inserted into the fitting. The joints shall be pressed using the tool approved by the manufacturer.

### **2.03 FLANGES, UNIONS, AND COUPLINGS**

- A. Unions for Pipe Sizes 3 Inches and Under:
  - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
  - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
  - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

### **2.04 PIPE HANGERS AND SUPPORTS**

- A. Plumbing Piping - Drain, Waste, Storm, and Vent:
  - 1. Conform to ASME B31.9.
  - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable swivel, clevis.
  - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  - 7. Vertical Support: Steel riser clamp.



8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- B. Plumbing Piping - Water, Gas, Compressed Air:
1. Conform to ASME B31.9.
  2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable swivel, clevis.
  4. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
  5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  7. Vertical Support: Steel riser clamp.
  8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Copper tubing 1/2 inch to 2 inch: When attached directly to copper piping or tubing, hangers shall be equipped with permanently attached factory liner of high compression factor, chemically treated to resist moisture, abrasion, heat, cold and vermin. Liner shall be felt or equally approvable material, or hangers shall be copper plated. Lined or plated hangers not required when hanger is oversized to cover an insulated line.

## 2.05 BALL VALVES

- A. Manufacturers:
1. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  2. Conbraco Industries / Apollo Valves.
  3. Crane Co. - Valve Division.
  4. Hammond.
  5. Watts.
  6. Milwaukee Valve Company.
  7. Jomar Valve
  8. Kitz.
  9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.
- C. Valves shall be rated 150 psi CWP and 600 psi non-shock WOG and will have 2 piece cast bronze lead free bodies conforming to NSF-61-G and ISO 6509, TFE seats, full port, separate packnut with adjustable stem packing, anti-blowout stems and chrome plated bronze ball. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110.
1. Valves shall have a permanent marking on valve body identifying valve as lead free in conformance with NSF-61-G.
- D. Valve handles shall be lever type, metal handle with epoxy coated finish. Plastic handles will not be approved.
1. Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

## **2.06 WATER PRESSURE REDUCING VALVES**

- A. Manufacturers:
  - 1. Amtrol Inc: [www.amtrol.com/#sle](http://www.amtrol.com/#sle).
  - 2. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  - 3. Cla-Val Company: [www.cla-val.com/#sle](http://www.cla-val.com/#sle).
  - 4. Watts Regulator Company: [www.wattsregulator.com/#sle](http://www.wattsregulator.com/#sle).
  - 5. Zurn Industries, LLC: [www.zurn.com/#sle](http://www.zurn.com/#sle).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Up to 2 Inches:
  - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

## **2.07 STRAINERS**

- A. Manufacturers:
  - 1. Mueller.
  - 2. Armstrong International, Inc.
  - 3. Nibco, Inc
  - 4. Sarco.
  - 5. Hoffman.
  - 6. Metalflex.
  - 7. Conbraco Industries / Apollo Valves
  - 8. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Size 2 inch and Under:
  - 1. Threaded bronze body, lead free conforming to NSF-61-G, for 200 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
  - 2. Class 125, threaded bronze lead free body or iron body 400 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
  - 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### **3.02 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space. Coordinate all installation with all other trades.
- 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. Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover for domestic water piping.
- H. Install vent piping penetrating roofed areas to maintain integrity of roof assembly and insulate roof penetration with spray foam. Vent piping termination through the roof to be cast iron no-hub. Paint vent through roof to color as selected by Architect/Engineer.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Excavate in accordance with Section 31 23 16.
- L. Install valves with stems upright or horizontal, not inverted. All valve handles shall be easily accessible.
- M. Install water piping to ASME B31.9.
- N. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- O. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- P. Sleeve pipes passing through partitions, walls and floors.
- Q. Inserts:
  - 1. Provide inserts for placement in concrete formwork.
  - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- R. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.
  - 2. Bent hanger rods will not be allowed. Provide swivel type clamps to avoid bent hanger rods.
  - 3. Support horizontal piping as scheduled. No pipe or duct shall be hung from another pipe, pipes or electrical conduit.
  - 4. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 5. Place hangers within 12 inches of each horizontal elbow.
  - 6. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 7. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 8. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 9. Provide copper plated hangers and supports for copper piping.
  - 10. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
  - 11. Support cast iron drainage piping at every joint.

### 3.04 APPLICATION

- A. Install press fittings using only the manufacturers approved press fitting equipment.

- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers. Gate valves will not be allowed on this project.

### 3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.

### 3.06 TESTING AND REPAIR

- A. Upon completion of each respective piping/ductwork system, but prior to insulating, covering, or backfilling, each system shall be thoroughly cleaned and flushed to remove construction dirt and foreign matter.
- B. Test Piping as Specified Herein
  - 1. No piping work shall be concealed or covered until it has been inspected and approved by the project inspector, who shall be notified when the Work is ready for inspection. Work shall be completely installed and tested as required by this Contract and Ordinances of the local Municipality and shall be leaktight to the satisfaction of those making the inspection and the Architect/ Engineer.
  - 2. In general, pressure tests shall be applied to piping. In no case shall piping be subject to pressure exceeding its rating. Defective work shall be promptly repaired or replaced and test shall be repeated until the particular system and component parts thereof receive approval of the Architect/Engineer.
  - 3. Provide temporary equipment for testing, including pump, blower, and gauges. Test piping system before insulation is installed and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves or to isolate sections where test pressure exceeds valve pressure rating.
  - 4. Repair piping system sections which fail required piping test by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stopleak compounds, mastics, or other temporary repair methods.
  - 5. Drain test water from piping systems after testing and repair work has been completed.
  - 6. Pressure for Testing of Piping Systems shall be as follows:
    - a. Domestic Cold Water Piping
      - 1) Piping shall be tested and results approved by Architect/Engineer prior to application of insulation.
      - 2) Piping system shall be capped and subjected to a static water pressure of 50 psig above operating pressure and a minimum of 125 psig, and pressure maintained for 4 hours with no leaks or loss in pressure.
      - 3) Test source shall be isolated before conducting pressure tests.
    - b. Sewer, Storm, Soil, and Waste Piping
      - 1) Soil and waste piping shall be plugged and subjected to not less than a 10 foot head of water. Water column shall be maintained for 2 hours with no leaks.
      - 2) Where subject to freezing, use air or smoke test for not less than 30 minutes and as required by code.
  - 7. Accurately record and report methods of testing, times, and dates of test, witnesses to the test, and the results of the test. Test reports shall be neatly typewritten on standard 8-1/2 inch by 11 inch sheets and submitted in 5 copies to Architect/Engineer for approval within 5 days after test has been performed.
- C. Damage resulting from tests shall be repaired or damaged materials replaced, to satisfaction of Architect/Engineer, and at no cost to Owner.

### 3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 33 01 10.58.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

### 3.08 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.
- B. Provide new water service complete with approved strainer, reduced pressure backflow preventer and shutoff valves.

### 3.09 SCHEDULES

- A. Pipe Hanger Spacing:
  - 1. Metal Piping:
    - a. Pipe Size: 1/2 inches to 1-1/4 inches:
      - 1) Maximum Hanger Spacing: 6.5 ft.
      - 2) Hanger Rod Diameter: 3/8 inches.
    - b. Pipe Size: 1-1/2 inches to 2 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 3/8 inch.
    - c. Pipe Size: 2-1/2 inches to 3 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 1/2 inch.
    - d. Pipe Size: 4 inches to 6 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 5/8 inch.
  - 2. Copper Piping
    - a. Pipe size: Up to 1 inch
      - 1) Maximum hanger spacing: 5 ft.
      - 2) Hanger rod diameter: 3/8 inch
    - b. Pipe size: 1-1/4 inch to 2 inch
      - 1) Maximum hanger spacing: 8 ft.
      - 2) Hanger rod diameter: 3/8 inch
    - c. Pipe size: 2-1/2 inch
      - 1) Maximum hanger spacing: 9 ft.
      - 2) Hanger rod diameter: 1/2 inch
    - d. Pipe size: 3 inch to 4 inch

- 1) Maximum hanger spacing: 10 ft.
  - 2) Hanger rod diameter: 1/2 inch
3. Plastic Piping:
- a. All Sizes:
    - 1) Maximum Hanger Spacing: 6 ft.
    - 2) Hanger Rod Diameter: 3/8 inch.

**END OF SECTION**

**SECTION 22 10 06  
PLUMBING PIPING SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Floor drains.
- B. Backflow preventers.
- C. Trap Seal Protection Devices
- D. Water Meter.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.

**1.03 REFERENCE STANDARDS**

- A. ASME A112.6.3 - Floor and Trench Drains 2019.
- B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers 2023.
- C. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies 2021.
- D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance 2011 (Reaffirmed 2016).
- E. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- F. NSF 372 - Drinking Water System Components - Lead Content 2022.
- G. PDI-WH 201 - Water Hammer Arresters 2017.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept specialties on site in original factory packaging. Inspect for damage.

**1.07 EXTRA MATERIALS**

- A. Supply for Owner's use in maintenance of project:
  - 1. Two loose keys for each outside wall hydrants and indoor hose bibbs.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

**2.02 DRAINS**

- A. Manufacturers:
  - 1. Zurn Industries, Inc.

2. Wade.
3. Josam Company.
4. Jay R. Smith Manufacturing Company.
5. Watts Regulator Company.
6. MIFAB
7. Sioux Chief
8. Hubell, Inc.
9. Froet Industries
10. Substitutions: See Section 01 60 00 - Product Requirements.

B. Floor Drain (FD):

1. Cast iron 12 inch by 12 inch floor drain sink with a square nickel top, with separate trap, seepage flange, interior secondary strainer, and heel proof full grate secured with slotted screws.

### 2.03 BACKFLOW PREVENTERS

A. Manufacturers:

1. Zurn Wilkins
2. ITT Lawler.
3. Watts Regulator Company
4. Conbraco Industries/ Apollo Valves
5. Caleffi
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Reduced Pressure Backflow Preventer: HVAC / Domestic water 3/4 inch to 2 inch.

1. ASSE 1013; lead free bronze body with lead free bronze 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 that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two ball valves, strainer, and four test cocks. Pipe relief to nearest floor drain. All components shall be lead free in compliance with NSF-61-G.

### 2.04 TRAP SEAL PROTECTION DEVICES

A. As an alternate to the trap primers for floor drains, a trap seal protection device can be used as allowed per the OBC, section 106.7.1

B. Manufacturers:

1. Sureseal
2. Mifab
3. Oatey
4. Green Drain, Inc.
5. Zurn
6. Substitutions: See section 01 6000 - Product Requirements

C. Construction: Mechanical device shall be an inline floor drain trap sealer, ASSE 1072 or IPC 09.1 listed. Body shall be constructed of ABS plastic. Diaphragm and sealing gasket to be constructed of neoprene rubber. Compression fitting sealing gasket 80 durometer.

### 2.05 WATER METER

A. Water Meter to be purchased from the Village of Beavercreek Utilities Department. Coordinate size and requirements with the village utilities department.

## PART 3 EXECUTION

### 3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.



- B. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on janitor rooms, flush valves, interior and exterior hose bibs.
- C. Pipe relief from backflow preventer to nearest drain.
- D. Install lavatory thermostatic mixing valves serving single lavs directly below the lavatory. Locate as high as possible below lavatory.
- E. Install trap primers for floor drains per state codes. Refer to detail on drawings for installation requirements.
- F. Install all drains at 99'-11-1/2" elevation (Finish Floor = 100'-0") unless noted otherwise on drawings. Install floor drains in shower areas to accommodate a floor slope of 1:48. The minimum height of the floor drain shall be 99'-11-1/2".

**END OF SECTION**

**SECTION 23 05 01  
MECHANICAL MATERIALS & METHODS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping specialties
- B. Lubrication and packing
- C. Installation requirements common to piping systems and equipment specification sections
- D. Concrete Housekeeping Pads.
- E. Emergency repairs or operation
- F. Provisions for later installations
- G. Final completion
- H. Project Conditions
- I. Quality Assurance
- J. Supervision and cooperation
- K. Maintenance and operating manuals
- L. Record drawings

**1.02 RELATED REQUIREMENTS**

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1 and 2, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to Section 01 1200 - Multiple Contract Summary for Work under other contracts.
- C. Refer to Section 07 8400 - Firestopping. Electrical Contractor shall provide submittals for fire stopping based on Section 07 8400.
- D. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.
- E. The Drawings prepared for this Project are an outline to show where pipes, ducts, and apparatus must go in order to harmonize with the building and installations of the various trades. Work must be installed in accordance with the Drawings insofar as possible. Drawings shall be carefully checked during the course of bidding and construction. If discrepancies, errors, or omissions are discovered prior to or during the construction phase, notify the Engineer immediately for interpretation or correction. Take necessary measurements and be responsible for same, including clearances for equipment that is to be furnished. The Architect/Engineer shall reserve the right to make minor location changes of piping and equipment where such adjustments are deemed desirable from an appearance or operational standpoint. Such changes will be anticipated sufficiently in advance to avoid extra work or unduly delay progress on the Project.
- F. The general building drawings shall be used to obtain dimensions and exact locations and as a check with other Contractors to avoid interferences with their Work. Refer to applicable Drawings on branches of the Work where other trades are involved on the Project so that added field work and job delays resulting from conflicts between crafts can be avoided. Piping or ductwork that is prefabricated before coordinating with the other trades may have to be redone at no additional cost if conflicts are encountered.

**1.03 SUMMARY**

- A. The Contractor(s) shall provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation

of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.

- B. The Contractor(s) shall arrange and pay for permits and inspections required in connection with the Work. The Contractor shall apply for and pay for meters, regulators, recorders, and gauges required. The Contractor must present to the Owner through the Architect/Engineer, properly signed certificates of final inspection by the governing authorities when they become due and shall not cover up Work until approved by those authorities.
- C. Materials or labor obviously required to fully complete the Work shall be included, even though each item necessarily involved is not specifically mentioned or shown. Such Work and materials shall be furnished and shall be of the same grade or quality as the parts actually specified and shown. Should there be a conflict between the plans and Specifications, the greater quantity and better quality shall be furnished.
- D. Should an overlap of Work between the various trades become evident, the Engineer shall be notified. Such an event shall not relieve the Contractor of the responsibility for the Work called for under his branch of the Specifications until a written clarification or directive is issued concerning the matter.
- E. Arrange all mechanical supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.
  - 1. If support must occur between panel joints, then threaded rods shall be dropped from both panel points, an adequate angle to both, and then the support attached to the angle is required.
  - 2. Unless specifically indicated or approved by Garman Miller & Associates Inc. do not provide support from roof decks.
- F. Related Work Specified Elsewhere
  - 1. Firestopping is Work of this Section though fire barrier sealants (firestopping) for walls and floors are specified in Section 07 8400. Contractors are responsible for proper sizing of their sleeves and core-drilled holes so that they are at least 1-1/2 inches larger in diameter than the penetrating items. Schedule 40 steel sleeves and core-drilled holes made excessively large or made and not used, will be firestopped and charged to the Contractor who was responsible.
- G. Related Work by Others
  - 1. Motors which are shipped loose from the mechanical equipment shall be installed as Work under Division 26, Electrical, or other trades as may be required, at the expense of the Contractor furnishing the loose motor(s).
  - 2. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
  - 3. Electric power wiring shall be included as Work under the electrical wiring section of Division 26, Electrical, except as follows:
    - a. Control wiring regardless of voltage shall be included as Work under specific Sections of Division 23.
    - b. Internal package type wiring as specified under specific Sections of Division 23.
- H. Cutting of water lines, electric conduit, or similar service lines in the course of Work performed under this Section shall be immediately repaired as part of the Work of this Section.

