PROJECT MANUAL

FOR THE

MAUMEE WATERSHED CONSERVANCY DISTRICT

HANCOCK COUNTY FLOOD RISK REDUCTION PROGRAM

ADDITIONAL HYDRAULIC IMPROVEMENTS

CITY OF FINDLAY, HANCOCK COUNTY, OHIO

STANTEC CONSULTING SERVICES INC.
4540 Heatherdowns Blvd.
Suite A
Toledo, Ohio 43614
Phone (419) 380-8910
Fax (419) 380-8920

60% Design Draft

TABLE OF CONTENTS

ADVERTISEMENT ..... A-1 & A-2

INTRODUCTION I-1

INSTRUCTIONS TO BIDDERS ..... IB-1 TO IB-10

SPECIAL PROVISIONS ..... SP-1 TO SP-6

PROPOSAL

Proposal ..... P-1 TO P-7
Proposal Affidavit P-8
Subcontractor List P-9
Qualifications of Bidder ..... P-10 & P-11
Sub-Contractors Experience Sheet ..... P-12 & P-13
Bid Guaranty and Contract Bond ..... P-14 & P-15
Non-Collusion Affidavit P-16

CONTRACT

Contract ..... C-1 & C-2
Contract Bond C-3
Contract Affidavit C-4
Certificate of Non-Disbarment C-5
Delinquent Personal Property Tax Affidavit C-6
Fiscal Officer Statement C-7

PROJECT FORMS

Notice of Award PF-1
Acceptance of Notice PF-2
Notice to Proceed PF-3
Notice of Commencement of Public Improvement ..... PF-4 & PF-5
Certification of Work and Affidavit of Payment to Subcontractors and Suppliers PF-6
Final Payroll Affidavit PF-7
Change Order PF-8
Request for Information PF-9
Work Change Directive PF-10
Field Order PF-11
Submittal Cover Sheet PF-12
Partial Payment Estimate ..... PF-13 & PF-14
Certificate of Substantial Completion PF-15

GENERAL CONDITIONS ..... 00700-1 thru 00700-65

SUPPLEMENTARY CONDITIONS ..... 00800-1 thru 00800-10
Resident Project Representative Duties, Responsibilities and Limitations 00800-A

PREVAILING WAGE RATES

PROJECT REQUIREMENTS **SECTION NUMBER**
Work Restrictions 01040
Coordination and Control of the Work 01043
Summary of Work 01100
Environmental, Safety, Health, and Accident Prevention 01110
Measurement and Payment 01200
Preconstruction Conference 01210
Submittals 01300
Construction Progress Schedule 01310
Temporary Work and Controls 01500
Field Offices and Sheds 01590
Execution Requirements 01700
Closeout Procedures 01770
Project Record Documents 01781
Demolitions 02060
Site Clearing 02110
Dewatering 02130
Excavation and Backfill 02220
Mitigative Measures 02400
Material Separation, Testing and Disposal 02800
Concrete Forming 03110
Concrete Accessories 03150
Concrete Reinforcing 03200
Cast-in-Place Concrete 03300
Grouting 03600
Anchor Systems 05053
Structural Steel Framing 05120
Metal Fabrications 05500
Aluminum Handrails and Railings 05525

ADVERTISEMENT FOR BID

Sealed bids for the furnishing of the necessary materials and construction of

MAUMEE WATERSHED CONSERVANCY DISTRICT
HANCOCK COUNTY FLOOD RISK REDUCTION PROGRAM
BLANCHARD RIVER ADDITIONAL HYDRAULIC IMPROVEMENTS

will be received by the Maumee Watershed Conservancy District located at 1464 Pinehurst Drive, Defiance, Ohio 43512 until:

10:00 A.M. LOCAL TIME
THURSDAY, _____, 2021

and at that time and place bids will be publicly opened and read aloud.

The proposed work generally consists of the construction of two riffle structures within the Blanchard River, construction of live brush layering on the riverbanks at the proposed riffle structures, replacement of storm sewers and structures, demolition of water, sanitary and gas utilities, construction of a pedestrian bridge ramp, and the excavation of a floodplain bench, part of which will contain hazardous soils.

Bid documents and plans may be obtained for a non-refundable fee of $_____ per set at the following location:

Stantec Consulting Services Inc.
4540 Heatherdowns Boulevard, Suite A
Toledo, Ohio 43614
Attention: Derek D. Dalton, P.E.
Phone: (419) 380-8910

Plans will be on file for review at:

Maumee Watershed Conservancy District
1464 Pinehurst Drive
Defiance, OH 43512
Phone: (419) 872-8746

Maumee Watershed Conservancy District
514 S Main St.
Findlay, Ohio 45840
Phone: (419) 424-5050

A mandatory pre-bid conference and site visit will be held at the City of Findlay Public Works Department, 330 North Cory Street, Findlay, Ohio on Tuesday, August 14, 2018 at 2:00PM local time.

Bids must be submitted on the forms bound in the Bidding Documents and must be accompanied by a Bid Guaranty and Contract Bond in accordance with Section 153.54 of the Ohio Revised Code or Bid Security furnished in Bid Bond Form issued by a Surety Company or Corporation licensed in the State of Ohio to provide said surety. The Bid Guaranty and Contract Bond as required by Section 153.54 of the Ohio Revised Code shall be in an amount equal to the sum of the bid submitted by each contractor. In lieu of posting the bond, a bidder may use a Cashier's Check, Certified Check or Letter of Credit for ten percent of the Contractor's bid as bid security. When a check or letter of credit is used, the bidder shall be required to post a 100 percent Performance Bond and a 100 percent Labor and Material Payment Bond, upon the signing of the contract.

The contractor and all subcontractors shall pay employees on the project the applicable state prevailing wages established by the Department of Industrial Compliance & Labor of the State of Ohio in accordance with Chapter 4115 of the Ohio Revised Code. The current Prevailing Wage Rate Schedule is bound in the Project Manual.

The Maumee Watershed Conservancy District reserves the right to reject any and all bids, and the right to accept the lowest responsive and responsible bid, the right to waive minor irregularities on any bid, and the right to accept the bid proposal which promotes the best interest of the District.

Failure to submit the Bid Guaranty Bond and the required three notarized affidavits with the bid shall be cause for considering the bid submission incomplete and for the rejection of the bid.

Each bid must contain the full name of the party or parties submitting the bid and all persons interested therein. Each bidder must submit evidence of its experiences on projects of similar size and complexity. The Owner intends and requires that this project reach substantial completion by _____ and final completion by _____.

All contractors and subcontractors involved with the project will, to the extent practicable use Ohio-made Products, materials, services and labor in the implementation of their project. Additionally, contractor compliance with the equal employment opportunity requirements of Ohio Administrative Code Chapter 123.2, the Governor's Executive Order of 1/27/72, and Governor's Executive Order 84-9 shall be required.

Publication dates:

_____, 2021
_____, 2021

INTRODUCTION

It is the intent of these documents to serve as the basis for preparing a Contractor's estimate of cost or the Contractor's bid; to show engineering intent and to set a level of quality of workmanship and performance; and as the basis for the written agreement between the Maumee Watershed Conservancy District (the "Owner") and any successful Bidders.

They represent the composite of the requirements of the Owner, as well as applicable funding agencies. An effort has been made, insofar as is practicable, to minimize any duplication or conflict in legal requirements or in standards of performance and workmanship. Insomuch as this is not always possible, there may be contained herein some conflicting requirements or standards, or general statements that are not always true with regard to particular projects. Thus, more stringent requirements shall take precedence, unless otherwise stated. For example, Supplemental Provisions will amend and/or add to the Standard Provisions and shall always have precedence over the provisions to which they are a supplement.

If there is any conflict between these documents and any laws, statutes, regulations, ordinances, or other requirements of any federal, state or local authority having jurisdiction over a particular matter, said laws, statutes, regulations, ordinances, or other requirements shall control. Additionally, these documents do not relieve a successful Bidder of the obligation to comply with any applicable laws, statutes, regulations, ordinances or requirements.

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INSTRUCTIONS TO BIDDERS

1. **Submission of Bid Proposals**
2. **Withdrawal of Bid Proposals**
3. **Rejection of Bid Proposals**
4. **Personal Examination**
5. **Pre-Bid Conference**
6. **Interpretation of Quantities in Bid Proposal**
7. **Interpretation of Construction Documents**
8. **Addenda**
9. **Evaluation of Bids**
10. **Investigation of Bidders**
11. **Qualifications of Bidders**
12. **Award of Contract**
13. **Notice to Proceed**
14. **Commencement and Completion**
15. **Bid Guaranty**
16. **Contract Bond**
17. **Form of Bid Guaranty and Bond**
18. **Corporate License**
19. **Non-collusion Affidavit**
20. **Prevailing or Minimum Wage Rates**
21. **Taxes**
22. **Delinquent Personal Property Tax**
23. **Out-of-State Corporations**
24. **Claims**

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1. **<u>Submission of Bid Proposals</u>**

Bid proposals must be submitted on the proposal forms contained in the bound Contract Documents and Specifications, and the same Contract Documents containing such proposals must be submitted in their entirety in sealed envelopes, plainly marked “Additional Hydraulic Improvements". Proposals must be received at the Maumee Watershed Conservancy District, 1464 Pinehurst Drive, Defiance, Ohio 43512 (hereinafter "Owner") by the specified time and date, at which time and place the proposals will be opened publicly and read aloud. (Bid Opening date is indicated in Advertisement).

The Bid Proposal must be signed in ink by the individual owner if the Bidder is a sole proprietorship or by an officer, authorized representative, or agent if the Bidder is a corporation, partnership, Limited Liability Company (LLC) or other entity. The Bidder’s complete name and business address must be shown. Additionally, if the Bidder is a joint venture, the name and business address of each individual entity participating in the joint venture must be shown. Anyone signing a Bid Proposal as an authorized representative or agent must designate in what capacity he or she is signing the Bid Proposal and provide sufficient evidence of his or her authority to do so.

The submission of a Bid Proposal shall constitute an incontrovertible representation by the Bidder that it has complied with every requirement stated herein and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

2. **<u>Withdrawal of Bid Proposals</u>**

Proposals may be withdrawn at any time before the scheduled closing time for receipt of bids, but may not be modified and resubmitted. No proposal or bid security may be withdrawn or modified after the scheduled closing time for submission of proposals for at least sixty (60) days, except as provided in Section 9.31 of the Ohio Revised Code. Proposals may be held by the Owner for a period not to exceed sixty (60) days from the date of bid opening for the purpose of reviewing the proposals and investigating the qualifications of Bidders prior to the Award of the Contract, unless an extension is made pursuant to Section 153.12 of the Ohio Revised Code.

As defined within Section 9.31 of the Ohio Revised Code, proposals may be withdrawn

by the respective Bidder within 48 hours after public opening provided a written request, signed by an authorized agent of the Bidder, is presented to the Owner stating that a mistake was made in the preparation of the original Bid and in reasonable satisfaction of the Owner. Should a Bidder request to withdraw a proposal, the same Bidder shall not be permitted to resubmit a proposal for the same project if the project is re-advertised.

3. Rejection of Bid Proposals

The Owner reserves the unqualified right to reject any or all proposals received. Blank spaces in the Proposal must be properly filled in and the phraseology of the Proposal must not be changed. Additions, qualifications or limitations must not be made to the items mentioned therein and any unauthorized conditions, limitations or provisions attached to a Proposal will be liable to render it informal and may cause its rejection. The right is reserved to waive informalities, irregularities, and technical defects of a non-material nature, as the best interest of the Owner may require.

Bid proposals will be considered irregular and may be rejected for the following reasons:

a. If the proposal is on a form other than that furnished or if the form is altered or any part thereof is detached or otherwise removed from the bid documents.

b. More than one Proposal for the same work is tendered from an individual, firm, or corporation under the same name or different names, or from corporations with one or more of the same persons as officers of such corporations, or from corporations who are holding companies, parent companies or holding companies which are subsidiaries of such corporations.

c. If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning.

d. If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.

e. If the proposal does not contain a unit price for each pay item listed, except in the case of authorized alternate pay items or lump sum items.

f. If the unit prices for labor and material provided by the Bidder, when extended for each item, do not match the subtotal presented for such items.

f. Bid prices are obviously unbalanced to the detriment of the Owner. Such determination shall be made at the sole discretion of the Owner.

g. Lack of competency or adequate labor, machinery, plant and other equipment.

h. Evidence of collusion among Bidders.

i. Other uncompleted work, whether or not with the Owner, which, in the judgment of the Owner, might hinder or prevent the prompt completion of this Work if awarded.

j. Failure to respond to request for clarification of the Bid within seven (7) working days.

k. The Owner reserves the right to disqualify or to reject any Bid for any other reasonable cause.

l. Disbarment of bidder.

4. Personal Examination

Bidders are required and individually responsible to understand the full scope of the Work through personal examination of the Contract Documents and investigation at the work site or sites as to existing conditions and the difficulties likely to be encountered in the performance of the Work.

Submission of a Bid shall be considered evidence that the Bidder has carefully examined the site of the proposed work, that the Bidder is satisfied as to the nature of the conditions to be encountered in performing the Work, and that the Bidder has performed all necessary additional investigations preparatory to submitting an informed and intelligent bid and to undertaking performance of the proposed Work.

No plea of ignorance of conditions that exist, or of conditions or difficulties that may be encountered in the execution of the Work, as a result of failure to make such examination and investigation, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every respect all of the requirements of the Contract, nor will the same be accepted as a basis for any claim whatsoever for extra compensation or for an extension of time.

5. Interpretation of Quantities in the Bid Proposal

The quantities listed in the Bid proposal are to be considered as approximate and are to be used only for the comparison of the Bids and as a basis for computing amounts of security or penal sums of Bonds to be furnished. The item costs to be tendered by the Bidders are to be tendered expressly for the scheduled quantities and as they may be increased or decreased by duly authorized Change Orders. Payments, except for lump sum Bids, and except for lump sum items in the item cost Bids, will be made to the Contractor for the actual quantities only if work performed or materials furnished is in accordance with the Contract Documents.

6. Pre-Bid Conference

A mandatory pre-bid conference and site visit will be held on _____, 2021 at _____ at _____, Findlay, Ohio. Representatives of the Owner and Engineer will be present to discuss the project and respond to questions provided at the pre-bid conference and site visit. Minutes of the meeting will be distributed as part of an Addendum.

7. Interpretation of Contract Documents

If any person, contemplating submitting a Bid for the proposed Project, is in doubt as to the true meaning of any part of the Contract Documents, they may submit to the Engineer, a written request for an interpretation thereof. Requests for interpretation shall be used for discrepancies, errors, clarifications, unspecified product substitutions, or other questions pertaining to the contract documents and drawings in relation to bidding issues. Non-written responses of any nature will not be considered valid in relation to bidding issues. Send written requests to: Stantec Consulting Services Inc., 4540

Heatherdowns Boulevard, Suite A, Toledo, Ohio 43614; Attention: Derek D. Dalton, P.E.; or via e-mail to derek.dalton@stantec.com.

Prospective bidders shall submit written requests of said questions to the Engineer, at least seven (7) calendar days before the bid opening date, which shall be 10:00 A.M. (EST), on Thursday, _____, 2021. Therefore, all requests for clarification shall be submitted and received no later than 10:00 A.M. (EST), on Thursday, _____, 2021. Requests received after this time will not be considered. The person submitting the request will be responsible for its prompt delivery and confirmation of the same.

8. Addenda

Any interpretation of the Contract Documents will be made only by Addendum duly issued. A copy of such Addendum will be mailed, faxed or delivered to each person receiving a set of such Contract Documents. Any such Addenda shall become part of the Contract Documents.

The time for opening the bids shall be extended for one (1) week, if within seventy-two hours before the date set for the opening of bids, the Owner mails or otherwise furnishes to prospective bidders a modification of its plans, specifications, or cost estimate for the project. The Owner will not be responsible for any other explanation or interpretation of the Contract Documents. The Owner will also not be responsible for any errors in the prospective bidders' address, phone number, or fax number.

9. Evaluation of Bids

After the proposals are opened and read aloud, they will be compared on the basis of the individual and combined Bidder's Total. In the event of a discrepancy between the labor and material price and extensions, the written prices for the labor and material shall govern.

The right is reserved to reject any or all proposals, to waive informalities, irregularities and defects of a minor nature or to advertise for new proposals, if in the judgment of the Owner, its best interests will be promoted thereby. The lowest responsive and responsible Bidder may be required by the Owner to further furnish the Owner with a complete breakdown of the lump sum Bid items, to the satisfaction of the Owner before signing the Contract. The lump sum breakdown shall be in sufficient detail to provide a check of claims for partial payments requests.

10. Investigation of Bidders

The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. In determining the award, consideration will be given to:

(a) Whether the Bidder maintains a permanent place of business

(b) Suitability of the Bidder's plan and equipment for the work

(c) Bidder's financial status and organization

(d) Bidder's record of experience in constructing improvements of this type; and

(e) Lowest Bid.

The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

11. Qualifications of Bidders

Each bidder shall submit in writing with its bid a detailed written statement to show to the reasonable satisfaction of the Owner that he has sufficient equipment, labor experience, ability and resources to satisfactorily perform the entire work in accordance with the provisions of the contract and specifications. Each bidder must state in full detail, on its proposal, its experience in this class of work.

Where a portion of the Contract is to be performed by a subcontractor, the name and address of each contractor and a detailed description of the experience of this subcontractor shall be included for the type or portion of work he is to construct. Forms for this are included in the Project Forms Section.

12. Award of Contract

After the proposals are opened and read aloud, they will be compared on the basis of the Bidder's Total Base Bid, which is the summation of the products of the approximate quantities shown in the proposal by the total (sum of labor and material) price of all standard items. The Bidder's Total Base Bid shall be the summation of only the standard bid items.

The right is reserved to reject any or all proposals, to waive informalities, irregularities and defects of a minor nature or to advertise for new proposals, if in the judgment of the Owner, its best interests will be promoted thereby.

The award of the work, if it is awarded, will be made as soon as is reasonably possible after the opening of the Bids to the lowest responsive and responsible Bidder whose proposal complies with all the requirements prescribed, but not later than sixty (60) calendar days, unless an extension is made pursuant to Section 153.12 of the Ohio Revised Code. In no case will an award be made until all necessary investigations are made as to the responsibility of the Bidder to whom it is proposed to award the contract. No contract shall be entered into if the price of the contract or the total price of all contracts in a combined bid is in excess of ten percent (10%) above the entire estimate.

The Owner reserves the right to rescind the award of the work at any time before the execution of the Contract by all parties without incurring any liability. Therefore, if the Contractor changes it position, economically or otherwise, after receiving a verbal or written notice of award and in reliance upon the Owner executing the Contract, the Contractor agrees to do so solely at its own risk and the Owner will not incur any liability from the Contractor's change of position.

The lowest responsible and responsive Bidder to whom the work is awarded will be required to execute the Contract and to furnish the required Contract Bond, Certificates of Insurance, and other documents within ten (10) calendar days from the date when Notice of Award is communicated in writing or orally to the Bidder. Execution of the contract shall be within sixty (60) calendar days of bid opening, unless an extension is made pursuant to Section 153.12 of the Ohio Revised Code. In case of failure of the Bidder to execute the Contract, the Owner may, at its option, consider the Bidder in default, in which case the Bidder will be subject to liability as set forth in Section 153.54 of

the Ohio Revised Code. The award may then be made to the next lowest responsible and responsive Bidder, or the work may be re-advertised as the Owner may decide.

13. Notice to Proceed

After the award of the Contract to the successful bidder, the Contractor shall not proceed with any work on the site until the Contractor has received a Notice to Proceed from the Owner. Materials may be ordered and other preparatory steps accomplished in this interim period. The Notice to Proceed shall be communicated in writing or orally to the Contractor within ten (10) calendar days of the execution of the Contract by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual Agreement between the Owner and Contractor.

14. Commencement and Completion

Bidders are required to satisfy themselves that they have sufficient equipment and facilities available to complete the Work as and when specified. Any Bid which stipulates that the work will be performed in a period of time greater than that specified shall be deemed irregular.

15. Bid Guaranty

Each Bid must be accompanied by a Bid Guaranty payable to the Owner in the form of either:

a. A Bid Guaranty and Contract Bond in accordance with Section 153.54 of the Ohio Revised Code or Bid Security furnished in Bid Bond Form issued by a Surety Company or Corporation licensed in the State of Ohio to provide said surety. Such Bond shall be issued for the full amount of the Bid

b. A certified check for ten percent (10%) of the Bid.

c. A cashier's check for ten percent (10%) of the Bid.

d. An irrevocable letter of credit for ten percent (10%) of the Bid, only upon prior approval from the Owner.

Bid Guaranties must be substantially in the bid guaranty form provided herein. If a bond is given, it shall be in favor of the Owner, and for the full amount of the bid. If the bid guaranty is given by a surety company, proof of authority of the officer or agent signing the guaranty, together with a recent financial statement of the surety company, shall be attached. In case a letter of credit, or certified or cashier's check is given, it shall be drawn on a solvent bank authorized to do business in Ohio, payable to the order of the "Maumee Watershed Conservancy District".

The amount of the check shall be ten percent (10%) of the amount of the bid price submitted or, in the case several bid prices are submitted, of the greatest total that can be derived by combining the various bid prices. The amount of such check of the bidder to whom the award is made shall be paid to the Owner as stipulated for liquidated damages if the said bidder fails to enter into a contract with the Owner and to furnish the required contract bond within ten (10) calendar days after notice of acceptance of its proposal. Award will be made within sixty (60) calendar days of opening of bids.

The bid guaranties, letters of credit or checks of all but the lowest three (3) bidders, will

be returned by mail within sixty (60) calendar days after opening of bids; bid guaranties, letters of credit or checks of the lowest three (3) bidders will be canceled, destroyed or returned within ten (10) calendar days after the execution of the contract.

16. Contract Bond

A Contract Bond of one hundred percent (100%) of the amount of the contract, with a satisfactory surety or sureties, will be required for the faithful performance of the work. The Contract bond furnished by the Contractor shall remain in effect until the expiration of the one-year guarantee period as assurance of the guarantee herein stipulated.

17. Form of Bid Guaranty and Contract Bond

All Bid Guaranty and Contract Bonds shall be signed by an authorized agent of an acceptable Surety Bonding Company and by the Bidder. Surety Bonding Company bonds shall be supported by credentials showing the power of attorney of the agent, the Certificate showing the legal rights of the Bonding Company to do business in the State of Ohio, and a financial statement of the surety. These supporting credentials need only be furnished by the successful Bidder upon the award of the work.

A bid shall be deemed non-responsive and shall be rejected if the bidder submits with its bond a bid guaranty, contract bond, payment bond, or combination of such bonds, executed by a Surety Company not licensed in the State of Ohio, or a surplus lines company not approved by the Superintendent of Insurance to execute such a bond in the State of Ohio.

18. Corporate License

Bidders must comply with the statutory requirements of the State of Ohio relative to the licensing of corporations or other entities organized under the laws of any other state or country and other pertinent requirements for doing business in Ohio.

19. Non-collusion Affidavit

Each Bidder is required to execute and submit with its Bid a Non-collusion Affidavit in order for its Bid to be considered complete.

20. Prevailing or Minimum Wage Rates

Each laborer, workman or mechanic employed by the Contractor for the work herein specified or by the subcontractor or by other persons upon such work shall be paid not less than the prevailing wage rates as determined by the Department of Industrial Relations of the State of Ohio in accordance with Chapter 4115 of the Ohio Revised Code (or the Secretary of Labor in accordance with the Davis-Bacon and Related Act, whichever applies).

Current wage rates in effect are included herein

In the event the wage rate for any labor classification is changed between the time and schedule was approved and the time the work required by this Contract is performed, or in the event any class of labor employed is not included in the published schedule of prevailing wages, then the rate prevailing at the time the work is actually performed as ascertained and determined by the Department of Industrial Relations of the State of Ohio (or Secretary of Labor), shall govern the work under this Contract. No increase in the Contract sum will be allowed for any later increase in the prevailing rates or wages as they may apply to this work.

21. Taxes

Materials purchased for use or consumption in connection with the proposed work may be exempt from the State of Ohio Sales Tax as provided for in Section 5739.02 of the Ohio Revised Code and also from the State of Ohio Use Tax, Section 5741.02. Bidders are required to certify the amount of materials included in their proposal which then be considered as the amount off exemption claimed under this provision.

Purchases by the Contractor, of expendable items such as form lumber, tools, oils, greases, fuel, or equipment rentals may be subject to the application of the Ohio Sales and Use Taxes.

The Contractor shall complete and provide to the City of Findlay City Income Tax Department an updated IRS W-9 matching records on file with IRS. In addition, the Contractor shall complete applicable registration form as required by the City of Findlay, for the purpose of setting up accurate records with regard to the Findlay City Income Tax. A copy of such registration with the City of Findlay shall be provided to the Owner and Engineer upon request.

All bidders shall be responsible for verifying the current income tax rates, rules and regulations of the City of Findlay by contacting the City Income Tax Department at:

Municipal Building, Room 115
P.O. Box 862
Findlay, Ohio 45839-0862
PH: 419.424.7133 FAX: 419.424.7410

22. Delinquent Personal Property Tax

All bidders are charged with notice of Section 5719.042 of the Ohio Revised Code and agree that if this contract is awarded to them, the successful bidder, prior to the time the contract is entered into, will submit to the Owner the affidavit required by said section of the Ohio Revised Code. Said affidavit, when filed with the Owner, is thereby incorporated into and made a part of this contract and no payment shall be made with respect to this contract unless such statement has been so incorporated as a part thereof.

Section 5719.042. After the award by a taxing district of any contract let by competitive bid and prior to the time the contract is entered into, the person making a bid shall submit to the district's fiscal officer a statement affirmed under oath that the person with whom the contract is to be made was not charged at the time the bid was submitted with any delinquent personal property taxes on the general tax list of personal property of any county in which the taxing district has territory or that such person was charged with delinquent personal property taxes on any such tax list, in which case the statement shall also set forth the amount of such due and unpaid delinquent taxes and any due and unpaid penalties and interest thereon. If the statement indicates that the taxpayer was charged with any such taxes, a copy of the statement shall be transmitted by the fiscal officer to the county treasurer within thirty (30) days of the date it is submitted.

A copy of the statement shall also be incorporated into the contract, and no payment shall be made with respect to any contract to which this section applies unless such statement has been so incorporated as a part thereof.

23. Out-of-State Corporations

Before a contract will be awarded to a foreign corporation or a person or partnership non-resident of the State of Ohio, such foreign corporation, person, or partnership shall file with the Secretary of State a power of attorney designating an agent for the purpose of accepting service of summons, in any action in law or equity, or both, brought in the State of Ohio.

24. Claims

All claims, counterclaims, disputes and other matters in question between the Owner, its agents and employees, and the Contractor arising out of or relating to the Contract or breach, shall be brought in a court of competent jurisdiction within the County of Defiance, State of Ohio.

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SPECIAL PROVISIONS

SP-1 Definitions
SP-2 Reference Specifications and Standard Drawings
SP-3 Equal Employment Opportunity
SP-4 Release Of Liability
SP-5 Certified Payroll
SP-6 Project Completion
SP-7 Substantial Completion
SP-8 Payment to Contractor
SP-9 Disposal of Excavated Material
SP-10 Working Hours
SP-11 Buy Ohio / Buy American
SP-12 Contractor's Superintendent
SP-13 General Notes

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SP-1 Definitions

The word "Owner" shall both mean the Maumee Watershed Conservancy District and their authorized agent. The word "Engineer" shall mean the Owner's representative, Stantec Consulting Services Inc. and their authorized agent. The word "Contractor" shall mean the individual or entity with whom the Owner has entered into Contract.

SP-2 Reference Specifications and Standard Drawings

Except as modified by these plans and by the detail specifications thereto, all work on this project shall be governed by the State of Ohio, Department of Transportation Construction and Material Specifications ("ODOT CMS"), dated January 1, 2019, and by such supplemental State specifications as may be in effect on January 1, 2021. Where there is a discrepancy between the ODOT CMS and supplemental State specifications and these project specifications, the project specifications shall govern.

SP-3 Equal Employment Opportunity

DURING THE PERFORMANCE OF THIS CONTRACT, THE CONTRACTOR AGREES AS FOLLOWS:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, ancestry, sex, age or physical disability or handicap. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, national origin, ancestry, or sex. Such action shall include, but is not limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The Contractor will in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, ancestry, or sex.

3. The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the State Administering Agency advising the said labor union or workers' representatives of the Contractor's commitments under this covenant and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The Contractor will comply with all provisions of the Owner on EEO and with the implementing rules, regulations, and applicable orders of the State Equal Employment Opportunity Coordinator.

5. The Contractor agrees it will fully cooperate with the State Administering Agency, the State Equal Employment Opportunity Coordinator and with any other official or agency of the Local, State or Federal Government which seeks to eliminate unlawful employment discrimination and with all other State and Federal efforts to assure equal employment practices under this contract, and said Contractor shall comply promptly with all requests and directions from the State Administering Agency, the State Equal Employment Opportunity Coordinator and any of the State of Ohio's officials and agencies in this regard, both before and during construction.

6. Full cooperation as expressed in clause 5, above, shall include, but not be limited to, being a witness and permitting employees to be witnesses and complainants in any proceeding involving questions of unlawful employment practices, furnishing all information and reports required by the Owner on EEO and by the rules, regulations, and orders of the State Equal Employment Opportunity Coordinator pursuant thereto and permitting access to its books, records, and accounts by the State Administering Agency and the State Equal Employment Coordinator for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

7. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in while or in part and the Contractor may be declared ineligible for further State Contracts or State Assisted Construction Contracts in accordance with procedures authorized by the Owner on EEO and such other sanctions may be instituted and remedies invoked as provided in said Regulation or by rule, regulation, or order of the State Equal Employment Opportunity Coordinator, or as otherwise provided by law.

   In the event this Contract is terminated for a material breach of said Regulation, the Contractor shall become liable for any and all damages, which shall accrue to the State Administering Agency, and Applicant and the State of Ohio as a result of said breach.

8. The Contractor will include the portion of the sentence immediately preceding paragraph 1 and the provisions of paragraphs 1 through 8 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the State Equal Employment Opportunity Coordinator issued by the Owner on EEO, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the State Administering Agency may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor, vendor or other party as a result of such direction by the State Administering Agency, the Contractor may request the State of Ohio to enter into such litigation to protect the interests of the State.

SP-4 <u>Release of Liability</u>

No person or corporation, other than the signer of the Contract as Contractor, has any interest hereunder and no claim shall be made or be valid, and neither the Owner, nor any official or agent thereof, shall be liable for or be held to pay any money except as provided herein. The

acceptance by the Contractor of payment shall operate as and shall be a release to the Owner and Engineer, and every officer and agent thereof, from all claims or liability to the Contractor for anything done or furnished for, or relating to the work, or for any act or neglect of the Owner, or of any person relating to or affecting the work.

SP-5 Certified Payroll

The Contractor and all subcontractors hired by the Contractor shall keep full and accurate payroll records covering all disbursements of wages to their employees to whom they are required to pay not less than the prevailing rate of wages, including fringe benefits, as set forth in the contract. Such records shall be preserved for a period of three years from date of completion of the contract, or as otherwise required by law.

The Contractor and all subcontractors hired by the Contractor shall deliver to the Owner a certified copy of its payroll, within two (2) weeks after the initial pay date, and supplemental reports weekly thereafter which shall show for each employee paid any wages, its name, current address, social security number, numbers of hours worked each day during the pay period and the total for each week, hourly rate of pay, job classification, fringe payments, and deductions from wages. In addition, the Contractor, at the beginning of performance under the Contract, shall give to the Owner a schedule of the dates during the life of the Contract with the Owner on which it is required to pay wages to employees and a complete list of all subcontractors. At any time during the life of the Contract, the Owner may demand that the Contractor and/or its Subcontractors submit an affidavit stating that wages have been paid for the pay period or periods in question in conformance with the minimum rates set forth in the contract along with the certified copies of payroll.

Upon completion of the contract and prior to final payment, the Contractor and all subcontractors hired by the Contractor shall file with the Owner an affidavit stating that it has fully complied with Chapter 4115 of the Ohio Revised Code and/or Title 29, Parts 3 and 5 of the Code of Federal Regulations, as applicable, and that wages have been paid in conformance with the minimum wage rate set forth in the contract. The affidavit must be executed and sworn to by the Officer or Agent or the Contractor or Subcontractor who supervises the payment of employees, before the Owner will release the Surety and/or make final payment due under the terms of the Contract.

THE OWNER MAY WITHHOLD PAYMENT OF ANY ESTIMATE UNTIL THE CONTRACTOR HAS SUBMITTED THE AFFIDAVIT AND CERTIFIED PAYROLL RECORDS, AND UNTIL ALL REQUIREMENTS HAVE BEEN MET IN ACCORDANCE WITH THE TERMS OF THE CONTRACT.

SP-6 Project Completion

Substantial Completion, as defined in SP-7 below, for the Contract shall be not later than _____. Final Completion date for the Contract shall be not later than _____.

SP-7 Substantial Completion

Substantial Completion is defined as the date when the work or a specified part thereof has progressed to the point where, in the opinion of the Owner and Engineer, it is sufficiently complete in accordance with the contract documents so that the work can be utilized for the purposes for which it is intended. Refer to the definition in Section 1.01.40 of the General Conditions. The exact date of Substantial Completion shall be as specified in the Certification of Substantial Completion, issued by the Owner and Engineer, as defined in Section 15.03 of the General Conditions. If Work is completed by the Contractor and is not in accordance with the Contract Documents, the Contractor shall remedy the defective work such that conforms to the requirements of the Contract Documents.

SP-8 Payment to Contractor

At least twenty (20) calendar days before the date established for each progress payment (but not more often than once a month), the Contractor shall submit to the Owner and Engineer for review an Application for Payment filled out and signed by the Contractor. The Contractor shall also supply such supporting documentation as is required by the Contract Documents (refer to section 15.01 of the General Conditions).

Payment to the Contractor for work completed shall initially be made at a rate of ninety two (92) percent of the partial labor estimates and ninety two (92) percent of material, up to the first fifty (50) percent on Contract, prepared by the Contractor and approved by the Owner and Engineer. All labor performed after the job is fifty (50) percent completed, shall be paid for at a rate of one hundred (100) percent of the estimates submitted by the Contractor and approved by the Owner and Engineer.

Payment for all materials purchased and stored on site shall be made at the rate of ninety two (92) percent of the Contractor's invoice cost, not to exceed the price bid per unit in the Contract, provided that the material meets the requirements of the Contact Documents and that all required inspections and submittals have been made and approved.

Payment to the Contractor prior to final acceptance of the Work shall be made as herein specified with the withheld percentage kept as a retainage for the faithful performance of the Work.

All funds retained shall be deposited in an escrow account as designated in section 153.63 of the Ohio Revised Code. Upon issuance of a Certificate of Substantial Completion by the Engineer, final acceptance of the project by the Owner and provided there exists no other reason to withhold retainage, the retained percentages held shall be released from escrow and paid to the Contractor, withholding only that amount necessary to assure completion.

SP-9 Disposal of Excavated Material

Unless otherwise defined within the Project Manual, the Contractor shall haul all excess excavated material off site and dispose of them in an environmentally safe manner and in compliance with all Federal, State and Local regulations. The costs for this work shall be included in the price bid for the various items.

SP-10 Working Hours

The Contractor shall restrict its working hours to 7:00 am to 5:30 pm, Monday through Friday, except in cases of emergency, or as otherwise permitted by the Owner or its authorized representative. No work shall be allowed on Sundays or Holidays. Exceptions to these hours may be granted upon approval by the Owner or its authorized representative. The Contractor shall secure all equipment and materials during non-working hours. The construction site shall be made safe for any persons who are on-site after hours. The Contractor shall make sure all trenches and excavated areas are completely backfilled during non-working hours.

SP-11 Buy Ohio / Buy American

The Contractor and all subcontractors hired by the Contractor shall, to the extent practicable, use products, materials, services and labor from the State of Ohio in the implementation of their project. All products and materials utilized in the implementation of the project shall be manufactured in the United States of America (USA).

SP-12 Contractor's Superintendent

The Contractor shall employ and retain a full time project superintendent at the project site at all times during execution of the Work. The Contractor's superintendent may be involved in the daily labor of the Work and shall be available to meet with the Engineer, Owner or other inspectors on various issues of the project upon request. The superintendent shall possess a sufficient level of knowledge of the Work to respond to questions, and the superintendent shall be authorized to make decisions for the Contractor. Contractor shall include costs for its superintendent in the price bid for various items of the proposal.

Furthermore, it shall be the responsibility of the Contractor's Superintendent to manage the overall work on the project and coordinate all Work of the various Sub-Contractors.

SP-13 General Notes

Applicable general notes, plan notes and specifications are included on the Contract Drawings and shall apply as if re-written herein.

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PROPOSAL

TO THE MAUMEE WATERSHED CONSERVANCY DISTRICT, DEFIANCE, OHIO, hereinafter referred to as "Owner", for the furnishing of all labor, materials and equipment for the completion of the Additional Hydraulic Improvements, City of Findlay, Hancock County, Ohio and doing such other work incidental thereto, all in accordance with the contract plans, appurtenant reference drawings and specifications provided therefore.

The signer of this proposal, as Bidder, understands the work for which this proposal is submitted is based on the prevailing wage rates herein, which prevailing wage rates, if the Contract is awarded to the said Bidder and entered into by the Owner and the said Bidder, will be paid to the various classes of labor employed upon the work.

EVERY BIDDER MUST TAKE NOTICE OF THE FACT THAT EVEN THOUGH ITS PROPOSAL MAY BE ACCEPTED AND THE DOCUMENTS SIGNED BY THE BIDDER TO WHOM AN AWARD IS MADE AND BY THE GENERAL MANAGER, AUTHORIZED TO SIGN ON BEHALF OF THE OWNER, THAT NO SUCH AWARD OR SIGNING BY THE GENERAL MANAGER ON BEHALF OF THE OWNER SHALL BE CONSIDERED A BINDING CONTRACT WITHOUT THE PROPER CERTIFICATE BY THE CLERK/TREASURER THAT FUNDS ARE AVAILABLE TO COVER THE COST OF THE WORK TO BE DONE, OR WITHOUT THE APPROVAL OF THE OWNER'S ATTORNEY AS TO THE FORM OF THE CONTRACT AND ALL THE PERTINENT DOCUMENTS RELATING THERETO HAVING BEEN APPROVED BY SAID OWNER'S ATTORNEY AND SUCH BIDDER IS HEREBY CHARGED WITH THIS NOTICE.

The signer of the Proposal, as Bidder, also declares that the only person, persons, company or parties interested in this Proposal are named in this Proposal, that it has carefully examined the Advertisement, Contract Documents, Supplemental Specifications, Special Provisions, Contract Bond, and that its representative has made such investigation as is necessary to determine the character and extent of the work, and it will contract with the Owner, in the form of contract hereto annexed, to provide the necessary labor, material, machinery, tools, and apparatus, do all the work required to complete the contract within the time mentioned in the General Conditions, and according to the requirements of the Owner herein and hereinafter set forth, and furnish the required surety bonds for the prices indicated on the Bid Sheet.

Furthermore, the Bidder shall provide a Lump Sum and Unit Price Bid on the Bid Proposal based on furnishing acceptable labor, materials and equipment, as required, at all locations in the performance of this Contract. The Bidder's Total Bid Price on the Bid Proposal is its total bid based on its unit prices and lump sum prices and estimated quantities developed by the Bidder. If there is an error in the figure provided by the Bidder, the Total Bid Price stated in words shall govern.

