

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

CHARLES MILL MARINA HOUSEBOAT PATH RENOVATIONS

PROJECT MANUAL

2025

BID DATE: THURSDAY, OCTOBER 23, 2025 @  
10:00AM



# MUSKINGUM WATERSHED CONSERVANCY DISTRICT

## CHARLES MILL MARINA HOUSEBOAT PATH

### BOARD OF DIRECTORS

Ronald E. Dziedzicki, President  
Jennifer L. Ponchak, Vice President  
James M. Gresh  
Robert S. Moorehead, Jr.  
Karl R. Gebhardt

### STAFF

Craig W. Butler, Executive Director/ Secretary  
David G. Lautenschleger, P.S., Chief of Engineering



## TABLE OF CONTENTS

### INTRODUCTORY INFORMATION

|          |                   |
|----------|-------------------|
| 00 01 01 | Title Page        |
| 00 01 02 | Officials         |
| 00 01 10 | Table of Contents |

### SOLICITATION

|          |                        |
|----------|------------------------|
| 00 11 13 | Advertisement for Bids |
|----------|------------------------|

### INSTRUCTIONS FOR PROCUREMENT

|          |                         |
|----------|-------------------------|
| 00 21 13 | Instructions to Bidders |
|----------|-------------------------|

### AVAILABLE INFORMATION

|          |   |
|----------|---|
| 00 31 16 | Engineer's Estimate of Construction Costs |
|----------|---|

### PROCUREMENT FORMS AND SUPPLEMENTS (submit with bid)

|          |   |
|----------|---|
| 00 41 01 | Bid Form  |
| 00 41 43 | Unit Price Schedule                               |
| 00 43 13 | Bid Guarantee and Contract Bond                   |
| 00 43 36 | Proposed Subcontractor Form                       |
| 00 45 13 | Bidder's Qualification                            |
| 00 45 19 | Non-Collusion Affidavit                           |
| 00 45 20 | Certification of Personal Property Tax            |
| 00 45 36 | Equal Employment Opportunity (EEO) Certification  |
| 00 45 43 | Certified Copy of Corporate Resolution            |
| 00 45 45 | Certification Regarding Debarment & Other Matters |
| 00 45 60 | Safety Recordkeeping Form                         |

## CONTRACTING FORMS AND SUPPLEMENTS

|          |   |
|----------|---|
| 00 52 01 | Agreement                                   |
| 00 60 01 | Certificate of Fiscal Officer               |
| 00 60 02 | Certificate of Owner's Attorney             |
| 00 62 40 | Equal Opportunity Certificate of Compliance |
| 00 63 63 | Change Order Form                           |
| 00 62 76 | Sample Pay Application                      |

## CONDITIONS OF THE CONTRACT

|          |   |
|----------|---|
| 00 72 00 | General Conditions                            |
| 00 73 00 | Supplementary Conditions                      |
| 00 73 43 | Ohio Wage Determination Schedule              |
| 00 73 44 | Affidavit of Compliance with Prevailing Wages |

## SPECIFICATIONS GROUP

|                                    |                             |
|------------------------------------|-----------------------------|
| Division 01 – General Requirements |                             |
| 01 30 00                           | Administrative Requirements |
| 01 32 16                           | CPM Schedule                |
| 01 33 00                           | Submittal Procedures        |
| 01 57 23_a                         | SWPPP                       |

## DIVISION 02 - EXISTING CONDITIONS

|          |                                |
|----------|--------------------------------|
| 02 01 00 | Protection of Trees and Shrubs |
| 02 50 00 | Demolitions                    |

## DIVISION 03 - CONCRETE

|          |                        |
|----------|------------------------|
| 03 30 00 | Cast-In-Place Concrete |
|----------|------------------------|

## DIVISION 04 – NOT USED

## DIVISION 05 – NOT USED

## DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

|             |                                       |
|-------------|---------------------------------------|
| 06 05 23    | Wood Plastic and Composite Fastenings |
| 06 06 10.13 | Nailing Schedule                      |
| 06 10 00    | Rough Carpentry                       |
| 06 20 00    | Finish Carpentry                      |

## DIVISION 07 - THERMAL AND MOISTURE PROTECTION

|          |                |
|----------|----------------|
| 07 92 00 | Joint Sealants |
|----------|----------------|

DIVISION 08 – NOT USED

DIVISION 09 – NOT USED

DIVISION 10 – NOT USED

DIVISION 11 – NOT USED

DIVISION 12 – NOT USED

DIVISION 13 – NOT USED

DIVISION 22 – NOT USED

DIVISION 23 – NOT USED

DIVISION 24 - NOT USED

DIVISION 25 – NOT USED

## DIVISION 26 - ELECTRICAL

|          |   |
|----------|---|
| 26 00 10 | Supplemental Requirement for Electrical Work                                |
| 26 05 19 | Low-Voltage Electrical Power Conductors and Cables<br>(TA 15001 & TA 15004) |
| 26 05 26 | Grounding and Bonding for Electrical Systems                                |
| 26 05 29 | Hangers and Supports for Electrical Systems                                 |
| 26 05 33 | Raceway and Boxes for Electrical Systems                                    |
| 26 05 44 | Sleeves and Sleeve Seals for Electrical Raceways and<br>Cabling             |

|          |                                       |
|----------|---------------------------------------|
| 26 05 53 | Identification for Electrical Systems |
| 26 09 23 | Lighting Control Devices              |
| 26 24 16 | Panelboards                           |
| 26 27 16 | Electrical Cabinets and Enclosures    |
| 26 28 23 | Enclosed Circuit Breakers             |
| 26 51 00 | Exterior and Interior Lighting        |
| 26 56 13 | Lighting Poles and Standards          |

#### DIVISION 27 - NOT USED

#### DIVISION 28 – NOT USED

#### DIVISION 29 - NOT USED

#### DIVISION 30 - NOT USED

#### DIVISION 31 - EARTHWORK

|          |   |
|----------|---|
| 31 11 00 | Site Clearing   |
| 31 14 13 | Topsoil Stripping and Stockpiling                         |
| 31 22 00 | Earthwork   |
| 31 23 00 | Excavating and Fill                                       |
| 31 23 18 | Rock Removal  |
| 31 23 19 | Dewatering  |
| 31 23 33 | Trenching and Backfilling                                 |
| 31 50 00 | Excavation Support and Protection (TA 15001 and TA 15004) |

#### DIVISION 32 - EXTERIOR IMPROVEMENTS

|          |                      |
|----------|----------------------|
| 32 10 02 | Roadway and Drainage |
| 32 17 13 | Parking Bumpers      |
| 32 91 19 | Seeding              |
| 32 93 00 | Plants               |

#### DIVISION 33 - UTILITIES

|          |  |
|----------|--|
| 33 05 13 | Precast Concrete Manholes and Structures |
| 33 05 24 | HDD of HDPE                              |
| 33 11 00 | Waterline and Fittings                   |



33 13 00 Chlorination Dechlorination CM17001  
33 41 00 Storm Utility Drainage Piping (MWCD)  
33 46 00 Subdrainage  
33 47 12 Geotextile

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION  
35 42 47 Riprap Slope Protection

DIVISION 40 – PROCESS INTERCONNECTIONS  
40 05 67 Pressure Reducing Valves

DIVISION 41 – NOT USED

DIVISION 44 – NOT USED

DIVISION 46 – NOT USED

DRAWINGS



## **ADVERTISEMENT FOR BIDS**

Sealed bids will be received by the Board of Directors, Muskingum Watershed Conservancy District, 2050 Reiser Ave. SE, New Philadelphia, Ohio 44663 until 10:00am, Thursday, October 23<sup>rd</sup>, 2025 for the Charles Mill Marina Houseboat Path Renovation as set forth in Bidding Documents on file. At said time and place, the bids will be publicly opened and read aloud for the following project work:

### **CHARLES MILL MARINA HOUSEBOAT PATH RENOVATION**

Bidding Documents can be seen at the Muskingum Watershed Conservancy District (MWCD) Engineering Office at 2050 Reiser Ave. SE, New Philadelphia, OH 44663. Bidding Documents may be obtained from AA Blueprint, 2757 Gilchrist Road, Akron, OH 44305, 1-800-821-3700, or at [www.aaplanroom.com](http://www.aaplanroom.com) upon payment of \$125.00 (plus UPS Shipping and Handling, if required). Payment shall be made to AA Blueprint. Bidding Documents are not returnable for a refund.

Any questions regarding the project should be directed to Kimley-Horn in writing by email to [katherine.holmok@kimley-horn.com](mailto:katherine.holmok@kimley-horn.com) no later than 4:00pm Friday, October 17, 2025.

Each bidder must deposit with his bid, security in the amount and form as stated in the Instructions to Bidders.

Bids shall be subject to the condition that the right is reserved to hold bids for a period not longer than 60 days after date of opening and/ or to award at any time during the period.

State of Ohio Prevailing Wage Rates for Ashland County will be applicable to this project. Current prevailing wage rates are available at the Department of Commerce, Division of Industrial Compliance website (see link below). Registration is required to look up current wage rates by county.

<https://www.com.ohio.gov/dico>

The MWCD reserves the right to reject any and all bids, or to increase, to decrease or omit any item or items and/ or to award to the lowest and most responsible, responsive bidder. The MWCD also reserves the right to waive any informalities or irregularities in the Bid received.



David G. Lautenschleger, P.S.  
Chief of Engineering

Adv: Sept. 30, 2025  
Oct. 7, 2025

# INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACTS

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

---

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

---

AMERICAN SOCIETY OF CIVIL ENGINEERS

---

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE  
*A Practice Division of the*  
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

Copyright © 2007 National Society of Professional Engineers  
1420 King Street, Alexandria, VA 22314-2794  
(703) 684-2882  
[www.nspe.org](http://www.nspe.org)

American Council of Engineering Companies  
1015 15th Street N.W., Washington, DC 20005  
(202) 347-7474  
[www.acec.org](http://www.acec.org)

American Society of Civil Engineers  
1801 Alexander Bell Drive, Reston, VA 20191-4400  
(800) 548-2723  
[www.asce.org](http://www.asce.org)

Associated General Contractors of America  
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308  
(703) 548-3118  
[www.agc.org](http://www.agc.org)

The copyright for this EJCDC document is owned jointly by the four  
EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

## **ARTICLE 1 – DEFINED TERMS**

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

## **ARTICLE 2 – COPIES OF BIDDING DOCUMENTS**

2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the advertisement or invitation to bid may be obtained from the Issuing Office. The cost for Bidding Documents is non-refundable.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

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

## **ARTICLE 3 – QUALIFICATIONS OF BIDDERS**

3.01 To demonstrate Bidder's qualifications to perform the Work, within 5 days of Owner's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be requested.

3.02 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

## **ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE**

4.01 *Subsurface and Physical Conditions*

A. The Supplementary Conditions identify:

1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site.
2. Those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in

Paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

#### 4.02 *Underground Facilities*

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

#### 4.03 *Hazardous Environmental Condition*

- A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.
- B. Copies of reports and drawings referenced in Paragraph 4.03.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

#### 4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions.

#### 4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates. Bidders shall not access site outside of normal business hours on weekdays.

#### 4.06 *Other Work Onsite and Owner Safety Program*

- A. Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding



Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

- B. Paragraph 6.13.C of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.07 It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data".
- E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

- 4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

## **ARTICLE 5 – SITE AND OTHER AREAS**

- 5.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

## **ARTICLE 6 – INTERPRETATIONS AND ADDENDA**

- 6.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 6.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

## **ARTICLE 7 – BID SECURITY**

- 7.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **10** percent of Bidder's maximum Bid price if in the form of a certified check or bank money order, or in the amount of 100% of Bidder's maximum Bid price if in the form of a Bid Guarantee Bond (on the form attached or similar form meeting the requirements of the Ohio Revised Code) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 7.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

- 7.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

## **ARTICLE 8 – CONTRACT TIMES**

- 8.01 The number of days within which, or the dates by which, Milestones are to be achieved and the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

## **ARTICLE 9 – LIQUIDATED DAMAGES**

- 9.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

## **ARTICLE 10 – SUBSTITUTE AND “OR-EQUAL” ITEMS**

- 10.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

## **ARTICLE 11 – SUBCONTRACTORS, SUPPLIERS AND OTHERS**

- 11.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.

- 11.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

## **ARTICLE 12 – PREPARATION OF BID**

- 12.01 The Bid must be submitted on the Bid Form included with the Bidding Documents. Additional copies may be obtained from Owner.
- 12.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each Bid item listed therein. In the case of optional alternatives the words “No Bid,” “No Change,” or “Not Applicable” may be entered.
- 12.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 12.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 12.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 12.06 A Bid by an individual shall show the Bidder’s name and official address.
- 12.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 12.08 All names shall be printed in ink below the signatures.
- 12.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 12.11 The Bid shall contain evidence of Bidder’s authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder’s state contractor license number, if any, shall also be shown on the Bid Form.

## **ARTICLE 13 – BASIS OF BID; COMPARISON OF BIDS**

- 13.01 *Lump Sum*

*[or]*

- A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each item described in the Bidding Documents as provided for in the Bid Form. The price for each bid item will be the amount added to or deleted from the base Bid via change order after award. This list shall be used for Schedule of Values on invoices.

#### 13.02 *Allowances*

- A. For allowances, the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of allowances, if any, named in the Contract Documents, in accordance with Paragraph 11.02.B of the General Conditions. Allowances shall be approved via approved Change Order by Owner, if needed.

#### 13.03 *Completion Time Comparisons*

- A. Bid prices will be compared after adjusting for differences in the time designated by Bidders for Substantial Completion. The adjusting amount will be determined at the rate set forth in the Contract Documents for liquidated damages for failing to achieve Substantial Completion for each day before or after the desired date appearing in Article 9 above.

### **ARTICLE 14 – SUBMITTAL OF BID**

- 14.01 Bidder is not required to submit the entire project manual but may submit only those documents listed in the Table of Contents as “Procurement Forms and Supplements.”
- 14.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” A mailed Bid shall be addressed to David G. Lautenschleger, P.S., Chief of Engineering, Muskingum Watershed Conservancy District, 2050 Reiser Ave. SE, New Philadelphia, Ohio 44663.

### **ARTICLE 15 – MODIFICATION AND WITHDRAWAL OF BID**

- 15.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.
- 15.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

## ARTICLE 16 – OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

## ARTICLE 17 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

## ARTICLE 18 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. A bid that includes any additions, deletions, or other modifications to the Bid Form or Unit Price Schedule shall be deemed nonconforming. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 18.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 18.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 18.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.
- 18.06 If the Contract is to be awarded, Owner will award the Contract to the lowest responsive and most responsible Bidder **based on the lump sum total bid price.**

## ARTICLE 19 – CONTRACT SECURITY AND INSURANCE

- 19.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to contract guarantee bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

## **ARTICLE 20 – SIGNING OF AGREEMENT**

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within 15 days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

## **ARTICLE 21 – SALES AND USE TAXES**

- 21.01 Owner is exempt from Ohio state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid. Refer to Paragraph 6.10 of the Supplementary Conditions for additional information.

## **ARTICLE 22 – RETAINAGE**

- 22.01 Provisions concerning retainage are set forth in the Agreement.

## **ARTICLE 23 – LOCAL BID PROTEST PROCEDURE**

- 23.01 A protest based upon an alleged violation of the procurement requirements may be filed against the Owner's procurement action by a party with an adversely affected direct financial interest. The protest shall be filed with the Muskingum Watershed Conservancy District. The Owner shall determine the protest. The Owner may request additional information or a hearing in order to resolve the protest.
- 23.02 A protest shall be filed as early a possible during the procurement process, but must be received by the Owner no later than one week after the basis of the protest is known or should have been known, whichever is earlier. If the protest is mailed, the protester bears the risk of non-delivery within the required time period.
- 23.03 A protest must clearly present the procurement requirement being protested, the procurement regulation which is alleged to be noncompliance, the facts which support to protest, and any other information necessary to support the protest.





MUSKINGUM WATERSHED CONSERVANCY DISTRICT

CHARLES MILL MARINA HOUSEBOAT PATH RENOVATION

ENGINEER'S ESTIMATE \$ 1,243,359.00



# BID FORM FOR CONSTRUCTION CONTRACTS

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE  
*A Practice Division of the*  
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

Copyright © 2007 National Society of Professional Engineers  
1420 King Street, Alexandria, VA 22314-2794  
(703) 684-2882  
[www.nspe.org](http://www.nspe.org)

American Council of Engineering Companies  
1015 15th Street N.W., Washington, DC 20005  
(202) 347-7474  
[www.acec.org](http://www.acec.org)

American Society of Civil Engineers  
1801 Alexander Bell Drive, Reston, VA 20191-4400  
(800) 548-2723  
[www.asce.org](http://www.asce.org)

Associated General Contractors of America  
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308  
(703) 548-3118  
[www.agc.org](http://www.agc.org)

The copyright for this EJCDC document is owned jointly by the four  
EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

## **BID FORM**

### *CHARLES MILL MARINA HOUSEBOAT PATH RENOVATIONS*

#### **TABLE OF CONTENTS**

|  | <b>Page</b> |
|--|-------------|
| Article 1 – Bid Recipient.....             | 4           |
| Article 2 – Bidder’s Acknowledgements..... | 4           |
| Article 3 – Bidder’s Representations ..... | 4           |
| Article 4 – Bidder’s Certification.....    | 5           |
| Article 5 – Basis of Bid .....             | 6           |
| Article 6 – Time of Completion.....        | 7           |
| Article 7 – Attachments to This Bid .....  | 6           |
| Article 8 – Defined Terms.....             | 7           |
| Article 9 – Bid Submittal.....             | 8           |

## ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Mr. David G. Lautenschleger, P.S. Chief of Engineering  
Muskingum Watershed Conservancy District  
2050 Reiser Avenue SE  
New Philadelphia, OH 44663

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

## ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

## ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum No.

Addendum Date

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

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

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site, if any provided, and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."

- E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

#### **ARTICLE 4 – BIDDER'S CERTIFICATION**

##### **4.01 Bidder certifies that:**

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

## **ARTICLE 5 – BASIS OF BID**

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following LUMP SUM PRICE:

*Lump Sum Bid Price for Base Bid*

---

(words)

(numerals)

## **ARTICLE 6 – TIME OF COMPLETION**

6.01 Bidder agrees that the Work will be substantially complete on or before June 30, 2026, and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before July 30, 2026.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

## **ARTICLE 7 – ATTACHMENTS TO THIS BID**

7.01 The following documents are submitted with and made a condition of this Bid:

- A. Unit Price Schedule;
- B. Required Bid security in the form of Bid Guarantee and Contract Bond or Certified Check;
- C. Proposed Subcontractors Form;
- D. Bidder’s Qualification;
- E. Non-Collusion Affidavit;
- F. Certification of Personal Property Tax;
- G. Certified Copy of Corporate Resolution;
- H. Equal Opportunity (EEO) Certification;
- I. Safety Recordkeeping Form; and



## **ARTICLE 8 – DEFINED TERMS**

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

## ARTICLE 9 – BID SUBMITTAL

9.01 This Bid is submitted by:

If Bidder is:

### An Individual

Name (typed or printed): \_\_\_\_\_

By: \_\_\_\_\_  
(Individual's signature)

Doing business as: \_\_\_\_\_

### A Partnership

Partnership Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

### A Corporation

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_

By: \_\_\_\_\_  
(Signature -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_  
(CORPORATE SEAL)

Attest \_\_\_\_\_

Date of Qualification to do business in Ohio is \_\_\_\_/\_\_\_\_/\_\_\_\_.

### A Joint Venture

Name of Joint Venture: \_\_\_\_\_

First Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

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

Second Joint Venturer Name: \_\_\_\_\_ (SEAL)

By: \_\_\_\_\_  
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): \_\_\_\_\_

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

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

Bidder's Business Address \_\_\_\_\_

\_\_\_\_\_

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

E-mail \_\_\_\_\_

SUBMITTED on \_\_\_\_\_, 20\_\_\_\_.

State Contractor License No. \_\_\_\_\_. *[If applicable]*



**UNIT PRICE SCHEDULE**  
**MUSKINGUM WATERSHED CONSERVANCY DISTRICT**  
**CHARLES MILL LAKE PARK AREA SHORELINE STABILIZATION PROJECT**

Each Bid Unit Price below (Unit Price Schedule) will be used for additions and deletions and review of bids only. In some cases, items of work are shown and / or called out on the PLANS to be completed without a specific bid item in the proposal or contract for payment purposes. In such cases, the Contractor shall include the costs for those items in the unit price bid for other items of work. Additionally, these items shall be incidental to the overall project and included by the contractor:

- All disposal of waste material, cleaning up, dust, odor, and noise control.
- All bonding, staging, etc.
- All field staking as necessary for construction, except as provided herein.

|               |   | QUANTITY |       | LABOR &<br>MATERIAL | SUBTOTAL<br>COST |
|---------------|---|----------|-------|---------------------|------------------|
|               |   | NO.      | UNIT  | PER                 |                  |
|               |   | UNITS    | MEAS. | UNIT                |                  |
| <b>Item #</b> | <b>Pay Item</b>   |          |       |                     |                  |
| SPEC          | Mobilization And General Conditions   | 1        | LS    |                     |                  |
| 202           | Demolition, Complete  | 1        | LS    |                     |                  |
| SPEC          | SWPP And Control Of Water, Complete   | 1        | LS    |                     |                  |
| 201           | Clearing & Grubbing, including tree/stump removal   | 1        | LS    |                     |                  |
| SPEC          | Concrete Dock Abutments, Complete, Including all Gravel                                       | 1        | LS    |                     |                  |
| SPEC          | Concrete Path, Complete, including Gravel and Concrete to Stairs                              | 6135     | SF    |                     |                  |
| SPEC          | Gravel Drive  | 157      | SY    |                     |                  |
| SPEC          | Short Wall, Complete including all gravel   | 656      | LF    |                     |                  |
| SPEC          | Integral Curbing, Complete including all gravel   | 595      | LF    |                     |                  |
| SPEC          | Asphalt Pavement Repair (Cut & Patch)   | 224      | SF    |                     |                  |
| SPEC          | Grassy Pavers, Complete   | 7840     | SF    |                     |                  |
| 601           | Riprap, Type B, Complete including geotechnical fabric  | 455      | SY    |                     |                  |
| SPEC          | Parking Wheel Stop  | 31       | EA    |                     |                  |
| 611           | 12" Conduit, Type D   | 12       | LF    |                     |                  |
| Spec          | Drop Manhole, Complete  | 1        | EA    |                     |                  |
| SPEC          | Wood Stairs with Landings and Railing, Complete including Last Step Modification on Ex. Steps | 1        | LS    |                     |                  |

Oct. 2025

|      |  |      |        |  |           |
|------|--|------|--------|--|-----------|
| 203  | Excavation   | 331  | CY     |  |           |
| 203  | Embankment   | 271  | CY     |  |           |
| 203  | Excavation & Haul  | 60   | CY     |  |           |
| 661  | Shrubs, Rhus Armoatica 'Gro-Low,<br>#1 Cont.   | 458  | EA     |  |           |
| 661  | Tree, Cercius Canadensus Redbud 1"<br>Caliper B&B  | 13   | EA     |  |           |
| 661  | Tree, Platanus Occidentalis American<br>Sycamore 1" Caliper B&B  | 2    | EA     |  |           |
| 659  | Seeding And Mulching, Fescue Mix<br>(Class 1 Lawn)   | 1    | LS     |  |           |
| SPEC | MWCD Seed Mix B - Slope Protection   | 8234 | SF     |  |           |
| 653  | Topsoil, Furnished And Placed  | 1    | LS     |  |           |
| SPEC | Electrical Work, Complete including<br>all handholds, connections, labeling,<br>poles, posts, receptacles, luminaire,<br>testing, panels, meter relocation,<br>~2059 lf conduit, wiring, etc. and<br>commissioning | 1    | LS     |  |           |
| SPEC | Water Work, Complete including all<br>Connections, Hydrants, conduit,<br>connections, and commissioning  | 1    | LS     |  |           |
| SPEC | Allowance  | 1    | Allow. |  | \$ 75,000 |

All specified cash allowances are included in the price(s) set forth above, and have been computed in accordance with Paragraph 11.02 of the General Conditions.

Oct. 2025

## **BID GUARANTEE AND CONTRACT BOND**

### **(SECTION 153.571 OHIO REVISED CODE)**

"KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned \_\_\_\_\_ as Principal and \_\_\_\_\_ as Surety, are hereby held and firmly bound unto the Muskingum Watershed Conservancy District 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 Charles Mill Marina Houseboat Path Renovations. The penal sum referred to herein shall be the dollar amount of the Principal's bid to the Obligee, incorporating any additive or deductive alternate bids made by the Principal on the date referred to above to the Obligee, which are accepted by the Obligee. In no case shall the penal sum exceed the amount of \_\_\_\_\_ dollars (\$ \_\_\_\_\_). (If the foregoing blank is not filled in, the penal sum will be the full amount of the Principal's bid, including alternates. Alternatively, if the blank is filled in, the amount stated must not be less than the full amount of the bid including alternates, in dollars and cents. A percentage is not acceptable.) For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named Principal has submitted a bid for the above referenced project.

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 the event the Principal pays to the Obligee the difference not to exceed ten per cent 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 to exceed ten per cent of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmission, 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; if the Obligee accepts the bid of the Principal and the Principal within ten days after the awarding of the contract enters into a proper contract in accordance with 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;

Now also, if the said Principal shall well and faithfully do and perform the things agreed by Principal to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materials suppliers, 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 materials suppliers 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 therefor shall in any wise affect the obligations of said Surety on its bond."

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

**PRINCIPAL:**

\_\_\_\_\_

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

SURETY: \_\_\_\_\_

\_\_\_\_\_

BY: \_\_\_\_\_

Attorney-in-Fact

**SURETY COMPANY ADDRESS**

\_\_\_\_\_  
Street

\_\_\_\_\_  
City State Zip

**SURETY AGENT'S ADDRESS**

\_\_\_\_\_  
Agency Name

\_\_\_\_\_  
Street

\_\_\_\_\_  
City State Zip



## PROPOSED SUBCONTRACTOR FORM

If the bidder intends to subcontract any portion of the work, the portion of the work to be sublet and the name and address of such subcontractor shall be listed below. Reference is made to the General and Supplementary Conditions for provisions regarding use and approval of subcontractors.

Portion of work  
to be sublet

Proposed subcontractor

AddressThis image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings on the paper.



## BIDDER'S QUALIFICATIONS

The bidder is required to state, in detail, in the space provided below, what work of a character similar to that included in the proposed contract he has done, to give references and such other detailed information as will enable the OWNER to judge of his responsibility, experience and skill. Bidder shall include a list of current projects including a description of the work, construction cost, contact person (reference) and phone number.

[illegible]



## NON-COLLUSION AFFIDAVIT

STATE OF OHIO

COUNTY OF (\_\_\_\_\_)

\_\_\_\_\_, being first duly sworn, deposes  
and says that he/ she is \_\_\_\_\_

(sole owner, partner, president, secretary, etc.)

of \_\_\_\_\_,

the party making the foregoing proposal or bid; that such bid is genuine and not collusive or sham; that said bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other person shall refrain from bidding, and has not in any manner, directly or indirectly sought by agreement or collusions, or communication or conference, with any person, to fix the bid price of affiant or any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against Muskingum Watershed Conservancy District or any person or persons interested in the proposed contract; and that all statements contained in said proposal or bid are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information or data relative thereto to any association or to any member or agent thereof.

\_\_\_\_\_  
Affiant

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

\_\_\_\_\_  
Notary Public in and for

\_\_\_\_\_ County, Ohio  
My commission expires \_\_\_\_\_



## CERTIFICATION OF PERSONAL PROPERTY TAX

DATE: \_\_\_\_\_

TO: Muskingum Watershed Conservancy District (Owner)  
2050 Reiser Avenue SE  
New Philadelphia, Ohio 44663

RE: CONTRACTOR'S AFFIDAVIT OF COMPLIANCE WITH OHIO REVISED  
CODE, CHAPTER 5719.042\*

State of Ohio  
County of \_\_\_\_\_

I, \_\_\_\_\_ hereby make oath and say that:

1. He is the \_\_\_\_\_ of \_\_\_\_\_, the firm  
that submitted the attached bid.
2. At the time the bid was submitted, the firm named above was not  
charged with delinquent personal property taxes on the general tax list of  
personal property in Ashland County, Ohio.
3. (If applicable) the amount due and unpaid in delinquent personal property  
taxes is \$\_\_\_\_\_ and the penalties and interest on the same  
are \$\_\_\_\_\_.

\_\_\_\_\_  
CONTRACTOR

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
TITLE

Sworn to before me and subscribed in my presence by \_\_\_\_\_  
the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Notary Public in and for

\_\_\_\_\_ County, Ohio

My commission expires \_\_\_\_\_

\* Sworn statement required by Ohio Revised Code as to the status of Bidder's  
(Company's) personal property taxes

THIS AFFIDAVIT MUST BE SIGNED BEFORE THE PROJECT CAN BE AWARDED.





## Contractor Equal Employment Opportunity Certification

During the performance of this contract, the undersigned agrees as follows:

1. The undersigned will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The undersigned will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The undersigned agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this equal opportunity (federally assisted construction) clause.
2. The undersigned will, in all solicitations or advertisements for employees placed by or on behalf of the undersigned, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.
3. The undersigned will send to each labor union or representative of workers, with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representative of the undersigned's commitment under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The undersigned will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The undersigned will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and relevant orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records and accounts by the administering agency of the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the undersigned's non-compliance with the equal opportunity (federally assisted construction) clause of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part, and the undersigned may be declared ineligible for further Government contracts of federally assisted construction contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rules, regulations, or order of the Secretary of Labor, or as provided by law.
7. The undersigned will include this equal opportunity (federally assisted construction) clause in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order No. 11246 of September 24, 1965, so that such provision will be binding upon each subcontract or vendor. The undersigned will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for non compliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor, as a result of such direction by the administering agency the undersigned may request the United States to enter into such litigation to protect the interest of the United States.

---

(Signature)

---

(Date)

---

(Name and Title of Signer, Please type)

---

(Firm Name)



**CERTIFIED COPY OF CORPORATE RESOLUTION**

I \_\_\_\_\_ of \_\_\_\_\_,  
(Name and Title) (Company Name)

certify that the following resolution was adopted by the Directors of \_\_\_\_\_, and the same has not been modified or amended:

RESOLVED: that \_\_\_\_\_ shall have authority to sign all bonds, agreements, notes and all the powers and duties prescribed by Chapter 1701 of the Ohio Revised Code and such others as the Board of Directors may from time to time assign him, and specifically a contract with the Muskingum Watershed Conservancy District regarding the Charles Mill Marina Houseboat Path Renovations.

(Date)

(Name and Title)





---

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

---

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 13 CFR Part 145. The regulations were published as Part VII of the May 26, 1988 *Federal Register* (pages 19160-19211). Copies of the regulations are available from local offices of the U.S. Small Business Administration.

**(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE)**

- (1) The prospective primary participant certifies to the best of its knowledge and belief that it and its principals:
- (a) Are not presently debarred, suspended, proposed for disbarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
  - (b) Have not within a three-year period preceding this application been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
  - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
  - (d) Have not within a three-year period preceding this application had one or more public transactions (Federal, State, or local) terminated for cause or default.
- (2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective primary participant shall attach an explanation to this proposal.

Organization Name \_\_\_\_\_

Date \_\_\_\_\_

By \_\_\_\_\_  
Name and Title of Authorized Representative

\_\_\_\_\_  
Signature of Authorized Representative

## INSTRUCTIONS FOR CERTIFICATION

1. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.
2. The inability of a person to provide the certification required below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such person from participation in this transaction.
3. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.
4. The prospective primary participant shall provide immediate written notice to the department or agency to which this proposal is submitted if at any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
5. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations (13 CFR Part 145).
6. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
7. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Covered Transactions," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
8. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the ineligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.
9. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
10. Except for transactions authorized under paragraph 6 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

## SAFETY RECORDKEEPING FORM

*To be submitted with Bid forms*

|   |  |       |       |       |
|---|--|-------|-------|-------|
|   |  | Year: | Year: | Year: |
| A.  | Recordable Injury/Illness Cases (TCIR)<br><i>(total of columns G through J on 300 log)</i>   |       |       |       |
| B.  | Days Away Injury/Illness Cases (DAFWII) <i>(total of column H on 300 log)</i>                |       |       |       |
| C.  | Days Away, Restricted & Transfer Cases (DART) <i>(total of columns H &amp; I on 300 log)</i> |       |       |       |
| D.  | Number of Fatalities <i>(total of column G on 300 log)</i>                                   |       |       |       |
| E.  | Days away from work <i>(total of column K on 300 log)</i>                                    |       |       |       |
| F.  | Days on job transfer or restriction <i>(total of column L on 300 log)</i>                    |       |       |       |
| G.  | *Total Case Incident Rate <i>(use formula below)</i>   |       |       |       |
| H.  | **DAFWII Rate <i>(use formula below)</i>   |       |       |       |
| I.  | ***DART Rate <i>(use formula below)</i>  |       |       |       |
| J.  | Total Hours Worked by All Employees  |       |       |       |
| <p><b>*Formula: # of cases x 200,000 / Total Hours Worked by all employees</b><br/> <b>**DAFWII - Days Away From Work Injury and Illness Rate (formerly called Lost Time Incident Rate)</b><br/> <b>***DART – Days Away Restricted Transfer Time Rate (all cases except medical only)</b></p> |  |       |       |       |

Contractor shall provide Workers' Compensation Experience Modification Rate (EMR) for the last three years.

| YEAR  | EMR   |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

A current copy of the contractor Ohio Workers' Compensation certificate of premium payment shall be submitted with bid documents.

A copy of the Designated Safety Representative's Certificate of Completion of the OSHA 30-hour Construction Safety Program





This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

# **SUGGESTED FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)**

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE  
*A Practice Division of the*  
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

This Suggested Form of Agreement has been prepared for use with the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition). Their provisions are interrelated, and a change in one may necessitate a change in the other. The language contained in the Suggested Instructions to Bidders (EJCDC C-200, 2007 Edition) is also carefully interrelated with the language of this Agreement. Their usage is discussed in the Narrative Guide to the 2007 EJCDC Construction Documents (EJCDC C-001, 2007 Edition).

Copyright © 2007 National Society of Professional Engineers  
1420 King Street, Alexandria, VA 22314-2794  
(703) 684-2882  
[www.nspe.org](http://www.nspe.org)

American Council of Engineering Companies  
1015 15th Street N.W., Washington, DC 20005  
(202) 347-7474  
[www.acec.org](http://www.acec.org)

American Society of Civil Engineers  
1801 Alexander Bell Drive, Reston, VA 20191-4400  
(800) 548-2723  
[www.asce.org](http://www.asce.org)

Associated General Contractors of America  
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308  
(703) 548-3118  
[www.agc.org](http://www.agc.org)

The copyright for this EJCDC document is owned jointly by the four  
EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

# SUGGESTED FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

THIS AGREEMENT is by and between the Muskingum Watershed Conservancy District (“Owner”) and \_\_\_\_\_ (“Contractor”).

Owner and Contract hereby agree as follows:

## ARTICLE 1 – WORK

- 1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

CHARLES MILL MARINA HOUSEBOAT PATH

## ARTICLE 2 – THE PROJECT

- 2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

COMPLETE PROJECT

## ARTICLE 3 – ENGINEER

- 3.01 The Project has been designed by Kimley-Horn (Engineer).
- 3.02 Owner will assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

## ARTICLE 4 – CONTRACT TIMES

- 4.01 *Time of the Essence*
- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- 4.02 *Dates for Substantial Completion and Final Payment*
- A. The Work will be substantially completed on or before June 30, 2026, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before July 30, 2026.

#### 4.02 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$1,000 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$1,000 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

### **ARTICLE 5 – CONTRACT PRICE**

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraph 5.01.A, below:

- A. For all Work, a lump sum of: \$ \_\_\_\_\_  
All specific allowances are included in the above price in accordance with Paragraph 11.02 of the General Conditions.

### **ARTICLE 6 – PAYMENT PROCEDURES**

#### 6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

#### 6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 25<sup>th</sup> day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.
  - a. 92 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
  - b. 92 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

#### 6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

### **ARTICLE 7 – INTEREST**

- 7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 12 percent per annum.

### **ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS**

- 8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:
  - A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
  - B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  - C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

- D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."
- E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 8.01. D & E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

## **ARTICLE 9 – CONTRACT DOCUMENTS**

### **9.01 *Contents***

- A. The Contract Documents consist of the following:
  - 1. This Agreement (pages 1 to 10, inclusive).
  - 2. Performance bond (Contract Bond).
  - 3. Payment bond. N/A
  - 4. Other bonds.

- a. Bid Guarantee and Contract Bond (pages 00 43 13-1 to 00 43 13-2, inclusive).
5. General Conditions (pages 00 72 00-1 to 00 72 00-67, inclusive).
6. Supplementary Conditions (pages 00 73 00-1 to 00 73 00-18, inclusive).
7. Specifications as listed in the table of contents of the Project Manual.
8. Drawings consisting of 28 sheets with each sheet bearing the following general title: the Drawings listed on attached sheet index.
9. Exhibits to this Agreement (enumerated as follows):
  - a. Contractor's Bid (pages 00 41 01-1 to 00 41 01-9, inclusive).
10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
  - a. Notice to Proceed.
  - b. Work Change Directives.
  - c. Change Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

## **ARTICLE 10 – MISCELLANEOUS**

### **10.01 *Terms***

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

### **10.02 *Assignment of Contract***

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

### 10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

### 10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

### 10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
  - 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

### 10.06 *Other Provisions*

- A. None



IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on \_\_\_\_\_ (which is the Effective Date of the Agreement).

OWNER:

Muskingum Watershed Conservancy District

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

Title: President, MWCD Board of Directors

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

Title:

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

David G. Lautenschleger, P.S.

Title: Chief of Engineering

Attest: \_\_\_\_\_

Title: Jamie Carlisle, Executive Assistant

CONTRACTOR

By:

Title:

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

Title:

Address for giving notices:

License No.:

(Where applicable)

Address for giving notices:

2050 Reiser Avenue SE

New Philadelphia, OH 44663

Agent for service of process:



## CERTIFICATE OF FINANCIAL OFFICER

As Financial Officer of the Muskingum Watershed Conservancy District (MWCD), I hereby certify that funds in the amount of \$\_\_\_\_\_ have been lawfully appropriated for the purpose of meeting the obligations of the contract with:

\_\_\_\_\_  
duly authorized by approval of the Board of Directors on \_\_\_\_\_  
and are in the Treasury or in the process of collection to the credit of the  
\_\_\_\_\_ Fund, free from any previous encumbrances.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
James L. Crandall, Chief Financial Officer



## **CERTIFICATE OF OWNER'S ATTORNEY**

I, the undersigned, \_\_\_\_\_, the duly authorized and acting legal representative of the Muskingum Watershed Conservancy District, do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Attorney-at-Law

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title



**EQUAL OPPORTUNITY**  
**CERTIFICATE OF COMPLIANCE**

In accordance with Ohio Administrative Code 123:2-11-01, Bidders to contracts awarded pursuant to Chapter 153 of the Ohio Revised Code must apply for a certificate of compliance to the state equal employment opportunity coordinator. The application shall be made on the form and according to the instructions established by the state equal employment opportunity coordinator. The application can be found at the Department of Administrative Services website <http://das.ohio.gov/eod>.

Where the state equal employment opportunity coordinator determines that a bidder has not committed any violation of any affirmative action program with which the bidder was required to comply during the previous five years, the coordinator shall issue a dated certificate of compliance that is valid for a period of 180 days.





**CHANGE ORDER NO.: [Number of Change Order]**

Owner:

Engineer:

Contractor:

Project:

Contract Name:

Date Issued:

Owner's Project No.:

Engineer's Project No.:

Contractor's Project No.:

Effective Date of Change Order:

The Contract is modified as follows upon execution of this Change Order:

Description:

**[Description of the change]**

Attachments:

**[List documents related to the change]**

| <b>Change in Contract Price</b>   | <b>Change in Contract Times<br/>[State Contract Times as either a specific date or a number of days]</b>  |
|---|---|
| Original Contract Price:<br>\$ _____  | Original Contract Times:<br>Substantial Completion: _____<br>Ready for final payment: _____   |
| <b>[Increase] [Decrease]</b> from previously approved Change Orders No. 1 to No. <b>[Number of previous Change Order]</b> :<br>\$ _____ | <b>[Increase] [Decrease]</b> from previously approved Change Orders No.1 to No. <b>[Number of previous Change Order]</b> :<br>Substantial Completion: _____<br>Ready for final payment: _____ |
| Contract Price prior to this Change Order:<br>\$ _____  | Contract Times prior to this Change Order:<br>Substantial Completion: _____<br>Ready for final payment: _____   |
| <b>[Increase] [Decrease]</b> this Change Order:<br>\$ _____   | <b>[Increase] [Decrease]</b> this Change Order:<br>Substantial Completion: _____<br>Ready for final payment: _____  |
| Contract Price incorporating this Change Order:<br>\$ _____   | Contract Times with all approved Change Orders:<br>Substantial Completion: _____<br>Ready for final payment: _____  |

Recommended by Engineer (if required)

Accepted by Contractor

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

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

Date: \_\_\_\_\_

Authorized by Owner

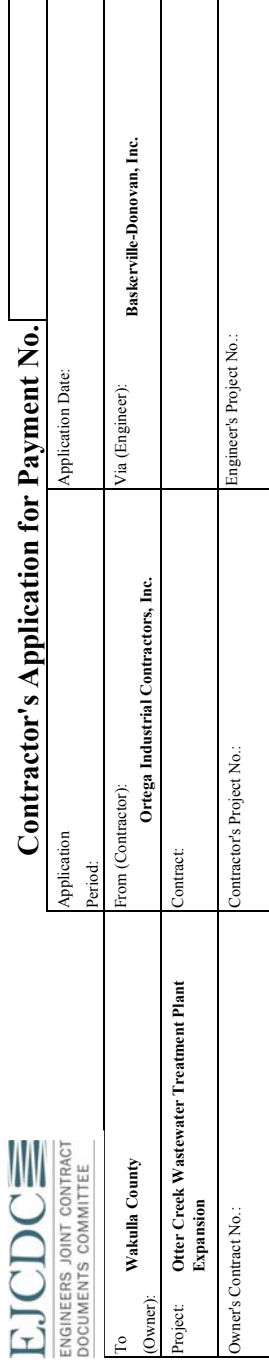
Approved by Funding Agency (if applicable)

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

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

Date: \_\_\_\_\_





|  |  |                           |                                     |
|--|--|---------------------------|-------------------------------------|
| ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE |  | Application Date:         |                                     |
| To<br>(Owner):                               | Wakulla County                                   | From (Contractor):        | Ortega Industrial Contractors, Inc. |
| Project:                                     | Otter Creek Wastewater Treatment Plant Expansion | Contract:                 | Baskerville-Donovan, Inc.           |
| Owner's Contract No.:                        |  | Contractor's Project No.: | Engineer's Project No.:             |

[illegible]

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

[illegible]

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

(Line 8 or other - attach explanation of the other amount)

(Construction Administrator) (Date)

(Line 8 or other - attach explanation of the other amount)

|      | (Owner) | (Date) |
|------|---------|--------|
| 1.   |         |        |
| 2.   |         |        |
| 3.   |         |        |
| 4.   |         |        |
| 5.   |         |        |
| 6.   |         |        |
| 7.   |         |        |
| 8.   |         |        |
| 9.   |         |        |
| 10.  |         |        |
| 11.  |         |        |
| 12.  |         |        |
| 13.  |         |        |
| 14.  |         |        |
| 15.  |         |        |
| 16.  |         |        |
| 17.  |         |        |
| 18.  |         |        |
| 19.  |         |        |
| 20.  |         |        |
| 21.  |         |        |
| 22.  |         |        |
| 23.  |         |        |
| 24.  |         |        |
| 25.  |         |        |
| 26.  |         |        |
| 27.  |         |        |
| 28.  |         |        |
| 29.  |         |        |
| 30.  |         |        |
| 31.  |         |        |
| 32.  |         |        |
| 33.  |         |        |
| 34.  |         |        |
| 35.  |         |        |
| 36.  |         |        |
| 37.  |         |        |
| 38.  |         |        |
| 39.  |         |        |
| 40.  |         |        |
| 41.  |         |        |
| 42.  |         |        |
| 43.  |         |        |
| 44.  |         |        |
| 45.  |         |        |
| 46.  |         |        |
| 47.  |         |        |
| 48.  |         |        |
| 49.  |         |        |
| 50.  |         |        |
| 51.  |         |        |
| 52.  |         |        |
| 53.  |         |        |
| 54.  |         |        |
| 55.  |         |        |
| 56.  |         |        |
| 57.  |         |        |
| 58.  |         |        |
| 59.  |         |        |
| 60.  |         |        |
| 61.  |         |        |
| 62.  |         |        |
| 63.  |         |        |
| 64.  |         |        |
| 65.  |         |        |
| 66.  |         |        |
| 67.  |         |        |
| 68.  |         |        |
| 69.  |         |        |
| 70.  |         |        |
| 71.  |         |        |
| 72.  |         |        |
| 73.  |         |        |
| 74.  |         |        |
| 75.  |         |        |
| 76.  |         |        |
| 77.  |         |        |
| 78.  |         |        |
| 79.  |         |        |
| 80.  |         |        |
| 81.  |         |        |
| 82.  |         |        |
| 83.  |         |        |
| 84.  |         |        |
| 85.  |         |        |
| 86.  |         |        |
| 87.  |         |        |
| 88.  |         |        |
| 89.  |         |        |
| 90.  |         |        |
| 91.  |         |        |
| 92.  |         |        |
| 93.  |         |        |
| 94.  |         |        |
| 95.  |         |        |
| 96.  |         |        |
| 97.  |         |        |
| 98.  |         |        |
| 99.  |         |        |
| 100. |         |        |

|       |  |
|-------|--|
| By:   |  |
| Date: |  |



This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE  
*A Practice Division of the*  
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

Copyright © 2007 National Society of Professional Engineers  
1420 King Street, Alexandria, VA 22314-2794  
(703) 684-2882  
[www.nspe.org](http://www.nspe.org)

American Council of Engineering Companies  
1015 15th Street N.W., Washington, DC 20005  
(202) 347-7474  
[www.acec.org](http://www.acec.org)

American Society of Civil Engineers  
1801 Alexander Bell Drive, Reston, VA 20191-4400  
(800) 548-2723  
[www.asce.org](http://www.asce.org)

Associated General Contractors of America  
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308  
(703) 548-3118  
[www.agc.org](http://www.agc.org)

The copyright for this EJCDC document is owned jointly by the four  
EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

## TABLE OF CONTENTS

|  | <b>Page</b> |
|--|-------------|
| Article 1 – Definitions and Terminology .....  | 7           |
| 1.01 Defined Terms.....  | 7           |
| 1.02 Terminology .....   | 11          |
| Article 2 – Preliminary Matters.....   | 12          |
| 2.01 Delivery of Bonds and Evidence of Insurance.....  | 12          |
| 2.02 Copies of Documents.....  | 12          |
| 2.03 Commencement of Contract Times; Notice to Proceed .....   | 12          |
| 2.04 Starting the Work.....  | 13          |
| 2.05 Before Starting Construction .....  | 13          |
| 2.06 Preconstruction Conference; Designation of Authorized Representatives .....   | 13          |
| 2.07 Initial Acceptance of Schedules .....   | 13          |
| Article 3 – Contract Documents: Intent, Amending, Reuse.....   | 14          |
| 3.01 Intent.....   | 14          |
| 3.02 Reference Standards .....   | 14          |
| 3.03 Reporting and Resolving Discrepancies .....   | 14          |
| 3.04 Amending and Supplementing Contract Documents .....   | 15          |
| 3.05 Reuse of Documents .....  | 16          |
| 3.06 Electronic Data.....  | 16          |
| Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental<br>Conditions; Reference Points ..... | 16          |
| 4.01 Availability of Lands .....   | 16          |
| 4.02 Subsurface and Physical Conditions .....  | 17          |
| 4.03 Differing Subsurface or Physical Conditions.....  | 17          |
| 4.04 Underground Facilities .....  | 19          |
| 4.05 Reference Points .....  | 20          |
| 4.06 Hazardous Environmental Condition at Site.....  | 20          |
| Article 5 – Bonds and Insurance .....  | 22          |
| 5.01 Performance, Payment, and Other Bonds .....   | 22          |
| 5.02 Licensed Sureties and Insurers .....  | 22          |
| 5.03 Certificates of Insurance .....   | 22          |
| 5.04 Contractor’s Insurance.....   | 23          |
| 5.05 Owner’s Liability Insurance .....   | 24          |
| 5.06 Property Insurance .....  | 24          |
| 5.07 Waiver of Rights .....  | 26          |
| 5.08 Receipt and Application of Insurance Proceeds .....   | 27          |
| 5.09 Acceptance of Bonds and Insurance; Option to Replace.....   | 27          |

|   |   |    |
|---|---|----|
| 5.10  | Partial Utilization, Acknowledgment of Property Insurer ..... | 27 |
| Article 6 – Contractor’s Responsibilities .....         |   | 28 |
| 6.01  | Supervision and Superintendence .....                         | 28 |
| 6.02  | Labor; Working Hours.....                                     | 28 |
| 6.03  | Services, Materials, and Equipment.....                       | 28 |
| 6.04  | Progress Schedule .....                                       | 29 |
| 6.05  | Substitutes and “Or-Equals” .....                             | 29 |
| 6.06  | Concerning Subcontractors, Suppliers, and Others .....        | 31 |
| 6.07  | Patent Fees and Royalties .....                               | 32 |
| 6.08  | Permits.....  | 33 |
| 6.09  | Laws and Regulations.....                                     | 33 |
| 6.10  | Taxes .....   | 34 |
| 6.11  | Use of Site and Other Areas .....                             | 34 |
| 6.12  | Record Documents.....   | 35 |
| 6.13  | Safety and Protection .....                                   | 35 |
| 6.14  | Safety Representative .....                                   | 36 |
| 6.15  | Hazard Communication Programs .....                           | 36 |
| 6.16  | Emergencies.....  | 36 |
| 6.17  | Shop Drawings and Samples .....                               | 36 |
| 6.18  | Continuing the Work .....                                     | 38 |
| 6.19  | Contractor’s General Warranty and Guarantee.....              | 38 |
| 6.20  | Indemnification .....   | 39 |
| 6.21  | Delegation of Professional Design Services .....              | 40 |
| Article 7 – Other Work at the Site.....                 |   | 40 |
| 7.01  | Related Work at Site .....                                    | 40 |
| 7.02  | Coordination.....   | 41 |
| 7.03  | Legal Relationships.....                                      | 41 |
| Article 8 – Owner’s Responsibilities .....              |   | 42 |
| 8.01  | Communications to Contractor.....                             | 42 |
| 8.02  | Replacement of Engineer.....                                  | 42 |
| 8.03  | Furnish Data.....   | 42 |
| 8.04  | Pay When Due .....  | 42 |
| 8.05  | Lands and Easements; Reports and Tests .....                  | 42 |
| 8.06  | Insurance .....   | 42 |
| 8.07  | Change Orders.....  | 42 |
| 8.08  | Inspections, Tests, and Approvals.....                        | 42 |
| 8.09  | Limitations on Owner’s Responsibilities.....                  | 42 |
| 8.10  | Undisclosed Hazardous Environmental Condition.....            | 43 |
| 8.11  | Evidence of Financial Arrangements .....                      | 43 |
| 8.12  | Compliance with Safety Program.....                           | 43 |
| Article 9 – Engineer’s Status During Construction ..... |   | 43 |
| 9.01  | Owner’s Representative.....                                   | 43 |
| 9.02  | Visits to Site .....  | 43 |
| 9.03  | Project Representative .....                                  | 44 |



|              |   |    |
|--------------|---|----|
| 9.04         | Authorized Variations in Work .....   | 44 |
| 9.05         | Rejecting Defective Work .....  | 44 |
| 9.06         | Shop Drawings, Change Orders and Payments .....                                 | 44 |
| 9.07         | Determinations for Unit Price Work .....  | 44 |
| 9.08         | Decisions on Requirements of Contract Documents and Acceptability of Work ..... | 45 |
| 9.09         | Limitations on Engineer's Authority and Responsibilities.....                   | 45 |
| 9.10         | Compliance with Safety Program.....   | 46 |
| Article 10 – | Changes in the Work; Claims .....   | 46 |
| 10.01        | Authorized Changes in the Work .....  | 46 |
| 10.02        | Unauthorized Changes in the Work .....  | 46 |
| 10.03        | Execution of Change Orders.....   | 46 |
| 10.04        | Notification to Surety.....   | 47 |
| 10.05        | Claims.....   | 47 |
| Article 11 – | Cost of the Work; Allowances; Unit Price Work.....                              | 48 |
| 11.01        | Cost of the Work.....   | 48 |
| 11.02        | Allowances.....   | 50 |
| 11.03        | Unit Price Work .....   | 51 |
| Article 12 – | Change of Contract Price; Change of Contract Times.....                         | 51 |
| 12.01        | Change of Contract Price.....   | 51 |
| 12.02        | Change of Contract Times.....   | 53 |
| 12.03        | Delays.....   | 53 |
| Article 13 – | Tests and Inspections; Correction, Removal or Acceptance of Defective Work..... | 54 |
| 13.01        | Notice of Defects .....   | 54 |
| 13.02        | Access to Work .....  | 54 |
| 13.03        | Tests and Inspections .....   | 54 |
| 13.04        | Uncovering Work.....  | 55 |
| 13.05        | Owner May Stop the Work.....  | 55 |
| 13.06        | Correction or Removal of Defective Work.....                                    | 55 |
| 13.07        | Correction Period.....  | 56 |
| 13.08        | Acceptance of Defective Work .....  | 57 |
| 13.09        | Owner May Correct Defective Work.....   | 57 |
| Article 14 – | Payments to Contractor and Completion.....                                      | 58 |
| 14.01        | Schedule of Values .....  | 58 |
| 14.02        | Progress Payments .....   | 58 |
| 14.03        | Contractor's Warranty of Title.....   | 60 |
| 14.04        | Substantial Completion.....   | 61 |
| 14.05        | Partial Utilization .....   | 61 |
| 14.06        | Final Inspection.....   | 62 |
| 14.07        | Final Payment .....   | 62 |
| 14.08        | Final Completion Delayed.....   | 63 |
| 14.09        | Waiver of Claims .....  | 64 |

|   |    |
|---|----|
| Article 15 – Suspension of Work and Termination ..... | 64 |
| 15.01 Owner May Suspend Work .....                    | 64 |
| 15.02 Owner May Terminate for Cause .....             | 64 |
| 15.03 Owner May Terminate For Convenience .....       | 65 |
| 15.04 Contractor May Stop Work or Terminate .....     | 66 |
| Article 16 – Dispute Resolution .....                 | 66 |
| 16.01 Methods and Procedures .....                    | 66 |
| Article 17 – Miscellaneous .....                      | 67 |
| 17.01 Giving Notice .....                             | 67 |
| 17.02 Computation of Times .....                      | 67 |
| 17.03 Cumulative Remedies .....                       | 67 |
| 17.04 Survival of Obligations .....                   | 67 |
| 17.05 Controlling Law .....                           | 67 |
| 17.06 Headings .....                                  | 67 |

## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
  4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
  7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
  9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

## 1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
  - a. does not conform to the Contract Documents; or
  - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
  - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
  2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
  3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
  4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

## **ARTICLE 2 – PRELIMINARY MATTERS**

### **2.01   *Delivery of Bonds and Evidence of Insurance***

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

### **2.02   *Copies of Documents***

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### **2.03   *Commencement of Contract Times; Notice to Proceed***

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.