#### **1.04 REFERENCE STANDARDS**

- A. Standards are described by reference to various associations. These are in addition, but not limited to, to those listed in:
  - 1. AGA American Gas Association
  - 2. ANSI American National Standards Institute
  - 3. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
  - 4. ASME American Society of Mechanical Engineers

5. AWS American Welding Society
  6. AWWA American Water Works Association
  7. CISPI Cast Iron Soil Pipe Institute
  8. NFPA National Fire Protection Association
  9. OSHA Occupational Safety and Health Act
  10. SMACNA Sheet Metal and Air Conditioning Contractors National Association
  11. UL Underwriters' Laboratories, Inc.
- B. Work shall be in complete accordance with codes, rules, and ordinances, regulations of authorities, bodies, associations, and governments, having proper or legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
  2. Ohio Mechanical Code, 2017 Edition.
  3. ASHRAE 90.1-2010; Energy Standard for Buildings Except Low Rise Residential Buildings.
  4. ASHRAE 62.1-2016; Ventilation for Acceptable Indoor Air Quality.
  5. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017 applicable requirements.
  6. NFPA 54 - National Fuel Gas Code.
  7. National Board of Fire Underwriters
  8. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
  9. Other Codes and Standards as specifically noted in each Section of the Specifications.
  10. Americans with Disabilities Act (ADA)
- C. References made to codes and standards, in these Specifications or on the Drawings, shall be taken to mean the latest edition, amendment, or revision of such reference in effect as of the date indicated on the Bid Documents unless otherwise noted.

#### **1.05 SUBMITTALS**

- A. Submit capacity requirements, catalog cuts, and illustrations in accordance with requirements of specifications and as required by specific Sections of this Specification.
- B. Shop Drawings shall be prepared by the Contractor or supplier.
  1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply, and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, piping, ductwork, and the like, and its relation to the building so there will be no irregularities or interferences. Shop drawings shall be prepared in coordination with other Contractors and other trades.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.06 QUALITY ASSURANCE**

- A. Instruments used by the Contractor shall be accurately calibrated and maintained in good working condition.
- B. Products and test instruments used shall be subject to approval of Architect/Engineer.
- C. Products and test instruments used shall be provided by each respective Contractor.
- D. Note that systems involved under this Contract heading shall be in accordance with applicable requirements listed in NFPA Standard 90A.
- E. Materials used in this Contract shall be those specified herein unless proposals for the use of alternate materials have been submitted and accepted in writing, as provided herein before. Materials shall be strictly first grade of their kind and shall be new and in first-class condition when installed. Damaged materials will be rejected and must be replaced by proper and

acceptable materials. Materials shall be similar and in accordance with the provisions of this Specification.

- F. No materials or equipment may be installed under this contract heading which do not meet the approval of the authorities having jurisdiction. Specific materials may have certain restrictions or exclusions as to their usage, including where they may not be located. Such regulations shall be adhered to where applicable. The requirements and regulations of the local and state building codes and regulations currently adopted shall be adhered to.
- G. Piping systems shall be installed by workmen having skills acquired by working at the trade which is recognized as necessary for competency.
- H. Pressure piping systems installed shall conform to the requirements of the State piping and welding codes where applicable.

#### **1.07 PROJECT CONDITIONS**

- A. Unless otherwise stipulated under a particular heading, the following rules relative to responsibilities of the several Contractors and subcontractors will apply.
  - 1. Each Contractor shall install roughing-in work pertaining to his trade for connection of Work performed under other Sections of these Specifications.
- B. Certain areas will be designated for the storage of materials and equipment and cooperation with the Owner in minimizing interference with existing operations will be mandatory.
  - 1. Where possible, store materials inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
  - 2. Follow manufacturer's instructions for receiving, inspecting, handling, storage, and protection of products prior to final installation
- C. Equipment Clearances and Requirements
  - 1. For many items of equipment described in these Specifications, several manufacturers are listed. The manufacturer listed on the drawings is the make on which the layout was based and on which clearances, service required electrical, and plumbing characteristics, etc., have been checked. Additional manufacturers listed are considered acceptable.
  - 2. Due to the possibility of restrictions imposed by space limitations, the responsibility for resolving conflicts resulting from the use of equipment other than first named shall rest with the equipment supplier and the Contractor. Submittals for this equipment will be considered as a statement that clearances for access, service, maintenance, etc., have been checked and found adequate.
  - 3. Alternate equipment or the equipment of additional manufacturers named in these documents shall meet Base Bid Specifications. In the event such equipment or any equipment which the bidder proposes to furnish, deviates from the requirements of equipment first named regarding electric service, power wiring, control wiring, plumbing or piping, sound attenuation, or vibration damping, it shall be the responsibility of the bidder to include in his price a sufficient sum to cover additional costs or charges resulting therefrom.
- D. In general, the piping and ductwork shown on the Drawings shall be considered as diagrammatic for clearness in indicating the general run and connections required, and may not be shown in its true position. The piping and ductwork and equipment may have to be offset, lowered or raised, as required, or as directed at the site in order to accommodate field conditions.

#### **1.08 SUPERVISION AND COOPERATION**

- A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start, and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.

- B. A Pre-Installation meeting shall convene one week before starting work of this section.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Provide motors and starter/disconnect switches having the voltage and electrical characteristics of the service available and where denoted on Drawings or as required.
  - 1. All motors shall be high efficiency type.

### **2.02 ESCUTCHEONS AND PLATES**

- A. Provide approved plates around each pipe passing through walls, floors, partitions, and ceilings when piping is exposed to view and on exterior of building. Plates shall be chrome-plated metal and sized to cover exposed ends of pipe insulation and pipe sleeves.
- B. Floor plates shall be split-type, heavy chrome-plated and securely attached to the pipe.

### **2.03 PIPE SLEEVES**

- A. Sheet metal sleeves shall be fabricated from galvanized sheet metal and shall be of no less than 18 gauge metal for 3 inch diameter and smaller, 16 gauge metal for 4 inch to 6 inch diameter, and 14 gauge metal for 6 inch diameter and larger.
- B. Steel pipe sleeves shall be fabricated from Schedule 40 galvanized steel pipe.
- C. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Lubrication and Packing
  - 1. Rotating and reciprocating equipment requiring lubrication shall be lubricated with the correct grade, type, and quantity of lubricant before being placed in service.
  - 2. Each shaft containing a packing gland shall be checked for condition by backing the packing gland off and examining for proper grade, amount, and type of packing as recommended by the manufacturer. Upgrade to proper standards as required.
  - 3. Maintain lubrication gaskets and packing during construction and assure that at the time of acceptance by the Owner are in first-class operating conditions.
- B. Motors, Starters, Controls, and Wiring
  - 1. Alignment of motors, that are factory coupled or mounted and field coupled and mounted, shall be performed by the equipment manufacturer and shall be rechecked after connections have been made and after 48 hours of operation in designed service.
  - 2. Starter/disconnects, controls, and wiring shall be coordinated with the appropriate Contractors and completed as required by these Documents.
- C. Cutting and Patching
  - 1. Cutting and drilling of walls, slabs, and structural members, required in conjunction with Work under this Section, shall be done under the supervision of the Architect/Engineer. Work shall be neatly done, removing no unnecessary material. Holes, openings, etc., shall be located where they will not weaken the structure. No beams, joists, etc., shall be cut without the written consent of the Architect/Engineer.
  - 2. Cutting of holes in masonry and concrete shall be performed with a core drill to minimize spalling, and limit damage to wall. Locations shall be accurately determined and checked, and the appropriate drill bit shall be used to minimize hole size.
  - 3. Sleeves or thimbles for holes as well as escutcheons and trim plates shall be provided. Installation shall permit free movement of pipe.
  - 4. Patching of work, where necessary, is to be done by a mechanic of the appropriate trade. Unless otherwise noted, patching for Work performed under this Section shall be

immediately repaired as part of the Work of this Section.

- D. Pipe Sleeves: Install pipe sleeves where piping passes through walls, floors, ceilings, and roofs.
1. Do not install sleeves through structural members of work, except as detailed on Drawings, or as reviewed and approved by Architect/Engineer.
  2. Install sleeves accurately centered on pipe runs.
  3. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run.
  4. Where insulation includes vapor barrier jacket, provide sleeve with sufficient clearance for installation.
  5. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves.
  6. Extend floor sleeves 1/4 inch above level floor finish, and 3/4 inch above floor finish sloped to drain unless otherwise noted.
  7. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.
  8. Where insulated piping passes through fire barriers, stop insulation at barrier for fire barrier penetration seal.
  9. Where piping passes through non-fire rated, or non waterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
  10. Do not install sleeves through suspended ceilings.
  11. Caulk non-fire rated sleeves with sealant.
- E. Protection
1. Provide proper protection to the building during the execution of Work involved under this contract heading.
  2. This protection shall include covering apparatus, building surfaces, and other materials to protect same from dirt; adequate temporary connections to protect apparatus from damage and required shielding to protect finished parts of the building. The following shall apply where applicable:
    - a. Protect finished floors from chips and cutting oil by the use of metal chip receiving pans and oil proof floor covers.
    - b. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
    - c. Protect equipment and finished surfaces from paint droppings, insulation adhesive, and sizing droppings, etc., by use of drop cloths.
  3. Pumps, motors, fans, and other rotating/reciprocating equipment stored for this Project shall be adequately protected with openings, bearings, etc., covered to exclude dust and moisture. Stock piled pipe, valves, fittings, ductwork, etc., shall be placed on dunnage and protected from weather and from entry of foreign material.
  4. During installation and until final connections are made, piping and ductwork shall be protected against entry of foreign matter. Equipment connections shall be carefully sealed until the actual time of system tie-in.
  5. During construction, all air intake openings on variable frequency drives, control panels, and other electronic equipment shall be protected with a temporary filter. At completion of project, filters shall be removed.
- F. Accessibility
1. Provide a union or flange in the piping at each screwed or welded valve, device, or item of equipment, and elsewhere as required for accessibility of repair. Each union shall be so installed as to permit the removal of item without disconnection of any piping except at the

union.

### **3.02 CONCRETE HOUSEKEEPING PADS**

- A. Contractor shall refer to Specification Section 03 3000 for requirements of concrete housekeeping pads.

### **3.03 EMERGENCY REPAIRS OR OPERATION**

- A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.
- B. The air handling units may be used for temporary heating. If units are used for temporary heating the heat wheel section shall be completely blanked off on both the supply and exhaust side to prevent any air, dust, etc. from passing through heat wheel. Any damage to the heat wheel due to unit use for temporary heating shall be replaced at no additional cost to the owner.

### **3.04 PROVISIONS FOR LATER INSTALLATIONS**

- A. Where work cannot be installed as the structure is being erected, the Contractor for such work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.
- B. The Contractor shall be responsible for becoming informed of the nature and arrangement of the materials and construction to which his work attached or passes through.

### **3.05 FINAL COMPLETION**

- A. Work shall be cleaned prior to Substantial Completion of the Work.
- B. Retouch or repaint factory painted prime and finish coats where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.
- C. Deliver filters, belts, and equipment, as required by this Specification, to Owner for Division 23 - HVAC Systems and obtained signed receipts of delivery.
- D. The Contractor shall clean equipment; restore damaged materials, remove grease, oil chemical, paint spots, and stains; and leave the Work in condition acceptable to Owner and Architect/Engineer.
- E. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay cost for such removal and disposition.
- F. Contractor shall explain all components of the HVAC System and demonstrate their operation and maintenance to the owner's representative.
  - 1. All demonstration and training shall be video-taped by the HVAC Contractor. Two copies shall be turned over to the owner's maintenance staff.

### **3.06 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS**

- A. Comply with Section 01 7800 and the following:
- B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder with each section separated by tabbed dividers. Material to be assembled as follows:
  - 1. First Page --Title of Job, Owner, Address, Date of submittal, Name of Contractor, and Name of Architect/Engineer. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering



- emergency service on 24 hour calls.
2. Second page--Index
  3. Sections--Each section shall include a subsection with a tab divider. The tab shall list the contents of the the divided section. There shall be a subsection that contains the following information:
    - a. Written list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
    - b. A copy of the approved shop drawing for all systems, equipment, and components (clearly marked for item furnished).
    - c. A copy of each manufacturer's operating instructions with an index at the beginning of the section.
    - d. A list of equipment used on the job, Contractor's purchase order numbers, supplier's name, and address.
- C. Submit electronic sets of final documents in final form. Electronic format shall be PDF's on CD's or USB flash drives.

### **3.07 RECORD DRAWINGS**

- A. The Contractor shall keep a running record of each change and deviation from the Drawings. Record shall be kept clean and undamaged upon a set of Drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to the Architect/Engineer one complete set of drawings which have been corrected to show deviations plus "Project Record Drawing" and the Contractor's letterhead type information. With the submittal shall be 2 sets of prints made from the corrected drawings.
1. CADD drawing option may be used by Contractor. Disks with specific Drawings are available from Architect/Engineer at a nominal charge. Contact Architect/Engineer for current fee.
- B. Record Drawings shall show:
1. Size, type, and capacity of materials, devices, or pieces of equipment.
  2. Location of devices or pieces of equipment.
  3. Location of diffusers, volume dampers, fire dampers, smoke dampers, and related devices of the building systems.
  4. Routing of piping (above and below grade), ductwork, or other building services.
- C. These drawings shall also record the location of concealed ductwork and piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
- D. Record drawings must be complete and accurate with regard to concealed piping, ductwork, like equipment, or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.

**END OF SECTION**

**SECTION 23 81 01  
TERMINAL HEAT TRANSFER UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electric Unit heaters.

**1.02 RELATED REQUIREMENTS**

- A. Refer to Section 01 6000 - Product Requirements
- B. Section 23 21 13 - Hydronic Piping.
- C. Section 23 21 14 - Hydronic Specialties.
- D. Section 23 09 93 - Sequence of Operations.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide typical catalog of information including arrangements.
- C. Shop Drawings:
  - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
  - 2. Submit schedules of equipment including room number where unit is located, style, size and capacity for each unit being supplied.
  - 3. Indicate mechanical and electrical service locations and requirements.,
- D. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- E. Operation and Maintenance Data: Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- C. Capacity rated in accordance with ARI.
- D. Hydronic coils shall be pressure tested to 400 psig.

**1.05 WARRANTY**

- A. Provide 1 year manufacturers warranty for unit heater motors and cabinet heaters.

**PART 2 PRODUCTS**

**2.01 ELECTRIC UNIT HEATERS**

- A. Manufacturers:
  - 1. Raywall.
  - 2. Markell
  - 3. Berko
  - 4. Qmark, Inc.
  - 5. Redd-i.
  - 6. Modine.
  - 7. Quillet, Inc.
  - 8. Substitutions: See Section 01 6000 - Product Requirements.