The Bidder proposes to complete the Work in accordance with the Contract Documents from the date of the Notice to Proceed and within the specified dates of the Contract. If the foregoing proposal shall be accepted by the Owner and the undersigned shall fail to execute a satisfactory Contract as hereto attached, then the Owner may, at its option, determine that the undersigned has abandoned the Contract, and thereupon, this Proposal shall be null and void and the certified check or bond accompanying this Proposal shall be forfeited and become the property of the Owner pursuant to the provisions of the Ohio Revised Code Sections 153.54 and 153.571.

In submitting this Bid, Bidder represents that:

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

  No. _____ Dated _____

  No. _____ Dated _____

No. _____ Dated _____

No. _____ Dated _____

- 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.

- Bidder 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.

Bidder will complete the Work for the following pricing:

ITEM NO.	DESCRIPTION	EST. QTY (a)	UNIT	UNIT PRICING (b)	EXTENSION (a x b)
1.0	In-Stream Improvements:				
1.1	Riffle 1 Construction	1	LS	$	$
1.2	Riffle 2 Construction	1	LS	$	$
2.0	Floodplain Bench Widening Improvements:				
2.1	Mobilization	1	LS	$	$
2.2	Clearing & Grubbing	1	LS	$	$
2.3	Construction Layout & Staking	1	LS	$	$
2.4	Tree Clearing	1	LS	$	$
2.5	Excavation, General	89,000	CY	$	$
2.6	Excavation, Construction & Demolition Debris	1,800	CY	$	$
2.7	Topsoil Removal, Storage, and Replacement	1	LS	$	$
2.8	Imported Topsoil	100	CY	$	$
2.9	Class 1, Permanent Seeding and Mulching	1	AC	$	$
2.10	Class 4B, Permanent Seeding and Mulching	17	AC	$	$
2.11	Riparian Buffer, Permanent Seeding and Mulching	3	AC	$	$
2.12	Bareroot Seedlings (1/2"x4')	950	EA	$	$
3.0	Utility Modifications:				
3.1	Sanitary Sewer Demolition, 48" Manhole	6	EA	$	$
3.2	Sanitary Sewer Demolition, 8" - 18" Pipe	1700	LF	$	$
3.3	Storm Sewer Demolition, 48" Manhole	5	EA	$	$

3.4	Storm Sewer Demolition, Catch Basin	7	EA	$	$
3.5	Storm Sewer Demolition, 4" - 18" Pipe	550	LF	$	$
3.6	Storm Sewer Demolition, 24" - 30" Pipe	500	LF	$	$
3.7	18" Storm Sewer N-12 HDPE	430	LF	$	$
3.8	18" Storm Sewer Outfall, ODOT HW 2.1	1	EA	$	$
3.9	30" Storm Sewer N-12 HDPE	475	LF	$	$
3.10	30" Storm Sewer Outfall, ODOT HW 2.1	1	EA	$	$
3.11	Gas Line Demolition, 2"	710	LF	$	$
3.12	Water Line Demolition, 4" or less	1800	LF	$	$
3.13	Fire Hydrant Demolition	2	EA	$	$
3.14	SWPPP and Erosion Control	1	LS	$	$
4.0	Pedestrian Bridge Ramp				
	Pedestrian Bridge Ramp Construction	1	LS	$	$
5.0	Allowances:				
5.1	Hazardous Waste Disposal Fees	1	LS	$	$
				TOTAL	$

Bidder will complete the Work for the following Base Bid Total Price (in words): _____

_____

_____Dollars ($_____)

In the event of a discrepancy between the total Base Bid in words above and the sum total of the figures presented through extension of applicable unit prices, the Base Bid Total in words shall prevail.

Signature of Bidder: _____ Date: _____

The Bidder must indicate whether a Corporation, Partnership, Company or Individual. *(circle one)*

THE PERSON SIGNING SHALL, IN THEIR OWN HANDWRITING, SIGN THE PRINCIPAL'S NAME, ITS OWN NAME AND TITLE. WHERE THE PERSON SIGNING FOR A CORPORATION IS OTHER THAN THE PRESIDENT OR VICE-PRESIDENT, IT MUST, BY AFFIDAVIT, SHOW ITS AUTHORITY TO BIND THE CORPORATION.

By: _____ Title: _____

Business Address of Bidder: _____

_____

Business Phone of Bidder: (_____) _____

Business Fax of Bidder: (_____) _____

(Remainder of page left intentionally blank)

PROPOSAL AFFIDAVIT

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

STATE OF OHIO_____)
) SS
COUNTY OF _____)

_____, being duly sworn, deposes and says that they are
(Name of Secretary)

Secretary of _____, a corporation organized and existing under and
(Name of Corporation)

by virtue of the laws of the State of _____, and having its principal office at:

_____
(Street Address)

_____
(City) *(County)* *(State)* *(Zip)*

Affiant further says that it is familiar with the records, minutes books and by-laws of _____

_____
(Name of Corporation)

Affiant further says that _____, as _____
(Name of Officer) *(Title)*

of the corporation is duly authorized to sign the Proposal for Additional Hydraulic Improvements, for said corporation by virtue of _____

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

_____
Affiant

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

_____
Notary Public:

My Commission Expires:

_____ _____
Date County State

SUBCONTRACTORS

The Bidder is required to state, in detail, in the space provided below, what Subcontractors, if any, are proposed to perform work on this Project, as well as the tasks to be accomplished and estimated value of such subcontracted work. If no Subcontractors are proposed, indicate the same. Attach additional sheets, if needed.

The Bidder acknowledges that he may not add Subcontractors nor substantially modify the value and character of work to be performed by their proposed Subcontractor(s) without the prior written approval of the Owner and Engineer. The Bidder further acknowledge that all Work, including that completed by Subcontractor(s), for which this proposal is submitted is based on the prevailing wage rates herein to be paid to the various classes of labor employed upon the work.

Subcontractor's Name:_____

Subcontractor's Address, Phone & Fax:_____

_____

Subcontractor's Task(s):_____

_____

Estimated Value of Subcontractor's Task(s): $_____

Subcontractor's Name:_____

Subcontractor's Address, Phone & Fax:_____

_____

Subcontractor's Task(s):_____

_____

Estimated Value of Subcontractor's Task(s): $_____

Subcontractor's Name:_____

Subcontractor's Address, Phone & Fax:_____

_____

Subcontractor's Task(s):_____

_____

Estimated Value of Subcontractor's Task(s): $_____

If Contractor does not intend to use any subcontractors, indicate by initialing here: ☐

QUALIFICATIONS OF BIDDER

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 reference and such other detailed information as will enable the Owner to judge of his responsibility, experience, skill, and financial standing. Bids from Bidders inexperienced in this particular work will not be considered. Among other things this statement shall include the following: Evidence to the effect that the Bidder maintains a permanent place of business, list of plant equipment available for the work under the proposed contract, together with the statements as to when purchased or otherwise obtained and statements as to its present physical condition; evidence to the effect that the bidder has a suitable financial status to meet obligations incident to the work, and evidence to the effect that the Bidder has appropriate technical experience. Attach additional sheets if needed.

1. Bidder's Name:_____

2. Bidder's Address:_____

_____

3. History of Firm:_____

_____

_____

_____

_____

_____

4. Previous Jobs Completed: (Include current phone no. for client/engineer)

   a. Project Name:_____

      Description:_____

      _____

      Client:_____

      Design Engineer:_____

   b. Project Name:_____

      Description:_____

      _____

      Client:_____

      Design Engineer:_____

   c. Project Name:_____

      Description:_____

      _____

      Client:_____

      Design Engineer:_____

QUALIFICATIONS OF BIDDER (Continued)

d. Project Name:_____

Description:_____

_____

Client:_____

Design Engineer:_____

e. Project Name:_____

Description:_____

_____

Client:_____

Design Engineer:_____

5. Manpower and Equipment available to perform Work:_____

_____

_____

_____

_____

_____

6. Evidence of Technical Experience:_____

_____

_____

_____

_____

_____

7. Evidence of Financial Status:_____

_____

_____

_____

_____

_____

_____

SUB-CONTRACTOR EXPERIENCE SHEET

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 their proposed Subcontractor(s) has done, to give reference and such other detailed information as will enable the Owner to judge of his responsibility, experience, skill, and financial standing. Attach additional sheets if needed.

1. Sub-Contractor Name:_____

2. Sub-Contractor Address:_____

_____

3. History of Firm:_____

_____

_____

_____

_____

_____

4. Previous Jobs Completed: (Include current phone no. for client/engineer)

   a. Project Name:_____

      Description:_____

      _____

      Client:_____

      Design Engineer:_____

   b. Project Name:_____

      Description:_____

      _____

      Client:_____

      Design Engineer:_____

   c. Project Name:_____

      Description:_____

      _____

      Client:_____

      Design Engineer:_____

SUB-CONTRACTOR EXPERIENCE SHEET (Continued)

5. Manpower and Equipment available to perform Work:_____

_____

_____

_____

_____

_____

6. Evidence of Technical Experience:_____

_____

_____

_____

_____

_____

7. Evidence of Financial Status:_____

_____

_____

_____

_____

_____

_____

BID GUARANTY AND CONTRACT BOND
(SECTION 153.571 Ohio Revised Code)

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

_____
(Name)

_____
(Address)

as principal, and _____, as sureties, are hereby held and firmly bound unto Maumee Watershed Conservancy District, Defiance, Ohio, as obligee, in the penal sum of the dollar amount of the bid submitted by the principal to the obligee on _____ _____ to undertake the project known as: **Additional Hydraulic Improvements**. 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 proposals made by the principal on the date referred to above to the obligee, which are accepted 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 ALTERNATIVES. 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.

Signed this _____ day of _____,20_____,

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named principal has submitted a bid on the _____ day of _____, 20_____ for the **Additional Hydraulic Improvements**.

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 materials; and in the event the principal pays to the obligee the difference not to exceed ten percent (10%) 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 percent (10%) 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 (10) 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 faithful do and perform the things agreed by the contract to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman 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 not event exceed the penal amount of this obligation as herein stated.

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

SIGNED AND SEALED this _____ day of _____ 20____.

	SURETY AGENT'S
PRINCIPAL:_____	BY:_____ (Attorney-in-Fact) (Seal)
BY:_____ (Seal)	_____ SURETY COMPANY ADDRESS:
TITLE:_____	_____ Agency Name
_____ ADDRESS:	_____ Street
_____ City, State Zip	_____ City, State Zip

NON-COLLUSION AFFIDAVIT

(This Affidavit must be executed for the bid to be considered.)

STATE OF OHIO)
) SS
COUNTY OF _____)

_____
(Name)

being duly sworn, deposes and says that it is_____
(Title)

of _____
(Firm)

the party making the foregoing proposal of bid; that such bid is genuine and not collusive or sham; that said bidder is not financially interested in, or otherwise affiliated in a business way with any other bidder on the same contract; that said Bidder has not colluded, conspired, connived, or agreed, directly or indirectly with any other 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 collusion, or communication or conference, with any person to fix the bid price of affiant or any other Bidder, or to fix any overhead profit of cost element of said bid price, or of that of any other bidder, or to secure any advantage against the Maumee 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 before me and subscribed in my presence this _day of _____, 20
.

_____
Notary Public

My Commission Expires:

_____
Date

_____
County State

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CONTRACT

THIS AGREEMENT, made and entered into this _____ day of _____, 20___, by and between Maumee Watershed Conservancy District, Defiance, Ohio, hereinafter referred to as "Owner", and _____, hereinafter referred to as "Contractor".

Owner and Contractor Hereby Agree as Follows:

Contractor, in consideration of (INSERT AMOUNT IN WORDS) Dollars ($(INSERT AMOUNT IN FIGURES)) to be paid by Owner, shall, at Contractor's own cost and expense, furnish all the labor, materials, tools and equipment for the Additional Hydraulic Improvements.

Said work shall be in accordance with the bid documents, including, but not limited to, the general conditions, supplementary conditions, specifications and all other drawings and related documents therein mentioned, all of which are hereby made a part of this Agreement. Said work is to be fully completed to the satisfaction of the Owner.

If the Contractor shall fail to comply with any of the terms, conditions, provisions or stipulations of this Agreement, then the Owner may avail itself of any or all remedies, whether under law, equity or this Agreement. All work to be performed hereunder shall be completed in a manner acceptable to the Owner by _____, unless an extension of time is granted. Substantial completion date for the work shall be _____.

The Contractor shall diligently prosecute the Work and shall complete all Work so that Final Acceptance occurs on or before the date specified above, unless the Contractor timely requests and the Owner grants an extension of time in accordance with the Contract Documents. The period of time established by the preceding sentence is referred to herein as the time for Contract Completion.

Upon failure to complete all Work within the time for Contract Completion, or failure to have the applicable portion of the Work completed upon any milestone completion date, the Owner shall be entitled to retain or recover from the Contractor, as Liquidated Damages, and not as a penalty, One Hundred Dollars

($100.00) for each and every calendar day thereafter until Contract Completion or the date of completion of the applicable portion of the Work. The amount of Liquidated Damages is agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of ascertaining the actual amount of damage the Owner, its constituency and the public would sustain.

THE CONTRACTOR HEREBY AGREES TO INDEMNIFY, DEFEND AND HOLD OWNER AND ITS AGENTS OR REPRESENTATIVES HARMLESS FROM ANY AND ALL CLAIMS FOR DAMAGES, COSTS, EXPENSES, JUDGMENTS OR DECREES RESULTING FROM ANY OPERATIONS OF SAID CONTRACTOR, ITS SUBCONTRACTORS, AGENTS, OR EMPLOYEES.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first set forth above.

MAUMEE WATERSHED CONSERVANCY DISTRICT, DEFIANCE, OHIO

General Manager, Clark Lynn Army

By:_____

By:_____

By:_____

CONTRACTOR:
(Contractor must indicate whether it is a corporation, partnership, proprietorship, etc., and provide appropriate evidence that the individual signing for Contractor is duly authorized to do so.)

By:_____

_____
(Title)

Approved as to form:

_____
(Owner's Attorney Name)

_____
(Title)

By:_____
Owner's Attorney

CONTRACT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____ _____, as principal and _____, as sureties, are hereby held and firmly bound unto _____ in the penal sum of ___ _____dollars for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

Signed this _____ day of _____, 20____.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named principal did on the _____ day of _____, 20____, enter into a contract with the Maumee Watershed Conservancy District which said contract is made a part of this bond the same as though set forth herein;

Now, if the said _____ shall well and faithfully do and perform the things agreed by _____to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing or completing of said Contract; we agreeing and assenting that this undertaking shall be for the benefit of any material men or laborer having a just claim, as well as for the obligee herein and during the one year guarantee period, then this obligation shall be void; 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 all and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

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

(Principal must indicate whether a Corporation, Partnership, Company or Individual)

_____	_____
Witness:	Principal
	_____
	Title
_____	_____
Witness:	Surety
	_____
	Title

CONTRACT AFFIDAVIT

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

STATE OF OHIO_____)
) SS
COUNTY OF _____)

_____, being duly sworn, deposes and says that he is Secretary of _____, a corporation organized and existing under and by virtue of the laws of the State of _____, and having its principal office at: _____
_____
_____
_____
(City) (County) (State) (Zip)

Affiant further says that it is familiar with the records, minutes books and by-laws of _____

_____
(Name of Corporation)

Affiant further says that _____, as _____
(Name of Officer) (Title)

of the corporation is duly authorized to sign the Contract for the Additional Hydraulic Improvements, for said corporation by virtue of _____
_____ (State whether a provision of by-laws or a resolution of the Board of Directors. If by resolution, give date of adoption.)

_____
Affiant

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

_____
Notary Public:

My Commission Expires:

_____ _____
Date County State

CERTIFICATE OF NON-DISBARMENT

STATE OF OHIO_____)
) SS
COUNTY OF _____)

The undersigned, being first duly cautioned and sworn, hereby certifies that:

1. The undersigned is the _____ of _____, a bidder with regard to certain work commonly referred to as Additional Hydraulic Improvements (the "Project").

2. _____ has not been disbarred or otherwise prohibited by any federal, state or local governmental agency, authority or contracting party from entering into a contract for, or performing work on, the Project.

Further, Affiant sayeth naught.

_____
(Print Name) (Print Title)

_____
(Signature)

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

_____
Notary Public:

DELINQUENT PERSONAL PROPERTY TAX AFFIDAVIT

STATE OF OHIO)
) SS
COUNTY OF _____)

_____, being duly sworn, deposes and says that he
(Name of Affiant)
is the _____of _____
(Title) *(Name of Vendor)*
with offices located at _____
(Address of Vendor)
and as its duly authorized representative states that effective this _____ day of _____
_____, 20___,
(date of submission of bid)
the _____
(Name of Vendor)

( ) Is not charged with delinquent personal property taxes on the general list of personal property in _____ or any other counties containing
(County where the project is located)
property in the taxing districts under the jurisdiction of the _____.
(City where the project is located)

( ) Is charged with delinquent personal property taxes on the general list of personal property in _____ or any other counties containing property in the taxing districts under the jurisdiction of the _____.

COUNTY	AMOUNT (include total amount and any penalties and interest thereon)
_____	$ _____
_____	$ _____

_____
Affiant

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

_____
Notary Public:

My Commission Expires:

_____ _____
Date County State

FISCAL OFFICER'S STATEMENT

I _____ hereby
(Name) *(Title)*

certify that I am the qualified and acting fiscal officer of the Maumee Watershed Conservancy District ,
(Owner)
and that the amount of money to which _____dollars
($_____) is required to meet the cost of the attached Agreement between _____
_____ (Contractor) and Maumee Watershed Conservancy District (Owner)
has been lawfully appropriated for the purpose of said Agreement and the money so appropriated is on deposit (in process of collection) to the credit of the appropriate fund free from any previous encumbrances.

_____
Date

_____
Signature

_____
Title

(SEAL)

This page was intentionally left blank.

NOTICE OF AWARD

To: _____

_____

_____

Project Description: Additional Hydraulic Improvements

The Maumee Watershed Conservancy District, Defiance, Ohio has considered the Bid submitted by you on _____ day of _____ 20____ (Bid Date) for the above-described work in response to its Advertisement for Bids and Information for Bidders.

You are notified that your Bid has been accepted for items in the amount of _____ Dollars ($_____).

You are required by the Information for Bidders to execute the Contract and to furnish the required contract bond (unless already provided with bid) pursuant to O.R.C. 153.571, Certificate of Insurance and Personal Property Tax Affidavit (unless already provided with bid) within ten calendar days from the date of this notice to you.

If you fail to execute said Contract and to furnish said Contract Bond within ten days from the date of this notice, the Owner will be entitled to consider all your rights arising out of the acceptance of your Bid as abandoned and as a forfeiture of your Bid Guaranty subject to the liability as set forth in Section 153.54 of the Ohio Revised Code. The Owner will be entitled to such other rights as may be granted by law.

The Owner reserves the right to rescind the award of the work at any time before the execution of the Contract by all parties without incurring any liability. Therefore, if you change your position, economically or otherwise, after receiving a verbal or written notice of award and in reliance upon the Authority executing the Contract, you agree to do so solely at your own risk and the Owner will not incur any liability from your change of position.

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

Dated this _____ day of _____, 20____.

General Manager

_____

Clark Lynn Army

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by_____
(Firm)

this _____ day of _____, 20____.

_____
Name

_____
Title

cc: Contractor's Surety
Surety's Agent

NOTICE TO PROCEED

TO: ____________________________ Date: ______________________________

____

____

Project Description:______________Additional Hydraulic Improvements______________________________.

You are hereby notified to commence work in accordance with the contract dated _____________ _______,20____

and you are to complete the work within _______ consecutive calendar days thereafter. The date of

completion of all work is therefore ____________, 20_____.

You are required to return an acknowledged copy of this Notice to Proceed to the Maumee Watershed

Conservancy District, 1464 Pinehurst Drive, Defiance, Ohio 43512.

Dated:

____________________________,20____. General Manager

____
Clark Lynn Army

* *

Acceptance of Notice

Receipt of the above Notice to Proceed is hereby acknowledged by ________________,

this __________ day of ____________________________, 20____.

By: ____

Name: ____

Title: ____

NOTICE OF COMMENCEMENT OF PUBLIC IMPROVEMENT
Section 1311.252 Ohio Revised Code

State of Ohio, County of Defiance, SS.

Notice is hereby given by the undersigned public authority ("Public Authority") of the commencement of a public improvement ("Project") as follows:

(1) The Project is identified as:

Additional Hydraulic Improvements
Project Name

City of Findlay, Hancock County, Ohio
Location

_____
Project Number

(2) The Public Authority responsible for the project is:

Maumee Watershed Conservancy District
1464 Pinehurst Drive
Defiance, Ohio 43512

(3) All principal contractors on the project and trade of each are as follows:

Principal Contractors	Trade
_____	_____
Name	
_____	
Address	

(4) Date the Public Authority executed the Contract with the principal contractor for the project:

_____

(5) The names and addresses of the sureties for all principal contractors are as follows:

Principal Contractors	Surety
_____	_____
Name	Name
_____	_____
Address	Address

(6) The name and address of the representative of the Public Authority upon whom service may be made for the purposes of serving an affidavit pursuant to Section 1311.26 of the Ohio Revised Code is:

Clark Lynn Army
Name

General Manager
Title

1464 Pinehurst Drive, Defiance, Ohio 43512
Address

* *

____
Public Authority

By: Clark Lynn Army

Title: General Manager

The signatory of this Notice of Commencement of Public Improvement ("Notice") personally appeared before me on behalf of the Public Authority, a notary public in an for said county and swore that all the information in the Notice is true as he/she verily believes and further that he/she is fully authorized by the Public Authority to give said notice.

Sworn to before me and subscribed in my presence this _______ day of ___________________________

20_____.

____
Notary Public

My Commission Expires:

___________________________ ___________________________________
Date County State

CERTIFICATION OF WORK
AND
AFFIDAVIT OF PAYMENT TO
SUBCONTRACTORS AND SUPPLIERS

THIS AFFIDAVIT SHALL ACCOMPANY EACH PROGRESS PAYMENT REQUEST SUBMITTED BY THE CONTRACTOR. FAILURE TO DO SO WILL RESULT IN REJECTION OF THE PROGRESS PAYMENT REQUEST BY THE OWNER. THE AFFIDAVIT SHALL BE SIGNED, DATED, AND NOTARIZED.

State of _____)
) ss.
County of _____)

I hereby certify to the best of my knowledge and belief, that all items and amounts shown in this estimate are correct; that all work has been performed and materials supplied in full accordance with the requirements of the referenced contract, and duly authorized substitutions, alterations, additions, and deletions; and that the attached Progress Payment request is a true statement of the contract amount up to and including the last day of the period covered by this estimate. I further certify that all suppliers, subcontractors, lessors, and laborers incorporated in this project to date have been paid for materials and services furnished under this contract, and that these are free and clear of all liens, claims, security interests, and encumbrances. I also certify that previous Progress Payments (if any) received for work under this contract have been applied to discharge in full the obligations of the undersigned incurred in connection with this work.

CONTRACTOR: _____ DATE: _____

BY:_____ TITLE: _____

_____
Notary Public

_____
Date

FINAL PAYROLL AFFIDAVIT
(Contractor or Subcontractor)

I, _____
(Name of person signing affidavit) *(Title)*
of the _____, do hereby certify that the wages paid to all employees for the full number of hours worked in connection with the Contract to the Improvement, Repair and Construction of: _____

_____ during the following period from _____ to _____

_____ is in accordance with the prevailing wages prescribed by the Contract Document. I further certify that no rebates or deductions for any wages due any person have been directly or indirectly made other than those provided by law.

_____
(Signature of Officer or Agent)

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

_____
Notary Public

The above affidavit must be executed and sworn to by the officer or agent or the Contractor or Subcontractor who supervises the payment of employees, before the Owner will release the surety and/or make final payment due under the terms of the Contract.

CHANGE ORDER

Order No. _____

Date: _____

Name of Project:_____

Owner:_____

Contractor: _____

The following changes are hereby made to the Contractor Documents:

Justification: _____

_____

_____

_____

Original contract price: $_____

Current contract price adjusted by previous change order $_____

The contract price due to this change order
will be (increased) (decreased) by: $_____

The new contract price including
this change order will be $_____

Change to contract time:

The contract time will be increased by ____ calendar days.

The date for completion of all work will be _____.

Approved by: _____
(Contractor)

Approved by: _____
Stantec Consulting Services Inc.

Approved by: _____
(Owner)

REQUEST FOR INFORMATION

From: _____ RFI Number: _____

_____ Date: _____

_____ Project: _____

_____ _____

Submitted to: ENGINEER – Stantec Consulting Services Inc. _____

Contract: _____

Specification Section: _____ Paragraph: _____ Drawing Reference: _____ Detail: _____

Request:

☐ Attachments

Signed by:

Response:

☐ Attachments

Follow-up: ☐ Contract Clarification ☐ Field Order ☐ Work Change Directive ☐ Proposal Request

Signed by: _____ Date: _____

ENGINEER – Stantec Consulting Services Inc.

Copy: ☐ OWNER ☐ CONTRACTOR ☐ RPR ☐ CPM ☐ Shop Dwg. File

SAMPLE

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

You are directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

_____

_____

Purpose for Work Change Directive:

☐ Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

☐ Nonagreement on pricing of proposed change.

☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price $ _____ (increase/decrease) Contract Time _____ days (increase/decrease)

If the change involves an increase, the estimated amounts are not to be exceeded without further authorization.

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Accepted for Contractor by:	Date
Approved by Funding Agency (if applicable):	Date:

SAMPLE

SAMPLE

Field Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Attention:

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.05A., for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____ _____

(Specification Section(s)) (Drawing(s) / Detail(s))

Description:

Attachments:

Engineer:

Receipt Acknowledged by (Contractor):	Date:

Copy to Owner

EJCDC No. C-942 (2002 Edition)
Prepared by the Engineers' Joint Contract Documents Committee and endorsed by the Associated General Contractors of America and the Construction Specifications Institute.

SAMPLE

SAMPLE

Stantec Consulting Services Inc.
Submittal Review Sheet

Project Name: Additional Hydraulic Improvements

Submittal ID: _____ - _____ - _____ - _____
(Contract No.) (Submittal No.) (Spec. Section) (Review No.)

Description: This submittal includes the _____ shop drawing review.

Contractor	Subcontractor/Supplier
Company Name: _____	_____
Address: _____	_____
_____	_____

Comments: This submittal has been reviewed by Stantec _____.

1.

- ☐ No Exceptions Noted
- ☐ Exceptions Noted
- ☐ Returned for Correction
- ☐ Record Copy
- ☐ Returned without Review

_____ Coordinator

_____ Date

Date Received	Date Returned

Review by Stantec is for the sole purpose of ascertaining general conformity with design. Contractor is responsible for dimensions, fabrication and construction methods, coordinating of sub-trades, detail design of components and errors or omissions on shop drawings.

Signed: _____

Contact Name: _____

Telephone No: _____

Reviewed: _____

PARTIAL PAYMENT ESTIMATE
ESTIMATE OF WORK COMPLETE

ESTIMATE NO. _____. PO # _____.
FOR PERIOD: _____ TO _____.
PROJECT: **ADDITIONAL HYDRAULIC IMPROVEMENTS**
LOCATION: **CITY OF FINDLAY, HANCOCK COUNTY, OHIO**
NAME OF CONTRACTOR: _____

ITEM NO.	DESCRIPTION OF ITEM	CONTRACT				COMPLETE TO DATE		
		QTY.	UNITS	UNIT COST	TOTAL	QTY.	COST TO DATE	PERCENT COMPLETE
TOTAL				**$0.00**		**$0.00**		

SCHEDULE OF CONTRACT CHANGE ORDERS:

List every change order issued to date of this request even if no work has been done under on or more such orders.			REVISIONS TO ORIGINAL CONTRACT PRICE		
Contract Change Order			Total Cost of Items Added by Change Order	Total Cost of Items Deleted by Change Order	Cost of Change Order Items Completed to Date
No.	Date	Description	(Column 1)	(Column 2)	
		TOTAL			

ANALYSIS OF ADJUSTED CONTRACT AMOUNT TO DATE:

(a) Original contract amount..... **$**_____
(b) Plus: Additions scheduled on (Column 1) above..... _____
(c) Less: Deductions scheduled on (Column 2) above..... _____
(d) Adjusted contract amount to date..... _____

ANALYSIS OF WORK PERFORMED

(a) Cost of original contract work performed to date..... _____
(b) Extra work performed to date..... _____
(c) Total cost of work performed to date ..... _____
(d) Less: Amount retained in accordance with contract terms
(Show both percent and dollar amount)..... _____ % _____
(e) Net amount earned on contract work to date ..... _____
(f) Add: Materials stored at close of this period
(Attach detailed schedule _____%)..... _____
(g) Subtotal of (e) and (f)..... _____
(h) Less: Amount of previous payments..... _____
(i) BALANCE DUE THIS PAYMENT..... _____
(j) Estimated percentage of construction work completed..... _____
(k) Percentage of contract time elapsed ..... _____

I hereby certify to the best of my knowledge and belief, that all items and amounts shown in this estimate are correct; that all work has been performed and/or material supplied in full accordance with the requirements of the referenced contract, and/or duly authorized deviations, substitutions, alterations, and/or additions; that the foregoing is a true statement of the contract amount up to and including the last day of the period covered by this estimate.

_____ _____
(Contractor) (Date)

_____ _____
(Signature of Authorized Representative) (Title)

I hereby certify that I have carefully inspected the work and as a result of my inspection and to the best of my knowledge and belief, the quantities shown in this estimate are correct and have not been shown in previous estimates and all materials purchased and all work performed is in accordance with the Contract Documents.

Stantec Consulting Services Inc. _____ _____
(Engineering Firm) (Date)

_____ _____
(Signature of Authorized Representative) (Title)

Approved _____ _____
(Owner) (Date)

CERTIFICATE OF SUBSTANTIAL COMPLETION

Project Additional Hydraulic Improvements
Engineer's Project No. 174316204
Owner Maumee Watershed Conservancy District
Contractor _____
Contract Date _____

The Work to which this Certificate applies has been inspected by authorized representatives of CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on:

_____
Date of Substantial Completion

The date of Substantial Completion is the date upon which all guarantees and warrantees begin, except as follows:

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

Executed by ENGINEER on _____, 20_____.

_____
ENGINEER

By _____

The CONTRACTOR accepts this certificate of substantial completion on _____, 20_____.

_____
CONTRACTOR

By _____

This page was intentionally left blank.

SUPPLEMENTARY CONDITIONS

These Supplementary conditions amend or supplement the Standard General Conditions of the Construction Contract (No. C-700) (2013 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

S.C. 1.01.A.24 DEFINED TERMS

Change the defined word "Liens" to "Mechanics Liens"

S.C. 5.01.B AVAILABILITY OF LANDS

Delete Paragraph 5.01.B. of the General Conditions in its entirety and insert the following in its place:

5.01.B. The Owner shall provide the Contractor with information necessary for filing a mechanic's lien. The information provided shall vary with the type of improvement project. Public improvements and private improvement requirements are detailed below.

1. The Owner of a public improvement project must prepare a Notice of Commencement which shall contain the following: the name, location and identification number of the project; the name and address of the Owner; the name, address and trade of all principal Contractors; the name and address of all sureties for those principal Contractors; the name and address of the representative of the Owner and any other information required by law. The Notice of Commencement shall be made available to anyone upon request.

2. Prior to the commencement of construction, the Owner of a private improvement project shall file a Notice of Commencement with the Recorder of the County or Counties in which the project is located. This Notice shall include the following: a legal description of the property; the names and address of the Owner; the original Contractors (those Contractors with whom the Owner has a direct contract); bonding companies and any other information required by law. Although the Owner has the right to file an amended affidavit to correct any errors, the Owner shall be liable for any loss of lien rights resulting from incorrect information provided on the Notice of Commencement. The Owner shall post and maintain a copy of the Notice of Commencement at a conspicuous place at the project site. The Owner shall serve the Notice of Commencement upon all original Contractors, and within ten (10) days, upon any other person requesting a copy.

S.C. 5.03.C SUBSURFACE AND PHYSICAL CONDITIONS

Add the following new paragraphs immediately after Paragraph 5.03.C:

5.03.C. In the preparation of drawings and specifications, Engineer or Engineer's Consultants relied upon the following reports of explorations and tests of subsurface conditions at the site:

a. Report dated _____

Prepared by _____

Titled _____

5.03.D. In the preparation of drawings and specifications, a Wetland Determination was conducted. The results of this Determination are included in the following report:

a. Report dated _____

Prepared by _____

Titled _____

5.03.E. In the preparation of drawings and specifications, Engineer or Engineer's Consultants relied upon the following drawings of physical conditions in or relating to existing surface and subsurface structures (except underground facilities) which are at or contiguous to the site:

a. Report dated _____

Prepared by _____

Titled _____

5.03.F. In the preparation of drawings and specifications, a Threatened and Endangered Species Determination was conducted. The results of this Determination are included in the following report:

a. Letter dated _____

Prepared by _____

Titled _____

b. TAILS# _____

Prepared by _____

S.C. 5.06.A HAZARDOUS ENVIRONMENTAL CONDITION AT SITE

Add the following new paragraphs to the end of Paragraph 5.06.A:

In the preparation of drawings and specifications, Engineer or Engineer's Consultant relied upon the following reports or drawings relating to a Hazardous Environmental Condition identified at the site:

a. Report dated _____

Prepared by _____

Title _____

S.C. 5.06.I HAZARDOUS ENVIRONMENTAL CONDITION AT SITE

Delete Paragraph 5.06.I. of the General Conditions in its entirety.

S.C. 6.03 CONTRACTOR'S INSURANCE

Add the following new paragraphs immediately before Paragraph 6.03.A

The limits of liability for the insurance required by paragraph 6.03 of the General Conditions shall provide the following coverages for not less than the following amounts or greater where required by Laws and Regulations:

S.C. 6.03.A Worker's Compensation of the General Conditions:

1.	State:	Statutory
2.	Applicable Federal (e.g., Longshoreman's):	Statutory
3.	Employer's Liability:	$1,000,000

S.C. 6.03.B. Commercial General Liability Insurance of the General Conditions, which shall also include completed operations and product liability coverage:

1.	General Aggregate (Except Products-- Completed Operations)	$5,000,000
2.	Products--Completed Operations Aggregate	$5,000,000
3.	Personal and Advertising Injury (Per Person/ Organization)	$1,000,000
4.	Each Occurrence (Bodily Injury and Property Damage)	$1,000,000

5. Property Damage liability insurance will provide explosion, collapse, and underground coverages where applicable.

6. Excess Liability

General Aggregate	$5,000,000
Each Occurrence	$1,000,000

S.C. 6.03.C.

The Contractual Liability coverage required by paragraph 6.03.C. of the General Conditions shall provide coverage for not less than the following amounts:

1.	General Aggregate	$5,000,000
2.	Each Occurrence (Bodily Injury and	

Property Damage) $1,000,000

S.C. 6.03.D. Automobile Liability:

1. Bodily Injury:

$1,000,000 Each Person

$1,000,000 Each Accident

Property Damage:

$1,000,000 Each Accident or

2. Combined Single Limit (Bodily Injury and Property Damage): $5,000,000 Each Accident

S.C. 6.03.G. Names of additional insureds is as follows:

Stantec Consulting Services Inc.
4540 Heatherdowns Boulevard, Suite A
Toledo, Ohio 43614
(419) 380-8910

(Name) Maumee Watershed Conservancy District
(Address) 1464 Pinehurst Drive, Defiance, Ohio 43512

S.C. 6.03.I Additional types and amounts of insurance required by the Owner are as follows:

No other requirements.

S.C. 6.05 PROPERTY INSURANCE

Delete Section 6.05.A of the General Conditions and replace with the following:

6.05.A Contractor shall purchase and maintain property insurance upon the Work at the site in the amount of full replacement cost thereof (subject to such deductible amounts as may be provided in these Supplementary Conditions or required by Laws and Regulations). This insurance shall:

6.05.A.1 Include the interests of Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

6.05.A.2 Be written on a Builder's Risk, "all-risk", or open peril, or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework and work in transit and shall insure against at least the following perils: fire, lightening, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement

of Laws and Regulations, water damage, and such other perils as may be specifically required by the Supplementary Conditions;

6.05.A.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);

6.05.A.4 Cover materials and equipment in transit for incorporation into the Work or stored at the site or at another location that was agreed to in writing by Owner prior to being incorporated into the work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer; and

6.05.A.5 Allow for partial utilization of the work by Owner;

6.05.A.6 Include testing and start-up; and;

6.05.A.7 Be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor and Engineer with thirty days written notice to each other additional insured to whom a certificate of insurance has been issued.

6.05.B All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained by Contractor in accordance with paragraphs in 6.05 A and B will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least thirty days' prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 6.06.

6.05.C Contractor shall not be responsible for purchasing and maintaining any property insurance to protect the interests of Owner, 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 Owner, 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.

6.05.D If Owner requests in writing that other special insurance be included in the property insurance policies provided under paragraphs in 6.05.A or B, Contractor shall, if possible, include such insurance, and the cost thereof will be charged to Owner by appropriate Change Order or Written Amendment. Prior to commencement of the work at the site, Contractor shall in writing advise whether or not such other insurance has been produced by Owner.

6.05.E Partial Occupancy or Use by Owner: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance, unless Owner secures other insurance.

S.C. 6.06 WAIVERS OF RIGHTS

Modify paragraph 6.06.A of the General Conditions as follows:

Delete the last two lines of paragraph 6.06.A and replace with the following:

"held by Owner or Contractor as trustee or otherwise payable under any policy so issued."

Delete the last subparagraph of 6.06.C and replace with the following:

6.06.C. Any insurance policy maintained by Contractor covering any loss, damage, or consequential loss referred to in this paragraph 6.06.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 any of Owner, Subcontractors, Engineer, Engineer's Consultants and the officers, directors, employees, and agents of any of them.

S.C. 6.07 RECEIPT AND APPLICATION OF PROPERTY INSURANCE PROCEEDS

Delete Section 6.07. of the General Conditions and replace with the following:

A. Unless otherwise directed by Owner, any insured loss under the policies of insurance required by paragraphs 6.05.A and 6.05.B will be adjusted with Contractor and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 6.07.B. Contractor 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. Additional time to replace or repair the work shall be covered by an appropriate Change Order or Written Amendment.

B. Unless otherwise directed by Owner, Contractor 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 fifteen days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, Contractor 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, Contractor as fiduciary shall adjust and settle the loss with the insurers.

S.C. 7.06 CONCERNING SUBCONTRACTOR, SUPPLIERS, AND OTHERS

Delete Section 7.06.N of the General Conditions and replace with the following:

7.06.N Owner or Engineer may furnish to any such Subcontractor, Supplier or other person or organization, to the extent practicable, information about amounts paid to Contractor in accordance with Contractor's Applications for Payment on account of the particular Subcontractor's, Supplier's, other person's or other organization's work.

S.C. 7.07 PATENT FEES AND ROYALTIES

Delete the last six (6) words of paragraph 7.07.C of the General Conditions, which are "not specified in the contract documents."

S.C. 7.09 TAXES

Add the following sentence to paragraph 7.09 of the General Conditions:

"If this project is funded by a public agency, Contractor should contact the Owner for the appropriate sales tax exemption certificate(s) for materials and equipment."