## 2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

## 2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
  - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
  - 2. a preliminary Schedule of Submittals; and
  - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

## 2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

## 2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of

the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

### **ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

#### **3.01 *Intent***

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

#### **3.02 *Reference Standards***

- A. Standards, Specifications, Codes, Laws, and Regulations
  1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

#### **3.03 *Reporting and Resolving Discrepancies***

- A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
  - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
  - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  1. A Field Order;
  2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

### 3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
  1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
  2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

### 3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

## **ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

### 4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

#### 4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

#### 4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

- 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
- 2. is of such a nature as to require a change in the Contract Documents; or
- 3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
  - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
  - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
  - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
  - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
  - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 *Underground Facilities*

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

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
  - a. reviewing and checking all such information and data;
  - b. locating all Underground Facilities shown or indicated in the Contract Documents;
  - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
  - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 4.05 *Reference Points*

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

#### 4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
  - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
  - 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
  - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to



permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

## ARTICLE 5 – BONDS AND INSURANCE

### 5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

### 5.02 *Licensed Sureties and Insurers*

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

### 5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

#### 5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
    - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
    - b. by any other person for any other reason;
  - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
  - 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners,

employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
  - a. Such insurance shall remain in effect for two years after final payment.
  - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

#### 5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

#### 5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
  1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of

them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
  3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
  4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
  5. allow for partial utilization of the Work by Owner;
  6. include testing and startup; and
  7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

#### 5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

#### 5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

#### 5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

#### 5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

## ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

### 6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

### 6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

### 6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.



#### 6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
  2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

#### 6.05 *Substitutes and “Or-Equals”*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or-equal” item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. *“Or-Equal” Items:* If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
    - a. in the exercise of reasonable judgment Engineer determines that:
      - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
      - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
      - 3) it has a proven record of performance and availability of responsive service.
    - b. Contractor certifies that, if approved and incorporated into the Work:
      - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
      - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

## 2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
  - 1) shall certify that the proposed substitute item will:
    - a) perform adequately the functions and achieve the results called for by the general design,
    - b) be similar in substance to that specified, and
    - c) be suited to the same use as that specified;
  - 2) will state:
    - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
    - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
    - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
  - 3) will identify:
    - a) all variations of the proposed substitute item from that specified, and
    - b) available engineering, sales, maintenance, repair, and replacement services; and
  - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

#### 6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or

entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
  - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
  - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

#### 6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its

use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

#### 6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

#### 6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner

and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

#### 6.10 *Taxes*

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

#### 6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

## 6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

## 6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts

any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

#### 6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

#### 6.15 *Hazard Communication Programs*

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

#### 6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

#### 6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

##### 1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

##### 2. *Samples:*

- a. Submit number of Samples specified in the Specifications.



- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

- 1. Before submitting each Shop Drawing or Sample, Contractor shall have:
  - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
  - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
  - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
- 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

- 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the

Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  1. observations by Engineer;
  2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
4. use or occupancy of the Work or any part thereof by Owner;
5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

#### 6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
  1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
  2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

## 6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

## **ARTICLE 7 – OTHER WORK AT THE SITE**

### 7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
  - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
  - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe

access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

#### 7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
  - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
  - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
  - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

#### 7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

## ARTICLE 8 – OWNER’S RESPONSIBILITIES

### 8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

### 8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

### 8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

### 8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

### 8.05 *Lands and Easements; Reports and Tests*

- A. Owner’s duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner’s identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

### 8.06 *Insurance*

- A. Owner’s responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

### 8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

### 8.08 *Inspections, Tests, and Approvals*

- A. Owner’s responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

### 8.09 *Limitations on Owner’s Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws

and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

**ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION**

9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

### 9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

### 9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

### 9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

### 9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

### 9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations



on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of,

and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

#### 9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

### **ARTICLE 10 – CHANGES IN THE WORK; CLAIMS**

#### 10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

#### 10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

#### 10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
  - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
  - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
  - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of

executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

#### 10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

#### 10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  - 1. deny the Claim in whole or in part;
  - 2. approve the Claim; or
  - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

## **ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK**

### **11.01 *Cost of the Work***

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
  - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
  - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
  - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
  - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
  - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
  - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
  - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
  - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
  - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
  - g. The cost of utilities, fuel, and sanitary facilities at the Site.
  - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
  2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
  3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

## 11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:*
1. Contractor agrees that:
    - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
    - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in

the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

*C. Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

**11.03 Unit Price Work**

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
  2. there is no corresponding adjustment with respect to any other item of Work; and
  3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

**ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES**

**12.01 Change of Contract Price**

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
  3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
  2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
    - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
    - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
    - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
    - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
    - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
    - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.



## 12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

## 12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

## **ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**

### **13.01 *Notice of Defects***

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

### **13.02 *Access to Work***

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

### **13.03 *Tests and Inspections***

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
  - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
  - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
  - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

#### 13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

#### 13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

#### 13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers,

architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

### 13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  - 1. repair such defective land or areas; or
  - 2. correct such defective Work; or
  - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

### 13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

### 13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

## **ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION**

### **14.01 *Schedule of Values***

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

### **14.02 *Progress Payments***

#### ***A. Applications for Payments:***

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

#### ***B. Review of Applications:***

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's

review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
  - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
  - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
  - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*C. Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

*D. Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
  - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
  - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
  - c. there are other items entitling Owner to a set-off against the amount recommended; or
  - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

**14.03 Contractor's Warranty of Title**

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.



#### 14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

#### 14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

#### 14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

#### 14.07 *Final Payment*

##### A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and

- d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

*B. Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

*C. Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

*14.08 Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

#### 14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

### **ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

#### 15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

#### 15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
3. Contractor's repeated disregard of the authority of Engineer; or
4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
  3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

#### 15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
  2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
  3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other

dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

#### 15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

### ARTICLE 16 – DISPUTE RESOLUTION

#### 16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or
3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

## **ARTICLE 17 – MISCELLANEOUS**

### **17.01 *Giving Notice***

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
  2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

### **17.02 *Computation of Times***

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

### **17.03 *Cumulative Remedies***

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

### **17.04 *Survival of Obligations***

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

### **17.05 *Controlling Law***

- A. This Contract is to be governed by the law of the state in which the Project is located.

### **17.06 *Headings***

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.





This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

## GUIDE TO THE PREPARATION OF SUPPLEMENTARY CONDITIONS

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE  
*A Practice Division of the*  
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

This Guide to the Preparation of Supplementary Conditions has been prepared for use with the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition). Their provisions are interrelated and a change in one may necessitate a change in the other. The suggested language contained in the Guide to the Preparation of Instructions to Bidders (EJCDC C-200, 2007 Edition) is also carefully integrated with the suggested language of this document. Comments concerning their usage are contained in EJCDC guidance documents.

Copyright © 2007 National Society of Professional Engineers  
1420 King Street, Alexandria, VA 22314-2794  
(703) 684-2882  
[www.nspe.org](http://www.nspe.org)

American Council of Engineering Companies  
1015 15th Street N.W., Washington, DC 20005  
(202) 347-7474  
[www.acec.org](http://www.acec.org)

American Society of Civil Engineers  
1801 Alexander Bell Drive, Reston, VA 20191-4400  
(800) 548-2723  
[www.asce.org](http://www.asce.org)

Associated General Contractors of America  
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308  
(703) 548-3118  
[www.agc.org](http://www.agc.org)

The copyright for this EJCDC document is owned jointly by the four EJCDC sponsoring organizations and held in trust for their benefit by NSPE.

## Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC C-700 (2007 Edition). All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

### SC-1.01 DEFINED TERMS

Add the following definitions:

1.52 – District- The Muskingum Watershed Conservancy District (MWCD)

1.53 – Board – The Board of Directors of the Muskingum Watershed Conservancy District, or the officer duly authorized to act for the Board in the execution of the work required by this Contract.

### SC-2.02 COPIES OF DOCUMENTS

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following in its place:

- A. Owner shall furnish to Contractor up to 3 printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

### SC-2.03 COMMENCEMENT OF CONTRACT TIME: NOTICE TO PROCEED

Amend 2.03 of the General Conditions to by striking out the word Sixtieth and substituting Ninetieth (90); and as so amended, paragraph 2.03 remains in effect.

### SC-4.02 SUBSURFACE AND PHYSICAL CONDITIONS

SC-4.02 Add the following new paragraphs immediately after Paragraph 4.02.B:

- A. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) are known to Owner:
  - 1. Drawings dated July, 2025, of Charles Mill Marina Houseboat Path Renovations , prepared by Kimley-Horn, Columbus, OH, entitled: “Charles Mill Marina Houseboat Path Renovations – Wetlands & Waterways Delineation Report”, consisting of 42 sheets numbered 1 to 42, inclusive.

- a. All of the information in such drawings constitutes “technical data” on which Contractor may rely.

E. The reports and drawings identified above are not part of the Contract Documents, but the “technical data” contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.

F. Copies of reports and drawings identified in SC-4.02.C and SC-4.02.D that are not included with the Bidding Documents may be examined at the Muskingum Watershed Conservancy District Annex Building during regular business hours.

#### SC-4.06 HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

B. Not Used.

#### SC-5.01 PERFORMANCE, PAYMENT AND OTHER BONDS

Delete Paragraph 5.01 in its entirety and insert the following in its place:

SC-5.01 Contractor is required to furnish with his bid Bid Security, which may be in the form of a Bid Guarantee and Contract Bond, conforming to Section 153.54 of the Ohio Revised Code for the full amount of the bid as surety for execution of the Contract. If Contractor submitted other acceptable bid security with the Bid, a Contract Bond conforming to Section 153.54 of the Ohio Revised Code must be furnished.

#### SC-5.04 CONTRACTOR’S LIABILITY INSURANCE

SC-5.04 Add the following new paragraph immediately after Paragraph 5.04.B:

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers’ Compensation, and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions:

a. State:

Statutory

- b. Applicable Federal (e.g., Longshoreman's): Statutory
  - c. Employer's Liability: \$1,000,000
- 2. Contractor's General Liability under Paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:
  - a. General Aggregate \$1,000,000
  - b. Products - Completed Operations Aggregate \$1,000,000
  - c. Personal and Advertising Injury \$1,000,000
  - d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000
  - e. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverages where applicable.
  - f. Excess or Umbrella Liability
    - General Aggregate \$1,000,000
    - Each Occurrence \$1,000,000
- 3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:
  - a. Combined Single Limit of \$1,000,000
- 4. The Contractual Liability coverage required by Paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:
  - a. Bodily Injury:
    - Each person \$1,000,000
    - Each Accident \$1,000,000
  - b. Property Damage:
    - Each Accident \$1,000,000
    - Annual Aggregate \$1,000,000

5. Include Owner, Muskingum Watershed Conservancy District on policy as additional insureds.

SC-5.06      PROPERTY INSURANCE

SC-5.06.A. Delete Paragraph 5.06.A in its entirety and insert the following in its place:

- A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any deductible or self-insured retention. This insurance shall:
  1. include the interests of Owner, Contractor, Subcontractors, Engineer, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or loss payee;
  2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by these Supplementary Conditions.
  3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
  4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
  5. allow for partial utilization of the Work by Owner;
  6. include testing and startup;
  7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued; and

8. comply with the requirements of Paragraph 5.06.C of the General Conditions.

SC-5.07      WAIVER OF RIGHTS

Delete all of General Conditions 5.07

SC-5.08      RECEIPT AND APPLICATION OF INSURANCE PROCEEDS

Delete all of General Conditions 5.08

SC-6.06      CONCERNING SUBCONTRACTORS, SUPPLIERS, AND OTHERS

SC-6.06      Add a new paragraph immediately after Paragraph 6.06.G:

- H. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

SC-6.06      Add the following new paragraph immediately after Paragraph 6.06 H:

- I. Any proposed Subcontractor will be identified on the form provided with the bidding documents. Use of additional Subcontractors must be approved by Owner upon written request by Contractor.
- J. The CONTRACTOR shall not sublet, sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of its right, title, or interest therein, without written consent of the Owner. If consent is given, the CONTRACTOR will be permitted to sublet a portion thereof, but shall perform with its own organization, work amounting to not less than 30 percent of the total contract cost, except that any items set forth in the Proposal to be specialty items may be performed by subcontract and the cost of any such specialty items so performed by subcontract may be deducted from the total cost before computing the amount of work required to be performed by the CONTRACTOR with its own organization. No subcontract, or transfer of Contract, shall in any case release the CONTRACTOR of its obligations, responsibilities, and liability under the Contract and bonds.

SC-6.08      PERMITS

SC-6.08      Add the following new paragraph immediately after Paragraph 6.08 A:

- B. The following permits have been acquired by Owner and will be provided to Contractor:
  1. OEPA Notice of Intent (NOI)

2. OEPA Approval for Public Water System (PTI)
3. U.S. Army Corps of Engineers Nationwide Permit #13 – PCN
4. U.S. Army Corps of Engineers Consent for work in Flowage Easement
5. Building permits from appropriate AHJs
6. County Floodplain Administrator Permit/Coordination

SC-6.09 LAWS AND REGULATIONS

Amend Paragraph 6.09.B by deleting the second clause, starting with “however...”

SC-6.10 TAXES

SC-6.10 Add a new paragraph immediately after Paragraph 6.10.A:

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Ohio and of cities and counties thereof on all materials to be incorporated into the Work.
  1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
  2. Owner’s exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC-6.13 SAFETY AND PROTECTION

**SC-6.13 Delete the second sentence of Paragraph 6.13.C and insert the following:**

The following Owner safety programs are applicable to the Work:

**DRUG AND ALCOHOL FREE WORKPLACE**

The MWCD wants to ensure that all employees working on MWCD projects and facilities are fully able to do their job and are not impaired by drug or alcohol use – a major cause of work site accidents. Our program requires the contractor employer meet, at a minimum, the requirements of section 153.03 of the Ohio Revised Code for drug-free programs. This will require every construction industry employer, regardless of size and including sole proprietors (employers with no employees), to have a drug-free program to protect construction workers and supervisors working on MWCD projects.



## FIRST AID AND CPR

Each job site shall have an assigned individual who is knowledgeable and has current certification in CPR and First Aid techniques, along with adequate medical supplies on site.

## HOUSEKEEPING

Housekeeping is essential for all work performed at any MWCD site. The Contractor is responsible for housekeeping in their work areas. This will include the construction debris being placed in acceptable receptacles, suspending all cords, hoses, and wires 8'-0" above walk surfaces and properly storing, stacking all other construction materials on site. Ensure all walking and working areas are free of tripping hazards. The Contractor is expected to provide separate containers or acceptable means of disposal for the collection trash, oily or used rags and any other hazardous/ non-hazardous products generated by Contractor.

## BARRICADES AND WARNING SIGNS

Barricades are utilized to protect employees and the public from fixed hazards or falling debris. Two (2) types of barricade tape are authorized as a visual warning for employees and the public. Barricade tape does not offer physical protection for floor edges, roof edges, floor openings, etc., and shall not be used for physical protection or site security methods.

Yellow/ Black Barricade Tape shall serve to advise "CAUTION" indicating to employees that a potential hazard exists. Employees may enter without permission from Contractor. This barricade tape shall be used for, but not limited to, the following:

- Excavation less than four (4) feet in depth.
- Identification of trip hazards, low hanging objects, etc.
- Material storage on the site.

Red Barricade Tape shall indicate "DANGER" and that potential serious hazard may be present. NO EMPLOYEE, other than workers assigned to work inside a RED barricade may enter without first obtaining permission from that Contractor. This barricade tape shall be used for, but not limited to, the following:

- Overhead work.
- Live Electrical components.
- Scaffold under construction.
- Around swing radius of equipment with a rotating superstructure.

#### SITE SECURITY

The construction site shall be adequately protected from unauthorized entry by the public by suitable and substantial means based on the type of project by fencing, structure or site design. Signage shall be posted indicating only authorized persons permitted to be within construction area. The construction zone shall be properly and easily defined by suitable means.

#### SPILL PREVENTION AND CONTROL

The storage of hazardous materials/ liquids, i.e. fuels, hydraulic oils, sealants, etc., shall be stored in a manner to protect from inadvertent spills or leaks during use. Onsite storage of hazardous materials/ liquids shall be accompanied by suitable spill response equipment to contain any releases from entering waters of the MWCD. Fuel tanks shall be provided with secondary containment or placed in a manner to provide protection and containment in the event of a leak. A written notification of materials exceeding 25 gallons shall be submitted to the Chief of Conservation of the MWCD indicating the location on the site, product being stored and method to contain the product prior to placing product on the site.

#### SIGNS AND NOTICES

Signage indicating the type of PPE required for entry into the construction zone shall be prominently posted at the appropriate access location to the work zone. Work zone notices shall be posted in a manner that is easily seen when approaching work site.

All work performed on public roadways shall follow the current OMUTCD version. Information signs shall be posted on narrow, single lane roads of construction traffic.

#### DESIGNATED SAFETY REPRESENTATIVE

Each Contractor is required to designate a responsible safety representative for each MWCD site. This individual may be a supervisor or a full time safety representative. In either case, this employee will have the authority and responsibility to immediately correct any safety deficiencies. The designated person should be able to demonstrate at a minimum general knowledge in the safety requirements of a project and have completed an OSHA 30 hour construction safety program.

A certificate of completion for the designated employees shall be submitted with the bid along with the recordkeeping form (See 00 45 60 Safety Recordkeeping Form).

#### SC-6.17 SHOP DRAWINGS AND SAMPLES

SC-6.17 Add the following new paragraphs immediately after Paragraph 6.17.E:

- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- G. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

#### SC-6.20 INDEMNIFICATION

Delete the following wording in Paragraph 6.20.A "...attributable to ... only to the extent".

#### SC-7.04 CLAIMS BETWEEN CONTRACTORS

SC-7.04 Add the following new paragraph immediately after paragraph GC-7.03:

##### SC-7.04 Claims Between Contractors

- A. Should Contractor cause damage to the work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, Engineer, or the construction coordinator, then Contractor (without involving Owner, Engineer, or construction coordinator) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such other contractor by agreement, or otherwise resolve the dispute by arbitration or at law.
- B. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, Engineer, the construction coordinator and the officers, directors, partners, employees, agents and other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any other contractor against Owner, Engineer, consultants, or the construction coordinator to the extent said claim is based on or arises out of Contractor's performance of the Work. Should another contractor cause damage to the Work or property of Contractor or should the performance of work by any other contractor at the Site give rise to any other Claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, or the construction coordinator or

permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, or the construction coordinator on account of any such damage or Claim.

- C. If Contractor is delayed at any time in performing or furnishing the Work by any act or neglect of another contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, and construction coordinator for any delay, disruption, interference, or hindrance caused by any other contractor. This paragraph does not prevent recovery from Owner, Engineer, or construction coordinator for activities that are their respective responsibilities.

#### SC-9.03 PROJECT REPRESENTATIVE

SC-9.03 Add the following new paragraphs immediately after Paragraph 9.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:
1. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.
  2. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
  3. Liaison:
    - a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the intent of the Contract Documents.

- b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
  - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
- 4. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
- 5. Shop Drawings and Samples:
  - a. Record date of receipt of Samples and approved Shop Drawings.
  - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
- 6. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
- 7. Review of Work and Rejection of Defective Work:
  - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
  - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 8. Inspections, Tests, and System Startups:
  - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the

presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

9. Records:

- a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- b. Maintain records for use in preparing Project documentation.

10. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.

11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. Completion:

- a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.
- b. Participate in a final inspection in the company of Engineer , Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).
2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor’s superintendent.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s work unless such advice or directions are specifically required by the Contract Documents.
5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC-11.03 UNIT PRICE WORK

SC-11.03.D Delete Paragraph 11.03.D in its entirety and insert the following in its place:

D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. if the Bid price of a particular item of Unit Price Work amounts to 10 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 15 percent from the estimated quantity of such item indicated in the Agreement; and
2. if there is no corresponding adjustment with respect to any other item of Work; and
3. if Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

#### SC-12.01 CHANGE OF CONTRACT PRICE

SC-12.01.C Contractor's Fee. Delete the semicolon at the end of GC 12.01.C.2.c, and add the following language:

, provided, however, that on any subcontracted work the total maximum fee to be paid by Owner under this subparagraph shall be no greater than 27 percent of the costs incurred by the Subcontractor who actually performs the work;

#### SC-12.03 DELAYS

SC-12.03 Add a new paragraph immediately after Paragraph 12.03 E:

1. Delays caused by typical weather or seasonal conditions should be anticipated and will be considered as the basis for an extension of time only when the actual work days lost exceeds the number of work days lost each month due to abnormal weather as determined by the following schedule:

| <u>Month</u> | <u>No. of Work Days Lost<br/>Due to Weather</u> |
|--------------|---|
| May          | 5   |
| June         | 5   |
| July         | 4   |
| August       | 4   |
| September    | 5   |
| October      | 6   |
| November     | 6   |



2. The time between December 1 and April 30 is considered winter months and no extensions will be granted for this time. A work day will be counted as lost of the Contractor's efficiency is reduced more than fifty (50%) percent on the critical item under construction at that time. Weekends and holidays will not be counted as lost work days.
3. The extended time for completion shall be in full force and effect the same as though it were the original time for completion.

#### SC-13.03 TESTS AND INSPECTIONS

Paragraph 13.03B is hereby amended to reflect that the cost of all inspections, tests and approvals which are required by the Contract Documents shall be paid by the Contractor, and as so amended, Paragraph 13.03 remains in effect.

#### SC-14.02.B REVIEW OF APPLICATIONS

Add the following new paragraphs immediately after Paragraph 14.02.B.5.d:

- e. Failure of the Contractor to make payments properly to Subcontractors, Suppliers or for labor.
- f. Failure of the Contractor to make acceptable submittals in accordance with the accepted schedules.
- g. Failure of the Contractor to maintain record documents reflecting work completed as of the date of the Application for Payment.

#### SC-14.02.C PAYMENT BECOMES DUE

Delete paragraph 14.02.C.1 of the General conditions in its entirety and replace with the following in its place:

Within thirty (30) days after presentation of the Application for Payment with Engineer's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) be paid by the Owner to Contractor.

#### SC-14.02.D REDUCTION IN PAYMENT

Add two new subparagraphs in Paragraph 14.02.D.1 of the General Conditions which are to read as follows:

- e. Additional retainage may be withheld if portions of work included in a unit price item is not complete, but Contractor is requesting payment for a quantity of the unit price item. This additional retainage is in addition to the contractual retainage noted in the Standard Form of Agreement.

- f. Additional retainage may be withheld if liability for liquidated damages has been incurred by Contractor.

SC-15.04 CONTRACTOR MAY STOP WORK OR TERMINATE

- 1. In paragraphs 15.04.A and B, change all reference to Owner failing to pay within thirty (30) days to read sixty (60).

SC-16 DISPUTE RESOLUTION

Add the following paragraph immediately after 16.01.A:

- 1. The Contractor will carry on the work and maintain the progress schedule during any mediation proceeding, unless otherwise mutually agreed in writing.

Add the following paragraph immediately after 16.01.C.3

D. Binding Arbitration in accordance with the rules of the American Arbitration Association will only be instituted if the parties mutually agree. The Contractor will carry on the work and maintain the progress schedule during any arbitration proceeding, unless otherwise mutually agreed in writing.

E. The arbitrator's decision is required to include:

- 1. Findings of Fact
- 2. Allocation of Award to each issue
- 3. Conclusion of Law
- 4. Basis of Award
- 5. Rationale

F. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Controlling Law relating to vacating or modifying an arbitral award.

G. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

END OF SUPPLEMENTARY CONDITIONS

## **OHIO WAGE RATES**

State of Ohio Prevailing Wage Rates for Ashland County will be applicable to this project. Current prevailing wage rates are available at the Department of Commerce, Division of Industrial Compliance website (see link below). Registration is required to look up current wage rates by county.

<https://www.com.ohio.gov/dico>



**AFFIDAVIT OF COMPLIANCE**

**PREVAILING WAGES**

I \_\_\_\_\_ do hereby certify that the  
(Name and title)  
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 compliance with the 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  
My commission expires: \_\_\_\_\_



## SECTION 01 30 00

### ADMINISTRATIVE REQUIREMENTS

#### 1.0 General

##### 1.1 Section Includes

- A. Existing Facilities
- B. Working Hours
- C. Site Cleaning
- D. Site Access
- E. Barriers
- F. Traffic Maintenance
- G. Existing Utilities
- H. Property Lines
- I. Air and Noise Pollution
- J. Final Cleaning
- K. Project Closeout
- L. Archaeological and Historical Resources
- M. Temporary Sanitary Facilities

##### 1.2 Existing Facilities

- A. Water and electric service for the Charles Mill Marina must be maintained throughout the construction period

##### 1.3 Working Hours

- A. Working hours shall be limited to 7:00 am to 5:00 pm Monday through Friday. Except as authorized by Owner, no work shall be performed on weekends or holidays.
- B. For this contract, holidays shall include the following dates:
  - 1. Fourth Thursday in November for Thanksgiving Day
  - 2. Fourth Friday in November for the Day after Thanksgiving
  - 3. December 24<sup>th</sup> for the Day before Christmas
  - 4. December 25<sup>th</sup> for Christmas Day
  - 5. January 1<sup>st</sup> for New Year's Day
  - 6. Third Monday in January for Martin Luther King Day

7. Third Monday in February for President's Day
8. Last Monday in May for Memorial Day
9. June 19<sup>th</sup> for Juneteenth National Independence Day
10. July 4<sup>th</sup> for Independence Day
11. First Monday in September for Labor Day

#### 1.4 Site Cleaning

- A. Clean site and adjacent streets or driveways daily to remove all debris, rubbish, and waste materials. Keep the work area free from accumulation of waste materials and remove all debris from the site as frequently as job conditions and safety aspects require. Ensure the grounds are kept in a neat and clean condition.

#### 1.5 Site Access

- A. Access to the project site must be maintained at all times. Restore any deterioration of adjacent streets immediately.

#### 1.6 Barriers

- A. Provide barriers as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction activities.

#### 1.7 Traffic Maintenance

- A. Maintain access for emergency vehicles at all times.
- B. Adjacent public streets must be kept open at all times.
- C. Any sealed joints that will receive traffic after application must be sanded with highway sand.

#### 1.8 Existing Utilities

- A. The location of underground utilities shown on the plans is based upon information obtained from the utility companies in accordance with the Ohio Revised Code Section 153.64.
- B. Actual locations shall be determined at time of construction by Contractor.



- C. Coordinate with utility owner prior to construction for any temporary support or protection.

#### 1.9 Property Lines

- A. Property lines shown on the plans are approximate only and are not intended for establishing actual property boundaries.

#### 1.10 Air and Noise Pollution

- A. Limit construction activities to daylight hours, or to those hours specified elsewhere in this section.
- B. Provide all construction equipment with proper emission control equipment, intake silencers, and mufflers, as required by safety standards.

#### 1.11 Final Cleaning

- A. Execute prior to final inspection.
- B. Remove all waste materials or temporary construction facilities from the site. Clean site, sweep paved areas, and rake other surfaces.

#### 1.12 Project Closeout

- A. Submit final [affidavits of payment,] waivers of lien[,], from Contractor and all Subcontractors and consent of surety company prior to final payment.
- B. Provide all warranties or bonds.
- C. Provide contact information for person responsible for warranty issues.

#### 1.13 Archaeological and Historical Resources

- A. Contractor is required to notify the Ohio Historical Society and the Ohio Historic Site Preservation Board of Archaeological Discoveries, in accordance with the Ohio Revised Code Section 149.53, if any such discoveries are found within the project area.

#### 1.14 Temporary Sanitary Facilities

- A. Provide and maintain temporary sanitary facilities at the project site in compliance with laws and regulations.

### 2.0 Products

2.1 Not Used

3.0 Execution

3.1 Not Used

END OF SECTION

## SECTION 01 32 16

### CPM SCHEDULE

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- 1.2 Quality Assurance
- 1.3 Interim Baseline and Baseline Schedules
- 1.4 Monthly Progress Update Schedules
- 1.5 Revision and Delay Schedules
- 1.6 Weather Delay Schedules
- 1.7 Recovery Schedules
- 1.8 Float
- 1.9 Basis of Payment

##### 1.2 Quality Assurance

- A. Scheduler: Contractor's personnel or Specialist Consultant specializing in CPM scheduling with five years minimum experience in scheduling construction work of complexity comparable to this Project, and having use of computer facilities capable of delivering detailed graphic printouts and electronic files within 48 hours of request. The Contractor shall designate a Schedule Representative at the preconstruction meeting who shall be responsible for coordinating with the MWCD or their Representative during the preparation and maintenance of the schedule.
- B. Contractor's Administrative Personnel: Two years minimum experience in using and monitoring CPM schedules on comparable projects.

##### 1.3 Interim Baseline and Baseline Schedules

- A. Definitions:
  - i. Baseline Schedule: The Baseline represents the contractor's intended/bid plan for prosecuting the work depicted in the contract documents at the time of bid. The baseline is the reference to which actual progress, delays, and/or acceleration will be compared. The baseline is intended to be a predictive tool to be used during the course of construction to plan the project.
  - ii. Interim Baseline Schedule: The Interim Baseline Schedule represents the first 90 calendar days of the contractor's intended/bid plan for prosecuting the work depicted in the contract documents at the time of bid. The Interim Baseline Schedule acts as a short term planning and schedule monitoring tool while the full baseline schedule is being developed.
- B. Setup and Format for Interim and Baseline Schedules
  - i. General Requirements
    - i. The Contractor shall be responsible for assuring all work, including all subcontractor work, is included in the schedule.
    - ii. The Contractor shall be responsible for assuring that all work sequences are logical and that the schedule indicates a coordinated plan.
    - iii. Show the order and interdependence of activities, with the use of appropriate activity relationships, and the sequence for accomplishing the work.
    - iv. Describe all elements of work in sufficient detail so that the MWCD or their

Representative can readily identify the activities and locations required to construct the work element and measure the progress of each activity.

- v. The contractor shall provide for and coordinate Owner provided or installed items, independent utility work, and/or work provided “by others” into the CPM schedule in such a way as to minimize rework, minimize additional protection of previously installed work, and in an effort to mitigate delays.
- vi. Failure by the Contractor to include any element of work required for performance of the Contract shall not excuse the Contractor from completing all work within the required time.
- vii. Approval by the MWCD or their Representative will not relieve the Contractor of any of their responsibilities for the accuracy or feasibility of the schedule.
- viii. Omissions and errors will be corrected as described in Section 1.5 in this specification and will not affect contract time.

ii. General Settings

- i. Calculate the critical path as “longest path”
- ii. The schedule may only be calculated using retained logic
- iii. Show open ends as non-critical
- iv. Total float shall be calculated as finish float
- v. Ignore relationships to and from other projects
- vi. Use “Duration” as the activity percent complete type

iii. Calendars

- i. All calendars must be Project level calendars, not Global or Resource calendars.
- ii. Calendar names should include the MWCD project number and a describing function (i.e. LL-##### - 5 day w/ holidays and weather, LL-##### - 7 day cure, LL-##### - 5 day asphalt w/ weather).
- iii. At a minimum, calendars should be established for MWCD reviews, standard work week, cure/settlement periods, milestones, and any items with temperature restrictions as per the specifications.
- iv. Seasonal (winter) and environmental shutdown periods shall be shown using non-working calendars.
- v. Weather and Seasonal Conditions shall be entered into all calendars containing physical work as non-work days per month as per the Weather and Seasonal Conditions table. Anticipated Days Lost Due to Weather shall be randomly distributed throughout each calendar containing physical work and should not be tightly grouped or concentrated on particular days within each week.

| <b>Weather and Seasonal Conditions</b> |  |
|--|--|
| <b>Month</b>                           | <b>Anticipated Days Lost<br/>days due to weather</b> |
| January                                | 8  |
| February                               | 8  |
| March                                  | 7  |
| April                                  | 6  |
| May                                    | 5  |
| June                                   | 5  |
| July                                   | 4  |
| August                                 | 4  |
| September                              | 5  |
| October                                | 6  |
| November                               | 6  |
| December                               | 6  |

- vi. All project milestones must be on a 7 day/week calendar with no non-work days.
  - vii. All review periods for MWCD shall be included on a designated calendar of 5 days/week and must include government holidays identified in section 01 30 00 Administrative Requirements.
  - viii. Anticipated weather and/or shutdown periods shall not be included for any days past the contract completion date. In the event the contract completion date is amended to a later date, weather days will be granted on a day for day basis pending an approved Weather Delay Analysis according to section 1.6.
- iv. Work Breakdown Structure / Activity Codes
- i. The contractor shall provide an organizational structure for the schedule using either a Work Breakdown Structure (WBS) or Project Activity Codes.
  - ii. The contractor shall break the project down into separate areas, phases, and responsibilities.
- v. Constraints
- i. Use constraints sparingly in the schedule. Constraints should only be used for contractual milestones such as the start, interim completion dates, and the finish date.
  - ii. Constraints should never be used in place of relationship ties. Activities should be split, if necessary, to create logical ties in lieu of constraining activities.
  - iii. The Start and Finish Milestones may contain mandatory start and finish constraints respectively.
  - iv. Interim Milestones should use only Early or Late Constraints.
- vi. Milestones
- i. Start Project: The Contractor shall include as the first milestone in the schedule, a milestone named "Start Project". The date used for this milestone is the date the Notice to Proceed is issued by the MWCD and shall be constrained to Start On said date.
  - ii. End Project Milestone: The Contractor shall include as the last activity in the project schedule, a milestone named "End Project". The date used for this milestone is

considered the project completion date and shall be constrained to Finish On or Before said date.

- iii. Start Phase Milestone: The Contractor shall include as the first activity for a project phase, an activity named "Start Phase X", where "X" identifies the phase of work.
- iv. End Phase Milestone: The Contractor shall include as the last activity in a project phase, an activity named "End Phase X" where "X" identifies the phase of work, and shall be tied as the predecessor to the Start of the next plan phase milestone.
- v. The Contractor may include additional milestones but, as a minimum, must include all contractual milestones. Milestones added by the contractor, but that are not contractual milestones may be tied via activity logic to other activities but cannot be constrained.

vii. Activities

- i. Activities must be included in sufficient detail to represent the contract scope of work and provide for logical sequencing of activities to demonstrate a logical, reasonable, workable plan to complete the work on or before the contract completion date.
- ii. Activity Identification (ID). Assign each activity a unique identification number. Activity ID length shall not be less than 4 characters nor exceed 10 characters. Once accepted, the Activity ID shall be used for the duration of the project.
- iii. Activity Description. Each activity shall have a narrative description consisting of a verb or work function (e.g.; form, pour, excavate) and an object (e.g.; slab, footing, underdrain).
- iv. Assign a planned duration in working days for each activity.
- v. Assign an appropriate project calendar to each activity in the schedule.
- vi. Include activities for submittals, working drawings, shop drawing preparation, material procurement and fabrication, delivery of materials, plant, and equipment, long lead items and other similar activities.
- vii. Include review activities by the MWCD or their Representatives with a duration of not less than 10 business days on a calendar containing government holidays identified in section 01 30 00 Administrative Requirements.
- viii. Do not exceed a duration of 15 working days for any construction activity except as follows:
  - 1. Settlement Periods
  - 2. Long Lead Items
  - 3. Fabrication Items
  - 4. Shop drawing preparation
  - 5. Other items upon approval from MWCD or their Representative.
- ix. Do not represent the maintenance of traffic, erosion control, or any other similar items as single activities extending to the Completion Date. Break these Contract Items into component activities such as initial setup, and/or tear down in order to meet the duration requirements of this section.
- x. Include activities such as cure times and/or settlement periods as per the applicable specifications.

viii. Activity Relationships and Logic

- i. All activities, except the first activity, shall have a predecessor(s).
- ii. All activities, except the final activity, shall have a successor(s).
- iii. Use only finish-to-start relationships with no leads or lags to link activities, or use start-to-start relationships with lags no greater than the predecessor duration to link activities.
- iv. Use of finish-to-finish relationship is permitted when both activities are already linked

with a start-to-start relationship.

- v. Any activity tied with a start-to-start relationship to a predecessor must also have a successor(s) tied with a finish to start relationship.

ix. Lag

- i. The use of lag is discouraged and should be used sparingly. Split activities into initial and final stages with appropriate durations to create logical link points in lieu of using lag.
- ii. Lead is not permitted.
- iii. Use lags no greater than the predecessor duration.

x. Level of Effort Activities

- i. Use level of effort activities to show the duration of specified contract work periods, phases and road closures.
- ii. The level of effort activity type is allowed to have a start-to-start relationship with the first activity in a series of activities and a finish-to-finish relationship with the last activity in a series of activities.

C. Submission Requirements:

i. Interim Baseline Schedule Submission:

- i. No later than the pre-construction meeting
- ii. No physical work shall commence prior to submission of an interim baseline or the full baseline schedule.
- iii. Submit per section 1.3.C.iii (General Requirements); additionally, 11x17 schedule hard copies and 8.5x11 copies of the narrative shall be provided and distributed by the contractor at the pre-construction meeting.

ii. Baseline Schedule Submission:

- i. No later than the pre-construction meeting if an interim is waived by the contractor.
- ii. OR; no later than 30 calendar days from the submission of an interim schedule.
- iii. No physical work shall commence prior to submission of an interim baseline or the full baseline schedule.
- iv. Submit per section 1.3.C.iii (General Requirements).

iii. General Requirements

- i. Submit all schedules within the time frames specified.
- ii. Provide an electronic .xer or .mpp file by Primavera P6, or Microsoft Project software (latest versions), respectively.
- iii. Provide an electronic .pdf print out of the full schedule, displaying the Gantt Chart, Activity ID, Activity Description, Original Duration, Start Date, Finish Date, and Total Float.
- iv. Provide a written schedule narrative in .pdf format describing the following:
  - 1. Current schedule interim milestone dates and completion dates
  - 2. A general description of the critical path
  - 3. Overall project status (ahead, on, or behind schedule)
  - 4. Current Delays
  - 5. Anticipated Delays
- v. Name the .xer or .mpp file as follows:

| <b>Table -1 Schedule Filename Convention</b> |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|
| <b>Progress Schedule</b>                     | <b>1st Submission</b> | <b>2nd Submission</b> | <b>3rd Submission</b> |
| Interim Schedule                             | PPPPP1IS              | PPPPP2IS              | PPPPP3IS              |
| Baseline Schedule                            | PPPPP1B               | PPPPP2B               | PPPPP3B               |
| Schedule Update #1                           | PPPPP1SU1             | PPPPP2SU1             | PPPPP3SU1             |
| Schedule Update #2                           | PPPPP1SU2             | PPPPP2SU2             | PPPPP3SU2             |
| Delay Analysis                               | PPPPP1TIA1            | PPPPP2TIA1            | PPPPP3TIA1            |
| Weather Delay Analysis                       | PPPPP1WD1             | PPPPP2WD1             | PPPPP3WD1             |
| Recovery Schedule                            | PPPPP1RS1             | PPPPP2RS1             | PPPPP3RS1             |
| Revision Schedule                            | PPPPP1RV1             | PPPPP2RV1             | PPPPP3RV1             |

*Note: P P P P P in the table above designates the MWCD Project Number*

#### D. Interim Baseline and Baseline Review

##### i. Interim Baseline Review

- i. The interim baseline schedule will be presented by the contractor no later than the pre-construction meeting and discussed as a part of said meeting.
- ii. The interim baseline schedule will not be approved or rejected (provided the schedule gives sufficient detail of the first 90 days of the project), as it is a tracking mechanism utilized until the completion and approval of the baseline schedule.

##### ii. Baseline Schedule Review

- i. If an Interim Schedule is waived by the Contractor, the project Baseline Schedule will be presented by the contractor at the pre-construction meeting and discussed as a part of said meeting.
- ii. If an Interim Baseline Schedule is submitted, the Contractor shall submit the full Baseline Schedule to MWCD or their Representative within 30 calendar days of the Pre-Construction Meeting.
- iii. The review of the Baseline Schedule shall commence the day after it is received by the MWCD or their representative and shall span 21 calendar days in which the MWCD or their representative shall either accept, reject, or approve as noted the Baseline.
- iv. If the MWCD or their Representative does not provide written notification regarding the disposition of the baseline schedule within 21 calendar days, the submission will be considered approved.
- v. For baseline schedules that are “approved as noted”, the Contractor shall make the necessary revisions and resubmit the revised schedule within 7 calendar days. Revisions to the baseline schedule beyond those requested by the MWCD or their Representative as a part of the “Approved as Noted” status will be grounds for immediate rejection.
- vi. For baseline schedules that are “rejected”, the MWCD or their Representative shall indicate in writing all portions of the schedule that are not in compliance with the contract requirements. The MWCD or their Representative shall conduct a mandatory meeting with the Contractor and the Contractor’s Schedule Representative within 5 business days of the MWCD or their Representative’s written notice. The purpose of this meeting is to resolve all issues with the baseline schedule. At this meeting the Contractor shall provide clarification and all requested information necessary for the MWCD or their Representative to “approve” the baseline schedule.
- vii. In the event the baseline schedule is not “approved” within 120 days of execution of the contract, all work shall cease on the project until the baseline schedule is “approved”.



- viii. Approval of the baseline schedule does not revise the Contract Documents. The baseline schedule must be “approved” or “approved as noted” by the MWCD or their Representative prior to the MWCD or their Representative evaluating any contractor claims associated with time impacts.

## 1.4 Monthly Progress Update Schedules

### A. Definition:

- i. Monthly Progress Update Schedule: The update schedule indicates the actual progress achieved within a given period (i.e. monthly) and the impact of the actual progress on the remainder of the activities in the project. The impacts of actual progress to the remaining activities provides for a predictive measure on the future course of the project. The Monthly Progress Update Schedule must only contain updates to the start, finish or progress of activities in the schedule from the previous data date to the current data date. No revisions besides activity status updates should be included in a Monthly Progress Update Schedule. The actual progress is compared to the baseline schedule, or the latest previously approved Monthly Progress Update Schedule to ascertain the actual progress of the project.

### B. Monthly Progress Update Schedule Preparation

- i. Enter the “Actual Start”, “Actual Finish”, “Remaining Duration”, or “Percent Complete” as appropriate for each activity within the update period.
- ii. Any activity with an actual start must also contain an appropriate percent complete.
- iii. Update the data date to the end of the update period.

### C. Submission Requirements:

- i. Monthly Progress Update Schedule Submission Deadlines
  - i. The monthly update period shall begin on the 16<sup>th</sup> day of the month and will terminate on the 15<sup>th</sup> day of the following month. The MWCD or their Representative may adjust these dates as necessary to meet project conditions or other requirements.
  - ii. The Contractor shall submit their Monthly Progress Update Schedule, with a data date of the 15<sup>th</sup> of the month, no later than the 20<sup>th</sup> of the month, for the life of the project.
  - iii. Submit per section E.ii (General Requirements).
- ii. General Requirements
  - i. Submit all schedules within the time frames specified.
  - ii. Provide an electronic .xer or .mpp file by Primavera P6, or MS project respectively.
  - iii. Provide an electronic .pdf print out of the full schedule, displaying the Gantt Chart, Activity ID, Activity Description, Original Duration, Start Date, Finish Date, and Total Float.
  - iv. Provide a written schedule narrative in .pdf format describing the following:
    - 1. Current schedule interim milestone dates and completion dates
    - 2. A general description of the critical path
    - 3. Changes or shifts in the critical path and the reason for these changes or shifts
    - 4. Overall project status (ahead, on, or behind schedule)
    - 5. Current Delays
    - 6. Anticipated Delays
  - v. Name the .xer or .mpp file as per Table – 1.

### D. Monthly Progress Update Schedule Review

- i. The MWCD or their Representative will review the schedule within 5 business days beginning on the first business day after the contractor’s submission.

- ii. The MWCD will review the contractor's actual dates compared to the project records to verify the accuracy of the information.
  - 1. Alternatively, the MWCD or their Representative may provide a listing of the schedule activities for the update period along with the recorded dates to the contractor prior to the update schedule submission.
  - 2. If the MWCD or their Representative provides their dates to the contractor, the contractor shall provide a disposition on the variance of any dates which are more than 3 days apart between the recorded dates of the contractor and the recorded dates of the MWCD or their Representative.
- iii. Any discrepancies between the contractor's recorded dates, and the dates recorded by the MWCD or their Representatives must be reconciled before the last day of the month in which the schedule was submitted.
- iv. Added work/activities, revisions made to logic, descriptions, calendars or any adjustments that may manipulate the schedule calculations will result in an immediate rejection of the schedule.
- v. Neither the MWCD nor their Representative will process monthly pay applications until the Monthly Progress Update Schedule is submitted for the previous period.

## 1.5 Revision and Delay Schedules

### A. Definition:

- i. Delay Schedule: During the course of the project, issues may arise that could not have been anticipated at the time of bid. These issues are entered into a Delay schedule in order to show the impact of the issue on the contractor's schedule. Extra work added by the owner and eligible for a time extension is not considered a delay, but shall be included in a revision schedule.
- ii. Fragmentary Network (fragnet): A fragnet is defined as the sequence of new activities that are proposed to be added to the existing schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. Alternatively, the fragnet may indicate a sequence of activities that have already happened.
- iii. Revision Schedule: The Work may require, the Owner may request, and/or the Contractor may make revisions to the CPM schedule in order to align the schedule to the physical work in the field and to maintain the predictive nature of the schedule as established in the baseline schedule. Addition of new activities or new calendars or changes to existing activities, calendars or logic constitute a revision. The revision shall incorporate all actualized activities up to the date of the revision. For revisions involving extra work requested by the MWCD, no time extensions will be granted unless justified in a revision schedule including said work.

### B. Reasons for Revisions:

- i. The Contractor must revise the schedule to correct Out-of-Sequence logic errors that impact the critical path.
- ii. A revision schedule must be compiled in order to justify any time extension related to extra work.
- iii. The Contractor may elect to revise the schedule in order to reflect actual/intended prosecution of the work or as per any part of section 1.5.B.v.i-v below.
- iv. The MWCD or their Representative may request a schedule revision when the current schedule does not accurately reflect the current prosecution of the work in order to align the schedule to actual field operations.
- v. The MWCD or their Representative may request a schedule revision when the current schedule no longer serves as a predictive tool to plan the course of the project due to:
  - i. Additional or non-performed work.
  - ii. Deviations from the schedule by the contractor's operations.

- iii. Progress has accelerated or decelerated.
- iv. There is a general deviation in the planned activity dates as compared to commonly held project knowledge regarding the project's progress.
- v. Approved phasing adjustments.

C. Revision Schedule Preparation:

- i. The basis of any revision or delay schedule must be the most recently approved Monthly Progress Update Schedule.
- ii. Based on the most recently approved Monthly Progress Update Schedule, revise the schedule to provide a predictive tool reflecting the planned course of the project to achieve the completion of the project by the current contract completion.
- iii. All revisions must comply with applicable sections of section 1.3.B.

D. Delay Schedule Preparation:

- i. Determine project progress prior to circumstance(s) necessitating the time extension. The previous accepted monthly update schedule, updated to the date of the circumstance alleging to have caused delay, shall be used to display the prior progress of the project. This schedule is referred to as the Un-impacted Schedule
- ii. Prepare a fragmentary network (fragnet) depicting the circumstance that is believed to have delayed the project.
- iii. Insert the fragnet into the Un-impacted Schedule
  - i. The first activity of the fragnet shall be the successor to the last activity that was completed prior to the alleged delay.
  - ii. The last activity of the fragment shall be the predecessor to the first activity that could not
- iv. Run the schedule calculations and determine the finish date. This schedule is referred to as the Impacted Schedule.
- v. Compare the Impacted Schedule finish date with the Un-impacted Schedule finish date in order to determine the duration of any warranted time extension.