- B. Assembly: UL listed and labelled assembly with terminal box and cover, and built-in controls.
- C. Heating Elements: Enclosed copper tube, aluminum finned element of coiled nickel-chrome resistance wire centered in tubes and embedded in refractory material.
- D. Cabinet: 0.0478 inch steel with easily removed front panel with integral air outlet and inlet grilles.
- E. Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure brackets.
- F. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard.
- G. Motor: Permanently lubricated, sleeve bearings for horizontal models, ball bearings for vertical models.
- H. Control: Wall mounted stratification thermostat with a range of 70 F to 130 F. Provide integral unit mounted power disconnect switches and thermal overload.
- I. Disconnect Switch: Factory mount disconnect switch.
- J. Hanger Bracket: Wall Mounted Bracket, lockable for horizontal and vertical mounting at any position.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceiling are finished and painted. Do not damage equipment or finishes.
- C. Install electric heating equipment including devices furnished by manufacturer but not factory mounted. Furnish copy of manufacturer's wiring diagram submittal. Install electrical wiring in accordance with manufacturer's submittals.

#### **3.02 CLEANING**

- A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
- B. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

**END OF SECTION**

**SECTION 26 01 01  
GENERAL PROVISIONS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to Section 01 11 00 - Summary of Work.
- C. Refer to Section 01 23 00 - Alternates.
- D. Refer to Division 23 Mechanical Specifications and to the requirements stated therein applicable to the Electrical Work, where coordination of trades is covered.
- E. The requirements of this Section shall apply to Work for Sections listed under Division 26, Electrical.

**1.02 SUMMARY**

- A. When equipment furnished for or by the Owner is indicated on the Drawings or specified, this Contractor shall provide the proper size switches, conduit, wires, boxes, and fittings that may be required; and make connections complete. This Contractor shall verify exact requirements and locations before installation.
  - 1. Boxes, raceways, fittings and the like required by this contractor or any subcontractor hired by this contractor shall be coordinated by this contractor prior to footer, floor, wall, etc. types of construction for correct size
- B. If the equipment, other than that which the Drawings were designed around, does not properly adapt itself to the space allotted or lend itself accessible for repair and maintenance, the Contractor shall be responsible to provide additional access panels, pipe, fittings, materials, and labor, to achieve the same end results.
- C. Electrical support from bar joists shall be allowed only at panel points in top of bottom cords.
  - 1. Loading shall not exceed 5 pounds/S.F. or 100 pounds per panel point applied at the panel point.
  - 2. If support must occur between panel points, then threaded rods shall be dropped from both panel points, an adequate angle attached to both, and then the support attached to the angle as required.
  - 3. Suspension wires, straps, and chains such as those used to support electrical fixtures or equipment shall not be attached to or through steel roof decks.
- D. The Contractor shall take field measurements necessary for his Work and shall be responsible for the accurate location and size of openings, recesses, slots, ferrules, and the like.
- E. The Contractor shall be required to cooperate with "Other Trades" and other Contractors in the coordination of his Work to avoid interferences with installations by other trades and Contractors.
- F. Should structural difficulties prevent the setting of cabinets or running of conduits, at points shown on Drawings, necessary minor deviations therefrom, as determined by the Architect/Engineer, may be permitted and shall be made without additional costs.
- G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition" and no additional compensation will be considered applicable. In the event that such interferences occur in course of the Work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences which may occur during the course of construction shall be brought to the immediate attention of the Architect/Engineer, and his decision, confirmed in writing, shall be

final.

- H. Installation of surface mounted trough type raceway above or below switchgear, distribution panels, and/or panelboards shall be approved by engineer prior to installation.

### 1.03 REFERENCES

- A. Work shall be in complete accordance with codes, rules, ordinances, regulations of authorities, bodies, associations, and governments, having proper and legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
  - 1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
  - 2. National Fire Protection Association applicable requirements
  - 3. National Board of Fire Protection
  - 4. National Electrical Code applicable requirements
  - 5. Other Codes and Standards as specifically noted in each Section of the Specifications
- B. Electrical equipment shall be Underwriter's approved; also, shall meet requirements established by NEC, NEMA, and ANSI and as specified hereinafter.
- C. Abbreviations of authorities used in these Specifications:
  - 1. NEC National Electrical Code Latest Edition adopted by the National Fire Protection Association
  - 2. NEMA National Electrical Manufacturers Association
  - 3. OSHA Occupational Safety and Health Act
  - 4. IES Illuminating Engineering Society Standards
  - 5. IPCEA Insulated Power Cable Engineers Association
  - 6. ANSI American National Standards Institute, Inc.
  - 7. FCC Federal Communications Commission
  - 8. EIA Electronic Industries Association
  - 9. NAB National Association of Broadcasters
  - 10. NAEB National Association of Educational Broadcasters
  - 11. CBM Certified Ballasts Manufacturers
  - 12. ITL Independent Testing Laboratories
  - 13. ETL Electrical Testing Laboratories
  - 14. UL Underwriters Laboratories
  - 15. DLC Design Light Consortium
  - 16. NICET National Institute for Certification in Engineering Technologies

### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Submit shop drawings and illustrations in accordance with requirements of Section 01 30 00 - Administrative Requirements.
- C. Shop Drawings (By Contractor)
  - 1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, conduit, and the like, and its relation to the building so there will be no irregularities or interferences on this account. Shop drawings shall be prepared after coordination with other Contractors and other trades.
  - 2. Shop drawings will not be required to be submitted for review by the Architect/Engineer, unless expressly required herein, but may be submitted when not expressly required, at the option of the Contractor.

## **PART 2 EXECUTION**

### **2.01 EXPLANATION AND PRECEDENCE OF DRAWINGS**

- A. For purpose of clearness and legibility, the Electrical "E" drawings are essentially diagrammatic and, although size and location of equipment are closely drawn to scale whenever possible, each Contractor shall make use of the data in all of the Contract Documents and shall verify this information at the building site.
- B. The Drawings indicate required size and points of termination of wiring and other related items and they may suggest proper routes for such items to conform to structure, avoid obstructions, and preserve clearances. It is not intended that Drawings indicate every necessary offset, and it shall be the Work of the Contractor to install each item in a manner as to conform to structure, avoid obstructions, preserve headroom, and keep opening and passageways clear, without further instructions or costs to the Owner.
- C. It is intended that apparatus be located symmetrical with architectural elements and shall be installed at exact height and location stipulated.
- D. The Contractor shall fully inform himself regarding peculiarities and limitations of the spaces available for the installation of work and materials provided under his Contract. He shall exercise due and particular caution to determine that parts of his work are made quickly and easily accessible.
- E. The Contractor shall carefully examine existing conditions, existing wiring, and other materials on the premises and compare the Drawings to the existing conditions. Variances and necessary changes shall be adjusted by appropriate modifications.

### **2.02 PERMITS, FEES, REGULATIONS, AND INSPECTIONS**

- A. Unless specifically noted otherwise, the Contractor shall arrange and pay for permits, fees, and inspections required in connection with his work.
- B. Work shall be inspected by approved local and state inspection bureaus, Electrical Inspection Agency or authority, and electric utility.
- C. Upon completion of the Work, the Contractor shall furnish to the Architect/Engineer a certification of inspection and approval from said Bureau or Agency before final payment on contract will be allowed.

### **2.03 PERMANENT UTILITY CONNECTIONS**

- A. The Contractor shall make his own arrangements with the utility companies for connection of the permanent utilities.

### **2.04 HOISTS, RIGGING, TRANSPORTATION, AND SCAFFOLDING**

- A. The Contractor shall provide scaffolding, staging, cribbing, tackle, hoists, and rigging necessary for placing of his materials and equipment in their proper places in the Project. Temporary work shall be removed from the premises when its use is no longer required on the job.
- B. The Contractor shall pay costs for transportation of materials and equipment to the jobsite and shall include such costs in his proposal.
- C. Scaffolding and hoisting equipment shall comply with requirements of pertinent Federal, State, and Local Laws and Codes.

### **2.05 PROTECTION**

- A. In addition to other requirements of the Contract, the Contractor shall provide various types of protection as follows:
  - 1. Protect finished floors from chips and cutting oil by the use of metal chip receiving pan and an oil proof floor cover.

2. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
  3. Protect equipment, finished surfaces from paint droppings, insulation adhesive, and sizing droppings by use of drop cloths.
- B. Switchboards, panelboards, light fixtures, and other electrical equipment shall be stored at the site with openings and bearings covered to exclude dust and moisture. Stockpiled pipe shall be placed on dunnage and protected from weather and from entry of foreign material.
- C. The Contractor shall be responsible for the protection of finished work of other trades from damage or defacement by his operations and shall remedy such damage at his own expense.

#### **2.06 EMERGENCY REPAIRS OR OPERATION**

- A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

#### **2.07 PROVISIONS FOR LATER INSTALLATIONS**

- A. Where Work cannot be installed as the structure is being erected, the Contractor for such Work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.
- B. The Contractor shall be responsible for informing himself of the nature and arrangement of the materials and constructions to which his work attaches or passes through.

#### **2.08 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEM**

- A. Provide a minimum of 2 hours total instruction to personnel selected by the Owner. Instructions shall include the following:
1. Show equipment locations and explain how the various systems function, including: power system, and lighting controls.
  2. Refer to operating instructions manual for record and clarify.
  3. Coordinate written and verbal instructions so that each is understood by personnel.
- B. Provide additional instructions to Owner's personnel as stipulated in other subsections of Division 26.

#### **2.09 FINAL COMPLETION**

- A. Work shall be cleaned prior to Substantial Completion of the Work.
- B. Retouch or repaint factory painted prime and finish coats, where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.
- C. Remove temporary wiring as soon as permanent system(s) or portions thereof are in operating condition and have been inspected and approved.
- D. Lamps, fixtures, lenses, and reflectors shall be cleaned by the Contractor no sooner than 10 days prior to Substantial Completion of the Work.
- E. The Contractor shall clean equipment; restore damaged materials; remove grease, oil, chemical, paint spots, and stains.
- F. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay costs for such removal and disposition.

## **2.10 CUTTING AND PATCHING**

- A. The Contractor shall do cutting and patching of building materials and piping, as required for the installation of his Work, but no structural members shall be cut without the approval of the Architect and such cutting shall be done in a manner directed by the Architect.
- B. Patching of and repair of damage to Work in place shall be done in a neat and workmanlike manner, meeting with the approval of the Architect. Contractor whose operations require cutting of work in place, or who causes damage which entails repairs of such work, shall employ mechanics of the particular trade whose work must be cut or which is damaged, and shall pay the costs of such patching or repair.
- C. Conduits penetrating masonry walls shall not interrupt the vertical masonry wall reinforcing. Coordinate the location of reinforcement with Division 4. Wherever more than 2 conduits 2 inches or larger are to pass through a masonry wall in the same location or where conduits of any size in a row equals a length of 3 feet or greater, prior approval from the Architect shall be required before disturbing the wall. Wherever multiple conduits pass through masonry walls provide a minimum of 4 inches between adjacent penetrations.
- D. The Contractor shall caulk around all conduit penetrations in non-fire rated wall with sealant.

## **2.11 GUARANTEE AND WARRANTY**

- A. The Contractor shall submit his and each equipment manufacturer's written certificates, warranting that each item of equipment furnished complies with the requirements of the Drawings and Specifications. The electrical system shall be warranted for one year from the date of substantial completion.

## **2.12 SUPERVISION AND COOPERATION**

- A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the Work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.

## **2.13 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS**

- A. Comply with Section 01 78 00 - Closeout Submittals and the following:
- B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder. Material to be assembled as follows:
  - 1. First Page - Title of Job, City of Beavercreek, Building Name, Project Address , Date of Submittal, Name of Contractor, and Garmann / Miller & Associates Inc. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
  - 2. Second Page - Index
  - 3. Third Page - Introduction to first section containing a complete written description of the system.
  - 4. First Section - Written description of system contents, where actually located in building, how each part functions individually, and how system works as a whole. Conclude with a list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
  - 5. Second Section - A copy of each approved shop drawing (clearly marked for item furnished), with an index at the beginning of the section. Provide a separate list of lighting fixtures used on the job; list shall include, but not be limited to: Plan type, manufacturer's catalog number, and voltage, number of lamps, lamp type, ballast catalog number, manufacturer's name and quantity (when required), catalog number and quantity of any replacement glass and plastic parts.



6. Third Section - A copy of each manufacturer's operating instructions with an index at the beginning of the section.
  7. Fourth Section - A list of equipment used on the job, Contractor's purchase order numbers, supplier's name and address.
- C. One (1) electronic copy of the Operation and Maintenance Manuals shall be placed on a Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.
1. PDF shall be indexed/bookmarked to allow a quick search to the relevant material.

#### **2.14 RECORD DRAWINGS**

- A. The Contractor shall keep a running record of each change and deviation from the Drawings. Records shall be kept clean and undamaged upon a set of drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to Garmann / Miller & Associates Inc. one complete set of Drawings which have been corrected to show deviations. With the submittal shall be 2 sets of prints made from the corrected Drawings for a total of 3 sets of record (as-built) drawings.
- B. Record Drawings shall show:
1. Size, type, and capacity of materials, devices, or pieces of equipment.
  2. Location of devices or pieces of equipment.
  3. Location of outlets or sources in building service systems.
  4. Routing of piping, conduit, ducts, or other building services.
  5. Actual circuit number.
  6. Actual luminaires (by manufacturer catalog number) installed.
  7. Building plan and devices shall be a scale of original construction documents.
  8. These drawings shall also record the location of concealed electric service, conduit, and other piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
  9. Record drawings must be complete and accurate with regard to concealed conduit, raceways, wiring, and like equipment or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.
- C. One (1) electronic copy of the Record Drawings shall be placed on a Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.

**END OF SECTION**

**SECTION 26 05 05  
MINOR ELECTRICAL DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical demolition.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Additional requirements for alterations work.
- B. Section 02 41 00 - Demolition.

**PART 2 PRODUCTS**

**2.01 MATERIALS AND EQUIPMENT**

- A. Materials and equipment for patching and extending work: As specified in individual sections.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation.
- D. Report discrepancies to Garmann / Miller & Associates Inc. before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

**3.02 PREPARATION**

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company. It is the Electrical Contractor's responsibility to provide all site electrical disconnections required for demolition. Coordinate this work with the General Contractor.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
  - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
  - 2. Make temporary connections to maintain service in areas adjacent to work area.

**3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned panelboards and distribution equipment.

- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

#### **3.04 CLEANING AND REPAIR**

- A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. 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.

**END OF SECTION**

**SECTION 26 05 19  
CONDUCTORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal-clad cable.
- B. Wire and cable for 600 volts and less.
- C. Wiring connectors.
- D. Electrical tape.
- E. Oxide inhibiting compound.
- F. Wire pulling lubricant.
- G. Cable ties.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 05 - MINOR ELECTRICAL DEMOLITION : Disconnection, removal, and/or extension of existing electrical conductors and cables.
- B. Section 31 23 16 - Excavation.
- C. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.
- D. Section 31 23 23 - Fill: Bedding and backfilling.

**1.03 REFERENCE STANDARDS**

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers 2005 (Reapproved 2021).
- F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation 2018.
- G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- I. NECA 104 - Standard for Installing Aluminum Building Wire and Cable 2012.
- J. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable 2018.
- K. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
- L. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- M. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.

- O. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- P. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- Q. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- R. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.
- S. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Design Data: Indicate sizing for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.
- 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, and installation of product.
- E. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing all conduits 2" and larger and all underground conduits.

#### **1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

### **PART 2 PRODUCTS**

#### **2.01 CONDUCTOR AND CABLE MANUFACTURERS**

- A. Cerro Wire & Cable Company.
- B. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
- C. Industrial Wire & Cable, Inc: [www.iewc.com](http://www.iewc.com).
- D. Southwire Company .
- E. Alcan Cable
- F. Phelps Dodge
- G. Substitutions: See Section 01 6000 - Product Requirements.