S.C. 7.16 SHOP DRAWINGS AND SAMPLES

Modify paragraphs within Section 6.17 of the General Conditions by deleting the words "and approval" at the following locations in the referenced subparagraphs:

7.16.D.1, Line 2	7.16.D.4, Line 1
7.16.D.2, Line 1	7.16.D.5, Line 1
7.16.D.3, Line 1	7.16.D.6, Line 1

Modify paragraph 7.16.D.7 of the General Conditions by deleting the words "acceptance or approval" and replace with "or acceptance".

Modify paragraph 7.16.E.1 of the General Conditions by deleting the words "and approval".

S.C. 9.06.A INSURANCE

Delete paragraph 9.06.A of the General Conditions in its entirety and insert the following in its place:

9.06.A Owner's and Contractor's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 6.03 through 6.05 of the General Conditions.

S.C. 10.01 OWNER'S REPRESENTATIVE

Delete paragraph 10.01.A of the General Conditions in its entirety and insert the following in its place:

10.01.A If the Owner authorizes the services of a Project Representative by the Engineer, the Engineer shall provide one or more full-time resident project representatives to assist the Engineer in carrying out his responsibilities at the site. The duties, responsibilities, and limitation of authority of any such Project Representative shall be to endeavor to further protect the Owner against defects and deficiencies in the work. But the furnishing of such Project Representative(s) shall not make the Owner or Engineer responsible for construction means, methods, techniques, sequences, or procedures or for any safety precautions or programs in connection with the Work.

The duties and responsibilities of the Project Representative shall be strictly limited to those as outlined in Section 00800A.

The Owner, Engineer and Project Representative will not be responsible for the acts or omissions of the Contractor or any Subcontractors, or any of his or their agents or employees, or any other persons at the site or otherwise performing any of the work.

S.C. 10.07 DECISIONS ON REQUIREMENTS OF CONTRACT DOCUMENTS AND ACCEPTABILITY OF WORK

Delete paragraph 10.07 of the General Conditions in its entirety and insert the following in its place:

10.07.A Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes, and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and Claims under Articles 11 and 13 in respect of changes in the Contract Price or Contract Times will be referred initially to Engineer in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant to Engineer and the other party to the Agreement promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to Engineer and the other party within sixty days after the start of such occurrence or event unless Engineer allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to Engineer and the claimant within thirty days after receipt of the claimant's last submittal (unless Engineer allows additional time). If either side objects to the Engineer proceeding with resolution of the claim or dispute, then the Engineer shall withdraw from deciding the dispute. The objecting party shall notify the Engineer and the other party involved in the claim or dispute of such objection at the time written notice to the dispute is issued, as previously indicated in this paragraph. The Engineer will then submit to the parties involved in the claim or dispute the names of three mediators, one of which shall be selected by the parties involved to perform the duties assigned to the Engineer as prescribed in paragraphs 10.07.A and 10.07.B. If the parties involved in the dispute cannot agree on the selection of a mediator, then the mediator shall be selected by the Engineer from the list submitted by Engineer. The costs of the mediator shall be equally shared by the parties involved in the dispute.

10.07.B If neither side objects to the Engineer proceeding to resolve the dispute, the Engineer shall proceed in the following manner. Engineer will render a formal decision in writing within thirty days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. Engineer's written decision on such claim, dispute or other matter will be final and binding upon Owner and Contractor unless a written notice of intention to appeal from Engineer's written decision is delivered by Owner or Contractor to the other and to Engineer within thirty days after the date of such decision.

10.07.C An appeal from a decision of the Engineer, or a dispute that is not resolved through a mediator, shall be decided by an independent person acceptable to both parties, or, if no one person is acceptable to both parties, the Owner shall appoint a person, the Contractor shall appoint a person, and the two people so appointed shall select a third person. The determination of a majority of people so selected shall be binding upon Owner and Contractor. All costs of such dispute resolution shall be borne one-half by the Owner and one-half by the Contractor.

S.C. 10.08 LIMITATIONS ON ENGINEER'S AUTHORITY AND RESPONSIBILITIES

Delete subparagraph 10.08.A in its entirety. Renumber subparagraphs 10.08.B thru E as 10.08.A thru D.

S.C. 15.01 PROGRESS PAYMENTS

Change the word "ten", on Line 1 of paragraph 15.01.D.1 of the General Conditions, to "thirty".

S.C. 15.03 SUBSTANTIAL COMPLETION

Add the following paragraph after 15.03.A, and renumber 15.03.B thru 15.03.F as 15.03.C thru 15.03.G:

15.03.B Substantial Completion shall be defined as the completion of all Bid Items, as described in the Proposal Form.

S.C. 18.09 CONTRACT DOCUMENTS IN ORDER OF PRECEDENCE

Add the following paragraph after Section 18.09 of the General Conditions:

18.09 Contract Documents in Order of Precedence

18.09.A. The order of precedence for the Contract Documents is as follows:

18.09.A.1. Contract or Agreement

18.09.A.2. Detailed Specifications (Division 1 through Division 16, as applicable)

18.09.A.3 Construction Drawings

18.09.A.4 City of Findlay Drawings (Sheets 62-67)

18.09.A.5 Ohio Department of Transportation (ODOT) Supplemental Specifications

18.09.A.6 ODOT Construction & Materials Specifications, Dated 2016

ATTACHMENT 00800 A

DUTIES, RESPONSIBILITIES, AND LIMITATIONS
OF AUTHORITY OF THE
RESIDENT PROJECT REPRESENTATIVE
AS SET FORTH IN THE OWNER AGREEMENT

The Engineer will establish and implement a program to monitor the quality of the construction work, the purpose of which will be to assist in guarding Owner against defects and deficiencies in the work of the Contractor. The project proposal, project plans and the specifications shall be used as the basis for construction inspection. The Engineer will reject work and will transmit to Owner and Contractor a notice of non-conforming work when it is determined by the Owner or Engineer that the Work does not conform to the requirements of the Contract Documents. The Engineer will make recommendations to Owner for corrective action to be performed when a Contractor's work does not conform to the requirements of the Contract Documents.

The number and special qualifications of Resident Project Representation personnel will be as appropriate to the needs and schedule of the Project, subject to the concurrence of Owner. Resident Project Representation personnel will observe work for its full durations and will be continuously aware of the status of the Contractor's work. In order to obtain the orderly progress of the work and protect Owner against claims by construction Contractor's, it is absolutely essential that the hallmark of the Resident Project Representation be prompt, decisive, but properly considered, action in regard to the observation and review of ongoing work. Resident Project Representation personnel will maintain a record of the quality of the work, will assess pertinent features of the installation, will observe and report damages to property, will compile discrepancy reports, will participate in observing required testing, start-up activities, and remedial measures, and will participate in the final overviews of the Project pursuant to acceptance.

The Resident Project Representative and assistants will observe the Contractor's work and perform the services listed below. The Resident Project Representative shall not have responsibility for the superintendence of construction site conditions, safety, safe practices or unsafe practices or conditions, operation, equipment, or personnel other than employees of the Engineer. This service will in no way relieve the Contractor of complete supervision and inspection of the work or the Contractor's obligation for complete compliance with the drawings and specifications. The Contractor shall have sole responsibility for safety and for maintaining safe practices and avoiding unsafe practices or conditions.

The Engineer is not authorized as a part of this service to change or release any requirements of Contract Documents. All changes to the Contract between Owner and Contractor will be by change orders executed by Owner. Communication between the Engineer and Contractor with regard to Resident Project Representation will not in any way be construed as binding the Engineer or Owner, or releasing the construction Contractor from the obligation for fulfillment of any of the terms of the Contract Documents. It is understood that the Engineer's action in providing quality review as stated herein is a service to Owner and, by performing as provided herein the Engineer, its officers, agents and employees shall not be responsible for Errors or Omissions in the construction inspection unless the inspection was performed in whole or in part by the Engineer, its officers, agents and employees, and then only responsible for their own

negligent acts, errors or omissions. The Engineer, its officers, agents and employees shall not be responsible for injury, sickness, disease, or death, or loss to or loss of tangible property of others, or project, when such injury, sickness, disease, or death, or loss to or loss of use of tangible property which results from actions, directions, or instructions either specifically given or failed to be given by Owner employees, who actually direct and control the Engineer. No action taken by the Engineer shall relieve any or all of the construction Contractors from their obligation to perform their work in strict conformity with the Contract Documents, and in strict conformity with all other applicable laws, rules and regulations.

Specific services performed by the Resident Project Representative and assistants are as follows:

1) Site Observations and Liaison with Owner and Contractor(s)

a) Conduct onsite observations of the general progress of the work to assist Engineer in determining if the work is proceeding in accordance with the construction contract documents.

b) Serve as Engineer's liaison with the Contractor, working principally through the Contractor's superintendent, and assist Engineer in providing interpretation of the construction contract documents. Transmit Engineer's clarifications and interpretations of the construction contract documents to the Contractor.

c) Assist Engineer in serving as Owner's liaison with the Contractor when the Contractor's operations affect Owner's onsite operation.

d) As requested by Engineer, assist in obtaining from Owner additional details or information when required at the jobsite for proper execution of the work.

e) Report to Engineer, giving opinions and suggestions based on the Resident Project Representative's observations regarding defects or deficiencies in the Contractor's work and relating to compliance with drawings, specifications, and design concepts.

f) Advise Engineer and the Contractor or its superintendent immediately of the commencement of any work requiring a shop drawing or sample submission if the submission has not been accepted by Engineer.

g) Monitor changes of apparent integrity of the site (such as differing subsurface and physical conditions, existing structures, and site-related utilities when such utilities are exposed) resulting from construction-related activities.

h) Observe pertinent site conditions when the Contractor maintains that differing subsurface and physical conditions have been encountered, and document actual site conditions. Review and analysis of the Contractor's claims for differing subsurface and physical conditions are supplemental services.

i) Review the Contractor's construction sequence and traffic control plans for all construction work undertaken simultaneously.

j) Verify that the Contractor has contacted utilities in the general construction

area and advised them of Contractor's schedule. Assist in coordinating scheduling of utility activities to minimize conflicts with Owner's activities.

k) Establish and furnish the Contractor with necessary baselines and control points that will be used as datum for the work. The Contractor will do actual construction staking.

l) Provide, through a subcontract, necessary surveying to re-establish streets to preconstruction grade and referencing and re-establishing land surveying movements. In easement areas, mark the easement limits.

m) Visually inspect materials, equipment, and supplies delivered to the work site. Reject materials, equipment, and supplies that do not conform to the construction contract documents.

n) Coordinate onsite materials testing services during construction. Copies of testing results will be forwarded to Owner for review and information.

o) Observe field tests of equipment, structures, and piping, and review the resulting reports, commenting to Engineer, as appropriate.

2) Outside Liaison and Public Information Services

a) Accompany visiting inspectors representing public or other agencies having jurisdiction over the project. Record the names of the inspectors, and the results of the inspections, and report to Engineer.

b) Provide personnel and facilities for dealing with telephoned or written complaints and other communications related to the construction of the project.

c) Provide the necessary services in connection with public information and notification of individual property owners during construction.

d) Meetings, Reports, and Document Review and Maintenance

e) Attend the preconstruction conference, and assist Engineer in explaining administrative procedures that will be followed during construction.

f) Schedule and attend monthly progress meetings and other meetings with Owner and the Contractor when necessary, to review and discuss construction procedures and progress scheduling, engineering management procedures, and other matters concerning the project.

g) Submit to Engineer, with a copy to Owner, weekly and monthly construction progress reports containing a summary of the Contractor's progress, general condition of the work, problems, and resolutions or proposed resolutions to problems.

h) Review the progress schedule, schedule of shop drawings submissions, and schedule of values prepared by the Contractor, and consult with Engineer concerning their acceptability.

i) Report to Engineer regarding work which is known to be defective, or which fails any required inspections, tests, or approvals, or has been damaged prior to final payment; and advise Engineer whether the work should be corrected or rejected, or should be uncovered for observation, or requires special testing, inspection, or approval.

j) Review applications for payment with the Contractor for compliance with the established procedure for their submission, and forward them with recommendations to Engineer, noting particularly their relation to the schedule of values, work completed, and materials and equipment delivered at the site, but not incorporated into the work.

k) Record date of receipt of shop drawings and samples. Receive samples that are furnished at the site by the Contractor, and notify Engineer of their availability for examination.

l) During the course of the work, verify that specified certificates, operation and maintenance manuals, and other data required to be assembled and furnished by the Contractor are applicable to the items actually installed; and deliver this material to Engineer for his review and forwarding to Owner prior to final acceptance of the work.

m) Maintain a marked set of drawings and specifications at the jobsite based on data provided by the Contractor. This information will be combined with information from the record documents maintained by the Contractor, and a master set of documents conforming to construction records will be produced.

n) Review certificates of inspections, tests, and related approvals submitted by the Contractor as required by laws, rules, regulations, ordinances, codes, orders, or the Contract Documents (but only to verify that their content complies with the requirements of, and the results certified indicate compliance with, the construction contract documents). This service is limited to a review of items submitted by the Contractor and does not extend to a determination of whether the Contractor has complied with all legal requirements.

3) Maintain the following documents at the jobsite.

a) Correspondence files.
b) Reports of jobsite conferences, meetings, and discussions among the Engineer, Owner, and Contractor.
c) Submittals of shop drawings and samples.
d) Reproductions of original construction contract documents.
e) Addenda.
f) Change orders.
g) Field orders.
h) Additional drawings issued subsequent to execution of the construction contract documents.
i) Progress reports.
j) Names, addresses, and telephone numbers of all contractors, subcontractors, and major suppliers of materials and equipment.

4) Maintain a daily diary or logbook of events at the work site, including the following information:

a) Days the Contractor worked on the work site.
b) Contractor and subcontractor personnel on jobsite.
c) Construction equipment on the jobsite.
d) Observed delays and causes.
e) Weather conditions.
f) Data relative to claims for extras or deductions.
g) Daily activities.
h) Observations pertaining to the progress of the work.
i) Materials received on jobsite.

The diary or logbook shall remain the property of Engineer.

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SECTION 01040

WORK RESTRICTIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Work Hours.

B. Work Sequence and Constraints.

C. Construction Entrances and Laydown Areas.

D. Haul Routes.

1.03 WORK HOURS

A. Except as otherwise indicated in this Section, construction activities shall be limited to the Workday defined by the City of Findlay, 7:00 AM to 5:30 PM Monday through Friday, but no sooner than sunrise and no later than sunset.

B. Work hours outside of the workday or Contractor's normal work schedule, including additional hours per day or days per week, may be required to comply with certain work restrictions and milestones. The Contractor shall bear sole responsibility for scheduling the Work and providing necessary resources and labor to complete the Work within the established work restrictions or milestone times at no additional cost to the Owner.

C. Weekend and holiday work is not permitted, unless specifically authorized by the Owner. Forty-eight (48) hours' notice is required in requesting weekend and holiday work.

1.04 WORK SEQUENCE AND CONSTRAINTS

A. The Work under this Contract shall be scheduled and executed with minimal impact on City of Findlay operations.0

B. Scheduling for the construction and demolition of the facilities shown shall incorporate the following constraints.

1. Locally observed statutory holidays include:

a. New Year's Day

b. Martin-Luther King Day

c. President's Day

d. Good Friday

e. Memorial Day

f. Fourth of July

g. Labor Day

h. Thanksgiving Day

i. Day after Thanksgiving Day

j. Christmas Eve Day

k. Christmas Day

2. Contractor shall assume that no work may occur on the above observed holidays, unless otherwise approved by the Owner in writing at least seven (7) calendar days in advance of such holiday.

3. No tree clearing shall occur between April 1 and September 30 of any year.

4. No in-stream work shall occur within the Blanchard River between April 15 and June 30 of any year due to spawning. Contractor may submit a request to the Engineer no later than February 15 for assistance in coordination of a waiver with the applicable regulatory agencies. A formal waiver is not guaranteed and the Engineer cannot warrant that a waiver will be granted.

5. Mussel rescue and relocations shall not occur between October 1 and May 1. Contractor shall not perform in-stream work without prior approval from the Engineer. Mussel rescue and relocations shall occur concurrently with the removal of each of the four in-stream structures.

6. Contractor shall avoid disturbance of any areas outside of the limits of disturbance shown on the plans. All damages and costs incurred, including but not limited to site restoration, fines and penalties, caused by exceeding the limits of disturbance shall be addressed at no expense to the Owner.

C. Refer to Sht. 03 of the plans for a suggested sequence of construction and listing of additional constraints.

1.05 CONSTRUCTION ENTRANCES AND LAYDOWN AREAS

A. Construction entrances are shown on the project Plans.

B. Contractor shall limit all access to and from the work sites to the construction entrances shown. Entrances shall be as follows:

1. Excavation west of Main Street: Gravel entrance on the east side of Cory Street, just North of the River.

2. Excavation east of Main Street: South side of Clinton Court just west of the CSX Railroad.

3. Excavation east of Main Street: South side of Clinton Court just east of Main Street.

4. In stream riffle construction: North side of the Blanchard River from the project area.

C. Laydown Areas provided for use by the Contractor and Limits of Disturbance shall be as designated on the project Plans. Contractor shall not utilize or otherwise disturb any areas outside of the designated Laydown Areas and defined Limits of Disturbance, unless otherwise directed in writing by the Owner and Engineer.

D. All areas disturbed by the Contractor shall be restored and permanently seeded to the satisfaction of the Owner and City of Findlay.

1.06 HAUL ROUTES

A. Contractor shall submit a listing of proposed haul routes for each proposed work site to the Engineer for review and approval by the City of Findlay.

B. In development of proposed haul routes, Contractor shall limit construction traffic from utilizing the following streets at any time:

1. Clinton Street
2. Taylor Street, north of the project area
3. Jefferson Street, north of the project area
4. Main Street

C. PRODUCTS

Not used.

PART 2 EXECUTION

Not Used.

END OF SECTION

SECTION 01043

COORDINATION AND CONTROL OF THE WORK

PART 1 GENERAL

1.01 SCOPE

A. This Section includes coordination and control of the Work.

1.02 SUBMITTALS

A. Submittals shall be in accordance with all requirements of Section 01300 and shall include:

1. Information for the Record:

a. Maintenance of Flow Plan – The Maintenance of Flow Plan shall outline the means, methods, procedures and construction sequencing that will be utilized to ensure flow is maintained within the existing combined sewer system during the construction of sanitary sewers and structures. The plan shall address any and all necessary temporary facilities, pumping equipment, flumes, plugs, pipelines, or other means that will be utilized. The Contractor will be responsible to maintain flows without diminishing the existing capacity of the sewer system and regulators and without causing or creating additional surcharging, backups, flooding or combined sewer overflows.

b. Haul Routes to and from the project area.

c. Maintenance of Traffic Plan.

d. Letter(s) from the Owner(s) of any potential disposal sites accepting spoil material generated by the Contractor.

e. Construction Progress Schedule.

1.03 CONFORMITY WITH DRAWINGS AND SPECIFICATIONS

A. All Work shall conform to the lines, grades, cross sections, dimensions, and directions shown on the Drawings and specified unless altered by the Engineer. The Engineer shall approve in writing all alterations and deviations that are required or desired.

B. Professional Engineers registered in the State of Ohio shall perform all field engineering. Professional Surveyors registered in the State of the project location shall perform all surveying. Engineers and Surveyors, acceptable to the Owner, shall submit Insurance Certificates giving evidence that they have current Errors and Omissions insurance coverage. The Contractor's Engineers and Surveyors shall:

1. Unless performed by the Owner verify and protect all survey control and reference points before starting field construction work. If a survey control or reference point is disturbed, notify the Owner prior to re-establishing. Any discrepancies shall be promptly reported to the Owner for resolution.

2. Unless performed by Owner, establish and periodically verify elevations, lines, grades, and levels. Locate and lay out all improvements by surveying or other appropriate instruments. Verify that all proposed improvements are constructed on Owner's property and that dimensions, locations, angles, and elevations of the constructed work are in accordance with the Drawings. On unit price items, determine and certify quantities for payment requests.

C. All work under this Contract shall be built in accordance with the lines and grades shown on the Drawings or as altered or modified by authority of the Owner and Engineer.

D. Contractor shall field verify horizontal and vertical locations and alignments of all pipes and structures prior to submitting shop drawings for proposed structures. In the event that the verified existing invert elevations do not match the plan inverts, the verified invert elevations shall take precedence.

E. Contractor shall be responsible to provide construction layout stakes in accordance with ODOT Item 623, as modified by these contract documents. Engineer will provide to Contractor electronic CAD point files to aid in construction staking following receipt of a release and indemnification prepared and provided by Engineer and to be executed by Contractor.

F. Contractor shall maintain a set of Contract Documents solely for use as the Project Record Documents. The Project Record Documents shall note all deviations from the original bid documents and reflect actual constructed conditions. Contractor shall have Project Record Documents available at each progress meeting to verify that deviations are being recorded as they are encountered.

1.04 EXISTING STRUCTURES SHOWN ON DRAWINGS

A. Where existing underground and surface structures are shown on the Drawings, the location, depth and dimensions of such structures are believed to be reasonable correct but are not guaranteed. The Contractor shall field verify the location, depth and dimensions of such structures and notify the Owner and Engineer of any variations prior to the start of the work on such structures.

B. Structures shown are based on available information, but not to be construed as a representation that such structures will, in all cases, be found or encountered exactly where shown, or that they represent all the structures which may be encountered.

1.05 COOPERATION OF CONTRACTOR

A. The Contractor shall conduct his operations so as to interfere as little as possible with those of the Owner, other contractors, utilities, or any public authority on or near the work.

B. The Owner reserves the right to perform other work by contract or otherwise, and to permit other public bodies, public utility companies, and others to do work on or near the project during progress of the Work. If a conflict arises, the Owner shall determine when and how the Work shall proceed.

C. The Contractor shall work with the Owner and/or nearby businesses to coordinate schedules during special events. Such special events will be determined by the Owner.

D. Claims for delay or inconvenience due to operations of such other parties on work specified, shown on the Drawings, as directed or which can be reasonably expected to be encountered by the nature and location of the Work will not be considered.

1.06 MAINTENANCE OF SANITARY SYSTEM DURING CONSTRUCTION

A. At the Owners discretion, interruption of existing combined or sanitary system flow may be necessary or allowed to the Contractor in areas that require temporary measures to lessen flow. If system maintenance is necessary, it shall be approved by Owner, executed only during periods designated by the Owner and properly coordinated to not adversely reduce flow within the system.

B. Bypassing of untreated sanitary wastewater to any stream or body of water is strictly prohibited.

1.07 PERMANENT PAVEMENT AND FINAL RESTORATION

A. Permanent pavement and final restoration shall be completed prior to the close of the last paving season prior to the Contract's final completion.

B. Pavement restoration shall include, but not limited to, replacement of pavement, curbs, driveways, and sidewalks.

1.08 TEMPORARY PAVEMENT RESTORATION

A. The Contractor shall provide and properly maintain temporary pavement for all roads in which construction occurs.

1.09 TEMPORARY PARKING FACILITIES

A. Parking spaces for the Contractor's personnel shall be provided and maintained in usable condition by the Contractor at all times. The parking areas shall consist of temporary parking areas or new permanent parking areas shown on the Drawings, or in the area designated by the Owner and Engineer. At the completion of the project, temporary parking areas shall be removed and the surface restored as specified, shown on the Drawings, as directed or to its original conditions, as determined by the Owner.

1.10 TEMPORARY WATER, HEATING LIGHTING, AND POWER

A. The Contractor shall provide all water, heat, lighting, and power required to construct and protect the work, or portions thereof, until Final Completion.

B. Water: Contractor shall be required to purchase water from the City, should temporary water be required for the execution of the proposed Work to be performed. Contractor shall acquire a hydrant meter to be provided by Owner.

1. Contractor shall provide written notification of the intent to utilize the public water system to the Owner and Engineer.

2. Contractor shall maintain the water system in the same condition as it was in prior to use and accept full responsibility for all costs associated with any damages incurred due to Contractor use of the system.

3. Backflow prevention and metering shall be obtained from the City of Findlay Water Department.

4. A $200 deposit is required for the use of a City-owned hydrant meter. At the completion of the Work the deposit will be returned upon receipt of the hydrant meter.

5. Water used for testing is not considered temporary water and will not be charged to the Contractor. Water for testing is shall be coordinated with the Owner.

6. The source for temporary water can be from the water utility if available. The Contractor shall obtain a water meter and backflow preventer from the City of Findlay for all temporary water. Contractor shall pay all deposits and fees for the meter and water consumed

C. Telephone & Data:

1. Contractor shall make all necessary arrangements and pay all installation and service charges for telephone and data lines for its staff at the Site.

D. Power:

1. Contractor shall provide all temporary power for heating, lighting, operation of Contractor's equipment, or for any other use by Contractor, if required.

2. Contractor shall be responsible for all utility services used by it and its subcontractors, and any utility services required for the Work. Contractor shall make all arrangements required with the utility companies and pay all costs attendant to the service except as otherwise provided herein.

3. Contractor shall abide by all rules and regulations of the utility or authority having jurisdiction.

4. The source for temporary power shall be from the local electric utility or portable power source at the expense of the Contractor.

E. Sanitary Facilities:

1. Contractor shall furnish temporary sanitary facilities at the Site, as provided herein, for the needs of all employees, subcontractors, and others performing work or furnishing services on this Project.

2. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 persons. Contractor shall enforce the use of such sanitary facilities by all personnel at the Site.

3. The toilets shall be maintained in clean and sanitary conditions.

4. The units shall be removed when they are no longer required.

1.11 DISPOSAL OF DEBRIS

A. All debris resulting from construction operations, i.e. packaging, waste materials, damaged equipment, etc., shall be removed from the site by the Contractor and properly disposed of off-site.

B. The Contractor shall police the hauling of debris to ensure that all spillage from haul trucks is promptly and completely removed from public and/or private rights-of-way and properly disposed of off-site.

C. All debris shall be disposed of in accordance with applicable federal, state, and local laws and regulations.

D. The cost of all collection and disposal of debris shall be the responsibility of the Contractor.

1.12 CONTROL OF NOISE

A. The Contractor shall eliminate noise to as great an extent as possible at all times. Air compressors shall be equipped with silencers and the exhaust of all gasoline motors and other power equipment shall be provided with mufflers.

B. When working in the vicinity of parks, libraries, and schools, precautions shall be taken to avoid noise and other nuisance, and the Contractor shall require strict observances of all pertinent ordinances and regulations.

1.13 SMOKE PREVENTION

A. Strict compliance with all ordinances regulating the production and emission of smoke will be required, and the Contractor shall accept full responsibility for all damage that may occur to any property as a result of negligence in providing required control.

1.14 DEBRIS AND DUST CONTROL

A. Contractor shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or another similar method. The use of calcium chloride or petroleum products is prohibited. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing dust.

B. The Contractor shall apply water, dust palliative, or both for the alleviation or prevention of a dust nuisance caused by his operations. Dust control operations shall be performed by the Contractor as site conditions dictate or as ordered by the Owner and Engineer.

C. The Contractor shall utilize mechanical equipment to remove all dirt and debris from all streets, drives and walks to the satisfaction of the Owner and Engineer. Cleaning shall be performed at a minimum of daily and as directed by the Owner and Engineer.

D. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

E. The Contractor shall comply with Ohio Administrative Code 3745-17, "Fugitive Dust Rule."

F. The Contractor shall not cause or permit fugitive dust source to be handled, transported or stored; or construction or demolition to take place without taking or installing reasonable available control measures to prevent fugitive dust from becoming airborne.

G. The cost of all the debris and dust control methods shall be the responsibility of the Contractor.

1.15 SANITARY REGULATIONS

A. The Contractor shall provide all necessary accommodations for the workers for changing clothes and for protection during inclement weather. Toilet accommodations shall also be maintained for the use of the employees on the Work. The accommodations shall be in locations approved by Owner and/or Engineer, properly screened from public observance and shall be maintained in a strictly sanitary manner.

B. The Contractor shall obey and enforce all other sanitary regulations and orders; shall take precautions against infectious diseases and the spread of same; and shall maintain at all times satisfactory sanitary conditions around all shanties, tool and supply houses, and on all other parts of the Work.

C. The cost of providing and maintaining sanitary facilities at the site shall be the responsibility of the Contractor.

1.16 USE OF EXPLOSIVES

A. Use of explosives is not permitted.

1.17 PUBLIC SERVICE STRUCTURES

A. Public service structures shall be understood to include all poles, tracks, pipes, wires, conduits, house-service connections, vaults, manholes, and other appurtenances, whether owned or controlled by the Owner or other public bodies or by privately-owned corporations, used to supply the public with transportation, heating, electric, telephone, cable, gas, water, sewer, or other services.

B. At least three (3) days in advance of breaking ground, the Contractor shall notify the registered underground protection service, all public bodies, and other owners of such facilities of the proposed location of his operations, advising them that their property may be affected and that such measures as they may deem necessary should be promptly taken to protect, adjust, remove, or build them.

C. Three (3) conditions which may be encountered will be dealt with as follows:

1. Structures which are adjacent to but not included within the limits of an excavation required for performance of the Work shall be protected, supported, and maintained by the Contractor at his expense.

2. Structures within the limits of the Work which can be satisfactorily supported and maintained in service and which do not require removal and rebuilding in the judgment of the Engineer shall be thus supported by the Contractor at his expense, including cost of repair or damage incidental to his operations.

3. In an instance where relocation of pipelines or other utility structures is required because of direct interference, as determined jointly by the Owner, Engineer, and Contractor, with the installation of the Work, the Contractor shall immediately notify the Owners of the utility structure involved. If not otherwise previously included within the proposed Work, the Owner, Engineer and Contractor will cooperatively engage to define the necessary strategy and cost/schedule implications of such instances in accordance with the General Conditions.

D. Multiple overhead utilities are located on the existing utility poles shown throughout the project sites that may not be reflected directly on the detailed drawings. Regardless if shown directly or not, the Contractor shall coordinate all construction efforts to ensure protection of and proper clearance from such utilities in accordance with all applicable regulations and standards.

1.18 UNAUTHORIZED WORK

A. Work done beyond the limits of disturbance shown on the Drawings or ordered, work done without required inspections, except as herein provided, or any Extra Work done without authority will be considered as unauthorized and will not be paid for under the provisions of the Contract. Work so done may be ordered removed or repaired at the Contractor's expense.

B. Work done without lines and grades being given shall be considered as unauthorized and subject to rejection.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 SEQUENCE OF CONSTRUCTION

A. A suggested sequence of construction is offered on Sht. 03 of the contract drawings. The sequence is offered not as a requirement, but as one possible way to construct the proposed improvements with the project area. The Contractor is ultimately responsible for the sequencing and scheduling of the Work, as required to meet the project milestones defined within the Contract. The use of the suggested sequence of construction does not imply any liability on the Owner or the Engineer.

B. The Contractor's sequence of construction and schedule shall reflect the work constraints denoted within Section 01040 and the table shown on Sht. 03.

PART 4 SPECIAL PROVISIONS

4.01 MAINTAINING FLOW IN EXISTING SEWERS

A. Flow in existing storm, combined, sanitary and private sewers shall be maintained at all times during the construction of this project. The Contractor shall furnish and install all necessary temporary facilities required to maintain the flow in existing sewers including bulkheads, plugs, stop planks, flumes, coffer dams, pumping equipment, valves, etc.

B. The Contractor shall provide a detailed plan to the Engineer indicating how the work operations will be performed to maintain flow in the existing storm, sanitary and private sewers. Since it is imperative the flows in the sewer system be maintained, the construction must be sequenced and performed by the Contractor to the approved plan.

END OF SECTION

SECTION 01100

SUMMARY OF WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions (if included) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Type of Contract

2. Construction Site Locations

3. Use of Premises

4. Owner Occupancy

5. Utility Locations

1.03 TYPE OF CONTRACT

A. Project will be constructed under a single prime contract with the stipulated price derived from a combination of unit prices, lump sum prices and allowances, as defined on the Proposal.

1.04 CONSTRUCTION SITE LOCATIONS

A. The main project site is located on the northerly bank of the Blanchard River bounded by N Cory Street on the west and the CSX Railroad on the east, excluding N Main Street.

B. In-stream project sites include two proposed riffle sites: one east and one west of the Pedestrian bridge at Civitan Park.

1.05 USE OF PREMISES

A. Contractor is limited to the areas within the delineated limits of disturbance defined on the contract drawings. Such areas include publicly owned lands from the City of Findlay, as well as permanent and temporary easements from private landowners. Contractor shall not disturb areas outside of the delineated limits of

disturbance for any construction operations without prior written approval of the Owner and Engineer.

B. The Contractor is required to maintain all of its work and staging operations within the rights-of-way, property lines, easements and limits as shown on Drawings. The Contractor is not prohibited from increasing its staging areas in conformance with the provisions of special agreements between the Contractor and individual landowners. The Contractor shall provide written confirmation to the Owner and Engineer from specific landowners confirming any such agreements made and stating the terms and conditions of the agreements. Such agreement shall include provisions to allow the Owner and Engineer access to those areas secured by the Contractor.

C. Contractor may utilize approved roadways for access to and from the site. Roadways shall not be utilized for storage of materials, employee parking or staging of construction equipment or vehicles.

D. Contractor shall keep all adjacent roadways, driveways, alleys and entrances serving the premises clear and available to Owner and Owner's employees, and private and public property owners at all times. Areas for Contractor's trailers, equipment and material storage, and Contractor's employee parking shall be agreed upon by Owner prior to the start of construction.

E. Contractor shall not disturb wetland or in-stream locations, unless otherwise designated on the contract drawings or defined within the detailed specifications.

F. Contractor shall not disturb areas beyond the delineated limits of disturbance.

1.06 OWNER OCCUPANCY

A. The Owner reserves the right to be present on site for construction observation and other activities.

B. The existing parking areas and ballfields within Swale Park shall remain serviceable and available for use by the City of Findlay and its residents at all times during the course of construction.

1.07 UTILITY LOCATIONS

A. All existing utilities shown on the drawings are in an approximate location based upon information available to the Engineer during design development. Contractor shall contact and notify Owner and all utility companies for the purpose of establishing confirmation of the approximate locations of the utilities not less than three (3) working days prior to beginning any construction.

B. Contractor shall be responsible for field verifying the location of all underground utilities including service taps using all means necessary prior to commencing work.

C. Due to variations between source information associated with record documents of existing utilities that will be affected by this project, the Contractor will be required to perform verification of elevations for the proposed sewer installations. In the event that the verified existing invert elevations do not match the plan inverts, the verified invert elevations shall take precedence.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

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SECTION 01110

ENVIRONMENTAL, SAFETY, HEALTH, AND ACCIDENT PREVENTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and other Division 1 Specifications Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Scope of Requirements.

B. Health & Safety Plan.

1.03 SCOPE OF REQUIREMENTS

A. General:

1. Contractor shall conduct all operations under this Contract in a manner to avoid the risk of bodily harm and risk of damage to any property. Contractor shall immediately take necessary and adequate precautions against any condition which may involve a risk of bodily harm or a risk of damage to any property. Contractor shall continuously inspect all Work and conduct health surveys of all work areas to discover and determine any unsafe condition and shall be solely and exclusively responsible for the discovery, determination, and correction of any such condition. This requirement will apply during all hours throughout the period Contractor is at the Site. Contractor shall take all measures reasonably possible to protect the health and safety of the general public and the Owner's workforce that may enter the project site during non-working hours. Contractor shall use appropriate barriers to delineate the Contractor's work area from working areas that may be occupied or entered by Owner's personnel.

2. The 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. This person is referred to as the Health & Safety Representative (HSR) in this Section. Contractor shall submit a resume of the HSR'S qualifications.

3. This section requires the *sole obligation and full and total responsibility* of the Contractor for the construction means, methods and techniques and to provide occupational safety and health according to the contract, the

requirements of OSHA, the laws of State and local jurisdictions, and any and all other provisions relevant to the subject that are given in the future as well as the specific requirements included in this section.

B. Health and Safety Expectations:

1. The Owner's safety goal for every project is **zero Injuries**. The Contractor and its Subcontractors shall endeavor to attain the project safety goal and commit to a serious, rigorous and persistent Safety Approach. The Contractor shall maintain accurate accident and injury reports. The Contractor shall require its Subcontractors to also maintain accurate accident and injury reports. The Contractor shall furnish the Owner, through the Engineer, a monthly summary of injuries and man-hours lost due to injuries by the 5th of each month or at other times as requested by the Engineer or the Owner. The reports shall be for the Contractor and each of its Subcontractors and shall not be submitted as an aggregated report. The Contractor's and Subcontractor's accident rates will be calculated monthly in accordance with the Bureau of Labor Statistics incident rate, frequency rate, and days away from work rate methods. If the Contractor's or Subcontractor's accident rates equal or exceed fifty percent of the national average for construction as reported by the Federal Government, the Contractor shall take immediate corrective action including the following:

a. Submittal of a written corrective action plan to the Engineer and Owner. The corrective action plan may include:

i. Removal from the Site of any Contractor or Subcontractor supervisor or employee not implementing or following the necessary safety and health measures.

ii. Increasing the amount of Contractor or Subcontractor employee safety and health training.

iii. Other corrective measures the Contractor or Subcontractor deems necessary.

b. Additions or modifications to Contractor's Health & Safety Plan to address the issues causing the incident rate to exceed the criteria listed above.

1.04 HEALTH & SAFETY PLAN

A. Project Health & Safety Plan:

1. Contractor shall develop, implement and maintain a written project specific Health & Safety Plan (HASP) specifically applicable to the Work. The HASP shall meet the requirements of laws, codes, and regulations,

and the requirements of all other authorities having jurisdiction over the Work, including the requirements of Federal and State Safety and Health Regulations for Construction. Contractor's written project HASP shall include disciplinary procedures and safety orientation training procedures applicable to Contractor's and its sub-Contractors' personnel.

2. Contractor's project specific HASP shall be submitted to the Owner via the Engineer for review within the (10) work days after the Notice to Proceed for the contract and not later than five (5) work days prior to the Pre-construction meeting. If these requirements cannot be met due to compression of the calendar between Notice to Proceed and the Pre-construction meeting, the Contractor will not be permitted to commence construction until the HASP has been submitted. This review will not relieve Contractor of its sole responsibility for safety and health, nor shall such review be construed as limiting in any manner Contractor's obligation to undertake any action which may be necessary or required to establish and maintain safe working conditions regarding its Work at the Site. The project HASP shall include at least the following basic elements:

   a. Statement of Policy on Safety and Health.

   b. Organizational Structure and Responsibilities.

   c. Emergency Contact List.

   d. Subcontractor sign-off on HASP.

   e. Unsafe Conditions.

   f. Accident Prevention.

   g. Worker Training.

   h. Safety Committee.

   i. Prevention of Drug and Alcohol Abuse.

   j. First Aid and Medicine.

   k. Trenching and Excavation Notice.

   l. Crane Inspections.

   m. Fall Protection.

   n. Fire Protection.

   o. Work Area Housekeeping/Cleanliness.

   p. Testing of Equipment/Machinery and Temporary Installations.

q. Project/Work Site Security.

r. Personal Protective Equipment.

s. Emergency Response Plan (project specific).

t. Control of Hazardous Materials.

u. Protection of the Environment and the General Public.

v. Identification and Resolution of Safety and Health Violations.

w. Job Hazard Analysis.

x. Documentation, Reporting and Files.

y. Firearms – not permitted on Owner job sites.