E. Submission Requirements:

- i. Revision Schedule Submission Deadlines
  - i. Revision schedules shall be submitted with a Monthly Progress Update, or within 5 business days of "acceptance" of a progress update.
    - 1. In the event discrepancies are discovered in the Monthly Progress Update, said discrepancies must be resolved prior to the submission of the Revision schedule or must be resolved in both the Monthly Update AND the Revision if submitted simultaneously.
  - ii. Revision schedules resulting from extra work believed to have an effect on the critical path shall be submitted with the cost proposal for the extra work.
- iii. Delay Schedule Submission Deadlines
  - 1. Delay schedule submissions shall occur within 5 business days of the alleged delay event.
- ii. General Requirements
  - i. Submit all schedules within the time frames specified
  - ii. Revisions must be based on the latest accepted Monthly Progress Update. The Revision Schedule must be submitted with the latest "accepted" Monthly Progress Update in which it was based on.

- iii. Provide an electronic .xer or .mpp file by Primavera P6, or MS project respectively for both the Revision schedule as well as the latest “accepted” Monthly Update Schedule.
- iv. Provide an electronic .pdf print out of the full schedule, displaying the Gantt Chart, Activity ID, Activity Description, Original Duration, Start Date, Finish Date, and Total Float.
- v. Provide a written schedule narrative in .pdf format describing the following:
  - 1. Current schedule interim milestone dates and completion dates
  - 2. A general description of the critical path
  - 3. The specific reason(s) for the revision or delay.
  - 4. Changes or shifts in the critical path and the reason for these changes or shifts
  - 5. Overall project status (ahead, on, or behind schedule)
  - 6. Current Delays
  - 7. Anticipated Delays
- vi. Name the .xer or .mpp file as per Table - 1

#### F. Revision/Delay Schedule Review

- i. The MWCD or their Representative will review the schedule within 14 calendar days beginning on the first business day after the contractor’s submission.
- ii. If the MWCD or their Representative does not provide written notification regarding the disposition of the revision schedule within 14 calendar days, the submission will be considered approved.
- iii. For revision schedules that are “approved as noted”, the Contractor shall make the necessary revisions and resubmit the revised schedule within 7 calendar days. Revisions to the revision schedule beyond those requested by the MWCD or their Representative as a part of the “Approved as Noted” status will be grounds for immediate rejection.
- iv. For revision schedules that are “rejected”, the MWCD or their Representative shall indicate in writing all portions of the schedule that are not in compliance with the contract requirements. The MWCD or their Representative shall conduct a mandatory meeting with the Contractor and the Contractor’s Schedule Representative within 5 business days of the MWCD or their Representative’s written notice. The purpose of this meeting is to resolve all issues with the revision schedule. At this meeting the Contractor shall provide clarification and all requested information necessary for the MWCD or their Representative to “approve” the revision schedule.
- v. Approval of the revision schedule does not revise the Contract Documents. The revision schedule must be “approved” or “approved as noted” by the MWCD or their Representative prior to the MWCD or their Representative evaluating any contractor claims associated with time impacts.
- vi. Upon acceptance, the revision schedule shall be the basis for evaluations replacing the original baseline logic.

## 1.6 Weather Delay Schedules

### A. Definition:

- i. Weather Delay Schedule: The schedule which indicates the effect of the actual weather experienced in a given period as compared to the anticipated weather included in the baseline schedule as depicted in Table-1. The Weather Delay schedule is a calculation performed by the software after the anticipated weather days have been removed and the actual Weather Days have been inserted.

### B. Weather Delay Schedule Preparation

- i. Make a copy of the previously accepted Monthly Progress Schedule file. This copy is referred to as the Weather Impacted Schedule.
- ii. For the month that incurred actual weather days, remove the anticipated weather only from calendars associated with the work that was delayed and input the actual weather days experienced into the Weather Impacted Schedule.
- iii. Schedule the project WITHOUT changing the data date.

C. Submission Requirements:

- i. Weather Delay Schedule Submission Deadlines
  - i. The Weather Delay Schedule shall be submitted prior to or along with the Monthly Update Schedule. Submission prior to the update is preferred.
- ii. General Requirements
  - i. Submit all schedules within the time frames specified
  - ii. Submit the weather impacted schedule, and the previously accepted Un-impacted Monthly Update Schedule
  - iii. Provide an electronic .xer or .mpp file by Primavera P6, or MS project respectively for both schedules.
  - iv. Provide an electronic .pdf print out of the full schedule, displaying the Gantt Chart, Activity ID, Activity Description, Original Duration, Start Date, Finish Date, and Total Float.
  - v. Name the .xer or .mpp file as per Table - 1

D. Weather Delay Schedule Review

- i. The MWCD or their Representative will review the schedule within 5 business days beginning on the first business day after the contractor's submission.
- ii. The MWCD or their Representative will confirm or dispute the requested weather days and reconcile with the Contractor within the 5 business day period
- iii. If warranted, a time extension will be granted for the weather days experienced in the requested month.

## 1.7 Recovery Schedules

A. Definition:

- i. Recovery Schedule: If an update is submitted showing the completion date more than 14 calendar days behind schedule, the contractor must submit a plan of action for recovering the lost time in order to complete the project by the established contract completion date. This plan shall be in the form of a recovery schedule, along with a written narrative.

B. Recovery Schedule Preparation

- i. Make a copy of the latest submitted Monthly Progress Schedule file. This copy will be used to develop the recovery schedule
- ii. Revise the schedule to provide a workable plan for completing the project by the current contract completion date.
- iii. All revisions must comply with applicable sections of section 1.3.C

C. Submission Requirements:

- i. Recovery Schedule Submission Deadlines
  - i. The Recovery Schedule shall be submitted no more than 5 business days after the submission of an Update Schedule indicating a completion more than 14 calendar days behind schedule.

- ii. General Requirements
  - i. Submit all schedules within the time frames specified
  - ii. Provide an electronic .xer or .mpp file by Primavera P6, or MS project.
  - iii. Provide an electronic .pdf print out of the full schedule, displaying the Gantt Chart, Activity ID, Activity Description, Original Duration, Start Date, Finish Date, and Total Float.
  - iv. Provide a written schedule narrative in .pdf format describing the following:
    - 1. Current schedule interim milestone dates and completion dates
    - 2. A general description of the critical path
    - 3. The specific plan for recovering time to meet the contract completion date.
    - 4. Changes or shifts in the critical path and the reason for these changes or shifts
  - v. Name the .xer or .mpp file as per Table – 1.

#### D. Recovery Schedule Review

- i. The MWCD or their Representative will review the schedule within 14 calendar days beginning on the first business day after the contractor's submission.
- ii. If the MWCD or their Representative does not provide written notification regarding the disposition of the revision schedule within 14 calendar days, the submission will be considered approved.
- iii. For revision schedules that are "approved as noted", the Contractor shall make the necessary revisions and resubmit the revised schedule within 7 calendar days. Revisions to the recovery schedule beyond those requested by the MWCD or their Representative as a part of the "Approved as Noted" status will be grounds for immediate rejection.
- iv. For revision schedules that are "rejected", the MWCD or their Representative shall indicate in writing all portions of the schedule that are not in compliance with the contract requirements. The MWCD or their Representative shall conduct a mandatory meeting with the Contractor and the Contractor's Schedule Representative within 5 business days of the MWCD or their Representative's written notice. The purpose of this meeting is to resolve all issues with the revision schedule. At this meeting the Contractor shall provide clarification and all requested information necessary for the MWCD or their Representative to "approve" the revision schedule.
- v. Approval of the revision schedule does not revise the Contract Documents. The Recovery schedule must be "approved" or "approved as noted" by the MWCD or their Representative prior to the MWCD or their Representative evaluating any contractor claims associated with time impacts.
- vi. Upon acceptance, the revision schedule shall be the basis for evaluations replacing the original baseline logic.
- vii. The MWCD will withhold pay applications until the MWCD or their Representative approves the Recovery Schedule.
- viii. In the event the current Completion Date is in dispute, the recovery schedule will need to be submitted once the dispute has been resolved.

## 1.8 Float

Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to MWCD caused delay), lag logic restraints, zero total or free float constraints, extending activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates.

1. Definitions of Float: Total Float is the length of time along a given network path that the actual

start and finish of activity(s) can be delayed without delaying the project completion date. Project Float is the length of time between the End Project Milestone and the Contract Completion Date.

2. Ownership of Float: Float available in the schedule, at any time shall not be considered for the exclusive use of either the MWCD or the Contractor. During the course of contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained as a result of favorable weather within a calendar month, where the number of days of normally anticipated weather is less than expected, will also contribute to the Project Float. A schedule showing work completing in less time than the contract time, and accepted by the MWCD, will be considered to have Project Float. Project Float will be a resource available to both the MWCD and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the project's critical path, consumes all available float and extends the work beyond the Contract Completion Date.
3. Negative Float: Negative float will not be a basis for requesting time extensions. Any extension of time will be addressed in accordance with the applicable sections of this specification. Scheduled completion date(s) that extend beyond the contract (or phase) completion date(s) may be used in computations for assessment of liquidated damages. The use of this computation is not to be construed as an order by the MWCD to accelerate the project.

## **1.9 Basis of Payment**

The MWCD will make payment per the following:

1. The MWCD will release 60 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after the MWCD or their Representative has approved the CPM Baseline schedule submission.
2. The MWCD will release an additional 30 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after 50 percent of the original contract amount is complete.
3. The MWCD will release the remaining 10 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after 90 percent of the original contract amount is complete.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used





## SECTION 01 33 00

### SUBMITTAL PROCEDURES

#### 1.0 General

##### 1.1 Section Includes

- A. Shop Drawings
- B. Construction Schedule
- C. Weekly Payrolls
- D. Substitutions

##### 1.2 Shop Drawings

- A. Defined as detailed drawings, product data, manufacturer's specifications, etc. and shall be submitted for all materials as listed in the individual specification or required on the plans.
- B. Submit all shop drawings by Contractor, in a minimum of three (3) sets for Owner's review. Submittals from anyone other than Contractor will be returned without review.
- C. Include transmittal with each submittal identifying the product by specification section, plan sheet, bid item, or other means.
- D. Stamp each submittal with Contractor's certification that he has reviewed and approved the shop drawing and that the material/drawing is in accordance with the contract documents.
- E. Any deviation from the contract documents must be clearly identified.
- F. Approval of shop drawings does not relieve contractor of his responsibility to follow all requirements of the contract documents.
- G. All dimensions must be field verified by Contractor.
- H. Upon receipt of show drawings, one of the following actions will be taken:
  - 1. Approved – approved with no comments.
  - 2. Approved as Noted – approved with specific items appropriately noted.
  - 3. Revise and Resubmit – required revisions will be appropriately noted and shop drawing must be corrected and resubmitted for approval.
  - 4. Not Approved – reason for disapproval will be noted.

##### 1.3 Construction Schedule

- A. Submit a construction schedule [at the Preconstruction Meeting] showing individual tasks with anticipated beginning and completion dates for each, and update on a monthly basis.

## 1.4 Weekly Payrolls

- A. Weekly tabulation of all employment on project, by employee, showing all payments, hours of work, and all deductions. Submit monthly with partial pay application.

## 1.5 Substitutions

- A. Substitutions shall be submitted in accordance with section 6.05 of the General Conditions.

## 2.0 Products

## 2.1 Not Used

## 3.0 Execution

## 3.1 Not Used

END OF SECTION

SECTION 01 57 23- STORM WATER POLLUTION PREVENTION PLAN

PART 1 GENERAL

1.1 DESCRIPTION

- A. This work consists of furnishing, installing, and maintaining temporary sediment and erosion control Best Management Practices (BMP) for earth disturbing activity areas. Furnish and install temporary sediment and erosion control best management practices in compliance with all NPDES and surface water permits. A Stormwater Pollution Prevention Plan (SWPPP) is a part of the Plans and provided to the contractor for compliance with the Ohio EPA Construction General Permit OHC000006.

1.2 REQUIREMENTS AND PROVISIONS

- A. File a Co-Permittee form as required in the Ohio EPA Construction General Permit. Information about the Co-Permittee form can be found at [http://epa.ohio.gov/Portals/35/storm/StormWater\\_Co-Permittee\\_NOI.pdf](http://epa.ohio.gov/Portals/35/storm/StormWater_Co-Permittee_NOI.pdf). For a copy of the Co-Permittee form see Appendix D. The contractor will furnish the Owner with a copy of the OEPA Co-permittee NOI approval letter at or before the Pre-Construction meeting.

PART 2 PRODUCTS

- 2.1 Furnish all materials included in SWPPP and as required by the Ohio EPA in OHC000006.

PART 3 EXECUTION

3.1 FURNISH AND INSTALL BMP

- A. Furnish and install the BMPs in accordance with the construction drawings and SWPPP Plans provided to the contractor.

3.2 MAINTENANCE

- A. Properly maintain all BMP throughout all phases and sequencing of construction activities. Dispose of silt removed from BMP according to ODOT C&MS 105.16 and the plans.

3.3 INSPECTIONS

- A. Perform the required OEPA NPDES Permit inspections and prepare inspection reports. Submit inspection reports to the Owner every 7 days and within 24 hours of a 0.5 inch (13 mm) or greater rainfall event throughout the life of the contract.

3.4 METHOD OF PAYMENT

- A. The cost for Stormwater Pollution Control shall be included in the unit price bid cost for the items necessitating the work. No additional compensation will be made under this item.

END OF SECTION 01 57 23

SECTION 02 01 00

PROTECTION OF TREES AND SHRUBS

PART 1

GENERAL

1.01 PROTECTION:

- A. Every effort shall be made by the Contractor when working near trees and shrubs to preserve same from harm. No trees or shrubs shall be removed unless so indicated on the Plans or as authorized in the field by the Engineer. The Contractor shall be responsible for damage to or loss of any tree or shrub not specifically designated to be removed.
- B. Wherever trees, which are not permitted to be removed, interfere with normal excavation procedures, the following shall govern. No machine excavation shall be made within a distance of three trunk diameters or 12 inches (whichever is greater) of any tree, and no roots over 2 inches in diameter shall be cut unless, in the opinion of the Engineer, it is impossible to complete the work without cutting. Excavation closer than three trunk diameters or 12 inches (whichever is greater) from any tree shall be made by hand, and the tree shall be tunneled where necessary as determined by the Engineer.
- C. Damage to tree limbs shall be held to a minimum. Shrubs and tree limbs shall be tied back wherever necessary to prevent their loss or damage. Wherever damage by construction equipment to limbs and branches is unavoidable, they shall be pruned before starting work and sealed in accordance with best forestry practice.
- D. Wherever necessary, the Contractor shall provide plank wrappers wired in place to protect tree trunks from being damaged by trench machinery, tractors or trucks. Protective planking shall be removed as soon as practical after the work in the vicinity has been completed. In removing spoil banks from around trees, hand work will be required as necessary to prevent damage to the trunks by construction machinery.
- E. Small trees (less than 4 inches in diameter) and shrubs which are removed or severely damaged during construction shall be replaced in kind and size by the Contractor. Trees larger than 1 inch in diameter shall be furnished balled and burlapped. The Contractor shall have the option of removing and replanting existing small trees and shrubs in the construction zone in lieu of replacement with new stock. All plantings shall be thoroughly watered at the time of planting and thereafter as required. All trees and shrubs planted or replanted by the Contractor which do not survive in good condition for a period of 18 months after the time of

PROTECTION OF TREES AND SHRUBS

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

planting, shall be removed and replaced by the Contractor.

1.02 MATERIAL

- A. Wrapping materials shall be Burlap-AASHO M182, Polyethylene film-ASTM D-2103, or paper.
- B. Wound paint shall be a standard bituminous product.

END OF SECTION

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

SECTION 02 50 00

DEMOLITIONS

PART 1 GENERAL

1.01 GENERAL DESCRIPTION

- A. Demolitions, removal and disposal work as shown on Drawings and scheduled.

1.02 SUMMARY

- A. Furnish all labor, materials, equipment and incidentals required for the following:
1. Demolition and removal of existing facilities as required to install the new Work. Demolition includes structural concrete, foundations, precast concrete, walkways, gravel, pavers, poles, lighting, rock, slabs, piping, process electrical and mechanical equipment, paving, curbs, walks, fencing, and other existing facilities.
  2. The repair of any concrete surfaces exposed by the demolition of concrete is also included. Void spaces left by structure removal shall be filled as shown and shall be completed in accordance with Section 31 23 16.
  3. Existing reinforcing steel in structural concrete shall NOT be cut or removed along with the associated concrete if the new structural concrete work requires that the existing reinforcing steel be used for splices.
    - a. Existing reinforcing steel which is not required for splices, or which is not shown to be embedded in the new concrete shall be neatly trimmed to allow surface patching as required.
  4. All concrete equipment pads, bases, pipe supports, and similar items are to be completely removed whenever the associated equipment or piping is to be removed, unless specifically designated to remain.
    - a. Remaining floor surfaces shall be repaired so as to leave a neat patch matching the existing floor's appearance, slope, and floor finish.
    - b. Concrete for patching shall comply with Section 03 30 00, except that maximum aggregate size shall be 3/8-inch.
  5. Removal of structural concrete will require temporary support of the adjacent concrete until such time as the new structure of concrete has cured sufficiently to allow the removal of formwork, shoring, and bracing.

- 6. Structural concrete, if shown to be removed or partially removed shall be neatly removed and patched.
- B. Furnish new anchoring materials including bolts, nuts, hangers, welds, and reinforcing steel, as required to install new Work.
- C. Furnish temporary supports or bracing of existing structural components as required.
- D. Excavation and Fill is specified in Section 31 23 - 00.
- E. Review the demolition requirements described in other Sections of the Project Manual or shown on the Drawings and coordinate with the general work requirements in this Section. Unless more specific direction is given by a particular project specification or Drawing detail, the requirements of the Section shall govern. It is the intent of the Section that the structural renovations of existing buildings and the installation of the new equipment shall be completely coordinated by the Contractor, and that the resulting appearance of the facility be free of obvious holes, scars, chipped or damaged surfaces and be architecturally finished to match existing surfaces.

#### 1.03 REFERENCES

- A. The specifications in this Section are subject to the administrative and procedural requirements specified in Division 1, as well as the broader requirements of the General Conditions.

#### 1.04 DEFINITIONS

- A. Mechanical Removals:
  - 1. Mechanical removal consists of dismantling and removing existing piping including residual contents, sediment or grit, pumps, motors, equipment, supports, and other appurtenances as specified, shown, or required for the completion of the Work.
  - 2. It includes cutting, capping, and plugging as required, except that the cutting of existing piping for the purpose of making connections and tie-ins are to be included under Division 33.
  - 3. In general, the notation to remove a particular equipment item shall be interpreted to include the removal of all associated piping, bases, supports, anchors, controls, conduit, wiring and related appurtenances unless specifically designated or ordered to the contrary.
  - 4. Pipe hangers which support both piping which is to be removed and piping which remains shall be readjusted after the piping is removed.



## MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

### B. Electrical Removals:

1. In general, the notation to remove a piece of equipment as indicated on the Drawings shall be interpreted to also include the removal of all electrical equipment, conduit, wires and appurtenances associated with the equipment. This includes, but is not limited to: all wires and conduit from the motor control center starter to the equipment; and all disconnects, remote switches and starters; all controls, alarms, conduit and instrumentation - both local and remote, and all supports, braces and hangers.
2. Electrical removals also consist of the removal of existing transformers, distribution switchboards, control panels, motors, conduits and wires, poles and overhead wiring, panel boards, lighting fixtures, and miscellaneous electrical equipment all as shown, specified, or required to perform the Work.
3. All removals of electrical equipment and appurtenances shall be in complete conformance with the requirements of Division 26.

### 1.05 SYSTEM DESCRIPTION

(Not used)

### 1.06 SUBMITTALS

A. Submit, for review, proposed methods.

#### B. Schedule:

1. Comply with Section 01 33 00.
2. Submit equipment and operations sequence.
3. Include coordination for shut-off, capping temporary services, continuation of utility services, and other applicable items to ensure no interruption of Owner's operations.

#### C. Documentation:

1. Submit copies of property transmittals as required by Subparagraph 3.02 E.5 of this Section.
2. Submit disposal permits as required by Subparagraph 3.05 D.3 of this Section.

### 1.07 REGULATORY REQUIREMENTS

(Not used)

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

1.08 SPECIAL WARRANTY

(Not used)

1.09 SCHEDULING

- A. Conduct Work so as to avoid interference with operations and work in the existing facilities.
- B. Include provisions for temporary services, as required, to ensure no interruption of Owner operations.
- C. Before any demolition work begins, the Contractor shall obtain approval of all necessary outage requests from the Owner or Owner's Representative.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTION

3.01 EXAMINATION AND VERIFICATION OF CONDITION

- A. Examination of Work Site:
  - 1. The Contractor is required to visit the work site during the bidding period to determine the hazards, working conditions, accessibility and true extent of the demolition work required under this Section.
  - 2. The Contractor shall determine if existing concrete walls, slabs, or beams contain electrical or metering conduit and wires. Prior to removal of such concrete structures, the Contractor shall investigate each location as thoroughly as possible to determine the possibility of any buried conduit. The methods of investigation shall include but not be limited to x-ray survey of areas to be removed. The Contractor shall make provisions for the careful and safe removal of the concrete to the limits shown, or as directed by the Construction Manager.
  - 3. The Contractor shall be responsible for any additional or differing demolitions, removals and subsequent repair of exposed surfaces which may be found necessary due to the selection of alternate equipment or due to the requirements of miscellaneous appurtenances to the equipment specified.
  - 4. Review with the Construction Manager, the exact area(s) where the existing railing is to be removed.

3.02 PREPARATION

---

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

A. Notification:

1. Notify the Construction Manager in writing at least 48 hours prior to the start of any segment of demolition or removal work.
  - a. Include an estimate of the anticipated number of hours per day or worksheets per day required in order to complete each segment of demolition or removal work.
2. Do not start any equipment removal or demolition operations without the permission of the Construction Manager.

B. Protection:

1. The Contractor shall take all necessary measures to prevent damage to structures, injury to occupants of these structures and damage which might result from falling debris or other causes; do not interfere with the use, and safe passage to and from adjacent structures.
2. Do not close or obstruct roadways, sidewalks or passageways adjacent to the Work.
3. Conduct all operations with a minimum interference to traffic.
4. Erect and maintain safety barriers, lights, sidewalk sheds, and other required protective devices around all areas of structural demolition or open excavations.
5. As a minimum, barriers shall conform to OSHA requirements.
  - a. Provide latchable gates for construction access as required.
6. Maintain flashing warning lights around demolition areas, excavated areas adjacent to roadways, and areas of pedestrian travel.
7. All open excavations and partially removed floors shall be kept lighted at all times, 24 hours per day, with floodlights and other lighting device.

C. Equipment to be Removed:

1. Existing piping passing through the area of Work, or new piping installed through the building by other Contracts, which is associated with other processes is to be protected during the demolition work, and all other work, included under this Contract. Included shall be protection from freezing.

2. The Contractor is cautioned that existing piping and equipment might still contain various amounts of their original contents, sediments or grit or might contain pockets of trapped gas, or other by-products common to the facilities. The Contractor should exercise care in commencing the removal of any segments of piping or equipment and ventilate the pipes. Use of cutting torches and abrasive cutting wheels shall be done only after pipelines have been well ventilated and verified as free of volatile substance.
  - a. Flushing of residual pipe contents into plant drains or storm sewers is prohibited.

D. Structural Removals:

1. The extent of structural demolition at any floor level or area shall first be laid out by the Contractor using chalklines, tape, or similar non-permanent markers so as to demonstrate to the Construction Manager that the true extent and nature of the removal is completely understood.
2. After review of the laid-out areas, the Construction Manager shall advise of corrections, if any, and shall discuss with the Contractor any specific details, procedures, barricades, and equipment required to conduct the demolition in a safe and expedient manner. Once satisfied as to the Contractor's general plan of operation, the Construction Manager shall issue notification to proceed with the demolition of the area. Contractor shall not proceed with removals until submittals have been approved and laid-out areas have been reviewed by Construction Manager.
3. The Contractor shall first provide a saw-cut 1" deep along the outline of the area to be demolished. The saw cut shall be required along all exposed surfaces, except at such locations where the cutting equipment cannot reach. In all cases, the saw cut shall NOT cut through existing reinforcing steel, unless specifically indicated to, or unless so directed by the Construction Manager.
4. Following the saw cutting of an area, the Contractor shall proceed with the main demolition.

3.03 APPLICATION

A. Explosives:

1. The use of explosives is not permitted on the job site.

B. Building Demolition:

---

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

(Not used)

C. Structural Removals:

1. Remove structures to the lines and grades shown unless otherwise directed by the Construction Manager.
2. As soon as removal work has otherwise been completed and approved by the Construction Manager, required filling shall be performed in accordance with Section 31 23 00. The final grade of required backfill in areas outside the prism of construction shall be such as to present a neat appearance. It shall be well drained and shall prevent water from draining unnecessarily onto adjacent areas.

D. Process Piping:

1. Remove existing process, water, chemical, gas, fuel oil, and other piping not required for the new Work where indicated or where it will interfere with the new Work.
2. Remove piping to the nearest solid support, cap and leave in place.
3. Purge volatile gases and make safe all process lines, fuel lines, and tanks prior to removal or capping.
4. Cut off and properly cap, to the satisfaction of the Construction Manager, both ends of remaining piping which passes through and is embedded in existing walls to the satisfaction of the Construction Manager.
5. Properly cap the remaining piping left open by demolition work.
6. When piping is to be altered, install temporary plugs or caps in the remaining pipe until such time as the piping modifications are made.
7. Abandoned underground piping may be left in place unless it interferes with new Work or is shown or specified to be removed.

E. Waste and Vent Piping and Roof Drains:

(Not used)

F. Potable Water Piping:

(Not used)

G. Electrical Equipment and Fixtures:

1. Remove existing electrical equipment and fixtures where shown with

---

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

such care as may be required to prevent unnecessary damage, to keep existing systems in operation and to keep the integrity of the grounding systems.

3.04 FIELD QUALITY CONTROL

(Not used)

3.05 CLEANING

A. Comply with Section 01 71 00.

B. Pollution Controls:

1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level.
  - a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
  - b. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations.
  - c. Do not rinse into plant drains or storm sewers without obtaining prior acceptance of the Construction Manager.
  - d. Return adjacent areas to conditions existing prior to the start of the Work.
2. Comply with governing regulations pertaining to environmental protection.

C. Disposal of Materials:

1. Remove from the site and properly dispose of all debris resulting from the demolition operations as it accumulates.
2. Remove and take from the site all concrete, brick, tile, concrete block, roofing materials, reinforcement, structural or miscellaneous metals, plaster, wire mesh and other items contained in or upon the structure unless otherwise directed by the Owner or Owner's Representative.
3. Do not re-use demolished items unless approved by the Owner or Owner's Representative.

D. Off-Site Disposal:

1. Dispose of all demolition materials, residual pipe contents, existing filter media, debris, and old concrete off the site as directed by the Owner or Owner's Representative.

2. Dispose of debris which is not to remain the property of the Owner in conformance with all existing applicable laws regulations.
  3. Obtain permit or written permission of the property owner or governing entity on whose property the materials and debris are placed. Furnish copy to the Owner or Owner's Representative.
- E. Alterations and Closures:
1. General: Conform with all applicable Specifications, the Drawings, and the directions of the Owner or Owner's Representative.
  2. Cutting and Drilling:
    - a. Repair all holes in an approved manner where alterations require cutting or drilling into existing floors, walls and roofs.
    - b. Repair such openings with the same or matching materials as the existing floor, wall, or roof, or as otherwise directed by the Owner or Owner's Representative.
    - c. Finish smoothly all repairs unless otherwise directed by the Owner or Owner's Representative.
  3. Openings:
    - a. Close and seal openings in existing concrete slabs, ceilings, masonry walls, floors, and partitions as shown or otherwise directed by the Owner or Owner's Representative.
    - b. Key new Work into the existing in an acceptable manner.
    - c. Weld new reinforcing steel to the existing reinforcing. Conform to AWS 1.4, Structural Welding Code Reinforcing Steel.
    - d. In general, use the same or matching materials as the existing adjacent surface.
    - e. Make the finished closure a smooth, tight, sealed, permanent closure acceptable to the Owner or Owner's Representative.
- F. Openings:
1. Saw cut new openings in existing concrete and masonry walls for windows, passageways, doors or other openings. Patch saw overcuts in concrete walls. Toothing in new masonry at corners of masonry walls.
- G. Repair and Patching:
1. The Contractor shall be responsible for providing all such minor repairs, patches and cover plates, whether specifically shown or described or not.

MUSKINGUM WATERSHED CONSERVANCY DISTRICT

---

H. Painting:

(Not used)

I. General Clean-Up:

1. Upon completion of the Work, remove all materials, equipment, waste, and debris of every sort and leave the premises clean, neat, and orderly.

END OF SECTION



SECTION 03 30 00 – CAST IN PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Refer to Civil Specifications for drainage fill under slabs-on-grade.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Shop Drawings: For steel reinforcement.
- D. Material test reports.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
  - 3. Preinstallation Conference. Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

## 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I/II. Fly ash is not permitted.
- B. Normal-Weight Aggregates: ASTM C 33, graded, 1-inch nominal maximum coarse-aggregate size.
  - 1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

## 2.4 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.5 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. 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.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Proportion normal-weight concrete mixture as follows:
  - 1. Footings:
    - a. Minimum Compressive Strength: 3000 psi at 28 days.
    - b. Maximum Water-Cementitious Materials Ratio: 0.45.
    - c. Slump Limit: 4 inches for conventional concrete, 8 inches for concrete with a verified slump of 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus one inch.
    - d. Air Content: 6 percent, plus or minus 1.5 percent for footings exposed to freezing-and-thawing cycles. Not applicable for footings not exposed to freezing-and-thawing cycles.
  - 2. Slab-on-grade, Exterior:
    - a. Minimum Compressive Strength: 4000 psi at 28 days.
    - b. Maximum Water-Cementitious Materials Ratio: 0.45.
    - c. Slump Limit: 4 inches for conventional concrete, 8 inches for concrete with a verified slump of 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus one inch.
    - d. Air content: 6 percent, plus or minus 1.5 percent.
  - 3. Slab-on-grade, Interior:
    - a. Minimum Compressive Strength: 4000 psi at 28 days.

- b. Maximum Water-Cementitious Materials Ratio: 0.5.
  - c. Slump Limit: 6 inches, plus or minus one inch.
  - d. Air content: Do not allow air content of troweled finished floors to exceed 3 percent.
- 4. Concrete Walls:
  - a. Minimum Compressive Strength: 4000 psi at 28 days.
  - b. Maximum Water-Cementitious Materials Ratio: 0.45.
  - c. Slump Limit: 4 inches, plus or minus one inch.
  - d. Air content: 6 percent, plus or minus 1.5 percent.

## 2.8 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- 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. 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 wide joints into concrete when cutting action will 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.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

### 3.7 FINISHING FORMED SURFACES

- A. 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.

### 3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
  1. Apply float finish to surfaces to receive trowel finish.
- C. 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 all exposed interior concrete floor surfaces and to all interior floor surfaces 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 and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
  1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will 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.

3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
  - 1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION 03 30 00



SECTION 06 05 23 – WOOD, PLASTIC, AND COMPOSITE FASTENINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood, Plastic, and Composite Fastenings.

1.2 QUALITY ASSURANCE

- A. Fabricator: Company specializing in fabricating products specified in this Section with minimum ten years' experience.

1.3 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 Fasteners:

1. Nails, Brads and Staples: ASTM F 1667 compliant.
2. Power-Driven Fasteners: NES NER-2 compliant.
3. Wood Screws: ASME B18.6.1 compliant.
4. Screws For Fastening to Cold-Formed Metal Framing: ASTM C 954 compliant except with wafer heads and reamer wings.
5. Lag Bolts: ASME B 18.2.1 compliant.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine all components for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Adjacent Surfaces: Protect adjacent surfaces during construction.
- B. Seal all joints and cracks.
- C. Cleaning: Clean all surfaces.
- D. Apply sealer as required by product manufactures.

3.3 INSTALLATION

A. Installation: According to manufacturer's instructions.

END OF SECTION

SECTION 06 06 10.13 – NAILING SCHEDULE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nailing Schedule.

1.2 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

1.3 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

- 2.1 Wood Blocking, Nailers and Furring: FSC certified. Provide where shown, in all walls as required to properly support surface mounted equipment such as wall stops, marker boards, casework, toilet partitions and toilet accessories and in all walls as required to properly support recessed equipment such fire extinguisher cabinets.

1. Decay and Termite Resistant Lumber: AWPA C2 compliant. Provide where shown, in all exterior wall and roof construction and at all locations adjacent to concrete or concrete block construction. Field treat all cut surfaces per AWPA M4.
2. Fire Retardant Lumber: AWPA C20 compliant. Provide where shown, in all return air plenums and elsewhere where required by code.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine all components for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Adjacent Surfaces: Protect adjacent surfaces by during construction.
- B. Seal all joints and cracks.
- C. Cleaning: Clean all surfaces.

D. Apply sealer as required by product manufactures.

3.3 INSTALLATION

A. Installation: According to reference standard and manufacturer's instructions.

3.4 PROTECTION

A. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 06 10 00 – ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes roof sheathing; preservative treatment of wood; fire retardant treatment of wood; miscellaneous framing and sheathing; telephone and electrical panel back boards.

1.2 REFERENCES

A. American National Standards Institute:

- 1. ANSI A135.4 - Basic Hardboard.
- 2. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. American Wood-Preservers' Association:

- 1. AWP A M4 - Standard for the Care of Preservative-Treated Wood Products.
- 2. AWP A U1 - Use Category System: User Specification for Treated Wood.

C. ASTM International:

- 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- 2. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
- 3. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- 4. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing.
- 5. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
- 6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- 7. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- 8. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

D. Northeastern Lumber Manufacturers Association:

- 1. NELMA - Standard Grading Rules for Northeastern Lumber.

E. Southern Pine Inspection Bureau:

- 1. SPIB - Standard Grading Rules for Southern Pine Lumber.

F. U.S. Department of Commerce National Institute of Standards and Technology:

- 1. DOC PS 1 - Construction and Industrial Plywood.
- 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
- 3. DOC PS 20 - American Softwood Lumber Standard.

G. Western Wood Products Association:

1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings For Site Fabricated Truss Frame: Indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, erection details and sequence.

C. Product Data: Submit technical data on insulated sheathing, wood preservative materials, and application instructions.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:

1. Lumber Grading Agency: Certified by DOC PS 20.
2. Wood Structural Panel Grading Agency: Certified by EWA – The Engineered Wood Association.
3. Lumber: DOC PS 20.
4. Wood Structural Panels: DOC PS 1 or DOC PS 2.

B. Surface Burning Characteristics:

1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

C. Apply label from agency approved by authority having jurisdiction to identify each fire retardant treated material.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect trusses from warping or other distortion by stacking in vertical position, braced to resist movement.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: AF&PA and SPIB.

B. Non-structural Light Framing: Construction Grade, 19 percent maximum moisture content.

- C. Miscellaneous Framing: Standard Grade, 19 percent maximum moisture content, pressure preservative treat.

## 2.2 SHEATHING MATERIALS

- A. Wood Structural Panel Roof Sheathing: Oriented Strand Board, Span Rating 24/0; Exposure Durability 1 exterior; sanded.
  - 1. Interior Composite Wood and Agrifiber Products: Contain no added urea-formaldehyde resins.
- B. Wood Structural Panel Wall Sheathing: EWA Rated Sheathing Oriented Strand Board, Span Rating 24/0; Exposure Durability 1 Exterior; sanded.
  - 1. Interior Composite Wood and Agrifiber Products: Contain no added urea-formaldehyde resins.
- C. Telephone and Electrical Panel Boards: Plywood. Fire Rated.

## 2.3 UNDERLAYMENT MATERIALS

- A. Plywood Underlayment: EWA Underlayment, Structural I, Span Rating 24/0; Exposure Durability Exterior; sanded.
  - 1. Interior Composite Wood and Agrifiber Products: Contain no added urea-formaldehyde resins.

## 2.4 SHEATHING AND UNDERLAYMENT LOCATIONS

- A. Above Grade Wall Sheathing: 1/2 inch thick, Span Rating 24/0, 48 x 96 inch sized sheets, square edges.

## 2.5 ACCESSORIES

- A. Fasteners and Anchors:
  - 1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
  - 2. Nails: ASTM F1667.
  - 3. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.
- B. Building Paper: ASTM D226; Type I, No. 15 unperforated asphalt felt.

## 2.6 FACTORY WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWP U1, using water-borne preservative.
- B. Moisture Content After Treatment: Kiln dried (KDAT).
  - 1. Lumber: Maximum 19 percent.
  - 2. Structural Panels: Maximum 15 percent.

## PART 3 EXECUTION

### 3.1 FRAMING

- A. Set members level and plumb, in correct position.
- B. Fasten framing in accordance with applicable code.
- C. Place horizontal members, crown side up.
- D. Construct load bearing framing and curb members full length without splices.

### 3.2 SHEATHING

- A. Fasten sheathing in accordance with applicable code.
- B. Secure roof sheathing with longer edge (strength axis) perpendicular to framing members and with ends staggered and sheet ends over bearing.
- C. Use sheathing clips between sheets between roof framing members.
- D. Place building paper horizontally over wall sheathing; weather lap edges and ends.
- E. Secure subfloor sheathing with longer edge perpendicular to floor framing and with end joints staggered and sheet ends over bearing. Attach with subfloor glue and drywall screws.
- F. Install plywood in combination single and two span continuous.
- G. Install telephone and electrical panel back boards with wood structural panel sheathing material where required. Size back boards 12 inches beyond size of electrical equipment.

### 3.3 TOLERANCES

- A. Framing Members: 1/8 inch from indicated position, maximum.

END OF SECTION



SECTION 06 20 00 – FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior Finish Carpentry:
    - a. Decking.

1.2 REFERENCE STANDARDS

- A. American National Standards Institute:
  - 1. ANSI A135.4 - Basic Hardboard.
  - 2. ANSI A156.9 - Cabinet Hardware.
  - 3. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. APA-The Engineered Wood Association:
  - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- C. ASTM International:
  - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 2. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
  - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 4. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- D. Architectural Woodwork Institute:
  - 1. AWI AWS - Architectural Woodwork Standards.
- E. Hardwood Plywood and Veneer Association:
  - 1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

1.3 SEQUENCING

- A. Sequence work to ensure utility connections are achieved in orderly and expeditious manner.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with AWI AWS Section 6 and Section 7 Economy Grade
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- C. Perform Work in accordance with local and State standards.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.
- B. Fabricator: Company specializing in fabricating products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.
- B. Maintain storage space relative humidity within ranges indicated in AWI AWS Section 2.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.
  - 1. Maintain relative humidity within ranges indicated in AWI AWS Section 2.

1.8 EXISTING CONDITIONS

- A. Verify field measurements prior to fabrication. Indicate field measurements on shop drawings.

PART 2 PRODUCTS

2.1 GENERAL

- A. All interior and exterior finish carpentry wood products shall be new. Re-purposed materials shall not be permitted.

2.2 EXTERIOR MATERIALS

- A. Exterior Softwood Lumber: DOC PS 20;
  - 1. Cut: Plain sawn
  - 2. Finger Jointing: Permitted with waterproof adhesives
- B. Exterior Preservative Treated Softwood Lumber: DOC PS 20;
  - 1. Cut: Plain sawn
  - 2. Finger Jointing: Permitted with waterproof adhesives.
- C. Lumber Moisture Content Range: 9-15 percent.
- D. Exterior Plastic Boards and Panels: Expanded PVC trim, color to be selected by architect; sizes as indicated on Drawings.

1. Manufacturer List:
  - a. AZEK Building Products; basis of design
  - b. CertainTeed Corp.

## 2.3 WOOD TREATMENT

- A. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Exterior Type.
- B. Wood Preservative Pressure Treatment: WDMA I.S.4
- C. Provide identification on fire retardant treated material.
- D. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.
- E. Moisture Content after Treatment: Redried
  1. Lumber: As specified for exterior and interior lumber.
  2. Plywood: Maximum 15 percent.

## 2.4 FABRICATION

- A. Fabricate finish carpentry to AWI AWS Section 6 Economy Grade.
- B. Shop assemble work for delivery to site, permitting passage through building openings.
- C. Fit exposed plywood edges with matching veneer edging. Use one piece for full length only.
- D. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.
- E. Apply high pressure decorative laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.
  1. Apply laminate backing sheet to reverse face of high pressure decorative laminate finished surfaces.
  2. Cap exposed edges with same HDPL material

## 2.5 FINISHES

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler matching surrounding surfaces and of types recommended for applied finishes.
- D. Stain, seal, and varnish exposed to view surfaces.

- E. Seal internal surfaces and semi-concealed surfaces.
- F. Prime, paint, Seal surfaces in contact with cementitious materials.

## 2.6 ACCESSORIES

- A. Adhesive for High Pressure Decorative Laminates: Type recommended by laminate manufacturer to suit application.
- B. Wall Adhesive: Cartridge type, compatible with wall substrate, capable of achieving durable bond.
- C. Fasteners and Anchors:
  - 1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
  - 2. Nails and Staples: ASTM F1667.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Lumber for Shimming and Blocking
- F. Veneer Edge Band: AWI AWS; standard wood veneer edge band matching face veneer.
- G. Plastic Edge Trim: AWI AWS; PVC; color as selected.
- H. Wood Filler: Solvent base, tinted to match surface finish color.
- I. Hardware: BHMA A156.9 as follows:
  - 1. Refer to Casework Section 06 41 00 for information on Hardware

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

### 3.2 PREPARATION

- A. Prime paint surfaces of wood items and assemblies to be in contact with cementitious materials.

### 3.3 DEMOLITION

- A. Modify and extend existing finish carpentry installations using materials and methods as specified.

### 3.4 INSTALLATION

- A. Install work in accordance with AWI AWS Section 6 and Section 7 Economy Grade and manufacturer's instructions
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Preparation For Site Finishing:
  - 1. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

### 3.5 TOLERANCES

- A. Conform to AWI AWS Section 6 requirements for the following:
  - 1. Smoothness.
  - 2. Gaps.
  - 3. Flushness.
  - 4. Flatness.
- B. Conform to AWI AWS Section 7 requirements for the following:
  - 1. Smoothness.
  - 2. Gaps.
  - 3. Flushness.
  - 4. Flatness.
  - 5. Alignment.

### 3.6 ATTACHMENTS

- A. Exterior Finish Carpentry:
  - 1. Enclosing Structural Members: Softwood lumber; "PT" preservative treat.

END OF SECTION



SECTION 07 92 00 – JOINT SEALANT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Silicone joint sealants.
  2. Urethane joint sealants.
  3. Latex joint sealants.
  4. Preformed joint sealants.
  5. Acoustical joint sealants.

1.2 SUBMITTALS

- A. Samples: For each kind and color of joint sealant required.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

- A. Neutral-Curing Silicone Joint Sealant SS-1: ASTM C 920.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF Building Systems.
    - b. Dow Corning Corporation.
    - c. GE Advanced Materials - Silicones.
    - d. May National Associates, Inc.

- e. Pecora Corporation.
    - f. Polymeric Systems, Inc.
    - g. Schnee-Morehead, Inc.
    - h. Sika Corporation; Construction Products Division.
    - i. Tremco Incorporated.
    - j. Custom Building Products – Polyblend Siliconized Caulk
  - 2. Type: Single component (S).
  - 3. Grade: Nonsag (NS).
  - 4. Class: 100/50.
  - 5. Uses Related to Exposure: Nontraffic (NT).
- B. Acid-Curing Silicone Joint Sealant SS-2: ASTM C 920.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF Building Systems.
    - b. Dow Corning Corporation.
    - c. GE Advanced Materials - Silicones.
    - d. May National Associates, Inc.
    - e. Pecora Corporation.
    - f. Polymeric Systems, Inc.
    - g. Schnee-Morehead, Inc.
    - h. Sika Corporation; Construction Products Division.
    - i. Tremco Incorporated.
  - 2. Type: Single component (S).
  - 3. Grade: Nonsag (NS).
  - 4. Class: 100/50.
  - 5. Uses Related to Exposure: Nontraffic (NT).
- C. Mildew-Resistant Silicone Joint Sealant SS-3: ASTM C 920.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF Building Systems.
    - b. Dow Corning Corporation.
    - c. GE Advanced Materials - Silicones.
    - d. May National Associates, Inc.
    - e. Pecora Corporation.
    - f. Polymeric Systems, Inc.
    - g. Schnee-Morehead, Inc.
    - h. Sika Corporation; Construction Products Division.
    - i. Tremco Incorporated.
  - 2. Type: Single component (S).



3. Grade: Nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: Nontraffic (NT).

## 2.3 URETHANE JOINT SEALANTS

### A. Urethane Joint Sealant US 1: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. BASF Building Systems.
  - b. Bostik, Inc.
  - c. Lymtal, International, Inc.
  - d. May National Associates, Inc.
  - e. Pacific Polymers International, Inc.
  - f. Pecora Corporation.
  - g. Polymeric Systems, Inc.
  - h. Schnee-Morehead, Inc.
  - i. Sika Corporation; Construction Products Division.
  - j. Tremco Incorporated.
2. Type: Multicomponent (M).
3. Grade: Pourable (P).
4. Class: 50.
5. Uses Related to Exposure: Traffic (T).

## 2.4 LATEX JOINT SEALANTS

### A. Latex Joint Sealant LS-1: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. BASF Building Systems.
  - b. Bostik, Inc.
  - c. May National Associates, Inc.
  - d. Pecora Corporation.
  - e. Schnee-Morehead, Inc.
  - f. Tremco Incorporated.

## 2.5 PREFORMED JOINT SEALANTS

- A. Preformed Foam Joint Sealant PS-1: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of **10 lb/cu. ft.** and impregnated with a nondrying, water-repellent agent. Factory produce in

precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Dayton Superior Specialty Chemicals.
  - b. EMSEAL Joint Systems, Ltd.
  - c. Sandell Manufacturing Co.
  - d. Schul International, Inc.
  - e. Willseal USA, LLC.

## 2.6 JOINT SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

## 2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
  1. Remove laitance and form-release agents from concrete.
  2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to

comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
    - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
    - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
  2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-1.
1. Joint Locations:
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
    - b. Tile control and expansion joints.
    - c. Joints between different materials listed above.
  2. Joint Sealant: US-1.
  3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2.
1. Joint Locations:
    - a. Construction joints in cast-in-place concrete.
    - b. Control and expansion joints in unit masonry.
    - c. Joints between metal panels.
    - d. Joints between different materials listed above.
    - e. Perimeter joints between materials listed above and frames of doors, windows and louvers.
    - f. Control and expansion joints in overhead surfaces.
  2. Joint Sealant: SS-1.
  3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.

- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces JS-3.
1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in tile flooring.
  2. Joint Sealant: US-1.
  3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-4.
1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints of exterior openings where indicated.
    - c. Tile control and expansion joints.
    - d. Vertical joints on exposed surfaces of interior unit masonry, walls and partitions.
    - e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
  2. Joint Sealant: LS-1.
  3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-5.
1. Joint Locations:
    - a. Exposed joints within aluminum entrance framing systems.
  2. Joint Sealant: SS-2.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-6.
1. Joint Sealant Location:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. In toilet rooms and break room.
  2. Joint Sealant: SS-3.
  3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.
- G. Joint-Sealant Application: Joints between millwork and wall surfaces JS-7.

1. Joint Sealant Location:
  - a. Joints between wall and sacking counter
  - b. Joints between wall and Break Room Counter
  - c. Joints between wall and Office Counter
2. Joint Sealant: SS-1.
3. Joint-Sealant Color: Polyblend Haystack #380

END OF SECTION 079200

**SECTION 26 00 10**  
**SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL WORK**

**PART 1      GENERAL**

**1.01          SUMMARY**

- A.      This Section specifies supplemental requirements generally applicable to the Work shown in the Contract Documents. This Section is also referenced by related Work specified in other Divisions.

**1.02          REFERENCE STANDARDS**

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

|      |   |
|------|---|
| ANSI | American National Standards Institute             |
| ASTM | American Society for Testing and Materials        |
| EPA  | Environmental Protection Agency                   |
| ETL  | Electrical Testing Laboratories, Inc.             |
| IEEE | Institute of Electrical and Electronics Engineers |
| ISA  | Instrument Society of America                     |
| NBS  | National Bureau of Standards                      |
| NEC  | National Electric Code                            |
| NEMA | National Electrical Manufacturers Association     |
| NESC | National Electrical Safety Code                   |
| NFPA | National Fire Protection Association              |
| NRTL | Nationally Recognized Testing Laboratory          |
| UL   | Underwriters Laboratories Inc.                    |

**1.03          ACTION SUBMITTALS**

- A.          Shop Drawings
- B.          Product Data

**1.04          INFORMATIONAL SUBMITTALS**

- A.          Electrical installation schedule

**1.05          CLOSEOUT SUBMITTALS**

- A.          Operation and maintenance data
- B.          Record Drawings

## **1.06 QUALITY ASSURANCE**

- A. All bolted or screwed electrical connections shall be tightened to manufacturer's specified torque. This requirement shall apply to all factory and field connections. Provide a test report for the agency to review.
- B. Provide an electrical system testing specification describing tests to be performed, acceptance criteria, timely notice to the agency to witness tests, and furnishing test results to the agency.
- C. Provide maintenance schedules that incorporate the manufacturer's recommendations. Maintenance schedules shall address status information on electrical equipment, especially replacement of consumable items such as fuses.
- D. Provide a list of overcurrent relay settings, ground fault relay settings, and settings for adjustable circuit breakers. Relays shall be tested, and the settings verified. Responsibility for detailed operational parameters and protection rests with the Design Professional and shall have manufacturer's acceptance.
- E. Provide comprehensive on-site and factory training on electrical equipment operation and safety concerns for personnel who will the system(s).

## **PART 2 PRODUCTS**

### **2.01 SUBSTITUTION LIMITATIONS FOR ELECTRICAL EQUIPMENT**

- A. Substitution requests for electrical equipment will be entertained under the following conditions:
  - 1. Notification of Contractor's intent to request substitutions for convenience must be declared within 10 days of contract award so potential risks to system performance and construction schedule may be identified for Contractor's response in submission of the substitution request. Submission of requests for substitutions for convenience must meet the conditions specified in the Contract Documents.
  - 2. For electrical equipment and systems, substitutions for cause are considered major construction risks. If it is possible that Contractor may need to request substitutions for cause because of equipment unavailability, or inability to meet construction schedule because of lead time, Contractor must declare the possibility as soon as



possible to permit establishing a mitigation plan for minimizing risks to system performance and construction schedule.

## **2.02 CONDUIT AND RACEWAY**

- A. Minimum conduit sizes shall be 3/4-inch diameter.
- B. Metal conduit connections shall be tight to ensure electrical continuity.
- C. All exposed conduits shall be aluminum or PVC coated Rigid Galvanized Steel. Conduits inside the buildings in non-process rooms shall be Rigid Galvanized Steel. All underground conduits shall be PVC Schedule 40 except for the service entrance underground conduits which shall be PVC Schedule 80. Rigid galvanized steel ells and turn-ups shall be provided when penetrating a concrete slab.
- D. Flexible conduit in dry locations and flexible liquid-tight conduit in wet locations may be used for connections to light fixtures, dry-type transformers, and equipment with noise, vibration, or motion problems.
- E. Wireways shall be galvanized steel with hinged covers.