#### **2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
  - 1. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors

- designated with the abbreviation "AL" indicate aluminum.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
  3. Tinned Copper Conductors: Comply with ASTM B33.
  4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- H. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
    - a. Exceptions:
      - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
      - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
  2. Control Circuits: 18 AWG.
- I. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  2. Color Coding Method: Integrally colored insulation.
  3. Color Code:
    - a. 208Y/120 V, 3 Phase, 4 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
      - 4) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.

### **2.03 SINGLE CONDUCTOR BUILDING WIRE**

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
  1. Feeders and Branch Circuits: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
  1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
    - a. Size 4 AWG and Larger: Type XHHW-2.
    - b. Installed Underground: Type XHHW-2.
  2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type XHHW-2.

### **2.04 METAL-CLAD CABLE**

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding: Stranded or solid.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Aluminum or steel, interlocked tape.

## **2.05 WIRING CONNECTORS**

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
  - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
  - 3. Connectors for Aluminum Conductors: Use compression connectors.
- C. Wiring Connectors for Terminations:
  - 1. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
  - 2. Aluminum Conductors: Use compression connectors or mechanical connectors for all connections.
  - 3. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- G. Mechanical Connectors: Provide bolted type or set-screw type.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

## **2.06 ACCESSORIES**

- A. Electrical Tape:
  - 1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- B. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.
- E. Split Bolt Connectors.
- F. Solderless Pressure Connectors.
- G. Spring Wire Connectors.
- H. Compression Connectors.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.

- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that raceway installation is complete and supported.
- E. Verify that field measurements are as indicated.
- F. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### **3.03 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install aluminum conductors in accordance with NECA 104.
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. Installation in Raceway:
  - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  - 2. Pull all conductors and cables together into raceway at same time.
  - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
  - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- H. Terminate cables using suitable fittings.
  - 1. Metal-Clad Cable (Type MC):
    - a. Use listed fittings.
    - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
    - c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.
- I. Install conductors with a minimum of 12 inches of slack at each outlet.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
  - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  - 3. Do not remove conductor strands to facilitate insertion into connector.



4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
  5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
  6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.
- P. In general, install EMT conduit for branch circuits throughout the building. EMT to junction box in room for lighting circuits. MC cable may be used from junction box to light fixtures. MC cable may also be used in metal stud walls for receptacles, but EMT shall still be used from the panel to a junction box in the room, between junction boxes above ceiling, and between each wall stub-out location.
- Q. Include an equipment ground conductor with each circuit.
- R. Provide dedicated neutrals for all circuits. Do not share neutrals.
- S. Wire and cable routing indicated is approximate unless dimensioned.
- T. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
- U. Install wire and cable in accordance with the NECA "Standard of Installation."
- V. Protect exposed cable from damage.
- W. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
- X. Use suitable cable fittings and connectors.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

**END OF SECTION**

**SECTION 26 05 26  
GROUNDING AND BONDING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to 01 23 00 - Alternates for Alternates that may affect the Work of this Section.

**1.02 SUMMARY**

- A. Provide a complete grounding system which shall be in accordance with the National Electric Code, State and Local Ordinances, and utility company requirements, and as indicated on the Drawings.

**1.03 QUALITY ASSURANCE**

- A. Grounding shall be in accord with NEC, Article 250, and others which apply. Equipment shall be provided with a suitable ground lug, except for distribution equipment (switchboards, panels, and the like) which shall be provided with a suitable ground bus.
- B. UL 467
- C. Bare solid copper conductors ASTM B3
- D. Bare stranded copper conductors ASTM B8
- E. Underground distribution components IEEE C2

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Minimum 12 AWG 600V insulated copper equipment grounding conductor insulated with green colored insulation.
- B. Stranded cable grounding electrode conductors.
- C. Bare copper conductors.
- D. Copper clad steel 3/4" grounding rods.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. The following requires permanent grounds: Electrical service equipment and enclosures, conduits, and other conductor enclosures; neutral or identified conductor of interior system, power and lighting panelboards, control centers; noncurrent carrying metal parts of fixed equipment, such as transformers, motors, starter and controller cabinets, instrument cases, lighting fixtures, switches, receptacles, equipment in hazardous locations; and others as indicated and/or required by NEC.
- B. The grounding conductor shall be continuous wire and carried throughout the power system. Properly ground the neutral point of secondary transformers to conduit and to system ground wire. (Wire size per NEC). Grounding wire looping from transformer to transformer is not allowed.
- C. System neutral conductor shall be identified throughout and shall be grounded at the point of service only.
- D. Metallic conduit shall be electrically continuous throughout and be grounded (bonded) at the service entrance. Feeder conduits (one inch and larger) shall also be grounded at pull boxes, junction boxes, cabinets, and terminal points using grounding knockouts and bushings, to the

equipment grounding bar or lugs.

- E. Cord connected appliance frames shall be grounded to the system grounding conductor and to the conduit system through a grounding conductor in the cord.
- F. Flexible conduit connections to equipment and motors, and the like, shall have an equipment grounding conductor, size per NEC 250.
- G. A green pigtail shall be installed from grounding slots of grounding outlets to system grounding conductor and to outlet box in each instance.
- H. A green pigtail shall be installed from the attachment bar of toggle switches to system grounding conductor and to outlet box.
- I. Green bonding jumper shall be installed in flexible metallic conduit, size per NEC 250.
- J. Provide a grounding conductor, sized per NEC 250 from the ground bus at the service entrance to each side of any cold water meter; to the reinforcing bars of the concrete structure; to building; to the steel structure of the building. Similarly jumper the steel structure at building expansion joints, and "catwalks" to the steel structure.
- K. Provide grounding of structural steel and ground field as denoted on the accompanying Drawings.
- L. A separate equipment grounding conductor, sized in accord with NEC 250 shall be installed with each and every conduit and shall be attached to ground bars, lugs, equipment, frames, devices, pull boxes, junction boxes, outlet boxes, and the like.
- M. Conduit is not an allowable grounding means.

**END OF SECTION**

**SECTION 26 05 29  
HANGERS AND SUPPORTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.
- B. Conduit and equipment supports.
- C. Anchors and fasteners.

**1.02 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.03 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**PART 2 PRODUCTS**

**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
  - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
  - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
  - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

- 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  - 1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
  - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

## **2.02 MANUFACTURERS**

- A. Threaded Rod Company
- B. All-Ohio Threaded Rod Company
- C. Precision Brand
- D. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.03 MATERIALS**

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
  - 1. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
  - 2. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
  - 3. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
  - 5. Solid Masonry Walls: Use expansion anchors or preset inserts.
  - 6. Sheet Metal: Use sheet metal screws.
  - 7. Wood Elements: Use wood screws.
  - 8. Substitutions: See Section 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Secure fasteners according to manufacturer's recommended torque settings.
  - H. Remove temporary supports.
  - I. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
    1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
    2. Obtain permission from Architect before drilling or cutting structural members.
  - J. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
  - K. Install surface-mounted cabinets and panelboards with minimum of four anchors.
  - L. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
  - M. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

**END OF SECTION**

**SECTION 26 05 33.13  
CONDUIT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Intermediate metal conduit (IMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Conduit fittings.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 90 00 - Painting and Coating.
- B. Section 26 05 26 - GROUNDING AND BONDING.
  - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 05 29 - HANGERS AND SUPPORTS.
- D. Section 26 05 53 - IDENTIFICATION.
- E. Section 26 05 33.16 - BOXES.

**1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A) 2020.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most recent edition adopted by Authority Having Jurisdiction, including all applicable Amendments and Supplements.
- K. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- L. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- M. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- N. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.

- P. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

#### **1.04 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

### **PART 2 PRODUCTS**

#### **2.01 CONDUIT REQUIREMENTS**

- A. Fittings for Grounding and Bonding: Also comply with Section 26 05 26 - GROUNDING AND BONDING.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Coordinate painting requirements with painting contractor where conduits are exposed due to open structure and the like.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- F. Conduit Size: Comply with NFPA 70.
  - 1. Minimum size: 1/2" unless otherwise specified.
- G. Underground Installations:
  - 1. PVC conduit may be used for underground installations. Where underground conduit (2" and larger) passes under a parking lot, driveway, roadway, or the like; encase conduit in concrete.
- H. Outdoor Locations Above Grade: Use rigid steel conduit.
- I. Wet and Damp Locations: Use rigid steel or intermediate metal conduit.
- J. Dry Locations:
  - 1. Concealed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
  - 2. Exposed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
  - 3. PVC conduit shall be used in the salt storage bin area.
- K. Where underground conduit enters a room and water entering through the conduit is a concern or an issue, provide a product similar to Raychem Rayflate Duct Sealing System at both ends of conduit to seal conduit air and water tight.

#### **2.02 MANUFACTURERS**

- A. Essex Group
- B. Hubbell Power Systems
- C. Hellermann Tyton



- D. Wheatland Tube Company
- E. Allied Tube and Conduit
- F. Cantex Inc.

**2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
  - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

**2.04 INTERMEDIATE METAL CONDUIT (IMC)**

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
  - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.
- C. Conduit Size: Comply with NFPA 70.

**2.05 FLEXIBLE METAL CONDUIT (FMC)**

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
- C. Description: Interlocked steel construction.

**2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)**

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
- C. Description: Interlocked steel construction with PVC jacket.

**2.07 ELECTRICAL METALLIC TUBING (EMT)**

- A. Thin wall conduit shall be Underwriter's approved electrical metallic tubing (EMT). EMT shall meet Federal Specification WW 806, latest edition.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use compression (gland) or set-screw type.
  - a. Do not use indenter type connectors and couplings.

## **2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT**

- A. Nonmetallic conduit shall be Underwriter's approved Schedule 40 heavy wall "PVC" polyvinyl chloride plastic type, properly supported and anchored. Conduit shall be terminated in end-bells or bushings. Provide bonding or grounding conductors in accordance with NEC.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
  1. Conduit inside the salt barn shall be schedule 80.
- C. Fittings:
  1. Manufacturer: Same as manufacturer of conduit to be connected.
  2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
- D. Description: NEMA TC 2; Schedule 40 PVC.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify routing and termination locations of conduit prior to rough-in.
- E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

### **3.02 INSTALLATION**

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.
- B. Install EMT conduit for branch circuits throughout the building. EMT to junction box in room for lighting circuits. MC cable may be used from junction box to light fixtures. MC cable may also be used in metal stud walls for receptacles, but EMT shall still be used from the panel to a junction box in the room, between junction boxes above ceiling, and between each wall stub-out location.
- C. Branch circuits may be routed underslab. In no case may conduits be routed within the slab.
- D. PVC conduit may be used for underground installations. Use metal rigid elbows with metal rigid above grade. Fiberglass elbows with zero burn-through, high strength/UV resistant reinforced epoxy may be used for large utility and electrical sweeps in lieu of the rigid. PVC conduits (2 inches and larger) that are routed outside the building under driveways, roadways, sidewalks or the like shall be incased in concrete.
- E. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
- F. Install nonmetallic conduit in accordance with manufacturer's instructions.
- G. Arrange supports to prevent misalignment during wiring installation.

- H. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- I. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- J. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29 - HANGERS AND SUPPORTS.
- K. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- L. Arrange conduit to maintain headroom and present neat appearance.
- M. Route exposed conduit parallel and perpendicular to walls.
- N. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- O. Maintain adequate clearance between conduit and piping.
- P. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- Q. Cut conduit square using saw or pipecutter; de-burr cut ends.
- R. Bring conduit to shoulder of fittings; fasten securely.
- S. 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.
- T. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
- U. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch size.
- V. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- W. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic and expansion joints.
- X. Provide suitable pull string in each empty conduit except sleeves and nipples.
- Y. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Z. Identify conduit under provisions of Section 26 05 53 - IDENTIFICATION.

**END OF SECTION**

**SECTION 26 05 33.16  
BOXES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Wall and ceiling outlet boxes.
- D. Pull and junction boxes.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 29 - HANGERS AND SUPPORTS.
- B. Section 26 27 26 - WIRING DEVICES:
  - 1. Wall plates.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).
- E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports 2013 (Reaffirmed 2020).
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- J. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- K. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

**1.04 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

**PART 2 PRODUCTS**

**2.01 BOXES**

- A. General Requirements:
  - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.

4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  3. Use suitable concrete type boxes where flush-mounted in concrete.
  4. Use suitable masonry type boxes where flush-mounted in masonry walls.
  5. Use raised covers suitable for the type of wall construction and device configuration where required.
  6. Use shallow boxes where required by the type of wall construction.
  7. Do not use "through-wall" boxes designed for access from both sides of wall.
  8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
  12. Wall Plates: Comply with Section 26 27 26.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
  3. Junction and Pull Boxes Larger Than 100 cubic inches:
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

## 2.02 MANUFACTURERS

- A. Appleton Electric.
- B. Arc-Co./Division of Arcade Technology: [www.arc-co.com](http://www.arc-co.com).
- C. Unity Manufacturing: [www.unitymfg.com](http://www.unitymfg.com).
- D. Hubbell
- E. Thomas and Betts
- F. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.03 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
  1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
  2. Concrete Ceiling Boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Wall Plates for Finished Areas: As specified in Section 26 27 26.

## **2.04 PULL AND JUNCTION BOXES**

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Coordinate locations of outlets with other trades prior to rough-in.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Supports:
  - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
  - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- E. Install boxes plumb and level.
- F. Flush-Mounted Boxes:
  - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
    - a. For boxes installed in masonry walls, use fittings equal or similar to Raco Block-Loc to hold box flush, plumb and level.
  - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- G. Install boxes as required to preserve insulation integrity.
- H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- I. Close unused box openings.
- J. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- K. Provide grounding and bonding in accordance with Section 26 05 26.
- L. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- M. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- N. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.

1. Adjust box locations up to 3 feet if required to accommodate intended purpose.
- O. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- P. Maintain headroom and present neat mechanical appearance.
- Q. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- R. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- S. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- T. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- U. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
  1. Switch outlets shall be located within 12" of latch side of door opening, nearest to the opening.
- V. Use flush mounting outlet box in finished areas.
- W. Coordinate the installation of flush mounted boxes in masonry walls with the Masonry Contractor to achieve neat openings.
- X. Do not install flush mounting boxes back-to-back in walls; provide minimum 8 inches separation.
- Y. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- Z. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- AA. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- BB. Use adjustable steel channel fasteners for hung ceiling outlet box.
- CC. Do not fasten boxes to ceiling support wires.
- DD. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- EE. Use gang box where more than one device is mounted together. Do not use sectional box.
- FF. Use gang box with plaster ring for single device outlets.
- GG. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- HH. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted metal box in other locations.

### **3.03 ADJUSTING**

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.

### **3.04 CLEANING**

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.
- B. Clean exposed surfaces and restore finish.

**END OF SECTION**

**SECTION 26 05 50  
BASIC MATERIALS AND METHODS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements are included as a part of this Section as though bound herein.
- B. Refer to Section 01 2300 for Alternates that may affect the Work of this Section.
- C. Refer to other Sections of Division 26 for additional detailed material and methods of Specifications.