A copy of the Project HASP shall be maintained on Project Site at all times.

3. Statement of Policy on Safety and Health:

a. The Contractor will provide a formal statement of its policy for the safety and health requirements of the project. The same policy shall state that the Contractor's policy is to execute their work in absolute conformance with State and local laws, the requirements of OSHA and the requirements of this section. This statement must specifically state that it is not company policy to expose workers and the general public to danger as a result of the work performed under this Contract. This statement shall be printed and placed in a visible place in front of each project or site.

4. Organizational Structure and Responsibilities:

a. The entire organization of the Contractor, including Subcontractors, will be responsible for implementing the HASP. The HASP shall include a definition of the structure of the health and safety organization and identify people who have key roles to supervise occupational safety and health. The Contractor will have enough staff to fulfill the functions of educating workers, controlling equipment, control of hazardous materials and monitoring safety and health program requirements. The Contractor shall appoint a Competent Person (as defined by OSHA) as the Health and Safety Representative (HSR). The HSR shall attend the regular meetings with the Engineer and Owner and address any issues of compliance with the requirements of safety and health of the project. The Contractor's HSR will have the authority to (1) stop any work that might endanger workers or the public, and (2) direct the correction of any violation of the

rules of safety and health. Additionally, the Contractor shall provide a list of competent persons in accordance with OSHA 29 CFR 1926.32(f).

5. Emergency Contact List:

   a. Contractor shall provide a list of emergency contacts to the Owner and Engineer that can be contacted during and after working hours. This list shall be updated with any changes as they occur.

6. Subcontractor Sign-off on HASP:

   a. All Subcontractors used on the project site by the Contractor must agree with and sign-off on the Contractor's HASP prior to starting work on the Site. A copy of this sign-off must be maintained on the Project Site and be available for inspection by the Owner/Engineer.

7. Unsafe Conditions:

   a. Contractor shall immediately correct any unsafe conditions identified by the HSR or any other entity. In the event Contractor fails to immediately correct such unsafe conditions, the Owner/Engineer may either have the unsafe conditions corrected by others at Contractor's expense, or direct that the Work be stopped in the area of the unsafe condition. However, this right to stop the Work shall not give rise to any duty on the part of Owner/Engineer to exercise this right to Contractor or to any third party. The Owner/Engineer will resolve conflicts regarding safety and health measures and practices.

8. Accident Prevention:

   a. The Contractor shall provide and maintain work environments and procedures that:

      i. Safeguard personnel, properties, materials and equipment of public and private entities exposed to operations and activities of the Contractor.

      ii. Prevent disruptions in the operations of Government or Municipalities and delays in the timing of completion of the Project.

      iii. Control costs of execution of this contract.

   b. For these purposes, in contracts for construction or dismantling, demolition or removal of improvements, the Contractor:

i. Will provide security barricades, signs and signal lights.

ii. Comply with State and local safety standards.

iii. Ensure that any additional measures be taken that the Owner/Engineer determines as reasonably necessary.

c. At such time that the Owner or the Engineer become aware of any violation of these requirements or any condition that represents a serious or imminent danger to health or public safety or to the staff of the Owner or other government entity, the Owner or Engineer will notify the Contractor verbally, at which time, the Contractor shall begin immediately the corrective actions to remove this safety violation. Owner or Engineer will confirm the notification later in writing. This notice will be deemed sufficient notice of violation and an order to perform the required corrective actions. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor does not perform or refuses to take immediate corrective actions, the Owner or Engineer may issue an order for total or partial stoppage of work until the Contractor has satisfactorily performed the corrective actions for the safety violation. The Contractor shall not be entitled to additional payment or extension of the project schedule by an order for stoppage of work under the provisions of this section.

d. The Contractor shall include this Section in all its subcontracts, with appropriate changes in the designation of the contracting parties.

e. Before starting the construction work, the Contractor shall:

i. Submit the HASP to comply with the provisions of this section. The HASP will include an analysis of the significant dangers to life, health, well-being and properties, which are inherent to the work of the contract. It shall also contain a plan to manage these dangers and

ii. Meet with representatives of the Owner and the Engineer to discuss and develop a mutual understanding to the administration of the accident prevention program.

f. The Contractor shall continuously inspect all work, materials, equipment and/or conduct surveys to see if there is any condition that may pose a hazard and is responsible for taking the necessary corrective measures during the construction period, from the beginning of the project to the turnover of the work.

9. Worker Training:

a. Contractor shall hold regularly scheduled meetings to instruct its personnel and its Subcontractors' personnel in safety and health practices and the requirements of the project HASP. Contractor shall furnish health and safety equipment for its employees and verify that its Subcontractors are furnishing health and safety equipment for their employees. The Contractor shall enforce the use of such equipment by its employees and the employees of its Subcontractors. After each meeting, the HSR of the Contractor shall prepare a report of the meeting with the names of the workers present and the topics discussed during the meeting.

10. Safety Committee:

a. Contractor shall establish a project safety committee consisting of members from management and labor.

11. Prevention of Drug and Alcohol Abuse:

a. The use of drugs and alcohol is strictly prohibited within the areas of work. As a result, the Contractor shall implement and enforce a program to prevent and detect the use of these substances. Evidence that each employee has passed the drug test shall be available for review upon Owner/Engineer request within three days of completion of the test. The program will include: pre-project assignment, periodic unannounced (random), and post-accident drug testing.

12. First-Aid and Medicine:

a. The Contractor is responsible for maintaining appropriate medicines and first aid items on site. Also, the Contractor will implement an emergency action plan for the evacuation of employees or wounded as a result of the work. Each work site must have at least one person trained in first aid that will be responsible for any situation that requires help. It is essential to have adequate communication between work site management and the headquarters of the Contractor or directly with an emergency service to respond as quickly as possible during an emergency.

13. Crane Inspections:

a. All crane operations conducted by the Contractor shall comply with 1926 Subpart BB.

b. All cranes in use on the Project by the Contractor shall be inspected on a monthly basis by a competent person. Inspection results shall be recorded on a monthly crane inspection report

form which shall be submitted to the Owner and the Engineer by the fifth working day of each month.

c. Contractor shall submit a current annual crane inspection report to the Owner and the Engineer prior to placing each crane in service at the Project. The annual inspection shall be performed by a third-party inspection service certified for such work by the US Department of Labor.

d. If Contractor fails to submit the monthly or annual report as specified or submits a report that contains errors, misrepresentations, or falsification of facts, the use of the crane covered by the inaccurate report shall be stopped until the violation is corrected. Additionally, the Contractor shall immediately discharge from the Project all personnel responsible for knowingly submitting a monthly or annual crane inspection report that includes false information. Personnel discharged for false crane inspection reporting shall not be again allowed on the Project.

14. Fall Protection:

a. The OSHA Fall Protection Standard 29 CFR 1926 Subpart M shall be strictly adhered to by the Contractor. No person or work operation is exempt, including structural steel erection operations, structural steel connectors, and scaffold erectors. Fall protection is required for all of the Contractor's work operations 100% of the time, whether climbing, traveling, or working. No Work operation is exempt from the 6-foot fall protection requirement.

b. Prior to starting Work operations requiring fall protection, the Contractor shall submit to the Owner and the Engineer a fall protection plan. The fall protection plan shall include, but not be limited to, the following:

i. Name of qualified person in charge of operation.

ii. Description of Work operation.

iii. List of fall exposures.

iv. Description of fall protection methods used to eliminate fall exposures.

v. Training and enforcement methods used to ensure employee compliance with the plan.

c. Fall protection body harnesses, lanyards, and lifelines shall be used in accordance with OSHA Standard 1926.502(d), with the following exceptions:

i. Full body harnesses shall be used in lieu of safety belts.

ii. Only lanyards with shock absorbers and locking type snap hooks shall be used.

iii. At least two (2) lanyards shall be used to provide 100 percent fall protection when moving around obstructions, connection points, or other similar items.

d. Fall protection guardrail systems shall comply with OSHA Standard 1926.502(b) except manila, plastic, or synthetic rope shall not be used as guardrails.

15. Fire Protection:

a. Only work procedures which minimize fire hazards to the extent practicable shall be used. Combustible debris and waste materials shall be collected and removed from the Project each day. Fuels, solvents, and other volatile or flammable materials shall be stored away from the construction and storage areas in well-marked, safe containers. Good housekeeping is essential to fire prevention and shall be practiced by Contractor throughout the construction period. Contractor shall follow the recommendations of Local Codes and Regulations regarding fire hazards and prevention.

b. Unless specified herein for a particular application, untreated canvas, paper, plastic, and other flammable flexible materials shall not be used on the Project for any purpose. If such materials are on equipment or materials that arrive at the Project, they shall be removed and replaced with an acceptable covering before storing or moving into the construction area.

c. Formwork, scaffolding, planking, and similar materials which are combustible but which are essential to execution of the Work shall be treated for fire resistance or otherwise protected against combustion resulting from welding sparks, cutting flames, and similar fire sources.

d. Temporary heating facilities shall not be left unattended.

e. Contractor shall provide adequate fire protection equipment in each warehouse, office, and other temporary structures, and in each work area it is occupying as specified herein. Access to

sources of fire water shall be identified and kept open at all times. Suitable fire extinguishers shall be provided in enclosed areas, in areas which are not accessible to fire water, or in areas which may be exposed to fire that cannot be safely extinguished with water. Each fire extinguisher shall be of a type suitable for extinguishing fires that might occur in the area in which it is located. In areas where more than one type of fire might occur, the type of fire extinguisher required in each case shall be provided. Each extinguisher shall be placed in a convenient, clearly identified location for accessibility in the event of fire.

f. Contractor alone shall be responsible for providing adequate fire protection. Failure of Contractor to comply with or Owner to enforce, the above requirements shall not relieve Contractor from any responsibility or obligation under this Subcontract.

16. Work Area Housekeeping/Cleanliness:

a. Special attention shall be given to keeping the inside of the structures and surrounding grounds clean and free from trash and debris. Contractor shall employ sufficient and special personnel to thoroughly clean its work areas continuously each working day and shall cooperate with the other Contractors to keep the entire construction site clean. This shall include sweeping the streets, collecting and disposing of trash, and all other functions required to keep the site clean. Materials and supplies shall be stored in locations which will not block access ways and shall be arranged to permit easy cleaning of the area.

b. All hoses, cables, extension cords, and similar materials shall be located, arranged, and grouped so that they will not block any access way and will permit easy cleaning and maintenance. At the close of each work week, and at the close of each day preceding a holiday, to the extent practical, all such items, including specifically named items which have not been used during the work week, shall be removed from the construction area and stored in Contractor's warehouses or other storage areas.

c. All trash, debris, and waste materials shall be collected and deposited in waste collection areas.

d. Contractor shall, at its expense, dedicate satisfactory personnel to perform daily cleaning.

e. Promptly upon the completion of the construction work, all scrap, trash, waste materials, and debris resulting from the Work under this Contract shall be deposited in Contractor provided waste

facilities. All Contractor-owned facilities, materials, and construction works shall be removed from the Site. Contractor shall thoroughly clean the Work, removing all accumulations of scraps, waste, oil, grease, weld spatter, insulation, paint, and other foreign substances. Surfaces damaged by deposits of insulation, concrete, paint, weld metal, or other adhering materials shall be restored by Contractor.

f. Remaining Owner-furnished materials shall be stored on the Site or removed from the Site as directed by Owner.

g. At the end of construction work, all holes, ruts, settlements, and depressions resulting from the Work shall be filled and graded to match elevations of adjacent surfaces, and all areas disturbed by construction shall be restored to their original condition to the maximum extent practicable and as acceptable to Owner.

h. In the event of Contractor's failure to comply with any of the above requirements, the cleanup work may be accomplished by Owner at Contractor's expense.

17. Testing of Equipment/Machinery and Temporary Installations:

a. All equipment, machinery and temporary installations for construction purposes shall be kept under optimum conditions for their safe operation. The Contractor's HSR shall carry out documented inspections and tests to verify that each piece of equipment, machinery or temporary installation on site meets all the requirements of occupational safety and health. All equipment, machinery or temporary installations that do not comply with the requirements of safety and health must be removed immediately from the site.

18. Project/Work Site Security:

a. Contractor shall cooperate with Owner on all security matters and shall promptly comply with any Project security requirements established by Owner. Contractor shall at all times conduct all its operations under this Contract in a manner to avoid the risk of loss, theft, or damage by vandalism, sabotage, or other means, of and to any property. Contractor shall promptly take all reasonable precautions which are necessary and adequate against any conditions which involve a risk of loss, theft, or damage to its property. Contractor shall continuously inspect all of the Work and facilities to discover and determine such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions.

b. If Owner considers it necessary, it will provide watchmen and guards to protect its own interests. Contractor shall provide guard service sufficient for the protection of its own property and equipment. Owner will not be responsible for any loss of, theft of, or damage to Contractor's or Subcontractor's property from any cause.

c. Contractor and its Subcontractors and their employees shall observe all procedures for admission to the Project required by Owner. Unauthorized personnel will not be permitted on the Project. Removal of any material or equipment from the Project must be authorized by Owner.

19. Personal Protective Equipment:

a. The Contractor is responsible for providing all employees with the proper Personal Protective Equipment (PPE) under their direction. The Contractor is responsible for verifying that their Subcontractors provide the proper PPE to their employees or the Contractor will be responsible for providing the proper PPE. Basics of PPE to be provided are:

i. Hard Hats.

ii. Safety Glasses.

iii. Work gloves.

iv. Communication Radios.

v. Earplugs.

vi. Raingear.

vii. Work Boots with steel safety toes.

viii. Seat Belts.

ix. Personal floatation devices

x. Life Saving Devices & Guards.

b. Any other item of personal protection that is required for special work, such as welding, cutting iron, work in confined areas, and so on, shall be furnished by the Contractor to the workers. If the special work is being performed by a Subcontractor, the Contractor is responsible to verify the Subcontractor is providing the proper PPE or the Contractor will be responsible for providing the proper PPE. Providing an item of personal protection to a worker means that the Contractor has taught workers the right

way to use the equipment and the personal risks entailed in the work to be conducted. Records of this training, including course completion documents and certifications, should be kept on site and filed for review.

c. In addition, the Contractor is responsible for providing and maintaining personal protection in the form of construction equipment such as:

i. Stairs and Ladders.

ii. Handrails and Guardrails.

iii. Barriers.

iv. Nets.

v. Scaffolding.

vi. Trench Collapse Protection.

If the construction equipment listed above is being provided by a Subcontractor, the Contractor is responsible for verifying that the Subcontractor is maintaining the equipment. If the Subcontractor is not doing so, the Contractor will assume this responsibility.

d. All personal safety equipment must meet the minimum requirements established by State and local laws and OSHA and must meet any special requirements present during the execution of the Work. The Contractor's HSR shall have the authority to order the immediate correction of any deficiency of personal protection present at the Site or suspend work until the deficiencies are corrected.

20. Control of Hazardous Materials:

a. As required under Federal Hazardous Communications Standards and certain state and local laws, Contractor shall provide Material Safety Data Sheets/Safety Data Sheets covering all hazardous materials furnished as part of or otherwise associated with the Work. Contractor will provide the MSDS/SDS to Owner and the Engineer prior to bringing the hazardous materials onto the Project. Contractor shall provide Owner and the Engineer with either copies of the applicable MSDS/SDS or copies of a document certifying that no MSDS/SDS are required under any federal, state, or local law, regulation, statute, or ordinance in effect at the Project.

b. Hazardous materials are defined in the applicable statute which may use the terminology "toxic substances" instead of "hazardous materials." Contractor is responsible for determining if any substance or material furnished, used, applied, or stored under this Contract is within the provisions of any applicable statute.

c. Contractor shall provide labeling of hazardous materials and training of employees in the safe usage of such materials as required under any applicable federal, state, or local law, regulation, statute, or ordinance. This includes, but is not limited to, used oils, greases, or solvents from any flushing or cleaning operations performed under this Contract. The labeling of hazardous material containers shall also include Contractor's name.

d. Contractor shall provide to Owner and the Engineer a proposed plan for hazardous material communication procedures prior to commencing work at the Project. Such plan shall include a list of hazardous materials and include their corresponding MSDS/SDS. The information submitted by Contractor will ultimately be used by Owner to inform its personnel of the presence of hazardous materials.

e. Contractor shall comply with Owner's hazardous communication program requirements. Owner will make available to Contractor upon request a list of hazardous materials which may be encountered by the Contractor at the Project along with access to copies of the corresponding MSDS/SDS prior to Contractor starting work at the Project. Contractor shall use this information to train its employees regarding any potential hazardous material that may be encountered at the Project.

    i. Contractor shall provide, when required, written notice of the presence of any hazardous material to local fire, medical, and law enforcement agencies with a copy of such written notice to Owner and the Engineer.

    ii. Contractor shall take all reasonable measures to prevent the release of any Hazardous Materials brought on to the Site or adjacent areas by Contractor or their Subcontractors/suppliers. Contractor shall immediately notify the Owner and the Engineer of any known spills, emissions, or other releases of Hazardous Materials that occur in connection with the performance of the Work. Contractor shall be responsible for removing from the Site and areas adjacent there to, and for properly disposing of, in compliance with the requirements of laws, codes, and

regulations, and the requirements of all other authorities having jurisdiction over the Work, including the requirements of U.S. EPA, Federal and State Safety and Health Regulations for Construction, any Hazardous Materials brought onto the Project and adjacent areas by Contractor or their Subcontractors/suppliers in the course of performing the Work.

iii. Contractor warrants full compliance with the provisions of this Article and further warrants that it will adhere to all applicable hazardous waste procedures and, if necessary, obtain or arrange for, at its expense, all identification numbers, permits, applications, and other things required in connection with its activities under this Contract.

21. Protection of the Environment and General Public:

a. The Contractor shall comply with environmental protection standards as well as safeguard the general public. All work will be conducted in accordance with the requirements of the local, State, and Federal governmental agencies in a way that minimizes the effect on the public and environment adjacent to the work being performed. The Contractor is solely responsible for coordinating work with public and private agencies that are affected by the work.

22. Identification and Resolution of Safety and Health Violations:

a. When any person or entity identified in the HASP identifies unsafe materials, equipment or work practices, Contractor management shall take immediate action to correct these dangerous conditions. The Contractor's HSR shall have the authority to stop any work that is ongoing and is determined to be a danger to workers or the general public. The Contractor's HSR shall prepare reports on their daily inspections to include special reports on any accident that may occur or has occurred. These reports must be handed over to the Owner and the Engineer no more than 48 hours after the inspection or accident, explaining any deficiencies and actions taken to correct the deficiency. Otherwise, the Engineer will report these shortcomings to the Owner, and the Owner will take appropriate action to assure implementation of corrective measures.

23. Job Hazard Analysis:

a. A Job Hazard Analysis (JHA) shall be submitted for all significant activities and tasks with high-risk potential, describing the job steps,

hazards associated with each job step and the controls used to remove or minimize the associated hazards.

24. Documentation, Reporting and Files:

a. The Contractor shall document in their Daily Report all actions taken with regards to project occupational safety and health. Special reports or other documents required by this contract must be signed or authenticated and dated by the individual responsible for the HASP. The Contractor shall establish and maintain a filing system to identify and facilitate the recovery of specific documents. Each month, the Contractor shall send a copy of the updated filing system to the Owner and the Engineer for future reference.

b. The Contractor's technical file to comply with the HASP will contain at least the following information:

i. The daily reports of the Contractor's HSR.

ii. Job Hazard Analysis.

iii. Accident Reports (including those of Subcontractors).

iv. Hazardous Materials Handling Instructions/Informational Documents.

v. Inspections and testing of machinery, equipment and temporary installations.

vi. Reports of the weekly meetings, safety meetings and worker training indicating that all workers have received and understand the appropriate site-specific safety training and issues.

vii. List of personal protective equipment issued to each worker.

viii. Photos taken to document accidents, mishaps, and near misses.

ix. An updated copy of the Contractor's HASP.

x. A copy of the applicable State and local laws and OSHA regulations that relate to safety, health and security.

xi. Designs of any temporary construction developed by a registered engineer certified in the applicable State.

xii. A copy of technical file will be maintained in the Contractor's field office at the Project Site.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01200

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Related Documents.

B. Scope.

C. Partial Payments

D. Base Bid Items

E. Final Payment Considerations.

1.02 RELATED DOCUMENTS

A. Ohio Department of Transportation Standard Drawings and Specifications.

B. Ohio Department of Transportation Construction and Materials Specifications (ODOT CMS) (2019 Ed.).

C. Ohio Department of Natural Resources (ODNR) Rainwater and Land Development Manual.

D. Ohio Manual of Uniform Traffic Control Devices for Streets and Highways (OMUTCD).

E. City of Findlay, OH Construction Standards.

F. Proposal.

1.03 SCOPE

A. CONTRACTOR shall furnish all labor, materials, tools, equipment, appurtenances and services, including all operation and maintenance manuals and training and start-up services, necessary to execute all Work required within the Project Manual, construction drawings and reference documents to provide a fully operational and functioning system. The Work shall be performed within the lump sum and unit cost bid items listed herein and shall represent full compensation for such Work.

B. The Bid Items listed herein constitute all of the Items under which payment will be made. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant services, layout surveys, sanitary requirements, testing, safety devices, submittals and record drawings, water supplies, power, maintaining traffic, removal of waste, watchmen, bonds (including Performance Bond), insurance, project coordination and all other requirements of the Contract Documents. Compensation for all such services and materials necessary to

complete the Work shall be included in the prices stipulated for the various lump sum and/or unit price bids submitted for the Bid Items listed herein.

C. The RPR will determine the actual quantities and percentage of Work performed by CONTRACTOR, based upon a Schedule of Values the CONTRACTOR shall submit at the beginning of the project. The 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). The ENGINEER's written decision thereon will be final and binding (except as modified by the CITY to reflect changed factual conditions or more accurate data) upon the CITY and CONTRACTOR, subject to the provisions of Article 10, Paragraph 10.05 Changes In The Work; Claims Section of 00700, General Conditions.

1.04 PARTIAL PAYMENTS

A. Refer to Contract.

1.05 BASE BID ITEMS

A. The Bid Items generally described within this section shall encompass the entirety of the project Work. Each Bid Item listed shall be treated as its own individual entity and the bid price submitted shall incorporate all tasks and costs associated with that particular Bid Item's completion.

B. The Bid Item descriptions provided below shall be deemed general in nature and may not include specific reference to all individual project components and tasks necessary to complete the Work. All Work contained within the Project Manual and Contract Drawings shall be a part of the total Base Bid, whether specifically denoted within this Section or not.

C. Item No. 1.1 – Riffle 1 Construction

1. The Lump Sum bid shall include all work and costs associated with…

D. Item No. 1.2 – Riffle 2 Construction

1. The Lump Sum bid shall include all work and costs associated with…

E. Item No. 2.1 – Mobilization

1. The Lump Sum bid shall include all work and costs associated with…

F. Item No. 2.2 – Clearing and Grubbing

1. The Lump Sum bid shall include all work and costs associated with…

G. Item No. 2.3 – Construction Layout and Staking

1. The Lump Sum bid shall include all work and costs associated with …

H. Item No. 2.4 – Tree Clearing

1. The Unit Cost bid shall include all work and costs associated with …

I. Item No. 2.5 – General Excavation, Hauling, and Disposal

1. The Unit Cost bid shall include all work and costs associated with …

J. Item No. 2.6 – Construction and Demolition Debris Excavation, Hauling, and Disposal

1. The Unit Cost bid shall include all work and costs associated with…

K. Item No. 2.7 – Topsoil Removal, Storage, and Replacement

1. The Lump Sum bid shall include all work and costs associated with…

L. Item No. 2.8 – Imported Top Soil

1. The Unit Cost bid shall include all work and costs associated with…

M. Item No. 2.9 – Class 1, Permanent Seeding and Mulching

1. The Unit Cost bid shall include all work and costs associated with…

N. Item No. 2.10 – Class 4B, Permanent Seeding and Mulching

1. The Unit Cost bid shall include all work and costs associated with…

O. Item No. 2.11 – Riparian Buffer, Permanent Seeding and Mulching

1. The Unit Cost bid shall include all work and costs associated with…

P. Item No. 2.12 – Bareroot Seedlings, ½"x4'

1. The Unit Cost bid shall include all work and costs associated with…

Q. Item No. 3.1 – Sanitary Sewer Demolition, 48" Manhole

1. The Unit Cost bid shall include all work and costs associated with…

R. Item No. 3.2 – Sanitary Sewer Demolition, 8" – 18" Pipe

1. The Unit Cost bid shall include all work and costs associated with…

S. Item No. 3.3 – 54" Storm Sewer Demolition, 48" Manhole

1. The Unit Cost bid shall include all work and costs associated with…

T. Item No. 3.4 – Storm Sewer Demolition, Catch Basin

1. The Unit Cost bid shall include all work and costs associated with…

U. Item No. 3.5 – Storm Sewer Demolition, 4" – 18" Pipe

1. The Unit Cost bid shall include all work and costs associated with…

V. Item No. 3.6 – Storm Sewer Demolition, 24" – 30" Pipe

1. The Unit Cost bid shall include all work and costs associated with…

W. Item No. 3.7 – 18" Storm Sewer, N-12 HDPE Pipe

1. The Unit Cost bid shall include all work and costs associated with…

X. Item No. 3.8 – 18" Storm Outfall, ODOT HW 2.1

2. The Unit Cost bid shall include all work and costs associated with…

Y. Item No. 3.9 – 30" Storm Sewer, N-12 HDPE Pipe

2. The Unit Cost bid shall include all work and costs associated with…

Z. Item No. 3.10 – 30" Storm Outfall, ODOT HW 2.1

2. The Unit Cost bid shall include all work and costs associated with…

AA. Item No. 3.11 – Gas Line Demolition, 2"

2. The Unit Cost bid shall include all work and costs associated with…

BB. Item No. 3.12 – Water Line Demolition, 4" or less

2. The Unit Cost bid shall include all work and costs associated with…

CC. Item No. 3.13 – Fire Hydrant Demolition

2. The Unit Cost bid shall include all work and costs associated with…

DD. Item No. 3.14 – SWPPP and Erosion Control

2. The Lump Sum bid shall include all work and costs associated with…

M. Item No. 4.1 – Pedestrian Bridge Ramp

1. The Lump Sum bid shall include all work and costs associated with…

N. Item No. 4.1 – Hazardous Waste Disposal Fees

1. Item No. 4.1 is for the sole use of the Owner to cover Hazardous Waste Disposal Fees. All proposed work associated with this item shall be submitted to the ENGINEER in writing prior to performing the work. The OWNER and ENGINEER shall determine if the proposed work is consistent with an unforeseen condition. A contingency allowance of $_____ has been assigned to this Bid Item. The CONTRACTOR shall be reimbursed for costs associated with this bid item, based upon invoices provided by the CONTRACTOR and in accordance with Section 00700 (General Conditions).

1.06 FINAL PAYMENT

A. Comply with the requirements for Final Payment contained in the Contract Documents, including Article 14.07 of Section 00700 General Conditions and as amended by the Supplementary Conditions.

B. Before final payment is made to the Contractor, the Contractor shall submit to the OWNER a release, in writing, from all the property owners whose property has been used by the Contractor outside the limits of construction and/or Right-of-Way.

C. Final payment shall be subject to any accumulated Milestone Liquidated Damages, Substantial Completion Liquidated Damages and/or Final Completion Liquidated Damages as defined within the City-Contractor Agreement and Section 01310 Construction Progress Schedule.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

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SECTION 01210

PRECONSTRUCTION CONFERENCE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General Conditions, Supplementary Conditions (if included), and other Division 1 Specifications Sections, apply to this section.

1.02 SECTION INCLUDES

A. Description.

B. Submittals.

C. Required Attendance.

D. Agenda.

1.03 DESCRIPTION

A. Date, Time, and Location: Conference will be scheduled within five (5) working days after execution of the Contract and before construction work begins at the site. The Owner will fix the date, time, and location of the meeting.

B. The Engineer will prepare the agenda, preside at the meeting, and prepare and distribute meeting notes to all parties.

C. The Contractor shall provide data required and be prepared to discuss all items on the agenda.

1.04 SUBMITTALS

A. Minutes: The Engineer will compile notes of the Preconstruction Conference and will distribute copies to the Owner, Engineer and the Contractor. The Contractor may make and distribute such other copies as it wishes.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 REQUIRED ATTENDANCE

A. The Contractor and major subcontractor(s).

B. Representative of Government Agencies having any form of jurisdiction, if available.

C. Engineer's representative(s).

D. Owner's Representative(s).

E. Local utility companies.

3.02 AGENDA

A. The agenda will be furnished to the Contractor a minimum of 48 hours prior to the Preconstruction Conference.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SHOP DRAWINGS AND ENGINEERING DATA

A. General

Shop Drawings and engineering data (submittals) covering all equipment and all fabricated components and building materials which will become a permanent part of the Work under this Contract shall be submitted to Engineer for review, as required. Submittals shall verify compliance with the Contract Documents and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and the operation of component materials and devices; the external connections, anchorages, and supports required; the performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. A schedule of the list of anticipated submittals for this project, inclusive of shop drawing, is included at the end of this Section.

Each submittal shall cover items from only one section of the specification unless the item consists of components from several sources. Contractor shall submit a complete initial submittal including all components. When an item consists of components from several sources, Contractor's initial submittal shall be complete including all components.

All submittals, regardless of origin, shall be approved by Contractor and clearly identified with the name and number of this Contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each copy of all submittals, regardless of origin, shall be stamped or affixed with an approval statement of Contractor. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.

Contractor shall be solely responsible for the completeness of each submittal. Contractor's stamp or affixed approval statement of a submittal, per Figure 01300-1, is a representation to Owner and Engineer that Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that Contractor has reviewed and coordinated each submittal with the requirements of the Work and the Contract Documents.

All deviations from the Contract Documents shall be identified as deviations on each submittal and shall be tabulated in Contractor's letter of transmittal using Figure 01300-2. If there are no deviations, the Contractor shall state “NO DEVIATIONS” on Figure 01300-2. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping.

The Contractor shall submit shop drawings in both hard copy and electronically.

For hard copy portion of the submittals three (3) copies of each drawing and the necessary data shall be submitted to Engineer. Engineer will return two (2) marked copies to Contractor. Facsimile (fax) or electronic copies will not be acceptable. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.

For the electronic portion of the submittals, drawings and the necessary data shall be submitted electronically to Engineer as specified below. Submittal documents shall be in black and white unless color is required for the review of the submittal. All electronic files shall be in Portable Document Format (PDF) as generated by Adobe Acrobat Professional Version 7.0 or higher. The PDF file(s) shall be fully indexed using the Table of Contents, searchable with thumbnails generated. PDF images must be at a readable resolution. For most documents, they should be scanned or generated at 300 dots per inch (dpi). Optical Character Recognition (OCR) capture must be performed on these images so that text can be searched, selected and copied from the generated PDF file. The PDF documents shall have a bookmark created in the navigation frame for each major entry ("Section" or "Chapter") in the Table of Contents. Thumbnails shall be generated for each page or graphic in the PDF file.

The opening view for each PDF document shall be as follows:

Initial View: Bookmarks and Page

Magnification: Fit in Window

The file shall open to the Contractor's transmittal letter, with bookmarks to the left. The first bookmark shall be linked to the Table of Contents.

PDF document properties shall include the submittal number for the document title and the Contractor's name for the author.

Electronic submittal file sizes shall be limited to 10 MB and shall be emailed to the Engineer. When multiple files are required for a submittal the least number of files possible shall be created.

Three (3) sets of hard copies of final approved shop drawings shall be generated. One (1) copy shall be returned to the Contractor, one (1) shall be retained by the Engineer and the third submitted shall be given to the Owner.

B. Engineer's Review of Submittals

Engineer's review of submittals covers only general conformity to the Drawings and Specifications, external connections, and dimensions that affect the layout; it does not indicate thorough review of all dimensions, quantities, and details of the material, equipment, device, or item covered. Engineer's review shall not relieve Contractor of sole responsibility for errors, omissions, or deviations in the drawings

and data, nor of Contractor's sole responsibility for compliance with the Contract Documents.

Engineer's submittal review period shall be up to 14 consecutive calendar days and shall commence on the first calendar day following receipt of the submittal or re-submittal in Engineer's office. The time required to mail the submittal or re-submittal back to Contractor shall not be considered a part of the submittal review period.

When the drawings and data are returned with review status "NOT ACCEPTABLE" or "RETURNED FOR CORRECTION", the corrections shall be made as instructed by Engineer. *Three (3) hard-copy corrected copies shall be resubmitted as well as the corrected electronic file. The corrected electronic drawings and data shall be resubmitted through a project file transfer platform (FTP) site or email.* Re-submittals by facsimile will not be accepted. When the drawings and data are returned with review status "EXCEPTIONS NOTED", "NO EXCEPTIONS NOTED", or "RECORD COPY", no additional copies need be furnished unless specifically requested by Engineer.

Engineer's review of submittals in no way implies any additional compensation of extension of time to Contractor.

C. Re-submittal of Drawings and Data

Contractor shall accept full responsibility for the completeness of each re-submittal. Contractor shall verify that all corrected data and additional information previously requested by Engineer are provided on the re-submittal.

When corrected copies are resubmitted, Contractor shall direct specific attention to all revisions in writing and shall list separately any revisions made other than those called for by Engineer on previous submittals. Requirements specified for initial submittals shall also apply to re-submittals. Re-submittals shall bear the number of the first submittal followed by a letter (A, B, etc.) or a unique identification that indicates the initial submittal and correct sequence of each re-submittal.

If more than one re-submittal is required because of failure of Contractor to provide all previously requested corrected data or additional information, Contractor shall reimburse Owner for the charges of Engineer for review of the additional re-submittals. This does not include initial submittal data such as shop tests and field tests that are submitted after initial submittal.

When re-submittals are needed, re-submittals shall be made within 10 days of the date of the letter returning the material to be modified or corrected, unless within five (5) days, Contractor submits an acceptable request for an extension of the stipulated time period, listing the reasons the re-submittal cannot be completed within that time.

The need for more than one re-submittal, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is the direct result of a change in the

Work authorized by a Change Order or failure of Engineer to review and return any submittal to Contractor within the specified review period.

1.02 CERTIFICATES

A. When specified in individual Specification Sections, submit certification by the manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Shop Drawings.

B. Indicate material or equipment conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or equipment but must be acceptable to Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

Figure 01300-1

SUBMITTAL No. _____
SECTION _____
Do not combine multiple sections together unless required by specifications.

(Contractor's Letterhead)

SUBMITTAL IDENTIFICATION &
CONTRACTOR'S APPROVAL STATEMENT

DATE: _____ COPIES _____ DRAWING SHEET NO._____

Description submittal contents: _____
Location: _____
Manufacturer_____
Subcontractor or Supplier (Optional) _____

REMARKS:
_____
_____
_____

CONTRACTOR'S APPROVAL

(Construction Company) has reviewed and coordinated the submitted documentation and verifies that the equipment and material meet the requirements of the Work and the Contract Documents. We accept sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data contained in the submittal as required by the Contract Documents.

Deviations: □ None □ Yes (See attached Figure 01300-2 for written description)

Approved By: _____ Date: _____

This approval does not release subcontractor / vendor from the contractual responsibilities.

Figure 01300-2

SUBMITTAL No. _____
SECTION _____
Do not combine multiple sections together unless required by specifications.

(Contractor's Letterhead)

SUBMITTAL IDENTIFICATION &
CONTRACTOR'S APPROVAL STATEMENT

DATE: _____ COPIES _____ DRAWING SHEET NO._____

Description submittal contents: _____
Location: _____
Manufacturer: _____
Subcontractor or Supplier (Optional): _____

DEVIATIONS

_____
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_____

Table 01300-1

SUBMITTAL SCHEDULE:
SHOP DRAWINGS & SUBMITTALS

SECTION NO.	EQUIPMENT OR MATERIAL	SHOP DRAWINGS REQUIRED	SHOP DRAWING SUBMITTAL DATE

This list shall not be considered complete. The Contractor shall comply with all submittal requirements throughout the project documents.

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Description.

B. Definitions.

C. Submittals.

D. Coordination.

E. Contractor's Project Schedule.

1.03 DESCRIPTION

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.

2. Submittals Schedule.

3. Daily construction reports.

4. Field condition reports.

1.04 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.

2. Predecessor Activity: An activity that precedes another activity in the network.

3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

E. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

F. Major Area: A story of construction, a separate building, or a similar significant construction element.

1.05 SUBMITTALS

A. Submittals Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrications, and delivery when establishing dates.

B. Contractor's Construction Schedule: Submit three (3) copies of initial schedule, large enough to show entire schedule for entire construction period.

1. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

a. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

2. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

a. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Engineer.

b. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 20 days, as separate activities in schedule.

Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

c. Submittal Review Time: Include review and resubmittal times indicated in Section 01300 in the schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.

d. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.

3. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial and Final Completion, and specific dates defined as constraints within the contract documents.

4. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

C. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. As the Work progresses, indicate Actual Completion percentage for each activity. Issue schedule one (1) week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

a. Identification of activities that have changed.

b. Changes in activity durations in workdays.

c. Changes in the critical path.

d. Changes in the Contract Time.

3. Distribution: Distribute copies of approved schedule to Engineer, Owner, subcontractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

D. Field Condition Reports: Submit three (3) copies at time of discovery of differing conditions.

1. Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

1.06 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.07 CONTRACTOR'S PROJECT SCHEDULE

A. A Progress Schedule shall be used to coordinate the Work and to provide a definitive basis for determining project progress. The Progress Schedule shall be prepared, maintained and updated by the Contractor monthly. The Contractor shall submit a preliminary Progress Schedule and a Progress Schedule for acceptance to the Owner. These schedules shall be the Contractor's working schedules and shall be used to plan, organize and execute the Work, record and report actual performance and progress, and show how the Contractor plans to complete all remaining Work as of the end of each progress report period. The Progress Schedule shall comprise all the detailed project-related activities using the critical path method (CPM). The Progress Schedule shall provide sufficient detail and clarity to reflect the intricacies and interdependencies of activities so the Contractor can plan, schedule, monitor, control and report on the progress of his work. In addition, it shall provide the Owner a tool to monitor and follow the progress for all phases of the Work. The Owner shall also use the schedule to plan the Owner's work.

B. Preliminary Progress Schedule:

1. Within ten (10) calendar days after the Notice to Proceed or at the Pre-construction meeting whichever comes first, the Contractor shall submit a preliminary Progress Schedule for review to the Owner. The preliminary Progress Schedule shall show detailed construction related activities for the first 60 days of the project. The remainder of the Contract activities shall be shown as summary bars within the Milestones of the Work. If the

Owner has comments relative to the work breakdown structure (WBS), task interdependencies and Milestones on the preliminary Progress Schedule, the Contractor shall provide additional detail and resubmit it within ten (10) calendar days. No progress payments will be made during the period specified above for the preliminary Progress Schedule until the preliminary Progress Schedule has been accepted by the Owner.

2. The preliminary Progress Schedule shall:

   a. Illustrate a feasible schedule for completion of the Work within the time and Milestones specified. Contractor must provide a schedule that illustrates an understanding of sequence of deadlines.

   b. Provide an elementary example of the schedule in the format to be used for the Progress Schedule.