## **2.03 WIRE AND CABLES**

- A. Conductors shall be stranded copper wire for No. 12 AWG and larger.
- B. The minimum power conductor size shall be No. 12 AWG.
- C. 600-volt insulation for wires and cables shall be type THHW / THWN / THHN.
- D. Neutrals or equipment grounding conductors # 4 AWG and larger may be black insulated wire identified by green tape in lieu of green insulation, per NEC. Phase conductors # 8 AWG and larger may be color coded with tape. Apply three bands of colored tape, 3/4" wide and one inch apart with four wraps of tape in each band, at each end of each wire.
- E. Color coding by voltage shall be as shown here:

| Conductor Type     | 480/277 Volts            | 208/120 Volts       |
|--------------------|--------------------------|---------------------|
| Phase conductors   | brown, orange, or yellow | black, red, or blue |
| Neutral conductors | natural grey             | white               |

- F. Any Cable connected to the "high leg" phase of a high leg delta distribution system must be colored orange.

- G. Power cables shall not be run in the same conduit with data or control cables.

## **2.04 ELECTRICAL SUPPORTING DEVICES**

- A. Conduits, cable trays, boxes, and fittings shall be hung from the building structure with metal supports. No electrical item shall be hung from pipes or ductwork.

## **2.05 ELECTRICAL ENCLOSURES**

- A. Electrical enclosures shall be sized appropriately to house all electrical components and rated for the intended application in accordance with NEMA standards. Provide electrical enclosures per the Contract documents. If the contract documents do not list the enclosure requirements, the following requirements shall apply:
  - 1. Outdoor = NEMA 3R
  - 2. Outdoor (subject to corrosive environment) = NEMA 4X
  - 3. Indoor (not subject to dust, moisture, fibers, or dripping) = NEMA 1
  - 4. Indoor (subject to dust, moisture, fibers, or dripping) = NEMA 12

## **2.06 ELECTRICAL IDENTIFICATION**

- A. Electric panel identifiers must include where they are located.
- B. Electrical panels shall have an engraved laminated plastic label attached with glue and screws with the panel identifier in one-inch letters and voltage rating in ½ inch letters. Embossed plastic tape labels are not to be used. Specify panels to have typewritten directories.

## **2.07 GROUNDING**

- A. An equipment grounding conductor shall be installed in every feeder and branch circuit conduit and raceway. Provide grounding to metal raceways/conduits when connecting to non-metallic fixtures. Equipment grounding conductors installed in metal conduits or raceways shall be bonded to that conduit or raceway at both ends of the run to minimize ground impedance.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Electrical Installation Schedule: Provide schedule for electrical installation Work to Owner and Engineer including, but not limited to, milestone dates for the following activities (when applicable):
1. Submission of specified coordination drawings.
  2. Submission of action submittals.
  3. Orders placed for major electrical equipment.
  4. Arrival of major electrical equipment on-site.
  5. Utility service outages.
  6. Utility service inspection and activation.
  7. System startup, testing, and commissioning activities for major electrical equipment.
  8. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
  9. Pouring of concrete for electrical equipment or electrical equipment racks and testing of concrete samples.
  10. Requests for inspections by authorities having jurisdiction.

### **3.02 INSTALLATION OF ELECTRICAL WORK**

- A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work. Consult Engineer for resolution of any conflicting requirements.

### **3.03 SYSTEM STARTUP**

- A. Commissioning Activities:
- 1) Construction Inspection
    - a) Commissioning of Electrical systems will require inspection of individual elements of the electrical systems construction throughout the construction period. The Contractor shall coordinate with the Commissioning Agent to schedule electrical systems inspections as required.
  - 2) System Testing
    - a) All testing shall be incorporated into the project schedule. The Contractor shall provide no less than 7 calendar days'

notice of testing. The Commissioning Agent will witness selected Contractor tests at the sole discretion of the Commissioning Agent.

### **3.04 FIELD QUALITY CONTROL**

- A. Administrant for Low-Voltage Electrical Tests and Inspections:
  - 1. Engage qualified low-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
  - 2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
  - 3. Administer and perform tests and inspections.

### **3.05 CLEANING**

- A. The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

### **3.06 CLOSEOUT ACTIVITIES**

- A. Operation and Maintenance Data: Prepare and submit the following:
  - 1) Provide emergency operation, normal operation, and preventive maintenance manuals for each system, equipment, and device installed.
  - 2) Include the following information:
    - a) Manufacturer's operating specifications.
    - b) User's guides for software and hardware.
    - c) Schedule of maintenance material items recommended to be stored at Project site.
    - d) Detailed instructions covering operation under both normal and abnormal conditions.
    - e) Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
    - f) List of load-current and overload-relay heaters with related motor nameplate data.

- g) List of lamp types and photoelectric relays used on Project, with ANSI and manufacturers' codes.
- h) Manufacturer's instructions for setting field-adjustable components.
- i) Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.
- j) EPSS: Manufacturer's system checklists, maintenance schedule, and maintenance log sheets in accordance with NFPA 110.
- k) Exterior pole inspection and repair procedures.
- l) Include copies of demonstration and training videos.

**END OF SECTION 26 01 00**



SECTION 26 05 19 - LOW VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

1.2 REFERENCES

- A. NECA (National Electrical Contractors Association) - Standard of Installation.
- B. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. NFPA 70.
- D. UL - Underwriters Laboratory.
- E. NEMA WC.
- F. Refer to Section 26 05 33 Raceway and Boxes for Electrical Systems for conduit requirements.

1.3 UNIT PRICE – MEASUREMENET AND PAYMENT

- A. Conductors and cable
  - 1. Basis of measurement: by linear foot.
  - 2. Measured to center of foundation, pull box, junction box, or power service, plus an allowance of 5 feet at each pull box, terminating point and connections end (for slack), except for a power service where the allowance will be 10 feet per ODOT 625.22.

1.4 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
  - 1. Stranded conductor for feeders and branch circuits 10 AWG and smaller.
  - 2. Stranded conductors for control circuits.
  - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
  - 4. Conductor not smaller than 16 AWG for control circuits.
  - 5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
  - 6. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet
- B. Wiring Methods: Provide the following wiring methods:

1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
4. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
5. Exterior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
6. Underground Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.

#### 1.5 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper.

#### 1.6 SUBMITTALS

- A. Product Data: Submit for building wire and each cable assembly type.
- B. Samples:
  1. Submit 1 each, 18 inch length of cable assembly from each reel.
  2. Select each length to include complete set of manufacturer markings.
  3. Attach tag indicating cable size and application information.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- D. Test Reports: Indicate procedures and values obtained.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and circuits.

#### 1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

#### 1.9 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.



1.10 COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- B. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 feet of length shown.

PART 2 PRODUCTS

2.1 BUILDING WIRE

- A. Manufacturers:
  - 1. Diamond Wire & Cable Co.
  - 2. Essex Group Inc.
  - 3. General Cable Co.
- B. Product Description: Single conductor insulated wire.
- C. Conductor: Copper.
- D. Insulation Voltage Rating: 600 volts.

2.2 WIRING CONNECTORS (TINNED COPPER)

- A. Solderless Pressure Connectors
- B. Spring Wire Connectors
- C. Compression Connectors

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify interior of building has been protected from weather.
- B. Verify mechanical work likely to damage wire and cable has been completed.
- C. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

### 3.3 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Install wire and cable in accordance with NECA "Standard of Installation."
- C. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- D. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- E. Special Techniques--Building Wire in Raceway:
  - 1. Pull conductors into raceway at same time.
  - 2. Install building wire 4 AWG and larger with pulling equipment.
- F. Special Techniques - Cable:
  - 1. Protect exposed cable from damage.
  - 2. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.
  - 3. Use suitable cable fittings and connectors.
- G. Special Techniques - Wiring Connections:
  - 1. Clean conductor surfaces before installing lugs and connectors.
  - 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
  - 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
  - 4. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
  - 5. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
  - 6. Terminate aluminum conductors with tin-plated, aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.
  - 7. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
  - 8. Install solid conductor for feeders and branch circuits 10 AWG and smaller.
  - 9. Install stranded conductors for branch circuits 10 AWG and smaller. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

### 3.4 WIRE COLOR

- A. General
  - 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:

- a. Black and red for single phase circuits at 120/240 volts.
  - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
  - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
  - a. Black and red for single phase circuits at 120/240 volts.
  - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
  - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
  - 1. For 6 AWG and smaller: Green.
  - 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

### 3.5 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION



SECTION 26 05 26 - GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
  - 1. Rod electrodes.
  - 2. Wire.
  - 3. Grounding well components.
  - 4. Mechanical connectors.
  - 5. Exothermic connections.

1.2 REFERENCES

- A. IEEE 142 (Institute of Electrical and Electronics Engineers) - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- B. IEEE 1100 (Institute of Electrical and Electronics Engineers) - Recommended Practice for Powering and Grounding Sensitive electronic Equipment.
- C. NECA (National Electrical Contractors Association) - Standard of Installation.
- D. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- E. NFPA 70 (National Fire Protection Association) - National Electrical Code.
- F. UL 467.
- G. Bare copper conductors ASTM "B".

1.3 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
  - 1. Metal underground water pipe.
  - 2. Metal building frame.
  - 3. Concrete-encased electrode.
  - 4. Ground ring as noted on drawings.
  - 5. Metal underground gas piping system.
  - 6. Rod electrode.
  - 7. Plate electrode.
  - 8. Rebar

1.4 DESIGN REQUIREMENTS

- A. Construct and test grounding systems.

1.5 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms maximum.

1.6 SUBMITTALS

- A. Product Data: Submit data on grounding electrodes and connections.
- B. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- C. Manufacturer's Installation Instructions: Submit for active electrodes.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and grounding electrodes.

1.8 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
- B. Perform Work in accordance with State of Ohio standard.
- C. Maintain one copy of each document on site.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.10 PRE-INSTALLATION CONFERENCE

- A. Convene minimum one week prior to commencing work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

#### 1.12 COORDINATION

- A. Complete grounding and bonding of building reinforcing steel prior concrete placement.

### PART 2 PRODUCTS

#### 2.1 ROD ELECTRODES

- A. Manufacturers:
  - 1. Apache Grounding/Erico Inc.
  - 2. Copperweld, Inc.
  - 3. Erico, Inc.
  - 4. O-Z Gedney Co.
  - 5. Thomas & Betts, Electrical.
- B. Product Description:
  - 1. Material: Copper Clad Steel.
  - 2. Diameter: 3/4 inch.
  - 3. Length: 10 feet.
- C. Connector: Connector for exothermic welded connection.

#### 2.2 WIRE

- A. Material: Stranded copper.
- B. Foundation Electrodes: 4/0 AWG.
- C. Grounding Electrode Conductor: Copper conductor bare.
- D. Bonding Conductor: Copper conductor bare.
- E. Branch and feeder circuits to be insulated and colored green.

#### 2.3 MECHANICAL CONNECTORS (Not to be used underground.)

- A. Manufacturers:
  - 1. Apache Grounding/Erico Inc.
  - 2. Copperweld, Inc.
  - 3. Erico, Inc.
  - 4. ILSCO Corporation.
  - 5. O-Z Gedney Co.
  - 6. Thomas & Betts, Electrical.
- B. Furnish materials in accordance with the National Electrical Code.

## 2.4 EXOTHERMIC CONNECTIONS

- A. Manufacturers:
  - 1. Apache Grounding/Erco Inc.
  - 2. Cadweld, Erco, Inc.
  - 3. Copperweld, Inc.
  - 4. ILSCO Corporation.
  - 5. O-Z Gedney Co.
  - 6. Thomas & Betts, Electrical.
- B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify final backfill and compaction has been completed before driving rod electrodes.

### 3.2 PREPARATION

- A. Remove paint, rust, mill oils, and surface contaminants at connection points.

### 3.3 INSTALLATION

- A. Install in accordance with IEEE 142.
- B. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.
- C. Install grounding and bonding conductors concealed from view.
- D. Install 4/0 AWG bare copper wire in foundation footing as indicated on Drawings.
- E. Bond together metal siding not attached to grounded structure; bond to ground.
- F. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- G. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.
- H. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.



- I. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
- J. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
- K. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
- L. Permanently attach equipment and grounding conductors prior to energizing equipment.

#### 3.4 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform ground resistance testing in accordance with IEEE 142.
- D. Perform leakage current tests in accordance with NFPA 99.
- E. Perform continuity testing in accordance with IEEE 142.
- F. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION



SECTION 26 05 29 - HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Conduit supports.
  - 2. Formed steel channel.
  - 3. Spring steel clips.
  - 4. Sleeves.
  - 5. Mechanical sleeve seals.
  - 6. Equipment bases and supports.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.

1.2 REFERENCES

- A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- B. NECA (National Electrical Contractors Association) - Standard of Installation.
- C. UL 723 (Underwriters Laboratories, Inc.) - Test for Surface Burning Characteristics of Building Materials.
- D. WH (Warnock Hersey) - Directory of Listed Products.

1.3 DEFINITIONS

1.4 SYSTEM DESCRIPTION

- A. Surface Burning: ASTM E84 and UL 723 with maximum flame spread/smoke developed rating of 25/450.

1.5 SUBMITTALS

- A. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- B. Product Data:
  - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
- C. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.
- D. Manufacturer's Installation Instructions:

- 1. Hangers and Supports: Submit special procedures and assembly of components.
  - E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
  - F. Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction.
- 1.6 QUALITY ASSURANCE
- A. Perform Work in accordance with the National Electric Code and the Ohio Building Code.
  - B. Maintain one copy of each document on site.
- 1.7 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
  - B. Installer: Company specializing in performing work of this section with minimum three years documented experience.
- 1.8 PRE-INSTALLATION CONFERENCE
- A. Convene minimum one week prior to commencing work of this section.
- 1.9 DELIVERY, STORAGE, AND HANDLING
- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
  - B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- 1.10 ENVIRONMENTAL REQUIREMENTS
- A. Provide ventilation in areas to receive solvent cured materials.

## PART 2 PRODUCTS

### 2.1 CONDUIT SUPPORTS

- A. Manufacturers:
  - 1. Allied Tube & Conduit Corp.
  - 2. Electroline Manufacturing Company.
  - 3. O-Z Gedney Co.

- B. Furnish materials in accordance with the National Electric Code.
- C. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- D. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- E. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- F. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.
- G. Cable Ties: High strength nylon temperature rated to 185 degrees F. self locking.
- H. Corrosion resistant finish in corrosive environments.
- I. Concrete inserts rated per load for attachment to concrete.

## 2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
  - 1. Allied Tube & Conduit Corp.
  - 2. B-Line Systems.
  - 3. Midland Ross Corporation, Electrical Products Division.
  - 4. Unistrut Corp.
- B. Product Description: Galvanized 12-gage thick steel. With holes 1-1/2 inches on center.

## 2.3 SPRING STEEL CLIPS

- A. Furnish materials in accordance with the National Electric Code and the Ohio Building Code.
- B. Product Description: Mounting hole and screw closure.

## 2.4 SLEEVES

- A. Furnish materials in accordance with the National Electric Code and the Ohio Building Code.
- B. Sleeves for Conduit Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- C. Sleeves for Conduit Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

2.5 MECHANICAL SLEEVE SEALS

- A. Furnish materials in accordance with the National Electric Code and the Ohio Building Code.
- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify openings are ready to receive sleeves.

3.2 PREPARATION

- A. Remove incompatible materials affecting bond.
- B. Install backing damming materials to arrest liquid material leakage.
- C. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- D. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
  - 1. Concrete Structural Elements: Provide precast inserts, expansion anchors.
  - 2. Steel Structural Elements: Provide beam clamps or spring steel clips.
  - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
  - 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
  - 6. Sheet Metal: Provide sheet metal screws.
  - 7. Wood Elements: Provide wood screws.
- B. Inserts:
  - 1. Install inserts for placement in concrete forms.
  - 2. Install 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 recessed into and grouted flush with slab.
- C. Locate and install anchors, fasteners, and supports in accordance with NECA Standard of Installation.
- D. Install conduit and raceway support and spacing in accordance with NEC. Refer to Article 300.6, "D": All areas are considered wet locations. Cut supports off clean, debur and paint exposed steel with cold galvanizing compound.
- E. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- F. Install multiple conduit runs on common hangers.
- G. Supports:
  - 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
  - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
  - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards **1 inch** off wall.
  - 4. Support vertical conduit at every floor.

#### 3.4 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending **6 inches** beyond supported equipment. Refer to Section 03 33 00.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

#### 3.5 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors **1 inch** above finished floor level. Caulk sleeves.

- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel or stainless steel escutcheons at finished surfaces as required.

3.6 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION



SECTION 26 05 33 - RACEWAY & BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.
- B. Conduit fittings.

1.2 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. NECA (National Electrical Contractor's Association) - "Standard of Installation"
- C. NEMA FB 1 (National Electrical Manufacturers Association) - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- D. NEMA OS 2 (National Electrical Manufacturers Association) - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- E. NEMA RN 1 (National Electrical Manufacturers Association) - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit.
- F. NEMA TC 3 (National Electrical Manufacturers Association) - PVC Fittings for Use with Rigid PVC Conduit.
- G. NEMA 250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum).
- H. NFPA 70 - National Electrical Code.
- I. Underwriter's Laboratory
- J. Liquidtight Flexible Metal Conduit UL 360.
- K. Underground Polyvinyl Chloride (PVC) NEMA TC9.

1.3 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Conduit, tubing, raceways, wireways:
  - 1. Basis of measurement: by linear foot.

1.4 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Underground More than 5 feet outside Foundation Wall: Provide thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.
- C. Underground Within 5 feet from Foundation Wall: Provide rigid steel conduit or thickwall nonmetallic. Provide cast metal or nonmetallic boxes. Use rigid metal sweeping 90 degree elbows when entering building from below grade.
- D. In or Under Slab on Grade: Provide thickwall nonmetallic conduit. Provide cast metal or nonmetallic boxes.
- E. Outdoor Locations, Above Grade: Provide PVC coated rigid steel or thickwall nonmetallic conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
- F. In Slab Above Grade: Provide PVC coated rigid conduit or thickwall nonmetallic conduit. Provide cast metallic or nonmetallic boxes.
- G. Wet and Damp Locations: Provide PVC coated rigid steel metal or thickwall nonmetallic conduit. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- H. Concealed Dry Locations: Provide PVC coated rigid or thickwall nonmetallic conduit. Provide cast metal or nonmetallic boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- I. Exposed Dry Locations: Provide PVC coated rigid steel or thickwall nonmetallic conduit. Provide sheet-cast or nonmetallic boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- J. PVC conduit may be for exterior branch circuits. Encase PVC conduit in 3 inch concrete when under drives and parking areas with minimal cover.

1.5 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.6 SUBMITTALS

- A. Product Data: Submit for the following:
  - 1. Flexible metal conduit.
  - 2. Liquidtight flexible metal conduit.
  - 3. Nonmetallic conduit.

4. Flexible nonmetallic conduit.
5. Nonmetallic tubing.
6. Raceway fittings.
7. Conduit bodies.
8. Surface raceway.
9. Wireway.
10. Pull and junction boxes.
11. Handholes.

- B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
1. Record actual routing of conduits larger than 2 inch trade size.
  2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC conduit from sunlight.

#### 1.9 COORDINATION

- A. Coordinate installation of outlet boxes for equipment connected.
- B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

### PART 2 PRODUCTS

#### 2.1 METAL CONDUIT

- A. Manufacturers:
1. Carlon Electrical Products.
  2. Hubbell Wiring Devices.
  3. Thomas & Betts Corp.
  4. Walker Systems Inc.
  5. The Wiremold Co.
- B. Rigid Steel Conduit: ANSI C80.1.

- C. Rigid Aluminum Conduit: ANSI C80.5.
- D. Intermediate Metal Conduit (IMC): Rigid steel.
- E. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

## 2.2 PVC COATED METAL CONDUIT

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Thomas & Betts Corp.
  - 4. Walker Systems Inc.
  - 5. The Wiremold Co.
- B. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

## 2.3 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Thomas & Betts Corp.
  - 4. Walker Systems Inc.
  - 5. The Wiremold Co.
  - 6. B-Line Systems, Inc.
  - 7. Chal Fant
  - 8. OBO Betterman
- B. Product Description: Interlocked steel construction.
- C. Fittings: NEMA FB 1.

## 2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Thomas & Betts Corp.
  - 4. Walker Systems Inc.
  - 5. The Wiremold Co.
- B. Product Description: Interlocked steel construction with PVC jacket.

- C. Fittings: NEMA FB 1.

## 2.5 ELECTRIC METALLIC TUBING (EMT)

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Western Tube and Conduit.
  - 3. Thomas & Betts Corp.
  - 4. Wheatland Tube Co.
  - 5. The Wiremold Co.
- B. Product Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel, set screw type.

## 2.6 NONMETALLIC CONDUIT

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Thomas & Betts Corp.
  - 4. Walker Systems Inc.
  - 5. The Wiremold Co.
- B. Product Description: NEMA TC 2; Schedule 40 PVC, thickwall to be Schedule 80 PVC.
- C. Fittings and Conduit Bodies: NEMA TC 3.

## 2.7 WIREWAY

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Thomas & Betts Corp.
  - 4. Walker Systems Inc.
  - 5. The Wiremold Co.
- B. Product Description: General purpose, Oiltight and dust-tight, Raintight type wireway as required.
- C. Knockouts: As required.
- D. Size: 4 x 4 inch, 6 x 6 inch, 8 x 8 inch, and 12 x 12 inch; length as indicated on Drawings.
- E. Cover: Hinged or Screw cover with full gaskets.
- F. Connector: Slip-in or Flanged as required.

- G. Fittings: Lay-in type with removable side; captive screws, drip shield.
- H. Finish: Rust inhibiting primer coating with gray enamel finish.
- I. 16 gauge galvanized construction with ANSI-49 epoxy gray paint.
- J. NEMA 4XSS raintight rating in exterior applications.
- K. NEMA 4XSS general purpose rating on interior of building.
- L. Sufficient size to accommodate all cables and wires installed.

## 2.8 OUTLET BOXES

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Thomas & Betts Corp.
  - 4. Walker Systems Inc.
  - 5. The Wiremold Co.
- B. Cast Boxes: NEMA FB 1, Type FD, cast fer alloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.
- C. Wall Plates for Finished Areas: As specified in Section 26 27 26.
- D. Wall Plates for Unfinished Areas: Furnish gasketed cover.

## 2.9 PULL AND JUNCTION BOXES

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Thomas & Betts Corp.
  - 4. Walker Systems Inc.
  - 5. The Wiremold Co.
- B. Hinged Enclosures: As specified in Section 26 27 16.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 1; flat-flanged, surface mounted junction box:
  - 1. Material: Galvanized cast iron.
  - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:
  - 1. Material: Galvanized cast iron.

2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
  3. Cover Legend: "ELECTRIC".
- E. Fiberglass Concrete composite Handholes: Die-molded, glass-fiber concrete composite hand holes:
1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
  2. Cover: Glass-fiber concrete composite, weatherproof cover with nonskid finish.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

#### 3.2 INSTALLATION

- A. Install Work in accordance with State Ohio standards.
- B. Install raceway and boxes in accordance with NECA "Standard of Installation."
- C. Ground and bond raceway and boxes in accordance with Section 26 05 26.
- D. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.
- E. Identify raceway and boxes in accordance with Section 26 05 53.
- F. Arrange raceway and boxes to maintain headroom and present neat appearance.

#### 3.3 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Install nonmetallic conduit.
- C. Arrange raceway supports to prevent misalignment during wiring installation.
- D. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.

- F. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- G. Do not attach raceway to ceiling support wires or other piping systems.
- H. Construct wireway supports from steel channel specified in Section 26 05 29.
- I. Route exposed raceway parallel and perpendicular to walls.
- J. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- K. Route conduit in and under slab from point-to-point.
- L. Maximum Size Conduit in Slab above Grade: 3/4 inch. Do not cross conduits in slab.
- M. Maintain clearance between raceway and piping for maintenance purposes.
- N. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- O. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.
- Q. 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 minimum 20 minutes.
- R. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- S. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams.
- T. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- U. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- V. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- W. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- X. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- Y. Close ends and unused openings in wire way.



### 3.4 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights.
- B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.

### 3.5 INTERFACE WITH OTHER PRODUCTS

- A. Locate outlet boxes to allow luminaires positioned as indicated on architectural reflected ceiling plan.
- B. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

### 3.6 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.

- B. Install knockout closures in unused openings in boxes.

3.7 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

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. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

- B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
  - 1. Material: Galvanized sheet steel.
  - 2. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

## 2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Advance Products & Systems, Inc.
    - b. CALPICO, Inc.
    - c. Metraflex Company (The).
    - d. Pipeline Seal and Insulator, Inc.
    - e. Proco Products, Inc.
  - 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 3. Pressure Plates: Stainless steel.
  - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Presealed Systems.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
  - 2. Sealant shall have VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.

- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
  - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
    - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
    - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
  - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
  - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
  - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
  - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

### 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical

sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544





SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
  - 1. Nameplates.
  - 2. Labels.
  - 3. Wire markers.
  - 4. Conduit markers.
  - 5. Underground Warning Tape.
  - 6. Lockout Devices.
- B. Related Sections:
  - 1. Section 09 90 00 - Painting: Execution requirements for painting specified by this section.

1.2 SUBMITTALS

- A. Product Data:
  - 1. Submit manufacturer's catalog literature for each product required.
  - 2. Submit electrical identification schedule including list of wording, symbols, letter size, color-coding, tag number, location, and function.
- B. Samples:
  - 1. Submit two tags, actual size.
  - 2. Submit two labels, actual size.
  - 3. Submit two nameplates, 4 by 4 inch in size illustrating materials and engraving quality.
- C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with State standard.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept identification products on site in original containers. Inspect for damage.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

#### 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

### PART 2 PRODUCTS

#### 2.1 NAMEPLATES

- A. Product Description: Laminated three-layer plastic with engraved white letters on black contrasting background color.
- B. Letter Size:
  - 1. 1/8 inch high letters for identifying individual equipment and loads.
  - 2. 1/4-inch high letters for identifying grouped equipment and loads.
- C. Minimum nameplate thickness: 1/8 inch.
- D. Placement: Place one nameplate on each power outlet of the dock number (2 per pole).

#### 2.2 LABELS

- A. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.
- B. Placement: Place labels at each meter & panel identifying the dock number(s) connected to this meter/panel.

#### 2.3 WIRE MARKERS

- A. Description: Split sleeve or tubing type wire markers.
- B. Legend:
  - 1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.

2. Control Circuits: Control wire number as indicated on schematic interconnection diagrams and Drawings.

## 2.4 CONDUIT AND RACEWAY MARKERS

- A. Description: Nameplate fastened with adhesive or Labels fastened with adhesive.
- B. Color:
  1. Medium Voltage System: White lettering on black background.
  2. 480 Volt System: Black lettering on white background.
  3. 208 Volt System: Black lettering on white background.
  4. Fire Alarm System: Red lettering on white background.
  5. Telephone System: Blue lettering on white background.
- C. Legend:
  1. Medium Voltage System: HIGH VOLTAGE.
  2. 480 Volt System: 480 VOLTS. HIGH VOLTAGE.
  3. 208 Volt System: 208 VOLTS.
  4. Fire Alarm System: FIRE ALARM.
  5. Telephone System: TELEPHONE.

## 2.5 UNDERGROUND WARNING TAPE

- A. Description: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

## 2.6 LOCKOUT DEVICES

- A. Lockout Hasps: Anodized aluminum hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

# PART 3 EXECUTION

## 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 00 for stencil painting.

## 3.2 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
  1. Install nameplate parallel to equipment lines.
  2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.

3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
  4. Secure nameplate to equipment front using screws or adhesive.
  5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
  6. Install nameplates for the following:
    - a. Switchboards.
    - b. Panelboards.
    - c. Transformers.
    - d. Service Disconnects.
- C. Label Installation:
1. Install label parallel to equipment lines.
  2. Install label for identification of individual control device stations.
  3. Install labels for permanent adhesion and seal with clear lacquer.
- D. Wire Marker Installation:
1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes and each load connection.
  2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
  3. Install labels at data outlets identifying patch panel and port designation as indicated on Drawings.
- E. Conduit/Raceway Marker Installation:
1. Install conduit/raceway marker for each conduit/raceway longer than 6 feet.
  2. Conduit/Raceway Marker Spacing: 20 feet on center.
  3. Raceway Painting: Identify conduit using field painting in accordance with Section 09 90 00.
    - a. Paint colored band on each conduit longer than 6 feet.
    - b. Paint bands 20 feet on center.
    - c. Color:
      - 1) 480 Volt System: Orange.
      - 2) 208 Volt System: Yellow.
      - 3) Fire Alarm System: Red.
      - 4) Telephone System: Blue.
- F. Underground Warning Tape Installation:
1. Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION

SECTION 26 09 23 - LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Switches.
2. Switch plates.
3. Occupancy sensors.
4. Photocells.
5. Photocell control unit.

B. Related Sections:

1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
2. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Product requirements for raceway and boxes for placement by this section.
3. Section 26 05 53 - Identification for Electrical Systems: Product requirements for electrical identification items for placement by this section.
4. Section 26 24 16 - Panelboards.
5. Section 26 27 26 - Wiring Devices: Product requirements for wiring devices for placement by this section.

1.2 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.
2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contractors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
3. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.
4. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
5. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
6. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

1.3 SYSTEM DESCRIPTION

- A. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting inside building larger than 5000 square feet. Control shutoff by method conforming to ICC IECC.
- B. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting outside building. Control shutoff by method conforming to ICC IECC.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's standard product data for each system component.

B. Manufacturer's Installation Instructions: Submit for each system component.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Submit replacement parts numbers.
2. Submit manufacturer's published installation instructions and operating instructions.
3. Recommended renewal parts list.

#### 1.6 QUALITY ASSURANCE

A. Perform Work in accordance with State of Ohio standard.

#### 1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

#### 1.8 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

A. Accept components on site in manufacturer's packaging. Inspect for damage.

B. Protect components by storing in manufacturer's containers indoor protected from weather.

### PART 2 PRODUCTS

#### 2.1 SWITCHES

A. Manufacturers:

1. Hubbell.
2. Leviton.
3. Lutron.
4. Pass and Seymour/Legrand.

B. Wall Switch: Industrial Grade non-pilot light toggle switches for overriding relays.

1. Color: White.

#### 2.2 SWITCH PLATES

A. Manufacturers:

1. Leviton.
2. Lutron.
3. Pass and Seymour/Legrand.

B. Product Description: Specification Grade.

1. Material: Plastic.
2. Color: Stainless steel.

## 2.3 OCCUPANCY SENSOR

A. Manufacturers:

1. Hubbell.
2. Leviton.
3. Lutron.
4. Watt Stopper/Legrand.

B. Compatible with modular relay panels. Capable of being wired directly to Class 2 wiring without auxiliary components or devices.

C. Separate sensitivity and time delay adjustments with LED indication of sensed movement. User adjustable time-delay: 30 seconds to 12 minutes.

D. Furnish with manual override.

E. Operation: Silent.

F. Room Sensors: Two-way Pattern.

G. Corridor and Hallway Sensors:

1. Capable of detecting motion 14 feet wide and 80 feet long with one sensor mounted 10 feet above floor.
2. Capable of detecting motion in warehouse aisle 10 feet wide and 60 feet long or 100 feet long when mounted 22 feet above floor.
3. Capable of being wired in master-slave configuration to extend area of coverage.

## 2.4 PHOTOCELLS

A. Manufacturers:

1. Phillips Lighting Co.
2. Watt Stopper.
3. Leviton.

B. General: Consist of sensor mounted with separate control-calibration module. Sensor connected to control-calibration module via single shielded conductor with maximum distance of 500 feet. Control unit powered by 24 VAC.

C. Control-Calibration Module: Furnish with the following:

1. Capable of being switched between 4 measurement ranges.
2. Separate trip points for high and low response settings.
3. Momentary contact device to override photocell relays.
4. Three minute time delay between switching outputs to avoid nuisance tripping.

D. Sensor Devices: Each sensor employs photo diode technology to allow linear response to daylight within illuminance range.

1. Exterior Lighting: Hooded sensor, horizontally mounted, employing flat lens, and working range **1-10 footcandles** in 10 percent increments. Entire sensor encased in optically clear epoxy resin.

## 2.5 PHOTOCELL CONTROL UNIT

### A. Manufacturers:

1. Phillips Lighting Co.
2. Watt Stopper.
3. Leviton.

B. Product Description: Photodiode control unit with PHOTOCELL ENABLE and MASTER OVERRIDE inputs for remote control, 3 minute time delay, and with selectable ranges for 1-10 footcandle and 10-100 footcandle.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Mount switches, occupancy sensors, and photocells as indicated on Drawings.
- B. Install wiring in accordance with Section 26 05 19.
- C. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings. Install wire in conduit in accordance with Section 26 05 33.
- D. Label each low voltage wire clearly indicating connecting relay panel. Refer to Section 26 05 53.
- E. Mount relay as indicated on Drawings. Wire numbered relays in panel to control power to each load. Install relays to be accessible. Allow space around relays for ventilation and circulation of air.
- F. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.
- G. Label each low voltage wire with relay number at each switch or sensor.



3.2 MANUFACTURER'S FIELD SERVICES

- A. Furnish services for minimum of one day for check, test, and start-up. Perform the following services:
  - 1. Check installation of panelboards.
  - 2. Test operation of remote controlled devices.
  - 3. Repair or replace defective components.

3.3 ADJUSTING

- A. Test each system component after installation to verify proper operation.
- B. Test switches after installation to confirm proper operation.
- C. Confirm correct loads are recorded on directory card in each panel.

3.4 DEMONSTRATION

- A. Demonstrate operation of the following system components:
  - 1. Operation of switches.
  - 2. Operation of occupancy sensors.
  - 3. Operation of photocell.

END OF SECTION



SECTION 26 24 16 - PANELBOARDS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes distribution and branch circuit panelboards.
- B. Related Sections:
  - 1. Section 26 05 26 - Grounding and Bonding.
  - 2. Section 26 05 53 - Electrical Identification.
  - 3. Section 26 28 13 - Fuses.

1.2 REFERENCES

- A. NECA (National Electrical Contractors Association) -Standard of Installation
- B. NEMA AB 1 (National Electrical Manufacturers Association) - Molded Case Circuit Breakers.
- C. NEMA FU 1 (National Electrical Manufacturers Association) - Fuses.
- D. NEMA ICS 2 (National Electrical Manufacturers Association) - Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated Not More Than 2000 Volts AC or 750 Volts DC.
- E. NEMA ICS 5 (National Electrical Manufacturers Association) - Industrial Control and Systems: Control Circuit and Pilot Devices.
- F. NEMA KS 1 (National Electrical Manufacturers Association) - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- G. NEMA PB 1 (National Electrical Manufacturers Association) - Panelboards.
- H. NEMA PB 1.1 (National Electrical Manufacturers Association) - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- I. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

1.3 SUBMITTALS

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- B. Product Data: Submit catalog data showing specified features of standard products.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- B. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 MAINTENANCE MATERIALS

- A. Furnish two of each panelboard key. Panelboards keyed alike.

PART 2 PRODUCTS

2.1 DISTRIBUTION PANELBOARDS

- A. Manufacturers:
  - 1. Westinghouse.
  - 2. General Electric.
  - 3. Square D.
- B. Product Description: NEMA PB 1, circuit breaker type panelboard.
- C. Service Conditions:
  - 1. Temperature: 110 degrees F.
  - 2. Altitude: 1,000 feet above sea level.
- D. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.
- E. Minimum integrated short circuit rating: 22,000 minimum amperes rms symmetrical for 240 or 208 volt panelboards; 42,000 minimum amperes rms symmetrical for 480 volt panelboards, or as indicated on Drawings. The larger AIC will be required.
- F. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Furnish circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
- G. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated on Drawings.
- H. Enclosure: NEMA PB 1, Type 1 cabinet box.

- I. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

## 2.2 BRANCH CIRCUIT PANELBOARDS

- A. Manufacturers:
  - 1. Westinghouse.
  - 2. GE Electrical.
  - 3. Square D.
- B. Product Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- C. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish insulated copper ground bus in each panelboard.
- D. For non-linear load applications subject to harmonics furnish 200 percent rated, plated copper, solid neutral.
- E. Minimum Integrated Short Circuit Rating: 22,000 amperes rms symmetrical for 240 volt panelboards; 42,000 amperes rms symmetrical for 480 volt panelboards, or as indicated on Drawings. The higher rating to be selected.
- F. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.
- G. Enclosure: NEMA PB 1, Type 1.
- H. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.
- I. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finish in manufacturer's standard gray enamel.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1 and NECA "Standard of Installation."
- B. Install panelboards plumb.
- C. Install recessed panelboards flush with wall finishes.

- D. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- E. Install filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads.
- G. Install engraved plastic nameplates in accordance with Section 26 05 53.
- H. Install spare conduits out of each recessed panelboard to accessible location above ceiling. Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.
- I. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NEC Article 517.

### 3.2 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.
- C. Perform switch inspections and tests listed in NETA ATS, Section 7.5.
- D. Perform controller inspections and tests listed in NETA ATS, Section 7.16.1.

### 3.3 ADJUSTING

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 3 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 26 27 16 - ELECTRICAL CABINETS AND ENCLOSURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes hinged cover enclosures, cabinets, terminal blocks, and accessories.
- B. This section does not apply to CT cabinets, which should conform to utility company standards, unless otherwise noted on the plans.

1.2 REFERENCES

- A. NECA (National Electrical Contractors Association) -Standard of Installation.
- B. NEMA ICS 4 (National Electrical Manufacturers Association) - Terminal Blocks for Industrial Control Equipment and Systems.
- C. NEMA 250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.
- B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.5 EXTRA MATERIALS

- A. Furnish two of each key.

PART 2 PRODUCTS

2.1 HINGED COVER ENCLOSURES

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.

- 3. Reliance Electric.
- 4. Hoffman.
- B. Construction: NEMA 250, Type 4XSS steel enclosure.
- C. Covers: Continuous hinge, held closed by flush latch operable by key.
- D. Furnish interior metal panel for mounting terminal blocks and electrical components; finish with white enamel.
- E. Enclosure Finish: Manufacturer's standard gray enamel.

## 2.2 CABINETS

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Reliance Electric.
  - 4. Hoffman.
- B. Boxes: Galvanized steel.
- C. Box Size: Indicated on drawings.
- D. Backboard: Furnish 1/8 inch thick steel backboard for mounting terminal blocks. Paint matte white.
- E. Fronts: Steel, flush or surface type, as noted, with concealed trim clamps, door with concealed hinge, and flush lock Finish with gray baked enamel.
- F. Furnish metal barriers to form separate compartments wiring of different systems and voltages.
- G. Furnish accessory feet for free-standing equipment.

## 2.3 TERMINAL BLOCKS

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Reliance Electric.
- B. Terminal Blocks: NEMA ICS 4.
- C. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
- D. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.



- E. Furnish ground bus terminal block, with each connector bonded to enclosure.

#### 2.4 PLASTIC RACEWAY

- A. Manufacturers:
  - 1. Carlon Electrical Products.
  - 2. Hubbell Wiring Devices.
  - 3. Reliance Electric.
  - 4. Hoffman.
- B. Product Description: Plastic channel with hinged or snap-on cover.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner in accordance with Section 26 05 29.
- C. Install cabinet fronts plumb.

#### 3.2 CLEANING

- A. Clean electrical parts to remove conductive and harmful materials.
- B. Remove dirt and debris from enclosure.
- C. Clean finishes and touch up damage.

END OF SECTION



SECTION 26 28 23 - ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes molded-case and insulated-case circuit breakers in individual enclosures.

1.2 REFERENCES

- A. NECA (National Electrical Contractors Association) - Standard of Installation.
- B. NEMA AB 1 (National Electrical Manufacturers Association) - Molded Case Circuit Breakers.
- C. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

1.3 SUBMITTALS

- A. Product Data: Submit catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations and continuous current ratings of enclosed circuit breakers.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.1 MOLDED CASE CIRCUIT BREAKER

- A. Manufacturers:
  - 1. Square D.
  - 2. General Electric.
  - 3. Westinghouse.
- B. Product Description: Enclosed, molded-case circuit breaker conforming to NEMA AB 1, suitable for use as service entrance equipment where applied.

- C. Service Conditions:
  - 1. Temperature: 110 degrees F.
  - 2. Altitude: 1,000 feet.
- D. Field-Adjustable Trip Circuit Breaker: Circuit breakers with frame sizes 200 amperes and larger have mechanism for adjusting long time, short time, continuous current setting for automatic operation. Range of Adjustment: amperes.
- E. Field-Changeable Ampere Rating Circuit Breaker: Circuit breakers with frame sizes 200 amperes and larger have changeable trip units.
- F. Current Limiting Circuit Breaker: Circuit breaker indicated as current-limiting have automatically-resetting current limiting elements in each pole. Let-through Current and Energy: Less than permitted for same size Class RK-5 fuse.
- G. Solid-State Circuit Breaker: Electronic sensing, timing, and tripping circuits for adjustable current settings; ground fault trip with integral ground fault sensing; instantaneous trip; and adjustable short time trip.
- H. Current Limiter: Designed for application with molded case circuit breaker.
  - 1. Coordinate limiter size with trip rating of circuit breaker to prevent nuisance tripping and to achieve interrupting current rating specified for circuit breaker.
  - 2. Interlocks trip circuit breaker and prevent closing circuit breaker when limiter compartment cover is removed or when one or more limiter is not in place or has operated.
- I. Accessories: As indicated on Drawings. Conform to NEMA AB 1.
  - 1. Shunt Trip Device: 120 volts, AC.
  - 2. Handle Lock: Provisions for padlocking.
  - 3. Insulated Grounding Lug: In each enclosure.
- J. Enclosure: NEMA AB 1, to meet conditions. Fabricate enclosure from steel finished.
  - 1. Interior Dry Locations: Type 4XSS.
  - 2. Exterior Locations: Type 4XSS.
  - 3. Industrial Locations: Type 4XSS.
- K. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install enclosed circuit breakers plumb. Provide supports in accordance with Section 26 05 29.
- C. Height: 5 feet to operating handle.

- D. Locate and install engraved plastic nameplates in accordance with Section 26 05 53.

3.2 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- E. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1.

3.3 ADJUSTING

- A. Adjust trip settings to coordinate circuit breakers with other overcurrent protective devices in circuit.
- B. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION



SECTION 26 51 00 – EXTERIOR AND INTERIOR LIGHTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes interior luminaries, lamps, ballasts, and accessories.

1.2 REFERENCES

- A. Underwriter's Laboratory.
- B. NFPA 70 - National Electric Code.
- C. Fluorescent fixtures UL 1570.
- D. High intensity discharge (HID) fixtures UL 1572.
- E. Incandescent fixtures UL 1571.
- F. Explosionproof fixtures UL 844.
- G. Track lighting UL 1574.
- H. Exit signs UL 924.
- I. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.
- J. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).
- K. High Intensity Discharge Ballast UL 1029.
- L. Latips ANSI Standards, C78 series.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire".
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: measured output of lamp and luminaire, or both.

- G. Luminaire: Complete lighting unit, including lamp, reflector and housing.

#### 1.4 SUBMITTALS

- A. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.
- B. Product Data: Submit dimensions, ratings, and performance data.
- C. Samples: Submit two color chips 3 by 3 inch in size illustrating luminaire finish color where indicated in luminaire schedule.

#### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

#### 1.6 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### 1.7 MAINTENANCE MATERIALS

- A. Furnish two of each plastic lens type.
- B. Furnish one replacement lamps for each lamp installed.
- C. Furnish two of each ballast type.

### PART 2 PRODUCTS

#### 2.1 INTERIOR LUMINAIRES

- A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

#### 2.2 ACCEPTABLE MANUFACTURERS

- A. Cooper Industries.
- B. Edison Price Lighting.
- C. GE Lighting Solutions.
- D. Juno Lighting Group.
- E. Lightoiler; a Phillips group brand.
- F. Lithonia Lighting; Acuity Brands Lighting.



## 2.3 LED LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. Recessed Fixtures: Comply with NEMA LE 4.
- D. Bulb shape complying with ANSI C79.1.
- E. Lamp base complying with ANSI C81.61 or IEC 60061-1.
- F. Rated lamp life of 35,000 hours.
- G. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- H. Internal driver.
- I. Nominal Operating Voltage: 120 V ac.
  - 1. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- J. Housings:
  - 1. Extruded-aluminum housing and heat sink.
  - 2. Clear anodized finish.

## 2.4 LED DOWNLIGHT

- A. Minimum 1,000 lumens. Minimum allowable efficacy of 80 lumens per watt.
- B. Universal mounting bracket.
- C. Integral junction box with conduit fittings.

## 2.5 LED SURFACE MOUNT, LINEAR AND NONLINEAR

- A. Minimum 750 lumens. Minimum allowable efficacy of 75 lumens per watt.
- B. Integral junction box with conduit fittings.

## 2.6 LED SUSPENDED, LINEAR

- A. Minimum 1,500 lumens. Minimum allowable efficacy of 85 lumens per watt.

## 2.7 LED SUSPENDED, NONLINEAR

- A. Minimum 1,500 lumens. Minimum allowable efficacy of 85 lumens per watt.

- B. Integral junction box with conduit fittings.

## 2.8 FLUORESCENT BALLASTS

- A. Manufacturers:
  - 1. Cooper Industries Inc.
  - 2. Duro-Test Corp.
  - 3. General Electric Co.
  - 4. Hubbell Lighting.
  - 5. Magnetek Inc.
  - 6. Pass & Seymour.
  - 7. Philips Electronic North America.
  - 8. Thomas Industries, Inc.
- B. Product Description: Electronic ballast, rapid start, less than 10 percent THD, suitable for lamps specified, with voltage to match luminaire voltage.
- C. Wraparound Fixtures:
  - 1. One piece acrylic prismatic.
  - 2. Number of lamps as required.
  - 3. Four foot length.
  - 4. Steel construction.
  - 5. Surface mounted.
- D. Strip Fixtures:
  - 1. No lenses.
  - 2. Four foot length.
  - 3. Asymmetric or Symmetric reflectors as required.
  - 4. Steel construction.
- E. Labels and Miscellaneous:
  - 1. Wet and damp location labels as required.
  - 2. Wireguards as required.

## 2.9 FLUORESCENT LAMPS

- A. Manufacturers:
  - 1. Duro-Test Corp.
  - 2. General Electric Co.
  - 3. Hubbell Inc.
  - 4. Lithonia Lighting.
  - 5. Philips Electronics.
  - 6. Siemens Corp.
  - 7. Cooper Lighting.
- B. Electronic type with maximum 10 percent total harmonic distortion.
- C. Conform to FCC Regulations.

- D. T8 lamp type.
- E. 90 percent minimum power factor.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install suspended luminaries using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.
- B. Support luminaries larger than 2 by 4 foot size independent of ceiling framing.
- C. Locate recessed ceiling luminaries as indicated on Drawings.
- D. Install surface mounted luminaries plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- E. Install recessed luminaries to permit removal from below.
- F. Install recessed luminaries using accessories and firestopping materials to meet regulatory requirements for fire rating.
- G. Install clips to secure recessed grid-supported luminaries in place.
- H. Install wall-mounted luminaries at height as indicated on Drawings or as scheduled.
- I. Install accessories furnished with each luminaire.
- J. Connect luminaries to branch circuit outlets provided under Section 26 05 33 using flexible conduit.
- K. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- L. Install specified lamps in each luminaire.
- M. Ground and bond interior luminaries in accordance with National Electric Code.

#### 3.2 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

#### 3.3 ADJUSTING

- A. Aim and adjust luminaries as indicated on architectural Drawings.

3.4 CLEANING

- A. Remove dirt and debris from enclosures.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.

3.5 PROTECTION OF FINISHED WORK

- A. Relamp luminaries having failed lamps at Substantial Completion.

3.6 LAMPS

- A. One case of spare lamps of each type of lamp of each type of lamp.
- B. 3500 degree Kelvin fluorescent lamps with minimum 70 CRI.

3.7 ACCESSORIES

- A. Suspended fixture support components include stem, rod and hook hangers.
- B. Fixture support poles, mast arms and brackets shall be sized appropriately for the EPA of the fixture.

3.8 SCHEDULES

- A. See Drawings

END OF SECTION

26 56 13.00 40 LIGHTING POLES AND STANDARDS

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 DEFINITIONS
- 1.3 SUBMITTALS
- 1.4 QUALITY CONTROL
  - 1.4.1 Drawing Requirements
    - 1.4.1.1 Poles
  - 1.4.2 Pressure Treated Wood Pole Quality
  - 1.4.3 Regulatory Requirements
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - 1.5.1 Wood Poles
- 1.6 WARRANTY

PART 2 PRODUCTS

- 2.1 SYSTEM DESCRIPTION
- 2.2 COMPONENTS
  - 2.2.1 Lighting Standards
  - 2.2.2 Poles
    - 2.2.2.1 Wood Poles
  - 2.2.3 Foundations for Lighting Standards
    - 2.2.3.1 Concrete Foundations

PART 3 EXECUTION

- 3.1 INSTALLATION
  - 3.1.1 Wood Poles
  - 3.1.2 Standard Foundations
    - 3.1.2.1 Excavation
    - 3.1.2.2 Concrete Placement
  - 3.1.3 Standard Setting
  - 3.1.4 Grounding
    - 3.1.4.1 Ground Rods and Pole Butt Electrodes
- 3.2 FIELD QUALITY CONTROL
  - 3.2.1 Ground Resistance Measurements

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI O5.1 (2017) Wood Poles -- Specifications & Dimensions

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA M6 (2013) Brands Used on Preservative Treated Materials

AWPA P1/P13 (2019) Standard for Creosote Preservative

AWPA U1 (2023) Use Category System: User  
Specification for Treated Wood

ILLUMINATING ENGINEERING SOCIETY (IES)

IES HB-10 (2011; Errata 2015) IES Lighting Handbook INSTITUTE OF ELECTRICAL AND

ELECTRONICS ENGINEERS (IEEE)

IEEE 81 (2012) Guide for Measuring Earth Resistivity, Ground  
Impedance, and Earth Surface Potentials of a Ground  
System

IEEE C2 (2023) National Electrical Safety Code

IEEE C135.80 (2012) Standard for Fasteners for Overhead Line  
Construction

IEEE C135.90 (2014) Standard for Pole Line Hardware for Overhead  
Line Construction

IEEE Stds Dictionary (2009) IEEE Standards Dictionary: Glossary  
of Terms & Definitions

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 263 (1973) ISO Inch Screw Threads - General Plan and  
Selection for Screws, Bolts and Nuts - Diameter Range  
0.06 to 6 inch

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C136.3 (2020) Roadway and Area Lighting Equipment  
– Luminaire Attachments

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2023; ERTA 4 2023) National Electrical Code

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS Bull 1728F-700 (2011) Specification for Wood Poles, Stubs, and Anchor Logs

UNDERWRITERS LABORATORIES (UL)

UL 467 (2022) UL Standard for Safety Grounding and Bonding Equipment

1.2 DEFINITIONS

Groundline section is that portion between 305 mm one foot above and 610 mm two feet below the groundline. Refer to IEEE Std Dictionary for additional related definitions and terminology.

1.3 SUBMITTALS

Submit the following in accordance with Section SUBMITTAL PROCEDURES:

SD-02 Shop Drawings Poles

1. QUALITY CONTROL

1.3.1 Drawing Requirements

1.3.1.1 Poles

Include dimensions, wind load determined in accordance with AASHTO LTS, pole deflection, pole class, and other applicable information conforming to IES HB-10.

1.5.2 Pressure Treated Wood Pole Quality

Ensure the quality of pressure treated wood poles. Furnish an inspection report (for wood poles) of an independent inspection agency, approved by the Owner, stating that offered products comply with AWWA M6, [AWWA P1/P13] [AWWA P8] and RUS Bull 1728F-700 standards. The RUS approved Quality Mark "WQC" on each pole will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWWA treatment standards.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle poles[ and] [standards], and all related accessories and other manufactured items in a manner to prevent damage or deformation.