**1.02 SUMMARY**

- A. Load Balance and Adjustment
  - 1. The Contractor shall furnish personnel and equipment and insure that building power, lighting, motor, and appliance loads are balanced between phases of service entrances, distribution feeders, and panelboards as closely as possible.
- B. This Contractor shall install rough-in work pertaining to his trade for each item of equipment furnished under another Section of the Specifications or by Owner. The Contractor shall, before bidding the Project, verify exact rough-in requirements before installation with the Contractor, subcontractor, Owner, or supplier furnishing said equipment, who shall furnish dimensional Drawings accurately locating rough-in for his equipment.
- C. The Contractor shall rough-in and connect fixtures, equipment, appliances, and the like, requiring electric services.
- D. Provide sleeves, raceways, conduit, conduit fittings, conductors, fuses, grounding equipment, devices, disconnects, starters, and protective systems required or denoted on Drawings.

**1.03 QUALITY ASSURANCE**

- A. Materials shall be new, complete with manufacturer's guarantee or warranty, and shall be approved by the Underwriters' Laboratories, Inc., if a standard has been established by that agency for the type of material.
- B. Materials shall also comply with applicable standards of the National Electrical Manufacturers' Association, Insulated Power Cable Engineers Association, National Safety Code, and the American Institute of Electrical Engineers. Such standards are hereby made a part of these Specifications.
- C. Work shall be executed in a workmanlike manner and shall present a neat mechanical appearance when completed. Methods and techniques of installation shall be subject to the approval of the Architect.
- D. Materials of the same type or class shall be the product of one manufacturer. For example, panelboards shall be from one manufacturer, lighting switches from one manufacturer.

**1.04 PROJECT CONDITIONS**

- A. The Contractor shall be responsible for the accurate location of his Work and for informing himself of the nature and arrangement of the materials, equipment, and construction to which his Work attaches or passes through.
- B. In general, piping, conduits, and other work shall be concealed in walls and above ceilings, in utility of pipe spaces, in chases, in joist spaces, in tunnels, in equipment rooms, and the like, insofar as is practical; so that such work will not interfere with the proper coordinated installation work of other trades or Contractors.



- C. In general, piping, conduits, and lines, except those below slabs on grade shall be installed parallel (or at right angles) to the building walls, and at such heights as not to obstruct portions of windows, doorways, stairways, pipe space, tunnel, or passageway, and properly concealed to not interfere with the proper coordinated installation of other trades or Contractors. Where interferences develop in the field, the Work shall be offset or routed as required to clear such interferences. Consult architectural, mechanical, electrical drawings, Contractors, and other details before installing work; and unless otherwise specified, ductwork installation shall take precedence over other crafts, such as piping and conduit as determined by the Architect/Engineer.
- D. Materials installed shall be new and never before used.
- E. The Contractor shall procure definite locations and connections before rough-in or installation. This Contractor shall then lay out his Work and be responsible for determining proper elevations, angles, measurements, and locations required for the installation of his Work.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Provide overcurrent protective devices in accordance with Article 240 of the National Electric Code.
- B. The overcurrent protective devices must be capable of interrupting the amount of short circuit current available at their location as stated in the National Electric Code.
- C. Overcurrent protective devices shall be so selected and coordinated to permit maximum continuity of service and comply with the National Electric Code.

**PART 3 EXECUTION**

**3.01 SITE PREPARATION**

- A. Excavation and Backfill - Underground Wiring: The following is supplemental to the requirements of Division 31, Site Construction.
- B. The Contractor shall do excavating of materials encountered, including backfilling, as shown or as necessary for the installation of underground wiring, foundations, and equipment in his Contract. Provide and maintain bracing, shoring, or sheathing necessary to support the walls of excavations.
- C. Trenches shall be opened in straight lines and bottomed out at least 4 inches below conduits or ducts. Exterior trenches shall have a minimum depth of 36 inches which shall be maintained between top of largest conduit or duct and finish grade.
- D. Where roots of live trees are encountered in excavations, they shall be carefully protected during construction. Contractor shall cut or remove interfering trees, remove stumps, and rocks in the line of the excavation; however, approval of the Architect shall be obtained before a tree is removed or cut. Shrubbery in line of excavation shall be removed with a ball of dirt and replaced at completion of installation.
- E. Where excavation is necessary in existing pavements, Contractors for whose work the excavation is required shall pay fees and costs of opening street or pavement and costs of filling and repaving in accordance with requirements of and to the satisfaction of the Municipality, Utility, or other Owners of such paving.
- F. Where existing sidewalks, drives, and roadways must be cut, they shall be cut in straight lines, shall present a neat appearance when relaid and shall match existing work. At such locations the backfill medium shall be concrete from the bottom of the finished surface to the bottom of the trench except as may be otherwise approved by the Architect/Engineer.
- G. Where excavation is necessary in an existing lawn, carefully remove and store sod. After backfilling trench, replace sod or apply top dressing of black dirt and seed to match existing

lawn. Care shall be exercised during the work to see that no unnecessary damage is done to lawns in the storing of dirt or other construction material. Should unnecessary damage occur, in the opinion of the Architect, the Contractor shall be required to recondition lawns at his own expense.

- H. In addition, the Contractor shall provide and maintain warning barricades, flags, and warning lights, and shall conduct his work so as to create a minimum amount of inconvenience to others, traffic, construction, and the like. Temporary suspension of work does not relieve the Contractor of responsibility for the above requirements.
- I. Remove and properly dispose of debris, rubbish, and excavation spoils resulting from the Work, off-site. Obtain necessary permits for dumping.

### **3.02 INSTALLATION**

- A. Special care shall be taken during load balance to assure that reverse rotation of motors is not caused.
- B. Materials installed under this Division of Work shall be supported from the building structure, independent of other pipe, duct, and equipment, except recessed "lay-in" fixtures not larger than 2 feet by 4 feet size may be supported as stipulated in other Divisions and Sections of Division 26.
- C. Conductors and cables shall be installed in conduit and other specified raceways which have been properly supported and anchored, unless otherwise specified.
- D. The Contractor shall install major and secondary control equipment and erect on approved type brackets or floor supports, located as directed, and make electric connections to major and secondary control equipment and motor or apparatus, complete, and assume full responsibility for the connections.
- E. Install taps and connections in properly selected outlet boxes and junction boxes. Install pull boxes only as required. Enclosures for wiring connections of motor controllers or switches shall not be used as junction boxes for cable tapping or splicing, except where the enclosures are designed to provide space which is suitable, adequate, and approved for the purpose.
- F. Cover and protect equipment, materials, enclosures, boxes, and raceways, before and after installation, to prevent injury and to prevent entrance of grit, dirt, and foreign matter.
- G. Phase, neutral, and ground conductors of a given circuit must be in the same raceway. Circuiting shall be as specified and denoted on the Drawings, with loads balanced as closely as possible across all phase legs.
- H. Make final electrical connections of equipment to rough-ins and the electrical system.
- I. Equip outlets with fittings and outlet boxes adapted to that particular outlet.
- J. Exposed outlets shall be equipped with heavy cast type boxes, such as "FS" and "FSA" type conduits. Exposed raceways in finished spaces shall be wiremold type finished to match adjacent surfaces in which case outlet boxes shall be compatible with the raceway system.
- K. The ends of raceway systems and conduits shall be carefully and securely capped during construction.

### **3.03 ACCESS DOORS**

- A. Locate panels accurately in coordination with the General Construction requirements and as directed by the Architect. Panels are to be provided in unaccessible ceilings and walls where necessary to provide access to equipment and wiring as required.

### **3.04 DISCONNECTS**

- A. Provide properly sized disconnects for apparatus and equipment whenever disconnecting means is not furnished by others. Each device, apparatus, or equipment must have local disconnecting means within actual sight of the motor or apparatus, and within 49 feet of the

same.

### **3.05 TESTING**

- A. Voltage and System Testing, Checking, and Reports
  - 1. The Contractor shall:
    - a. Test and determine that system is free of short circuits and other faults.
    - b. Test and record meter reading to ground at various points and devices.
  - 2. Contractor shall conduct such other tests and adjustments of equipment as required by Architect/Engineer or necessary to verify performance requirements. Submit data taken during such tests to Architect/Engineer. Contractor shall pay professional engineering fees involved in required testing of equipment.
  - 3. Electrical Contractor shall provide necessary electrical personnel and testing instruments as required to assist Architect/Engineer in testing of installation.

**END OF SECTION**

**SECTION 26 05 53  
IDENTIFICATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.
- G. Field-painted identification of conduit.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 91 23 - Interior Painting.
- B. Section 26 05 19 - CONDUCTORS: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- C. 26 0533.13 - Conduit.
- D. 26 0533.16 - Boxes.
- E. 26 2416 - Panelboards.
- F. 26 2726 - Wiring Devices.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011 (Reaffirmed 2017).
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011 (Reaffirmed 2017).
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

**1.04 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

**PART 2 PRODUCTS**

**2.01 IDENTIFICATION REQUIREMENTS**

- A. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
  - 2. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
    - a. Service equipment.
    - b. Industrial control panels.
    - c. Motor control centers.
    - d. Industrial machinery.
- B. Identification for Conductors and Cables:
  - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.

2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

## 2.02 MANUFACTURERS

- A. Brady Corporation.
- B. Seton Identification Products.
- C. HellermannTyton.
- D. Substitutions: See Section 01 6000 - Product Requirements.

## 2.03 IDENTIFICATION

- A. Identification of Electrical Conduits and Raceways
  1. Electrical conduit which is accessible for maintenance operations (except conduits in finished spaces) shall be identified with approved stencils or semi-rigid plastic identification pipe markers, electrical markers, or approved equal.
  2. For stencils use black enamel (except white on black, red, blue or dark backgrounds). Where lines are painted, apply stenciling after the finish coat dried. Characters shall be one inch high and when dry shall be coated with clear lacquer or approved equivalent.
  3. Electrical markers to be used on diameters 3/4 inch through 5 inches.
  4. Electrical markers to be used on diameters 6 inches or larger (with wire bindings and seals).
  5. Markers (or stencils) shall be located adjacent to each junction box, pull box, controller, panelboard, relay, and the like.
  6. At Contractor's option, covers only of junction boxes shall be labeled or stenciled (in lieu of conduit) with approved permanent labels denoting voltage and circuit designation inside box (for single-phase legs, label voltage to ground; for two or more phase legs, label the phase-to-phase voltage; and combinations shall be suitably labeled).
- B. Equipment Identification
  1. Provide nameplates on equipment such as panelboards, distribution panels, motor starters, safety switches, control devices, and the like.
  2. Lettering shall include name of equipment, the specific unit number, and reference to on/off or other instructions that are applicable.
  3. Power panelboards, distribution panels, and motor control centers shall have a nameplate for each section of same and for each device contained therein, i.e., "Panel A," "Sump Pump," as is applicable.
  4. Nameplates shall be laminated phenolic with a white surface and black core. Use 1/16 inch thick material for plates up to 2 inches by 4 inches. For larger sizes use 1/8 inch thick material. Lettering of names should correspond to nomenclature specified for apparatus, corresponding with the Drawings, details, schedules, charts, wiring diagrams, and operating instructions as approved by the Architect/Engineer.
  5. Lettering shall be condensed Gothic. The space between lines shall be equal to the width of the letters. Use 1/4 inch minimum height letters which occupy 4 to the inch. Increase letter size to 3/4 inch on largest plates.
  6. In addition, feeder circuits which serve devices (panelboards, appliances) that are located remote from (more than 3 feet from) their main circuit protective device shall have approved identification installed where and as directed which indicates the origin of the power supply, feeder size, and location of main protective device, i.e., "Feeder No. 3; 4-500 MCM, 1-2 AWG Ground, 4" C.; Main Switchboard Circuit 13"; as is applicable.
  7. Appliances, motors, heaters, and the like which are served by a separately mounted disconnect switch, motor starter, or combination type motor starter shall be labeled accordingly for easy identification, i.e.:

- a. Combination Starter: "HVAC-4" - "Supply Air Fan Motor"
  - b. Motor at HVAC Unit: "HVAC-4" - "Supply Air Fan Motor"
  - c. Disconnect Switch: "HVAC-3" - "Primary Air Heater"
  - d. Heater at HV Unit: "HVAC-3" - "Primary Air Heater"
8. Nameplates to be .020 inch to .064 inch thick aluminum, not less than 3/4 inches by 2-1/2 inches or 1 inch by 3 inches, except 1-1/2 inches by 4 inches or 3 inches by 6 inches for large items. Plates shall have a colored enamel background, with etched or engraved natural aluminum lettering not less than 3/16 inch high, except 1/4 inch high for 1 inch by 3 inches and 1-1/2 inches by 4 inch plates and 1/2 inch high for 1-3/4 inches by 6 inches and larger plates (unless specifically described elsewhere in this Specification).
  9. Background color shall be black, or as otherwise required. Plate shall have pressure sensitive permanent adhesive factory backing, as approved.
  10. Note: Use 3/4 inch by 2-1/4 inch size for single gang face plates, 1-1/4 inches by 4 inches for two gang plates attached with black, round head, self threading screws, made of 1/16 inch minimum thick, laminated phenol resin sheet, with white background and black ink or lacquer filled lettering.
  11. Attached directly to the apparatus in a manner approved by the Architect/Engineer.
- C. Outlet Box Covers (or finishing plates)
1. Indicate circuit numbers in box on back (box) side of cover (plate) using heavy line laundry marker pen.
- D. Indexing
1. Index each distribution center circuit and each panel circuit, clearly, neatly, and completely, including "Spares." Index shall be typewritten upon heavy card stock paper not subject to fading or mildew and shall be covered with a clear plastic window, and held securely in a suitable frame. Type date (month and year) and panel designation on each index.
  2. Each index shall be sequenced in accord with actual panel circuiting, i.e.:
    - a. Left side - top to bottom - 1, 3, 5, 7
    - b. Right side - top to bottom - 2, 4, 6, 8
    - c. All circuits shall be visible without removing panel index.
  3. Standard index cards printed 1, 2, 3, are not acceptable.
  4. Use actual Owner provided room numbers for circuit labeling in lieu of construction room numbers. Indexes provided with the Drawings are not suitable to use as panelboard indexes.
- E. Other Items
1. Provide identification as required in other subsections of these Specifications and as denoted on the Drawings.

## 2.04 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
1. Materials:
  2. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
  2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- D. Locations:

1. Each electrical distribution and control equipment enclosure.
- E. Letter Size:
1. Use 1/8 inch letters for identifying individual equipment and loads.
  2. Use 1/4 inch letters for identifying grouped equipment and loads.

## **2.05 WIRE AND CABLE MARKERS**

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.
- G. Description: Cloth type wire markers.
- H. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.
- I. 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.

## **2.06 UNDERGROUND WARNING TAPE**

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
1. Tape for Buried Power Lines: Black text on red background.
  2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

## **2.07 WARNING SIGNS AND LABELS**

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
1. Materials:
  2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
  2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
  3. Minimum Size: 2 by 4 inches unless otherwise indicated.
- D. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.
- B. Degrease and clean surfaces to receive nameplates and labels.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
  - 1. Surface-Mounted Equipment: Enclosure front.
  - 2. Flush-Mounted Equipment: Inside of equipment door.
  - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
  - 4. Elevated Equipment: Legible from the floor or working platform.
  - 5. Interior Components: Legible from the point of access.
  - 6. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

**END OF SECTION**



**SECTION 26 05 55  
CONNECTORS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to Section 01 2300 for Alternates that may affect the Work of this Section.