C. Progress Schedule:

1. The Progress Schedule comprises all the construction related activities for the Work and shall show the order in which the Contractor proposes to carry out the work. The Contractor shall include Milestones, coordination necessitated by limited access and available work areas, and the availability and use of manpower, material and equipment. Contractor shall use the Progress Schedule to plan, schedule and coordinate the Work including activities of subcontractors and suppliers.

2. The activities included in the Progress Schedule shall be defined in work days. Durations shall be based on the labor (crafts), equipment, and materials required to perform each activity on a normal workday basis. All durations shall be the result of definitive manpower and resource planning by Contractor to perform the Work, in consideration of contractually defined on-site work conditions and Contractor's planned means and methods. Activity durations shall be 20 working days or less except in case of non-construction activities.

3. When the Progress Schedule is accepted by the Owner, it will be used as the baseline schedule for analysis of Contractor's progress. The Contractor shall update the Progress Schedule monthly. Update shall be produced in color and of a plot size determined by the Owner.

D. Submittals:

1. If the Progress Schedule is not submitted, no progress payments will be made after the due date until the Progress Schedule has been submitted.

2. Printouts and electronic layouts required as part of the Progress Schedule submittal and monthly updates are as follows:

a. Summary Schedule: one page Milestone and summary schedule, sorted by total float, early-start, early-finish;

b. Critical Path Schedule: sorted based on the total float, early-start, early-finish;

c. Look-ahead Schedule: Work scheduled for the next 60 days sorted based on total float, early-start, early finish;

3. Contractor shall submit additional layouts if directed by the Owner. The schedule, critical path, and look-ahead schedules shall be submitted and shall be of a plot size as determined by the Owner.

4. Contractor shall submit three (3) copies in full color on 11"x17" paper of each schedule unless otherwise directed.

E. Monthly Schedule Updates:

1. Monthly Progress Schedule updates shall be submitted for the duration of the Contract on a date agreed to by the Owner and Contractor. If monthly Progress Schedule updates are not submitted by the due date, progress payments will be withheld until the required information is submitted.

The updated schedule shall be reviewed each month in a meeting with the Owner to verify:

a. Actual start dates,

b. Actual completion dates,

c. Activity percent completion,

d. Deviations from the baseline schedule.

F. Responsibility for Schedule Compliance:

1. Whenever it becomes apparent from the current Progress Schedule that the critical path is delayed and the contract Milestones and completion date will not be met, Contractor shall mitigate the delay by taking some or all of the following actions at no additional cost to Owner.

a. Increase manpower in such quantities and crafts as will bring the project back on schedule within the completion dates and Milestones.

b. Increase the number of working hours per shift, shifts per day, working days per week, and the amount of equipment, or any combination of the foregoing, to substantially eliminate the

backlog of work. All additional shifts must adhere to the work hours specified within Section 01040.

c. Re-schedule activities to achieve maximum practical concurrence of activities and to comply with the schedule date(s).

2. Within ten (10) calendar days, the Contractor shall submit a recovery schedule and written statement of the steps intended to remove or arrest the delay to the critical path in the schedule. The Owner will review the recovery schedule to verify that the negative impacts on the schedule have been mitigated. If the Contractor fails to submit the required information or should fail to take measures acceptable to the Owner, the Owner may direct the Contractor to increase man-power, equipment and scheduled work hours to remove or arrest the delay to the critical path and the Contractor shall promptly provide such level of effort at no additional cost to Owner.

3. In the event the Contractor fails to follow the updated or revised recovery schedule, Owner may elect to withhold progress payments until Contractor complies with the revised schedule.

G. Change Orders, Delays, and Extensions of Time:

1. When change orders or delays are experienced by Contractor and Contractor requests an extension of time, Contractor shall submit a written time impact analysis to the Owner illustrating the influence of each change or delay to the current Contract Schedule completion date. Each time impact analysis shall include sufficient information incorporating the change order or delay into the Progress Schedule to demonstrate how Contractor was delayed.

2. Each time impact analysis shall demonstrate the estimated time impact based on the events of the change or the delay; the date the change was given to Contractor or the delay incurred, the status of construction at that point in time, and the event time computation of all activities affected by the change or delay. The event times used in the analysis shall be those included in the latest update of the Progress Schedule or as adjusted for the events of delay.

3. Three (3) copies of the time impact analysis shall be submitted electronically within five (5) working days of delay occurrence or direction to proceed with a change is given to Contractor. No time extensions will be considered if the time impact analysis is not submitted within the specified time.

4. The Owner will review the Contractor's time impact analysis. The Contractor shall furnish such justification and supporting evidence as the

Owner deems necessary to determine whether the Contractor is entitled to an extension of time. The Owner's review of each time impact analysis will be made within ten (10) working days of receipt of the time impact analysis and additional information as required by the Owner, unless subsequent meetings and negotiations are necessary.

5. Time extensions will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total or remaining float along the critical path at the time of actual delay. Delays in activities which are not on the critical path and do not affect Contract completion dates, will not be considered for an extension of time.

6. Causes for Extensions of Time:

   a. Owner-Initiated Changes:

      i. Owner-initiated changes to the Contract work that absorb float time will not be considered for an extension of time. Owner initiated changes that affect the critical path of the Progress Schedule shall be grounds for extending or shortening completion dates. Use of float time for Contractor initiated changes will require Owner's concurrence. Contractor's changes, however, shall give way to Owner-initiated changes competing for the same float time.

   b. Outside Contractor's Control:

      i. Events outside of the Contractor's control that affect the critical path of the Progress Schedule will be considered for an extension or reduction of the Contract Times.

   c. Weather Delays:

      i. The Contractor shall incorporate AVERAGE non-productive weather days based on historical data into progress schedule in order to build a realistically executable schedule.

      ii. Additional weather days will only be added to the contract based on the following:

         (a) Weather delays will only be awarded for inclement weather in excess of historical averages as documented by NOAA for precipitation and temperature days.

(1) Monthly Precipitation shall exceed monthly average precipitation as shown in Table 1.

(2) Precipitation days are defined as days where at least 0.10" of precipitation occurred in a single day.

(3) Temperature days are defined as days where the minimum temperature was 10°F or lower or was 105°F or higher.

(4) Mud days are defined as the day after a precipitation day where precipitation was ≥ 1 inch. Mud days must fall on a work day and are not counted if the day is also a precipitation day.

(b) Inclement weather must delay work on activities in the critical path

(c) Inclement weather must delay work for at least 50% of the scheduled work day.

(d) Inclement weather delays will only be considered for full workdays (i.e., half days such as Christmas Eve would not be considered)

(e) Additional weather days may be granted at the discretion of the Engineer for circumstances not covered by the tables and figures herein. Examples include documented high wind days that prevent crane operations.

(f) Only one weather day can be awarded per day (i.e., Contractor cannot earn a precipitation day **and** a temperature or mud day for the same calendar day.)

iii. Contractor will notify Responsible Project Representative (RPR) daily of weather delays as they occur. RPR will record non-production due to weather days on RPR's Daily Inspection Reports. Weather days not reported to PR as they occur will not be considered.

iv. Engineer will determine Contractor's entitlement to an extension of the Contract time as a result of weather delays, based on the data included in Tables 1 through 3 and the flow charts in Figures 1 and 2.

Table 1 – Average Monthly Precipitation 10 year average 2000-2010 NOAA National Data Center, Annual Climatological Summaries												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AVE	1.70	1.83	2.44	3.32	3.23	3.34	3.84	3.44	3.35	2.19	2.29	2.40

Table 2 - Average Number of Calendar Days with Precipitation of >=0.10 inches or More inches of rain (or equivalent inches of rain) in a Single 24-hour Period 10 year average 2000-2010 NOAA National Data Center, Annual Climatological Summaries												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AVE	3	3	4	6	6	5	6	4	5	4	4	4

Table 3 – Monthly Count of Days with Temperatures ≤ 10°F or ≥ 105°F 10 year average 2000-2010 NOAA National Data Center, Annual Climatological Summaries												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AVE	6	5	1	0	0	0	0	0	0	0	0	2

FIGURE 1 - HOW TO CALCULATE PRECIPITATION DAYS

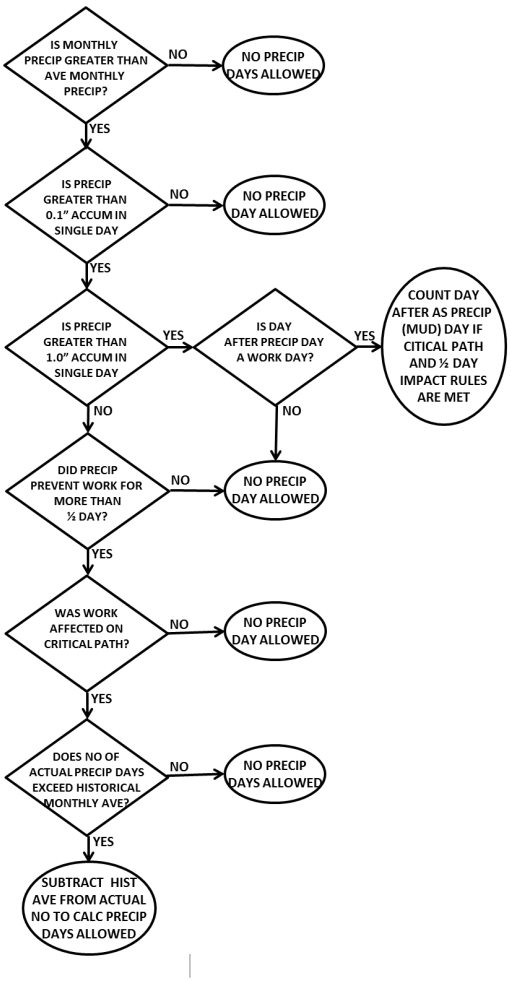
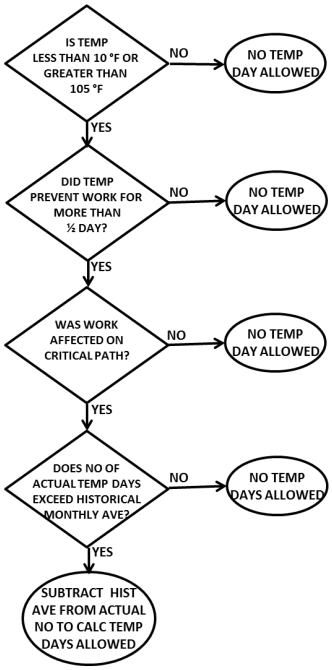


FIGURE 2 - HOW TO CALCULATE TEMPERATURE DAYS



v. Application for weather related extensions of time shall be submitted to the Engineer monthly as part of the Progress Schedule update and shall state the extension requested and be supported by the relevant weather data. Weather related extensions not requested monthly will not be considered.

vi. Any weather-related extension of Contract time shall be non-compensable. Efficiencies gained as a result of favorable weather within a calendar month, where the number of days of normally anticipated weather days is less than expected, shall contribute to the project float and shall not affect the Contract Times.

H. Project Calendars:

1. Project Calendars shall use workdays and calendar days as the planning unit for the schedule. Each calendar shall be set to start on Mondays with

holidays in accordance with Owner policy. The following calendars shall be used for each activity except as otherwise accepted by the Owner:

a. 5-Day x 8 Hour Workweek (with holidays) shall be used for 5-day 40-hour workweek activities: Monday through Friday. All holidays and non-work days shall be assigned to this calendar. This calendar shall be used for all normal work activities, submittals, and fabricate and delivery activities. This calendar shall be the default calendar for the project unless otherwise specified.

2. The work day to calendar day correlation shall be based on a single shift and 5- day work week with adequate allowance for holidays, adverse weather and all other special requirements of the Work. The Contractor may, at his option, propose alternate baseline calendars to allow a second shift and/or a single shift on Saturdays subject to the concurrence and acceptance of the Owner.

3. For the purpose of developing the project schedule, the Contractor shall consider the following list of holidays observed by the Owner as non-work days, all of which shall be incorporated into the schedule:

New Year's Day
Martin Luther King Day
President's Day
Good Friday
Memorial Day
Fourth of July
Labor Day
Thanksgiving Day
Day after Thanksgiving Day
Christmas Eve Day
Christmas Day

I. Float: The Contractor shall not use float suppression techniques, including preferential sequencing (arranging critical path through activities more susceptible to Owner caused delay); lag logic restraints; zero total or free float constraints; extended activity times; or imposing constraint dates other than as required by the Contract. Float suppression will be cause for rejection of the preliminary Progress Schedule or full Progress Schedule and its updates.

J. Mandatory Milestones:

1. The Contract duration shall be equal to the time period between the Notice to Proceed and the Final Completion Milestone. The following Milestones are mandatory.

a. Project Award.

b. Notice to Proceed.

c. Substantial Completion as established in the Supplementary Conditions.

d. Final Completion as established in the Special Provisions.

2. The following additional Milestones are to be considered and incorporated into the Progress Schedule in accordance with the Contract terms, if applicable.

a. Permit and other environmental constraints (See Section 01040).

b. Lane closure or utility outage requirements.

c. Applicable sequencing or phasing Milestones.

d. Other Milestones deemed appropriate by the Owner.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01500

TEMPORARY WORK AND CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and other Division 1 Specifications Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Contractor's Use of the Site.

B. Mobilization.

C. Barriers, Signs, Lights & Site Safety.

D. Maintaining Traffic.

E. Maintenance of Storm Water Flow and Drainage.

F. Protection of Public and Private Property.

G. Damage to Existing Property.

H. Pollution Control.

I. Unauthorized Work.

J. Erection, Installation and Removal of Temporary Facilities

K. Maintenance and Removal

L. Erosion Sediment Control & Stormwater Pollution Prevention Plan

M. Notification of Utility Owners

1.03 SUBMITTALS

A. Submittals shall meet the requirements of Section 01300.

1.04 CONTRACTOR'S USE OF THE SITE

A. The Contract Drawings indicate the Project Work Area and the Contractor shall confine all operations to the designated areas, public rights of way and easements unless specifically approved in writing by the Owner.

B. The Contractor shall make provisions for his employee and subcontractor parking at the Contractor's cost. Contractor parking shall not disturb maintenance of traffic or private property.

C. Contractor shall, at all times, maintain temporary fencing at each work site. The Contractor shall replace or construct secure temporary fencing at the end of each work day if removal of the existing is required to complete the Contract.

1.05 MOBILIZATION

A. Perform preparatory work and operations for the assembling and setting up necessary for Work on the Project, such as shops, storage areas, sanitary facilities, moving in of personnel and equipment, incidentals to the Project, and any other facilities, as required by the Specifications and special requirements of the Contract Documents, as well as by laws and regulations in effect at the Site.

B. Perform demobilization to remove the items and equipment specific to the Project.

1.06 BARRIERS, SIGNS, LIGHTS & SITE SAFETY

A. Provide, erect, and maintain barricades, suitable and sufficient warning lights, and take all necessary precautions for the protection of the public.

B. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

D. The Contractor shall erect and maintain such strong and suitable barriers, signs, and warning lights as will effectively prevent accidents and injury to people and property.

E. In addition to other safety requirements, a temporary fence at least four (4) feet high shall surround any active work sites at the end of each workday.

F. Construction safety measures shall comply with Department of Labor Occupational Safety and Health Regulations for Construction.

1.07 MAINTAINING TRAFFIC

A. Conduct work so that inconvenience to Owner and other work at the site is minimized. At least limited traffic shall be permitted, except for those periods when, because of actual construction, curing of concrete, etc., travel is impossible, or when travel by the public is too hazardous.

B. Prior to the start of construction, meet with and obtain the permission of the Owner prior to modifying traffic flow on any access drive or street and to establish site-specific requirements including but not limited to schedule.

C. During construction, give the Owner and Engineer 48-hours prior notice of the modification of traffic flow on any access drive or street, as earlier agreed upon by the Owner, Engineer and Contractor.

D. Specific maintenance of traffic requirements for City of Findlay public streets shall be in accordance with the City of Findlay Engineering Division (419) 424-7121.

E. Detours: In the event that the traffic cannot be maintained on the alignment of the original roadbed or pavement, Contractor shall, at its own expense, construct and maintain a signed detour route around the construction work. Each detour shall include all necessary barricades, guardrails, approaches, lights, signals, signs, and other devices and precautions necessary for protection of the Work and safety of the public and established in accordance with the Ohio Manual of Uniform Traffic Control Devices. All detours must be approved by the authority having jurisdiction.

1.08 MAINTENANCE OF STORM WATER FLOW AND DRAINAGE

A. Maintain drainage on the Site where construction operations alter the existing conditions.

B. Contractor shall provide for drainage of storm water and such water as may be applied or discharged on the Site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the Site, and adjacent property. Maintain drainage as required to protect the Work and in accordance with the SWPPP Plan.

1.09 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

A. Contractor shall protect all existing trees to remain, adjacent structures and property from damage caused by its construction operations.

B. All trees, pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards, parkways, and medians affected by the Work, shall be restored to their original condition, whether within or outside the identified work limits. All replacements shall be made with new materials.

1.10 DAMAGE TO EXISTING PROPERTY

A. Contractor shall be responsible for any damage to existing structures, Work, materials, or equipment because of his operations and shall repair or replace any damaged structures, Work, materials, or equipment to the satisfaction of and at no additional cost to the Owner.

B. Contractor shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the Work or any part of site thereof, whether by Contractor or its subcontractors. Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

1.11 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

C. All facilities require a Spill Prevention, Control, and Countermeasures Plan (SPCC) when the capacity of oil storage (in containers of 55 gallons or larger) exceed in aggregate 1,320 gallons. If the total amount of oil products stored on the site exceeds this value, the Contractor shall develop and implement a SPCC Plan and provide a copy of the plan to the Owner.

1.12 UNAUTHORIZED WORK

A. Work performed beyond the lines shown on the Drawings, specified, or ordered; work done without being reviewed, final shop drawings or required inspection; or any extra work performed without written authorization will be considered unauthorized work and will not be paid for under the provisions of the Contract. Work so performed may be ordered removed at Contractor's expense.

1.13 COOPERATION OF CONTRACTORS

A. The Contractor(s) shall plan and perform their work to minimize interference with the operation of the Owner, other contractors, utilities, and public facilities on or near the Work.

B. The Owner reserves the right to perform other work by contract or otherwise, and to permit other public entities, utilities, or others perform work on or near the Work site during the construction period. If a conflict arises that cannot be resolved by the conflicting parties, the Owner and Engineer will determine when and how the Work will proceed. Related claims of any nature by such parties will not be considered.

1.14 ERECTION, INSTALLATION, AND REMOVAL OF TEMPORARY FACILITIES

A. Temporary facilities shall be placed in accordance with applicable laws, codes, and regulations.

B. All temporary facilities shall be maintained to provide adequate service.

C. Existing equipment used for temporary services shall be restored to pre-construction or better condition.

D. The installation shall comply with applicable requirement specified in the various Divisions of this Project Manual.

E. The temporary system shall be maintained to provide continuous service.

F. At the completion of the project, all temporary materials and equipment shall be completely removed.

G. Existing facilities use for temporary services shall be restored to pre-construction or better condition.

PART 2 PRODUCTS

2.01 Provide products as required.

PART 3 EXECUTION

3.01 MAINTENANCE AND REMOVAL

A. Maintain temporary facilities and controls as long as needed for the safe and proper completion of the Work.

B. Remove the temporary facilities and controls as rapidly as progress of the Work will safely permit, or as directed by the Owner. Temporary facilities and controls shall be removed prior to Final Application for Payment inspection.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

3.02 EROSION AND SEDIMENT CONTROL

A. Contractor shall prepare and implement a Stormwater Pollution Prevention Plan (SWP3) in accordance with applicable rules. The SWP3 shall be presented to the City of Findlay Engineering Department for review not less than five (5) calendar days prior to starting work.

B. Contractor shall submit Notice of Intent (NOI) and Notice of Termination (NOT) forms, as required. The Contractor shall pay all applicable fees. Contractor shall minimize amount of bare soil exposed at one time.

C. All disturbed areas shall be raked smooth and temporarily seeded or otherwise stabilized within seven (7) calendar days of disturbance, in accordance with applicable requirements of the Stormwater Pollution Prevention Plan (SWP3). If disturbed areas are within 50 feet of a stream, the area shall be raked smooth and temporarily seeded or otherwise stabilized within two (2) calendar days of disturbance, in accordance with applicable requirements of the SWP3.

D. All areas affected by project operations shall be permanently seeded in accordance with ODOT Item 659 as modified by the project Drawings.

E. All costs associated with Erosion and Sediment Control, including all site preparation, temporary and permanent seeding, shall be included in the lump sum cost bid for Item 3.28 – SWPPP and Erosion Control.

3.03 NOTIFICATION OF UTILITY OWNERS

A. Not less than five (5) working days in advance of mobilization, notify in writing all utility companies, such as gas, water, electric power, transmission, cable, and telephone, which have installations that could be disturbed by the Work; and make proper provisions for locating, removing, relocating, or otherwise protecting said installations. Make additional utility company contacts and provisions to locate and protect utility company installations, as necessary, as the Work progresses.

B. Unless shown on the Drawings or otherwise specified to be removed, protect or relocate all active utility installations or improvements encountered by the Work. Service interruptions should be avoided whenever possible but when unavoidable, interruptions should be kept to a minimum. In such cases, promptly notify all those affected.

C. If a utility installation or improvement is damaged, promptly notify those affected, repair or replace to utility standards. Restore service as soon as possible at no additional cost to Owner.

D. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Owner and Engineer and secure appropriate instructions.

E. Do not proceed with the permanent relocation of utilities until written instructions are received from the Owner.

END OF SECTION

SECTION 01590

FIELD OFFICES AND SHEDS

PART 1 GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide fully functional Contractor's and Engineer's field offices within 30 days of Notice to Proceed.

B. The Contractor shall provide, furnish, and maintain until the final completion and acceptance of work, a separate field office and appurtenant facilities for the exclusive use of the Engineer and other representatives of the Owner. Joint occupancy with other activities will not be permitted. The office shall be placed at a location approved by the Owner and Engineer with a parking area and utilities provided.

C. Contractor shall provide and maintain the following including, but not limited to, access, drives, parking areas, walks, sanitary sewers, potable water, HVAC, security, and cleaning services.

D. The office, including all equipment and furnishings, shall be new or in used condition acceptable to the Owner and Engineer.

1.02 SUBMITTALS

A. Submittals shall meet the requirements of Section 01300.

B. Contractor shall provide Engineer with copies of applicable permits for the installation of temporary utilities to serve the Contractor's and Engineer's office.

C. Shop Drawings:

D. Provide shop drawings for the Engineer's trailer showing floor plan layout.

E. Provide site drawing showing location of field trailers and dimensions and layout of parking areas.

PART 2 PRODUCTS

2.01 CONTRACTOR'S OFFICE

A. The Contractor shall provide a secure weather-tight office of sufficient size and facilities to accommodate Contractor's field personnel, separate conference room with table and chairs for 12-persons, job meetings, storage of field documents, layout space for Drawings, and drafting table.

B. Provide one set of all Contract Documents, Project Record Documents, Submittals and Samples in the office for ready reference at all times.

2.02 ENGINEER'S FIELD OFFICE

A. The Contractor shall be responsible for providing and maintaining a fully enclosed office building, which is separately insulated, secure, painted, and near to the Work Site, for the Engineer's use. The office shall be located within the same vicinity as the Contractor's Field office, however shall be a separate office from the Contractor's Field office and have a separate entrance. A portable building (trailer) is acceptable.

B. The office shall be compliant with ODOT Item 619, Type B, as modified by this Section.

2.03 TOILET FACILITIES

A. Provide all field offices with toilet facilities internal to the field office or trailer. Water supply and wastewater storage may be by means of separate, tanked facilities if approved by local governing authorities.

B. Maintain facilities in a sanitary condition. Comply with governing authority and health standards.

C. The Engineer's and Contractor's personnel will use these toilet facilities.

2.04 OFFICE CLEANING AND SNOW REMOVAL

A. The Contractor shall provide continuous maintenance and cleaning of the Engineer's Field Office once a week for the duration of the project.

B. Contractor shall provide snow removal service, including de-icing of walkways, for the duration of the project. Snow removal shall occur following any snowfall greater than 1".

2.05 STORAGE SHEDS

A. Provide watertight sheds for storage of materials subject to weather damage, vandalism, or theft.

B. Provide sheds with lockable doors and floors raised above the ground.

2.06 Temporary Utilities

A. Contractor shall provide all temporary utilities as required to service the Contractor's and Engineer's offices in accordance with Article 2.7 of the General Conditions.

B. Contractor shall acquire all permits and pay applicable fees for such installations. These costs shall be included in the pay item Mobilization / Demobilization / General Conditions.

PART 3 EXECUTION

3.01 SERVICES

A. All fuel, electricity, and internet service shall be paid by the Contractor.

B. The Contractor shall provide continuous maintenance and cleaning once a week for the duration of the project. If a toilet or lavatory are provided, these services shall include, but not limited to, paper towels, toilet paper, and soap.

C. The field office shall be maintained by the Contractor until the work is complete. Earlier removal shall not be done without prior written approval of the Owner and Engineer.

3.02 SECURITY

A. The Contractor shall be responsible for the security of the field office trailer.

B. The Contractor shall supply the Engineer two (2) sets of door keys for the field office and any other measured used to secure the trailer site.

3.03 LOCATION

A. Field office shall be located to provide access by Owner and Engineer and visitors without having to traverse site.

B. Field office shall be located where it will cause as little interference with the work as possible. Relocation of the field office during the course of the project shall be permitted upon written approval of Owner and Engineer.

C. Field office location shall be coordinated with and approved by Owner and Engineer.

END OF SECTION

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SECTION 01700

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions (if included) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.

2. Field engineering and surveying.

3. General installation of products.

4. Progress cleaning.

5. Starting and adjusting.

6. Protection of installed construction.

7. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.

2. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.03 SUBMITTALS

Not used.

1.04 QUALITY ASSURANCE

Not used.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

3.02 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Engineer.

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.

1. General:

2. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.

3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

4. Inform installers of lines and levels to which they must comply.

5. Check the location, level and plumb, of every major element as the Work progresses.

6. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.

7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

3.04 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

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

1. Do not change or relocate existing benchmarks or control points without prior written approval of Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.05 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

E. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

F. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.06 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

F. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.07 PROTECTION OF INSTALLED CONSTRUCTION

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

3.08 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

END OF SECTION

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SECTION 01770

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions (if included) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.

2. Warranties.

3. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.

2. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

3. Divisions 2 through 16 Sections, as applicable, for specific closeout and special requirements for the Work in those Sections.

1.03 SUBSTANTIAL COMPLETION

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

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Prepare and submit Project Record Documents, and similar final record information.

5. Terminate and remove temporary facilities from Project site, construction tools, and similar elements.

6. Complete final cleaning requirements.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for Final Completion.

1.04 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to the General Conditions.

2. Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 WARRANTIES

A. Submittal Time: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial site maintenance program.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project Site and dispose of lawfully.

END OF SECTION

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SECTION 01781

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions (if included) and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.

2. Record Specifications.

B. Related Sections include the following:

1. Section 01770 "Closeout Procedures"

2. Divisions 2 through 16 Sections, as applicable, for specific requirements for Project Record Documents of the Work in those Sections.

1.03 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up Record Prints.

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an understandable drawing technique.

c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.

b. Revisions to details shown on Drawings.

c. Locations and depths of underground utilities.

d. Changes made by Change Order or Work Change Directive.

e. Changes made following Engineer's written orders.

f. Details not on the original Contract Drawings.

g. Field records for variable and concealed conditions.

3. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

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

END OF SECTION

SECTION 02060

DEMOLITIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. Demolitions, removal and disposal work as shown on Drawings. Salvaged and reused equipment and materials are shown on the Drawings.

1.02 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required for the following:

1. Demolition and removal of existing facilities and/or structures as required. Demolition includes structural concrete, precast concrete, walkways, slabs, metals, roofing, masonry, piping, chain link fence, and other existing facilities. Also included is the salvaging of designated materials.

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 compacted in accordance with Section 02220.

3. 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 wall and floor surfaces shall be repaired so as to leave a neat patch matching the existing surface's appearance, slope, and finish.

b. Concrete for patching shall comply with Section 03300, except that maximum aggregate size shall be 3/8-inch.

4. Abandon buried and exposed piping by filling with low strength mortar backfill per ODOT Item 613, unless otherwise directed the Engineer.

1.03 RELATED SECTIONS

A. Section 01300 – Submittals

B. Section 02220 – Excavation and Backfill

C. 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 demolitions of existing buildings and the installation of the new equipment shall be completely coordinated by the Contractor.

1.04 REFERENCE STANDARDS

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.

B. ASTM D 698: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.

1.05 SYSTEM DESCRIPTION

No specific requirements.

1.06 SUBMITTALS – Submittals shall meet the requirements of Sections 01300.

A. Shop Drawings:

1. Proposed dust control measures.

2. Proposed noise control measures.

3. Proposed haul routes between Site and disposal areas before commencing this Work.

4. Submit following Lists and Schedules to Owner:

a. Detailed sequence of demolition work, with starting and ending dates for each activity.

b. Inventory list of materials removed under this Work. Owner will determine items for retention by Owner.

c. Coordination Schedule for shutoff, capping, or interruption of utility services.

B. Product Data: Not Used.

C. Samples or Mock-ups: Not Used.

D. Maintenance and Operating Instructions: Not Used.

E. Personnel Qualifications: Not Used.

F. Operator Training/Lesson Plans: Not Used.

G. Warranties and Guarantees: Not Used.

H. Special Tools and Repair Parts: Not Used.

I. Installation Data and Inspection Data: Not Used.

J. Performance Reports and Test Data: Not Used.

K. Product/Material Certifications: Not Used.

L. Construction Photographs: Not Used.

M. Project Record Documents: Not Used.

N. Other: Submit lists of salvaged and equipment relocated and reused.

1.07 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 72 hours prior to commencement of work from the Resident Project 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 Contractor shall make provisions for the careful and safe removal of the concrete to the limits shown, or as directed by the Resident Project Representative.

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.

3.02 PREPARATION

A. Notification:

1. Notify the Resident Project Representative in writing at least 72 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 work shifts 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 Owner.

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 barricaded, 24 hours per day.

C. Piping and Equipment to be Removed or Abandoned:

1. Existing piping passing through the area of Work, or new piping installed 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, 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 flush or 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.

D. Possession of Removed Items:

1. Removed Items to Remain Property of Owner:

a. Removed items to remain property of the Owner shall be discussed with the Owner and labeled "salvage". The inclusion of a particular item shall be interpreted to include all local controls, local starters, disconnects and enclosures.

b. Items designated to be salvaged are to remain the property of the Owner. The Contractor shall remove materials/equipment using methods and machinery such that no damage occurs to the materials/equipment and its appurtenances.

i. Items either marked with orange paint marks or tagged with red tags are to be removed, cleaned, transported as directed, and stored on-site.

ii. Removed items to remain the property of the Owner shall be thoroughly flushed and scrub-brushed clean of all sludge, grit, grease, and similar material, and shall be stored at locations on-site as directed by the Resident Project Representative.

a) Grease: All items to be stored and requiring grease shall be greased and all parts subject to corrosion shall be protective coated.

iii. All removal, clean up, transportation and placement in storage of salvaged items shall be by the Contractor.

2. All equipment selected or identified to remain the property of Owner, shall be removed and stored as described:

a. Carefully remove so as not to damage.

b. Equipment is to be placed on pallets or wood skids and is to be completely covered with plasticized tarpaulins to protect from weather.

3. Equipment designated to be removed and disposed of shall become the Contractor's property and disposed of in accordance with Paragraph 3.03 of this Section.

E. Structural Removals:

1. The extent of structural demolition at any floor level or area shall first be laid-out by the Contractor using chalk lines, tape, or similar non-permanent markers so as to demonstrate to the Resident Project Representative that the true extent and nature of the removal is completely understood.

2. After review of the laid-out areas, the Resident Project Representative 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 Resident Project Representative 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 Resident Project Representative.

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 Resident Project Representative.

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 for demolition is not permitted on the job site.

B. Below-Grade Demolition.

1. Proceed with demolition from the top of the structure.

2. Demolish concrete and masonry in small, manageable sections.

3. Completely fill below-grade areas and voids resulting from demolition work, except as required for the construction of proposed structures.

a. Install approved fill.

i. Use satisfactory soil materials consisting of earth, stone, gravel or sand as approved by the Engineer. Fill shall be free from debris, trash, frozen materials, stones over 6-inch diameter, roots and other organic matter.

ii. Before placement of fill materials, ensure that fill placement areas are free of standing water, frost, frozen materials, topsoil, trash and debris.

iii. Place fill materials in horizontal layers not exceeding 12 inches in loose depth. Compact each layer at optimum moisture content of fill material to density equaling original adjacent ground, unless later excavation for new work is necessary.

iv. In areas where new structures are constructed over fill, compact granular fill material to 100 percent of its maximum dry density as determined by Standard Proctor Test (ASTM D698).

v. After fill placement and compaction, grade surfaces to meet adjacent contours and to provide flow to surface drainage structures, unless shown otherwise.

4. Do not allow demolition operations to damage adjacent structures or equipment. Do not allow excessive vibrations or impact to be transmitted through structures or equipment.

5. Provide temporary support or bracing of existing structural components not removed at all locations where shown, or where the removals will adversely affect the structural integrity or the continuity of the remaining structural components.

a. All temporary supports and bracing shall remain in place until such time as the adjacent structural modifications have fully cured and are capable of supporting normal dead and live loads.

C. Structural Removals:

1. Remove structures to the lines and grades shown unless otherwise directed by the Resident Project Representative.

2. As soon as removal work has otherwise been completed and approved by the Resident Project Representative, required filling shall be performed

in accordance with Section 02220. 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. Pavement, Sidewalks, Curbs, Etc., Demolition: When designated for removal, an existing wearing course, concrete base course, concrete pavement, bituminous wearing course, concrete sidewalks, concrete gutters, stone or concrete curbs, concrete combined curb gutter, concrete traffic dividers, etc., shall be removed and disposed of as follows:

1. Removal methods shall be used which ensure that other existing installations such as adjacent pavements, etc., which are to remain in place will not be damaged. Installations which are to remain in place and which are damaged by the Contractor's operations shall be repaired to the satisfaction of the Resident Project Representative at no cost to the Owner.

2. Removal of damaged curbs shall consist of removal of entire sections or partial removal if the concrete is cut neatly in an acceptable manner and then separated from the undamaged portion. The minimum length of curb removed for replacement shall be five (5) feet.

3. Where only a portion of an existing sidewalk, pavement, etc., is to be removed, a neat joint shall be sawed or otherwise cut at the removal limit if it does not occur at an existing joint.

4. If the amount of pavement, sidewalks, or other item(s) to be removed is of sufficient size to warrant the use of graders or other mechanical equipment, these machines shall operate only in such areas and in such manner that the above provisions will not be violated.

5. Precautions shall be taken by the Contractor to prevent the displacement of, or damage to manholes or valve boxes located within the limits of the pavement to be removed, or to the curbing, catch basins, and pavement adjacent to the area of the wearing course to be removed. The Contractor shall repair, or replace, as may be required, at no additional cost to the Owner, any and all such items which are damaged by the Contractor's operations. The pavement removal shall be limited to the areas shown on the plan or as determined by the Resident Project Representative. The edges of the adjoining bituminous pavements shall be neatly saw cut to form vertical joints with the pavement courses to be constructed under this Contract.

6. Materials to be salvaged shall be stored at locations determined by the Resident Project Representative and shall be cleaned and ready for re-use.

7. Materials that are not to be salvaged or that are not suitable for re-use shall be disposed of as indicated in this Section.

8. Fill Material:

   a. The Contractor is advised that spoil material from construction of the pipe and structures will be in excess of what is available for placement on the site. In trucking the selected material as designated on the plans to the fill location all local, state and federal regulations will be strictly adhered to. It is the Contractor's responsibility to coordinate the placement of all spoil material to be wasted on-site and off-site and provide a Soil Management Plan to the Owner and Engineer for review prior to beginning earthwork operations.

3.04 FIELD QUALITY CONTROL

Not Used.

3.05 CLEANING

A. Comply with Section 01700.

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. 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 and properly dispose from the site 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 Resident Project Representative.

3. Do not re-use demolished items unless approved by the Resident Project Representative.

4. Remove excess soil material remaining from demolition in excess of what is needed for placement on site.

D. Off-Site Disposal:

1. Dispose of all demolition materials, debris, and old concrete off the site as directed by the Resident Project 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 Resident Project Representative.

E. Alterations and Closures:

1. General: Conform to all applicable Specifications, the Drawings, and the directions of the Resident Project 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 Resident Project Representative.

c. Finish smoothly all repairs unless otherwise directed by the Resident Project Representative.

3. Openings:

a. Close and seal openings in existing concrete slabs, ceilings, masonry walls, floors, and partitions as indicated on the Drawings or otherwise directed by the Resident Project Representative.

b. Key new Work into the existing in an acceptable manner.

c. In general, use the same or matching materials as the existing adjacent surface.

d. Make the finished closure a smooth, tight, sealed, permanent closure acceptable to the Resident Project Representative.

4. Pipes to be Removed or Abandoned:

a. Pipes designated on the drawings as "To Be Removed" shall be completely removed. All exposed ends of pipes left in place shall be sealed and made watertight.

b. Pipes designated on the drawings as "To Be Abandoned" shall be left in place and filled with low strength mortar.

c. Approved precast stoppers or masonry bulkheads shall be used to seal and make watertight the ends of the pipes specified above.

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. Tooth 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.

    a. Repair damage done to facilities to remain, or to any property belonging to the Owner or occupants of the facilities.

2. Structural concrete, if shown to be partially removed, and which has rough or raw edges not covered or otherwise "finished" by new structural work, shall be neatly repaired so as to blend in with the surrounding concrete surfaces.

3. Exposed Surfaces:

    a. Repair all surfaces of walls, floors, ceilings, or other areas which are exposed by any of the removals specified herein or in other Sections of these Specifications, or shown on the Drawings, and which will remain as architecturally finished surfaces and which have holes, scars, chipped or other damaged surfaces revealed by the removal.

    b. Use the same or matching materials as the existing surface or as may be otherwise directed by the Resident Project Representative.

    c. Where the use of matching materials are not available or where their use is not feasible or practical, or where so indicated or directed by the Resident Project Representative, stainless steel cover plates may be used to conceal scarred surfaces or openings. Cover plates shall be brushed satin finish, gasketed, and attached to the existing surface with counter sunk stainless steel screws.

4. Junction Points:

    a. After removal of part or all of concrete or masonry walls, slabs and like work which tie into new Work or existing work, neatly repair the point of junction so as to leave only finished edges and surfaces exposed.

H. 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 02110

SITE CLEARING

PART 1 GENERAL

1.01 DESCRIPTION

A. Clearing, grubbing, scalping and disposing of debris and sediment and erosion control as shown and specified.

1.02 SUMMARY

A. Furnish all labor, materials, equipment, and incidentals required to perform all clearing, grubbing, scalping and stripping, and storage of topsoil, and removal and disposal of stumps and all vegetation and debris and provide sediment and erosion control as shown and specified.

1.03 RELATED SECTIONS

A. Section 02060 – Demolitions

B. Section 02220 – Excavation and Backfill

C. Section 02400 – Mitigative Measures

D. Stormwater Pollution Prevention Plan Sheets as contained in Contract Drawings

1.04 REFERENCE STANDARDS

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.

1.05 SUBMITTALS

Not Used.