1.6.1 Wood Poles

Stack poles stored for more than 2 weeks on decay-resisting skids arranged to support the poles without producing noticeable distortion. Store poles to permit free circulation of air, such that the bottom poles in the stack are at least 305 mm one foot above ground level and

growing vegetation. Do not permit decayed or decaying wood to remain underneath stored poles. Do not drag treated poles along the ground. Do not use pole tongs, cant hooks, and other pointed tools capable of producing indentation more than 25 mm one inch in depth in handling the poles. Do not apply tools to the groundline section of any pole.

#### 1.7 WARRANTY

Provide support for the equipment items by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

### ]PART 2 PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship, which have been in satisfactory commercial or industrial use for 2 years prior to bid opening under similar circumstances and of similar size, and have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, provide products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section. Submit 1 copies of all mounting details.

#### 2.2 COMPONENTS

##### 2.2.1 Lighting Standards

Lighting standard, includes pole, anchor base, brackets, and accessories, designed to withstand vertical and horizontal loading on the entire structure and supported equipment without damage or permanent deformation to any component of the lighting standard.

##### 2.2.2 Poles

Provide poles designed for wind loading of 100 miles per hour determined in accordance with AASHTO LTS while supporting luminaires and all other appurtenances indicated. Provide effective projected areas of luminaires and appurtenances used in calculations specific to the actual products provided on each pole. Provide embedded type bases designed for use with underground supply conductors. Provide, handhole as shown in plans. Secure handhole cover as per plans. Do not install scratched, stained, chipped, or dented poles.

##### 2.2.2.4 Wood Poles

Provide wood poles conforming to ANSI O5.1 and RUS Bull 1728F-700 of Southern Yellow Pine. Gain, bore, and roof poles before treatment, and treat full length with chromated copper arsenate (CCA) or ammoniacal copper arsenate (ACA) according to AWP A T1 and AWP A U1 as referenced in RUS Bull 1728F-700. Provide poles branded by manufacturer with manufacturer's mark and date of treatment, height and class of pole, wood species, preservation code, and retention. Place the brand so that the bottom of the brand or disc is 3050 mm 10-feet from the pole butt for poles up to 15250 mm 50-feet long.

### PART 3 EXECUTION



### 3.1 INSTALLATION

Provide electrical installations conforming to IEEE C2, NFPA 70, and to the requirements specified herein.

#### [3.1.1 Wood Poles

Make pole holes at least as large at the top as at the bottom and large enough to provide 100 mm 4-inches of clearance between the pole and the side of the hole.

- a. Setting depth: Pole setting depths are as follows:

| Length of Pole (feet) | Setting in Soil (feet) |
|-----------------------|------------------------|
| 20                    | 5.0                    |
| 25                    | 5.5                    |
| 30                    | 5.5                    |
| 35                    | 6.0                    |
| 40                    | 6.0                    |
| 45                    | 6.5                    |
| 50                    | 7.0                    |
| 55                    | 7.5                    |
| 60                    | 8.0                    |

- b. Soil setting: "Setting in Soil" depths applies where pole holes are in soil, sand, or gravel or any combination of these.
- c. Setting on sloping ground: On sloping ground, measure the depth of the hole from the low side of the hole.
- d. Backfill: Tamp pole backfill for the full depth of the hole and mound the excess fill around the pole.

3.1.8 Grounding

Provide grounding conforming to NFPA 70, the contract drawings, and the following:

- a. Provide soft-drawn, stranded copper equipment grounding conductor. Provide No. 8 AWG bare copper wire grounding electrode conductor between pole and ground rod. Ground lighting fixture brackets on wood and concrete poles with a No. 6 AWG bare copper grounding electrode conductor connected to the ground rod.
- b. Drive ground rods into the earth so that after the installation is complete, the top of the ground rod is approximately 300 mm 1-foot below finished grade, except in handholes.
- c. Use butt grounds made of at least 4 m 13-feet of No. 6 bare copper wire stapled to the butts of wood poles in spirals where a ground resistance of 25 ohms or less can be obtained by this method.

3.2 FIELD QUALITY CONTROL

3.2.1 Ground Resistance Measurements

Measure the resistance to ground by the fall-of-potential method described in IEEE 81.

-- End of Section --

SECTION 31 11 00 - SITE CLEARING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Removal of surface debris.
- B. Removal of trees, shrubs, and other plant life.
- C. Removal and reuse of fencing around the trash area and at the temporary gate.

1.3 REGULATORY REQUIREMENTS

- A. Comply with Laws and Regulations for environmental requirements, disposal of debris, burning debris on Site, and use of herbicides.
- B. Coordinate clearing work with Utility Companies.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that existing trees, shrubs, and other plant life designated to remain are tagged or identified.
- B. Identify a salvage area for placing removed materials.
- C. Mark areas of fence at trash enclosure to be temporarily removed (chalk).
- D. Mark areas of fence at temporarily construction access.
- E. Install all soil erosion control measures per Stormwater Pollution Prevention Plan and any permits from the Ohio EPA prior to starting in site clearing and grubbing.

3.2 PROTECTION

- A. Protect trees, plant growth, and features designated to remain, as final landscaping.
- B. Protect benchmarks, survey control points, and existing structures from damage or displacement.
- C. Protect fence panels and posts that will be re-used.

3.3 CLEARING

- A. Clear areas required for access to Site and execution of Work.
- B. Remove trees and shrubs indicated, stumps, and root system to a depth of 12 inches.
- C. Clear undergrowth and deadwood without disturbing subsoil.
- D. Remove surface debris.

3.4 REMOVAL

- A. Remove fencing.

3.5 DISPOSAL

- A. Dispose of debris, extracted plant life, and removed materials off Site in accordance with Laws and Regulations.

3.6 REINSTALL

- A. Reinstall sections of removed fencing around trash enclosure and fence for temporary construction entrance.

END OF SECTION

SECTION 31 14 13 - TOPSOIL STRIPPING AND STOCKPILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Soil materials.
- B. Removal of topsoil.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Locate, identify, and protect utilities.
- C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- D. Remove all heavy grasses, weeds and other vegetation prior to stripping topsoil.
- E. Protect benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SOIL REMOVAL

- A. Remove topsoil from areas of construction, areas to be filled and graded, and other areas designated.
- B. Remove lumped soil, boulders, and rock.

- C. Stockpile excavated topsoil classified by ENGINEER as suitable for further use and remove material classified as unsuitable and material in excess of Project requirements.
- D. Benching Slopes: Horizontally bench existing slopes greater than 1:8 (V:H) to key placed fill material to slope to provide firm bearing.

#### 3.4 STOCKPILING

- A. Stockpile materials on-site at approved locations and so as not to impede the natural drainage in the area.
- B. Stockpile in sufficient quantities to meet Project requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

#### 3.5 STOCKPILE CLEANUP

- A. Remove stockpile; leave area in a clean and neat condition. Grade Site surface to prevent free standing surface water. If approval given by OWNER, leave unused materials in a neat, compact stockpile.
- B. If a borrow area is indicated, leave area in a clean and neat condition. Grade Site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 22 00 - EARTHWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Soil materials.
- B. Removal of topsoil and subsoil.
- C. Cutting, grading, filling, compacting, and rough contouring the Site for structures, walks, pavements, and drainage.
- D. Final grade topsoil for seeding.

1.3 SHOP DRAWINGS

- A. Submit a sieve analysis and a proctor test report for Earth Fill A material.
- B. Submit a sieve analysis with uniformity coefficient noted and a proctor test report for Sand Fill.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Subsoil: (Earth Fill A).
  - 1. Excavated and reused material. Local borrow material.
  - 2. Cohesive soil that does not include more than 6% organic matter.
  - 3. Material shall include at least 60 percent by weight passing the No. 200 sieve with a Plasticity Index of at least 8. Particles larger than 4 inches must be broken down or removed.
  - 4. Soil shall not contain miscellaneous material, such as roots and crop stubble.
  - 5. Will be compacted with maximum lift thickness of 8 inches.
- B. Topsoil: (Earth Fill B).
  - 1. Excavated and reused material. Local borrow material.
  - 2. Graded.
  - 3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, weeds, and foreign matter.
  - 4. Contains no greater than 20 percent nor less than 5 percent organic matter.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

#### 3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Locate, identify, and protect utilities.
- C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- D. Protect benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

#### 3.3 SOIL REMOVAL

- A. Remove topsoil from areas of construction, areas to be filled and graded, and other areas designated.
- B. Excavate subsoil to required lines, levels, and contours.
- C. Remove lumped soil, boulders, and rock.
- D. Stockpile excavated topsoil and subsoil material classified by ENGINEER as suitable for further use and remove material classified as unsuitable and material in excess of Project requirements.
- E. Do not excavate wet subsoil unless means available to process wet material to obtain optimum moisture content.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1:8 (V:H) to key placed fill material to slope to provide firm bearing.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

#### 3.4 STOCKPILING

- A. Stockpile materials on-site at approved locations and so as not to impede the natural drainage in the area.
- B. Stockpile in sufficient quantities to meet Project requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.



### 3.5 STOCKPILE CLEANUP

- A. Remove stockpile; leave area in a clean and neat condition. Grade Site surface to prevent free standing surface water. If approval given by OWNER, leave unused materials in a neat, compact stockpile.
- B. If a borrow area is indicated, leave area in a clean and neat condition. Grade Site surface to prevent free standing surface water.

### 3.6 SUBSOIL FILLING

- A. Have condition of foundation approved by ENGINEER prior to placing fill.
  - 1. Roll undisturbed subsoil foundation to determine the presence of soft spots.
  - 2. Remove soft spots and fill excavation as specified for subsoil at a price mutually agreed upon by OWNER and CONTRACTOR, and the Contract Price will be adjusted by Change Order.
  - 3. Give surface of repaired area a light harrowing to permit the knitting of the bottom layer of fill to the foundation.
- B. Fill areas to contours and elevations designated allowing for placement of topsoil.
- C. Do not place fill when either the material, the foundation, or the fill on which it would be placed is frozen or the moisture content is not within the acceptable range.
- D. Place fill material in continuous layers and mechanically compact. Maximum 6 inches per layer compacted depth.
- E. Maintain moisture content of fill materials as required to attain specified compaction density.
- F. Compact to 95 percent of maximum dry density, except under and within 5 feet of proposed pavements and under structures.
- G. Compact to 98 percent of maximum dry density under and within 5 feet of proposed pavements.
- H. Compact to 100 percent of maximum dry density all fill areas under structures.
- I. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise.
- J. Make grade changes gradual. Blend slope into level areas.

### 3.7 SUBSTRATE PREPARATION FOR TOPSOIL

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones in excess of 2 inches in size and lumps larger than 3 inches.
- C. Scarify surface to depth of 3 inches. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.8 PLACING TOPSOIL

- A. Place topsoil to a nominal depth of 4 inches. Place topsoil during dry weather.
- B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.
- C. Remove roots, weeds, rocks, and foreign material while spreading.
- D. Manually spread topsoil close to plant life and structures to prevent damage.
- E. Remove surplus subsoil and topsoil from Site.
- F. Leave stockpile area and Site clean and raked, ready for seeding.

3.9 FIELD QUALITY CONTROL

- A. Testing:
  - 1. Field In-Place Density Tests: ASTM D1556 (cone method) or ASTM D2922 (nuclear method).
  - 2. Compaction Testing: ASTM D698 (Standard Proctor).
- B. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION

SECTION 31 23 00 - EXCAVATION AND FILL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
1. Preparing and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.
  2. Excavating and backfilling for structures.
  3. Drainage and moisture-control fill course for slabs-on-grade.
  4. Subbase course for walks and pavements
  5. Subsurface drainage backfill for walls and trenches
  6. Excavating and backfilling for underground utilities and appurtenances.

1.02 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and, where applicable, the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below Subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Subbase Course: The layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.
- E. Base Course: The layer placed between the Subbase and surface pavement in a paving system.
- F. Fill: Soil materials used to raise existing grades.
- G. Suitable material: Earth or materials designated as being suitable for their intended use by soils technicians or the soils engineer. Suitable material shall be designated as meeting the requirements of the Unified Soil Classification System types SW, GW, GC, SC, SM, ML, CI or as designated in these specifications. Suitable materials are further restricted as outlined in ODOT 203.03 Restrictions on the use of Embankment Materials.
- H. Unsuitable material: Earth material unsatisfactory for its intended use and as classified by the soils technicians. In addition to organic matter, sod, muck, roots, and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.

- I. Pipe Bedding: Layer placed over the excavated subgrade in a trench before laying pipe.
- J. Unauthorized excavation consists of removing materials beyond indicated lines and grades. Unauthorized excavation, as well as remedial work related to unauthorized excavation shall be at the Contractor's expense.
- K. Structures: Slabs, curbs, electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
- L. Utilities include on-site underground pipes, conduits, ducts, cables, as well as underground services.
- M. ODOT, Construction and Materials Specifications of the State of Ohio

#### 1.03 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Test Reports: In addition to test reports required under field quality control, submit reports from a qualified testing laboratory and interpreting test results for specification compliance.
  - 1. Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources. Classify soils in accordance with ASTM D2487 and ODOT Soil Classification Chart, which is in general agreement with ASTM D3282 "Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes".
  - 2. Laboratory compaction curves in accordance with ASTM D698, Method C for each on-site or borrow soil proposed for fill and backfill.
  - 3. Material certifications
- C. For proof-rolling equipment, provide charts or tabulations verifying the contact areas and pressures over the full range of inflation pressures and over the full range of loading conditions.
- D. Excavation Plan: Prior to start of excavation operations, submit written plan to demonstrate compliance with OSHA Standard 29 CFR Part 1926 Subpart P - Excavations.

#### 1.04 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
- B. Testing and Inspection Service: The Contractor shall employ an independent testing agency qualified to classify proposed on-site and borrow soils to verify that soils comply with specified requirements, and to perform required field and laboratory testing required for submittals.

- C. The Contractor shall have a competent representative onsite at all times during the Work to monitor compliance with OSHA trenching and excavation regulations. The representative shall be capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees. The representative shall have authorization to take prompt and corrective measures to eliminate such hazards or working conditions.

#### 1.05 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the others except where permitted in writing by the Owner and then only after acceptable temporary utility services have been provided.
  - 1. Provide a minimum 48-hour notice to the Owner and receive written notice to proceed before interrupting any utility.

### PART 2 PRODUCTS

#### 2.01 FILL MATERIALS

- A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
- B. Imported Borrow Materials: Unless otherwise shown or specified, imported borrow materials shall be natural soil or natural granular materials free of rock, gravel, or soil masses larger than 2 inches in any dimension, topsoil, debris, waste, frozen materials, grass, roots, vegetation, brick, steel, and other deleterious matter. Soil materials shall be capable of specified compaction requirements. Materials to be placed within 6-inches of any structure or pipe shall be free of rocks and unbroken soil masses having a maximum dimension of 2-inches. On-site soil materials meeting this specification will be suitable materials. Soils shall meet all of the following criteria.
  - 1. Soils shall have a liquid limit no greater than 50\_40.
  - 2. Soils shall comply with the restrictions of ODOT Item 203.03.
  - 3. The following materials as defined under ODOT Item 203.02 shall not be used as fill, backfill, or embankment materials:
    - i. Reclaimed asphalt concrete pavement (RACP) per Item 203.02A.
    - ii. Petroleum contaminated soil (PCS) per Item 203.02K
    - iii. Recycled Portland Cement Concrete per Item 203.02M
    - iv. Recycled Materials per Item 203.02N.
    - v. Slag materials per Item 203.02Q
- C. Aggregate Base Material, Aggregate Fill, and Select Fill: Crushed carbonate stone or crushed gravels meeting the requirements of ODOT Item 304 with the following exception: No imported slag or recycled concrete materials shall be permitted.

- D. Stone/Granular Fill/Drainage Fill: ODOT Item 703, No. 57 or 67. (Crushed limestone only; no slag permitted.)
- E. Pipe Bedding, Cover and Embedment: Course interlocking aggregate conforming to ODOT Item 703.01 (AASHTO M43) No. 57. Aggregate shall be crushed carbonate stone or crushed gravel. No slag or recycled concrete materials shall be permitted.
- F. Fill, Backfill, and Embankment Materials: Unless otherwise shown or specified, fill, backfill, and embankment materials shall be existing excavated soils free of debris larger than 6-inches in any dimension, frozen materials, grass, roots, vegetation, and other large debris fragments. Onsite fill soils with moderate amounts of glass fragments, slag, bricks, concrete fragments, or asphalt fragments will be allowed as backfill. Fill materials shall be capable of specified compaction requirements.
- G. Low Strength Mortar (LSM) Backfill:
  - 1. Flowable and pumpable fill conforming to the requirements of ODOT Item 613, Type 1 or Type 2.
- H. Temporary Fence:
  - 1. Posts:
    - i. End and Corner Posts: 2-inch diameter, galvanized steel; maximum distance to adjacent posts shall be 6 feet.
    - ii. Cross Bracing: 1-inch diameter, galvanized steel: placed at all ends and corners.
    - iii. Intermediate Posts: Steel; U, Y, T or channel sections; maximum spacing between intermediate posts shall be 10 feet.
    - iv. All posts shall be driven into the ground a minimum of 3 feet.
  - 2. Wire: Provide #9 galvanized wire, top and bottom. Anchor to posts and draw to 150 pounds tension.
  - 3. Fence Fabric: Provide 48-inch high safety-orange, polyethylene construction. Attach fence fabric to top and bottom wire and posts with 1/4-inch wide polyethylene self-locking ties at 24 inches center to center.

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion control measures to prevent erosion or displacement of soils and discharge

of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

- D. Allow no rock, boulders, cobbles, or unyielding debris to project within 6 inches of pipe or structure.
- E. Where pipe is to terminate into a structure, place and compact backfill for the deeper structure to a minimum elevation of 1 foot above top of pipe prior to excavating trench and placing pipe.
- F. Place barricades and warning lights around any open excavations occurring as part of this Work. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
- G. Furnish, install, maintain, and subsequently remove temporary fences surrounding all excavations and all other Work areas required by this Project. All temporary fencing, in addition to meeting these requirements, shall meet all requirements of OSHA.

### 3.02 DEWATERING AND DRAINAGE

- A. Dewatering system as specified in Section 31 23 19 Dewatering.
- B. The Contractor has full responsibility for maintaining the site in a dewatered condition throughout the construction period.
  - 1. Prevent surface and subsurface water from flowing into excavations and from flooding adjacent areas.
  - 2. Remove water from excavation as fast as it collects.
  - 3. Use well points, cofferdams, or other acceptable methods to permit construction under dry conditions.
  - 4. Maintain dry conditions until fresh concrete has reached sufficient strength to withstand earth and hydrostatic loads.

### 3.03 EXCAVATION

- A. Explosives: Do not use explosives.
- B. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.
- C. Controlling Water: Maintain excavation in dry condition.
  - 1. If pumping is required, pump excavations in such a manner to prevent the carrying away of unsolidified concrete materials, and to prevent damage to the existing subgrade. Avoid pumping of fine grain particles from the in place soils.

### 3.04 STABILITY OF EXCAVATIONS

- A. Comply with all Federal and State Occupational Safety and Health Administration (OSHA) regulations. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.
- B. Excavation support systems as specified in Section 31 50 00 Excavation Support and Protection.

3.05 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing precast or prefabricated structures, placing and removing concrete formwork, installing services and other construction, and for inspection.
- B. 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 a solid base for other work.

3.06 EXCAVATION FOR WALKS, GRAVEL DRIVES AND PAVEMENTS

- A. Excavate surfaces under walks, gravel drives and pavements to the indicated cross sections, elevations, and grades.

3.07 EXCAVATION FOR TRENCHES

- A. Excavate trenches in a manner to minimize loss of soil into the excavation, to minimize soil movement outside the excavation, to maintain stability of the excavation, and to preserve the existing strength of soils surrounding the excavation.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated. Sidesloping or "benching down" of the trench will not be permitted where the trench is excavated within a permanent pavement, or where such sidesloping or benching would endanger existing underground utilities or structures. Confine trench widths to dedicated rights-of-way or construction easements.
- C. Provide a trench width sufficient, but no greater than necessary, to ensure working room to properly and safely place and compact backfill within the pipe zone. The space between the pipe and trench wall shall be wider than the compaction equipment used in the pipe zone.
- D. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.
  - 1. For pipes or conduits less than 6-inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand excavated trench bottoms and support pipe on an undisturbed subgrade.



2. For pipe 6-inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped pipe backfill.
- E. As the excavation progresses make frequent observations for cracking and subsidence of ground near the excavation, excessive deflection or failure of support system elements and connections, and other indications of distress.
- F. In the event that excavation threatens to endanger personnel, the work, or adjacent property, cease excavation. Evaluate methods of construction and revise as necessary to ensure the safe continuation of the work.
- G. Methods of trench excavation shall accommodate the installation of trench support systems in conformance with OSHA requirements; and shall accommodate the removal of pavement, rubble, building debris, abandoned pipe, and boulders.
- H. Allow no rock, boulders, cobbles, or unyielding debris to project within 6 inches of pipe or structure.
- I. Where pipe is to terminate into a structure, place and compact backfill for the deeper structure to a minimum elevation of 1 foot above top of pipe prior to excavating trench and placing pipe.
- J. The length of open trench permitted in any location shall not exceed the amount of pipe to be installed that day. Backfill trenches completely at the end of each day. Alternatively, cover trenches with road plates.

### 3.08 TRENCH AND EXCAVATION SUPPORT SYSTEMS

- A. If a trench box is used during backfill operations, it shall be lifted to a location above each layer of backfill material prior to compacting the layer. Do not advance the trench box in a manner that would pull the already joined pipe apart or leave voids around the pipe.
- B. Modify ground support systems as necessary during the course of the work to suit soil and groundwater conditions encountered.
- C. Removal of sheeting from below the top of the pipe zone after backfill in the pipe zone has been compacted is prohibited, unless otherwise approved by the Engineer. If the Engineer permits such removal, fill voids left on removal of sheeting and compact backfill material to required densities.
- D. Restrictions on removal of sheeting also apply at manholes and other concrete structures.
- E. The Contractor may, at his expense, and with the written approval of the Engineer, leave sheeting in place provided that the top 5 feet below the final street or surface grade is removed. Provide additional clearance as necessary for new or relocated utility lines or other structures.

### 3.09 SUBGRADE PREPARATION

- A. After pavement subgrade has been compacted in accordance with these specifications, the subgrade shall be proof-rolled in accordance with ODOT Item 204.06. The proof-rolling should be observed by an on-site Geotechnical Engineer or a Soils Technician working under the Engineer's supervision. If very-soft to soft, very-loose, weak, or unstable areas are present, these unsuitable subgrades should either be; 1) remediated in place by scarifying, aerating (drying), and re-compacting; 2) removed and the resulting undercut excavations filled in a controlled manner with approved, properly compacted backfill; or, 3) improved in-place by other subgrade stabilization methods as directed by the on-site Geotechnical Engineer. Such other methods could include working large (#1 and #2) stone into the yielding subgrades, use of lime or cement modification, or by partial undercutting and replacement with a system of Geogrid or a separating fabric overlain by an adequate thickness of stone needed to achieve subgrade stability. The Contractor is responsible for correcting all substandard materials or workmanship.

1. Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for changes in Work.

- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Engineer.

#### 3.010 UNAUTHORIZED EXCAVATION

- A. Limits: Unauthorized excavation is defined as all excavation outside the lines and grades shown.
- B. Responsibility: All unauthorized excavation, together with the removal and disposal of the associated material, is at the Contractor's expense.
- C. Backfill: Fill and compact the unauthorized excavation with select fill at the Contractor's expense.

#### 3.011 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip lines of remaining trees.

#### 3.012 BACKFILL

- A. Backfill excavations promptly, but not before completing the following:
1. Acceptance of construction below finished grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents
3. Testing, inspecting, and approval of underground utilities

4. Concrete formwork removal
5. Removal of trash and debris from excavation
6. Removal of temporary shoring and bracing and sheeting
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

### 3.013 BACKFILL OF STRUCTURES

- A. Unless otherwise shown or noted, backfill around structures shall be as follows:
  1. Under pavements, walks and gravel drives: use select fill. Under lawn and porous paver areas: use backfill materials
- B. Backfill shall not be placed, nor excavation support systems removed, until internal supporting walls of structures have been completed.
- C. Remove all form materials and trash from the excavation before placing any backfill. Remove loose, sloughing, or caving soil from bottoms and sidewalls of excavation.
- D. Backfill around structures only after the concrete has attained 2/3 of the specified compressive strength. Obtain the Engineer's approval of concrete work and attained strength prior to backfilling.
- E. Raise backfill uniformly around structures to prevent unbalanced lateral loading. Place backfill in such a manner that any water in the excavation will be displaced by backfill and not trapped therein.
- F. Do not operate earth-moving equipment within 5 feet of walls of structures for the purpose of depositing or compacting backfill materials.
- G. Where compacting granular backfill adjacent to walls, use hand-operated tampers or other equipment that will not damage the structure.
- H. Low Strength Mortar Backfill:
  1. Use LSM for backfilling where indicated by the drawings.
  2. The LSM shall be placed in accordance with the requirements of ODOT Item 613.

### 3.014 TRENCH BACKFILL

- A. Immediately prior to placing pipe bedding, remove loose, sloughing, or caving soil from the bottom and sidewalls of the excavation.
- B. Place pipe bedding material for the full width of the trench and to proper grade and elevation, and compact to provide a firm, uniform support for the pipe. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints,

fittings, and bodies of conduits. Compact bedding to specified requirements.

- C. Place pipe bedding material for a minimum of 6 inches below the pipe and for the full width of the trench to proper grade and elevation, and compact to provide a firm, uniform support for the pipe. Compact bedding to requirements specified in paragraph 3.017. .
- D. Position the pipe to correct line and grade. Excavate bell holes in the bedding to ensure that the pipe is lying flat on the trench bottom and is supported by the full length of the pipe barrel. Fill any voids under the bell or pipe by working in bedding material.
- E. Place pipe bedding material in loose lifts not to exceed 6 inches, and compact around the pipe to the height shown on the Drawings. Compact to requirements specified in paragraph 3.017. Do not allow compaction equipment to contact and damage the pipe.
- F. Backfill above pipe bedding material with pipe cover material. Place in loose lifts not to exceed 6 inches and compact to a height of 12 inches above the pipe barrel. Compact to requirements specified in paragraph 3.017.
- G. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.
- H. Place and compact final backfill of suitable soil material to final subgrade.
- I. Backfill trenches above the pipe zone with backfill or LSM, as shown on the drawings.
- J. Do not permit backfill to free-fall onto a pipe with less than 2 feet of cover over the top of the pipe. Do not allow backfill to drop with a force capable of damaging or displacing the pipe. Place backfill in a manner that avoids segregation. Stop backfill at the necessary grade to provide for the placement of subgrade, surface course, or topsoil as required.
- K. Where trenching operations expose existing pipelines and telephone or electrical conduits, replace any bedding in a manner to restore the original grade and level of support of the pipe or conduit. Complete the trench backfill above the existing pipeline or conduit with the backfill shown or specified, or as directed by the Engineer.
- L. Comply with Pipe Trench Details shown on the Drawings.

### 3.015 FILL

- A. Preparation: Remove vegetation, topsoil, debris, wet, and unsuitable soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
  - 1. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
  - 2. Where the existing ground surfaces have slopes equal to or greater than 1 vertical to 8 horizontal, place benches into the existing slope prior to placing fill.
- B. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture- condition or aerate soil and recompact to required density.

C. Place fill materials in layers to required elevations for each location listed below.

1. Under grass, use suitable excavated or borrow soil material.
2. Under walks, gravel drives and pavements, use select fill.
3. Under steps and ramps, use select fill.
4. Under footings and foundations, use select fill.

### 3.016 MOISTURE CONTROL

A. Before or during compaction, allow the embankment material that contains excess moisture to dry to a moisture content needed to meet the density requirements. Continue drying until the required moisture is uniform throughout the lift. However, for material that displays pronounced elasticity or deformation under the action of loaded rubber tire construction equipment or other equipment, reduce the moisture content to secure stability. Expedite and manipulate the embankment material by drying the wet embankment material by using plows or discs; by adding dry material, lime, lime kiln dust, or cement; or by other methods.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry suitable soil material that is too wet to compact to specified density.
  - i. Stockpile or spread and dry removed wet suitable soil material.

### 3.017 COMPACTION

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy construction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Lift thickness for #57 stone and other open graded aggregates shall not be more than be 12 inches loose depth.

B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

C. Use of vibratory equipment is not permitted where water tables are high or existing soils contain a high moisture content.

D. Compact soil and well graded aggregates to not less than the following percentages of maximum dry density according to ASTM D698- Standard Proctor Density:

1. Under structures, building slabs and steps, compact the top 12 inches below subgrade and each layer of backfill or fill material to 100 percent maximum dry density.

2. Under pavements, walkways and gravel drives, compact the top 6 inches below subgrade and each layer of backfill or fill material to at least 98 percent maximum dry density.
  3. Under lawn or unpaved areas, compact the top 6 inches below subgrade and each layer of backfill or fill material to at least 90 ~~95~~ percent maximum dry density.
- E. Consolidate #57 stone and other open graded aggregate materials to orient individual stone facets until the backfill demonstrates non-movement of the material under further compactive efforts, unless otherwise directed by the Engineer based on field observations and measurements. Open graded material consolidation can be tested by one of the following methods:
1. ODOT Test Section Method C (1015.06.C.3), or
  2. Provide compactive efforts adequate to achieve at least 1" vertical settlement per 12" of loose lift depth, and the backfill demonstrates non-movement of material under further compactive effort.

### 3.018 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated
1. Provide a smooth transition between existing adjacent grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
- B. Site Grading: Slope grades to direct water away from and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Lawn or Unpaved Area: Plus or minus 1 inch
  2. Walk and Gravel Drives: Plus or minus 1 inch
  3. Pavements: Plus or minus 1 inch when tested with a straight edge applied parallel to the centerline.
- C. Pipes shall be laid to within one-half inch of grade (measured at invert) and to within one inch of line.

### 3.019 BASE COURSES

- A. Place base course material over subbases to pavement.
1. Compact base course per requirements.
  2. Shape base to required crown elevations and cross-slope grades.
  3. When thickness of compacted base course is 6 inches or less, place materials in a single layer.

4. When thickness of compacted base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.020 DISPOSAL OF EXCAVATED MATERIALS

- A. At no additional cost to the Owner, haul away from the Project Site all material removed from the excavations that does not conform to the requirements for fill or is otherwise in excess of that required for the project.
- B. Dispose of unsuitable or excess materials in compliance with municipal, county, state, federal or other applicable regulations at no additional cost to the Owner.

3.021 REPAIR/RESTORATION

- A. Restoring and Resurfacing Existing Roadways and Facilities:
  1. Place 1-1/2 inches of temporary bituminous pavement immediately after backfilling trenches in paved roadways that are to be retained for permanent use.
    - i. In areas of roadway where LSM backfill is used, the LSM may be used as temporary pavement.
  2. Maintain the surface of the paved area over the trench in good and safe condition during progress of the entire Work, and promptly fill all depressions over and adjacent to the trench caused by settlement of backfilling.
  3. The permanent replacement pavement shall be equal to that of the existing roadways unless otherwise specified.
- B. Disturbed Areas:
  1. Restore all pavement, gutters, curbs, sidewalks, or roadways disturbed or damaged by the Contractor's operations, except areas designated "New Pavement" or "Proposed Pavement."
  2. Repair damage and restore disturbed areas to conditions present before commencement of the Work.
  3. Refer to Section 32 91 19 Seeding.
- C.

3.022 FIELD QUALITY CONTROL

- A. Testing Agency Services: As required in Section 01 41 00 Testing Laboratory Services, testing shall be performed by an independent testing agency retained by the Owner and paid by the Owner. Allow the testing agency to inspect and test each subgrade and each fill, backfill, or base layer. Do not proceed until test results for previously completed work verify

compliance with requirements.

1. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2937 (drive cylinder method), as applicable.
    - i. Field in-place density tests may also be performed by the nuclear method according to ASTM D 6938, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 6938.
    - ii. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Engineer.
  2. Footing Subgrade: At footing subgrades, perform at least one test per 25 feet length of footing of each soil stratum to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata when acceptable to the Engineer.
  3. Paved, Gravel Drive and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2000 sq. ft. or less of paved area, gravel drive or building slab, but in no case fewer than three tests.
  4. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in-place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.
  5. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in-place density test for each 150 feet or less of trench, but no fewer than two tests per trench.
- B. When testing agency reports that subgrades, fills, backfills, or bases are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

### 3.023 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions
  1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.



- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.024 SETTLEMENT

- A. Any subsequent damage to slabs, piping, utilities, or structures caused by settlement of fill material occurring within the 1-year guarantee period addressed in the General Conditions will be considered to be caused by improper compaction and shall be corrected by the Contractor at no additional cost to the Owner. Restore any structures damaged by settlement to the condition that existed prior to the commencement of the work.

END OF SECTION



SECTION 31 23 18 - ROCK REMOVAL (MECHANICAL)

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Removing identified rock during excavation.
  - 2. Removing discovered rock during excavation.
  - 3. Expansive tools to assist rock removal.
  - 4. Blasting is not permitted by this specification.
- B. Related Sections:
  - 1. Section 31 23 00 – Excavation and fill
  - 2. Section 31 23 33 – Trenching and Backfilling

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Site Rock Removal:
  - 1. Basis of Measurement: By cubic yard measured before removal.
  - 2. Basis of Payment: Includes preparation of rock for removal, mechanical disintegration of rock, removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.
- B. Trench Rock Removal:
  - 1. Basis of Measurement: By cubic yard measured before removal.
  - 2. Basis of Payment: Includes preparation of rock for removal, mechanical disintegration of rock, removal from position, loading and removing from site. For over excavation, payment will not be made for over excavated work nor for replacement materials.

1.3 DEFINITIONS

- A. Definition of Rock:
  - 1. MWCD defines rock as boulders and pieces of concrete, slag, or masonry exceeding 1/2 cubic yard in volume, or solid ledge rock with a Rock Quality Designation (RQD) greater than 25 based on available geotechnical investigation data and, that requires wedging or sledging, or barring or breaking up with a power-operated tool.
  - 2. MWCD does not define materials observed to be soft or disintegrated rock or slag removable with a hand-pick or power-operated excavator or shovel equipped with bucket mounted rippers, loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, or rock beyond the maximum limits of measurement allowed, that may fall into the excavation as rock.
- B. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- C. Shop Drawings: Indicate proposed mechanical rock removal method.

1.4 QUALITY ASSURANCE

- A. Company specializing in mechanical disintegration of rock, with five years documented experience.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions and note subsurface irregularities affecting Work of this section.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.

3.3 ROCK REMOVAL BY MECHANICAL METHOD

- A. Excavate and remove rock by mechanical method.
  - 1. Drill holes and use expansive tools, wedges or mechanical disintegration compound to fracture rock.
- B. Cut away rock at bottom of excavation to form level bearing.
- C. Remove shaled layers to provide sound and unshattered base for footings, foundations or bases.
- D. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- E. Remove excavated materials from site.
- F. Correct unauthorized rock removal in trenches by providing additional bedding material specified for the utility.
- G. Correct unauthorized rock removal in excavations with lean concrete fill (CDF) as directed by Engineer.

3.4 FIELD QUALITY CONTROL

- A. Request visual inspection of foundation bearing surfaces by Engineer before installing subsequent work.

END OF SECTION

SECTION 31 23 19 - DEWATERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Dewatering system.
  - 2. Surface water control system.
  - 3. Monitoring wells.
  - 4. System operation and maintenance.
  - 5. Water disposal.
- B. Related Sections:
  - 1. Section 00 31 00 - Available Project Information: Subsurface investigation report.
  - 2. Section 31 23 00 – Excavating and Fill: Excavation for structures below ground water table.
  - 3. Section 31 23 33 – Trenching and Backfilling: Trenching for utilities below ground water table.

1.3 DEFINITIONS

- A. Dewatering includes the following:
  - 1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations and trenches.
  - 2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations and trenches.
  - 3. Disposing of removed water.
- B. Surface Water Control: Removal of surface water within open excavations.

1.4 SYSTEM DESCRIPTION

- A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.
- B. Provide monitoring wells and monitoring equipment to obtain meaningful observations of conditions affecting excavation, adjacent structures, and adjacent water wells.

- C. Furnish standby equipment stored at Project site and ready for immediate use upon failure of dewatering equipment. For each of the following types of dewatering equipment, if used, provide an adequate number of standby units of sufficient size:
1. Dewatering Centrifugal Pumps.
  2. Dewatering Turbine Pumps.
  3. Pump Power Units.
  4. Dewatering Jet Eductor Pressure Pumps.
  5. Portable Electric Generators: 50 percent for multiple units. 100 percent for a single unit.
  6. Commercial Electric Power: 100 percent standby electric generating equipment.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Design dewatering systems to:
1. Lower water table within areas of excavation a minimum of 24 inches below the bottom of excavation to permit Work to be completed on dry and stable subgrade.
  2. Relieve hydrostatic pressures in confined water bearing strata a minimum of 24 inches below excavation to eliminate risk of uplift or other instability of excavation.
  3. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
  4. Prevent loss of fines, quick conditions, or softening of foundation subgrade.
  5. Maintain stability of sides and bottoms of excavations and trenches.
- B. Design surface water control systems to:
1. Collect and remove surface water and seepage entering excavation.

#### 1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Signed and sealed by professional engineer.
1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump capacities and locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
  2. Indicate primary and standby power system location and capacity.
  3. Indicate layout and depth of monitoring wells, piezometers and flow measuring devices for system performance measurement.
  4. Include detailed description of dewatering and monitoring system installation procedures, operation and maintenance of equipment.
  5. Include description of emergency procedures to be followed when problems arise.
- C. Product Data: Submit data for each of the following:
1. Dewatering Pumps: Indicate sizes, capacities, priming method, engine/motor characteristics.
  2. Pumping equipment for control of surface water within excavation.
- D. Design Data: Signed and sealed by professional engineer.

1. Indicate design values, analyses, and calculations to support design.
2. Include description and profile of geology, soil, and groundwater conditions.

E. Field Reports: Per Article 3.9 of this specification

#### 1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

#### 1.8 QUALITY ASSURANCE

- A. Comply with regulatory authorities having jurisdiction for the following:
1. Drilling and abandoning of wells used for dewatering systems.
  2. Water discharge and disposal from pumping operations.
- B. Obtain permit from EPA under National Pollutant Discharge Elimination System (NPDES), for storm water discharge from construction sites.
- C. Submit documentation to ODNR for groundwater withdrawal in excess of 100,000 gallons per day.

#### 1.9 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this section with minimum of five continuous years documented experience and responsible for design, operation, and maintenance of dewatering system.
1. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.
- B. Design, install, and monitor operation of dewatering under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Ohio.

#### 1.10 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.
1. Review methods and procedures related to dewatering:
    - i. Site conditions
    - ii. Temporary erosion control measures
    - iii. Geotechnical report
    - iv. Proposed site clearing and excavations
    - v. Existing utilities and subsurface conditions
    - vi. Construction Schedule: Verify availability of Installer's personnel, equipment and facilities needed to make progress and avoid delays

vii. Testing and monitoring of dewatering system

1.11 SEQUENCING

- A. Sequence work to obtain required permits before start of dewatering operations.
- B. Sequence work to install and test monitoring systems minimum 7 days before testing and operating dewatering systems.
- C. Sequence work to install and test dewatering and surface water control systems minimum 7 days before starting excavation or trenching operations.

1.12 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work to permit the following construction operations to be completed on dry stable substrate.
  - 1. Excavation for structures specified in Section 31 23 00.
  - 2. Trenching for utilities specified in Section 31 23 33.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

- A. Select dewatering equipment to meet specified performance requirements.
- B. Contractor shall use dewatering products in accordance with recommendations of the manufacturer.

2.2 MONITORING EQUIPMENT

- A. Select and furnish Piezometers for installation to monitor water elevation. Specify if water levels will be recorded manually, or by data recorder
- B. Select Flow Measurement: Furnish devices as follows:
  - 1. Pitometer installed on discharge of pipe of from each well.
  - 2. Pitometer installed to measure flow from entire dewatering system.

2.3 ACCESSORIES

- A. Valves and Fittings: Furnish valves and fittings to isolate each well from header pipe and to prevent loss of pump prime.
- B. Filter Sand: Fine aggregate, graded to suit well screen.



- C. Grout: Mixture of portland cement and bentonite clay or sand suitable for sealing abandoned wells and piping.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Subsurface investigations identified in Section 00 31 00 are available for review and are for information only. The opinions expressed in those reports are those of the Geotechnical Engineer and represent interpretations of subsoil conditions, tests and results of analyses conducted by the Geotechnical Engineer. Owner will not be responsible for interpretations on conclusions drawn in those reports.
- C. Conduct additional borings and investigations as required to complete dewatering system design.
- D. Call Local Utility Line Information service at not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.

#### 3.2 PREPARATION

- A. Protect existing adjacent buildings, structures, pavements and other facilities or improvements from damage caused by settlement, lateral movement, undermining, washout or other hazards created by dewatering operations.

#### 3.3 MONITORING WELLS

- A. Install monitoring wells at locations indicated on shop drawings as specified for dewatering wells.
- B. Test each monitoring well point to verify installation is performing properly.
- C. Install piezometers, calibrate, and test for proper operation.
- D. Protect monitoring well standpipes from damage by construction operations.
- E. Maintain accessibility to monitoring wells continuously during construction operations.
- F. Maintain monitoring wells until new construction is completed, fill is in place and dewatering is no longer required. Remove monitoring wells after groundwater is allowed to return to normal level.

### 3.4 DEWATERING SYSTEM

- A. Install dewatering system in accordance with shop drawings.
- B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.
- C. Drill wells in sizes and to depth indicated in shop drawings. Provide temporary surface casing when required to stabilize soil while advancing well.
- D. Use gravel packs, well screens, filters or other means to prevent pumping of fine sands or silts from the subsurface.
- E. Test well for proper water flow through well screen and pumping rate for dewatering system operation. Repeat development until well meets performance requirements.
- F. Cover and seal top of well until pump is installed.
- G. Install pumps in accordance with manufacturer's instructions.
- H. Connect pumps to discharge header. Install valves to permit pump isolation.

### 3.5 SURFACE WATER CONTROL SYSTEM

- A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area.
- B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels or storm drains via settling basins in accordance with requirements of agencies having jurisdiction.
- C. Control and remove unanticipated water seepage into excavation.

### 3.6 SYSTEM OPERATION AND MAINTENANCE

- A. Operate dewatering system continuously until structures have been constructed and backfilling is complete.
- B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.
- C. Conduct daily observation of dewatering system and monitoring system. Make required repairs and perform scheduled maintenance.
- D. Fill fuel tanks before tanks reach 25 percent capacity.

- E. Start emergency generators at least twice each week to check operating condition.
- F. When dewatering system cannot control water within excavation, notify Architect/Engineer and stop excavation work.
  - 1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
  - 2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.
- G. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.
- H. Correct unanticipated pressure conditions affecting dewatering system performance.
- I. Do not discontinue dewatering operations without Architect/Engineer's approval.

### 3.7 WATER DISPOSAL

- A. Discharge water into existing storm sewer system or drainage channels. Provide settling basins, or other treatment devices so water being discharges contains less than 10 ppm suspended solids.

### 3.8 SYSTEM REMOVAL

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.
- B. Remove piezometers and monitoring wells.
- C. Fill abandoned piping with grout.
- D. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.

### 3.9 FIELD QUALITY CONTROL

- A. After dewatering system is installed, perform pumping test to determine when selected pumping rate lowers water level in well below pump intake. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.
- B. Monitor and record the following, daily, until steady state conditions occur. Then monitor and record conditions twice each week.
  - 1. Average discharge flow rate for each deep well, eductor header, and well point.

- C. Monitor and record the following, daily, until dewatering system is discontinued. Then monitor and record conditions weekly until Work is completed, monitoring wells are removed, or until directed by Architect/Engineer.
    - 1. Ground water elevation.
  - D. Monitor ground water discharge for suspended solids content. Sample and test water from each well weekly. Maximum permitted suspended solids content 10 parts per million.
  - E. Survey existing adjacent buildings, structures, and improvements weekly to detect movement in comparison to original elevations during dewatering operations.
    - 1. Notify Architect/Engineer immediately of measured movement.
  - F. Submit initial installation reports including the following:
    - 1. Installation and development reports for well points and pumps.
    - 2. Installation and baseline reports for monitoring wells and piezometers.
    - 3. Test reports of monitoring well water analysis.
    - 4. Initial dewatering flow rates.
  - G. Submit weekly monitoring reports including the following:
    - 1. Dewatering flow rates.
    - 2. Piezometer readings.
    - 3. Test reports of discharge water analysis.
    - 4. Maintenance records for dewatering and surface water control systems.
- 3.10 BASIS OF PAYMENT
- A. The cost for dewatering and surface water control system utilized shall be included in the bid cost of the item necessitating the work. No compensation will be made under this item.

END OF SECTION

SECTION 31 23 33 - TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Excavating trenches for buried utilities and appurtenances.
- B. Backfilling and compaction from top of bedding to grade. (Bedding is included with the buried utility to be installed in the trench.)

1.3 DEFINITIONS

- A. Buried Utility: Any buried pipe, duct, conduit, or cable.

1.4 SHOP DRAWINGS

- A. Submit a sieve analysis and a proctor test report for granular backfill material.

1.5 COORDINATION

- A. Verify Work at lower elevations is complete before placing higher elevation work.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Earth Backfill: Excavated earth material, finely divided and free of stones 3 inches or greater in any dimension to at least 3 feet above pipe top.
- B. Granular Backfill:
  - 1. ODOT Item 304 for up to 18 inches below the surface, except no slag permitted.
  - 2. ODOT Item 304 for top 18 inches, except no slag permitted.
- C. Controlled Density Fill (C.D.F.): Three types as follows:
  - 1. C.D.F. I: Class II concrete; follow Section 03 30 00.
  - 2. C.D.F. II:
    - i. Self-compacted, cementitious fill material consisting of cement, fly ash, fine aggregate and water.
    - ii. Strength: 50 psi minimum compressive strength at 28 days.
    - iii. Cement: Type I; follow Section 03 30 00; minimum 50 pounds per cubic yard.

- iv. Fly Ash: Follow Section 03 30 00; no limit on quantity.
  - v. Fine Aggregate: Follow Section 03 30 00; no limit on quantity.
  - vi. Water: Potable; approximately 500 pounds per cubic yard.
  - vii. Mix design to be reviewed by ENGINEER.
- 3. C.D.F. III: Bank run sand and gravel, select sand or well graded crushed stone, free of organic materials and other deleterious substances. No rocks or lumps larger than 2 inches nor contain more than 13 percent by weight passing No. 200 sieve.
- D. Topsoil:
  - 1. Excavated and reused material. Local borrow material.
  - 2. Graded.
  - 3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, weeds, and foreign matter.
  - 4. Contains no greater than 20 percent nor less than 5 percent organic matter.

### PART 3 EXECUTION

#### 3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect plant life, lawns, and other features remaining as part of final landscaping. Protect existing trees and shrubs in accordance with Article 3.6 of this Section.
- C. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- D. In lawn areas and in farm fields, as determined by ENGINEER, remove and stockpile topsoil for replacement during backfilling.
- E. Prior to open trenches entering paved limits of a street, alley, driveway, or parking area, neatly cut the pavement for its full depth, then remove, and dispose of off-site.

#### 3.2 EXCAVATION

- A. Excavate material encountered to subgrade elevations, indicated slopes, lines, depths and invert elevations required for utilities.
- B. Cut trenches to uniform widths sufficient to enable installation and allow inspection, unless otherwise specified, and to provide for the minimum cover specified.
- C. Do not interfere with 45 degree bearing plane of foundations.
- D. Provide trench protection in accordance with Article 3.5 of this Section.
- E. Hand-excavate and shape trench bottom to provide uniform bearing and support of the buried utility. Remove loose material.

- F. Use pavement protection such as matting or rubber tracks when using track-mounted equipment to protect pavement to remain.
- G. For Pipe Sewers:
  - 1. The trench width below the top of pipe level shall not exceed the dimensions specified for the various types and sizes of pipe, and shall be at least 12 inches greater in width than the outside diameter of the pipe barrel. Whenever the maximum allowable trench width (below the top of pipe level) is exceeded for any reason, ENGINEER reserves the right to direct CONTRACTOR to use greater strength pipe, to modify the type of backfill, to embed the pipe in concrete, or to utilize a combination of these procedures, all at CONTRACTOR's expense.
  - 2. Excavate trenches in earth to a depth at least 1/8 the outside pipe diameter or 4 inches, whichever is greater, below the outside bottom of the pipe barrel and bell when the pipe is laid on its final grade.
- H. For Water Mains and Force Mains, and for Process Piping:
  - 1. Except where otherwise specifically required or permitted by ENGINEER, excavate trenches to a depth sufficient to provide not less than 4 feet of vertical cover over the outside top and to provide not less than 4 inches of bedding below the outside bottom of the pipe barrel. However, install at a greater depth when shown on Drawings, when necessary to pass under other utilities or obstructions, or where necessary to prevent high points. When paralleling roadside ditches or streams, provide lateral cover at least equal to specified vertical cover.
  - 2. The width of the trench shall not be more than 24 inches greater than the outside pipe diameter, except at joints, where sufficient space shall be provided for properly making the joints without raising the length of pipe above the solid bottom of the trench. Care shall be taken to detect and remove stones and debris in the bottom of the trench which would damage the pipe or be detrimental to the proper bedding of the pipe, with removal to be for a depth of at least 6 inches below the bottom of the pipe.
- I. Excavate trenches in rock to a depth of 6 inches below the outside bottom of the duct, conduit, or cable and all joints when the pipe is installed on final grade, and provide a cushioning layer of bedding material.
- J. Excavate trenches for river crossings in the river bottom by dredging, coffer damming, or other acceptable method. Deposit excavated material on the river bed adjacent to the trench on the downstream side. Take care to prevent the material from being washed back into the trench.
- K. When water is encountered in the trench, de-water as required to maintain the water level at least 3 feet below the bottom of the trench on a continuous basis until ENGINEER allows removal of the de-watering system. Supply, operate, and maintain pumps, piping, etc., for the de-watering system.
- L. If in ENGINEER's opinion, the subgrade is not suitable to provide adequate foundation for the buried utility being installed, ENGINEER may direct that the unsuitable material be removed and replaced with approved granular material.

### 3.3 BACKFILLING

- A. Do not place heavy or large quantities of backfill material until backfilling has progressed to a depth of at least 3 feet over the top of the buried utility. Carefully place backfill material so as not to damage the joints or displace the buried utility.
- B. Backfill immediately following trenching and installation operations to reduce the possibility of damage to pavements and buried utilities, and as required to comply with Article 3.8 of this Section, and maintain backfilled areas in accordance with Article 3.7 of this Section.
- C. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- D. Backfill trenches with compacted granular backfill to the invert elevation of existing buried utilities when the line of construction is along the existing, and to the invert elevation of other new buried utilities to be provided under the Contract as directed by ENGINEER.
- E. For backfilling trenches not requiring compacted granular material or C.D.F., replace as much of the excavated material as possible. Until backfilling has progressed to a depth of at least 3 feet over the top of the buried utility, use finely divided material, free of stones 3 inches or greater in any dimension, boulders and other harmful debris, and place in 6 inch layers, loose measurement, and compact by mechanical tamping. Place remainder of backfill in maximum 12 inch layers, loose measurement, and compact by mechanical tamping. In no case shall compaction be less than 95 percent of maximum density as determined in accordance with ASTM D698 (Standard Proctor), unless otherwise specified.
- F. Along weed or unsodded areas, grade the backfilled material to conform to the original ground profile.
- G. In lawn areas and in fields used for farming, replace topsoil removed and stockpiled prior to trenching and grade to conform to the original ground profile.
- H. In lawns and other areas where grass exists, as determined by OWNER or ENGINEER, provide a minimum of 4 inches of topsoil, grade the area, and make ready for seeding. If the existing replaced topsoil does not provide the required minimum depth, provide required additional topsoil.
- I. Regrade and reshape all road shoulders and all ditches and swales from existing high points to existing drainage structures or other outlets along the proposed improvement. Ditches which are reshaped shall have reasonable side slopes. Vertical or steep slopes will not be permitted. CONTRACTOR, OWNER and ENGINEER shall mutually agree and establish all ditch grades to be restored prior to construction.
- J. Backfill trenches to contours and elevations with unfrozen materials.
- K. Backfill areas remaining after removal and abandonment of existing facilities as specified for trenches.