**1.02 SUMMARY**

- A. Provide required materials for a complete system.
- B. Upon request, points of junction, splices, taps, connections, pull boxes, and outlets shall be opened for inspection by Architect/Engineer or other approved authority.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Connectors shall be similar and equal to those manufactured by O.Z. Electrical Manufacturing Company, Burndy Engineering Company, Thomas & Betts Company.
- B. Splices, taps, and other connections involving conductors not larger than No. 8 AWG max. shall be made with insulated connectors like 3M Co. "Scotchloks," Ideal Co. "Wing-Nut," or T & B Co. "Piggy" connectors. Connectors shall be wrapped with 8.5 mil heavy duty, premium grade all-weather vinyl electrical insulating tape.
- C. Splices, taps, and other connections involving conductors larger than No. 8 AWG shall be made using approved compression type connectors, insulated with at least four 1/2 lap layers of 8.5 mil heavy duty, premium grade all-weather vinyl electrical insulating tape and covered overall with at least two 1/2 lap wraps of friction tape.
- D. Connections or joints in wet or damp areas shall be waterproofed in an approved manner.
- E. Connections of aluminum conductors are not acceptable.
- F. Connectors shall be sized to carry 100 percent of the current capacity of the conductors connected. Conductors shall not be trimmed to fit a connection, the connection device shall be changed to accommodate the conductor.
- G. Compression lugs shall be by T&B, O.Z. Electrical Manufacturing, or Burndy Engineering Company.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Splices and taps shall be made using approved mechanical connectors of the type best suited.
- B. Under no circumstances will a soldered splice, tap, or connection be acceptable.

**END OF SECTION**

**SECTION 26 05 83  
EQUIPMENT WIRING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical connections to equipment.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 19 - CONDUCTORS.
- B. Section 26 05 33.13 - CONDUIT.
- C. Section 26 0526 - Grounding and Bonding
- D. Section 26 05 33.16 - BOXES.
- E. Section 26 27 26 - WIRING DEVICES.
- F. Section 26 28 16.16 - ENCLOSED SWITCHES.

**1.03 REFERENCE STANDARDS**

- A. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

**1.05 COORDINATION**

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, 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 of equipment.
- D. Sequence electrical connections to coordinate with start-up of equipment.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
  - 1. Colors: Comply with NEMA WD 1.
  - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
  - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Disconnect Switches: As specified in Section 26 28 16.16 and in individual equipment sections.
- C. Wiring Devices: As specified in Section 26 27 26.
- D. Flexible Conduit: As specified in Section 26 05 33.13.
- E. Wire and Cable: As specified in Section 26 05 19.
- F. Boxes: As specified in Section 26 05 33.16.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

### **3.02 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

**END OF SECTION**

**SECTION 26 24 16  
PANELBOARDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - HANGERS AND SUPPORTS.
- C. Section 26 05 53 - IDENTIFICATION: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches; National Electrical Manufacturers Association; 1993.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- G. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- H. NEMA PB 1 - Panelboards 2011.
- I. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- L. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- M. UL 67 - Panelboards Current Edition, Including All Revisions.
- N. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3300 - Submittal Procedures
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

- E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

#### **1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

#### **1.06 MAINTENANCE MATERIALS**

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Furnish two of each panelboard key.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Square D
- B. Siemens.
- C. Eaton
- D. General Electric
- E. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 PANELBOARDS - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature:
    - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating: As indicated on drawings.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  - 2. Boxes: Galvanized steel unless otherwise indicated.
    - a. Provide wiring gutters sized to accommodate the conductors to be installed.
  - 3. Fronts:
    - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
    - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
  - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

## 2.03 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
  - 2. Phase and Neutral Bus Material: Aluminum or copper.
  - 3. Ground Bus Material: Aluminum or copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
  - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
  - 2. Provide clear plastic circuit directory holder mounted on inside of door.
- F. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- G. Provide an isolated ground bar in designated panelboards.
- H. Minimum Integrated Short Circuit Rating: As indicated on the Drawings.
- I. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.
  - 1. Type HACR for air conditioning equipment circuits.
  - 2. Class A ground fault interrupter circuit breakers where scheduled.
  - 3. Do not use tandem circuit breakers.
- J. Current Limiting Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole.
- K. Enclosure: NEMA PB 1, Type 1.
- L. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards.
- M. Cabinet Front: Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

## 2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
  - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
  - 2. Interrupting Capacity:
    - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      - 2) 14,000 rms symmetrical amperes at 480 VAC.
    - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
  - 3. Conductor Terminations:
    - a. Provide mechanical lugs unless otherwise indicated.

- b. Provide compression lugs where indicated.
- c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
- 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
- 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide grounding and bonding in accordance with Section 26 05 26.
- J. Install all field-installed branch devices, components, and accessories.
- K. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.
- L. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- M. Provide filler plates to cover unused spaces in panelboards.
- N. Provide computer-generated circuit directory for each lighting and appliance panelboard and each power distribution panelboard provided with a door, clearly and specifically indicating the loads served. Revise directory to reflect circuiting changes required to balance phase loads. Identify spares and spaces.
- O. Provide identification nameplate for each panelboard in accordance with Section 26 0553.
- P. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.
  - 1. Minimum spare conduits: 4 empty 1 inch.

### **3.02 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Correct deficiencies and replace damaged or defective panelboards or associated components.

### **3.03 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 10 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

**END OF SECTION**



**SECTION 26 27 26  
WIRING DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 33.16 - BOXES.
- B. Section 26 0526 - Grounding and Bonding

**1.03 REFERENCE STANDARDS**

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.

**1.04 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Cooper
- B. Arrow Hart
- C. Pass & Seymour
- D. Hubbell
- E. Leviton

**2.02 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

### **2.03 ALL WIRING DEVICES**

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### **2.04 WALL SWITCHES**

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable FS W-S-896; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
  - 1. Body and Handle: Gray, plastic with toggle handle.
    - a. Voltage: 120 volts, AC.
    - b. Current: 20 amperes.
  - 2. Ratings: Match branch circuit and load characteristics.
- C. Switch Types: Single pole, double pole, 3-way, and 4-way.

### **2.05 RECEPTACLES**

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498 and where applicable FS W-C-596; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Receptacles: Heavy duty, complying with NEMA WD 6 and WD 1.
  - 1. Device Body: Gray, plastic.
  - 2. Receptacles circuited to the generator shall be red in color.
  - 3. Configuration: NEMA WD 6, type as specified and indicated.
  - 4. Prewired pigtail connectors that accommodate Fed Spec receptacles are approved. Must be crimped and welded terminal application connector.
- C. Convenience Receptacles: Type 5 - 20 equal to Hubbell 5362, Cooper BR20, or Pass & Seymour CR20W.
  - 1. Prewired pigtail receptacles: Type 5 - 20 equal to Pass & Seymour PT5362, Hubbell SNAP5362, or Cooper ArrowLink.
- D. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

### **2.06 WALL PLATES**

- A. Wall Plates: Comply with UL 514D.
  - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  - 2. Size: Standard.
  - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Cover Plates: Smooth stainless steel.
- C. Weatherproof covers to be metal hinged covers that allows cord to be plugged in with cover closed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.03 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.
- L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- P. Connect wiring device grounding terminal to outlet box with bonding jumper.

- Q. Install standard plates on switch, receptacle, and blank outlets in finished areas.
- R. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

### **3.04 INTERFACE WITH OTHER PRODUCTS**

- A. Coordinate locations of outlet boxes provided under Section 26 0537 to obtain mounting heights specified.
- B. Mounting heights refer to bottom of box.
- C. Install wall switch 44 inches above finished floor.
- D. Install convenience receptacle 16 inches above finished floor, UNO.
- E. Install convenience receptacle 4 inches above backsplash of counter, UNO.
- F. Install dimmer 44 inches above finished floor.
- G. Install telephone jack 16 inches above finished floor, UNO.
- H. Install telephone jack for side-reach wall telephone to position top of telephone at 44 inches above finished floor.
- I. Install telephone jack for forward-reach wall telephone to position top of telephone at 48 inches above finished floor.

### **3.05 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle to verify operation and proper polarity.
- F. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- G. Correct wiring deficiencies and replace damaged or defective wiring devices.

### **3.06 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

### **3.07 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**SECTION 26 28 13  
FUSES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fuses.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 24 16 - PANELBOARDS: Fusible switches.
- B. Section 26 28 16.16 - ENCLOSED SWITCHES: Fusible switches.

**1.03 REFERENCE STANDARDS**

- A. NEMA FU 1 - Low Voltage Cartridge Fuses 2012.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Submittal Procedures.
- B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 MAINTENANCE MATERIALS**

- A. See Section 01 6000 - Product Requirements for additional provisions
- B. Furnish three of each size and type fuse installed.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Bussman.
- B. LittellFuse
- C. Edison Fuse
- D. Substitutions: See Section 01 6000 - Product Requirements.

**2.02 FUSES**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.

- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Main Service Switches Larger than 600 amperes: Class L (time delay).
- H. Main Service Switches: Class RK1 (time delay).
- I. Power Load Feeder Switches Larger than 600 amperes: Class L (time delay).
- J. Power Load Feeder Switches: Class RK1 (time delay).
- K. Motor Load Feeder Switches: Class RK1 (time delay).
- L. Lighting Load Feeder Switches Larger than 600 amperes: Class L time delay.
- M. Lighting Load Feeder Switches: Class RK1 (time delay).
- N. Other Feeder Switches Larger than 600 amperes: L time delay.
- O. Other Feeder Switches: Class RK1 (time delay).
- P. General Purpose Branch Circuits: Class RK1 (time delay). Class J is also acceptable.
- Q. Motor Branch Circuits: Class L time delay.
- R. Lighting Branch Circuits: Class G.

### **2.03 CLASS RK1 FUSES**

- A. Fuses "0 through 600" amperes shall be U.L. Class "RK1" and of the current limiting, dual element type, U.L. approved for 200,000A RMS, symmetrical interrupting capacity. They shall have a silver sand short circuit element, and shall carry 500 percent of rating for a minimum of 10 seconds on overloads. Fuses shall be Buss Low-Peak fuses, type "LPS/RK" or "LPN/RK" as required, except as otherwise denoted on the Drawings.
  - 1. Substitutions: See Section 01 6000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

**END OF SECTION**

**SECTION 26 28 16.16  
ENCLOSED SWITCHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fusible switches.
- B. Nonfusible switches.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 29 - HANGERS AND SUPPORTS.
- B. Section 26 28 13 - FUSES.
- C. Section 26 0526 - Grounding and Bonding

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; 1993.
- C. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).
- D. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- E. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Submittal Procedures
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Project Record Documents: Record actual locations of enclosed switches.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Square D
- B. Siemens.
- C. Cutler Hammer
- D. General Electric
- E. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 COMPONENTS**

- A. Fusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
  - 1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
  - 2. Handle lockable in OFF position.
  - 3. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.

- B. Nonfusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
  - 1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
  - 2. Handle lockable in OFF position.
- C. Enclosures: NEMA KS 1.
  - 1. Interior Dry Locations: Type 1.
  - 2. Exterior Locations: Type 3R.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 05 26.
- H. Install fuses in fusible disconnect switches.
- I. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

### **3.02 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Perform field inspection in accordance with Section 01 4500 and 01 4510
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- E. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

**END OF SECTION**



**SECTION 26 51 00  
INTERIOR LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Interior luminaires.
- B. Exit signs.
- C. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - Grounding and Bonding
- B. Section 26 05 29 - HANGERS AND SUPPORTS.
- C. Section 26 05 33.16 - BOXES.

**1.03 REFERENCE STANDARDS**

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.
- C. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps 2017, with Editorial Revision (2022).
- D. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.
- E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.
- F. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1598 - Luminaires Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Submittal Procedures
- B. Shop Drawings: Indicate dimensions and components for each luminaire.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Conform to requirements of NFPA 70 and NFPA 101.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS - LUMINAIRES**

- A. As indicated on the Drawings.
- B. Substitutions: See Section 01 60 00 - Product Requirements except where individual luminaire types are designated with substitutions not permitted.

### **2.02 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- G. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- H. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- I. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- J. Grid Ceilings: Fasten luminaires to ceiling grid members using suitable clips.
- K. Install recessed luminaires to permit removal from below.
- L. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- M. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Drawings.
- N. Install accessories furnished with each luminaire.
- O. Connect luminaires and exit signs to branch circuit outlets provided under Section 26 0537 using flexible conduit.

- P. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- Q. Bond products and metal accessories to branch circuit equipment grounding conductor.
- R. Install lamps in each luminaire.

**3.02 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection in accordance with Section 01450 and 01451
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

**3.03 CLEANING**

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

**3.04 PROTECTION**

- A. Relamp luminaires that have failed lamps at Substantial Completion.

**3.05 SCHEDULE - SEE DRAWINGS**

**END OF SECTION**

**SECTION 26 56 00  
EXTERIOR LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior luminaires.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 29 - HANGERS AND SUPPORTS.
- B. Section 26 05 33.16 - BOXES.

**1.03 REFERENCE STANDARDS**

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.
- C. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps 2017, with Editorial Revision (2022).
- D. IES RP-8 - Recommended Practice: Lighting Roadway and Parking Facilities 2022.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2000 (Reaffirmed 2006).
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 1598 - Luminaires Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3300 - Submittal Procedures
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. As indicated on the Drawings.

## **2.02 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.03 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Install lamps in each luminaire.
- I. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor.

### **3.02 FIELD QUALITY CONTROL**

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

### **3.03 CLEANING**

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.

- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

**3.04 SCHEDULE - SEE DRAWINGS**

**END OF SECTION**

SECTION 31 10 00  
SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Protecting existing vegetation to remain.
  2. Removing existing vegetation.
  3. Clearing and grubbing.
  4. Stripping and stockpiling topsoil.
  5. Removing above- and below-grade site improvements.
  6. Temporary erosion and sedimentation control.

1.2 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- C. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify Ohio 811 for area where Project is located before site clearing.

- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
- E. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

### 3.3 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.



1. Notify Owner not less than five (5) days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

### 3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  2. Grind down stumps and remove roots larger than 2 inches (50 mm) in diameter, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
  3. Use only hand methods or air spade for grubbing within protection zones.
  4. Chip removed tree branches and stockpile in areas approved by Owner.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

### 3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth in a manner to prevent intermingling with underlying subsoil or other waste materials.
  1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  1. Stockpile surplus topsoil to allow for respreading deeper topsoil.

### 3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

### 3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 31 20 00  
EARTH MOVING

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. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, and pavements.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks and pavements.
6. Subbase course and base course for asphalt paving.
7. Subsurface drainage backfill for walls and trenches.
8. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
2. Section 311000 "Site Clearing" for site stripping, grubbing, stripping [ ] topsoil, and removal of above- and below-grade improvements and utilities.
3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
4. Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct preexcavation conference at Project site.
  - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
    - a. Personnel and equipment needed to make progress and avoid delays.
    - b. Coordination of Work with utility locator service.
    - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
    - d. Extent of trenching by hand or with air spade.
    - e. Field quality control.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  - 1. Classification according to ASTM D 2487.
  - 2. Laboratory compaction curve according to ASTM D 698.

## 1.6 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

## 1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify Ohio 811 Call Before You Dig" for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in are in place.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- C. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

- F. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and zero to 5 percent passing a No. 8 (2.36-mm) sieve.
- G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and zero to 5 percent passing a No. 4 (4.75-mm) sieve.
- H. Sand: ASTM C 33/C 33M; fine aggregate.
- I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 DEWATERING

- A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
- B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

- D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  - 2. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
    - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

### 3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  - 2. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
  - 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

### 3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.
  - 1. Clearance: **12** inches **300** mm
- C. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
  - 1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

### 3.8 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade with a pneumatic-tired roller with a weight of **10** tons, **15** tons, or **13.6** tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction, **3** times. Limit vehicle speed to 3 mph (5 km/h).
  - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### 3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.