1.06 REGULATORY REQUIREMENTS

A. Codes and Standards:

1. Observe state and local laws and code requirements for the hauling and disposing of trees, shrubs, stumps, roots, rubbish, debris and other matter. Contractor is responsible for all permits and fees.

1.07 QUALITY ASSURANCE

A. Guarantee that Work performed under this Section will not permanently damage trees, shrubs, turf, or plants designated to remain, or other adjacent work or facilities.

B. Replace items damaged due to the Contractor's operations which appear within one year after completion of the project, at no expense to the Owner.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PREPARATION

A. Protection:

1. Protect streets, roads, adjacent property and all other facilities and structures from damage caused by the Contractor's operations.

2. Return to original condition, satisfactory to the Resident Project Representative, facilities damaged by the Contractor's operations.

3. Protect trees, shrubs, and grassed areas by using fences, barricades, wrapping, or other methods as shown, specified or approved by the Owner.

4. Do not stockpile material or equipment beneath trees.

5. Do not remove trees without prior approval from the Owner unless shown or specified.

B. Salvageable Items:

1. Carefully remove items designated to be salvaged and store in a location designated by the Resident Project Representative, in accordance with the requirements of Section 02060.

C. The Contractor shall not allow personnel, equipment or material stockpiling in any areas that are outside of the designated Construction Influence Area (CIA). This includes locations still on the property generally bordered inside of the bioswales, near wetlands, bridge abutments or other locations deemed out of the CIA.

D. The Contractor will maintain fill activities only in areas identified and treat all other locations as restricted from personnel, equipment and storage.

3.02 APPLICATION

A. Clearing and Grubbing:

1. Limits of Clearing:

a. All areas within the Contract limit line as shown or specified.

2. Scalping:

a. Scalp areas where excavation or embankment is to be made.

b. Scalping includes the removal of material such as brush, roots, sod, grass, residue of agricultural crops, sawdust, and decayed vegetable matter from the surface of the ground. Scalping is not intended to include topsoil.

3. No burning is allowed on job site.

4. Topsoil Stockpiles and the Contractor Staging Areas shall adhere to the locations designated on the design plans or as directed by the Resident Project Representative.

5. Trimming Trees and Shrubs: All trees to be removed or trimmed shall be approved and coordinated with the Owner.

B. Topsoil Removal

1. Stripping Operation:

a. Remove heavy growths of grass from areas before stripping.

b. Strip topsoil to depth encountered, preventing intermingling with the underlying subsoil or other objectionable material.

c. Limit topsoil stripping to a sufficient distance from existing trees to prevent damage to the main root system.

2. Storage:

a. Stockpile topsoil in areas designated on the design plans or as directed by the Resident Project Representative.

b. Construction storage piles are to allow free drainage of surface water.

c. Stored topsoil in excess of quantities required for construction shall be removed and disposed of off-site.

3.03 FIELD QUALITY CONTROL

A. Restore any areas outside the Contract limit lines where disturbed by the Contractor's operations.

3.04 CLEANING

A. Comply with Section 01700.

B. Final Disposal:

1. Remove and properly dispose of all trees, shrubs, stumps, roots, brush, masonry, rubbish, scrap, debris, pavement, curbs, fences, and any miscellaneous items as required to permit construction of the new Work.

2. Obtain written permission from the property owner on whose property the materials and debris are placed. Furnish copy to the Resident Project Representative.

END OF SECTION

SECTION 02130

DEWATERING

PART 1 GENERAL

1.01 GENERAL DESCRIPTION

A. This section specifies designing, furnishing, installing, maintaining, operating, and removing temporary dewatering systems required to lower and control ground water levels, hydrostatic pressures, and control surface water, and precipitation entering the excavation during construction; disposing of pumped water; constructing, coordinating, maintaining and observing, installing and removing of equipment and instrumentation for the control of the system.

B. This section specifies designing, furnishing, and installing permanent dewatering systems required to lower and control ground water levels, hydrostatic pressures, and control surface water and precipitation entering the excavation during and after construction.

C. Dewatering includes lowering the water table, intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation, collecting and pumping water seepage that enters the excavations; increasing the stability of excavated slopes; preventing loss of material from the slopes or bottom of the excavation; improving the excavating and hauling characteristics of on-site soil; preventing rupture or heaving of the bottom of an excavation and disposing of pumped water.

D. All available information on subsurface conditions is provided in the reports listed in Section 00800 (SC-4.02). and supplemental reports and addendum. The conditions depicted therein were valid at the time of the investigation. Conditions may not be the same during dewatering operations. If the Contractor chooses to rely on the information presented therein, it does so solely on its own risk.

1.02 SUMMARY

A. Furnish all labor, materials, equipment, and incidentals to lower the water table, relieve hydrostatic pressure, control groundwater seepage, collect and pump water from excavations, collect and divert surface drainage from entering the excavation during construction and to dispose of pumped water to the existing or new storm conveyances.

1.03 RELATED SECTIONS

A. Section 01300 - Submittals

B. Section 02220 – Excavation and Backfill

C. Section 02400 – Mitigative Measures

D. Stormwater Pollution Prevention Plan Sheets as contained in Contract Drawings

1.04 REFERENCE STANDARDS

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.

1.05 GENERAL

A. Locate dewatering facilities where they would not interfere with utilities, demolition and construction work.

B. Modify dewatering procedures that may threaten to cause damage to existing facilities so as to prevent damage. Such modifications shall be made in accordance with these specifications and at no additional expense to the Owner.

1.06 SUBMITTALS. Comply with Section 01300.

A. Shop Drawings: The CONTRACTOR shall provide dewatering plan including drawings and written text which illustrates the location and identification of the components of the proposed dewatering system. The plan shall include but is not limited to the following:

1. Proposed locations and number of wells, well points, piezometers and sumps.

2. Proposed casing diameters and depths.

3. Proposed location and size of the discharge piping

4. Proposed estimated total pumping horsepower and standby power generator(s) capacity.

5. Proposed location and size of sediment pond or sediment removal system.

6. Proposed means of flow monitoring.

7. Calculations supporting design of sediment pond or sediment removal system.

B. Product Data: Not Used.

C. Samples or Mock-ups: Not Used.

D. Maintenance and Operating Instructions Not Used.

E. Personnel Qualifications: Not Used.

F. Operator Training/Lesson Plans Not Used.

G. Warranties and Guarantees: Not Used.

H. Special Tools and Repair Parts: Not Used.

I. Installation Data and Inspection Data: Not Used.

J. Performance Reports and Test Data: Not Used.

K. Product/Material Certifications Not Used.

L. Construction Photographs: Not Used.

M. Project Record Documents: Not Used.

N. Other: Agency permits, if required, for discharge to Maumee River.

1.07 REGULATORY REQUIREMENTS

A. Permits, if required by local, state or federal agencies, as applicable shall be obtained by the Contractor prior to commencement of dewatering. Submit copies of permits to the Resident Project Representative. If the pumping equipment has a capacity exceeding 100,000 gallons per day, Contractor shall acquire a water withdraw registration from the ODNR.

B. All wells installed by the Contractor shall be logged and all logs submitted to the Ohio Department of Natural Resources, (ODNR) Division of Water on the appropriate form in accordance with ODNR requirements. Copies of logs shall be submitted to the Resident Project Representative.

C. The Contractor shall complete submittals required by ODNR ground water withdrawal facility registration. Submittals shall be made directly to ODNR and copies submitted to the Resident Project Representative.

D. The Contractor shall complete submittals required by ODNR well abandonment procedure consistent with Part. 3.02 of this Section. Submittals shall be made directly to ODNR and copies submitted to the Resident Project Representative.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 INSTALLATION AND OPERATION

A. Installation of the dewatering system shall not interfere with daily activities of the Owner.

B. The Contractor shall keep the Resident Project Representative advised of any changes made to accommodate field conditions and, on completion of the dewatering system installation, revise and resubmit information drawings as necessary to show the installed configuration.

C. The Contractor shall organize dewatering operations to lower the ground water level in excavations or remove water from excavations as required for execution of the work and to provide a stable, dry subgrade for the execution of subsequent work. Take all precautions to prevent disturbances of foundations soils.

D. In the event that any part of the dewatering system may become inadequate or fail, the Contractor shall provide complete standby equipment including a power generator(s) installed and available and additional pumps. The standby equipment shall be fully automated for immediate use as may be required to adequately maintain the dewatered conditions at all times.

E. The Contractor shall be responsible for providing all electrical controls and power distribution. All conductors shall be copper and all enclosures shall be minimum NEMA 3R. Costs for maintenance of electrical components associated with the dewatering system shall be the responsibility of the Contractor. The

Contractor shall meter and pay all costs for power associated with dewatering and installation of the system.

3.02 ABANDONMENT. Abandonment shall be by the Contractor with no additional cost to the Owner.

A. Upon completion of temporary dewatering and contingent upon the approval the Resident Project Representative, the Contractor shall remove and properly seal all monitoring and dewatering wells installed by the Contractor in accordance with ODNR well abandonment procedures.

B. The Contractor shall also submit copies of "Water Well Sealing Report" to ODNR and the Resident Project Representative for each well that is abandoned.

END OF SECTION

SECTION 02220

EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 DESCRIPTION

A. Excavating, backfilling, and disposing of earth materials as shown, specified, and required for the purpose of constructing structures, pipelines, roads, walkways, curb and gutter, grading, and other facilities required to complete the Work, and establish final grades.

1.02 SUMMARY

A. Section includes excavation, backfilling, grading and disposal of earth materials required to accomplish the Work.

B. Section also includes preparation of subgrade for foundations, slabs, pavements, dewatering of excavations and erosion control.

1.03 RELATED SECTIONS

A. Section 01300 – Submittals

B. Section 02130 – Dewatering

C. Section 02400 – Mitigative Measures

1.04 REFERENCE STANDARDS

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.

B. Reference Standards:

1. ASTM A36/A36M, Carbon Structural Steel.

2. ASTM A328/A328M, Steel Sheet Piling.

3. ASTM A992/A992M, Structural Steel Shapes.

4. ASTM C618, Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

5. ASTM D422, Test Method for Particle-Size Analysis of Soils.

6. ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.

7. ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3).

8. ASTM D2216, Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

9. ASTM D6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (shallow depth).

10. ASTM D4318, Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

11. PTI DC35.1, Recommendations for Prestressed Rock and Soil Anchors.

12. AISC, 14th Edition, Steel Construction Manual.

13. AASHTO LRFD Bridge Design Specification, 7th Edition with 2015 and 2016 Interim Revisions.

1.05 SYSTEM DESCRIPTION

A. Contractor shall be responsible for designing, installing, and operating earthwork systems as required to accomplish satisfactory sheeting, bracing, protection, underpinning, and dewatering.

1.06 SUBMITTALS

A. Submittals shall meet the requirements of Sections 01300:

B. Shop Drawings: Comply with Section 01300 and provide the following:

1. Sieve Analysis (ASTM C136) – One test for each material source.

2. Submit a moisture density curve (ASTM D698) for each type of material used for backfill. The maximum dry weight and optimum moisture content shall be indicated.

3. Test backfill material in conformance with the specified "Compaction Requirements", Subsection 3.03.

a. Where tests indicate insufficient compaction, the Contractor shall perform additional compaction and shall perform additional tests as required by the Engineer. Testing shall continue until specified compaction has been attained by additional compaction effort.

b. Retests shall be referenced to the corresponding failing test and paid for by the Contractor.

4. Manufacturer's product literature, design certifications and calculations sealed by a Professional Engineer in the State of Ohio for the following items:

a. Sheeting and bracing, where required or needed;

b. Trench boxes and shields.

5. Compaction methods and procedures.

6. Excavation procedures.

a. File only pertinent information for the following items, prepared and stamped by a Professional Engineer, registered in the State of Ohio:

i. Sheeting and bracing, where required.

ii. Compaction methods and procedures.

iii. Excavation procedures.

C. Product Data: Comply with Section 01300 and provide the following:

1. Source-locations of all materials shall be identified to the Engineer.

2. Source quality laboratory test of all fill materials as required to show compliance with material specifications.

D. Performance Reports and Test Data: Comply with Section 01300 and provide the following:

1. Test reports on borrow material.

2. Gradation analysis for sub-base and base materials.

1.07 REGULATORY REQUIREMENTS

A. Permits and Regulations:

1. Obtain all necessary permits for work in roads, and rights-of-way, etc.

2. Obtain permits as required by local, state, and federal agencies for discharging water from excavations to rivers and streams.

3. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

A. General Earth Fill/Backfill:

1. Free of rock, or gravel larger than 4 inches in any dimension, debris, waste, frozen materials, and stumps or other organic or deleterious matter.

2. Plasticity Index: Not to Exceed 22 percent.

3. Maximum laboratory dry weight shall not be less than 90 pounds per cubic foot (PCF); soils having maximum dry weights of less than 100.0 PCF shall not be used in the top 12 inches of all subgrades.

B. Pipe Backfill:

1. Suitable native material complying with General Backfill or Select Granular Fill Materials of this Section.

C. Pipe Bedding:

1. Crushed limestone, free from organic matter.

2. Meeting ODOT requirements for 703.11 Type 1, 2, 3, Table 6 or Table 7 or as otherwise approved by the Engineer.

3. If using coarse aggregate material for bedding and backfill below the groundwater elevation, wrap the coarse aggregate with Type A geotextile fabric.

D. Select Granular Fill ODOT (Item 304 Aggregate) Roadways and Paved Surfaces:

1. Well graded granular material shall be crushed carbonate stone, crushed gravel, and crushed air-cooled blast furnace slag or other types of suitable materials, free from organic matter.

E. Drainage Fill:

1. Washed, uniformly graded mixture of crushed stone, or crushed or uncrushed gravel conforming to ODOT Item 703.13 and AASHTO M43 No. 57.

F. Stabilized Crushed Aggregate (ODOT Item 411):

1. Comply with Section 02510, Asphalt Concrete and Aggregate Paving.

Sieve Size	Total Percent Passing
1 ½ inch (37.5 mm)	100
1 inch (25.0 mm)	75 to 100
¾ inch (19.0 mm)	60 to 100
3/8 inch (9.5 mm)	35 to 75
No. 4 (4.75 mm)	30 to 60
No. 30 (600 µm)	7 to 30
No. 200 (75 µm)	3 to 15

G. Crushed Aggregate Slope Protection:

1. Crushed gravel, stone or slag, Size No. 1 or No. 2 meeting ODOT 601.06 or as shown on contract documents.

H. Topsoil:

1. Characteristics: Natural, fertile, sandy loam material capable of sustaining vigorous plant growth and of uniform composition throughout. Furnish topsoil that is free of subsoil, clay lumps, stone, grass, brush, weeds, roots and other objectionable material.

2. Material Analysis:

a. Furnished and Placed

	Range	Average
Sand (0.5 – 2.00 mm dia. range)	30 – 70%	50%
Silt (.002 – 0.5 mm dia. range)	20 – 45%	33%
Clay (less than .002 mm dia. Range)	5 – 30%	17%
Organic Matter	6 – 10%	8%
pH	6.0 – 7.5	

b. If topsoil that has been removed from the site and stockpiled by the Contractor is reused, modify it to meet these requirements:

i. Topsoil shall be free from stone, lumps, vegetation, plant parts, and all deleterious material.

ii. Topsoil shall possess 6% to 10% organic matter.

iii. Topsoil shall maintain a pH of 6.0 to 7.5.

PART 3 EXECUTION

3.01 EXAMINATION AND VERIFICATION OF CONDITION

A. Observation:

1. Initial Observation:

a. The Contractor will examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Engineer of conditions that are detrimental to the completion of the Work.

2. Unsatisfactory Conditions:

a. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

B. Test Pits:

1. General:

a. The Contractor shall perform exploratory test pits as may be necessary or ordered by the Engineer in advance of excavation to determine the exact location and elevation of subsurface structures, pipelines, and conduits which are likely encountered and shall make acceptable provision for their protection, support and maintenance in operation. Vacuum excavation (pot hole) may be used if adequate information can be obtained by such method. No additional payment shall be made for test pits.

b. Conflicts with existing structures and utilities not located, as specified, far enough in advance of construction, shall not be considered as a basis for delay claims or additional payment.

3.02 INSTALLATION

A. Use of Explosives: Use of explosives is not permitted.

B. Dust Control:

1. Comply with the Sections 02400.

C. Excavation:

1. General:

a. Scope: Perform all excavation required to complete the Work as shown and specified.

b. Excavated Materials: Earth, sand, clay, gravel, hardpan, boulders/rocks not requiring drilling or jack hammering to remove, decomposed rock, pavements, rubbish, and all other materials within the excavation limits.

c. Excavations: Use open excavations, shored and braced where necessary to prevent collapse.

d. Sheeting and Bracing: Install in accordance with drawings submitted under Article 1.06.

2. Controlling Water:

a. Maintain excavation in dry condition. If dewatering is required, conform to Drainage and Dewatering paragraph(s) below, and specification section 02130.

b. Pumping: 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. Footings:

a. Hand trim all structure excavations to permit the placing of full widths, and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.

b. When excavations are made below the required grade, without the written order of the Engineer, backfill with select granular fill or concrete as directed by the Engineer at the Contractor's expense.

4. Size of Excavation:

a. Extend excavation sufficiently on each side of structures, and footings, to permit setting and removal of forms, installation of sheeting, shoring, or safe sloping of banks. Sizes of the excavation must fit within site constraints.

5. Topsoil:

a. Strip topsoil, from areas to be excavated or filled, to whatever depths encountered in a manner to prevent intermingling with underlying subsoil and other objectionable materials.

i. Remove growths of grass from areas before stripping.

ii. Stockpile topsoil where directed by the Engineer or construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust. Install erosion controls as necessary.

iii. Dispose of unsuitable or excess topsoil same as waste material, herein specified

6. Subgrade:

a. Subgrade requirements for roadways, structures and electrical conduits and duct banks:

i. Firm, dense, and thoroughly compacted and consolidated.

a) Compact soils to not less than 100 percent of maximum dry density determined by the standard proctor test (ASTM D 698).

b) Free from mud, muck, and other soft or unsuitable materials.

c) Remain firm and intact under all construction operations.

ii. Soft Subgrade:

a) Subgrade surfaces that become mucky shall be repaired by removing the disturbed material and replacing with compacted select granular material.

b) If, in the opinion of the Engineer the subgrade becomes softened or mucky due to construction delays, failure to dewater properly, or any other causes within the control of the Contractor, it shall be excavated to firm material, trimmed, and backfilled with select granular fill material or concrete at the Contractor's expense.

iii. Backfill on sides of structures:

a) The sides of structures that are under a slab shall be backfilled to 100 percent of the maximum dry density. Others shall be backfilled to 95 percent. The moisture content of the fill shall be within 3 percent

of optimum. Unless otherwise noted on the plans, all backfill on the sides of structures, which are under pavement, shall be select granular fill.

b. All subgrades shall be inspected and approved by the Engineer prior to the placement of any work.

7. Pipe Trench Preparation:

a. Trench Width:

i. Sufficient to provide room for installing, joining and inspecting piping, but no wider.

ii. Enlargements at pipe joints may be made if required and allowed by Engineer but shall not exceed tolerances established by pipe manufacturer.

iii. Sufficient for sheeting, bracing, sloping, and dewatering.

iv. Sufficient to allow thorough compacting of backfill adjacent to bottom half of pipe.

v. Do not use excavating equipment which requires the trench to be excavated to excessive width.

b. Trench Depth:

i. As shown on the Drawings or if not shown, sufficient to provide a 6 inch depth of compacted select granular fill or bedding material beneath the bottom of the pipe. Depth of trench shall be sufficient to provide bedding material.

ii. If required and approved by Engineer, depths may be revised.

8. Stability of Excavations:

a. Sides of Excavations: Slope to comply with codes and ordinances of agencies having jurisdiction.

b. Shoring and Bracing: Use where sloping is not possible either because of space restrictions or instability of material excavated.

c. Safety: Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

d. Caving: If caving occurs outside the excavation area, backfill the resulting hole with select granular fill in accordance with the requirements of this section after removing the loose material.

e. The Engineer that designs the slope/excavation stability system shall be a registered Professional Engineer within the State of Ohio and have Professional Liability Insurance in accordance with project specifications.

9. Material Storage:

a. Stockpile satisfactory excavated materials in approved areas, until required for backfill or fill. No soil stockpiles are to be located on site within 100' of installed pipe or equipment or where the pipe is being installed.

b. Place, grade, and shape stockpiles for proper drainage.

c. Locate and retain soil materials away from edge of excavations.

d. Cover storage piles if required to prevent wind-blown dust. Install erosion controls as necessary.

e. Dispose of excess soil and waste materials as specified hereinafter.

10. Unsuitable Material:

a. Where the existing material beneath the bedding material is considered unsuitable by the Engineer, remove and replace it with select granular fill, as directed.

b. Excavate and place select granular fill material as required under Select granular fill Paragraph of this Section.

D. Unauthorized Excavation:

1. Limits: Unauthorized excavation is defined as all excavation outside the lines and grades shown.

2. Responsibility: All unauthorized excavation together with the removal and disposal of the associated material is at the Contractor's expense.

3. Backfill: Fill and compact the unauthorized excavation with select granular fill and at the Contractor's expense.

E. Drainage and Dewatering:

1. General:

a. The Contractor has the total responsibility for maintaining the site in a dewatered condition throughout the construction period.

b. Prevent surface and subsurface water from flowing into excavations and from flooding adjacent areas.

c. Remove water from excavation as fast as it collects.

d. Use well points, sumps, pumping, cofferdams, or other acceptable methods to permit construction under dry conditions.

e. Maintain dry conditions until fresh concrete has reached sufficient strength to withstand earth and hydrostatic loads.

f. Maintain the ground water level at a minimum of 18 inches below the bottom of the excavation to provide a stable slope and surface for construction operations, a stable subgrade for the permanent work, and to prevent damage to the work during all stages of construction.

g. Protect excavation from flooding until all walls and floor framing up to and including grade level floors are in place and backfilling has been completed.

h. Provide, maintain, and continuously monitor during the duration of dewatering pumps, sumps, suction, and discharge lines and other dewatering system components necessary to convey water away from excavations.

i. Obtain the Engineer's concurrence before shutting down dewatering system for any reason.

2. Standby Capability:

a. Provide complete standby equipment to insure continuity of dewatering operations.

3. Disposal of Water Removed by Dewatering System:

a. Dispose of all water removed from the excavation in such a manner as not to endanger public health, property, or any portion of the work under construction or completed.

b. Dispose of water in such a manner as to cause no inconvenience to the Owner or others involved in work around the site.

c. Pump intakes shall withdraw water from the surface of the trench or work area in order not to re-suspend or continually mix water.

d. Convey water from the construction site in a closed conduit. Do not use trench excavations as temporary drainage ditches.

e. Obtain permits as required by local, state, and federal agencies.

F. General Backfill:

1. General:

a. Furnish, place, and compact all backfill required for structures and electrical conduits and duct banks required to provide the finished grades shown and as described.

b. Unless otherwise specified, fill may be obtained from on-site sources, provided that it complies with the material requirements of these specifications. If additional materials are required, furnish from off-site sources at no additional cost to the Owner.

2. Restrictions: Backfill excavations as promptly as Work permits, but not until completion of the following:

a. Review by the Engineer of construction below finish grade including damp proofing, waterproofing, and perimeter insulation.

b. Observation, testing, approval, and recording of locations of underground utilities.

c. Removal of concrete formwork.

d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling and remove in manner to prevent settlement of the structure or utilities, or leave in place if required. Excavation shall be backfilled in accordance with the other sections of this specification.

e. Removal of trash and debris.

f. Permanent or temporary horizontal bracing is in place on horizontally supported walls. Note that no backfilling of the main structure excavation shall be allowed until the top slab has been constructed and reached its design strength.

3. Placement:

a. Keep excavation dry during backfilling operations.

b. Bring up backfill evenly on all sides around structures and piping.

4. Backfill against Concrete:

   a. Do not differ the levels of backfill against concrete walls by more than 2 feet on either side of walls unless walls are adequately braced or all floor framing is in place up to and including grade level slabs.

   b. All structural foundation units shall be backfilled as soon as practicable after the concrete has cured sufficiently so that it will not be damaged, and to avoid the pooling of surface water and the accumulation of debris.

   c. No backfill shall be placed against abutments, piers, or walls until the walls have been accepted by the Engineer. Where backfill is placed against a waterproofed surface, care shall be taken that no damage is done to the waterproofing material.

   d. Backfill behind walls will not be permitted until the concrete has attained adequate strength as determined either by the length of curing time or by the testing of field-cured cylinders. For full height of backfill, the minimum curing time shall be 14 days. For half height of backfill, the curing time shall be seven (7) days. These requirements are subject also to the temperature and strength requirements of Division 3.

5. Backfill in Pipe Trenches shall comply with sections in Division 2 and the following:

   a. Place backfill in pipe trenches where pipe is below other pipes or paved areas, in horizontal layers not exceeding 3 inches in depth and thoroughly compact before the next layer is placed.

   b. Pipes under structures shall be bedded and backfilled to the bottom of the slab or mudseal with concrete.

   c. In other pipe trenches, compact bedding and backfill materials in layers of 6 inches up to the pipe spring line and 12 inches thereafter.

   d. Deposit bedding and backfill materials uniformly and simultaneously on each side of the pipe to prevent lateral displacement.

6. Backfill for Pipes in Fill Areas shall comply with the following:

a. Prior to the installation of piping place the fill as described herein until a minimum height of 2 feet above the pipe is reached, unless otherwise required.

b. Excavate the fill for the trench width, install the bedding, pipe, and backfill.

c. Place the remainder of the fill.

7. Thickness of Lifts:

a. Unless otherwise specified or required place fill in horizontal loose lifts not exceeding 8 inches in thickness. Mix and spread in a manner assuring uniform lift thickness after placing. Completely compact each lift before placing additional backfill materials.

b. Where backfill or fill against structures is to be compacted with hand-operated equipment, place fill in horizontal loose lifts not exceeding 4 inches in thickness.

8. Moisture:

a. Control the water content of fill material during placement within the range necessary to obtain the specified compaction.

b. Maintain the moisture content of the fill within 3 percent of the optimum moisture content for compaction, as determined by laboratory tests.

c. Perform all necessary work to adjust the water content to within the range necessary to permit the specified compaction.

d. Do not place fill material where free water is standing on saturated soil.

e. No compaction of fill will be permitted with free water standing on any portion of the fill.

9. Unacceptable Material:

a. Do not place or compact fill in a frozen condition or on top of frozen material.

b. Remove fill containing organic materials or other unacceptable materials and replace with approved material.

10. Compaction Equipment:

a. Perform compaction of fill with suitable equipment for the type of material placed and which is capable of providing the densities required.

b. Hand tamping will not be permitted.

c. Compaction by flooding will not be permitted.

d. Backfill Around Structures:

i. Within 10 feet of foundations or walls, use light compaction equipment with the gross weight of the equipment not exceeding 7,000 pounds.

ii. Portions of the backfill or fill which are too near to structures to permit the use of rolling equipment for compaction shall be thoroughly compacted by tamping with pneumatic tampers or vibratory plate type compactors.

11. Coverage:

a. Compact fill by at least three (3) coverages of all portions of the surface of each lift by compaction equipment.

b. Coverage is defined as the condition obtained when all portions of the surface of the fill materials have been subjected to the direct contact of the compactor.

12. Tests:

a. Test the effectiveness of the equipment at the commencement of compacted fill work by construction of a small section of fill within the area where fill is to be placed.

b. If tests on this section of fill show that the specified compaction is not obtained, adjust one (1) or all of the following items: number of coverages; thickness of lift; fill moisture content; and, type of compactor.

13. Compaction:

a. Minimum Density for General Backfill: 95 percent of maximum density obtained in the laboratory as determined by the standard proctor test (ASTM D698).

b. Compact fill that supports and is within 5 feet of structures, piping, conduits, roadways, parking areas, and sidewalks to 100 percent

of maximum density, determined by standard proctor test (ASTM D 698).

14. Inadequate Compaction:

    a. If the specified density cannot be obtained by other methods, completely remove unacceptable fill, replace with suitable material, and compact to specified density.

15. Settlement:

    a. Repair any settlement that occurs, at Contractor's own expense.

G. Select Granular Fill:

1. Provide material at the following locations:

    a. Support for structure foundations where Contractor excavates below design subgrade. Backfill at Contractor's expense.

    b. Soft subgrades where over-excavation is required by the Engineer.

    c. Under paved area for pipe initial backfill.

    d. Where shown on the Drawings.

2. Restrictions:

    a. Make subgrade surface level, dry, firm, and subject to Engineer acceptance.

    b. Do not place fill if free water is standing on the surface of area to receive fill.

    c. Do not place or compact fill in a frozen condition or on top of frozen material.

3. Thickness of Lifts:

    a. Place fill in horizontal loose lifts of 8 inches maximum thickness.

    b. Mix and spread in a manner to assure uniform lift thickness after placing.

    c. Compact each layer of fill before placement of the next lift.

4. Unacceptable Material:

a. Do not place fill containing lumps, pockets, or concentrations of silt or clay, rubble, debris, wood, or other organic matter.

b. Remove and dispose of fill containing unacceptable material off-site at Contractor's expense.

5. Moisture:

a. The moisture content of the fill being compacted shall be within 3 percent of optimum moisture content.

b. Moisten the fill materials during placement to achieve water contents needed for compaction. The water shall be added in a manner that will not soften the subgrade.

6. Equipment:

a. Perform compaction of fill with equipment suitable for the type of fill material being placed.

b. Select equipment that is capable of providing the densities required.

c. Vibratory rollers or vibratory plate compactors are suitable for compaction of select granular fill.

7. Coverage:

a. Compact each layer of material by at least three (3) complete coverages of all portions of the surface of each lift using suitable compaction equipment.

b. One (1) coverage is defined as the condition reached when all portions of the lift have been subjected to the direct contact of the compacting surface of the compactor.

8. Compaction:

a. Minimum Density: 100 percent of maximum density obtained in the laboratory in accordance with ASTM D698.

b. If the field and laboratory tests indicate unsatisfactory compaction, make the necessary adjustments in moisture content, operations, and equipment to obtain the specified degree of compaction.

9. Disturbed Materials:

a. Provide, place, and compact select granular fill material necessary to replace subgrade materials disturbed and softened as a result of the Contractor's operations or to backfill unauthorized excavation.

b. Furnish additional fill at Contractor's expense.

H. Drainage Fill:

1. Placement: As shown or specified.

I. Type 411 Aggregate:

1. Provide material at the following locations:

a. Along roadway shoulders and subgrade of flexible pavement sections.

b. Where shown on the Drawings.

2. Restrictions:

a. Make subgrade surface level, dry, firm, and subject to Engineer acceptance.

b. Do not place fill if free water is standing on the surface of area to receive fill.

c. Do not place or compact fill in a frozen condition or on top of frozen material.

3. Thickness of Lift:

a. Place fill in horizontal loose lift of 6 inches maximum thickness.

b. Mix and spread in a manner to assure uniform lift thickness graduation and moisture content after placing.

4. Unacceptable Material:

a. Do not place fill containing lumps, pockets, or concentrations of silt or clay, rubble, debris, wood, or other organic matter.

b. Remove and dispose of fill containing unacceptable material off-site at Contractor's expense.

5. Moisture:

a. The moisture content of the fill being compacted shall be within 3 percent of optimum.

b. Moisten the fill materials during placement to achieve water contents needed for compaction. The water shall be added in a manner that will not soften the subgrade.

6. Equipment:

a. Perform compaction of fill with equipment suitable for the type of fill material being placed.

b. Select equipment which is capable of providing the densities required.

c. Vibratory rollers or vibratory plate compactors are suitable for compaction of select granular fill.

7. Coverage:

a. Compact each layer of material by at least three (3) complete coverages of all portions of the surface of each lift using suitable compaction equipment.

b. One (1) coverage is defined as the condition reached when all portions of the lift have been subjected to the direct contact of the compacting surface of the compactor.

8. Compaction:

a. Minimum Density: 100 percent of maximum density obtained in the laboratory as determined by standard proctor test (ASTM D 698).

b. If the field and laboratory tests indicate unsatisfactory compaction, make the necessary adjustments in moisture content, operations, and equipment to obtain the specified degree of compaction.

9. Disturbed Materials:

a. Provide, place, and compact material necessary to replace subgrade materials disturbed and softened as a result of the Contractor's operations or to backfill unauthorized excavation.

b. Furnish additional fill at Contractor's expense.

J. Controlled Density Fill:

1. Controlled density fill material shall be brought up uniformly to the fill line shown on the plans or as directed by the Engineer.

2. Controlled density fill shall be placed in lifts no greater than 4 feet. Each lift shall be given a minimum of 24 hours to setup before placement of additional lifts.

K. Grading:

1. General:

a. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas.

b. Smooth subgrade surfaces within specified tolerances.

c. Compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

2. Grading Outside Building Lines:

a. Grade area adjacent to building lines to drain away from structures and to prevent water pooling.

b. Finish surfaces free from irregular surface changes, and as follows:

i. Turfed Areas or Areas Covered with Gravel, Stone, Wood Chips, or Other Special Cover: Finish areas to receive topsoil or special cover areas to within not more than 1 inch above or below the required subgrade elevations.

ii. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1 inch above or below the required subgrade elevation.

iii. Pavements: Shape surface of areas under pavement to line, grade and cross section, with finish surface not more than ½ inch above or below the required subgrade level.

3. Compaction:

a. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

L. Disposal of Excavated Materials:

1. Excess or Unsuitable Material:

a. Haul away from the Project Site all material removed from the excavations which does not conform to the requirements for fill at no additional cost to the Owner.

b. Dispose of unsatisfactory materials in compliance with municipal, county, state, federal or other applicable regulations at no additional cost to the Owner.

c. When excess excavated material is disposed at locations off the project site, the Contractor shall obtain and submit the written permission from the property owner of the property upon which the material is to be placed to the Owner or Owner's Representative.

M. Restoring and Resurfacing Existing Roadways and Facilities:

1. General:

a. Place 1 ½ inches of temporary bituminous pavement immediately after backfilling trenches in paved roadways which are to be retained for permanent use.

b. Maintain in good and safe condition during progress of the entire Work, the surface of the paved area over the trench, and promptly fill all depressions with temporary bituminous permanent and adjacent to the trench caused by minor settlement of backfilling. As determined by the Engineer, settlement greater than 2 inches may include excavation and recompaction of backfill.

c. The permanent replacement pavement shall be equal to that of the existing roadways unless otherwise specified.

2. Disturbed Areas:

a. Restore at Contractor's expense all pavement, gutters, curbs, sidewalks, or roadways disturbed or damaged by the Contractor's operations, except areas designated "New Pavement" or "Proposed Pavement."

b. Repair damage to as good condition as was present before commencement of the Work.

3.03 FIELD QUALITY CONTROL

A. Testing:

1. Work shall conform to the following tests:

a. Fill Materials: Gradation, ASTM D422.

b. Compacted Fill: Compaction, ASTM D698 and in-place density, D1556 or D6938

2. Contractor's Responsibilities:

a. As specified in Sections 01400 and 01410.

b. Notify the Engineer at the completion of compaction of each lift to obtain testing or inspection.

c. Obtain the permission of the Engineer before proceeding with subsequent lifts.

B. Quality Control Testing During Construction:

1. At the discretion of the Engineer, the Owner's independent testing lab shall inspect and approve subgrades and fill layers before further construction work is performed thereon.

2. The laboratory shall perform the following field tests:

a. Trench Backfill – One test for every 200 cubic yards of backfill material.

b. Subgrade Compaction – One test for every 300 square yards of subgrade.

c. If requested by the Engineer, additional tests shall be performed for any of the above.

3. Tests of subgrades and fill layers may be taken as follows:

a. Footing Subgrade: For each strata of soil on which footings will be placed, at least one (1) test may be taken to verify required design bearing capacities. Subsequent verification of each footing subgrade with related tested strata, when acceptable to the Engineer.

b. Paved Area Subgrade: At least one (1) field density test of subgrade for every 2,000 square feet of paved area may be taken but in no case less than three (3) tests. In each compacted fill layer, one (1) field density test for every 2,000 square feet of paved area, may be taken but in no case less than three (3) tests.

C. Unsuitable Compaction:

1. If, based on reports of testing lab and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense to the Owner.

END OF SECTION

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SECTION 02400

MITIGATIVE MEASURES

PART 1 GENERAL

1.01 WORK INCLUDES

A. Storm Water Pollution Prevention Plan (SWPPP); description of all BMPs to be utilized throughout the project, and plan of soil erosion control and sedimentation control measures to be used at and around all Federally, State or locally controlled or regulated waters.

1.02 RELATED SECTIONS

A. Section 01300 – Submittals

B. Section 01500 – Temporary Work and Controls

C. Section 02130 – Dewatering

D. Section 02220 – Excavation and Backfill

1.03 SUBMITTALS

A. Description of the soil erosion and sedimentation control plan, all BMPs to be utilized throughout the project, and plan of soil erosion control and sedimentation control measures to be used at and around all Federally, State, or locally controlled or regulated waters.

1.04 QUALITY ASSURANCE

A. Refer to General Requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 SOIL EROSION AND SEDIMENTATION CONTROL

SWPPP shall comply with requirements on Drawings.

Any site preparation that will involve earth moving (such as excavation or clearing and grubbing) shall not commence until the Contractor is fully prepared to start the work.

The Contractor shall seed all areas disturbed by his work as part of the restoration unless the area will be paved or occupied by new facilities. Special care shall be taken to ensure that backfilling over trenches and other excavation is well compacted prior to seeding. If settlement occurs after seeding and during the term of the Contract, the Contractor shall fill the settled areas with approved topsoil, fertilize and reseed the area. Lawns disturbed by the Contractor's operations shall be reseeded with the same type of grass. Seeding and mulching shall be in accordance with ODOT Item Section 659, Seeding and Mulching.

Existing topsoil will be stockpiled and replaced upon final grade. Soil and other material will not be stored next to or within the drip-line of trees. Stockpiled topsoil is to be protected through the use of silt barriers, temporary seeding, or covering such as with anchored straw mulch. Topsoil shall comply with section 02220.

As construction is completed, permanently stabilize each disturbed area with perennial vegetation installed according to ODOT Item 659 as modified by the project drawings. Excess stockpiled soil must be either removed or permanently stabilized within 15 days of completion of the construction.

Rock channel protection finished surface shall conform to the cross-sections shown on plans, and according to ODOT Item 601. Rock channel protection material shall also conform to ODOT Item 703.

When working adjacent to a waterway, the Contractor shall maintain a buffer zone of undisturbed vegetation between the work area and the waterway. If a buffer zone of vegetation cannot prevent siltation of the waterway, silt barriers shall also be installed by the contractor in these areas to prevent sediment laden runoff from entering the waterway.

2.02 DUST CONTROL

The Contractor shall take all necessary provisions to prevent soil from being deposited onto paved areas and into natural watercourses, ditches, and public sewers. The following methods shall be utilized to help minimize the production of dust;

A. All dirt tracked onto or spilled on pavement, sidewalks, or driveways shall be cleaned by means of shovel and hand brooms, or other approved means. Devices which create large amounts of dust or which redistributes the dirt in an environmentally displeasing manner will not be allowed.

B. The Contractor shall apply water for as a means of dust control as directed by the Engineer or Owner. Water used for dust control shall be furnished and applied by means of tanks equipped with suitable sprinkling devices and in the quantity ordered.