- L. Maintain moisture content of fill materials as required to attain specified compaction density.
- M. Complete backfilling of the trench in the river bed in such a manner that a ridge is not left on the river bottom. Remove and dispose of surplus material.

#### 3.4 FIELD QUALITY CONTROL

- A. OWNER may check compaction of the backfill at any time.
- B. For compacted earth and granular backfill in trenches, OWNER may employ a testing laboratory to make tests on Site and will pay all costs for the first set of tests performed per lift. If compaction fails to meet Specifications, all succeeding tests for that lift shall be at expense of CONTRACTOR. The OWNER must be notified 24 hours prior to the start of the backfill process.

#### 3.5 TRENCH PROTECTION

- A. Provide trench protection using a trench box, wood sheeting and bracing, or such other method as determined by CONTRACTOR to maintain a stable excavation and comply with applicable Laws and Regulations.
- B. For wood sheeting and bracing use sound lumber suitable for the purpose intended, and arrange so as to support the trench walls and existing structures and utilities. Cut off sheeting to be left in place not less than 18 inches below ground surface.
- C. Sheeting and bracing may be removed at the discretion and responsibility of CONTRACTOR after placing and compacting backfill to a level at least 2 feet above the pipe top. Do not pull sheeting in increments exceeding 3 to 4 feet in order to avoid the danger of breaking the buried utility due to the weight of the backfill. Upon removal, immediately fill and recompact voids left due to such removal.
- D. Where necessary to drive sheeting below the pipe bottom, drive sheeting to an elevation as determined by ENGINEER and leave such sheeting in place from a point 2 feet above the top of the buried utilities.

#### 3.6 PROTECTION, REMOVAL AND REPAIR OF TREES AND SHRUBS

- A. Consult with ENGINEER and obtain permission prior to removal of any tree or shrub not noted on Drawings to be removed well in advance of such removals.
- B. Fell trees to be removed so as not to injure trees to remain.
- C. Remove stumps and roots to a minimum of 12 inches below grade.
- D. Take every precaution to prevent damage to trees and shrubs not noted to be removed.
- E. Carefully trim and shape trees, tree limbs and bushes located such that CONTRACTOR's equipment will damage same during construction. Flush cut all limbs and branches. Replace

trees and bushes other than those whose removal is approved by CMT, which are destroyed or damaged to the extent that their continued life is impaired.

- F. Prior to Final Payment, employ a competent arborist to inspect all trees and shrubs along the Work line and to properly trim, prune, repair and protect any that have been damaged, and to designate those which have been so damaged as to require replacement.

### 3.7 MAINTENANCE OF TRENCHES AND EXCAVATIONS

- A. Maintain the backfilled trenches and other excavations at all times during the progress of the Work. In particular, keep those trenches or excavations within 15 feet of the edge of pavements or traveled roadways filled to the same level as the adjacent undisturbed ground. Immediately fill in any settlement which occurs during this period to prevent the possibility of accidents.

### 3.8 PROGRESS

- A. Complete backfilling operations within a reasonable distance of trenching and buried utility installation operations. The specific limitations of this paragraph shall be at the discretion of the ENGINEER, but the general intent is to require CONTRACTOR to minimize the inconvenience to nearby residents or businesses. OWNER will be permitted to require CONTRACTOR to cease trenching and buried utility installation operations at such time as they feel that backfilling has not progressed satisfactorily. At no time shall the exposed trench length exceed 50 feet.

END OF SECTION

SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Sheeting, shoring and bracing necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments
  - 2. Maintenance of bracing, as required.
  - 3. Removal of bracing as required.

1.3 QUALITY ASSURANCE

- A. Design: Plan preparation of sheeting, shoring and bracing work shall be prepared and sealed by a Professional Engineer registered in the State of Ohio.
- B. Regulations: Comply with local, State and Federal codes, regulations and ordinances of governing authorities having jurisdiction. Conform to the requirements of Subpart P, Excavation, Trenching and Shoring Requirements of the Occupational Safety and Health Standards and Interpretations, latest revision.

1.4 COORDINATION

- A. The Contractor shall be responsible for the coordination, expediting and scheduling of his operations with the operations of all other Contractors for the orderly and timely construction of the total project.

1.5 SUBMITTALS

- A. Design Drawings: Provide design drawings for sheeting, shoring, and bracing system and other data prepared and sealed by a registered Professional Engineer. System design and calculations must be acceptable to local authorities having jurisdiction. Drawings shall be submitted within thirty (30) days of award.

1.6 EXISTING UTILITIES

- A. Protect existing active sewer, water, gas, electricity and other utility services and structures.

- B. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal and discontinuing of services, as affected by this work. All work shall be done at the Contractor's expense.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. General: Provide suitable sheeting, shoring and bracing materials that will support loads imposed. Materials need not be new, but must be in serviceable condition.

## PART 3 EXECUTION

### 3.1 PROTECTION OF EXCAVATION

- A. Protect the sides of excavations from caving and unacceptable soil movement. Wherever sheeting and shoring is required, locate the system to clear permanent construction.
- B. Sheeting and shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place at completion of work.
- C. The Contractor shall receive approval from the ENGINEER before leaving any sheeting and shoring in place as a part of the completed Work. Sheeting and shoring that is approved to be left in place shall be cut off a minimum of 18 inches below finished grade.

### 3.2 BRACING

- A. Locate bracing to clear construction and other permanent work. If necessary to move a brace, install additional bracing prior to removal of original brace.
- B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Engineer.
- C. Maintain bracing until elements are re-braced by backfilling or construction is able to withstand lateral earth and hydrostatic pressures.
- D. Remove sheeting, shoring and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities and utilities.
- E. Repair or replace, as directed by Engineer, adjacent work damaged or displaced through the installation or removal of shoring and bracing work.

3.3 BASIS OF PAYMENT

- A. The cost for all sheeting, shoring, and bracing system utilized shall be included in the bid cost of the item necessitating the work. No compensation will be made under this item.

END OF SECTION



## SECTION 32 10 02

### ROADWAY AND DRAINAGE

#### 1.0 GENERAL

##### 1.1 SECTION INCLUDES

- A. Roadway Items
- B. Drainage Items

##### 1.2 REFERENCES

ODOT – Ohio Department of Transportation

- A. ODOT – Construction and Material Specifications
- B. ODOT – Standard Construction Drawings

##### 1.3 SUBMITTALS

- A. Submit certifications of mix design, aggregate sieve analysis, test reports, and shop drawings on furnished products in accordance with Section 01 33 00 – Submittal Procedures.

#### 2.0 PRODUCTS

##### 2.1 MATERIALS

- A. Latest edition of ODOT Construction and Material Specifications and ODOT Standard Construction Drawings will govern the material requirements for all roadway and drainage items for this project.

#### 3.0 EXECUTION

##### 3.1 APPLICATION

- A. Latest edition of ODOT Construction and Material Specifications will govern the installation and application of all roadway and drainage items for this project.
- B. No payment will be made for any item of work not specifically listed in the unit price schedule. Include costs for any incidental items not included in the unit price schedule with other line items of the bid.

##### 3.2 EXCEPTIONS

- A. Replace all references in ODOT Construction and Material Specifications to Owner as the Ohio Department of Transportation with Muskingum Watershed Conservancy District.
- B. Replace all references in ODOT Construction and Material Specifications to the Director with the word Engineer.

- C. In the ODOT Construction and Material Specifications, any reference to testing which is required for this project by the Construction and Material Specifications is to be borne by the Contractor.

END OF SECTION



SECTION 32 17 13 - PARKING BUMPERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Precast concrete parking bumpers.
  - 2. Parking bumper anchors.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit unit configuration, dimensions.

1.3 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate the Work with pavement placement and parking striping.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Parking Bumper Company, Universal, Indiana. Series 5000
- B. American Eagle Precast, LLC, Detroit, Michigan, Solid Type
- C. Linsday Precast, 6' bumper block (Dwg: BB-Stock)
- D. Oberfields, LLC: "Medium" or "Commercial" parking block
- E. Substitutions: Section 01 33 00 - Submittal Procedures, and the General Conditions.

2.2 CONCRETE BUMPERS

- A. Cement: ASTM C150, Portland Type I – Normal gray color.
- B. Concrete Materials: ASTM C33; water and sand.
- C. Reinforcing Steel: ASTM A615, deformed steel bars; epoxy coated, strength and size commensurate with precast unit design.

- D. Air Entrainment Admixture: ASTM C260.
- E. Concrete Mix: Minimum 4000 psi, 28 day strength, air entrained to 5 to 7 percent.
- F. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
- G. Embed reinforcing steel, and drill or sleeve for two (2) dowels.
- H. Cure units to develop concrete quality, and to minimize appearance blemishes including non-uniformity, staining, or surface cracking.
- I. Minor patching in plant is acceptable, providing appearance of units is not impaired.

## 2.3 CONFIGURATION

- A. Nominal Size:
  - 1. Parking Spaces: Approximately 5 inches high, 8 inches wide at base, 6 feet long.
  - 2. RV Pads: Approximately 6 inches high, 8 inches wide at base, 8 feet long.
- B. Profile: Manufacturer's standard. [Rectangular cross section with sloped vertical faces, square ends.

## 2.4 ACCESSORIES

- A. Dowels: Steel, epoxy coated: 3/8-inch - 1/2-inch diameter.
  - 1. On concrete pavement: Provide minimum 24-inch long dowels.
  - 2. On asphalt pavement: Provide minimum 15-inch long dowels.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install units without damage to shape or finish. Replace or repair damaged units.
- B. Install units in alignment with adjacent work.
- C. Fasten units in place with 2 dowels for each unit bumper.
- D. Where installation is on concrete, post-install rebar by core drilling through pavement.

END OF SECTION

SECTION 32 91 19 - SEEDING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Preparation of topsoil.
- B. Fertilizing, seeding, mulching, and watering.
- C. Maintenance.

1.3 PROJECT CONDITIONS

- A. Seeding, ODOT 659, Class 1 is required for all earth areas disturbed by CONTRACTOR's operations except for:
  - 1. Provide steep embankment seed mixture (Mix B) and erosion control blanket on slopes 3:1 or greater unless otherwise directed by ENGINEER.

1.4 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver grass seed in separate varieties, separately packaged or bagged, with labels or tags in accordance with ORC 907.03. Seed in damaged packaging is not acceptable.

PART 2 PRODUCTS

2.1 SEED MIXTURE

- A. Seed Mix B: Slope Stabilization Mix Per MWCD Standard 6.b. – Use in undeveloped areas; Slopes steeper than 3:1 (200 oz per acre):
  - 1. Big Blue Stem (Andropogon Geradii): 24 percent
  - 2. Side Oats Grama (Bouteloua Curtipendula): 8 Percent.
  - 3. Prairie Sedge Mix (Carex Spp.): 2 percent.
  - 4. Canada Wild Rye (Elymus Canadensis): 16 percent
  - 5. Virginia Wild Rye (Elymus Virginicus): 12 percent
  - 6. Switch Grass (Panicum Virgatum): 6 percent
  - 7. Little Blue Stem (Schizachyrium Scoparium): 16 percent
  - 8. Indian Grass (Sorghastrum Nutans): 16 percent
- B. Seed Mix B: Temporary Cover (752 oz per acre):

1. Common Oat (*Avena Sativa*): 68 percent.
2. Annual Rye (*Lolium Multiflorum*): 32 percent.

## 2.2 MULCHING MATERIALS

- A. For slopes 3:1 or greater, provide erosion control blankets.
  1. Manufacturers: PPS Packaging Company, XCEL Superior Erosion Control Blanket, or as approved.
  2. Description: Machine-produced mat of wood excelsior fibers, 80 percent of which are 6 inches or longer in length with a consistent width of fibers evenly distributed throughout the blanket, with a photo-degradable, extruded plastic netting covering the top and bottom of each blanket.
  3. Weight: 1.0 pounds per square yard.
  4. Accessories: 8 inch by 1 inch by 8 inch, 9 gage staples.

## 2.3 WATER

- A. Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that prepared soil base is ready to receive Work of this Section.

## 3.2 PREPARATION OF TOPSOIL

- A. Prepare topsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots, clods, lumps, boulders, and stones.
- C. Scarify topsoil to a depth of 2 inches. Repeat cultivation in areas where equipment used for hauling has compacted topsoil.

## 3.3 SEEDING

- A. Apply seed at manufacture's specifications.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, frozen or during windy periods.

3.4 MAINTENANCE

- A. Protect and care for seeded areas until grass is a well established, uniform growth at least 4 inches high.
- B. Water to prevent grass and soil from drying out.
- C. Once established, remove excess mulch and mow grass to a height not less than 1-1/2 inches nor greater than 2-1/2 inches.
- D. Control growth of weeds.
- E. Maintain grass for 2 weeks after initial mowing.
- F. Reseed areas that do not show a prompt catch at intervals of 21 days until a uniform growth is established.
- G. Reseed areas damaged due to acts of neglect by residents or vandalism only at the request and expense of OWNER.

END OF SECTION



SECTION 32 93 00 - PLANTS

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. Plants.
  - 2. Tree stabilization.
  - 3. Tree-watering devices.
  - 4. Landscape edgings.
- B. Related Requirements:
  - 1. Section 32 91 19 "Seeding" for turf (lawn) and hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than sizes indicated; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

- G. Finish Grade: Elevation of finished surface of planting soil.
- H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- I. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- J. Planting Area: Areas to be planted.
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

#### 1.4 COORDINATION

- A. Coordination with Seeded Areas: Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
  - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

#### 1.5 PREINSTALLATION MEETINGS

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

#### 1.6 ACTION SUBMITTALS

- A. Samples for Verification: For each of the following:
  - 1. Samples on-site as a standard for comparison.
  - 2. 5 lbs. of mulch for each color and texture of mulch required, in labeled plastic bags.



1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
  - 1. Manufacturer's certified analysis of standard products.
  - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- D. Sample Warranty: For special warranty.
- E. Material Test Reports: For existing surface soil and imported topsoil.
- F. Planting Schedule: Indicating anticipated planting dates for exterior plants.
- G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
  - 1. Retain applicable subparagraphs below; revise to suit Project.
  - 2. Experience qualification includes having successfully completed a minimum number of previous projects. Before retaining "Professional Membership" and "Experience" subparagraphs below for government-funded projects, verify acceptability of these requirements with Owner.
  - 3. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
  - 4. Experience: Three years' experience in landscape.
  - 5. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 6. Certification program in "Personnel Certifications" Subparagraph below is administered by the Professional Landcare Network. Verify availability of qualified individuals in Project area before retaining. See Evaluations.

7. Personnel Certifications: Installer's field supervisor shall have certification in all of the following categories from the Professional Landcare Network.
    - a. Landscape Industry Certified Technician - Exterior.
    - b. Landscape Industry Certified Interior.
    - c. Landscape Industry Certified Horticultural Technician.
  8. Pesticide Applicator: State licensed, commercial.
- B. Provide Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis (existing surface soil and imported topsoil): Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
1. Report suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.
- D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
1. Retain subparagraph below if allowances are required.
  2. Contractor shall submit pictures for approval prior to shipment.
- E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
  2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- F. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.
- 1.10 DELIVERY, STORAGE, AND HANDLING
- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.

- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
  - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- H. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
  - 1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
  - 2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
  - 3. Do not remove container-grown stock from containers before time of planting.
  - 4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

#### 1.11 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

- B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
  - 1. Spring Planting: March 15-May 15
  - 2. Fall Planting: September 15- December 1
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

#### 1.12 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - i. Death and unsatisfactory growth.
    - ii. Structural failures including plantings falling or blowing over.
    - iii. Faulty performance of tree stabilization, edgings.
  - 2. Warranty Periods: From date of planting completion.
    - i. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
    - ii. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
  - 3. Include the following remedial actions as a minimum:
    - i. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
    - ii. Replace plants that are more than 25 percent dead or in an unhealthy condition as determined by the owner.
    - iii. Provide extended warranty for period equal to original warranty period, for replaced plant material.

### PART 2 - PRODUCTS

#### 2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
  - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots are unacceptable.
  - 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
- E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

## 2.2 PLANTING SOILS

- A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
  - 1. Ratio of Loose Compost to Topsoil by Volume: 1:3.
- B. Planting Soil Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs, or marshes.
  - 1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch (25 mm) or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

## 2.3 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
  - 1. Type: Shredded, non-dyed, double processed hardwood
  - 2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
  - 3. Color: Dark natural brown when dry.
  - 4. No dyes or chemicals.

- B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch (25-mm) sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
  - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- C. River Rock Cobble Mulch: Suitable for plant beds around building structures. Free from deleterious material.
  - 1. Type: Washed, rounded river cobble stone mulch
  - 2. Size Range: 1.5"- 2"
  - 3. Color: Color varies, owner to approve.
  - 4. No dyes or chemicals.

#### 2.4 PESTICIDES

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

#### 2.5 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
  - 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end.
  - 2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
  - 3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.
  - 4. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
  - 5. Guy Cables: Five-strand, 3/16-inch- (4.8-mm-) diameter, galvanized-steel cable, with zinc-coated [turnbuckles] [compression springs], a minimum of 3 inches (75 mm) long, with two 3/8-inch (10-mm) galvanized eyebolts.
  - 6. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.
  - 7. Proprietary Staking-and-Guying Devices: Proprietary stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and according to manufacturer's written recommendations.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- 1) Arborbrace; ArborBrace Tree Guying System.
- 2) Better Bilt Products, Inc; Tree Anchor Kit.
- 3) DeepRoot Green Infrastructure, LLC; ArborTie AT LD100 Professional Anchoring Kit, ArborTie ATHD15 Heavy Duty Anchoring Kit.
- 4) Foresight Products, LLC; Duckbill Professional Tree Guy System.
- 5) J. R. Partners; Grate Stake, Mega Grate Stake, Mega Stake, R2 Stake.
- 6) Villa Root Barrier; Wonder Tree Guy, Wonder Tree Tie.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.
3. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball and that do not encircle the trunk; sized according to manufacturer's written recommendations unless otherwise indicated.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Border Concepts, Inc; Tomahawk Tree Stabilizers.
    - 2) Foresight Products, LLC; Duckbill Rootball Fixing System.
    - 3) Tree Staple, Inc; Tree Staples.

2.6 SOIL SEPARATOR (WEED) FABRIC

- A. Geotextile Fabric: Furnish fabric composed of strong rot-proof polymeric fibers formed in a woven or non-woven fabric.
- B. Manufacturers:
  1. TenCate Mirafi S600
  2. Pro 5 Weed Barrier
  3. Woven Weed Restrictor (Fabriscape)
  4. Or approved equal
- C. Minimum property values:
  1. Weed fabric to be 4.1 oz. (minimum weight) polypropylene.
  2. UV Exposure (%): 70

2.7 TREE-WATERING DEVICES

- A. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.
  1. Color: dark chocolate or green.

2.8 LANDSCAPE EDGINGS

- A. Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge.

## 2.9 MISCELLANEOUS PRODUCTS

- A. Wood Pressure-Preservative Treatment: AWPAC2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- C. Burlap: Non-synthetic, biodegradable.
- D. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.
- E. Planter Filter Fabric: Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.
- F. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
  - 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.



### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

### 3.3 PLANTING AREA ESTABLISHMENT

- A. Loosen subgrade of planting beds to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply fertilizer directly to subgrade before loosening.
  - 2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
    - i. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    - ii. Mix lime with dry soil before mixing fertilizer.
  - 3. Spread planting soil mix to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- B. Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: At time directed by Landscape Architect, broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

### 3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
  - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.
  3. Do not excavate deeper than the root ball, measured from the root flare to the bottom of the root ball.
  4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  5. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
  6. Maintain supervision of excavations during working hours.
  7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
- B. Backfill Planting Pit: With Planting Soil Mix
1. Mix Topsoil with soil amendments and fertilizer per soil test
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.
- 3.5 TREE, SHRUB, AND VINE PLANTING
- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 2 inches (50 mm) above adjacent finish grades.
1. Backfill with Planting Soil Mix. Mix Topsoil with soil amendments and fertilizer per soil test.
  2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
  5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
1. Carefully remove root ball from container without damaging root ball or plant.
  2. Backfill with planting soil mix around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  3. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

### 3.6 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

### 3.7 TREE STABILIZATION

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
  1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
  2. Upright Staking and Tying: Stake trees with two stakes for trees up to 12 feet (3.6 m) high and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.
  3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
  4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.8 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil mix for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
  - 1. Trees and Treelike Shrubs in Turf Areas: Apply organic mulch ring of 3-inch (75-mm) average thickness, with 36-inch (900-mm) radius around trunks or stems. Do not place mulch within 6 inches (150 mm) of trunks or stems.
  - 2. Planting Beds around Building Structures and in Transient Lots: Apply 3-inch (75-mm) average thickness of Washed Rounded River Cobble Stone Mulch over weed fabric.

3.10 EDGING INSTALLATION

- A. Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge.

3.11 INSTALLING SLOW-RELEASE WATERING DEVICE

- A. Provide one device for each tree.
- B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

3.12 PLANTMAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

### 3.13 PESTICIDE APPLICATION

- A. Apply organic pesticides and other organic chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Apply with weed guard geotextile fabric under rock cobble mulch. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

### 3.14 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.
  - 1. Submit details of proposed pruning and repairs.
  - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
  - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
  - 1. Provide new trees of same size as those being replaced for each tree of 6 inches (150 mm) or smaller in caliper size.
  - 2. Provide two new tree(s) of 6-inch (150-mm) caliper size for each tree being replaced that measures more than 6 inches (150 mm) in caliper size.
  - 3. Species of Replacement Trees: Species selected by Architect.

### 3.15 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.16 MAINTENANCE SERVICE

- A. Maintenance Service for Trees, Shrubs and Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.
- B. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
  - 1. Maintenance Period: 12 months from date of acceptance by owner.
- C. All weeds within the mulched area shall be removed as often as required. Under no circumstances shall weeds be allowed to attain more than 6-inches of growth.
- D. Remove all tree guys, tree wrap, slow release watering bags, and any metal or plastic ties from trees one (1) year after planting.

END OF SECTION

SECTION 33 05 13 - PRECAST CONCRETE MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Modular precast concrete manholes for sanitary and storm sewers, including frames, covers, anchorage, and accessories.
  - 2. Bedding and cover materials.

1.3 REFERENCES

- A. ASTM International:
  - 1. ASTM A48 - Standard Specification for Gray Iron Castings.
  - 2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
  - 3. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
  - 4. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
  - 5. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
  - 6. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
  - 7. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals.
  - 8. ASTM D4101 - Standard Specification for Polypropylene Injection and Extrusion Materials
  - 9. ASTM F1417 - Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
- B. American Concrete Institute (ACI):
  - 1. ACI 318 – Building Code Requirements for Structural Concrete and Commentary.
  - 2. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures and Commentary
- C. National Precast Concrete Association:
  - 1. NPCA Plant Certification Program
  - 2. NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.

1.4 DESIGN REQUIREMENTS

- A. Design of Lifting Devices for Precast Components: In accordance with ASTM C913.

- B. Design of Joints for Precast Components: In accordance with ASTM C913; maximum leakage of 0.025 gallons per hour per foot of joint at 3 feet of head.

#### 1.5 SUBMITTALS

- A. Shop Drawings: Indicate manhole locations, elevations, piping, and sizes and elevations of penetrations.
- B. Product Data: Submit cover and frame construction, features, configuration and dimensions.
- C. Submit manufacturer's detailed instructions on installation requirements, including storage and handling procedures.
- D. Field Quality Control Submittals: indicate results of Contractor-furnished tests and inspections.

#### 1.6 QUALITY ASSURANCE

- A. Obtain precast concrete utility structures from single source.
- B. Perform structural design according to ACI 318.
- C. Perform work according to NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- D. Conform to the material and fabrication requirements in ASTM C913.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Accept precast structures on site in manufacturer's original packaging and inspect for damage.
- B. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast manholes.
- C. Lift structures from designated lifting points.
- D. Store precast concrete manholes to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- E. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.



1.9 ENVIRONMENTAL REQUIREMENTS

- A. Cast-in place concrete: Cold Weather Requirements: ACI 530.

PART 2 PRODUCTS

2.1 MANHOLES

- A. Base, riser and top sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C443.
1. Shape: Cylindrical, unless otherwise indicated on drawings.
  2. Construction: Concentric with eccentric cone top section; lipped male/female joints; sleeved to receive pipe sections. Base shall be integrally cast with riser.
  3. Clear Inside Dimensions: 48 inch diameter, unless otherwise indicated on Drawings.
  4. Design Depth: As indicated on Drawings.
- B. Grade Adjusting Rings: Precast Concrete per ASTM C478
- C. Factory Applied Coating: The exterior surfaces of wet wells and receiving manholes on force mains shall be prepared per coating manufacturer's recommendations and receive factory application of a coal tar epoxy lining equal to Bitumastic No. 300-M.
1. Interior surfaces of wet well and receiving manholes on force mains shall be coated with a 3-layer epoxy coating system, as specified in spec 09 87 30 – Protective Lining for Concrete Exposed to Severe Wastewater Environments. Apply coating after successful leakage/watertightness test, described in paragraph 3.5.B. of this specification.
    - a. Tnemec Series 218 MortarClad/436 PermaShield/435 Perma-Glaze
    - b. Or approved equal.
- D. Pipe and Conduit Entry: Furnish openings as required.
- E. Resilient Connectors: ASTM C923; A-Lok Connector, Kor-N-Seal or approved equal
- F. Manhole Steps:
1. ASTM C478, ASTM D4101 and ASTM A615
  2. Polypropylene with ½" diameter grade 60 steel reinforcement.
  3. Formed integral with manhole sections.
  4. 12 inches wide, 12 inches on center vertically, embedded a minimum of 3-inches into wall.
- G. Mortar: ASTM 270, Type S two parts Portland cement and two parts sand by volume.
- H. Grout: Epoxy mortar grout; sluice quartz filler compressive strength of 11,000 psi minimum; tensile strength of 200 psi minimum and water permeability of 0.1 percent maximum.
1. Manufacturer: Preco Products, IPA Systems, or equal
- I. Chimney Seals: Internal and external type using rubber sleeves and extensions having a minimum thickness of 3/16 inch, and a rubber compound meeting ASTM C923. Internal seal

sleeves to be double or triple-pleated, minimum unexpanded vertical height of 8 inches and 10 inches respectively, not less than 2 inches of vertical expansion when installed. External seal sleeves to be corrugated, unexpanded vertical heights of 6 and 9 inches, not less than 2 inches of vertical expansion when installed. Bands to be 16 gage stainless steel meeting ASTM A240, Type 304. Hardware to be stainless steel meeting ASTM 593 and 694, Type 304.

## 2.2 FRAMES AND COVERS

- A. Manholes: Product Description: ASTM A48, Class 30B heavy duty, cast iron construction, machined flat bearing surface.
  - 1. Cover Clear Opening: 24 inches diameter, unless otherwise indicated on Drawings.
  - 2. Cover molded with SANITARY name.
  - 3. Frames and Covers: Neenah Foundry R-1643 frame with heavy duty solid cover or approved equal.

## 2.3 BEDDING AND COVER MATERIALS

- A. Bedding: Minimum 6-inches ODOT #57 compacted aggregate base.
- B. Cover: Fill Type as specified for buried utility.
- C. Backfill from Above Pipe to Finish Grade:
  - 1. Outside pavement influence zone: Earth backfill specified for buried utility.
  - 2. Within pavement influence zone: compacted aggregate backfill specified for buried utility.

## 2.4 FABRICATION

- A. Fabricate precast concrete utility structures conforming to ACI 318 and NPCA Quality Control Manual for Precast and Pre-stressed Concrete Plants.
- B. Fabricate precast concrete utility structures and openings to size and configuration as indicated on Drawings.

## 2.5 MIXES

- A. Select proportions for normal weight concrete according to ACI 318.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify items provided by other sections of Work are properly sized and located.
- C. Verify built-in items are in proper location, and ready for roughing into Work.

- D. Verify correct size of manhole excavation.

### 3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.
- B. Do not install structures where site conditions induce loads exceeding structural capacity of structures.
- C. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage. Remove and replace damaged units.

### 3.3 INSTALLATION

- A. Excavation and Backfill:
  - 1. Excavate for manholes in accordance with requirements specified for buried utility and in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.
  - 2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes in dry trench.
- B. Lift precast components at lifting points designated by manufacturer.
- C. When lowering structures into excavations and joining pipe to manhole sections, take precautions to ensure interior of pipeline and structure remains clean.
- D. Set precast base structures with top surface level and bearing firmly and fully on crushed aggregate bedding, compacted in accordance with provisions for buried utility or on other support system shown on Drawings.
- E. Assemble multi-section structures by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections.
- F. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section.
- G. Joint sealing materials may be installed on site or at manufacturer's plant.
- H. Verify manholes installed satisfy required alignment and grade.
- I. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe.
- J. Make pipe connections
  - 1. Storm Sewers: Except for where resilient connectors are specified, fill area between pipe and wall opening with grout. Provide ½-inch thick neoprene material around pipe prior to grouting.
  - 2. Connect pipe to structure and seal watertight.

- K. Cut pipe to finish flush with interior of manhole or wet well.
- L. Shape inverts through manhole using Class C concrete. Contour to form continuous drainage channel consistent with the diameter and shape of the lower half of the sewer pipes.

### 3.4 MANHOLE FRAME AND COVER INSTALLATION

- A. Set frames using epoxy mortar with ¼-inch joints and grade adjusting rings. Interior and exterior of the adjustment section shall be parged with ¼-inch epoxy mortar.
- B. Set frame and cover 6 inches above finished grade for manholes with covers located within unpaved areas to allow area to be graded away from cover beginning 2 inches below top surface of frame.
- C. Set frame and cover for manholes with covers located within paved areas such that the road surface shall provide positive drainage away from the casting. Place a 4000-psi Class C concrete collar a minimum of 8-inches wide for the full depth of the frame.

### 3.5 FIELD QUALITY CONTROL

- A. Leakage Tests of New precast structures:
  - 1. Repair all visible leakage in manholes.
  - 2. Perform negative air pressure (vacuum) testing of sanitary manholes and wet wells per ASTM C1244.
    - a. Vacuum testing equipment:
      - 1) Vacuum pump
      - 2) Vacuum line
      - 3) Vacuum tester base:
        - a) Compression band seal
        - b) Outlet port
      - 4) Shutoff valve
      - 5) Stopwatch
      - 6) Plugs
      - 7) Vacuum gage: calibrated to 0.1-in. Hg
    - b. Verify manholes are backfilled and ready for testing.
    - c. Repair both outside and inside of joint to ensure permanent seal.
    - d. Test manholes with manhole frame set in place.
      - 1) Plug pipe openings; securely brace plugs and pipe.
      - 2) Connect vacuum pump to outlet port with valve open, then draw vacuum to 10-in. Hg.
      - 3) Close valve.
      - 4) Manhole test duration in seconds:
        - a) Manhole diameter of 4 feet: 60
        - b) Manhole diameter of 5 feet: 75
        - c) Manhole diameter of 6 feet: 90
      - 5) Record vacuum drop during test period.

- 6) If vacuum drop is greater than 1-in. Hg during testing period, repair and retest manhole.
  - 7) If vacuum drop of 1-in. Hg does not occur during test period, manhole is acceptable, discontinue testing.
  - 8) If vacuum test fails to meet 1-in. Hg drop in specified time after repair, repair and retest manhole.
3. For precast structures where vacuum testing is impractical (i.e., wet wells larger than 6' diameter), perform water tightness test described here: (from "Testing Reinforced Concrete Structures for Watertightness", from the American Concrete Institute-AWWA Committee Report (May 1993))
  - a. Containment structure should be structurally complete and capable of resisting the hydrostatic pressure of the test water.
  - b. Test Preparation:
    - 1) Preferably, backfill should not be placed around the water-containment structure before the test. Inspection points should be open to all piping, channels, and conduits that leave the structure, including any underdrain outlets. During filling, outlets should be monitored for water tightness, underdrain outlet should be monitored for any increase in flow, and the structure (especially concrete joints) should be monitored for any visible leakage. Correct any visible leakage from structure or increase in flow from underdrain system before the start of test measurements. When test preparations are acceptable, the structure should be kept full of water for a minimum of 3 days before test begins.
  - c. Test Measurements:
    - 1) Measure the water surface at a minimum of 2 points 180° apart, and preferably 4 point 90° apart.
    - 2) Measure water temperature at 18" below surface.
    - 3) In uncovered water-containment structures, refer to Committee Report for an evaporation-precipitation measurement procedure.
    - 4) Inspect the structure's exterior daily for indications of leakage.
    - 5) Continue test for a period of time sufficient to produce at least a 0.5-inch drop in the water surface based on the leakage occurring at the maximum allowable rate. Calculate the test duration using:  $[\text{Drop (.5")}] / (\text{allowable leak rate} \times \text{depth})$  (where allowable leak rate is in inches/inches/day and depth in inches).
    - 6) At the end of the test period, record water surface location at the same location the original measurements were taken.
    - 7) Record water temperature. The leakage rate from the tank should be computed and corrected for temperature variations if necessary.
    - 8) If the leakage rate exceeds the criteria indicated below, the structure has failed the test. The structure should also be considered to have failed the test if water is observed flowing

from the structure (other than from the underdrain system) or if moisture (other than from precipitation or condensation) can be transferred to a dry hand from exterior surfaces.

- 9) Any structure that fails the water tightness test should be repaired and retested.

d. Allowable Leakage Rates:

- 1) Unlined structure with side water depth  $\leq 25'$  should not exceed 0.1 percent of the water volume in 24 hours.
- 2) Structures with lined walls and a side water depth  $\leq 30'$  should not exceed 0.06 percent of water volume in 24 hours.
- 3) Structures with lined floors and a side water depth  $\leq 30'$  should not exceed 0.04 percent of water volume in 24 hours.
- 4) Fully lined structures should not exceed 0.025 percent of water volume in 24 hours.

END OF SECTION

SECTION 33 05 24

UTILITY HORIZONTAL DIRECTIONAL DRILLING (HDPE)

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions, and Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Excavation for approach trenches and pits.
  - 2. High Density Polyethylene (HDPE) pipe.
  - 3. Horizontal directional drilling.
    - a. Pilot hole
    - b. Reaming of pilot hole
    - c. Pull back of pipe.

1.3 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Horizontal Directional Drilling:
  - 1. Basis of Measurement: By linear foot.
  - 2. Basis of Payment: Includes excavations, dewatering, drilling fluids, drilling equipment, pipe and accessories, fusion equipment, if applicable, tests, backfill and restoration.

1.4 DESIGN REQUIREMENTS

- A. Design Criteria:
  - 1. Drilling Steering System: Remote with continuous electronic monitoring of boring depth and location.
  - 2. Directional Change Capability:
    - a. Minimum curve radius of 50 times the outer diameter of the product pipe.
    - b. 90 degrees based demonstrated minimum radius allowed by bend rate tolerance of product pipe.
  - 3. Ratio of Reaming Diameter to Pipe Outside Diameter:
    - a. Nominal pipe diameter of 8 inches and smaller: 4 inches minimum.
    - b. Nominal pipe diameters 8 – 24 inches: Minimum of 1.5 times the pipe outside diameter.
    - c. Nominal pipe diameters greater than 24 inches: Submit recommended ratio and reaming procedures for review.

4. Where directionally drilling in order to cross environmentally sensitive watercourses, the suggested depth from the riverbed to the top of the pipe shall be a minimum of 15 feet.
5. Where directionally drilling in order to cross smaller streams, the depth from the streambed to the top of the pipe shall be a minimum of 5 feet.
6. Where directionally drilling in order to cross roadways, the depth from the roadway surface to the top of the pipe shall be a minimum of 5 feet – 6 inches.
7. Contractor shall calculate the safe pulling strength of HDPE pipe using ASTM F1804-*Standard Practice for Determining Allowable Tensile Load for Polyethylene (PE) Gas Pipe During Pull-In Installation*, or similar conservative methodology and considering the conditions and duration of the installation, making every effort to ensure the allowable tensile load of the pipe is not exceeded.

## 1.5 SUBMITTALS

- A. Submit to Engineer no later than 10 days prior to mobilization for drilling. Submittals must be accepted in writing before commencing the Work.
  1. Shop Drawings:
    - a. Technical data for equipment, method of installation, and proposed sequence of construction.
    - b. Detailed Construction Plan, including sketches and information pertaining to pits, dewatering, method of spoils removal, equipment size and capacity, equipment capabilities including installing pipe on radius, type of drill bit, drilling fluid, method of monitoring line and grade and detection of surface movement, name plate data for drilling equipment and mobile spoils removal unit. Additionally, the use of rollers, baskets, and side booms to suspend and direct pipe during pullback should be discussed.
    - c. A drilling fluid management plan.
    - d. Contractor shall prepare a frac-out contingency plan for creek and wetland crossings in the event drilling fluid surfaces to ensure proper containment and disposal.
    - e. A statement of the butt fusion equipment to be used.
    - f. A statement of the type and capacity for the mud mixing system.
    - g. A listing of any specialized support equipment.
    - h. A statement of the type of tracking transmitter/devices selected and procedures to be used in the performance of this work.
    - i. A project schedule.
  2. Product Data:
    - a. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.
    - b. Product data and pipe supplier data indicating conformance with this specification and applicable standards, including written documentation regarding any intended variance from this specification and applicable



standards. This will include experience of pipe supplier by years and number of projects, warranty information and independent laboratory testing certification.

- c. Pipe and joint details, minimum wall thickness, joint fusion equipment and appurtenances.
  - d. Identify source of water used for drilling.
  - e. Submit copy of approvals and permits for use of water source.
3. Contractor Qualifications: Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of pipe and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- C. Record actual horizontal location and depth of installed pipe at 25 feet intervals.
- D. Show depth and location of abandoned bores.
- E. Record depth and location of drill bits and drill stems not removed from bore.

#### 1.7 QUALITY ASSURANCE

- A. Perform work in accordance with the following:
  - 1. NUCA HDD Installation Guidelines.
  - 2. ASTM F1962 - Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings.
  - 3. Applicable pipe and equipment manufacturer's guidelines.

#### 1.8 QUALIFICATIONS

- A. Contractor: Company specializing in performing work of this section with minimum 3 years documented experience, including applicable manufacturer approvals or certifications.
  - 1. Work Experience: Include 10 successful projects of similar scope and conditions.
  - 2. Furnish list of Owner references upon request.
- B. Fusion Technician: Fully qualified by pipe supplier to join and install pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date Work is performed.

1.9 SPECIFIED PIPE SUPPLIERS

- A. High Density Polyethylene (HDPE) pipe shall be approved manufacturer satisfying the requirements listed within this specification.

1.10 PRE-INSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary end caps and closures on piping and fittings until pipe is installed.
- B. Protect pipe from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.
- C. Accept products on site in manufacturer's original containers or configuration. Inspect for damage.
- D. Use shipping braces between layers of stacked pipe. Stack piping lengths no more than 3 layers high.
- E. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F.
- F. Support pipes with nylon slings during handling.

1.12 ENVIRONMENTAL REQUIREMENTS

- A. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.13 COORDINATION

- A. Coordinate work with utilities within construction area.
- B. Perform work in accordance with applicable roadway or railroad occupancy permits. Maintain one copy of occupancy permit document on-site.
- C. Perform work in accordance with applicable regulatory agency permits. Maintain one copy of occupancy permit document on-site.

## PART 2 PRODUCTS

### 2.1 DRILLING FLUID

- A. Drilling Fluid: Liquid bentonite clay slurry; totally inert with no environmental risk.

### 2.2 PIPE

- A. High Density Polyethylene (HDPE)
  - 1. Pipe material shall conform to PPI/ASTM PE 3408 and ASTM F714. Cell classification PE 345434C per ASTM D3350
  - 2. Pipe ½-inch to 3-inches: AWWA C901, IPS
  - 3. Pipe 4-inches and greater: AWWA C906, DIPS
- B. Minimum Wall Thickness:
  - 1. Based on construction plan submittal
  - 2. Anticipated minimum wall thickness
    - a. Pipe 3-inches or smaller: - DR 9, IPS
    - b. Pipe 4-inches and larger: SDR 9, DIPS
- C. Joints: Butt fused joints in accordance with ASTM D2657 and pipe manufacturer's written instructions.
  - 1. Butt fused joints shall have internal bead projections of not more than 1/4 inch.
  - 2. Joint strength shall be equal to or greater than the pipe and shall indicate a ductile rather than brittle fracture when tested.
- D. Electrofusion Couplings
  - 1. Repair of defective butt fused joints or damaged HDPE pipe sections shall be removed and repaired using new HDPE pipe of similar diameter and SDR and joined using HDPE electrofusion couplings.
- E. Restrained Joints & Couplings for Pressure Pipelines:
  - 1. Where HDPE pipe must be joined with Ductile, PVC or other mainline pipe or fittings, all joints and couplings shall be fully restrained to the specified maximum test pressure, and de-rated for appropriate service temperature.
    - a. Push-on joints: Ebba Iron Series 15PF00, or approved equal
    - b. Mechanical joints: Ebba Iron Series 2000, or approved equal
    - c. Flanged joints: Ebba Iron Series 2100 restrained Flange Adapter, or approved equal
    - d. Restrained repair couplings: Ebba Iron Series 3800 Restrained Coupling, or approved equal.
  - 2. Provide stainless steel internal stiffeners, sized based on the inside diameter and SDR of the HDPE pipe.
    - a. Fixed diameter type; 2-inches or less: Form Meter Box Company, or approved equal

- b. Fixed diameter type; 4-inches and larger: JCM 230/231, or approved equal
- c. Split ring & wedge type; 4-inches and larger: Romac Industries, Inc., or approved equal

F. Flexible Couplings:

- 1. Where HDPE pipe must be joined with Ductile, PVC or other mainline piping, flexible couplings with internal stiffeners conforming to ASTM C425, as manufactured by Fernco or equal, shall be used. All joints shall be fully restrained. Mechanical joint adapters and mechanical joint solid sleeves are acceptable.
- 2. Seal clamps and hardware shall be stainless steel.

2.3 FILL MATERIALS

- A. Subsoil Fill: Excavated and reused soil with no rocks over 3 inches in diameter, frozen earth or foreign matter.

2.4 WATER SOURCE

- A. Water: Potable, obtained from local public water utility.

2.5 UNDERGROUND PIPE MARKERS

A. Tracer Wire:

- 1. Tracer wire shall be attached to top of pipe
- 2. pe on all water mains, water services and sanitary force mains. Tracer wire shall also be installed inside of empty data/communications conduits.
- 3. For open cut/direct bury installations, provide minimum #10 solid copper tracer.
  - a. For all RV and building water services, provide two (2) wire segments:
    - 1) Between water main and curb box, terminate service line tracer at water main; do not splice into main line tracer wire.
    - 2) One wire from curb box and terminating at street riser elbow for RV connection or at building foundation wall.
    - 3) Provide 24-inch coil of excess wire extended to curb box lid from both directions.
- 4. Extend wire to within 2 inches of grade with approximately two extra feet of slack provided within all valve boxes, pull boxes, manholes, or provide a cathodic protection test station or PVC pipe with cap offset from pipe where needed to house slack wire and provided access for testing. Any tracer wire installed outside the valve box, etc., is unacceptable and will be rejected.
- 5. Cathodic protection test stations shall be combination cast iron & ABS, 2-1/2" dia shaft, flush to grade, tamper proof with "TEST" marked on the lid. Bingham & Taylor Model P200, or approved equal. Test stations to be installed no more than 1000 feet apart.

6. For HDD installations, provide #10 copper clad steel tracer wire attached to top of pipe. Install continuous with each bore. Tracer wire shall be copper clad steel of sufficient tensile strength to exceed pull forces of HDD process. Maintain electrical continuity at intermediate bore pits either by splicing ends of tracer wire or installing cathodic protection test station or PVC pipe cap adjacent to pipe for access and to house slack wire for testing.
7. Test all tracer wire for electrical continuity prior to final acceptance.

B. ACCESSORIES

1. Grout: One part ASTM C150, Type I Portland cement and 6 parts mortar sand per ODOT 703.03, mixed with water to consistency applicable for pressure grouting.
2. Flowable Fill: ODOT Item 613.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify connection to existing piping system size, location, and invert elevations are in accordance with Drawings.

3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
  1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Locate, identify, and protect utilities indicated to remain from damage.
- C. Identify required lines, levels, contours, and datum locations.
- D. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Establish pipe elevations with not less than 5 feet – 6 inches of cover.
- G. Establish minimum vertical separation of 18-inches from other utility piping

### 3.3 DEWATERING

- A. Intercept and divert surface drainage, precipitation, and groundwater away from excavation through use of dikes, curb walls, ditches, pipes, sumps or other means.
- B. Develop and maintain substantially dry subgrade during drilling and pipe installation.
- C. Comply with Ohio EPA requirements for discharging water to watercourse, preventing stream degradation, and erosion and sediment control.

### 3.4 EXISTING WORK

- A. Maintain access to existing facilities, and other remaining active installations requiring access. Modify installation as necessary to maintain access.

### 3.5 EXCAVATION

- A. Excavate approach trenches and pits in accordance with installation plan and as site conditions require. Minimize number of access pits.
- B. Provide sump areas to contain drilling fluids.
- C. Install dewatering measures and excavation supports as required.
- D. Restore areas after completion of drilling and product pipe installation.

### 3.6 DRILLING PILOT HOLE

- A. Drill pilot bore with vertical and horizontal alignment as indicated on Drawings or approved installation plan.
- B. Guide drill remotely from ground surface to maintain alignment by monitoring signals transmitted from drill bit.
  - 1. Monitor depth, pitch, and position.
  - 2. Adjust drill head orientation to maintain correct alignment.
- C. Inject drilling fluid into bore to stabilize hole, remove cuttings, and lubricate drill bit and pipe.
- D. Continuously monitor drilling fluid pumping rate, pressure, viscosity, and density while drilling pilot bore, back reaming, and installing pipe to ensure adequate removal of soil cuttings and stabilization of bore.
  - 1. Provide relief holes when required to relieve excess pressure.
  - 2. Minimize heaving during pullback.
- E. Calibrate and verify electronic monitor accuracy during first 50 feet of bore in presence of Engineer before proceeding with other drilling. Excavate minimum of two test pits

spaced along first 50 feet of bore to verify required accuracy. When required accuracy is not met, adjust equipment or provide new equipment capable of meeting required accuracy.

- F. After completing pilot bore, remove drill bit.

### 3.7 REAMING PILOT BORE

- A. After completing pilot bore, remove drill bit. Install reamer and pipe pulling head.
  - 1. Select reamer with minimum bore diameter required for pipe installation.
- B. Reaming may need multiple passes to enlarge pilot bore sufficiently for pipe installation

### 3.8 DRILLING OBSTRUCTIONS/INCOMPLETE BORES

- A. Should a bore of desired length cannot be completed, or if obstructions are encountered during drilling, notify Engineer immediately. Do not proceed around obstruction without Engineer's approval.
- B. The following procedures should be followed to confirm that the installation can not be completed via directional drilling:
  - 1. A minimum of three (3) directionally drilled installation attempts shall be made. All three (3) attempts shall include substantial efforts to maintain drilling fluid circulation. Each of these attempts may include minor variations from the approved Detailed Construction Plan. Examples of minor variations include altering the drill/bore path alignment by less than 10 feet, altering the fluid volumes or properties, and changing the drill head and/or backreaming tools. Deviation from the bore path shown on the drawings is acceptable within certain parameters. All work must be performed within available rights of way, easements, or within work zones agreed upon in writing by the property owner.
  - 2. Evaluation Meeting: Once all three (3) attempts have failed to complete the installation, a meeting shall be held to determine the best course of action for the project. The Contractor, Engineer, and Owner shall discuss what the failure is attributable to. At this meeting, the Engineer shall make a determination as to whether the failure is attributable to inadequate drilling techniques or unforeseen conditions.
    - a. If failure is attributable to inadequate drilling fluid volumes or properties, inadequate installation equipment selection, and/or drilling and reaming rates, then the Contractor shall make any necessary adjustments to the Detailed Construction Plan and any other affected submittals. Once the new plan is approved, a minimum of three (3) additional directionally drilled installation attempts shall be made.
    - b. If failure is attributable to unforeseen obstructions and/or unstable geological conditions that can not be overcome, no further attempts shall be required of the Contractor.

3. Alternative Construction Method Meeting: After the minimum six (6) unsuccessful attempts have been made and/or unforeseen conditions have been determined to prevent the successful completion of the bore, a meeting shall be held to discuss the best course of action to complete the pipe installation. At this point other alternative construction installation techniques shall be considered. Any contract modification that may be required shall be handled as outlined in the contract documents.

### 3.9 PIPE INSTALLATION

- A. Attach pipe to pipe pulling head. Pull reamer and pipe to entry pit along pilot bore.
- B. Inject drilling fluid through reamer to stabilize bore and lubricate pipe.
- C. Install piping with horizontal and vertical alignment as shown on Drawings.
- D. Protect and support pipe being pulled into bore so pipe moves freely and is not damaged during installation.
- E. Do not exceed pipe manufacturer's recommended pullback forces.
- F. Install trace wire continuous with each bore. Splice trace wire only at intermediate bore pits. Tape or insulate trace wire to prevent corrosion and maintain integrity of pipe detection.
  1. Terminate trace wire for each pipe run at structures along pipe system.
  2. Provide extra length of trace wire at each structure, so trace wire can be pulled 3 feet out top of structure for connection to detection equipment.
  3. Test trace wire for continuity for each bore before acceptance.
- G. Provide sufficient length of pipe to extend past termination point to allow connection to other pipe sections or structures.
- H. Allow minimum of 24 hours for stabilization after installing pipe before making connections to pipe.
- I. Mark location and depth of bore with spray paint on paved surfaces, and wooden stakes on non-paved surfaces at 25-foot intervals.

### 3.10 SLURRY REMOVAL AND DISPOSAL

- A. Contain excess drilling fluids at entry and exit points until recycled or removed from site. Provide recovery system to remove drilling spoils from access pits.
- B. Remove, transport and legally dispose of drilling spoils.
  1. Do not discharge drilling spoils in sanitary sewers, storm sewers, or other drainage systems.



2. When drilling in suspected contaminated soil, test drilling fluid for contamination before disposal.
- C. When drilling fluid leaks to surface, immediately contain leak and barricade area from vehicular and pedestrian travel before resuming drilling operations.
- D. Complete cleanup of drilling fluid at end of each workday.

### 3.11 BACKFILL

- A. Install backfill as specified in Section 31 23 00.
- B. Backfill approach trenches and pits with subsoil fill to contours and elevations of surrounding existing grade.
- C. Compact subsoil fill to minimum 95 percent of maximum density.