### 3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring, bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill voids with satisfactory soil while removing shoring and bracing.
- D. Initial Backfill:
  - 1. Soil Backfill: Place and compact initial backfill of  free of particles larger than **1  25**  in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.
    - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Final Backfill:
  - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Warning Tape: Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

### 3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
  - 3. Under steps and ramps, use engineered fill.
  - 4. Under building slabs, use engineered fill.
  - 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### 3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than **8** inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to **ASTM D 1557**:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at **98** percent.
  - 2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at **95** percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at **85** percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at **95** percent.

### 3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
1. Turf or Unpaved Areas: Plus or minus **1** inch (25 mm) .
  2. Walks: Plus or minus **1** inch (25 mm) .
  3. Pavements: Plus or minus **1/2** inch (13 mm) .
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

### 3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course [ 12 inches (305 mm) ] on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course [ 12 inches (305 mm) ] under pavements and walks as follows:
1. Place base course material over subbase course under hot-mix asphalt pavement.
  2. Shape subbase course and base course to required crown elevations and cross-slope grades.
  3. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
  4. Place subbase course [ 12 inches (305 mm) ] that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
  5. Compact subbase course [ 12 inches (305 mm) ] at optimum moisture content to required grades, lines, cross sections, and thickness to not less than [95] percent of maximum dry unit weight according to **ASTM D 1557**.

### 3.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
1. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
  2. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
  3. Compact each layer of drainage course to required cross sections and thicknesses to not less than **95** percent of maximum dry unit weight according to ASTM D 698.

### 3.19 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  - 2. Determine that fill material classification and maximum lift thickness comply with requirements.
  - 3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab but in no case fewer than three tests.
  - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length but no fewer than two tests.
  - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length but no fewer than two tests.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

### 3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

**SECTION 31 66 13  
RAMMED AGGREGATE PIERS**

**PART 1- GENERAL REQUIREMENTS**

**1.01 DESCRIPTION**

Work shall consist of designing, furnishing, and installing aggregate pier ground improvement to the lines and grades designated on the project foundation plan and as specified herein. Aggregate pier ground improvement as referenced in this specification shall be constructed by either vibro stone columns or Rammed Aggregate Pier<sup>□</sup> systems. The aggregate piers shall be in a columnar-type configuration and shall be used for support of foundation loads.

**1.02 WORK INCLUDED**

- A. Provision of all equipment, material, labor, and supervision to design and install aggregate piers. Design shall rely on subsurface information presented in the project geotechnical report. Site/Working grade preparation, layout of aggregate piers, spoil removal (as required), footing excavations, and subgrade preparation following aggregate pier installation is not included.
- B. The aggregate pier design and installation shall adhere to all methods and standards described in this Specification.
- C. Drawings and General Provisions of the Contract, including General and Supplemental Conditions, and Division 1 Specifications, apply to the work in this specification.

**1.03 APPROVED INSTALLERS**

- A. The Aggregate Pier Installer (the Installer) shall be approved by the Project Geotechnical and Structural Engineer (Owner's Engineer) prior to bid opening. Without exception, no alternate installer will be accepted unless approved by the Owner's Engineer at least two (2) weeks prior to bid opening.
- B. Installers of aggregate pier foundation systems shall have a minimum of 5 years of local experience with the installation of aggregate pier systems and shall have completed at least 50 regional specific projects.
- C. Installers licensed by the Geopier Foundation Company, Inc. ([www.geopier.com](http://www.geopier.com)) will be accepted as approved installer.

**1.04 REFERENCE STANDARDS**

- A. Design
  - 1. "Control of Settlement and Uplift of Structures Using Short Aggregate Piers," by Evert C. Lawton (Assoc. Prof., Dept. of Civil Eng., Univ. of Utah), Nathaniel S. Fox (President, Geopier Foundation Co., Inc.), and Richard L. Handy (Distinguished Prof. Emeritus, Iowa State Univ., Dept. of Civil Eng.), reprinted from *IN-SITU DEEP SOIL IMPROVEMENT, Proceedings of sessions sponsored by the Geotechnical Engineering Division/ASCE in conjunction with the ASCE National Convention held October 9-13, 1994, Atlanta, Georgia.*

2. "Settlement of Structures Supported on Marginal or Inadequate Soils Stiffened with Short Aggregate Piers," by Evert C. Lawton and Nathaniel S. Fox. *Geotechnical Special Publication No. 40: Vertical and Horizontal Deformations of Foundations and Embankments*, ASCE, 2, 962-974.
  3. "Behavior of Geopier-Supported Foundation Systems during Seismic Events," by Kord Wissmann, Evert C. Lawton, and Tom Farrell. Geopier Foundation Company, Inc. Blacksburg, VA □1999.
  4. "The design of vibro replacement." H.J. Priebe. *Ground Engineering*, London. Dec 1995.
- B. Modulus Testing
1. ASTM D 1143 - Pile Load Test Procedures
  2. ASTM D 1194 - Spread Footing Load Test
- C. Materials and Inspection
1. ASTM D 1241 - Aggregate Quality
  2. ASTM D 422 - Gradation of Soils
- D. Where specifications and reference documents conflict, the Aggregate Pier Designer shall make the final determination of the applicable document.

#### **1.05 CERTIFICATIONS AND SUBMITTALS**

- A. Design Calculations - The Installer shall submit detailed design calculations and construction drawings prepared by the Aggregate Pier Designer (the Designer) for review and approval by the Owner or Owner's Engineer. All plans shall be sealed by a Professional Engineer in the State in which the project is constructed.
- B. Professional Liability Insurance - The Aggregate Pier Designer shall have Errors and Omissions design insurance for the work. The insurance policy should provide a minimum coverage of \$3 million per occurrence.
- C. Building Code Acceptance – The Aggregate Pier Installer shall demonstrate that the Aggregate Pier system has been evaluated by the International Code Council (formerly ICBO).
- D. Modulus Test Reports – A modulus test(s) is performed on a non-production Aggregate Pier element as required by the Aggregate Pier Designer to verify the design assumptions. The Installer shall furnish the General Contractor a description of the installation equipment, installation records, complete test data, analysis of the test data and verification of the design parameter values based on the modulus test results. The report shall be prepared under direction of a Registered Professional Engineer.
- E. Daily Aggregate Pier Progress Reports – The Installer shall furnish a complete and accurate record of Aggregate Pier installation to the General Contractor. The record shall indicate the pier location, length, volume of aggregate used or number of lifts, densification forces during installation, and final elevations or depths of the base and top of piers. The record shall also indicate the type and size of the installation equipment used, and the type of aggregate used. The Installer shall immediately report any unusual

conditions encountered during installation to the General Contractor, to the Designer and to the Testing Agency.

**PART 2- MATERIALS**

**2.01 AGGREGATE**

- A. Aggregate used by the Aggregate Pier Installer for pier construction shall be pre-approved by the Designer and shall demonstrate suitable performance during modulus testing.
- B. General use aggregate may consist of well-graded aggregate, recycled concrete, or other graded aggregate approved by the Designer
- C. Potable water or other suitable source shall be used to increase aggregate moisture content where required. The General Contractor shall provide such water to the Installer.

**PART 3- DESIGN REQUIREMENTS**

**3.01 AGGREGATE PIER DESIGN**

- A. The design of the Aggregate Pier system shall be based on the service load bearing pressure and the allowable total and differential settlement criteria of all footings indicated by the design team for support by the Aggregate Pier system. The Aggregate Pier system shall be designed in accordance with generally accepted engineering practice and the methods described in Section 1 of these Specifications. The design life of the structure shall be 50 years.
- B. The design shall meet the following criteria.

**F**

Maximum Allowable Bearing Pressure for Footings supported by Rammed Aggregate Pier Reinforced Soils	4,500 psf
Estimated Total Long-Term Settlement for Footings:	≤ 1-inch
Estimated Long-Term Differential Settlement of Adjacent Footings:	≤ ½-inch

- C. The Aggregate Pier elements shall be designed and installed to completely penetrate existing fills where encountered and designs shall consider stresses imposed by adjacent footings, as applicable.
- D. The Aggregate Pier elements shall be designed using an Aggregate Pier stiffness modulus to be verified by the results of the modulus test described in Section 5.02 of these specifications.



### **3.02 DESIGN SUBMITTAL**

The Installer shall submit detailed design calculations, construction drawings, and shop drawings, (the Design Submittal), for approval at least 1 week(s) prior to the beginning of construction. A detailed explanation of the design parameters for settlement calculations shall be included in the Design Submittal. Additionally, the quality control test program for Aggregate Pier system, meeting these design requirements, shall be submitted. All computer-generated calculations and drawings shall be prepared and sealed by a Professional Engineer, licensed in the State or Province where the piers are to be built. Submittals will be submitted electronically only unless otherwise required by specific submittal instructions.

## **PART 4 EXECUTION**

### **4.01 APPROVED INSTALLATION PROCEDURES**

The following sections provide general criteria for the construction of the Aggregate Piers. Unless otherwise approved by the Designer, the installation method used for Aggregate Pier construction shall be that as used in the construction of the successful modulus test.

- A. Aggregate Piers Installed using augered Rammed Aggregate Pier systems –
  - 1. Augered Rammed Aggregate Pier systems shall be pre-augered using mechanical drilling or excavation equipment.
  - 2. If cave-ins occur during excavation such that the sidewalls of the hole are deemed to be unstable, steel casing shall be used to stabilize the cavity, or a displacement Rammed Aggregate Pier system may be used.
  - 3. Aggregate shall be placed in the augered cavity in compacted lift thicknesses no greater than 24 inches as determined by the Aggregate Pier Designer.
  - 4. Should cave-ins occur on top of a lift of aggregate such that the volume of the caved soil is greater than 10 percent of the volume of the aggregate in the lift, then the aggregate shall be considered contaminated and shall be removed and replaced with uncontaminated aggregate.
  - 5. A specially designed beveled tamper and high-energy impact densification apparatus shall be employed to densify lifts of aggregate during installation. The tamper diameter shall be at least 80% of the pre-augered hole diameter. The apparatus shall apply direct downward impact energy to each lift of aggregate.
  
- B. Aggregate Piers Installed using Displacement Rammed Aggregate Pier systems –
  - 1. Displacement Rammed Aggregate Pier systems shall be constructed by advancing a specially designed mandrel augmented by dynamic vertical ramming energy to the full design depth. The hollow-shaft mandrel, filled with aggregate, is incrementally raised, permitting the aggregate to be released into the cavity, and then lowered by vertically advancing and/or ramming to densify the aggregate and force it laterally into the adjacent soil. The cycle of raising and lowering the mandrel is repeated to the top of pier elevation. The cycle distance shall be determined by the Rammed Aggregate Pier designer.

2. Special high-energy impact densification apparatus shall be employed to vertically densify the Rammed Aggregate Pier elements during installation of each constructed lift.
3. Densification shall be performed using a mandrel/tamper. The mandrel/tamper foot is required to adequately increase the lateral earth pressure in the matrix soil during installation.
4. Downward crowd pressure shall be applied to the mandrel during installation.

C. Aggregate Piers Installed using Vibroflot Stone Columns

1. If vibroflot stone column construction is used to construct the Aggregate Piers, the Installer shall use an electric down-hole vibroflot (probe) capable of providing at least 200 HP of rated energy and a centrifugal force of 30 tons. The vibroflot diameter must be at least 60% of the Aggregate Pier design diameter. An appropriate metering device should be provided at such a location that inspection of amperage build-up may be verified during the operation of the equipment. Metering device may be an ammeter directly indicating the performance of the vibroflot tip of the eccentric. Complete equipment specifications should be submitted to the Engineer and General Contractor prior to commencement of the fieldwork.
2. The probe and follower tubes shall be of sufficient length to reach the elevations shown on the installer's approved construction drawings. The probe, used in combination with the available pressure to the tip jet, shall be capable of penetration to the required tip elevation. Pre-augering shall be used to aid in achieving design penetration depths.
3. The probe shall penetrate into the foundation soil layer to the minimum depths required in the installer's construction plans. After penetration to the required depth, the probe shall not be withdrawn more than 2 feet at any time unless the stone stops flowing to the bottom of the probe.
4. Redriving the probe into the treated depth shall be attempted at approximately 12 to 18-inch intervals to observe resistance to penetration and amperage build-up. During redriving, the probe tip shall penetrate to within 1 foot of the previous redriving depth.
5. Amperage build-up and backfill quantities will be contingent upon the type of probe used and procedures. Prior to commencement of work, the contractor shall discuss the equipment capabilities with the Engineer to determine if trial probes will be necessary.
6. The Installer shall provide a full-time third-party quality control technician on-site during the installation process.

**4.02 PLAN LOCATION AND ELEVATION OF AGGREGATE PIERS**

The as-built center of each pier shall be within 6 inches of the locations indicated on the plans. Piers installed outside of the above tolerances and deemed not acceptable by the Designer shall be rebuilt at no additional expense to the Owner.

**4.03 REJECTED AGGREGATE PIERS**

Aggregate Pier elements installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers unless the Designer approves the condition or provides other remedial measures. All material and labor required to replace rejected piers shall be provided at no additional cost to the Owner unless the cause of rejection is due to an obstruction or mislocation.

## **PART 5- QUALITY CONTROL**

### **5.01 CONTROL TECHNICIAN**

The Installer shall have a full-time, third-party Control Technician on site to verify and report all installation procedures. The Installer shall immediately report any unusual conditions encountered during installation to the Aggregate Pier Designer, the General Contractor, and to the Testing Agency. The quality control procedures shall include the preparation of Aggregate Pier Progress Reports completed during each day of installation containing the following information:

1. Footing and Aggregate Pier location.
2. Pre-auger diameter and soil conditions encountered during drilling (if required).
3. Aggregate Pier length.
4. Planned and actual Aggregate Pier elevations at the top and bottom of the Aggregate Pier.
5. Average lift thickness of each Aggregate Pier.
6. Volume of aggregate used in each Aggregate Pier.
7. Documentation of any unusual conditions encountered.
8. Type and size of densification equipment used.

### **5.02 AGGREGATE PIER MODULUS TEST**

When authorized, an Aggregate Pier Modulus Test(s) shall be performed at locations agreed upon by the Aggregate Pier Designer and the Testing Agency to verify or modify Aggregate Pier designs. Modulus Test Procedures shall utilize appropriate portions of ASTM D 1143 and ASTM D 1194, as outlined in the Aggregate Pier design submittal. The test element shall be tested to a load equal to the element area times at least 150 percent of the Aggregate Pier element's maximum design stress (not allowable bearing pressure for footings) to demonstrate that the element exhibits the expected design pier stiffness during service loading. Single-element modulus tests that are proposed to be loaded as a function of allowable bearing pressure are not considered standard practice and will not be accepted since the allowable bearing pressure is often only a fraction of the Aggregate Pier element's maximum design stress.

### **5.04 BOTTOM STABILIZATION TESTING BST / CROWD STABILIZATION TESTING CST**

Bottom stabilization testing (BSTs) or Crowd stabilization testing (CSTs) shall be performed by the Control Technician during the installation of the modulus test pier. The tests are performed by applying downward vertical energy to the tamper, mandrel or probe following lift construction and monitoring the amount of additional deflection from the applied energy. Additional testing as required by the Aggregate Pier Designer (minimum 10% of the production Aggregate Piers) shall be performed on selected production Aggregate Pier elements to compare results with the modulus test pier.