2.03 NOISE CONTROL

Construction activities will be limited to 6:00 am to 8:00 pm all other streets or as otherwise defined within the Maintenance of Traffic provisions in the plans and specifications. No work will be performed outside the aforementioned hours or on Sundays, except in cases of emergency, and then only on written permission of the Commissioner of Emergency Services.

All motorized construction equipment will be equipped with proper emission control equipment, mufflers, and intake silencers as appropriate to minimize noise and air pollution. Equipment shall be checked for proper tuning to minimize exhaust emissions and noise.

2.04 TREE/VEGETATION PROTECTION

Unless otherwise shown on the Drawings, tree removal will be limited to that necessary for construction and will be limited further to the work limits whenever possible. No tree removal will be permitted outside the work limits without permission of the Engineer. Trees that are not to be removed will be protected by ensuring that trees to be removed are felled so as not injure those remaining.

2.05 DEWATERING

Pumping of sediment-laden water from trenches or other excavations into any "Waters of the State", surface waters, any stream corridors, any wetlands, or sanitary or storm sewers is prohibited. All dewatering flows are to be settled into sediment basins or traps or directed through filters before discharge to stabilized sites, such as steams or storm sewers. Dewatering flows should be diverted away from stream banks, exposed soils or other sites where the flows could cause erosion.

Contractor shall comply with Sections 02130 and 02220.

2.06 PROHIBITED CONSTRUCTION ACTIVITIES

A. Storing construction equipment and vehicles and/or stockpiling construction materials on property, public or private, not previously specified on the plans by the Owner or Engineer for such purposes.

B. Disposing of excess or unsuitable excavated materials in wetlands or floodplains, even with the permission of the property owner.

C. Discharging pollutants such as chemicals, fuels, lubricants, bituminous materials, raw sewage and other harmful wastes into or alongside of rivers, streams, or into natural or man-made channels leading thereto.

END OF SECTION

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SECTION 02800

MATERIAL SEPARATION, TESTING, AND DISPOSAL

PART 1 GENERAL

1.01 DESCRIPTION

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specifications, apply to this section.

B. The Contractor shall furnish all labor, supervision, equipment and material necessary for the proper handling and disposal of construction and demolition debris, hazardous waste (if encountered), solid waste, and native spoil material. During excavation, a qualified person will be present on site to aid in sorting materials based on an understanding of the statutory requirement for safe handling and disposal, visual observations, and prior land use.

1.02 RELATED SECTIONS

A. Section 01300 – Submittals

B. Section 01200 – Measurement and Payment

C. Section 01300 – Submittals

D. Section 02220 – Excavation and Backfill

E. Supplementary Conditions – Reference Documents

1.03 DEFINITIONS

A. Clean Soil – Includes native fill and/or native soil that have not been impacted by regulated materials. Clean soil does not include C&DD, solid waste, or Hazardous Waste.

B. Construction and Demolition Debris (C&DD): consisting only of reinforced or non-reinforced concrete, asphalt, concrete, brick, block, tile, or stone that may be reutilized as construction fill material.

C. Exclusion Zone: The zone created by roping off a boundary around an area where excavation is occurring and where construction and demolition debris, hazardous waste, solid waste, and native spoil material may be present.

D. Hazardous Waste: Material that is listed specifically as Hazardous Waste or exhibits one or more characteristics of Hazardous Waste as defined in OAC Chapter 3745-51. Toxicity Characteristic Leaching Procedure (TCLP) analysis will be used to determine whether the material meets the definition of hazardous due to toxicity.

Material will be considered Hazardous Waste due to toxicity if TCLP results exceed regulated levels listed in RCRA Subtitle D (40 CFR §261.24).

E. OSHA Haz-Mat Trained: An Occupational Safety and Health Administration (OSHA) hazardous materials trained supervisor or worker that has been instructed in handling and disposal of construction and demolition debris, solid waste, and hazardous materials.

F. Native Fill: Material generally consisting of Topsoil or Subsoils excavated or mined from and utilized as fill within the same site, such as to fill in low-lying areas of the site. Native fill does not include C&DD, Hazardous Waste, or Solid Waste and is considered suitable for beneficial re-use either on or off site.

G. Native Soil: Material generally consisting of topsoil and/or subsoils excavated or mined and utilized as fill within the same site, such as to fill in low-lying areas of the site. Native Soil does not include C&DD, Hazardous Waste, or Solid Waste and is considered suitable for beneficial re-use either on or off site.

H. Non-Native Fill: Materials imported into the site and generally found in filled areas of the site. Non-Native Fill may include spent non-toxic foundry sand, soil, C&DD, railroad ballast, tires, coal and other materials that might currently be considered Solid or Hazardous Wastes.

I. Solid Waste: Unwanted residual solid or semisolid materials, including but not limited to garbage, scrap metals, scrap tires, combustible and noncombustible materials, street sweepings, and debris. Solid Waste does not include Native Fill, Native Soil, C&DD, or Hazardous Waste.

J. Storm Water Pollution Prevention Plan (SWP3): A written and/or drawn sediment pollution control plan or strategy developed in accordance with OAC 3745-39 to minimize erosion and prevent off-site sedimentation throughout all earth-disturbing activities in the project area.

K. Topsoil: Natural, fertile, sandy loam material capable of sustaining vigorous plant growth and of uniform composition throughout. Topsoil does not include subsoil, clay lumps, stone, grass, brush, weed, roots and other objectionable materials.

1.04 SUBMITTALS

A. Submittals shall be in accordance with Section 01300 Submittals.

B. Submit a Contaminated Materials Management Plan (CMMP) to the Engineer for review and acceptance within 14 days after Notice to Proceed. No work, with the exception of site inspections and surveys, shall be performed until the CMMP is accepted. The Contractor shall allow the duration defined in Section 01300 for the Engineer to review. No adjustment for time or money will be made if re-submittals

of the CMMP are required due to deficiencies. At a minimum, the CMMP shall include:

1. Schedule of activities.

2. Spill Contingency Plan, including procedures for documenting and reporting to the Engineer encounters with and releases of hazardous or contaminated materials.

3. Spill Prevention Plan.

4. Methods and procedures of excavation and equipment to be used.

5. Methods, procedures, and proposed documentation for the transportation, disposal, and offsite treatment, if required, of hazardous materials, including the identification of disposal and/or treatment facilities, and certified, licensed transporters.

6. Equipment decontamination procedures.

C. The Contractor shall provide a copy of the site-specific Health & Safety Plan (HASP).

D. Submit records, reports, or certificates of contaminated materials disposal/treatment within 5 business days of disposal/treatment.

1.05 QUALITY ASSURANCE

A. Work shall be directed by a supervisor trained and experienced in hazardous and contaminated material handling. The supervisor shall have completed OSHA training requirements for working with hazardous substances, including the 8-hour supervisory course. The supervisor shall have a minimum of 3 years of experience in managing hazardous and/or contaminated materials projects. Submit a copy of the supervisor's qualifications and experience for review by the Engineer.

B. Site Safety and Health Officer qualifications shall include the following:

1. Completion of the required OSHA training in accordance with 29 CFR 1910.120, including completion of 40-hour supervisory training, 8-hour annual updates, and completion of 3 days onsite training by a fully qualified instructor.

2. Minimum 3 years of experience in hazardous and/or contaminated materials related work.

3. Current certification in first aid and cardiopulmonary resuscitation (CPR).

4. Working knowledge of federal, state and local occupational health and safety regulations.

5. Working knowledge of health and safety programs for personnel working in hazardous environments.

C. Site Safety and Health Officer is:

1. Required to be onsite and present during excavation and handling of all hazardous materials work to be completed by the Contractor.

2. Responsible for the development, implementation, enforcement, and monitoring of the work in compliance with the HASP.

3. Responsible for conduction the pre-construction training, briefings, and other periodic training of onsite personnel with regard to the HASP and other safety requirements to be observed during construction.

PART 2 PRODUCTS

2.01 GENERAL

A. The Contractor shall provide spill response materials, including, but not limited to: containers, adsorbents. Shovels, and personal protective equipment. Spill response materials shall be available at all times during which potentially hazardous or contaminated material is being handled or transported. Spill response materials shall be compatible with the types of materials and contaminates being handled.

B. The Contractor shall provide facilities for equipment, tool, and personnel decontamination for the duration of the work.

C. Geomembranes to be used as liner or material cover shall be chemical resistant, reinforced, and leak proof, with a minimum of 10 mils.

PART 3 EXECUTION

3.01 GENERAL

A. Conduct all work in accordance with the approved CMMP.

B. The Contractor shall manage hazardous materials in compliance with applicable statutes and regulations. No material considered hazardous shall be stored at the project site.

C. Material handling and disposing of C&DD, hazardous waste, and native spoil material are subject to the approval of the Engineer. At a minimum, handling and disposal methods shall comply with the requirements of the individual Contract Documents and any applicable Federal, State and Local regulations.

D. The Contractor shall not remove from the point of generation, transport, treat, store or discharge any C&DD, hazardous waste, or native spoil material without prior approval from the Engineer.

E. The extent of known contaminated materials and the types of known contaminants are provided in the Supplementary Conditions Reference Documents. Notify the Engineer immediately if contaminated substances are discovered that were not previously identified or assumed, or if other discrepancies between data provided and actual field conditions are discovered.

F. The Contractor shall obtain required permits and notifications for removal (excavation), storage, transportation, and disposal of contaminated material, including sanitary sewer discharge. Permits shall be obtained at no additional cost to the Owner.

3.02 MATERIAL SEPARATION, STOCKPILING, TESTING AND DISPOSAL

A. The predominant contaminant of concern on the project site is hexavalent chromium in the soils. Previously performed sampling produced hexavalent concentrations beyond the threshold to be considered characteristically hazardous. The site is the location of a former chromium plating facility, Superior Plating.

B. During excavation, the Engineer will provide a qualified representative present on site to aid in defining materials for separation based on an understanding of the statutory requirements for safe material handling and disposal; observations of non-native fill material, garbage, debris, soil staining, or odors; and knowledge of prior land use. Unless visual observations suggest otherwise, general excavation will not require stockpiling or testing prior to offsite disposal or beneficial reuse.

C. Excavation of Areas of Hazardous Materials:

1. The Contractor shall remove soil from the indicated area to the depth specified by the plan. The depth of removal may vary based upon actual site conditions and will be field verified by Engineer's representative. If hazardous material is identified at the proposed finished grade, the area shall be over-excavated by approximately 2 feet and backfilled with clean soil to proposed finished grade.

2. An exclusion zone shall be set up around the area in which excavation is to be performed. All equipment and vehicles that come into contact with the excavated soils shall be decontaminated before leaving the exclusion zone, with the exception that the vehicles or containers used to transport the excavated soils do not have to be decontaminated, provided only the inside of the container portion of the vehicle has come into contact with the excavated soils.

D. Material Transportation and Disposal:

1. Following material testing and characterization by the Engineer's on-site representative, material characterized as Hazardous Waste shall be removed from the project site in leakproof vehicles or containers for disposal at a suitably licensed disposal facility by the Contractor. Proof of acceptance shall be submitted to the Engineer.

2. Prior to being decontaminated, and except when excavated soil is being loaded or unloaded, open-top vehicles or containers which are used to transport waste shall be tarped. Whenever reasonably possible, open-top vehicles or containers shall be covered or tarped during the transport of excavated soil on-site.

3. Any remedial activities or demolition shall be conducted in accordance with the approved HASP.

E. The Contractor shall restrict the spread of contaminated materials over the general project area.

F. The Contractor shall restore all loading area(s), haul road(s), stockpile area(s), wheel washing area(s), and other disturbed areas.

3.03 MATERIAL TESTING

A. The Engineer shall provide analytical testing of solid waste or hazardous materials encountered during excavation. The disposal of potentially contaminated water shall be provided for by the Contractor as directed or authorized by the Engineer's on-site representative.

B. The Contractor shall be responsible for disposal of all non-site related materials generated by its personnel or equipment to complete the work. Disposal of all materials shall be conducted in accordance with Federal, State and Local regulations.

3.04 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A. The Contractor shall comply with the SWPPP included in project Drawings to minimize erosion and prevent off-site sedimentation throughout project related earth disturbing activities.

3.05 EMERGENCY RESPONSE

A. Should an incident arise which necessitates Emergency Response, including but not limited to, fire, explosion, release or imminent release of contaminated materials, or accident, the Contractor shall immediately notify the proper authorities, the Engineer, and the Owner.

B. Emergency Response activities shall be initiated by the Contractor according to the procedures and protocol established within the approved HASP, the Contingency Plan and site pre-construction safety meeting.

3.06 CONTINGENCY PLAN

A. General

1. The Contractor shall be prepared to provide responses to potential releases from the site during construction and be prepared to manage hazardous wastes collected during construction.

2. Minimum plans for emergency responses are outlined in this Section. The Contractor shall provide additional plans for emergency responses as needed in the Contractor's Health and Safety Plan.

3. The Contractor shall identify an on-site Health and Safety Manager to coordinate the Health and Safety requirements, monitoring, and personal protection equipment requirements.

B. Potential Release of Contaminated Storm Water

1. Should a release of storm water that contacts excavated soil occur, the following procedures shall be followed:

a. During storm events, storm water runoff will be diverted as best as possible from any exposed areas to minimize the volume of storm water that contacts the waste material. No hazardous material will remain exposed at the end of daily construction activities as reasonably practical.

b. If rainfall is sufficiently heavy that work is temporarily ceased, the exposed hazardous materials area should be covered with either soil or an appropriate geosynthetic material as is reasonably practical to minimize the amount of rainfall that contacts the exposed waste.

c. If storm water has not infiltrated into the exposed area before construction can proceed, the excess water will be pumped from the area and containerized. The collected liquid will be sampled to determine final disposal requirements. If all levels are below MCLs, the containerized storm water may be disposed into the existing sanitary sewer system, otherwise, the collected storm water will be disposed off-site at an approved facility.

d. If the collected storm water may overflow the excavation or exposed area, construct earthen berms or dikes to contain the flow.

C. Fires or Explosions During Construction

1. The potential for fires or explosions during construction is limited but must be considered.

2. Procedures to monitor for explosive conditions during excavation, if applicable, should be included in the approved HASP prepared by the Contractor.

3. Should an explosion or fire occur requiring emergency assistance, the procedures identified in Part 3.06 E of this Section shall be implemented.

4. On-site personnel should not attempt to control fires or explosions that clearly require assistance from trained emergency response units.

D. Management of Hazardous Materials

1. Materials shall be covered overnight in a closed, leak-proof container in an area where the containers will not be contacted by any surface water flow. If materials are exposed due to ongoing excavation, the area shall be covered with clean material or geomembrane overnight.

2. Contaminated water or decontaminated water will be contained on-site in closed/covered, leakproof containers in diked area until testing can be performed to determine the proper disposal method of the material as described in this Section.

E. Emergency Assistance Procedures and Notifications

1. The Contractor shall identify an Emergency Site Coordinator.

2. The responsibilities of the Emergency Coordinator include:

a. Assessing the situation and determine whether an emergency exists and report and coordinate immediately with the Engineer.

b. Notifying outside emergency services (fire, police, regional hazardous response team, hospitals, etc.) as necessary.

c. Coordinate and contact emergency maintenance personnel (including maintaining a list of key personnel including all after hours' telephone numbers for emergency maintenance or response groups which may be involved).

d. Establishing specific locations of wind direction indicators on-site.

3. If an emergency response has been enacted, the Emergency Coordinator, shall notify and report to the appropriate agencies as needed including,

but not limited to, National Response Center, Ohio EPA, U.S. EPA, Department of Transportation, Contractor, Health and Safety Director, Remedial Action Group.

a. If the Emergency Coordinator, and the Site Health and Safety Officer determines that a situation exists that requires assistance of outside response personnel, the City of Findlay Fire Department will be contacted. The Fire Department will contact and coordinate with other emergency response agencies as delineated within the City's Standard Operating Procedures.

4. The Contractor's personnel shall provide information to the Fire Department and other agencies as needed to assist in implementation of actions to protect on-site personnel and the community.

3.07 RECORDS

A. Maintain records of all waste determinations, including appropriate results of analyses performed, substances and sample location, the time of collection, and other pertinent data as required by 40 CFR 280, Section 74 and 40 CFR 262 Subpart D, and other applicable regulations. Transportation, treatment, and disposal methods and dates, quantities of waste, and names and addresses of each transporter and the disposal or reclamation facility shall also be recorded and available for inspection, as well as copies of the following documents:

1. Manifests.

2. Waste analyses or waste profile sheets.

3. Certifications of final treatment/disposal signed by the responsible disposal facility official.

4. Land disposal notification records required under 40 CFR 268 for hazardous wastes.

5. Records shall be provided in accordance with applicable federal, state, and local regulations. Following Contract closeout, the records shall become the property of the Owner.

B. Manifesting shall conform to ODOT and applicable federal, state, and local regulations.

3.08 DOCUMENTATION OF TREATMENT OR DISPOSAL:

A. Furnish the original return copy of the hazardous waste manifest, signed by the owner or operator of a facility legally permitted to treat or dispose of those

materials furnished to the Engineer not later than 5 working days following the delivery of those materials to the facility.

B. Furnish a statement of agreement from the proposed treatment, storage or disposal facility and certified transporters to accept hazardous or special wastes in the CMMP.

C. If the Contractor selects a different facility from that identified in the CMMP, documentation shall be provided to the Engineer for approval to certify that the facility is authorized and meets the standards specified in 40 CFR 264 and applicable state and local regulations.

END OF SECTION

SECTION 03110

STRUCTURAL CAST-IN-PLACE CONCRETE FORMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes but not limited to:

1. Formwork for cast-in place concrete.

2. Shoring, bracing, and anchorage.

3. Form accessories.

1.02 DEFINITIONS

A. Abrupt Surface Irregularities: Offsets and fins in formed concrete surfaces resulting from displaced, mismatched, or misplaced forms, sheathing, or liners or from defects in forming materials. Abrupt irregularities shall be measured within 1 inch of the irregularity.

B. Gradual Surface Irregularities: Irregularities in formed concrete surfaces resulting from warping and similar uniform variations from planeness or true curvature. Gradual surface irregularities shall be measured by determining gap between concrete and near surface along a 5 feet straightedge, measured between contact points.

1.03 REFERENCE STANDARDS

A. American Concrete Institute:

1. ACI 117, Standard Specifications for Tolerance for Concrete Construction and Materials.

2. ACI 301, Specifications for Structural Concrete.

3. ACI 318, Building Code Requirements for Structural Concrete.

4. ACI 347, Guide to Formwork for Concrete.

B. American Forest and Paper Association:

1. AF&PA, National Design Specifications for Wood Construction.

C. The Engineered Wood Association:

1. APA/EWA PS 1, Voluntary Product Standard, Structural Plywood.

D. The American Society of Mechanical Engineers

1. ASME A17.1, Safety Code for Elevators and Escalators.

E. West Coast Lumber Inspection Bureau

1. Standard No. 17 Grading Rules for West Coast Lumber.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Provide for inserts, openings, sleeves, other penetrations, and embedments.

B. Scheduling

1. Formwork shall be completed at least 24 hours in advance of placing concrete.

2. Notify Engineer when interim phases of formwork installation are reached and upon completion of formwork.

1.05 SUBMITTALS

A. Section 01300 - Submittals: Requirements for submittals.

B. Shop Drawings:

1. Submit formwork, shoring, and reshoring shop drawings.

2. Indicate the following:

a. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.

b. Means of leakage prevention for concrete exposed to view in finished construction.

c. Sequence of timing of erection and stripping assumed compressive strength at time of stripping, height of lift and height of drop during placement.

d. Vertical, horizontal and special loads in accordance with ACI 347, Section 2.2 and camber diagrams, when applicable.

e. Notes to formwork erector showing size and location of conduits and piping embedded in concrete in accordance with ACI 318 Chapter 26.

f. Procedure and schedule for removal of shores and installation and removal of reshores.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347, ACI 301, and ACI 318.

B. For wood products furnished for Work of this Section, comply with AF&PA.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage:

1. Upon delivery to the Site, place materials in area protected from weather.

2. Store materials in accordance with manufacturer's recommendations.

3. Store materials above ground on framework or blocking. Cover wood for forms and other accessory materials with protective, waterproof covering. Provide for adequate air circulation or ventilation under cover.

B. Handle materials in accordance with the manufacturers' recommendations. Do not damage materials during handling.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

A. Design Criteria:

1. Design, erect, support, brace and maintain forming in accordance with ACI 347 so that forming safely supports vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by forming system or in-place construction that has attained adequate strength for the purpose. Construct forming so that concrete members and structures are of correct size, shape, alignment, elevation, and position.

2. Design forms and falsework to include values of live load, dead load, weight of moving equipment operated on forming, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

3. Provide shores and struts with positive means of adjustment capable of taking up forming settlement during concrete placing operations, using wedges or jacks, or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.

4. Support form facing materials by structural members spaced sufficiently close to prevent beyond tolerance deflection, in accordance with ACI 117. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable

tolerances. For long-span members without intermediate supports, provide camber in forming as required for anticipated deflections resulting from weight and pressure of fresh concrete and construction loads.

5. Design and construct forming to be readily removable without impact, shock or damage to concrete surfaces and adjacent materials.

6. Provide forming sufficiently tight to prevent leakage of cement paste during concrete placing. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

2.02 MATERIALS

A. Wood Form Materials

1. Form Materials: At discretion of Contractor.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

C. Tubular Column Forms:

1. Non-reusable, round paper or fiber tubes constructed of laminated plies using water-resistant type adhesive with wax-impregnated exterior for weather and moisture protection.

2. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation.

3. Fiberglass or steel forms may be used for cylindrical columns if acceptable by the Engineer in writing.

D. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.

E. Framing, Studding and Bracing: Stud or No. 3 structural light framing grade.

2.03 ACCESSORIES

A. Form Ties:

1. Provide factory-fabricated fixed length galvanized metal form ties, designed to prevent form deflection, and to prevent spalling of concrete surfaces upon removal.

2. Ties to be Snap-off type, with the portion to remain within the concrete after the removal of exterior parts of the tie to be at least 1 1/2 inch from the outer concrete surface.

3. Ties shall leave a uniform, circular hole no larger than 1 inch diameter at the concrete surface, when forms are removed.

4. Ties shall have waterstops on all exterior, below grade walls, and walls subject to hydrostatic pressure.

5. Do not use removable ties unless accepted by the Engineer. Removable ties are not allowed on exterior below-grade walls or walls subject to hydrostatic pressure. If removable ties are accepted, Contractor shall submit hole repair details for approval by the Engineer.

6. Wire ties are not permitted.

7. Do not use reinforcing bars shown by the Drawings as part of the form tie system unless approved by the Engineer.

B. Spreaders: Standard, non-corrosive metal from clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Wire ties, wood spreaders or through bolts are not permitted.

C. Form Release Agent:

1. Commercial formulation, silicone-free form-release agent, designed for use on all types of forms, which will not bond with, stain, nor adversely affect concrete surfaces, and which will not impair subsequent treatment of concrete surfaces requiring bond or adhesion nor impede wetting of surfaces which will be cured with water, steam, or curing compounds.

2. Form release agent for use on steel forms shall be non-staining and rust-preventive.

D. Chamfer Strips: Wood or rigid plastic type, minimum 3/4 x 3/4 inch triangular fillets.

E. Miscellaneous Joint Strips: Preformed strips for reveals, rustication and similar joints fabricated of wood, metal, or plastic.

F. Dovetail Anchor Slot: Galvanize steel, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

G. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and centers before proceeding with formwork.

B. Request instructions from the Engineer when formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding.

C. Examine substrate and conditions under which the Work will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

B. Remove loose material from bottom of earth forms prior to placing concrete.

C. Minimize form joints. Make joints sufficiently tight to prevent loss of mortar.

D. Arrange and assemble formwork to permit dismantling and stripping without damaging concrete during formwork removal.

E. Arrange forms to allow stripping without removal of principal shores, where required to remain in place.

F. For any work activities conducted during non-daylight hours, Contractor shall furnish and maintain temporary lighting to safely and adequately illuminate the work areas for workers and inspectors.

3.03 INSTALLATION

A. Earth Forms:

1. Earth forms are not permitted.

B. Formwork - General:

1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.

2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.

3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.

4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.

5. Complete wedging and bracing before placing concrete.

C. Forms for Smooth Finish Concrete:

1. Use steel, plywood or lined board forms.

2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.

3. Install form lining with close-fitting square joints between separate sheets without springing into place.

4. Use full size sheets of form lines and plywood wherever possible.

5. Tape joints to prevent protrusions in concrete.

6. Use care in forming and stripping wood forms to protect corners and edges.

7. Level and continue horizontal joints.

8. Keep wood forms wet until stripped.

D. Architectural Form Liners:

1. Erect architectural side of formwork first.

2. Attach form liner to forms before installing form ties.

3. Install form liners square, with joints and pattern aligned.

4. Seal form liner joints to prevent grout leaks.

5. Dress joints and edges to match form liner pattern and texture.

E. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.

F. Framing, Studding and Bracing:

1. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.

2. Distribute bracing loads over base area on which bracing is erected.

3. When placed on ground, protect against undermining, settlement or accidental impact.

G. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.

H. Obtain Engineer's approval before framing openings in structural members not indicated on Drawings.

I. Install chamfer strips on all external corners.

J. Before form materials can be re-used, surfaces that will be in contact with freshly cast concrete shall be thoroughly cleaned, damaged areas repaired and projecting nails withdrawn. Re-use of form material shall be subject to approval by the Engineer.

3.04 APPLICATION – FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.05 INSTALLATION – INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Install formed openings for items to be embedded in or passing through concrete work.

B. Locate and set in place items required to be cast directly into concrete.

C. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.

D. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

E. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

F. Form Ties:

1. Use sufficient strength and sufficient quantity to prevent spreading of forms.

2. Place ties at least 1 inch away from finished surface of concrete.

3. Leave inner rods in concrete when forms are stripped.

4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.

G. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

H. Construction Joints:

1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.

2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.

3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.

4. Arrange joints in continuous line straight, true and sharp.

I. Embedded Items:

1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.

2. Do not embed wood or uncoated aluminum in concrete.

3. Obtain installation and setting information for embedded items furnished under other Specification sections.

4. Securely anchor embedded items in correct location and alignment prior to placing concrete.

5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.

J. Openings for Items Passing Through Concrete:

1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.

2. Coordinate work to avoid cutting and patching of concrete after placement.

3. Perform cutting and repairing of concrete required as result of failure to provide required openings.

K. Screeds:

1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.

2. Slope slabs to drain where required or as shown on Drawings.

3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

L. Screed Supports:

1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.

2. Staking through membrane is not be permitted.

M. Cleanouts and Access Panels:

1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.

2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.06 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by the Engineer.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

D. Leave forms in place for minimum number of days as specified in ACI 347.

3.07 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.08 ERECTION TOLERANCES

A. Tolerances: Construct formwork to produce completed concrete surfaces within construction tolerances specified in ACI 117.

3.09 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

B. Notify Engineer after placement of reinforcing steel in forms, but prior to placing concrete.

C. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

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SECTION 03150

CONCRETE ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes but not limited to:

1. Preformed Expansion Joint Filler.

2. Joint Sealer.

3. Concrete Construction Joint Retardant Roughener.

4. Epoxy Bonding Agent.

5. Epoxy-Cement Bonding Agent.

6. Concrete Bond Breakers.

7. Form Savers.

8. Plastic Dowel Insert.

B. Related Requirements:

1. Section 03110 – Structural Cast-In-Place Concrete Forms.

1.02 DEFINITIONS

A. Isolation and Expansion Joints: Defined as a planned joint that separates two adjacent concrete placements to isolate movement between members and allow concrete to expand freely. Typically, a space is provided between the two placements by placing a filler joint material against the first pour, which acts as a form for the second pour.

1. Isolation Joints: No steel reinforcement or dowels cross the joint in addition to provision of a formed separation space. Typically this type of joint is used in slabs-on-ground at points of contact between slabs and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.

2. Expansion Joints: Includes dowels but no steel reinforcement crossing the joint in addition to provision of a formed separation space. The dowels allow movement in one direction, but shear transfer in the other directions.

3. Unless otherwise indicated or specified, expansion joints in water bearing members shall be provided with a waterstop of the shape indicated.

B. Contraction Joint: Defined as planned joint to intentionally create a plane of weakness where cracks are likely to form. The cross section may be reduced in thickness, reinforcement or both. The section can be reduced by cutting, notching or forming grooves in the concrete, by placing material to act as a bond breaker in the joint, or where two placements of concrete meet across which no bond is achieved.

1. A "full" contraction joint has no reinforcement crossing the joint. A "partial" contraction joint has 50 percent or less of normal reinforcement crossing the joint. If more than 50 percent of reinforcement crosses the joint, the joint should be classified as a construction joint.

2. Dowels or shear keys may be provided to transfer shear forces.

3. Unless otherwise indicated or specified, contraction joints in water bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated.

C. Construction Joint: A construction joint is defined as the contact between newly placed concrete and existing concrete surfaces that have become so rigid that the new concrete cannot be incorporated integrally by vibration with that previously placed, across which development and maintenance of bond are required, and through which any reinforcement that may be present is not interrupted.

1. The surface of the first placement may also be required to be roughened to enhance bond strength.

2. Unless otherwise indicated on Drawings, construction joints in water bearing members shall be provided with a waterstop of the shape indicated.

1.03 REFERENCE STANDARDS

A. American Concrete Institute:

1. ACI 301, Specifications for Structural Concrete.

B. ASTM International:

1. ASTM A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

2. ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

3. ASTM D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

4. ASTM D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

5. ASTM D1752, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

6. ASTM D2628, Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

7. ASTM D2835, Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

8. ASTM E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

C. US Army Corps of Engineers

1. CRD-C572, Specifications for Polyvinylchloride Waterstop.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Provide for inserts, openings, sleeves, other penetrations, and embedments.

1.05 SUBMITTALS

A. Section 01300 - Submittals: Requirements for submittals.

B. Action Submittals: Submit the following:

1. Shop Drawings:

a. Layout of joint locations. Submit and obtain approval prior to submitting concrete reinforcement Shop Drawings.

b. For joints that require waterstops, submit layout of locations showing waterstop details. Indicate waterstop type, waterstop joint conditions, and details on how joint conditions will be handled.

2. Manufacturer's Information: Manufacturer's literature, specifications, warranties, and installation instructions for all materials required.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage:

1. Upon delivery to the Site, place materials in area protected from weather.

2. Store materials in accordance with manufacturer's recommendations.

3. Store materials above ground on framework or blocking.

B. Handle materials in accordance with the manufacturers' recommendations. Do not damage materials during handling.

PART 2 PRODUCTS

2.01 PREFORMED EXPANSION JOINT FILLER

A. Non-water retaining structures: Provide bituminous-type expansion joint filler conforming to ASTM D994, or preformed expansion joint filler complying with ASTM D1752, Type I (sponge rubber) or Type II (cork), in thickness shown.

B. Water retaining structures: Provide preformed expansion joint filler complying with ASTM D1752 Type I (sponge rubber) or Type II (cork), in thickness shown.

2.02 JOINT SEALANT AND SEALANTS

A. Field-Molded Sealants and Primer, XXX.

B. Compression Seals and Lubricant: Compression seals shall conform to ASTM D2628; lubricant for installation shall conform to ASTM D2835.

2.03 CONCRETE CONSTRUCTION JOINT RETARDANT ROUGHENER

A. Provide water-soluble non-flammable, surface-retardant roughener.

B. Manufacturer: (Provide one of the following for the types of joints specified)

1. Rugasol-S, by Sika Corporation for horizontal joints only.

2. Concrete Surface Retarder-Formula S, by Euclid Chemical Company, for horizontal joints only.

3. Concrete Surface Retarder-Formula F, by Euclid Chemical Company, for vertical joints only.

4. TK-6100 Concrete Form Surface Retarder, by TK Products.

5. Or equal.

2.04 EPOXY BONDING AGENT

A. Provide a 2 component epoxy-resin bonding agent.

B. Manufacturer:

1. Sikadur 32 Hi-Mod LPL, by Sika Corporation.

2. Eucopoxy LPL, by the Euclid Chemical Company.

3. Resi-Bond J-58, by Dayton Superior.

4. Or equal.

2.05 EPOXY-CEMENT BONDING AGENT

A. Provide 3 component epoxy resin-cement blended formulated as bonding agent.

B. Manufacturer:

1. Sika Armatec 110 EpoCem, as manufactured by Sika Corporation.

2. Duralprep A.C., as manufactured by the Euclid Chemical Company.

3. Emaco P24, as manufactured by MBT/ChemRex.

4. Or equal.

2.06 CONCRETE BOND BREAKERS

A. Provide asphalt-saturated rag felt building paper, not less in weight than commercially known as 15 pound felt building paper, which weighs 15 pounds per 100 square feet.

B. Chemical Bond Breaker:

1. Provide medium solids resin solution concrete curing compound complying with ASTM C309 or bituminous paint.

2.07 FORM SAVERS

A. Mechanical Connection:

1. The mechanical connection shall meet building code requirements of developing in tension or compression as required by local norms/codes. The mechanical connection shall be positive-locking, taper-threaded-type coupler manufactured from high quality steel. The bar ends must be taper threaded using the manufacture's bar threading equipment to ensure proper taper and thread engagement. All connectors shall be installed to the manufacturer's requirements.

2. Mechanical connectors to meet or exceed the requirements of ACI 318 Type 2 splice requirements.

3. Mechanical connectors to have a current evaluation report by ICC Evaluation Service.

4. The strength of the mechanical connection shall be a minimum of 125% of the yield strength of the connected reinforcing bar.

B. Manufacturers:

1. D368 Taper-Lock Form Saver, as manufactured by Dayton Superior.

2. Lenton Form Savers, as manufactured by ERICO.

3. Or approved equivalent.

2.08 PLASTIC DOWEL INSERT

A. Patented square or round dowel alignment method for concrete slabs utilizing 100% polypropylene material sleeve with base that is face attached to the formwork. See project documents for location, dowel size and spacing.

B. Manufacturers:

1. Speed Dowels and/or Speed Load as manufactured by Sika/Greenstreak, St. Louis, MO.

2. Or approved equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrate and conditions under which the Work will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Provide joint locations and details, including materials and methods of installation of joint fillers and waterstops, as specified and indicated. In no case may any fixed metal be continuous through an expansion or isolation joint.

3.03 EXPANSION AND ISOLATION JOINTS

A. Comply with requirements of ACI 301 and this Section.

B. Locate and install expansion or isolation joints as shown and indicated. Install joint filler, if required, in accordance with manufacturer's instructions. Install joint seals or sealants as specified in this Section.

C. Provide isolation joint where sidewalk or other slab-on-ground abuts a concrete structure and slab-on-ground is not shown doweled into that structure. Form isolation joint by 1/2 inch joint filler with upper 1/2 inch of joint filled with sealant.

3.04 CONTRACTION JOINTS

A. Locate and install contraction joints as shown and indicated. Install joint seals or sealants, if required, as specified in this Section.

B. Provide contraction joints in non-water bearing slabs-on-ground as shown or indicated. Where contraction joints are not shown or indicated, space contraction joints at 24 to 36 times thickness of slab in both directions. Locate contraction joints only at places approved by Engineer.

C. Where contraction joints are not shown or indicated, a groove, with depth of at least 25 percent of the member thickness, shall be tooled, formed, or saw-cut in concrete. Groove shall be filled with joint sealant material.

D. Where contraction joint is formed by sawcutting, make sawcut in presence of Engineer immediately after concrete has set sufficiently to support the saw and be cut without damage to concrete. Keep concrete continually moist during cutting. Joints shall be approximately 1/8 inch wide.

E. Where contraction joint is formed by tool or forms, insert tool or joint forming strip in concrete. After concrete has achieved design strength, remove upper portion of joint forming strip and fill void with sealant.

3.05 CONSTRUCTION JOINTS

A. Comply with requirements of ACI 301 and the Contract Documents.

B. Locate and install construction joints as shown or indicated on the Drawings. Where not shown or indicated, locate joints to not impair strength of the structure; position joints at points of minimum shear. Location of joints shall be approved by Engineer. In addition to joints shown or indicated on the Drawings, locate construction joints as follows:

1. In foundation mats, locate joints at spacing of approximately 30 feet. Joints shall be located within middle third of element span, unless otherwise shown or indicated on the Drawings. Element span shall be considered distance between piles or, as determined by Engineer, distance between bearing elements, such as columns, exterior walls and interior walls. Place concrete in strip pattern, unless otherwise shown or indicated on the Drawings.

2. In walls, locate joints at a maximum spacing of 30 feet. Locate joints away from wall intersections a minimum of 1/4 of the clear span distance between wall intersections measured horizontally.

3. In structural slabs and beams, joints shall be located within middle third of element span and shall be located in compliance with ACI 301, unless otherwise shown or indicated on the Drawings.

4. In slabs on grade, locate joints at spacing of approximately 30 feet. Place concrete in strip pattern, unless otherwise shown or indicated on the Drawings.

C. Horizontal Joints:

1. Roughen concrete at interface of construction joints by abrasive blasting, hydroblasting, or using surface retardants and water jets to expose aggregate and remove accumulated concrete on projecting rebar immediately subsequent to form stripping, unless otherwise approved by Engineer. Immediately before placing fresh concrete, thoroughly clean existing contact surface using stiff brush or other tools and stream of

pressurized water. Surface shall be clean and wet, and free from pools of water at time of placing fresh concrete.

2. Remove laitance, waste mortar, and other substances that may prevent complete adhesion. Where joint roughening was performed more than 7 days prior to concrete placing or where dirt or other bond reducing contaminants are on surface, perform additional light abrasive blasting or hydroblasting to remove laitance and all bond-reducing materials just prior to concrete placement.

D. Vertical Joints:

1. Apply roughener to the form in thin, even film by brush, spray, or roller in accordance with manufacturer's instructions. After roughener is dry, concrete may be placed.

2. When concrete has been placed, remove joint surface forms as early as necessary to allow for removal of surface retarded concrete. Forms covering member surfaces shall remain in place as required under Section 03110 – Structural Cast-In-Place Concrete Forms. Wash loosened material off with high-pressure water spray to obtain roughened surface subject to approval by Engineer. Alternately, surface shall be roughened by abrasive blasting or hydroblasting to expose aggregate. Outer 1 inch of each side of joint face shall be masked and protected from blasting to avoid damaging member surface.

3.06 JOINT SEALS AND SEALANTS

A. Accurately position and secure against displacement oiled wood strips, or joint seal or sealant manufacturer's premolded filler strips to clean, smooth concrete surface of joint. Provide wood strips with a slight taper, dressed and of the size required to install filler strips at the desired level and below the finished concrete surface and to form groove for joint sealant or seals to the size shown. Material used to secure premolded fillers and wood strips to concrete shall not harm the concrete and shall be compatible with the joint sealant or seals. Do not remove wood strips until after concrete curing period. After removing filler strips, thoroughly clean groove to remove all laitance, curing compound, foreign materials, protrusions of hardened concrete, standing water and any dust.

B. Joints with Field Molded Sealant: Joints shall not be sealed when sealant, air or concrete temperature is less than 40 degrees F. Immediately prior to installation of field molded sealants, clean joint of all debris and further cleaned using water, chemical solvents or other means as recommended by sealant manufacturer. Joints shall be dry prior to filling with sealant. Bond breaker and back-up material shall be installed where required. Joints shall be primed and filled flush with joint sealant in accordance with manufacturer's recommendations.