### 3.12 ERECTION TOLERANCES

- A. Maximum Variation from Horizontal Position: 12 inches.
- B. Maximum Variation from Vertical Elevation: 2 inches.
- C. Minimum Horizontal and Vertical Clearance from Other Utilities: 18 inches.
- D. When pipe installation deviates beyond specified tolerances, abandon bore, remove installed pipe, re-bore, and reinstall pipe in correct alignment.
- E. Fill abandoned bores with grout or flowable fill material.

### 3.13 FIELD QUALITY CONTROL

- A. Butt Fusion Joint Testing:
  1. On each day joint fusions are to be made, the first fusion shall be a trial fusion. The trial fusion shall be allowed to cool completely, and test straps shall be cut out. Test straps are to be cut a minimum of 12-inches long or 30 times the wall thickness, with the fusion joint in the center. Test strap width shall be a minimum of 1-inch or 1.5 times the wall thickness.
  2. The test strap shall not fail at the fusion joint when the strap is bent back until the points 6-inches on either side of the joint (or 15 times the wall thickness) touch. No fusion of pipe shall be completed or installed until trial fusions pass the bent strap test.
- B. Hydrostatic and Leakage Testing for HDPE Pipe:
  1. Upon completion of the pipeline installation, the entire length shall be hydrostatically tested in accordance with the manufacturer's recommendations, approved by the Engineer, using a test pressure equivalent to 1 ½ times the

design working pressure of the pipe. The “Non-Monitored Make-Up Water Test” shall be utilized unless otherwise specified or directed by the Engineer.

2. Under the initial expansion phase, the test section shall be completely filled with water and purged of air pockets prior to applying the specified test pressure. Make up water is added as required to maintain the specified test pressure for a three (3) hour period.
3. For the leakage test phase, the test pressure is reduced by 10 psi and the pressure must remain steady (within 5% of the reduced target pressure) for a minimum duration of one (1) hour.
4. Any testing performed without the knowledge of the Engineer shall not be considered a test for the purpose of this specification.

C. Compaction Testing:

1. In Place Density Tests: ASTM D1556 (cone method) or ASTM D2922 (Nuclear method)
2. Compaction Testing: ASTM D698 (Standard Proctor).
3. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
4. Frequency of Compaction Testing: One for each lift.

3.14 DISINFECTION OF THE PIPELINE FOR POTABLE WATER PIPING

- A. After installation and passing all required tests, the pipeline shall be disinfected prior to being placed into service. Unless otherwise directed by the Owner, the pipeline shall be disinfected per AWWA C651.

3.15 CLEANING

- A. Upon completion of drilling and pipe installation, remove drilling spoils, debris, and unacceptable material from approach trenches and pits. Clean up excess slurry from ground.
- B. In the event that the bentonite slurry used for drilling/lubricating migrates upward through fissures in the ground causing roadway pavement upheaval, the contractor shall be responsible to restore pavement to original condition.
- C. Restore approach trenches and pits to original condition.
- D. Remove temporary facilities for drilling operations in accordance with Section 01 50 00 - Temporary Facilities and Controls.

END OF SECTION

SECTION 33 11 00

WATERLINE AND FITTINGS

PART I GENERAL

1.01 DESCRIPTION

- A. Work Included: Water line, thrust restraint, service connections, hydrants, valves, fittings and appurtenances as specified herein or/and as indicated on the drawings.

1.02 QUALITY ASSURANCE

- A. Qualifications of Workmen: Provide at least one person per pipe laying crew who shall be present at all times during execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the Ohio Environmental Protection Agency Standards, American Water Works Association Requirements and Owner's requirements.
1. Where provisions of pertinent codes and standards conflict with this Specification, the more stringent provisions shall govern.

1.03 JOB CONDITIONS

- A. Dust Control: Use all means necessary to control dust as required by the Engineer on and near the Work and on and near all trench areas if such dust is caused by the Contractor's operations during performance for the Work or if resulting from the condition in which the Contractor leaves the site.
1. Thoroughly moisten or apply calcium chloride to all surfaces as required to prevent dust being a nuisance to the public and concurrent performance of other work on site. No additional payment will be made for dust control.
- B. Protection: Use all means necessary to protect all materials of this Section before, during, and after installation and to protect all objects designated to remain.
1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

1.04 SUBMITTALS

- A. Shop Drawings: Within 15 days after award of Contract, and before any of the materials of this Section are delivered to the job site, submit complete Shop Drawings to the Engineer in accordance with the provisions of the general and special conditions of these specifications; show all details of the connections, pipe including joints, etc.

- B. Material List: Accompanying the Shop Drawings, submit five copies of a complete list of all material and equipment proposed to be furnished and installed under this operation of the Work, giving manufacturers' name, catalog number, and catalog cut for each item, where applicable.
- C. Manufacturer's Recommendations: Accompanying the Materials List, submit five copies of the manufacturers' current recommend method of installation for said pipe material, hydrants, valves and appurtenances.
- D. As-Built Drawings: During progress of the Work, the Contractor shall maintain an accurate record of all changes made in the installation from the layout and materials shown on the approved Shop Drawings. This shall be the property of the Engineer upon completion of the job.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not place materials on private property without written permission of property owner.
- B. During loading, transporting and unloading, exercise care to prevent damage to materials. In the event of damage, immediately make all repairs or remove damaged materials from site and replace as directed by the Engineer and at no additional cost to the owner.
- C. Do not drop pipe or fittings.
- D. At no time shall other pipes or material be placed in the pipes.
- E. Repair damage to pipe exterior and interior surfaces per manufacturer's instructions; pipe too damaged shall be subject to rejection.
- F. Do not stack pipe higher than recommended by pipe manufacturer.
- G. Store gaskets for joints in cool, dry location out of direct sunlight and not in contact with petroleum products.

PART 2 PRODUCTS

2.01 GENERAL

- A. All pipe, fittings, couplings, and appurtenant items shall be new and free from defects or contamination. Wherever possible, all products utilized shall be the standard products of the manufacturer. They shall be furnished in pressure or thickness classes as specified or shown.
- B. All pipe and fittings shall be suitably marked for identification purposes to guarantee that what is furnished was prepared for use under this Contract and is in accordance with the

requirements of these specifications. All pipes and fittings will be immediately examined upon arrival at the job. Any pipes or fittings that fail to comply with the Specifications will be rejected and shall be replaced by the Contractor with pieces that prove to be satisfactory upon inspection.

2.02 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. Provide water pipe and fittings meeting the following requirements:

1. Water mains less than 4-inches:
  - a. Pipe: HDPE, per AWWA C901 and NSF/ANSI 61, IPS, - DR 9 (200 psi) minimum with butt fusion joints. Dimensions and workmanship per ASTM D3035.
  - b. Fittings: HDPE, molded, per AWWA C901 and NSF/ANSI 61, IPS, - DR 9 (200 psi) minimum with butt fusion or electro-fusion joints. Fittings and transitions per ASTM D3261. Molded fittings shall be fully pressure rated to match pipe SDR pressure rating to which they are made. Fittings shall be molded by Manufacturer—no Contractor molded fittings shall be used unless approved by Owner or Engineer.
2. Water mains 4-inches and larger:
  - a. Pipe: HDPE, per AWWA C906 and NSF/ANSI 61, DIPS, DR 11 (200 psi) minimum with butt fusion joints. Dimensions and workmanship per ASTM F714.
  - b. Fittings: HDPE, molded, per AWWA C906 and NSF/ANSI 61, DIPS, SDR 11 (200 psi) minimum with butt fusion or electro-fusion joints. Fittings and transitions per ASTM D3261. Molded fittings shall be fully pressure rated to match pipe SDR pressure rating to which they are made. Fittings shall be molded by Manufacturer—no Contractor molded fittings shall be used unless approved by Owner or Engineer
3. Water Service Lines.
  - a. Pipe: HDPE, per AWWA C901, NSF/ANSI 61, ½-inch through 2-inch, CTS, DR 9 (250 psi) minimum.
  - b. Connect service lines to HDPE water main.
    - 1) Use HDPE service saddle fusion or electro-fusion tapping tees with outlet stub appropriately sized for CTS, DR 9 service line.
    - 2) For new installations, saddle fusion or electro-fusion tees or outlets appropriately sized for CTS, DR 9, service lines are acceptable.
    - 3) See drawings for RV water service connections.

B. Electrofusion Couplings

1. Repair of defective butt fused joints or damaged HDPE pipe sections shall be removed and repaired using new HDPE pipe of similar diameter and SDR and joined using HDPE electrofusion couplings.

C. Restrained Joints and Couplings for Pressure Pipelines:

1. Where HDPE pipe must be joined with Ductile, PVC or other mainline pipe or fittings, all joints and couplings shall be fully restrained to the specified maximum test pressure, and de-rated for appropriate service temperature. Concrete anchors shall also be provided for the HDPE pipe.
  - a. Push-on joints: Ebba Iron Series 15PF00 or approved equal.
  - b. Mechanical joints: Ebba Iron Series 2000, or approved equal.
  - c. Flanged joints: EBBA Iron Series 2100 restrained Flange Adapter, or approved equal.
  - d. Restrained couplings: EBBA Iron Series 3800 Restrained Coupling, or approved equal.
2. Provide stainless steel internal stiffeners, sized based on the inside diameter and SDR of the HDPE pipe.
  - a. Fixed diameter type; 2-inches or less: Ford Meter Box Company, or approved equal
  - b. Fixed diameter type; 4-inches and larger: JCM 230/231, or approved equal
  - c. Split ring & wedge type; 4-inches and larger: Romac Industries, Inc., or approved equal

## 2.03 FIRE & FLUSH HYDRANTS

- A. Fire Hydrants shall be post type conforming to AWWA C502, Mueller Super Centurion 250, or approved equal.
  1. 3-way (2 hose nozzle/1 pumper nozzle). Coordinate connection with Fire Department
  2. 5-foot depth of bury unless otherwise noted on plans.
  3. Hydrant leads shall be 4-inch minimum/6-inch maximum with isolation gate valve
  4. Hydrants to open to left
  5. Nozzle caps and operating nuts: National Standard 1 ½-inch pentagon
  6. Thread on stem and nut: US Standard
- B. Flush Hydrants shall be post type conforming to AWWA C502, Mueller No. A-411 or approved equal.
  1. 1-way (1 2 ½-inch nozzle); hose connection/thread type – US Standard thread with 2 ½-inch female standard thread x 2 ½-inch male cam lock hose connection with female lockable cap.
  2. 5 foot bury depth unless otherwise noted on plans.
  3. Hydrant leads shall be 2-inch min/3-inch max with corresponding curb valve/gate valve and valve box.
  4. 150 psi max operating pressure
  5. Hydrants to open to left
  6. Nozzle caps and operating nuts: National Standard 1 ½" pentagon
  7. Thread on stem and nut: US Standard

2.04 YARD HYDRANTS

A. Typical & Frost Free Yard Hydrant

1. Complete hydrant assembly consisting of 1-inch x ¾-inch galvanized reducing elbow with Legend ¾-inch T-537 Ball Hose Bibb and brass hose connection vacuum breaker ¾-inch FHT x ¾-inch MHT backflow preventer; For Frost Free, provide Woodford Model S3 Freezeless Sanitary Yard Hydrant.
2. Curb Box and Cover: Provide two-piece, screw extension type Buffalo style curb box for 2-inch and smaller curb stop valves, Bingham & Taylor Model 4901 with standard bottom section and 4970 foot piece. For curb valves requiring a box with a 4980 enlarged base, provide concrete valve support. Curb box size(s) shall provide adequate extension range and/or equipped with extension piece to reach final grade with required depth of bury. Provide new style flush fit cover and top piece. Cover shall be marked "WATER" with brass head bolt.
3. 1" Curb Valve: Mueller Co. MARK II ORISEAL, Model H15172N (CTS compression/FIP thread; provide HDPE internal stiffeners at all compression fittings).
4. Yard hydrants to be installed as close to water main as possible and 5 feet off pavement.

2.05 PEDESTAL WATER FOUNTAINS

- A. Provide a pedestal drinking fountain at shelter structures where shown on plans and as specified in 22 40 00, Plumbing Fixtures.
- 1.

2.07 VALVE BOXES

- A. Cast iron valve boxes shall be installed for all valves installed underground. Valve boxes shall meet the requirements of ASTM A48. Only valve boxes manufactured of cast iron will be allowed. The casting shall be manufactured of clean, even grain, grey cast iron with a minimum tensile strength of 21,000 psi. The valve box shall be smooth, true to pattern, free from blowholes, sand holes, projections and other harmful defects.
- B. Valve boxes shall have a minimum 5-1/4 inch shaft, a weight of at least 60 pounds and a wall thickness of at least 1/4". Valve boxes shall be of two piece design including bottom section and top section with lid and shall be adjustable to fit the depth of earth cover over the valve. Three-piece valve boxes will be allowed for excessively deep valves.
- C. The valve box shall be coated with a standard bituminous coating of either coal tar or asphalt basic applied to all inside and outside surfaces.
- D. Valve boxes shall be accurately centered over valve operating nuts, and backfill shall be thoroughly tamped around them. They shall be set vertically plumb and properly adjusted so that the tops of boxes will be at grade in any paving, walk, road or ground surface.
- E. Valve boxes shall be designed so as to prevent the transmission of surface loads directly to the valve or piping. Valve boxes inside paving, walks, or road surfaces shall not be set on the valves but shall be supported on crushed stone fill.
- F. The seating surface of both the lid cover and the top section of the valve box shall be cast so the cover will not rock after it has been seated and will fit tightly with little or no play in the fit. Valve boxes shall have the word "WATER" cast into the covers.
- G. Wherever valve boxes fall outside of the roadway pavement, the top of the box shall be set

in a concrete slab 18" x 18" x 6" thick (or 18" circular x 6" thick) with the top of the slab and box flush with the top of the ground.

- H. Valve boxes shall be East Jordan Iron Works 8550 Series Two Piece Screw Type Valve Box with 6800 Valve Box Drop Lid or approved equal.

## 2.08 GATE VALVES

- A. Gate Valves 2-inches through 12-inches shall be Clow Model 2639 Full Body Ductile Iron Resilient Wedge Gate Valves, or approved equal.
- B. Resilient Wedge Seat Gate Valves meeting or exceeding AWWA C509 with ductile/cast iron body, inside screw design and non-rising stem with thrust bearing washers. The stem shall be protected by a weather shield and upper O-ring above the stem collar
- C. Gate valves shall be provided with mechanical joint ends.
- D. Include HPDE mechanical joint adapter with stainless steel internal stiffener.
- E. Gate valves shall be installed in vertical position without actuators and designed to operate equally well with pressure on either side of the gate.
- F. Gate valves shall OPEN by turning the 2-inch operating nut to the left (COUNTER-CLOCKWISE).
- G. Provide fusion-bonded epoxy coating meeting AWWA C550 and NSF 61.

## 2.09 UNDERGROUND PIPE MARKERS

- A. Tracer Wire:
  - 1. Tracer wire shall be attached to top of pipe on all water mains, water services and sanitary force mains.
  - 2. For open cut/direct bury installations, provide minimum #10 solid copper tracer.
    - a. For all RV and building water services, provide two (2) wire segments:
      - 1) Between water main and curb box, terminate service line tracer at water main; do not splice into main line tracer wire.
      - 2) One wire from curb box and terminating at street riser elbow for RV connection or at building foundation wall.
      - 3) Provide 24-inch coil of excess wire extended to curb box lid from both directions.
  - 3. Extend wire to within 2 inches of grade with approximately two extra feet of slack provided within all valve boxes, pull boxes, manholes, or provide a cathodic protection test station or PVC pipe with cap offset from pipe where needed to house slack wire and provided access for testing. Any tracer wire installed outside the valve box is unacceptable and will be rejected.
  - 4. Cathodic protection test stations shall be combination cast iron & ABS, 2-1/2" diameter shaft, flush to grade, tamper proof with "TEST" marked on the lid.



Bingham & Taylor Model P200, or approved equal. Test stations to be installed no more than 1000 feet apart.

5. For HDD installations, provide #10 copper clad steel tracer wire attached to top of pipe. Install continuous with each bore. Tracer wire shall be copper clad steel of sufficient tensile strength to exceed pull forces of HDD process. Maintain electrical continuity at intermediate bore pits either by splicing ends of tracer wire or installing cathodic protection test station or PVC pipe cap adjacent to pipe for access and to house slack wire for testing.
6. Test all tracer wire for electrical continuity prior to final acceptance.

B. Marking Tape

1. Underground Utility marking tape shall be 3-inch wide, non-detectable type, conforming to APWA Uniform Color Code, with lettering indicating the utility type buried below. Install over top of pipe to dimension shown in the trench detail for utility type being installed.

2.10 VALVE MARKERS

- A. Provide above-ground valve markers where valves are sited in natural, high-grass (un-mowed) areas.
- B. Mark all main line valves: Gate valves on 4-inch lines.
- C. Mark inline valves.

2.11 BEDDING AND COVER MATERIALS:

- A. Refer to MWCD Standard Drawings and Part 3 of this Specification.

2.12 OTHER MATERIALS AND EQUIPMENT

- A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be new, first quality of their respective kinds, and subject to approval of the Engineer.
- B. In the specifications and on the Engineer's drawings, are specified and shown certain pieces of equipment and materials deemed most suitable for the service anticipated. This is not done to eliminate other equipment and materials equally as good and efficient. The Contractor shall prepare his bid on the particular materials and equipment specified. Following the award of the contract, should the Contractor desire to use other equipment and materials, he shall submit to the Owner a written request for such change and state the advantage to the Owner and the savings or additional cost involved by the proposed substitution. The determination as to whether or not such change will be permitted rests with the Owner and the Engineer.
- C. Each major item of equipment shall be inspected by a manufacturer's representative during installation and upon completion of the work. The Contractor shall supply the

Engineer with a certificate of such inspection.

## 2.13 AIR RELEASE VALVES AND MANHOLES

### A. Combination Air Valves

1. Combination air valves shall be a single body type and shall conform to AWWA C512. Valves shall be suitable for potable water service and shall be certified to NSF 61, "Drinking Water System Components – Health Effects". The valves shall be "full port". The size of the inlet, outlet and orifice shall be as noted on the detail drawings. Air release orifice shall be suitable for 300 psi maximum working pressure (Class 300).
2. The valve shall exhaust large quantities of air during the filling of the pipeline, without blowing shut, closing only after all the air has been vented. The valve shall continue to release small quantities of air under pressure as often as needed to keep the system free of accumulated air. The valve shall automatically open to allow air to reenter during draining, or whenever a negative pressure occurs.
3. Single body combination air valves, sizes 4-inches and smaller, shall have full size NPT inlets and outlets equal to the nominal valve size. The valve shall have two additional NPT connections for the connection to gauges, testing, and draining.
4. The valve body and cover for Class 300 valves shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. The float, guide shafts, and bushings shall be constructed of Type 316 stainless steel. Non-metallic floats, linkage or bushings are not acceptable. Resilient seats shall be Buna-N.
5. The exterior of the combination air valve shall be coated with a universal alkyd primer.
6. Manufacturer:
  - a. Series 201C.2 by Val-Matic Valve & Manufacturing Corporation.
  - b. Series 140C by APCO Willamette Valve & Primer Corporation
  - c. Approved equal.

### B. Manholes

1. The Contractor shall provide and install complete, a precast concrete manhole, as shown on the detail drawings, for each air release valve.
2. See Section 33 05 13, "Precast Concrete Manholes and Structures" for additional requirements including steps, frame & cover, etc.
3. Pipe-to-manhole connectors shall be Link-Seal Modular Seal, Model "S-316" or approved equal.

### C. Restrained Flange Adapters

1. Flange adapters shall be made of ductile iron conforming to ASTM A536 and shall have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10 (125#/Class 150 bolt pattern).
2. Restraint for the flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of gripping wedges.
3. For PVC and HDPE pipe, the flange adapter will have a pressure rating greater or equal to the pipe.
4. All internal surfaces of the gasket ring (wetted parts) shall be lined with a minimum of

15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating and gaskets shall meet NSF 61. Exterior surfaces of the gasket ring shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

5. Provide pipe stiffeners for connecting to HDPE pipe. Stiffeners shall meet pipe manufacturer's recommendations.
6. Manufacturers:
  - i. Series 2100 Restrained Flange Adapter by EBAA Iron, Inc.
  - ii. Approved equal.

D. Ball Valves

1. Manufactured per MSS SP-110.
2. Valves shall be pressure rated to minimum 300psi WOG non-shock.
3. Valve shall have 100% full port opening.
4. Body, ball, stem, spring washer, threaded pack gland, locking handle and handle nut shall be stainless steel.
5. Seat shall be reinforced PTFE.
6. Thrust washer and stem packing shall be carbon filled PTFE.
7. Valves shall be threaded; female, iron pipe size (FIPS). Threads shall conform to ASME B1.20.1.
8. Manufacturers:
  - a. Apollo Valves by Conbraco Industries, Inc.
  - b. NIBCO, Inc.
  - c. Or approved equal.

E. Swing Check Valve

1. Swing check valves shall conform to MSS SP-80. Valves shall be manufactured out of bronze per ASTM B62 and be pressure rated to 300psi WOG non-shock. Valves shall have metal-to-metal seal and solder CxC end connections.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Inspection: Prior to all work of this Section, carefully inspect the installed point where this installation may properly commence. Verify that all pipe and appurtenances have been installed in accordance with all pertinent codes and regulations, approved shop drawings, the original design and the referenced standards.
- C. Discrepancies: In the event of discrepancy, immediately notify the Engineer. Do not proceed with installation in areas of discrepancy, until all such discrepancies have been fully resolved.

3.02 INSTALLATION

- A. General: Install all waterline and appurtenances in strict accordance with the manufacturer's recommendations, ASTM D2774 Standard Practice for Underground Installation of Thermoplastic Pressure Piping, ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications, and as approved by the Design Professional. These specifications are intended to discuss the requirements associated with open trenching installation methods.
- B. Line Grade: From the established baseline and benchmarks, the Contractor shall provide a registered surveyor that shall extend and maintain the necessary lines and grades for the construction. The Contractor shall set all additional construction stakes for the project which are needed to establish offset stakes, reference points, supplementary bench-marks, right-of-way lines and any other horizontal or vertical controls necessary to secure a correct layout of the work. The Contractor shall be responsible for having the finished work conform to the horizontal alignment, grade, elevation, and dimensions called for in the plans. The Contractor shall exercise care in the preservation of stakes and benchmarks and shall have them reset at no additional cost to the Owner when any are damaged, lost, displaced, or removed. The Contractor shall use competent personnel and suitable equipment for the layout work required and shall provide that it is done under the supervision of a registered professional engineer or a registered surveyor. The method of maintaining grade shall be submitted for approval.
- C. Trenching: The excavation shall be completed in accordance with ASTM D2321. The base of the trench shall be free of rocks, stones, metal, concrete, bricks, wood, soil lumps, or other hard materials during placement of the pipe. All pipe endangered by such debris shall be subject to removal and disposal at the Contractor's expense and when directed by the Design Professional. No dirt or material shall be stockpiled on the trench once backfilled, nor shall any construction traffic be allowed on the trench.
- D. Pipe Placement: Before any pipe is lowered into the trench, it shall be inspected for damage, and any unsatisfactory lengths shall be rejected. The interior and exterior of each pipe length used shall be cleaned as necessary to remove all dirt or other foreign material before it is inspected. The interior of the pipe shall be kept clean until the work is accepted.
  - 1. Pipe shall not be laid in water, mud or when trench conditions or the weather is unsuitable for such work, except by permission of the Design Professional.
  - 2. If mud, surface water, leaves and/or other debris have been permitted to enter the strung-out pipe, the inside shall be cleaned as directed by the Design Professional after all such foreign materials are completely cleaned from the pipe and before the pipe is lowered into the trench.
  - 3. Wide, fabric choker slings shall be used to move or lower pipe and fittings into the trench. Wire rope or chains shall not be used. Pipe shall not be pushed off the bank nor shall it be permitted to fall into the trench. Each type of pipe, fitting, special, or other appurtenances shall be handled in strict accordance with recommendations of its respective manufacturer.

4. When pipe laying is not in progress, the open ends of installed pipe shall be closed by appropriate means to prevent the entrance of dirt and water. In the event debris or water enter any portion of the pipeline, cleaning of the line shall be performed as directed by the Design Professional at no additional cost to the Owner.
  5. All fittings and bends shall be provided with thrust blocks in order to prevent movement of the pipe. Any fittings with bell and spigot or mechanical joints shall be provided with either thrust blocking as indicated on drawings or mechanical restraint devices. The thrust blocks shall be placed between solid ground and the fitting or other part of the pipeline to be restrained. The area of bearing on the pipe and on the ground in each instance shall be as indicated on the details.
- E. Bedding and Haunching: Type I bedding and haunching material conforming to ODOT CMS, Item 703.02, fine aggregate. Bedding material shall be placed by hand shovel around the lower half of both sides of the pipe to the springline, in maximum 4-inch lifts and shall be compacted to with a tamping tool to ensure area is completely filled and free of voids.
- F. Initial Backfill: The initial backfill requirements shall be Type I bedding material conforming to ODOT CMS, Item 703.02, fine aggregate. Material shall be placed from the springline to a minimum of 12 inches above the crown of the pipe. Place initial backfill in 6-inch maximum lifts and properly compacted to 90% Standard Proctor (ASTM D698).
- G. Tracer Wire Placement: Tracer wire shall be attached to the top of the pipe. The tracer wire run shall be continuous between accessible points such as air release manholes, meter vaults, etc. such that the wire can be attached to a connection terminal located at the access structure. See subparagraph 2.09.A. of this specification.
- H. Final Backfill: The final backfill requirements shall be as stated in ASTM D2321 and as prescribed below, or as otherwise noted on the drawings.
1. In areas where the pipe lies outside of public road right-of way and/or the 1 to 1 influence line of traffic areas (driveways, parking lots, etc.), suitable excavated material can be utilized as final backfill material if it meets Class III or better per ASTM D2321. Material shall be placed in 12-inch maximum lifts and compacted to 90% Standard Proctor (ASTM D698). Compacted final backfill shall extend from the limits of initial backfill to the top of trench, matching the existing grade. Mounding of final backfill will not be permitted.
  2. In areas where the pipe lies within public road right-of way or within the 1 on 1 influence line of a traffic area impact zone (driveways, parking lots, etc.), the trench shall be backfilled with compacted granular material per ODOT CMS Item 304. Material shall be placed in 6-inch maximum lifts and properly compacted to 95% Standard Proctor (ASTM D698). Material shall be placed to the top of the pavement subgrade, and to within 6-inches of the existing grade in all other areas.
  3. No dirt or material shall be stockpiled on the trench once backfilled, nor shall any construction traffic be allowed on the trench.

3.04 INSTALLATION USING HORIZONTAL DIRECTIONAL DRILLING

- A. See Specification 33 05 24 – HDD of HDPE\_MWCD, for installation of HDPE waterline using Horizontal Directional Drilling (HDD).

3.05 FIELD QUALITY CONTROL

- A. Butt Fusion Joint Testing:
1. On each day joint fusions are to be made, the first fusion shall be a trial fusion. The trial fusion shall be allowed to cool completely, and test straps shall be cut out. Test straps are to be cut a minimum of 12-inches long or 30 times the wall thickness, with the fusion joint in the center. Test strap width shall be a minimum of 1-inch or 1.5 times the wall thickness.
  2. The test strap shall not fail at the fusion joint when the strap is bent back until the points 6-inches on either side of the joint (or 15 times the wall thickness) touch. No fusion of pipe shall be completed or installed until trial fusions pass the bent strap test.
- B. Compaction Testing:
1. In Place Density Tests: ASTM D 1556 (cone method) or ASTM D6938-15 (Nuclear method)
  2. Compaction Testing: ASTM D698 (Standard Proctor).
  3. When tests indicate Work does not meet specified requirements remove Work, replace and retest.
  4. Frequency of Compaction Testing: One for each lift.

3.06 FLUSHING

- A. Prior to leakage test, all pipeline construction shall be flushed with water approved by the Engineer to remove any foreign material. Flushing shall be followed by disinfection. The AWWA C651 minimum flushing velocity of 3 fps shall be provided. Flushing at these rates shall be continued for at least five (5) minutes. In the event the foregoing requirements cannot be met due to the Owner's facilities being inadequate, alternate rate(s) and duration(s) of flushing shall be as directed by the Owner's Representative.

3.07 HYDROSTATIC LEAKAGE TESTING:

- A. After flushing, the waterlines shall be hydrostatically tested in accordance with the manufacturer's recommendations and shall be approved by the Design Professional. The test pressure shall be equivalent to 150 psi minimum, or 1-1/2 times the design working pressure of the pipe, whichever is greater. The "Non-Monitored Make-Up Water Test" shall be utilized unless otherwise specified or directed by the Design Professional. For HDPE pipe

follow the ASTM F2164 standard unless otherwise specified or directed by the Design Professional.

- B. Test equipment and the pipeline test section shall be examined before pressure is applied to ensure that connections are tight, necessary restraints are in place and secure, and components that should be isolated or disconnected are isolated or disconnected. All low pressure filling lines and other items not subject to the test pressure shall be disconnected or isolated.
- C. The test section shall be completely filled with the clean water, taking care to bleed off any trapped air. Venting at high points may be required to purge air pockets while the test section is filling. Venting may be provided by bleed valves or equipment vents. The test fluid and test section temperatures shall be less than 80°F.
- D. The test procedure consists of initial expansion, and test phases. For the initial expansion phase, the test section is pressurized to test pressure and make-up test liquid is added as required to maintain maximum test pressure for four (4) hours. For the test phase, the test pressure is reduced by 10 psi. This is the target test pressure. If the pressure remains steady (within 5% of the target test pressure) for an hour, leakage is not indicated.
- E. If leaks are discovered, depressurize the test section before repairing leaks.
- F. Leakage at a butt fusion joint may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered. Leaks at fusion joints require the fusion joint to be cut out and redone.
- G. If the pressure leak test is not completed due to leakage, equipment failure, etc., the test section should be de-pressurized and repairs made. Allow the test section to remain depressurized for at least eight (8) hours before retesting.
- H. Any testing performed without the knowledge of the Design Professional shall not be considered a test for the purpose of this specification.
- I. Air (pneumatic) testing will not be allowed.

### 3.08 DISINFECTION

- A. After satisfactory hydrostatic testing, disinfection shall be conducted in accordance with AWWA C651, except tablet chlorination is not permitted. The disinfection procedure and procedure for disposal of chlorinated water must be submitted to the Engineer for approval, prior to any of this work being performed.
- B. During disinfection, all valves and hydrants shall be operated to ensure that all appurtenances are disinfected.

- C. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use. All chlorinated water discharged to drainage courses shall be done in accordance with Ohio EPA Regulations and AWWA C655. Where chlorinated discharge may cause damage to the environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water. The manner, disposal point and rate of discharge shall be submitted for approval to the Engineer.
- D. Bacteriological samples will be taken at locations as designated by the Engineer. One test shall be taken per 1,000 feet of pipe. A minimum of three (3) tests will be required. All samples must be evaluated by a laboratory that is selected by the Engineer. The Contractor shall pay for cost of the evaluations. No connection to the existing water main shall be made until a laboratory certifies that the water quality in the new waterlines is suitable for human consumption. Additional sterilizations and testing may be required to obtain certification and shall be paid for by the Contractor.
- E. Contractor shall provide all disinfectants and disinfection equipment necessary to complete the disinfection.

3.09 CLEANING UP

- A. Upon completion of the work of this Section, level all components of the water distribution system completely free from silt and obstructions and restore all surfaces to the condition they were in at the start of the work of this Section.

END OF SECTION



CHLORINATION AND DECHLORINATION

PART 1 - GENERAL

1.1 SCOPE AND GENERAL CONDITIONS

- A. This section includes the requirements for disinfection of the Charles Mill Lake Park waterline extension. Once the interior (wet) finish-coat has cured for a minimum of seven-(7) days, the CONTRACTOR shall perform disinfection procedures to return the tank to service.

1.2 REFERENCES

- A. AWWA C652-86, Section 4.0 – "Disinfection Methods", Method 2.
- B. National Sanitation Foundation (NSF) Standard 61 "Drinking Water System Components-Health Effects."

1.3 RECORD OF COMPLIANCE

- A. The record of compliance shall be the bacteriological test results certifying that the water held in the storage facility is free of coliform bacteria contamination. In addition the turbidity of the water shall be tested and shall meet the requirements of the MWCD.

1.4 CONTRACTOR REQUIREMENTS

- A. Furnish all chlorination materials, de-chlorination materials, rigging, equipment, safety equipment and labor required to disinfect the interior of the Atwood Tank Spheroid.
- B. After the interior coating has dried at least seven (7) days or at least the minimum number of days required by the coating manufacturer, whichever is greater, the CONTRACTOR shall furnish all rigging, equipment, pressure washing equipment, safety equipment, harnesses, respirators, labor and materials to disinfect the interior of tank with a strong chlorine solution in compliance with standards specified herein.
- C. The procedures and guidelines suggested are general in nature and the CONTRACTOR shall submit a disinfection plan for approval. The plan shall be submitted to the MWCD for review at a minimum of fourteen – (14) days prior to the work. At a minimum the plan shall include:
  - 1. Tank Isolation and Pre-chlorination Procedures.

2. Initial Cleaning Procedures Prior to Chlorination.
  3. Chlorination Procedures in Conjunction with Chlorination Method 2.
  4. Rigging and Safety Equipment to be used.
  5. Emergency Evacuation Plan.
  6. Materials to be used.
  7. Dechlorination Procedures.
  8. Schedule. Where no schedule has been defined, bacteriological samples shall be taken as soon as the tank is filled and always within three - (3) working days after receipt of written notification from CONTRACTOR that chlorination is complete. Results of sample analysis will be available within three - (3) calendar days after sampling.
  9. Contingency Plan Should Bacteria Test(s) Fail.
- D. The CONTRACTOR shall insure that the finish-coat is not damaged as a result of pressure washing and disinfection operations. Any such damage shall be corrected and re-inspected at the CONTRACTOR'S expense.
- E. No work will be permitted until proper notification and verification of the schedule.
- F. Ensure lining has cured prior to chlorination.

#### 1.5 MWCD REQUIREMENTS

- A. General: The MWCD'S personnel will cooperate fully with the CONTRACTOR in supplying water for pre-cleaning and disinfection and will coordinate all valve and piping work.
- B. The MWCD will schedule a meeting prior to disinfection with all parties present. The purpose of the meeting is to define all of the responsibilities of each party, procedures required for disinfection and also to establish a timeframe.
- C. Operate all valves and maintain isolation valves in closed position during disinfection period until bacteriological samples have satisfactorily passed tests.
- D. Potable Water Supply: If there is an adequate potable water supply at the project site, the MWCD shall permit the CONTRACTOR to use the potable water supply contingent upon availability and the MWCD'S written approval and review of the CONTRACTOR'S disinfection plan. Should the MWCD agree to furnish potable water the CONTRACTOR shall use an approved back flow device or check valve to insure that water from the disinfection process, treatment or spent does not backflow into the water supply.
- E. Take samples and conduct necessary testing to ensure water supply is free of coliform and pathogenic organisms, and in accordance with EPA guidelines. The

MWCD will also examine the water for turbidity prior to placing the tank back in service.

1.6 APPROVED CHLORINATION METHOD:

- A. AWWA C652-86, Section 4.0 – “Disinfection Methods”, Method 2.
  - 1. Sufficient chlorine compound shall be dissolved in water to form to a 200 mg/L solution, which shall be sprayed on all interior areas. Repeat the spray process after a 30 minute interval, and then remove from tank. Chlorine solution may be mixed in a drum on the ground and pumped with airless spray equipment into the tank, piping and wetriser.
  - 2. De-chlorinate spent water as per Ohio EPA requirements and properly dispose of once the captured water has had sufficient time to be neutralized.

1.7 SPECIAL CONDITIONS

- A. The CONTRACTOR shall be required to seal all piping and drains and shall isolate and or capture all spent tap water, chlorinated water and debris. Discharging water with any measurable chlorine residual or contaminated water or other liquids and/or solids into any drain or sewer is prohibited. Such release shall be grounds for immediate termination of this Contract and the CONTRACTOR shall be liable for any fines, penalties or remediation costs. The CONTRACTOR shall protect all drain systems from the entrance of any liquids or solids until such time the chlorination material can dissipate to a residual of 0.0 ppm.
- B. Should the bacteria test(s) fail, the CONTRACTOR shall re-disinfect at no cost to MWCD until acceptable bacteria tests and turbidity goals are met. If adjustments are required in the CONTRACTOR’S disinfection plan, they shall be made at no cost to the MWCD.
- C. As part of this Contract, the CONTRACTOR will be required to repeat the tank chlorination plan at the anniversary inspection.

1.8 SUBMITTALS

- A. General: Submit for Information Only.
  - 1. Qualifications and experience of personnel under whose supervision chlorination or dechlorination is to be performed when liquid chlorine as described in AWWA B301 or other pressurized chemicals.
  - 2. Method of Construction with Contactor Drawings to include method of chlorination, type and quantity of chemicals, source of water for disinfection, discharge locations of chlorinated water or, if required, method of treating chlorinated water.

- B. Disinfection Plan: The procedures and guidelines suggested in the disinfection plan are general in nature and the CONTRACTOR shall submit his/her own plan for approval. The plan shall be submitted to the MWCD for review at least fourteen – (14) days prior to the work and shall include the following minimum items:
1. Tank Isolation and Pre-chlorination Procedures.
  2. Initial Cleaning Procedures Prior to Chlorination.
  3. Chlorination Procedures in Conjunction with Chlorination Method 2.
  4. Rigging and Safety Equipment to be used.
  5. Emergency Evacuation Plan.
  6. Materials to be used.
  7. Dechlorination Procedures.
  8. Schedule.
  9. Contingency Plan Should Bacteria Test(s) Fail.

## 1.9 QUALITY ASSURANCE

- A. The MWCD will collect bacteriological samples and the MWCD'S laboratory will perform bacteriological testing.
- B. ACCEPT/REJECT
1. General: Should the bacteriological samples not pass satisfactorily, CONTRACTOR shall repeat process until samples pass on two consecutive days.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: All materials used to disinfect the tank interior, that may come in contact with surfaces that will store potable water shall meet the requirements under the National Sanitation Foundation (NSF) Standard 61 "Drinking Water System Components-Health Effects."
- B. Disinfection: Approved Forms of Chlorine have been provided and shall comply with AWWA C651:
1. Liquid Chlorine.
  2. Sodium Hypochlorite Solution (liquid).
  3. Calcium Hypochlorite Granules (dry solid).

C. Dechlorination:

1. Ascorbic Acid, or approved equal.

D. Related Materials and Products:

1. MATERIALS: Follow Section 02510, AWWA standards, and requirements specified herein:
  - a. Dechlorination Tablets LPD-CHLOR™ Sodium Sulfite, Bio- Max Sodium Sulfite, or VITA-D-CHLOR (Ascorbic acid).
  - b. Bag: 16 inch (top opening) by 8 inch nylon.
  - c. Diffusers:
    - 1) For flow rates up to 120 gpm: Use 4 inch circular strainer to hold bag with sodium sulfite or ascorbic acid tablets, attach to fire hydrant or fire hose using adapter.
    - 2) For flow rates from 31-1250 gpm: Use Pollard LPD-250 or LPD-250A Diffusing Dechlorinator.
    - 3) Low Flow Inserts: For flow rates from 31 to 200gpm.
  - d. Rubber Bands: Heavy duty to fit around nylon bag.
  - e. Fire Hose: Standard 2 ½ inch.
  - f. High Pressure washing Hoses: Suitable for machine they are serving.
  - g. Adapters: To connect 4-inch circular strainer to fire hydrant or fire hose.
  - h. End Wall Cap: Threaded for use with standard fire hose.
  - i. Protection Equipment: See LPD-CHLOR™ TABLET Material Safety Data Sheets (MSDS).
  - j. Chlorine Field Test Kit (Hach Colorimeter).
  - k. Containers: Any containers used for mixing chlorine or de-chlorine solutions (i.e. 55 gallon drums, etc.) shall be free of contaminants as per National Sanitation Foundation (NSF) Standard 61 "Drinking Water System Components-Health Effects."

PART 3- EXECUTION

3.1 GENERAL

- A. The CONTRACTOR shall seal all piping and drains prior to cleaning and disinfection. All tap water, chlorinated water, spent water and debris material from the cleaning and disinfection operations shall be captured. Discharging potentially chlorinated water or contaminated water or other liquids and/or solids into storm or sanitary drains, or in streams and waterways is prohibited. Such release shall be grounds for immediate termination of this Contract and the CONTRACTOR shall be liable for any fines, penalties

or remediation costs. The CONTRACTOR shall protect all drain systems from the entrance of any liquids or solids until such time the chlorination material can dissipate to a residual of 0.0 ppm verified by the MWCD or CONSULTANT.

### 3.2 TANK CLEANING AND DISINFECTION PROCEDURES

Tank Cleaning and Disinfection Procedures shall include but not limited to:

- A. Seal all drains, pipes and tank appurtenances that could result in a release of disinfection materials.
- B. Pre-cleaning requirements:
  1. Physically remove all materials from the interior including but not limited to unused rigging, tools, spent cleaning and paint materials and debris such as dust and discarded safety equipment prior to washing out the tank.
  2. Pressure wash clean 100% of all interior surfaces including roof and supports, compression rings, shell, bowl, riser cylinder and related piping and tank appurtenances prior to disinfection.
  3. The MWCD reserves the right to conduct an optional pre-cleaning operation in-house, prior to the CONTRACTOR performing disinfection procedures. The pre-cleaning or flushing method includes:
    - a. The MWCD shall open the influent/effluent valve to flush-out the isolation valve to the tank and to remove any residual sediment prior to disinfection. One procedure includes opening the inlet valve to the tank and observing the flow from the riser manway until the water is clear. Once it is clear, shut the supply down and pump out the residual water out of the lower riser.
- C. Disinfection: Once pressure wash cleaning of the interior is completed, the CONTRACTOR shall disinfect the tank interior as per AWWA C652-86, Section 4.2, Chlorination Method 2.
  1. A solution of 200 mg/L available chlorine shall be applied directly to surfaces of all parts of the storage facility that would be in contact with water when the storage facility is full to the overflow elevation. This CONTRACTOR shall also be required to apply disinfection solution above the overflow as well to prevent any contaminated materials or bacteria from entering the water supply during repeated cycles of condensation.
  2. Method of Application: The chlorine solution may be applied with suitable brushes or spray equipment. The solution shall thoroughly coat all surfaces to be treated, including the inlet and outlet piping, and shall be applied to any separate drain piping such that it will have available chlorine of not less than 10/mg/L when filled with water. Overflow piping and weir shall also be disinfected.
  3. Retention: The disinfection surfaces shall remain in contact with the strong chlorine solution for at least 30-min. Spent chlorinated water, unused tap water and unused mixed solutions shall be neutralized or dechlorinated to a residual of 0.0 ppm prior to disposal. Potable water shall then be admitted, the drain piping shall be purged of the 10-mg/L

chlorinated water, and the storage facility shall then be filled to its overflow level. Following this procedure, and subject to satisfactory bacteriological testing and acceptable aesthetic quality, such water may be delivered to the distribution system.

### 3.3 DISCHARGING AND TREATING CHLORINATED WATER

- A. Dechlorination or storage of chlorinated water before discharge:
  - 1. Chemically dechlorinate water or store water until chlorine residual is non-detectable.
  - 2. The discharge must meet all State and EPA requirements as specified in General Discharge Permit number 06 HT, Part IV Sections A and D.
    - a. Collect at least 3 grab samples evenly spaced over course of discharge.
    - b. Analyze samples for chlorine residual.
    - c. Chlorine residual: Non –detectable in all samples.
    - d. If water is chemically dechlorinated, dissolved oxygen (DO) must be measured as well in each of the 3 samples.
    - e. DO: 5.0 mg/L or greater for discharges to I, I-P, and II waters and 6.0 mg/L or greater for discharges to III, III-P, and IV-P waters.
- B. Dechlorination Procedure: The suggested dechlorination procedure is a guide in assisting the CONTRACTOR in preparing a dechlorination plan. Whatsoever method and procedures used must be approved by the MWCD and shall meet the requirements specified in this section.
  - 1. Proportion mixture or quantity for dechlorination will be made based on the volume of water being retained.
    - a. Retain treated chlorinated water in tank and piping for a minimum of 24 hour period or as determined in the CONTRACTOR'S Plan.
    - b. At end of 24 hour period, treated water shall have no measureable residual chlorine before the water can be discharged into the drain. If the desired residual is not met re-test in 24-hours. The CONTRACTOR can adjust the treatment solution as deemed necessary to achieve the desired chlorine residual provided the pH remains below 9.2.
- C. Discharging:
  - 1. When sanitary sewers, tanks or detention ponds are not available at project site, then dechlorinate potable water, store or discharge as specified herein.
    - a. Safety Procedures: LPD-Chlor™ MSDS and the MWCD'S health and safety programs.
  - 2. To treat water or pipe lines with flow rates up to 120 gpm: Use fabricated diffuser of 4-inch strainer and adapter:
    - a. Place 8 tablets in 8 inch by 16 inch (top opening) nylon bag with 4 tablets pushed to each side of bag.

- b. Fold bag over tablets, twisting in center.
  - c. Secure with rubber bands and position firmly inside fabricated 4 inch diffuser.
  - d. Estimated time to replenish tablets:
    - 1) 15 hours for flows of 31 to 120 gpm.
    - 2) Dechlorination with a low flow insert for flow rates from 31-200 gpm.
    - 3) Minimum tablets: 10 for every discharge.
    - 4) Carefully stack tablets in column chamber of LPD unit.
3. Discharging Methods: Once properly treated:
- a. Discharge into existing sanitary sewer manholes.
  - b. Maintain minimum 1 foot vertical air gap between end of discharge pipe and drain or manhole frame.
  - c. Do not cause surcharge or disrupt service.
  - d. Flow rate:
    - 1) Allowable flow rate shall be coordinated with the Atwood Regional Water and Sewer District
    - 2) Detention pond will not be available for dechlorination or for discharging operations.

**END OF SECTION**



SECTION 33 41 00 – STORM UTILITY DRAINAGE PIPING

- 811.1 Conduit Description
- 811.2 Conduit Materials
- 811.3 Conduit Definitions
- 811.4 Conduit Material Provisions
- 811.5 Submittals
- 811.6 Conduit Excavation
- 811.7 Conduit Bedding
- 811.8 Laying Conduit
- 811.9 Joining Conduit
- 811.10 Exterior Coatings and Membrane Waterproofing
- 811.11 Conduit Backfilling
- 811.12 Conduit Placement and Compaction Requirements
- 811.13 Clearing Site and Restoring Damaged Surfaces
- 811.14 Field Paving of New or Existing Conduit
- 811.15 Conduit Method of Measurement
- 811.16 Conduit Basis of Payment
- 811.17 Structure Description
- 811.18 Structure Materials
- 811.19 Structure Construction Methods, General
- 811.20 Structure Excavation and Backfill
- 811.21 Structure Brick and Block Masonry
- 811.22 Precast Structure Concrete Modular Construction
- 811.23 Structure Concrete (Cast-In-Place)
- 811.24 Structure Method of Measurement

**811.1 Conduit Description.** This work consists of constructing or reconstructing long span structures, pipe culverts, sewers, and drains (referred to below as Type A, Type B, Type C, Type D, Type E, and Type F conduits) in accordance with the technical specifications included in this section. All material specification numbers called out in this section shall refer to the Ohio Department of Transportation (ODOT) Construction and Material Specifications (CMS) dated January 1, 2016.

Use removed or excavated materials in the Work when the material conforms to the specifications; if not, then recycle or dispose of the material according to 105.16 and 105.17.

**811.2 Conduit Materials.** Furnish materials conforming to:

- Soil and granular embankment..... 203.02.R
- Structural backfill, Types 1 and 2..... 703.11

The Engineer will allow Type 3 structural backfill, conforming to 703.11, to be used as bedding below the pipe only when pumping operations do not control severe ground water problems. Place at least 12 inches (300 mm) of Type 1 structural backfill on top of the Type 3 structural backfill to prevent piping.

- Embankment..... 203.02.R

|   |                      |
|---|----------------------|
| Concrete for collars and encasement,<br>Class C.....                          | 499 and 511          |
| Concrete for field paving using aggregate<br>No. 7, 8, or 78, Class C .....   | 499 and 511          |
| Reinforcing steel<br>(collars and encasement) .....                           | 509.02               |
| Mortar.....   | 602                  |
| Non-shrink mortar .....   | 705.22               |
| Bituminous pipe joint filler.....   | 706.10               |
| Resilient and flexible gasket joints for: Concrete<br>sewer and culvert ..... | 706.11               |
| Vitrified clay, B & S.....  | 706.12               |
| Preformed butyl rubber joint filler .....                                     | 706.14               |
| 4x4 - W1.4 x W1.4 galvanized<br>welded wire fabric for field paving .....     | 709.08               |
| Type 2 membrane waterproofing .....   | 711.25               |
| Type 3 membrane waterproofing .....   | 711.29               |
| Fabric wrap, Type .....   | 712.09               |
| Joint wrap .....  | ASTM C 877, Type III |
| Buried Liner Waterproofing Membrane.  | 711.22               |

Furnish pipe of the size and kind specified in the Proposal and conforming to applicable subsections of 706 and 707. The metric equivalent pipe size may vary with material type for the same English size pipe. The difference in sizes shall not be construed as an exclusion of a material type. The kinds of pipe allowed for each of the designated types of conduit are as follows:

Type A Conduits - Culverts:

|  |         |
|--|---------|
| Reinforced concrete pipe.....                                    | 706.02  |
| Reinforced concrete elliptical pipe.....                         | 706.04  |
| Precast reinforced concrete box sections                         | 706.05  |
| Precast reinforced concrete 3-sided flat<br>topped culverts..... | 706.051 |
| Precast reinforced concrete<br>arch sections.....                | 706.052 |
| Precast reinforced concrete round<br>sections .....              | 706.053 |

Type B Conduits - Storm sewers under pavement:

|   |        |
|---|--------|
| Reinforced concrete pipe .....                    | 706.02 |
| Reinforced concrete elliptical pipe .....         | 706.04 |
| Corrugated polyethylene smooth<br>lined pipe..... | 707.33 |

Type C Conduits - Storm sewers not under pavement:

|   |        |
|---|--------|
| Reinforced concrete pipe .....                    | 706.02 |
| Reinforced concrete elliptical pipe .....         | 706.04 |
| Corrugated polyethylene<br>smooth lined pipe..... | 707.33 |

Type D Conduits - Drive pipes and bikeways:

|   |        |
|---|--------|
| Reinforced concrete pipe.....                     | 706.02 |
| Corrugated polyethylene<br>smooth lined pipe..... | 707.33 |

Type E Conduits - Miscellaneous small drain connections and headers:

|   |        |
|---|--------|
| Reinforced concrete pipe.....                     | 706.02 |
| Corrugated polyethylene<br>drainage pipe.....     | 707.32 |
| Corrugated polyethylene<br>smooth lined pipe..... | 707.33 |
| Polyvinyl chloride solid wall pipe.....           | 707.45 |

Type F Conduits - Conduits on steep slopes; underdrain  
outlets:

|  |        |
|--|--------|
| Corrugated polyethylene smooth<br>lined pipe (underdrain outlets)..... | 707.33 |
| Polyvinyl chloride solid wall pipe<br>(underdrain outlets).....        | 707.45 |

**811.3 Conduit Definitions.** For the purposes of this specification, the following definitions are used:

- A. Long span structure includes all of the following material kinds: 706.05, 706.051, 706.052, 706.053, 707.15, and 707.25.
- B. Plastic pipe includes all of the following materials kinds: 707.31, 707.32, 707.33, 707.41, 707.42, 707.43, 707.44, 707.45, 707.46, 707.47, 707.51, 707.52, and 748.02.
- C. Corrugated metal pipe includes all of the following material kinds: 707.01, 707.02, 707.03, 707.04, 707.05, 707.07, 707.11, 707.12, 707.13, 707.14, 707.21, 707.22, 707.23, and 707.24.
- D. Iron pipe includes the following material kind: 748.01.
- E. Rigid Pipe includes all of the following material kinds: 706.01, 706.02, 706.03, 706.04, 706.08, 706.09, and 748.06.
- F. Conduit includes long span structures, pipe, culverts, sewers, drains, or any other item specified herein.