## **PART 6- QUALITY ASSURANCE**

### **6.01 INDEPENDENT ENGINEERING TESTING AGENCY OWNER'S QUALITY ASSURANCE**

21062.00 City of Beavercreek  
Salt Barn & 9-Acre Property  
Site Improvements  
Bid Documents

Rammed Aggregate Piers

31 66 13- 6  
October 05, 2023

The Aggregate Pier Installer shall provide full-time, third-party Quality Control monitoring of Aggregate Pier construction activities. The Owner or General Contractor is responsible for retaining an independent engineering testing firm to provide Quality Assurance services.

#### **6.02 RESPONSIBILITIES OF INDEPENDENT ENGINEERING TESTING AGENCY**

- A. The Testing Agency shall monitor the modulus test pier installation and testing. The Installer shall provide and install all dial indicators and other measuring devices.
- B. The Testing Agency shall monitor the installation of Aggregate Piers to verify that the production installation practices are similar to those used during the installation of the modulus test elements.
- C. The Testing Agency shall report any discrepancies to the Installer and General Contractor immediately.
- D. The Testing Agency shall observe the excavation, compaction and placement of the foundations as described in Section 7.05. Dynamic Cone Penetration testing or other approved testing methods may be performed to evaluate the footing bottom condition as determined by the Testing Agency.

### **PART 7- RESPONSIBILITIES OF THE GENERAL CONTRACTOR**

#### **7.01 SITE PREPARATION AND PROTECTION**

- A. The General Contractor shall locate and protect underground and aboveground utilities and other structures from damage during installation of the Aggregate Piers.
- B. Site grades for aggregate pier installation shall be within 1 foot of the top of footing elevation or finished grade elevation to minimize aggregate pier installation depths. Ground elevations and bottom of footing elevations shall be provided to the Aggregate Pier Installer in sufficient detail to estimate installation depth elevations to within 3 inches.
- C. The General Contractor will provide site access to the Installer, after earthwork in the area has been completed. A working surface shall be established and maintained by the General Contractor to provide wet weather protection of the subgrade and to provide access for efficient operation of the Aggregate Pier installation.
- D. Prior to, during and following Aggregate Pier installation, the General Contractor shall provide positive drainage to protect the site from wet weather and surface ponding of water.
- E. If spoils are generated by aggregate pier installation, spoil removal from the aggregate pier work area in a timely manner to prevent interruption of aggregate pier installation is required.

#### **7.02 AGGREGATE PIER LAYOUT**

The location of aggregate pier-supported foundations for this project, including layout of individual aggregate pier elements, shall be marked in the field using survey stakes or other means approved by the Installer at locations shown on the drawings.

#### **7.03 CONTRACTOR'S / OWNER'S INDEPENDENT TESTING AGENCY OWNER'S QUALITY ASSURANCE**

General Contractor is responsible for acquiring an Independent Testing Agency (Quality Assurance) as required. Testing Agency roles are as described in Part 6 of this specification. The Aggregate Pier Installer will provide Quality Control services as described in Part 5 of this specification.

#### **7.04 EXCAVATIONS FOR OBSTRUCTIONS**

- A. Should any obstruction be encountered during Aggregate Pier installation, the General Contractor shall be responsible for promptly removing such obstruction, or the pier shall be relocated or abandoned. Obstructions include, but are not limited to, boulders, timbers, concrete, bricks, utility lines, etc., which shall prevent installing the piers to the required depth or shall cause the pier to drift from the required location.
- B. Dense natural rock or weathered rock layers shall not be deemed obstructions, and piers may be terminated short of design lengths on such materials.

#### **7.05 UTILITY EXCAVATIONS**

The General Contractor shall coordinate all excavations made subsequent to Aggregate Pier installations so that excavations do not encroach on the piers as shown in the Aggregate Pier construction drawings. Protection of completed Aggregate Piers is the responsibility of the General Contractor. In the event that utility excavations are required in close proximity to the installed Aggregate Piers, the General Contractor shall contact the Aggregate Pier Designer immediately to develop construction solutions to minimize impacts on the installed Aggregate Pier elements.

#### **7.06 FOOTING BOTTOMS**

- A. Excavation and surface compaction of all footings shall be the responsibility of the General Contractor.
- B. Foundation excavations to expose the tops of Aggregate Piers shall be made in a workman-like manner, and shall be protected until concrete placement, with procedures and equipment best suited to (1) avoid exposure to water, (2) prevent softening of the matrix soil between and around the Aggregate Piers before pouring structural concrete, and (3) achieve direct and firm contact between the dense, undisturbed Aggregate Piers and the concrete footing.
- C. All excavations for footing bottoms supported by Aggregate Pier foundations shall be prepared in the following manner by the General Contractor. Recommended procedures for achieving these goals are to:
  - 1. Limit over-excavation below the bottom of the footing to 3-inches (including disturbance from the teeth of the excavation equipment).
  - 2. Compaction of surface soil and top of Aggregate Piers shall be prepared using a motorized impact compactor ("Wacker Packer," "Jumping Jack," or similar). Sled-type tamping devices shall only be used in granular soils and when approved by the designer. Loose or soft surficial soil over the entire footing bottom shall be recompacted or removed, respectively. The surface of the aggregate pier shall be recompacted prior to completing footing bottom preparation.
  - 3. Place footing concrete immediately after footing excavation is made and approved by owner's testing agency, preferably the same day as the excavation. Footing concrete must be placed on the same day if the footing is bearing on moisture-sensitive soils.

If same day placement of footing concrete is not possible, open excavations shall be protected from surface water accumulation. A lean concrete mud-mat may be used to accomplish this. Other methods must be pre-approved by the Designer.

- D. The following criteria shall apply, and a written inspection report sealed by the project Testing Agency shall be furnished to the Installer to confirm:
  - 1. That water has not been allowed to pond in the footing excavation at any time.
  - 2. That all Aggregate Piers designed for each footing have been exposed in the footing excavation.
  - 3. That immediately before footing construction, the tops of Aggregate Piers exposed in each footing excavation have been inspected and recompactd as necessary with mechanical compaction equipment.
  - 4. That no excavations or drilled shafts (elevator, etc) have been made after installation of Aggregate Pier elements within the excavation limits described in the Aggregate Pier construction drawings, without the written approval of the Installer or Designer.
- E. Failure to provide the above inspection and certification by the Testing Agency, which is beyond the responsibility of the Aggregate Pier Installer, may void any written or implied warranty on the performance of the Aggregate Pier system.

**PART 8- PAYMENT**

**8.01 METHOD OF MEASUREMENT**

- A. Measurement of the aggregate piers is on a lump sum basis.
- B. Payment shall cover design, supply, and installation of the aggregate pier foundation system. Excavation of unsuitable materials, delays, re-engineering, and remobilization as documented and approved by the Owner or Owner's Engineer, shall be paid for under separate pay items.

**8.02 BASIS OF PAYMENT**

- A. The accepted quantities of piers will be paid per approval, in-place aggregate-pier. Payment will be made under:

<u>Pay Item:</u>	<u>Pay Unit:</u>
Preparation of plans and specifications and installation of aggregate pier elements	\$____ Lump Sum

SECTION 32 12 16  
ASPHALT PAVING

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. Hot-mix asphalt paving.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference.
1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
    - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
    - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include technical data and tested physical and performance properties.
  2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
  3. Job-Mix Designs: For each job mix proposed for the Work.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each paving material.

- B. Material Test Reports: For each paving material, by a qualified testing agency.
- C. Field quality-control reports.

#### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of **ODOT** for asphalt paving work.
  - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

#### 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
  - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.
  - 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement.

### PART 2 - PRODUCTS

#### 2.1 AGGREGATES

- A. General: Use materials and gradations in accordance with the ODOT specifications.
- B. Coarse Aggregate: Per ODOT Material Specifications
- C. Mineral Filler: Per ODOT Material Specifications

#### 2.2 ASPHALT MATERIALS

- A. Asphalt Binder: Per ODOT Material Specifications
- B. Asphalt Cement: : Per ODOT Material Specifications
- C. Tack Coat: Per ODOT Material Specifications



- D. Water: Potable.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

### 3.3 PLACING HOT-MIX ASPHALT

- A. Per ODOT Specifications.
- B. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- C. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- D. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- E. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- F. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

SECTION 33 42 00  
STORMWATER CONVEYANCE

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. PE pipe and fittings.
  - 2. PVC pipe and fittings.
  - 3. Concrete pipe and fittings.
  - 4. Cleanouts.
  - 5. Manholes.
  - 6. Catch basins.
  - 7. Stormwater inlets.

1.3 DEFINITIONS

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Manholes: Include plans, elevations, sections, details, frames, and covers.
  - 2. Catch basins. Include plans, elevations, sections, details, frames, covers, and grates.
  - 3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of pipe and fitting, from manufacturer.
- B. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes in accordance with manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets in accordance with manufacturer's written rigging instructions.

## PART 2 - PRODUCTS

- A. Pipe and Fittings:
- B. Gaskets: ASTM C 564, rubber.
  - 1. Gaskets: AWWA C111/A21.11, rubber.

## 2.2 CORRUGATED-PE PIPE AND FITTINGS

- A. Source Limitations: Obtain corrugated-PE pipe and fittings from single manufacturer.
- B. Corrugated-PE Drainage Pipe and Fittings NPS 3 to NPS 10 (DN 80 to DN 250): AASHTO M 252, Type S, with smooth waterway for coupling joints.
- C. Corrugated-PE Pipe and Fittings NPS 12 to NPS 60 (DN 300 to DN 1500): AASHTO M 294, Type S, with smooth waterway for coupling joints.
- D. Corrugated-PE Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
- E. Corrugated-PE Soiltight Couplings: AASHTO M 294, corrugated, matching pipe and fittings.

## 2.3 PVC PIPE AND FITTINGS

- A. Source Limitations: Obtain PVC pipe and fittings from single manufacturer.
- B. NSF Marking: Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic storm drain and "NSF-sewer" for plastic storm sewer piping.

- C. PVC Cellular-Core Piping:
  - 1. PVC Cellular-Core Pipe and Fittings: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness, PVC cellular-core pipe with plain ends for solvent-cemented joints.
  - 2. Fittings: ASTM D 3034, SDR 35, PVC socket-type fittings.
- D. PVC Type PSM Sewer Piping:
  - 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
  - 2. Fittings: ASTM D 3034, PVC with bell ends.
  - 3. Gaskets: ASTM F 477, elastomeric seals.
- E. PVC Water-Service Piping:

## 2.4 CLEANOUTS

- A. Cast-Iron Cleanouts:
  - 1. Source Limitations: Obtain cast-iron cleanouts from single manufacturer.
  - 2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside caulk or spigot connection and countersunk, tapered-thread, brass closure plug.

## 2.5 MANHOLES

- A. Standard Precast Concrete Manholes:
  - 1. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 2. Diameter: 48 inches (1200 mm) minimum unless otherwise indicated.
  - 3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
  - 4. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
  - 5. Riser Sections: 4-inch (102-mm) minimum thickness, and lengths to provide depth indicated.
  - 6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
  - 7. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
  - 8. Steps: Individual FRP steps or FRP ladder wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than **60 1500** inches (mm).

9. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
10. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

## 2.6 CONCRETE

A. General: Cast-in-place concrete in accordance with ACI 318 (ACI 318M), ACI 350 (ACI 350M), and the following:

1. Cement: ASTM C 150/C 150M, Type II.
2. Fine Aggregate: ASTM C 33/C 33M, sand.
3. Coarse Aggregate: ASTM C 33/C 33M, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

## 2.7 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Per standard ODOT specification

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

### 3.3 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants in accordance with ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 (76) inches (mm) above finished surface elsewhere unless otherwise indicated.

### 3.4 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

### 3.5 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.
- F. Backfill to grade in accordance with Section 312000 "Earth Moving."

### 3.6 CLEANING

- A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION 334200

**SECTION 43 22 56  
SALT BRINE PRODUCTION SYSTEM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping

**1.02 RELATED REQUIREMENTS**

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1 and 2, General Requirements, are included as a part of this Section as though bound herein.
- B. 03 3000 - Cast in Place Concrete
- C. 22 0501 - Plumbing Materials & Methods
- D. 26 2717 - Equipment Wiring
- E. 32 1313 - Concrete Paving
- F. 33 1116 - Site Water Utility Distribution Piping

**1.03 SUMMARY**

- A. The Division 22 plumbing contractor shall be responsible for the removal and installation of the brine production and storage system. All pumps, tanks, fill station manifold, brine production system and controls shall be removed and reinstalled. All wiring, brine piping/valves and Hydraulic piping/fittings/valves to be removed and replaced when installed at the new building. Owner will furnish the additional tank and pump required at the new location to be installed by the contractor.

**1.04 REFERENCE STANDARDS**

- A. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2011.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Submit capacity requirements, catalog cutsheets, and illustrations in accordance with the requirements of specifications and as required by specific sections of this Specification.
- C. Submittals on building shelter: Include plans and elevations, fabrication details indicating laminate thickness and section depths and widths, location of openings, size and location of anchor bolts, gasketing details, insulation properties, electrical information, and unit heater properties.
- D. Shop Drawings shall be prepared by the Contractor or supplier.
  - 1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply, and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, piping, ductwork, and the like, and its relation to the building so there will be no irregularities or interferences. Shop drawings shall be prepared in coordination with other Contractors and other trades.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Ohio Department of Transportation's name and registered with manufacturer.



## **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- C. Performance: 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.
- D. Contractor shall explain all components of the plumbing system and demonstrate their operation and maintenance to the owner's representative.

## **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver the Salt Brine Production System and shelter to the new location. Handle and store the system to prevent damage.

## **1.08 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide one year parts and labor warranty on all equipment from date of startup.
- C. Provide one year cellular service with remote troubleshooting for the Henderson Xtreme alternate system.

## **PART 2 PRODUCTS**

### **2.01 PIPING**

- A. Schedule 80 PVC with solvent welding joints. This piping shall be used within the pump house building to the exterior wall for connection to flex hoses outside.
- B. 2" EPDM spiral plied synthetic fabric with wire helix. Temperature range -40F to 180F. This piping is to be used at the exterior of the building.
- C. Fittings, valves and couplings: Cam-lock design. Polypropylene construction with stainless steel levers.
- D. Hydraulic tubing, SAE 100R16 / SAE 100R2, 4,300 psig minimum operating pressure. Minimum wall thickness shall be 1/2" – 0.083" wall. Fittings shall be crimped with threaded ends compatible with the pipe with similar characteristics. Coordinate connection sizes with the existing pump connections.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. If a manufacturer other than the basis of design is provided, the Division 22 Plumbing contractor shall be responsible to coordinate all electrical changes with Division 26 electrical contractor. Division 22 plumbing contractor shall assume all cost for required electrical changes.
- B. Provide instructions manual for detailed start-up, operational and maintenance information. Coordinate operations with the owner requirements.
- C. Install the shelter level and bolt anchors using similar bolt-down method.
- D. Division 26 Electrical contractor shall connect to power supply.
- E. Contractor shall connect to water supply. Contractor shall make all plumbing connections to the system as required to create a fully operational system.
- F. Test completed assembly to assure proper operation of entire complete system.
- G. Clean and demonstrate operation to owner.

**3.02 SYSTEM STARTUP**

- A. Pengwyn representative shall provide startup of system and controls. Contact is number is (614)488 -2861

**END OF SECTION**