- G. Backfill is soil, granular embankment, or structural backfill placed above the bedding to the elevation as describe.
- H. A cut situation is an existing field situation when the top of the conduit is below the existing ground where an embankment may be constructed.
- I. A fill situation is an existing field situation when the top of the conduit is above the existing ground where an embankment is to be constructed.
- J. A fill situation, meets the requirements of a cut if the fill is constructed to at least 2 feet (600 mm) above the top of the conduit before placing the conduit.
- K. The conduit rise is the vertical distance from outside wall to outside wall or outside corrugation measured at the middle of the conduit.
- L. The conduit span is the horizontal distance from outside wall to outside wall or outside corrugation measured at the widest point of the conduit.
- M. The conduit spring line is equal to the rise divided by two.
- N. Trench width is the horizontal distance between the vertical walls of the trench measured in feet.

**811.4 Conduit Material Provisions.** The Owner will allow any of the following alternate material provisions:

- A. The Contractor may use Type 1 or 2 structural backfill if granular or soil embankment is required or allowed.
- B. Supply pipe of the required size or one size larger.
- C. If 707.05 or 707.07 conduit is specifically itemized or specified in the Proposal, the Contractor may provide conduit conforming to 707.04 and having a bituminous paved invert. Provide the same corrugation profile and sheet thickness listed in the Proposal.
- D. The Contractor may furnish higher strength concrete or plastic pipe of the same type where lower strength pipe is specified.
- E. The Contractor may furnish a thicker metal pipe of the same corrugation profile and type where a lesser thickness is permitted or specified.
- F. For metal pipe 54 inch (1350 mm) diameter or larger and pipe-arch, ensure the manufacturer provides match marked ends and a layout drawing.

**811.5 Submittals.** Prepare shop drawings and calculations when required below. Have a Registered Engineer prepare, sign, seal and date all calculations. Have another Registered Engineer check all drawings and calculations, sign, and seal and date all calculations. Submit load rating calculations to the Office of Structural Engineering for all structures with a 10 foot span and greater in accordance to the most current version of ODOT's Bridge Design Manual. Submit two copies of the shop drawings and calculations to the Engineer. The Engineer will submit one copy to the Owner according to the following:

- A. If Reinforced Concrete Circular Pipe, 706.02, requires a "Special Design" with a specified D-load requirement above the minimum D-load, submit shop drawings and design calculations. Design the

pipe to meet the D-load requirements required to meet the performance of this specification. Include the following information in the submittal: all structural design and loading information, all material specifications, all dimensions, and the installation plan.

B. Precast reinforced concrete 3-sided flat topped culverts, precast reinforced concrete arch culverts, or precast reinforced concrete round sections, (706.051, 706.052, or 706.053) must submit structural analysis methods, structural design criteria and calculations, structure details, and shop drawings. Include details for a precast slab bottom if required.

C. Submit hydraulic calculations if requesting approval to substitute a precast reinforced concrete 3-sided flat topped culvert (706.051), a reinforced concrete arch culvert (706.052), or a precast reinforced concrete round section (706.053) for one another. The proposed culvert must meet or exceed the same hydraulic requirements as the specified culvert and minimum cover requirements. If the specified culvert is on pedestal walls, include the shop drawings for the pedestal wall design in the submittal because 3-sided flat topped culverts, arch culverts, and round sections require different pedestal wall designs.

D. Submit hydraulic calculations if requesting approval to substitute either a precast reinforced concrete 3-sided flat topped culvert, a precast reinforced concrete arch culvert, or a precast reinforced concrete round section (706.051, 706.052, or 706.053) placed on a precast or cast-in-place slab bottom for a precast reinforced concrete box culvert (706.05). The proposed culvert must meet the same hydraulic requirements as the specified box culvert and minimum cover requirements. The Owner may allow the bottom slab to be cast-in-place but will not issue a time extension for any delays resulting from the use of a cast-in-place bottom slab.

**811.6 Conduit Excavation.** Measure trench width at the span of the conduit. Center the trench excavation about the centerline of the conduit.

Use Method A for a cut situation, and use Method B for a fill situation.

A. **Method A.** Excavate the trench for the conduit. Provide vertical trench walls.

If long span culvert is used, provide a minimum trench width of the span plus 2 feet (0.6 m) on each side.

If rigid pipe is used, provide a minimum trench width of the span times 1.33.

If plastic or corrugated metal pipe is used, provide a minimum trench width of the span times 1.25 plus 1 foot (0.3 m).

If plastic pipe is used and the ID is 8 inch (200 mm) or less furnish a minimum trench width of the OD.

Increase these minimums to a width that allows the jointing of the conduit, and the placement and compaction of the backfill.

B. **Method B.** Construct the embankment to a height at least equal to half of the rise and to a width on each side of the conduit two times the span of the conduit before excavating for the conduit. Excavate the trench in the constructed embankment to a width conforming to Method A above.

Furnish a firm foundation for the conduit bed for its full length. The Engineer will require the removal of unsuitable material below the conduit bedding or below the bottom of the conduit if bedding is not required for the width of the trench. Replace the unsuitable material with structural backfill. Remove rock or shale in the conduit foundation for at least 6 inches (150 mm)

below the bottom of the bedding. Replace the rock or shale with structural backfill. Unless in the contract documents, the Owner will pay for this work according to 109.05.

If the Engineer changes the flow line by more than one foot (0.3m), the Owner will pay according to 109.05.

The Contractor may jack or tunnel the pipe with the written permission of the Director.

**811.7 Conduit Bedding.** Type 1 bedding consists of structural backfill extending at least 6 inches (150 mm) below the bottom of the conduit for the full width of the trench. Compact the bedding according to 811.11.

Use Type 1 bedding for 706.05, or 706.051, 706.052, and 706.053 on slab bottoms. Also use Type 1 bedding for 707.03, 707.15, and 707.25 on corrugated invert plates.

Type 2 bedding consists of structural backfill extending at least 3 inches (75 mm) for all 706 rigid pipe conduits and 6 inches (150 mm) for all other conduits below the bottom of the conduit for the full width of the trench. Extend the bedding up around the pipe for a depth of not less than 30 percent of the rise of the conduit. Shape the bedding to fit the conduit with recesses shaped to receive the bell of bell-and-spigot pipe. Leave the bedding below the middle one-third of the pipe span uncompacted. Compact the remaining bedding according to 811.11.

Use Type 2 bedding for Types A, B, C, and D conduits except for long span structures and for conduits that require Type 3 bedding.

Type 3 bedding consists of a natural foundation with recesses shaped to receive the bell of bell-and-spigot pipe. Scarify and loosen the middle one-third of the pipe span.

Use Type 3 bedding for Type C and Type D conduits of the following materials: 706.01, 706.02, or 706.03.

Type 4 bedding consists of a natural foundation shaped to fit the conduit with recesses shaped to receive the bell of bell-and-spigot pipe.

Use Type 4 bedding for Types E and F conduits.

**811.8 Laying Conduit.** Lay the conduit in the center of the trench starting at the outlet end with the bell or groove-end laid upgrade. Ensure that the conduit is in contact with the bedding throughout its full length such that line and grade is maintained. Lay metal conduits according to one of the following methods:

A. If the seam is longitudinally either riveted or welded, place the seam or weld at the spring line.

B. If the metal pipe is fabricated helically (having a continuous seam running around the outside of the pipe), arrange the corrugations so the helix angle or twist is rotating downstream in the direction of the flow to increase hydraulic performance.

Maintain flows at all times until the new facilities are completed and in service. Maintain the flows through existing facilities to be replaced unless a temporary bypass conduit is used.

Construct the inlet and outlet ends of all conduit runs with pipe ends as normally fabricated by the manufacturer. If field cutting is necessary, locate the cut end at an interior joint within the run and provide a cradle, collar, or band to ensure a stable joint.

Construct a concrete collar on the last joint if field cutting is necessary to meet a structure or headwall.

Erect 707.03, 707.15, 707.23, and 707.25 conduits according to 522.03. Where two plate thicknesses are specified, locate the thicker plates at the bottom and corner plates in pipe-arch structures, and the bottom row, if centered, or bottom two rows, if not centered, in round structures.

Set the 706.051 units on the concrete footing shown on the plans. Unless otherwise shown on the plans, provide a 3-inch (75 mm) deep keyway centered on the precast leg. The width of the keyway shall be 6 inches (150 mm) greater than the thickness of the precast leg. Place the units in a 1/2-inch (13 mm) bed of mortar. If proper line and grade of the structure cannot be maintained on the bed of mortar, set the units on 5 × 5-inch (125 × 125 mm) masonite or steel shims. Fill the entire keyway joint with mortar.

Set the 706.052 units on the concrete footing shown on the plans. Unless otherwise shown on the plans, provide a 3-inch (75 mm) deep keyway centered on the precast leg. The width of the keyway shall be 6 inches (150 mm) greater than the thickness of the precast leg. Place the units on 5 × 5-inch (125 × 125 mm) masonite or steel shims to provide a minimum 1/2-inch (13 mm) gap between the footing and bottom of the unit's bottom leg. Fill the entire keyway joint with mortar.

Set the 706.053 arches on the concrete footing shown on the plans. Unless otherwise shown on the plans, provide an 8-inch (200 mm) deep keyway for spans up to 24 feet (7.3 m) and a 10-inch (250 mm) deep keyway for all spans greater than 24 feet (7.3 m). Center the keyway on the precast arch base. The width of the keyway must be 8 inches (200 mm) greater than the thickness of the precast arch base. For non-vertical leg arches set on pedestal walls, a one-sided keyway is acceptable if the required pedestal wall design thickness is not sufficient for a full keyway. Place masonite or steel shims to provide a minimum of 1.5-inch (38 mm) gap between the footing and the bottom of the precast arch base. Fill the entire keyway joint with mortar. Provide 5000 psi (34.5 MPa) mortar. For arches that gain structural continuity by a cast-in-place closure at the project site, provide concrete with the same compressive strength as the precast arch.

If reinforced concrete pipe has elliptical reinforcing, the top and bottom of the pipe are clearly marked on the pipe. Handle and place reinforced concrete pipe with elliptical reinforcement and reinforced concrete horizontal elliptical pipe with single cage reinforcement with the reinforcement markings along a vertical plane as marked on the pipe. Handle and place reinforced concrete pipe with auxiliary supports (S-stirrups) with the centerline of the auxiliary support system (S-stirrups) in a vertical plane as marked on the pipe.

For 706.05, 706.051, 706.052, or 706.053 structures fill the lifting devices with mortar. Cover the exterior of the lifting devices with joint-wrap material if outside the limits of the membrane waterproofing. Use joint-wrap with a minimum width of 9 inches (225 mm). Use only lifting devices that do not require a hole through the structure.

For all 707 conduit, use only lifting devices that do not require a hole through the structure.

Immediately after placing conduit, construct the end treatments at both the outlet and inlet ends.

These end treatments include headwalls, concrete riprap, rock channel protection, sod or other erosion control items.

**811.9 Joining Conduit.** Join the conduit sections so that the ends are fully entered and the inner surfaces are flush and even. Furnish sealed, banded, or bolted joints for Types A, B, C, D, and F



conduits. Provide open joints for Type E conduits wrapped with 4-inch (100 mm) wide tarred paper or tarred burlap with pack soil placed around this material to hold it in place during backfilling.

The Engineer may allow joint materials other than those listed below, provided the Contractor demonstrates the proposed material makes durable sealed joints.

Furnish joints that do not allow infiltration of backfill material into the conduit or use a fabric wrap on the outside of the conduit.

Install conduit so that match marks align and in accordance with the layout drawings supplied by the manufacturer.

**A. Joints.**

**1. Metal Pipe.**

If using corrugated metal pipe, provide coupling bands conforming to 707.01 or 707.02. These bands will have the same coating as the pipe being joined and use gasketed coupling bands or fabric wrap the coupling bands when using structural backfill Type 2 for the bedding or backfill. A maximum difference between adjacent pipe sections of 1/2 inch (15 mm) will be allowed before coupling bands are placed. Securely strut the end of each pipe section for pipe diameters 54 inches (1350 mm) or greater that have a wall thickness of less than 0.109 inch (2.77 mm). Install the ties or strapping in the first or second valley of the annular corrugations on each end of each piece of pipe. Install two struts per end such that they are perpendicular to one another and cross at their midpoints. Strut by using wire ties or other approved methods. Remove the strutting after securing the coupling bands.

Bell and spigot joints conforming to 707.12 may be used for corrugated steel spiral rib conduits. Ensure the spigot and bell ends are clean and free from dirt or debris prior to assembly. Place a gasket in the first corrugation of the spigot end and thoroughly lubricate the gasket and the bell end of the receiving conduit prior to assembly. Ensure the spigot is securely driven home into the bell upon final assembly.

a. Rigid Pipe. For 706.01, 706.02, or 706.04, 706.05, or 706.08 that require sealed joints, use any of the following methods:

i. Apply 706.10 to the pipe in sufficient quantity to completely fill the joint once the pipe is placed in its final position at a gap of 1 inch (25.4 mm) or less. After placing the pipe in its final position, point and trowel the 706.10 to form a smooth transition on the inside and a complete seal on the outside.

ii. Apply 706.14 to the pipe in sufficient quantity to seal the joint but not necessarily fill the joint once the pipe is placed in its final position at a gap of 1 inch (25.4 mm) or less. Immediately before installing 706.14, clean the joint free of all debris then prime both sides of the joint with an asphalt based primer according to the 706.14 manufacturer's recommendations.

iii. Provide 706.11 or 706.12 as specified.

b. For 706.03 conduit, use fibrated coal tar joint compound applied according to the manufacturer's recommendations.

c. If resilient and flexible gasket joints conforming to 706.11 or 706.12 are specified on sanitary sewer conduits, test the joints for infiltration or exfiltration according to ASTM C 969. If any section of conduit fails to meet the test requirements, make corrections until the test



requirements for the section are met.

**B. Filling Joints.** After placing 706.05, 706.051, or 706.052 in their final position with a maximum joint gap of 1 inch (25.4 mm), clean the joint gap or joint of all debris and perform the following:

1. For 706.05 joints, fill the top exterior joint gap and the bottom and side interior joint gap with mortar. Next, for any exterior joint not covered by membrane waterproofing, cover the exterior joint with a 9-inch (225 mm) wide strip of joint wrap. Center the joint wrap on the joint. Use a continuous length of joint wrap sufficient to extend from the bottom of the vertical face on one side to the bottom vertical face on the other side.

2. For 706.051, fill the top keyway joint with 705.22. The side or leg joints shall also be filled with 705.22 for the keyway type joint or filled per 706.05 for a tongue and groove type joint. Clean the joint of all debris immediately before installing the joint filling material. Wet all surfaces of the keyway joint, but do not allow free standing water in the joint. Prepare, place, and cure the 705.22 according to the manufacturer's recommendations. Next cover the exterior joint with a 12-inch (300 mm) wide strip of joint wrap. Center the joint wrap on the joint. Use a continuous length of joint wrap sufficient to extend from the bottom of the vertical face on one side to the bottom vertical face on the other side. Apply membrane waterproofing to the precast sections after they are installed.

3. For 706.052 and 706.053, install a 7/8 × 1 3/8-inch (24 × 34 mm) 706.14 joint filler along the outside joint chamfer. Use a continuous length of joint filler sufficient to extend from the bottom of the vertical face on one side to the bottom vertical face on the other side. Before installing the joint filler, prime the joint chamfer with a primer according to manufacturer's recommendations. For 706.052 and 706.053, cover all exterior joints with a 12-inch (300 mm) wide strip of joint wrap centered on the joint. Use a continuous length of joint wrap sufficient to extend from the bottom of the vertical face on one side of the structure to the bottom vertical face on the other side. Next, apply all waterproofing as shown on the plans. Apply membrane waterproofing to the precast sections after they are installed.

**C. Sealing Concrete Surfaces.** For 706.05, 706.051, 706.052, or 706.053 apply an approved epoxy-urethane sealer per the plans to all top surfaces not covered by membrane waterproofing. Extend the sealer 1 foot (0.3 m) below the backfill on all sides of the culvert sections including the joint.

The Engineer and Contractor will visually inspect all conduit and joints before any backfill is placed. Rejoin, re-lay, or replace all conduit out of joint tolerance, alignment, settled, or damaged.

**811.10 Exterior Coatings and Membrane Waterproofing.** If shown on the plans, externally apply membrane waterproofing to 706.05, 706.051, 706.052 or 706.053. Apply the membrane waterproofing to the top surface and extend it vertically down both sides of the structure. Clean the concrete surfaces when the membrane waterproofing does not adhere to the structure. Apply the membrane waterproofing to all surfaces that will be in contact with the backfill. Apply the waterproofing according to the appropriate requirements of Item 512.

Apply waterproofing to 707.03, 707.15, 707.23, and 707.25 conduits with less than eight feet (2.4 m) of cover by one of the following methods.

A. Coat the exterior of the conduit above the limits of the bedding and within the limits of backfill. Ensure that all plate seams and bolts are thoroughly sealed. The coating material and application

shall conform to AASHTO M 243. Allow asphalt mastic material to dry 48 hours and tar base material to dry 28 hours before placing the conduit backfill. Rib stiffeners do not need to be coated.

B. Construct Buried Liner Waterproofing Membrane protection in the fill per the manufacturer's recommendations. The Buried Liner Waterproofing Membrane protection will be a seamless continuous sheet placed over the conduit and extend at least 10 feet (3.3 m) outside of the paved shoulder and for the width of the trench.

**811.11 Conduit Backfilling.** Place backfill to the limits described and according to the compaction requirements. Place the backfill in the trench and embankment outside the trench uniformly on both sides of the conduit for all conduit installations.

A. General. The Contractor may operate small compaction equipment with less than a total weight of 1 ton (0.9 metric ton) over the conduit to compact the backfill. Do not use hoe packs on top of the conduit until 2 feet (0.6 m) of backfill is compacted on top of the conduit. The Contractor may operate compaction equipment with less than a total weight of 8 tons (7 metric tons), but more than 1 ton (0.9 metric ton), over the conduit after placing and compacting 2 feet (0.6 m) of backfill. Do not operate equipment with a total weight of 8 tons (7 metric tons) or more, until placing and compacting a cover of 4 feet (1.2 m) over the top of the conduit. The above restrictions apply when working within one span on each side of the conduit, or 6 feet (1.8 m), whichever is less. As shown on the plans, encase conduits with the specified thickness of Class C concrete.

B. Long Span.

1. For all long span structures except 706.053 in cut, place and compact structural backfill over the top of the section to a minimum depth 4 feet (1.2 m) or to the subgrade elevation whichever is less and for a width of 2 feet (0.6 m) on each side of the section. Use soil, granular embankment, or structural backfill to construct the adjacent embankment and for the remaining depth to the subgrade. Construct the adjacent material according to Item 203.

2. For all long span structures except 706.053 in fill, place and compact structural backfill over the top of the section to a minimum depth of 2 feet (0.6 m) or to the subgrade elevation whichever is less and for a width of 2 feet (0.6 m) on each side of the section. Use soil, granular embankment, or structural backfill to construct the adjacent embankment and for the remaining depth to the subgrade. Construct the adjacent material according to Item 203.

For 706.053 structures in cut or fill, place and compact structural backfill on both sides of the structure to the following minimum limits: vertically from the base up to a height of 75 percent of the rise; horizontally on each side of the structure to a sloping line that begins 2 feet (0.6 m) from the base of the structure and slopes up and away from the structure at a 1H:1V slope (45 degree angle). Use soil, granular embankment, or structural backfill to construct the adjacent embankment and for the remaining depth to the subgrade. Construct the adjacent material according to Item 203.

C. Type A and B. Backfill Types A and B conduits except for long span structures as follows

1. In a cut situation, place and compact structural backfill above the bedding for the full depth of the trench. Within the trench and more than 4 feet (1.2 m) above the top of the conduit, if the trench can accommodate compaction equipment, the Contractor may construct Item 203 Embankment. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.

2. In a fill situation, place and compact structural backfill above the bedding for the full depth of the trench specified in 811.06.B. Above these limits, uniformly place the lesser of one pipe span or 4 feet (1.2 m) of structural backfill on each side of the conduit and to a depth of 2 feet (0.6 m) above the top of the conduit. Construct the embankment outside the limits of the backfill. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.

D. Type C and D. Backfill Type C and D conduits as follows:

1. In a cut situation, for plastic pipe, place and compact structural backfill above the bedding and to 6 inches (150 mm) over the top of the pipe. All other conduit material types place and compact backfill. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.

2. In a fill situation, for plastic pipe, place and compact structural backfill above the bedding for the full depth of the trench specified in 811.06.B. Above these limits, uniformly place the lesser of one pipe span or 4 feet (1.2 m) of structural backfill on each side of the conduit and vertically to the top of the conduit. Then place for a depth of 6 inches (150 mm) structural backfill over the top of the pipe equal to the trench width centered on the pipe center line. Construct the embankment outside the limits of the backfill. All other conduit material types place and compact backfill. For plastic pipe with an ID 8 inch (200 mm) or less, place and compact structural backfill above the bedding for the full depth of the trench.

E. Type E. Place and compact backfill above the bedding to a height equal to two-thirds of the conduit rise then place and lightly compact backfill for a depth of 12 inches (0.3 m) above the pipe. Place no stones larger than 4 inches (100 mm) that will be part of the embankment in contact with the pipe.

F. Type F. Place and compact backfill above the bedding. Backfill Type F conduits for underdrain outlets according to 605.03.C.

**811.12 Conduit Placement and Compaction Requirements.** Place soil, granular embankment, or Structural Backfill Type 1 or 2 in lifts not to exceed 8 inches (200 mm). The Owner will perform all compaction testing according to Supplement 1015. The compaction requirements per material type are as follows:

A. For soil embankment, compact each lift until 96 percent of AASHTO T 99 is achieved.

B. For granular embankment and Structural Backfill, Type 1 or 2, compact each lift of material according to 811.12.E using mechanical devices, hoe packs, jumping jacks, hand devices, vibrating plates, or other equipment that meets the restrictions in 811.11. Provide compaction equipment that compacts the material under the haunch of the pipe. If the compaction equipment cannot fully compact the material under the haunch, supplement the compaction equipment by using shovel slicing, spud bars, or mechanical spud bars to compact the material under the haunch of the pipe. Use shovel slicing and spud bars in conjunction with the compaction operations to compact the material and to manipulate the material under the haunch of the pipe.

For Structural Backfill Type 2, compact each lift of material according to 811.12.E using flood compaction or mechanical devices, hoe packs, jumping jacks, hand devices, vibrating plates, or other equipment that meets the restrictions in 811.11. Provide compaction equipment that compacts the material under the haunch of the pipe. If the compaction equipment cannot fully compact

the material under the haunch, supplement the compaction equipment by using shovel slicing, spud bars, or mechanical spud bars to compact the material under the haunch of the pipe. Use shovel slicing and spud bars in conjunction with the compaction operations to compact the material and to manipulate the material under the haunch of the pipe

C. Place Structural Backfill Type 3 in layers not to exceed 12 inches (300 mm) loose depth. Vibrate, tamp, or compact to approximately 85 percent of the original layer thickness.

D. At the beginning of the work, construct a test section in the conduit trench. The Engineer will use at least 96 percent of the test section maximum dry density for acceptance of the production areas. Use at least the same number of passes or compactive effort used to construct the test section to compact the production areas. Use compaction equipment with a total weight or centrifugal force of at least 1/2 ton (0.5 metric tons). Supply the manufacture's specification for the compaction equipment. Except when using a hoe pack, use at least six passes with the compaction equipment in the production areas.

The Engineer may reduce the minimum passes if the passes are detrimental to compaction.

Construct a new test section if the pipe type, bedding material, backfill material, or trench conditions change.

E. If using trench boxes with either Type A or B conduits, configure the trench box so that the bedding and backfill material is compacted directly against the trench walls.

F. The Engineer may adjust the lift thickness to obtain the required compaction, fill all the voids, achieve the proper seating of the backfill material, and achieve the stability of the backfill material and the pipe. Do not use equipment or methods that compromise the structural integrity of the pipe.

**811.13 Clearing Site and Restoring Damaged Surfaces.** Immediately after completion of the placing and compacting of the backfill remove and dispose of all surplus material according to 811.01 and clear the site and restore all required surfaces

**811.14 Field Paving of New or Existing Conduit.** Field pave the bottom of the conduit with concrete as shown on the plans.

For new pipe installations, do not pave until at least 4 feet (1.2 m) of fill is placed on top of the conduit, or the top of subgrade is reached. If the paving is placed before completion of the entire fill, clean any gaps between the conduit and concrete paving, then fill with heated bituminous material conforming to 705.04.

Reinforce the paving with 4 x 4-W1.4 x W1.4 galvanized welded wire fabric (or comparable). Provide a mesh with a width 4 inches (100 mm) less than the finished paving. Securely fasten the mesh to the conduit near each edge and at the center of the mesh at points not more than 4 feet (1.2 m) apart along the flow line of the culvert. Repair any damage to the galvanizing or other coating material caused by placement or by tack welding. Use wire brushing and paint with zinc rich paint to make the repairs.

For aluminum structural plate, securely fasten the mesh to the circumferential seam bolts with galvanized tie wire.

**811.15** Provide a paving that is 3 inches (75 mm) thick measured from the top of the corrugations of the conduit to a height equal to 1/3 of the rise. Provide galvanized reinforcing steel support chairs beneath the mesh where necessary. Give special care to the mesh during concrete placement.

After placing the concrete, strike it off with a template to produce the proper radius, and finish with a float to produce a smooth finish. Cure the concrete according to 451.10.

**811.16 Conduit Method of Measurement.** The Owner will measure conduit by the number of feet (meters), measured from center-to-center of appurtenant small structures or between open ends inclusive of lengths of pipe bends and branches. The Owner will not deduct for catch basins, inlets, or manholes that are 6 feet (2 m) or less across, measured in the direction of flow. Where the location of an appurtenance or an open end is changed with the approval of the Engineer to accommodate full conduit sections, the Owner will measure the length placed. Conduits placed on slopes steeper than 3:1 or with beveled or skewed ends will be measured along the invert.

When the pay item calls for concrete encasement, payment for furnishing and placing the concrete encasement and for any additional excavation required shall be included in the unit bid price for the pertinent conduit. When the pay item calls for a new conduit to be field paved, payment for the field paving, including all work and materials necessary for the item, shall be included in the unit bid price for the pertinent conduit.

The Owner will measure field paving of existing pipe by the number of feet (meters).

**811.17 Conduit Basis of Payment.** The Owner will pay for accepted quantities at the contract prices as follows:

| Item | Unit | Description                        |
|------|------|------------------------------------|
| 611  | Foot | <u>12</u> " Conduit, Type <u>D</u> |

**811.18 Structure Description.** This work consists of constructing or reconstructing manholes, catch basins, inlets, inspection wells, junction chambers or precast reinforced concrete outlets of the type and sizes specified; or adjusting existing castings to grade, as specified (formerly referred to as 604) per the 2010 CMS.

Use removed or excavated materials in the Work when the material conforms to the specifications; if not, then recycle or dispose of the material according to 105.16 and 105.17.

**811.19 Structure Materials.** Furnish materials conforming to:

|  |                           |
|--|---------------------------|
| Structure concrete, Class C. ....  | 499, 511                  |
| Brick and masonry units.....   | 704                       |
| Precast reinforced concrete manhole,<br>catch basin, and inlet sections..... | 706.13                    |
| Precast reinforced concrete outlet.....                                      | 706.15                    |
| Preformed expansion joint fillers .....                                      | 705.03                    |
| Epoxy coated reinforcing steel .   | 509.02, 709.00            |
| Cast frames, grates,<br>and covers.....                                      | 711.12, 711.13, or 711.14 |
| Welded frames and grates .....   | 513.17, 711.01            |
| Steps .....  | 711.13, 711.30, or 711.31 |
| Structural backfill,<br>Types 1, 2 and 3.....                                | 703.11                    |

|  |                |
|--|----------------|
| Resilient and flexible gasket joints ..... | 706.11         |
| Curing materials .....                     | 705.05, 705.07 |
| Mortar.....                                | 602            |
| Non-shrink Mortar.....                     | 705.22         |

**811.20 Structure Construction Methods, General.** Construct the specified structures according to the plans. Place inlets, catch basins, inspection wells, junction chambers or precast outlets at the locations and elevations shown in the plans according to the standard construction drawings or as directed by the Engineer. Place manhole castings at the elevation and station with offset to the center of the casting or as directed by the Engineer. Place the manhole base at the elevation and station with offset to agree with the pipe station, offset and pipe invert elevation according to the standard construction drawings or as directed by the Engineer. Use flat slab top manholes as shown on the standard construction drawing. Do not remove the flat slab top manhole lifting devices.

If the Engineer changes the structure elevation by more than 1 foot (0.3 m), the Owner will pay according to 109.05.

Thoroughly mortar with a flush mortar joint the underdrain outlet pipe to the precast reinforced concrete outlet. Furnish and place lateral sewer connections including drops and leads except pipe included in Item 811 Conduits.

Locate or cut conduits as shown on the standard construction drawings so they do not protrude inside the structure walls. Take adequate precautions to prevent structure concrete or mortar cement from freezing. Preheat the brick, concrete block, or precast concrete structure throughout the entire mass to a temperature between 50 to 80 °F (10 to 27 °C) before placing mortar if the ambient temperature is 40 °F (4 °C) or less.

Set iron frames, tops, and covers of the type shown on the plans in a mortar bed with a flush mortar joint.

Prevent earth or debris resulting from construction operations from entering the manholes, catch basins, junction chamber, inlets, and precast reinforced concrete outlets. Remove any debris.

**A. Reconstruction to grade**

1. Carefully remove and clean the existing castings.
2. Remove the existing walls of manholes down to the spring line or below as necessary.
3. Remove existing walls of catch basins and inlets below the window openings, grates, or any points of wall failure.
4. Using the salvaged casting, reconstruct the structure to the new grade, conforming as nearly as practicable to the existing dimension and type of construction.

**B. Adjustment to grade**

1. Carefully remove and clean the existing frame, adjust the height of supporting walls, and reset the existing frame in a bed of concrete mortar or structure concrete to the new grade.
2. Carefully remove the existing cover or grate and install a casting or an acceptable adjusting device on file at the Laboratory or an adjusting device approved by the Engineer to the new grade and install per the manufacturer's recommendations.



**811.21 Structure Excavation and Backfill.** Excavate to dimensions that provide ample room for construction.

The Engineer will require the removal of unsuitable material below the structure bedding. Replace unsuitable material with 811.12 Structural Backfill. When the Engineer requires the removal and replacement of unsuitable material below the bedding for precast structures and below the structure for cast-in-place structures, the Owner will provide compensation according to the Contract or by Supplemental Agreement.

Ensure that the backfilling follows the completion of the work as closely as the type of construction will permit. Do not disturb the structure while backfilling. Backfill structures located within the pavement area with structural backfill to the subgrade according to 811.11, Type A or B conduit. Backfill structures outside of the pavement area according to 811.11, Type C conduit.

**811.22 Structure Brick and Block Masonry.** Thoroughly wet brick and concrete block masonry units before laying in the mortar, and lay the brick and masonry units with a flush mortar joint.

Take adequate precautions to prevent concrete and mortar from freezing. Do not set brick and masonry units having a temperature of 40 °F (4 °C) or less with mortar until heated. When required, heat to ensure that a temperature of 50 to 80 °F (10 to 27 °C) is obtained throughout the entire mass of the material.

Cure the exposed surfaces of all brick and block masonry by covering with wet burlap for 48 hours or by applying curing membrane according to Item 511.

**Precast Structure Concrete Modular Construction.** Furnish precast structures according to the contract documents. Extra openings or excessive diameter of openings are cause for rejection of the precast structure. Furnish precast bases on a compacted structural backfill bed having a minimum thickness of 3 inches (75 mm). Ensure that the structural backfill bed is level and uniformly support the entire area of the base.

After placing the pipe, grout all openings between the pipe and structure less than 4 inches (100 mm) with mortar and grout all openings between the pipe and structure greater than 4 inches (100 mm) with non-shrink mortar. Seal all joints between modules with materials specified in 811.11 for Type A, B, C, D, or F conduit.

Cure median inlets with the same materials and methods specified in 622.07.

The manufacturer of precast modular items must be certified according to Supplement 1073.

**811.23 Structure Concrete (Cast-In-Place).** Place and furnish structure concrete as shown on the plans.

**811.24** Basins, Monument Assemblies, Reference Monuments, Inspection Wells, Junction Chambers, and Precast Reinforced Concrete Outlets, whether new, reconstructed, or adjusted to grade, by the number of each type of structure complete and accepted.





SECTION 33 46 00 - SUBDRAINAGE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. French Drain System.
  - 2. Filter Aggregate.
  - 3. Subdrainage Piping.
  - 4. Manholes, Catch Basins, and Inlets.

1.2 RELATED DOCUMENTS

- A. Section 31 22 00 Earthwork.
- B. ODOT CMS Item 605, Underdrains.
- C. ODOT CMS Item 611, Pipe Culverts, Sewers, Drains, and Drainage Structures.
- D. ODOT CMS Item 659, Seeding.
- E. ODOT CMS Item 671, Erosion Control Mats.
- F. ODOT CMS Item 703, Aggregate.
- G. ODOT CMS Item 712, Miscellaneous.

1.3 SUMMARY

- A. Section Includes:
  - 1. Drainage system.
  - 2. Filter aggregate.
  - 3. Piping.

1.4 SUBMITTALS

- A. Section 01 33 00 Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate dimensions, high and low points of culverts, gradient of slope between corners and intersections, outlets.
- C. Product Data: Submit data on drainage products and accessories.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 Contract Closeout: Requirements for submittals.
- B. Project Record Documents: Record location of pipe runs, connections, and principal invert elevations.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Furnish materials per details on the Construction Drawings:
  - 1. Perforated Polyvinyl chloride Pipe: Per ODOT CMS 707.41 and ASTM F758. SDR35 smooth-wall, perforated underdrain pipe in 20-foot lengths, with bell and spigot ends and all required fittings.
  - 2. Pipe Coupling: Solid Polyvinyl chloride.
  - 3. Hole pattern to meet ASTM F758/AASHTO M278 pattern, with 3/8" diameter holes, 3" spacing between holes, 4 rows at 90 °(45 ° from vertical).
  - 4. Rubber gasket joints shall be used for connections.
- B. Filter Aggregate Materials:
  - 1. AASHTO No. 2 or No. 3 stone per ODOT CMS Item 703.04.
  - 2. AASHTO No. 57 stone per ODOT CMS Item 703.04.
- C. Geotextile Fabric:
  - 1. ODOT CMS Item 712.09, Type A.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work. Verify trench cut or excavated base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

### 3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with filter aggregate. Remove large stones or other hard matter that could damage drainage piping or impede consistent backfilling or compaction.

### 3.3 INSTALLATION

- A. For areas where pipe is installed as part of subdrainage system:
  - 1. Excavate trench. Install geotextile fabric along sides and bottom of trench.
  - 2. Place drainage pipe on aggregate filter bedding.
  - 3. Lay pipe to slope gradients noted on Drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.
  - 4. Place pipe with perforations facing down. Mechanically join pipe ends.
  - 5. Install pipe couplings. Place end caps.
  - 6. Install filter aggregate at sides, and top of pipe. Install top cover compacted thickness as specified in Drawings. Place aggregate in maximum 6-inch lifts, consolidating each lift.
  - 7. Place jute matting over topsoil and final seeding as shown on Contract Drawings.

END OF SECTION

SECTION 33 47 12 - GEOTEXTILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the requirements for furnishing, installation, and protection of the woven geotextile to be used under bedding stone for inboard slope protection and gabions.
- B. The geotextile used shall meet the requirements of this section as specified herein and all work shall be performed in accordance with the procedures provided herein, the manufacturer's recommendations, and the Contract Drawings.

1.3 REFERENCES

- A. ASTM International (ASTM)
  - 1. ASTM D 4355 - Standard Specifications for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water -Xenon-Arc Type Apparatus
  - 2. ASTM D 4491 - Standard Test Method for Water Permeability of Geotextiles by the Permittivity Method
  - 3. ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles
  - 4. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
  - 5. ASTM D 4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile
  - 6. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Product
  - 7. ASTM D 5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles

1.4 SUBMITTALS

- A. Pre-Certification Submittals: Submit the following to the ENGINEER for Approval:
  - 1. Manufacturer's written certification that the Liner Geotextile meets the physical/mechanical properties listed in Table 1 of Paragraph 2.1 and the Slope Protection Geotextile meets the properties of CMS Item 712.09, Type B.
  - 2. Samples and product literature for proposed Geotextiles
  - 3. Manufacturer's and Installer's Qualifications

- B. Construction Submittals: Submit the following to the ENGINEER for review no later than 2 days following placement:
  - 1. Quality Control Installation Certification documentation by Installer
  - 2. Geotextile Warranty

#### 1.5 CONSTRUCTION QUALITY CONTROL

- A. Field Inspection and Testing will be performed under the provisions of this Specification.
- B. Provide visual Inspection for delivery and installation damage and for conformance with this Specification
- C. Conformance Testing:
  - 1. At the discretion of the ENGINEER, Geotextile material delivered to site may be tested for conformance with properties listed in Part 2 of this section.
  - 2. Samples shall be taken across the full width of the Geotextile roll and shall not include the entire outer wrap. Samples shall be 3 ft. long by full roll width. Machine direction shall be marked on the sample.
  - 3. The ENGINEER may request additional conformance testing at any time during the Contract to confirm that the Geotextile meets the specified properties listed in part 2 of this section. The Contractor shall bear the costs of any failing tests and retesting.
  - 4. In the event that a portion of the material fails the quality control criteria, the Installer shall remove non-conforming rolls from site. In the event the material failing the quality control criteria has been installed, the Installer shall remove and replace the entire area that failed quality control testing at no cost to the owner.

#### 1.6 CONSTRUCTION QUALITY CONTROL

- A. Field Inspection and Testing will be performed under the provisions of this Specification.
- B. Provide visual Inspection for delivery and installation damage and for conformance with this Specification.
- C. Conformance Testing
  - 1. At the discretion of the CM, Geotextile material delivered to site may be tested for conformance with properties listed in Part 2 of this section.
  - 2. Samples shall be taken across the full width of the Geotextile roll and shall not include the entire outer wrap. Samples shall be 3 ft. long by full roll width. Machine direction shall be marked on the sample.

3. The CM may request additional conformance testing at any time during the Contract to confirm that the Geotextile meets the specified properties listed in part 2 of this Section. The Contractor shall bear the costs of any failing tests and retesting.
4. In the event that a portion of the material fails the quality control criteria, the Installer shall remove non-conforming rolls from site. In the event the material failing the quality control criteria has been installed, the Installer shall remove and replace the entire area that failed quality control testing at no cost to the owner.

#### 1.7 QUALIFICATIONS

- A. The Manufacturer(s) of the Geotextile shall have a minimum of 5 continuous years experience in the manufacture of similar Geotextile products.
- B. The Installer(s) of the Geotextile shall have a minimum of 5 years continuous experience in the installation of similar geotextile products.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping:
  1. Geotextile shall be supplied in rolls individually wrapped with protective plastic covers.
  2. Geotextile rolls shall be marked and/or tagged with the following information in 3 locations - outer cover, roll and inside roll core:
    - i. Product Identification including Manufacturer and Type.
    - ii. Lot number and roll number.
    - iii. Roll length, width, and weight.
- B. Storage and Protection:
  1. Unloading, on-site handling and storage of Geotextile rolls are the responsibility of the Installer.
  2. The Contractor shall provide secure, dry on-site storage areas for the rolls away from construction traffic.
  3. Store and protect the Geotextile rolls from dirt, water, ultraviolet light, vandalism and other sources of damage.
  4. Preserve integrity and readability of Geotextile roll labels.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Slope Protection Geotextile shall have the minimum physical/mechanical properties included in ODOT CMS Item 712.09, Type B.
- B. The geotextile shall be resistant to biological deterioration and shall be designed for a buried soil environment.

### PART 3 - EXECUTION

#### 3.1 SUBSURFACE ACCEPTANCE

- A. The Installer shall inspect the surface upon which the geotextile will be placed and provide written acceptance for the placement of the non woven geotextile.
- B. After the surface has been accepted by the Installer, it shall be the Installer's responsibility to indicate to the Contractor any change in conditions that may require repair work.

#### 3.2 EQUIPMENT

- A. Methods used to unroll the geotextile shall not damage the underlying prepared soil surface or the geomembrane.
- B. Equipment used shall not damage the Geotextile by handling, trafficking, or other means. Defects in or damage to material during installation arising from the use of equipment shall be repaired at no cost to the owner.

#### 3.3 INSTALLATION

- A. Geotextile deployment shall comply with the following:
  - 1. The Geotextile shall be placed in accordance with manufacturer's recommendations, these specifications, and at locations shown on the Contract Drawings.
  - 2. The Geotextile shall be placed with the long roll dimension parallel with line of maximum slope and shall be laid smooth and free of wrinkles, tension, folds, or creases. Butt seams shall not be allowed on the slopes.
  - 3. Methods used to unroll and position the Geotextile shall not cause tears, punctures, or abrasion to the Geotextile.
  - 4. Methods used to place adjacent rolls of Geotextile shall maintain a minimum overlap of 4 inches and shall minimize wrinkles between adjacent rolls.
  - 5. The Geotextile shall be protected at all times from accumulations of dirt, dust, debris, sand, or mud that will clog the Geotextile. If excessive contaminant materials are noted on the Geotextile, the Geotextile shall be replaced as directed by the ENGINEER.
  - 6. The Geotextile shall be protected at all times during construction to avoid damage caused by surface runoff or soil cover placement. Any damage to the Geotextile during installation or during placement of overlying materials shall be repaired or replaced by the Contractor at no expense to the owner.
  - 7. To prevent wind uplift and damage, all exposed Geotextiles shall be ballasted with sand bags. Sandbags shall remain in place until replaced with cover material.
- B. Overlap Seaming
  - 1. Geotextiles shall be overlapped a minimum of 4 inches prior to seaming.
  - 2. All Geotextile overlaps shall be continuously thermally seamed by hot air or hot wedge methods. Seam width shall be a minimum of 1 inch.

3. Areas to be seamed shall be clean and free of foreign material.
- C. Defects and Repairs
1. Repair all flaws or damaged areas by placing a round or oval patch of the same material extending a minimum of 1 ft in all directions beyond the damaged area.
  2. Thermally seam the patch to the Geotextile by hot air or hot wedge methods. Provide a minimum 1-inch seamed width around the entire patch perimeter.

END OF SECTION





SECTION 35 42 47 - RIPRAP SLOPE PROTECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes construction of riprap inboard slope protection and slope protection at discharge end of stormwater and drainage pipes throughout the site.

1.3 PERFORMANCE REQUIREMENTS

- A. Install riprap slope protection at the locations and to the dimensions shown on the plans. Dumped rock fill and bedding stone shall be measured perpendicular to the slope (not vertically).
- B. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to keep the groundwater level at least 2 feet below the bottom of the excavation for riprap slope protection in accordance with Section 31 23 19, "Dewatering".

1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Geotextile information in accordance with Section 33 47 12.
- B. Samples:
  - 1. Sample of geotextile.
  - 2. Aggregate Materials (all types)
  - 3. Riprap

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of utility.
  - 2. Do not proceed with interruption of utility without Owner's written permission.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Dumped Rock: In accordance with ODOT CMS Item 601.07 Dumped Rock Fill, Type B and Type C (Crushed Limestone). No broken concrete shall be included within the Dumped Rock.
- B. Bedding Stone: In accordance with ODOT CMS Item 703.01 (No. 1 Stone and No. 2 Stone). The No. 1 stone shall be used under the Type B Dumped Rock, and the No. 2 Stone shall be used under the Type C Dumped Rock.
- C. All dumped rock and bedding stone shall be of good quality stone that will not disintegrate under action of air, water, waves or conditions to be met in handling and placing and shall be hard and durable, and of suitable quality to ensure permanence in the structure. It shall be clean and free from earth, clay, refuse, broken concrete or adherent coating. The dumped rock and bedding stone shall be obtained from a quarry whose material can prove a long-time record of satisfactory durability and satisfactory resistance to extreme weather conditions.
- D. The dumped rock shall satisfactorily meet the exposure conditions of the 'Soundness of Aggregates test by freezing and Thawing', American Association of State Highway and transportation Officials (AASHTO) Designation T-103-62, procedure 'C', when submitted to at least 30 cycles of freezing and thawing. The loss in weight of material after the completion of 30 cycles of freezing and thawing shall not exceed 15 percent and this rock shall show no appreciable damage. Soundness testing shall be performed on appropriately sized specimens of material to be used for riprap and dumped rock fill.

2.2 GEOTEXTILES

- A. Geotextile for inboard slope protection shall be in accordance with Section 33 47 12 "Geotextile".

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, embankments, access drives, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. All excavations shall be in accordance with the latest U.S. Department of Labor Occupational Safety & Health Administration (OSHA) guidelines.
- C. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 01 57 23 "Construction Stormwater Protection Control" during construction operations.

### 3.2 INSTALLATION

- A. Inboard slope protection, inlet structure slope protection and pipe slope protection shall be placed as detailed in the Plans in accordance with CMS 601.07.
- B. Placement of the geotextile, bedding stone and the dumped rock shall be constructed at the locations and elevations shown on the Plans.
- C. The top of the geotextile shall be secured by embedding the upper edge a minimum of 2-feet into the embankment as shown in the details. The geotextile shall be held in-place by pins or staples to prevent movement during rock placement. Geotextile sheets shall be placed with the machine direction parallel to the slope. Successive sheets shall be overlapped in such a manner that the upslope sheet is placed over the downslope sheet. The Dumped Rock placement shall begin at the lower elevation and progress upslope.
- D. Overlapping seams shall have a minimum overlap of 12 inches. Damaged geotextile shall be repaired immediately. Geotextile installation shall be in accordance with the manufacturer's recommendations and Section 33 47 12 "Geotextile".
- E. Bedding stone shall not be dropped on the geotextile a distance of more than one foot. Any geotextile damaged during construction shall be replaced at the Contractor's expense.
- F. Dumped rock shall not be dropped more than one foot onto the bedding stone unless it can be shown and accepted by the CM that the placement will not damage the geotextile.

- G. The Dumped Rock shall be placed by, excavator clamshell or other method approved by the CM. The Dumped Rock shall be arranged to provide a dense compact slope of the required thickness within a tolerance of 6 inches above or below the grade. Spaces between the larger rocks shall be filled and chinked (by hand, if necessary). If the gradation of the furnished Dumped Rock is such that smaller rock are not available to properly chink the voids, additional smaller stone (No. 1 and No. 2 aggregate, per CMS item 703.01) shall be furnished by the Contractor at no additional expense to the Owner.
- H. Stone sizes may be such that selective placement may be required to fill voids and to attain the proposed elevations. Placement of the aggregate is to be performed such that it minimizes voids, and it does not tear or damage geotextile.
- I. Geotextile patch shall be placed over any damaged area and extend 3 feet beyond the perimeter of the tear or damage.

### 3.3 FIELD QUALITY CONTROL

- A. All work to be performed in accordance with CMS 601 and 703.
- B. Provide continual observation to ensure that riprap slope protection is being installed in accordance with plans and specifications.

### 3.4 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic 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, or settled due to subsequent construction operations or weather conditions.

END OF SECTION

SECTION 40 05 67

PRESSURE REDUCING VALVES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included: pressure reducing valves and appurtenances located in utility buildings or vaults as specified herein.

1.02 QUALITY ASSURANCE

- A. Supplier shall have been manufacturing pressure reducing valves for a period of at least ten (10) years and shall, at the request of the Engineer, provide a list of installations involving equipment of similar size and application.

1.03 SUBMITTALS

- A. Submit detailed product data and descriptive literature including dimensions, weights, head loss data, pressure rating and materials of construction.
- B. Manufacturer's Installation Instructions: Submit installation instructions for backflow preventer assemblies, valves, and accessories.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of pressure reducing valves.
- B. Operation and Maintenance Data: Submit spare parts list, exploded pressure reducing valve views and recommended maintenance intervals.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept pressure reducing valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Furnish cast iron and steel valves with temporary protective coating.
- C. Furnish valves with temporary end caps and closures. Maintain caps and closure in place until installation.
- D. Protect pressure reducing valves from entry of foreign materials by temporary covers.
  - 1. Protect openings in sections of completed piping systems.
  - 2. Protect openings in piping systems when Work is not in progress.

1.06 WARRANTY

- A. Furnish a five (5) year manufacturer's warranty for pressure reducing valves.

PART 2 PRODUCTS

2.01 PRESSURE REDUCING VALVES

- A. Function: The valve shall function to reduce a higher, fluctuating inlet pressure to a lower, steady outlet pressure regardless of variations in demand.
- B. Sizes: 1/2 through 2 inches
- C. Construction: Pressure reducing valves on pipes sized 1/2 to 2 inches shall be a direct acting valve. The valve shall consist of globe-type bodies with a spring-loaded, heat-resistant diaphragm connected to the outlet of the valve that acts upon a spring. This spring holds a pre-set tension on the valve seat installed with a pressure equalizing mechanism for precise water pressure control.
  - 1. Pressure reducing valves shall meet the requirements of ASSE Standard 1003.
  - 2. Valve body and cover shall be made of bronze per ASTM B62. The body and cover shall be suitable for water supply pressures up to 300psi.
  - 3. Valve trim shall be stainless steel.
  - 4. Strainer shall be integral and shall be stainless steel.
  - 5. Diaphragm shall be reinforced EPDM.
  - 6. Valve disc shall be EPDM rubber.
  - 7. Seat shall be a replaceable stainless steel.
- D. MANUFACTURERS
  - 1. Watts Regulator Company, Series 25AUB-Z3
  - 2. Cla-Val, Model 990
  - 3. Approved equal

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install valve in accordance with manufacturer's written instructions and approved submittals.

3.02 MANUFACTURERS FIELD SERVICE

- A. Manufacturer's field representative shall be present at the jobsite for assistance during equipment start-up and to train owner's personnel in the operation, maintenance and troubleshooting of the equipment provided. A minimum of eight (8) hours of manufacturers field service will be provided.

3.03 STARTING SYSTEMS

- A. Coordinate schedule for putting pressure reducing valve on line.
- B. Notify Engineer seven days prior to going on line with pressure reducing valve.
- C. Verify that each pressure reducing valve has been checked for proper lubrication and for conditions which may cause damage.
- D. Verify tests agree with those required by the equipment manufacturer.
- E. Execute operating procedure under supervision of applicable manufacturer's representative and Contractors' personnel in accordance with manufacturers' instructions.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment installation prior to operation.
- G. Submit a written report that the pressure reducing valve has been properly installed and is functioning correctly to the Engineer and the Owner.

#### 3.04 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate Project equipment and instruct in a classroom environment located at a location chosen by the Owner and instructed by a qualified manufacturers' representative who is knowledgeable about the Project.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate pressure reducing valve, control, adjustment, trouble-shooting, servicing and maintenance at agreed time at equipment designated location.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- F. The amount of time required for instruction on each item of equipment is that specified in individual sections.

END OF SECTION