C. Joints With Preformed Compression Seals: Install joint seals with equipment which are capable of installing joint seals to prescribed depth without cutting, nicking, twisting, or otherwise distorting or damaging the seal and with no more than 5 percent stretching of seal. Cover sides of joint and, if necessary, sides of compression seal with a coating of lubricant, and install seal to depth indicated

with joint seal installation equipment. Coat butt joints with liberal applications of lubricant.

3.07 BONDING AGENTS

A. Use epoxy bonding agent for bonding of fresh concrete to concrete that has been in place for at least 60 days, and for bonding to existing concrete.

B. Use epoxy-cement bonding agent for the following:

1. Bonding toppings and concrete fill to concrete that has been in place for at least 60 days, and for bonding to existing concrete.

2. For locations where bonding agent is required and concrete cannot be placed within open time period of epoxy bonding agent.

C. Use cement-water slurry as bonding agent for toppings and concrete fill to new concrete. Cement water slurry shall be worked into surface with stiff bristle broom and place the concrete before cement-water slurry dries.

D. Handle and store bonding agent in accordance with manufacturer's printed instructions and safety precautions.

E. Mix bonding agent in accordance with manufacturer's instructions.

F. Before placing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with bonding agent not less than 1/16 inch thick. Place fresh concrete while bonding agent is still tacky (within its open time), without removing in-place bonding agent coat, and as directed by manufacturer.

2.09 FORM SAVERS AND PLASTIC DOWEL INSERT

A. Install per manufacturers requirements.

END OF SECTION

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SECTION 03200

CONCRETE REINFORCING

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete reinforcing.

2. Extent of concrete reinforcing is shown and indicated in the Contract Documents.

3. Work includes fabrication and placement of reinforcing including bars, ties, and supports, and welded wire fabric for concrete, encasements, and fireproofing.

B. Related Sections:

1. Section 03150, Concrete Accessories.

2. Section 05053, Anchor Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ACI 315, Details and Detailing of Concrete Reinforcement.

2. ACI 318, Building Code Requirements for Structural Concrete.

3. ACI 350, Code Requirements for Environmental Engineering Concrete Structures.

4. ANSI/AWS D1.4, Structural Welding Code - Reinforcing Steel.

5. ASTM A82, Specification for Steel Wire, Plain, for Concrete Reinforcement.

6. ASTM A185, Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

7. ASTM A615, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

8. ASTM A706, Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

9. ASTM A775, Specification for Epoxy-Coated Steel Reinforcing Bars.

10. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.

11. Concrete Reinforcing Steel Institute (CRSI), Manual of Standard Practice.

12. ICC Evaluation Service (ES) AC 308, Acceptance Criteria for Post-Installed Anchors in Concrete Elements.

B. QUALITY ASSURANCE

C. Qualifications:

1. Testing Laboratory: Shall meet requirements of ASTM E329 and shall have experience in the testing welded splices of reinforcing steel and tension testing of reinforcing bars set in adhesive in hardened concrete.

2. Installer of Adhesive Dowels: Shall be experienced and certified by manufacturer of adhesive as possessing necessary training for installing manufacturer's products. Distributors or manufacturer's representatives shall not provide product training unless qualified as certified trainers by anchor manufacturer.

D. Certifications:

1. Weld Procedures: For types of splices and grades of reinforcing used in the Work, weld procedures for welded reinforcing steel splices shall be certified in accordance with ANSI/AWS D1.4.

2. Welders: For types of splices and grades of reinforcing used in the Work, welders shall be certified for welding reinforcing steel splices in accordance with ANSI/AWS D1.4.

1.03 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Drawings for fabricating, bending, and placing concrete reinforcing. Comply with ACI 315, Parts A and B.

b. For walls, show elevations at minimum scale of 1/4 inch to 1 foot.

1) Elevations shall show all openings and reference details that identify additional reinforcing required around each opening.

2) Elevations shall denote each wall intersection and reference a detail that identifies additional reinforcing required at wall intersection. As an alternate to providing separate details for each wall intersection, provide overall plan detailing only the additional wall intersection reinforcing for each wall intersection.

c. For slabs and mats, show top and bottom reinforcing on separate plan views.

1) Plans shall show all openings and shall reference details that identify additional reinforcing around each opening.

d. Show bar schedules, stirrup spacing, diagrams of bent bars, location of bar splices, length of lap splices, arrangements, and assemblies, as required for fabricating and placing concrete reinforcing unless otherwise noted.

e. Splices shall be kept to a minimum. Avoid, when possible, splices in regions of maximum tensile stresses.

f. Drawings detailing location of all construction and expansion joints, as required under Section 03150, Concrete Accessories, shall be submitted and approved before Shop Drawings for reinforcing are submitted.

g. Drawings detailing location, spacing, edge distance, and embedment depth of adhesive dowels. Adhesive system shall be submitted and approved before Shop Drawings with adhesive dowels are submitted.

2. Product Data:

a. Manufacturer's product data for adhesive, if not submitted under other Sections.

b. Adhesive manufacturer's test data and ICC ES report to verify specified capacity of adhesive dowels.

B. Informational Submittals: Submit the following:

1. Certificates:

a. Steel manufacturer's certificates of mill analysis, tensile, and bend tests for reinforcing steel.

b. Certification of welders and weld procedures for splices.

c. Adhesive manufacturer's certification verifying that installer is qualified and using proper installation procedures.

2. Manufacturer's Instructions:

a. Installation instructions for adhesive systems.

3. Field Quality Control Submittals:

a. Reports of all field quality control testing, where applicable.

b. Results of required inspection of welded splices of reinforcing bars.

c. Results of required tensile testing of adhesive dowels. Include size and location of bars tested.

4. Special Procedure Submittals; Description of reinforcing weld locations and weld procedures.

1.04 DELIVERY, HANDLING, AND STORAGE

A. Deliver concrete reinforcing products to Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings on approved Shop Drawings.

B. Store concrete reinforcing products to prevent damage and accumulation of dirt and excessive rust. Store on heavy wood blocking so that reinforcing does not come into contact with the ground.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars: Shall be deformed in accordance with ASTM A615, and as follows:

1. Provide Grade 60 for all bars, unless indicated otherwise.

2. At beams and columns forming frames and wall boundary elements, where shown on the Drawings, provide ASTM A706 or ASTM A615, Grade 60, with tested actual maximum yield stress of 78,000 pounds per square inch and ratio of actual tested tensile strength to tested yield strength not less than 1.25.

B. Mechanical Couplers: Reinforcement bars may be spliced with mechanical connection. Connection shall be full mechanical connection that shall develop in tension or compression, as required, at least 125 percent of specified yield strength (fy) of bar in accordance with ACI 318. Where splices at the face of wall are shown or approved by Engineer, form saver-type mechanical couplers may be used. Form-saver couplers shall have integral plates designed to positively connect coupler to formwork.

C. Steel Wire: Shall be in accordance with ASTM A82.

D. Welded Smooth Wire Fabric: Shall be in accordance with ASTM A185.

1. Furnish in flat sheets, not rolls.

E. Column Spirals: Hot-rolled rods for spirals, conforming to ASTM A615.

F. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing in place.

1. Use wire bar type supports complying with CRSI MSP recommendations, except as specified in this Section. Do not use wood, brick, or other unacceptable materials.

2. For slabs on grade, use precast concrete blocks, 4 inches square in plan, with embedded tie wire as specified by CRSI 1 MSP. Precast concrete blocks shall have same or higher compressive strength as specified for concrete in which they are located.

3. For concrete surfaces where legs of supports are in contact with forms, provide supports complying with CRSI MSP.

G. Adhesive Dowels:

1. Dowels:

a. Dowel reinforcing bars shall be deformed in accordance with ASTM A615, Grade 60.

2. Adhesive:

a. Requirements for adhesive are specified under requirements for concrete adhesive anchors in Section 05053, Anchor Systems.

2.02 FABRICATION

A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI MSP. In case of fabricating errors, do not re-bend or straighten reinforcing in manner that injures or weakens material.

B. Unacceptable Materials: Reinforcing with 1 or more of the following defects is not allowed:

1. Bar lengths, bends, and other dimensions exceeding specified fabrication tolerances.

2. Bends or kinks not shown on approved Shop Drawings.

3. Bars that do not meet or exceed their ASTM specification requirements when hand-wire-brushed, with respect to cross section, nominal weight, or average height of deformations.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine the substrate and conditions under which concrete reinforcing is to be placed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with applicable recommendations of Laws and Regulations, applicable standards, and CRSI MSP for details and methods of reinforcing placement and supports.

B. Clean reinforcing to remove loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Position, support, and secure reinforcing against displacement during formwork construction and concrete placing. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

1. Place reinforcing to obtain minimum concrete coverages specified in ACI 318, and the Contract Documents. Arrange, space, and securely tie bars and bar supports together with 16 gage wire to hold reinforcing accurately in position during concrete placing. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

2. Prior to placing concrete, using surveyor's level or string line, demonstrate to Engineer that specified cover of reinforcing has been attained.

3. Do not secure reinforcing steel to forms with wire, nails, or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.

D. Allowable Placing Tolerances: Comply with ACI 318, Chapter 25 - Reinforcement Details.

E. Provide sufficient number of supports of strength required to carry reinforcing. Do not place reinforcing bars more than 2 inches beyond last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Lap Splices:

1. Provide standard reinforcing splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars as shown on the Drawings.

G. Install welded wire fabric in lengths as long as practical. Lap adjoining pieces at least 1 full mesh and lace splices with 16 gage wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

H. Mechanical Couplers:

1. Mechanical butt splices shall be in accordance with recommendations of mechanical splicing device manufacturer. Butt splices shall develop 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Bars shall be flame-dried before butt splicing.

Provide adequate jigs and clamps or other devices to support, align, and hold longitudinal centerline of bars being butt spliced in straight line.

I. Welded Splices:

1. When field welding of reinforcing is required on the Drawings or allowed by Engineer in writing, welding of reinforcing bars shall conform to ANSI/AWS D1.4. Preheating and rate of cooling requirements shall be based on bar steel chemistry and ANSI/AWS D1.4. Welded splices shall be sized and constructed to transfer minimum of 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Unless otherwise allowed by ENGINEER in writing, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

2. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural steels, shall conform to applicable provisions of ANSI/AWS D1.4 and Engineer's requirements for the particular application.

3. After completing welding on coated reinforcing bars, repair coating damage as specified in this Section. Welds and steel splice members, when used to splice bars, shall be coated with same material used for repair of coating damage.

J. Adhesive Dowels:

1. Comply with manufacturer's written installation instructions and requirements of this Section.

2. Drill holes to adhesive system manufacturer's recommended drill bit diameter and to specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits complying with tolerances indicated in ANSI B212.15. Core-drilled holes shall not be permitted.

3. Before setting adhesive dowel, hole shall be made free of dust and debris by method recommended by adhesive system manufacturer. Brush the hole with adhesive system manufacturer-approved brush and blow hole clean with clean, dry, oil-free compressed air to remove all dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.

4. Before injecting adhesive, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.

5. Prior to injecting adhesive into the drilled hole, dispense to an appropriate location for waste an initial amount of adhesive from the mixing nozzle until adhesive is a uniform color, indicating that product is properly mixed.

6. Inject adhesive into hole through injection system-mixing nozzle and extension tubes (as required) placed to bottom of hole. Withdraw nozzle's discharge end as adhesive is placed while keeping nozzle immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled from hole during dowel placing.

7. Twist dowel during insertion into partially-filled hole to ensure full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.

8. Provide adequate curing in accordance to adhesive system manufacturer's requirements prior to continuing with adjoining or adjacent Work that could impose or impart load on the dowels. Do not begin adjoining or adjacent Work until dowels are successfully tested or when approved by Engineer.

9. Limitations:

a. Installation Temperature: Comply with manufacturer's instructions for installation temperature requirements. Provide temporary protection and other measures, such as heated enclosures, necessary to ensure that base material temperature complies with requirements of adhesive systems manufacturer during installation and adhesive system curing.

b. Oversized Holes: Advise Engineer immediately if size of drilled hole is larger than recommended by adhesive system manufacturer. Cost of corrective measures, including but not limited to redesign of dowels due to decreased capacities, shall be paid by Contractor.

3.03 FIELD QUALITY CONTROL

A. Site Inspections and Tests:

1. General:

a. Do not place concrete until reinforcing is inspected, and permission for placing concrete is granted by Engineer. Concrete placed in violation of this provision will be rejected.

b. Do not close up formwork for walls and other vertical members until reinforcing is inspected, and permission for placing concrete is granted by Engineer. Concrete placed in violation of this provision will be rejected.

c. Correct defective Work by removing and replacing or correcting, as required by Engineer.

d. Contractor shall pay cost of corrections and subsequent testing required to confirm integrity of post-installed anchors.

e. Testing laboratory shall submit test results to Contractor and Engineer within 24 hours of completion of test.

2. Site Tests:

a. Owner Will employ testing laboratory to perform field quality testing of adhesive dowels at the Site.

1) Testing shall comply with ASTM E488.

2) Test at least 10 percent of each type of adhesive dowel. If 1 or more dowels fail the test, Contractor shall pay cost to test all dowels of same diameter and type installed on the same day as the failed dowel.

3) Test dowels to 60 percent of specified yield strength. Engineer will direct which dowels are to be tested.

4) Apply test loads with hydraulic ram.

5) Displacement of dowels shall not exceed D/10, where D is nominal diameter of dowel.

3. Inspection of Welded Splices: Owner will employ testing laboratory to perform field quality control testing of welded splices. All welded splices shall be visually inspected. Radiographically test minimum of 5 percent of butt splice welds. Repair defective welds so that welds are completely sound.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install cast-in-place concrete.

2. The Work includes providing concrete consisting of Portland cement, fine and coarsen aggregate, water, and approved admixtures; combined, mixed, transported, placed, finished, and cured. The Work also includes:

a. Providing openings in concrete to accommodate the Work under this and other Sections, and building into the concrete all items such as sleeves, frames, anchorage devices, inserts, and all other items to be embedded in concrete Work.

B. Coordination:

1. Review installation procedures under other Sections and coordinate installation of items to be installed in the concrete Work.

C. Classifications of Concrete:

1. Class "A" concrete shall be steel-reinforced and includes the following:

a. All concrete, unless otherwise shown or indicated.

2. Class "AF" concrete shall be steel-reinforced and may be used in lieu of Class "A" concrete for the following:

a. Walls and foundations thicker than 16 inches.

3. Class "B" concrete shall be placed without forms or with simple forms, with little or no reinforcing, and includes the following, unless otherwise shown or indicated:

a. Concrete fill within structures.

b. Duct banks.

c. Unreinforced encasements.

d. Curbs and gutters.

e. Sidewalks.

f. Thrust blocks.

4. Class "D" concrete shall be unreinforced and used where required as concrete fill under foundations, filling abandoned piping, and where "lean concrete" or "mudmat" is shown or indicated in the Contract Documents.

D. Related Sections:

1. Section 03150, Concrete Accessories.

2. Section 03600, Grouting.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AASHTO M182, Specification for Burlap Cloth Made From Jute or Kenaf and Cotton Materials.

2. AASHTO TP23, Test Method for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.

3. ACI 117, Specifications for Tolerances for Concrete Construction and Materials and Commentary.

4. ACI 301, Specifications for Structural Concrete.

5. ACI 302.1R, Guide for Concrete Floor and Slab Construction.

6. ACI 304R, Guide for Measuring, Mixing, Transporting and Placing Concrete.

7. ACI 305R, Specification for Hot Weather Concreting.

8. ACI 306R, Cold Weather Concreting.

9. ACI 309R, Guide for Consolidation of Concrete.

10. ACI 318, Building Code Requirements for Structural Concrete and Commentary.

11. ACI 350-06, Code Requirements for Environmental Engineering Concrete Structures and Commentary.

12. ASTM C31/C31M, Practice for Making and Curing Concrete Test Specimens in the Field.

13. ASTM C33, Specification for Concrete Aggregates.

14. ASTM C39/C39M, Test Method for Compressive Strength of Cylindrical Concrete Specimens.

15. ASTM C42/C42M, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

16. ASTM C94/C94M, Specification for Ready-Mixed Concrete.

17. ASTM C109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).

18. ASTM C138/C138M, Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.

19. ASTM C143/C143M, Test Method for Slump of Hydraulic- Cement Concrete.

20. ASTM C150, Specification for Portland Cement.

21. ASTM C157/C157M, Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.

22. ASTM C171, Specification for Sheet Materials for Curing Concrete.

23. ASTM C172, Practice for Sampling Freshly Mixed Concrete.

24. ASTM C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

25. ASTM C260, Specification for Air-Entraining Admixtures for Concrete.

26. ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

27. ASTM C330, Specification for Lightweight Aggregates for Structural Concrete.

28. ASTM C494/C494M, Specification for Chemical Admixtures for Concrete.

29. ASTM C618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

30. ASTM C882/C882M, Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

31. ASTM C989, Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.

32. ASTM C1064/C1064M, Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

33. ASTM C1077, Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

34. ASTM C1240, Specification for Silica Fume Used in Cementitious Mixtures.

35. ASTM D1042, Test Method for Linear Dimensional Changes of Plastics Under Accelerated Service Conditions.

36. ASTM D3574, Standard Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams.

37. ASTM E96/E96M, Test Methods for Water Vapor Transmission of Materials.

38. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.

39. ASTM E1643, Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

40. ASTM E1745, Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

41. NSF/ANSI 61, Drinking Water System Components - Health Effects.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Concrete Testing Laboratory:

a. Employ independent testing laboratory experienced in design and testing of concrete materials and mixes to perform material evaluation tests and to design concrete mixes. Employ different laboratories for design of concrete mixes and field testing.

1) Testing agency shall be in accordance with ASTM E329 and ASTM C1077.

2) Testing laboratory shall have been inspected and passed within previous 2 years by Cement and Concrete Reference Laboratory (CCRL) of NIST for: testing concrete aggregates, and for preparing and testing concrete trial batches with or without admixtures. Testing laboratory shall provide documentation indicating how deficiencies, if any, in most recent CCRL inspection report were corrected.

3) Selection of testing laboratory is subject to Owner's acceptance.

4) Submit written description of proposed concrete testing laboratory giving qualifications of personnel, laboratory facilities, and equipment, and other information requested by Engineer.

2. Water Reducing Admixture Manufacturer:

a. Water-reducing admixtures shall be manufactured under strict quality control in facilities operated under a quality assurance program. Submit copy of manufacturer's quality assurance handbook to document program existence.

b. Manufacturer shall maintain a concrete testing laboratory approved by CCRL at NIST.

c. Manufacturer shall be capable of providing services of qualified field service representatives at the Site.

B. Laboratory Trial Batch:

1. Each concrete mix design specified shall be verified by laboratory trial batch, unless indicated otherwise.

2. For classes of concrete that require air-entrainment, test the trial batch at highest percentage of air allowed for that class of concrete.

3. Perform the following testing on each trial batch:

a. Aggregate gradation for fine and coarse aggregates.

b. Fly ash testing to verify meeting specified properties, unless fly ash Supplier submits certification by an independent testing laboratory.

c. Slump.

d. Air content.

e. Compressive strength based on 3 cylinders each tested at 7 days and at 28 days.

4. Submit for each trial batch the following information:

a. Project identification name and number (if applicable).

b. Date of test report.

c. Complete identification of aggregate source of supply.

d. Tests of aggregates for compliance with the Contract Documents.

e. Scale weight of each aggregate.

f. Absorbed water in each aggregate.

g. Brand, type, and composition of cementitious materials.

h. Brand, type, and amount of each admixture.

i. Amounts of water used in trial mixes.

j. Proportions of each material per cubic yard.

k. Gross weight and yield per cubic yard of trial mixtures.

l. Measured slump.

m. Measured air content.

n. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7 day and 28 day test, and for each design mix.

C. Certification of Concrete Mix:

1. The requirement for trial batch will be waived upon compliance with requirements of this Paragraph. Verify compressive strength of each specified mix by data from series of at least 30 consecutive tests that have been made within previous 12 months. Test is the average strength of all specimens of the same age fabricated from sample taken from a single batch of concrete. Tests shall have been made on concrete with identical mix design to mix design proposed for the Work, including sources of aggregate and manufacturers of cementitious materials and admixtures. Average of tests shall be above required average compressive strength required by ACI 318. Standard deviation for series of tests shall be less than 600 psi.

D. Component Supply and Compatibility:

1. Provide all admixture materials from a single manufacturer.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. List of concrete materials and proportions for the proposed concrete mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs. Do not start laboratory trial batch testing until this submittal is approved by Engineer.

b. Laboratory Trial Batch Reports: Submit laboratory test reports for concrete cylinders, materials, and mix design tests.

c. Ready-mixed Concrete: Submit the following information.

1) Physical capacity of mixing plant.

2) Trucking facilities available.

3) Estimated average amount of the specified concrete that can be produced and delivered to the Site during a normal, 8 hour day, excluding output to other customers.

2. Product Data:

a. Manufacturers' specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.

B. Informational Submittals: Submit the following:

1. Certifications:

a. Notarized certification of conformance to reference standards used in this Section, when required by Engineer.

2. Delivery Tickets: Copies of all delivery tickets for each load of concrete delivered to or mixed at the Site. Each delivery tickets shall contain the information in accordance with ASTM C94 along with project identification name and number (if any), date, mix type, mix time, quantity and amount of water introduced.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Transportation, Delivery, and Handling:

1. Materials used for concrete shall be clean and free from foreign matter during transportation and handling, and kept separate until measured and placed into concrete mixer.

2. Implement suitable measures during hauling, piling, and handling to ensure that segregation of coarse and fine aggregate particles does not occur and grading is not affected.

B. Storage:

1. For storage, provide bins or platforms with hard, clean surfaces.

PART 2 PRODUCTS

2.01 CEMENTITIOUS MATERIALS

A. Cement:

1. Portland cement shall be Type II(MH) ASTM C150. Type I or Type II may be used in lieu of Type II(MH) when approved by Engineer.

2. Portland cement shall be produced by one facility. Alternate cement sources may be used provided that mix design has been approved and acceptable trial batch verifying performance has been made.

3. Do not use cement that has deteriorated because of improper storage or handling.

B. Fly Ash Mineral Admixture:

1. Mineral admixtures, when used, shall conform to the requirements of ASTM C618 Class F, except as follows:

a. The loss on ignition shall be a maximum of 4 percent.

b. The maximum percent of sulfur trioxide (SO3) shall be 4.

2. Fly ash shall be considered to be a cementitious material.

3. Laboratory trial batches shall be tested to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.

C. Ground Granulated Blast Furnace Slag:

1. Ground granulated blast furnace slag (GGBS) mineral admixture, when used, shall conform to ASTM C989, Grade 100.

2. GGBS is considered a cementitious material.

3. Perform laboratory tests on trial batches to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.

D. For all classes of concrete, when Type II(MH) Cement is used, fly ash or GGBS may be used within the following percentages by weight. When Type II Cement is used, fly ash or GGBS shall be used within the following percentages by weight. When Type I Cement is used, in lieu of Type II(MH) Cement, fly ash or GGBS shall be used such that total tricalcium aluminate content (C3A) of the resulting cementitious material is not greater than 8 percent.

1. When fly ash is used, material shall have minimum of 20 percent and maximum of 25 percent of total weight of cementitious material.

2. When GGBS is used, material shall have minimum of 40 percent and maximum of 50 percent of total weight of cementitious material.

2.02 AGGREGATES

A. General:

1. Aggregates shall conform to ASTM C33, Class Designation 4S, and as specified in this Section.

2. Do not use aggregates containing soluble salts or other substances, such as iron sulfides, pyrite, marcasite, ochre, or other materials, that can cause stains on exposed concrete surfaces.

B. Fine Aggregate:

1. Provide clean, sharp, natural sand free of loam, clay, lumps, and other deleterious substances.

2. Dune sand, bank run sand, and manufactured sand are unacceptable.

C. Coarse Aggregate:

1. Provide clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:

a. Crushed stone, processed from natural rock or stone.

b. Washed gravel, either natural or crushed. Slag, pit gravel, and bank run gravel are unacceptable.

2.03 WATER

A. Water used in producing and curing concrete shall be clean and free of injurious quantities of oils, acids, alkalis, organic materials, and other substances that may be deleterious to concrete and steel.

2.04 CONCRETE ADMIXTURES

A. Provide admixtures in accordance with product manufacturer's published instructions. Admixtures shall be compatible with each other. Admixtures shall not contain thiocyanates, shall not contain more than 0.05 percent chloride ion, and shall be non-toxic in the concrete mix after 30 days. Do not use admixtures that have not been incorporated and tested in the accepted mixes, unless otherwise approved by Engineer.

B. Air Entraining Admixtures: ASTM C260.

1. Air entraining admixture shall be vinsol resin or vinsol rosin-based.

C. Water-Reducing Admixture: ASTM C494, Type A.

1. Proportion Class "A", Class "AF", Class "AS", and Class "B" concrete with non-air entraining, normal setting, water-reducing, aqueous solution of modified organic polymer. Admixture shall not contain lignin, nitrates, or chlorides added during manufacturing.

D. High Range Water-Reducing Admixture (HRWR): ASTM C494, Type F/G.

1. Use high range water-reducing admixture in the concrete classifications so specified or indicated. Use of HRWR admixture is allowed at Contractor's option in all other classifications of concrete. When used, HRWR admixture shall be added to concrete in accordance with admixture manufacturer's published instructions. Specific admixture formulation shall be as recommended by admixture manufacturer for Project conditions.

E. Set Control Admixtures: In accordance with ASTM C494. Use the following as required:

1. Type B, Retarding.

2. Type C, Accelerating.

3. Type D, Water reducing and Retarding.

4. Type E, Water reducing and Accelerating.

5. Type F, Water-reducing, high range admixtures.

6. Type G, Water-reducing, high range, and retarding admixtures.

F. Calcium Chloride: Do not use calcium chloride.

2.05 PROPORTIONING AND DESIGN OF MIXES

A. Prepare concrete design mixes in accordance with Table 03 30 00-A:

TABLE 03 30 00-A
CONCRETE DESIGN MIX CRITERIA

Concrete Class	Coarse Aggregate(1) Size A	Coarse Aggregate(1) Size B	Minimum Cementitious (lbs/cu yd)	Max. W/CM(4)	Slump(2)	Air (%)	Min. Comp Strength(3) (psi)
Class "A"	No. 57	No. 8	564	0.42	4" max.	6 +/- 1	4,500
Class "AF"	No. 467	No. 8	517	0.42	4" max.	5 +/- 1	4,500
Class "B"	No. 57 or No. 67		517	0.50	4" max.	6 +/- 1	3,000
Class "D"	Any ASTM C33		No requirements				2,000

Notes Applicable to Table 03 30 00-A:

1. Coarse aggregate size numbers refer to ASTM C33. Where Size A and B are designated in Table 03 30 00-A, it is intended that the smaller Size B aggregate is to be added, replacing a portion of the coarse or fine aggregate, in the minimum amount necessary to make a workable and pumpable mix with sand content not exceeding 41 percent of total aggregate.

2. Slumps indicated are prior to addition of high range water reducer (super plasticizer).

3. Mix designs shall be made for all but Class "D", which does not require trial batch, so that the compressive strength achieved for laboratory trial batches will not be less than 125 percent of specified design strength.

4. Quantity of water to be used in the determination of water-cementitious materials (W/CM) ratio shall include free water on aggregates in excess of SSD and water portion of admixtures.

B. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, Site conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as approved by Engineer. Before using adjusted concrete mixes, laboratory test data and strength results shall be submitted to and approved by Engineer.

C. Admixtures:

1. Use air-entraining admixture in concrete, unless otherwise shown or indicated. Add air-entraining admixture at admixture manufacturer's prescribed rate to produce concrete at point of placement having air content within prescribed limits.

2. Use water-reducing or high-range water-reducing admixtures in all Class "A" and Class "AF" concrete.

3. Use amounts of admixtures recommended by admixture manufacturer for climatic conditions prevailing at the Site at time of placing. Adjust quantities and types of admixtures as required to maintain quality.

D. If adding water at the Site is desired, withhold water at the batch plant so that specified water-cement (or cementitious material) ratio is not exceeded. Addition of water shall be accordance with ASTM C94. After high-range water-reducing admixture is incorporated into the batch, addition of water is not allowed.

E. Slump Limits with High-Range Water Reducer:

1. Slump shall not exceed 4 inches prior to adding high-range water reducer and shall not exceed 8 inches, measured at point of placement, after adding high-range water reducer.

2.06 BONDING AGENT

A. Provide epoxy and epoxy-cement bonding agents in accordance with Section 03150, Concrete Accessories.

2.07 CONCRETE CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.

B. Curing Mats: Shall be heavy carpets or cotton mats, quilted at 4 inches on centers, and weighing minimum of 12 ounces per square yard when dry.

C. Moisture-Retaining Cover: Provide one of the following, complying with ASTM C171:

1. Waterproof paper.

2. Polyethylene film.

3. White burlap polyethylene sheet.

D. Liquid Curing Compound: ASTM C309 Type 1-D (water retention requirements):

1. Provide fugitive dye.

2. Curing compound shall be applied by roller or power sprayer.

2.08 FINISHING AIDS

A. Evaporation Retardant:

1. Product and Manufacturer: Provide one of the following:

a. MasterKure ER 50, by BASF.

b. Eucobar, by Euclid Chemical Company.

c. SikaFilm, by Sika Corporation.

d. Or equal.

2.09 CRACK INJECTION MATERIALS

A. Structural Crack Repair System:

1. Epoxy for Injection: Low-viscosity, high-modulus moisture insensitive type.

2. Products and Manufacturers: Provide one of the following:

a. Sikadur 35, Hi-Mod L.V. and Sikadur 31, Hi-Mod Gel, by Sika Corporation.

b. Eucopoxy Injection Resin, by Euclid Chemical Company.

c. Or equal.

B. Non-structural Crack Repair System:

1. Hydrophobic Polyurethane Chemical Grout:

a. Provide hydrophobic polyurethane that forms a flexible gasket.

b. Products and Manufacturers: Provide one of the following:

1) SikaFix HH LV, by Sika Chemical Company.

2) Hydro Active Flex SLV, by De Neef Construction Chemicals, Inc.

3) Or equal.

c. Shrinkage limit shall not exceed 4 percent in accordance with ASTM D1042.

d. Minimum elongation of 250 percent in accordance with ASTM D3574.

e. Minimum tensile strength of 150 pounds per square inch in accordance with ASTM D3574.

2. Hydrophilic Acrylate-Ester Resin:

a. Hydrophilic crack repair system shall be acrylate-ester resin that forms a flexible gasket and increase in volume a minimum of 50 percent when in contact with water.

b. Products and Manufacturers: Provide one of the following:

1) Duroseal Multigel 850, manufactured by BBZ USA, Inc.

2) Or equal.

2.10 CONCRETE REPAIR MATERIALS

A. Concrete repair mortar shall be pre-packaged, polymer-modified cementitious repair mortar with the following minimum properties:

1. Compressive Strength at 1 Day: 2,000 pounds per square inch (ASTM C109).

2. Compressive Strength at 28 Days: 6,000 pounds per square inch (ASTM C109).

3. Bond Strength at 28 Days: 1,800 pounds per square inch (ASTM C882 modified).

B. Products and Manufacturers: Provide one of the following:

1. Five Star Structural Concrete, by Five Star Products, Inc. Use formulation recommended by manufacturer for the specific application conditions.

2. SikaTop 122 Plus, SikaTop 123 Plus, SikaTop 111 Plus, or Sikacem 133, by Sika Corporation. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.

3. Emaco S88-CA or S66-CR, by Master Builders Inc. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.

4. Verticoat, Verticoat Supreme, or Euco SR-VO, by Euclid Chemical Company. Use formulation from among those listed in this paragraph recommended by manufacturer for specific application conditions.

5. Or equal.

C. Cement Mortar: Shall consist of mix of 1 part cement to 1.5 parts sand with sufficient water to form trowelable consistency. Minimum compressive strength at 28 days shall be 4,000 pounds per square inch. Where required to match the color of adjacent concrete surfaces, blend white portland cement with standard portland cement so that, when dry, patching mortar matches the color of surrounding concrete.

2.11 CHEMICAL HARDENER

A. Provide clear chemical hardener of fluosilicate family.

B. Product and Manufacturer: Provide one of the following:

1. Lapidolith, by Sonneborn ChemRex Inc.

2. Hornolith, by A.C. Horn, Inc.

3. Or equal.

2.12 SHAKE-ON METALLIC HARDENER

A. Provide metallic hardener formulated, processed, and packaged under stringent quality control at metallic hardener manufacturer-owned and controlled factory. Hardener shall be a mixture of specially-processed and graded aggregate, selected portland cement, and plasticizing agents.

B. Product and Manufacturer: Provide one of the following:

1. Euco-Plate H.D., by Euclid Chemical Company.

2. Masterplate 200, by Master Builders, Inc.

3. Or equal.

2.13 VAPOR RETARDER

A. Vapor Retarder:

1. Vapor retarder membrane shall comply with the following.

a. Water Vapor Transmission Rate, ASTM E96: 0.04 perms or lower.

b. Water Vapor Retarder, ASTM E1745: Meets or exceeds Class C.

c. Thickness of Retarder (plastic), ACI 302 1R: Not less than 10 mils.

2. Products and Manufacturers: Provide one of the following:

a. Stego Wrap 10 mil Vapor Retarder, by Stego Industries LLC.

b. Griffolyn 10-mil, by Reef Industries.

c. Moistop Ultra, by Fortifiber Industries.

d. Or equal.

B. Accessories:

1. Provide accessories by same manufacturer as vapor retarder.

2. Seam Tape:

a. Tape shall have water vapor transmission rate (ASTM E96) of 0.3 perms or lower.

b. Products and Manufacturers: Provide one of the following:

1) Stego Tape by Stego Industries LLC.

2) Griffolyn Fab Tape by Reef Industries.

3) Moistop Tape by Fortifiber Industries.

4) Or equal.

3. Vapor Proofing Mastic:

a. Mastic shall have a water vapor transmission rate ASTM E96, 0.3 perms or lower.

4. Pipe Boots:

a. Construct pipe boots from vapor barrier material, pressure sensitive tape, mastic, or a combination thereof, in accordance with manufacturer's recommendations.

2.14 SOURCE QUALITY CONTROL

A. Concrete materials may require testing, as directed by Engineer, at any time during the Work if concrete quality is in question. Provide access to material stockpiles and facilities at all times. Tests shall be done at no expense to Owner.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine the substrate and conditions under which the Work will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 CONCRETE MIXING

A. General:

1. Concrete may be produced at batch plants or by the ready-mixed process. Batch plants shall comply with recommendations of ACI 304R and have

sufficient capacity to produce concrete of qualities required and in quantities required to comply with the accepted Progress Schedule. All plant facilities are subject to acceptance of Engineer.

2. Mixing:

a. Mix concrete with a rotating type batch machine, except where hand mixing of very small quantities is approved by Engineer.

b. Remove hardened accumulations of cement and concrete from drum and blades to ensure proper mixing action.

c. Replace mixer blades upon loss of 10 percent of mixer blades' original height.

B. Ready-Mix Concrete:

1. Comply with ASTM C94 and the Contract Documents.

a. Plant Equipment and Facilities: Conform to requirements of NRMCA certification.

b. Mix concrete in revolving-type truck mixers that are in good condition and produce thoroughly-mixed concrete conforming to the Contract Documents.

c. Do not exceed rated capacity of mixer.

d. Mix concrete for minimum of 2 minutes after arrival at the Site, or as recommended by mixer manufacturer.

e. Do not allow drum to mix while in transit.

f. Mix at proper speed until concrete is discharged from mixer.

g. Maintain adequate facilities at the Site for continuous delivery of concrete at required rates.

h. Provide access to mixing plant for Engineer upon request.

C. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery to prevent delay of placing concrete after mixing, or holding dry-mixed materials too long in mixer before the adding water and admixtures.

3.03 TRANSPORTING CONCRETE

A. Transport and place concrete not more than 60 minutes after water has been added to the dry ingredients.

1. If approved set control admixture, Type B, D, or G is used transport and place concrete not more than 90 minutes after water has been added to the dry ingredients.

B. Avoid spilling and separation of concrete mixture during transportation.

C. Do not place concrete in which the ingredients have separated.

D. Do not retemper partially set concrete.

E. Use suitable equipment for transporting concrete from mixer to forms.

3.04 PREPARATION FOR CONCRETING

A. Submit to Engineer laboratory trial batch test results for proposed mixes at least 15 days prior to start of Work. Do not begin concrete production until associated laboratory trial batch test result submittal has been approved by Engineer.

B. Notify Engineer a minimum of 24 hours in advance of placing concrete to allow for inspection of form work, joints, waterstops, reinforcement, embedded items, and vapor retarders. The section to be placed shall be fully prepared for concrete placement at the time of notice. Confirm inspection status with Engineer a minimum of 4 hours prior to concrete placement. Do not begin placing concrete until Work is in conformance with the Contract Documents.

C. Subgrade surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

D. Reinforcing steel and embedded items shall be completely cleaned of mortar, loose rust, form release compounds, dirt, or any other substance which would interfere with proper bonding with concrete. Protective coatings on embedded aluminum items shall continuously cover the surface to be in contact with concrete. Any defects in the coating shall be repaired.

E. Do not place concrete until flow of water entering space to be filled with concrete has been properly stopped or has been diverted by pipes, or other means, and carried out of the forms, clear of the Work. Do not deposit concrete underwater, and do not allow water to rise on concrete surfaces until concrete has attained its initial set. Do not allow water to flow over concrete surface in manner and or velocity that will injure concrete surface finish. Provide temporary pumping or other dewatering operations for removing water as required.

F. Prepare joint surfaces in accordance with Section 03 15 00, Concrete Accessories.

3.05 CONCRETE PLACEMENT

A. General:

1. Place concrete continuously, so that no concrete will be placed on concrete that has hardened sufficiently to cause formation of seams or

planes of weakness within the section. If section cannot be placed continuously, provide construction joints in accordance with Section 03150, Concrete Accessories.

2. Deposit concrete as nearly as practical in its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to action that may cause segregation.

3. Screed concrete that is to receive other construction to proper level to avoid excessive skimming or grouting.

4. Do not use concrete that becomes non-plastic and unworkable, or does not conform to required quality limits, or that has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the Site and dispose of it in conformance with Laws and Regulations.

5. Do not place concrete until forms, bracing, reinforcing, and embedded items are each in final position and secure.

6. Do not place footings in freezing weather unless adequate precautions are taken against frost action.

7. Do not place footings, piers or pile caps on frozen soil.

8. Unless otherwise instructed, place concrete only when Engineer is present.

9. Allow minimum of 72 hours between adjoining concrete placements.

B. Bonding for Next Concrete Pour:

1. Prepare for bonding of fresh concrete to concrete that has set but is not fully cured, as follows:

a. Thoroughly wet the surface, but allow no free-standing water.

b. For horizontal surfaces place a 6 inch layer of Construction Joint Grout, as specified in Section 03600, Grouting, over the hardened concrete surface.

c. Place fresh concrete before the grout has attained its initial set.

2. Accomplish bonding of fresh concrete to fully cured, hardened, existing concrete by using a bonding agent as specified in Section 03150, Concrete Accessories.

C. Concrete Conveying:

1. Handle concrete from point of delivery at the Site, transfer to concrete conveying equipment, and transfer to locations of final deposit as rapidly as practical by methods that prevent segregation and loss of concrete mix materials.

2. Provide mechanical equipment for conveying concrete to ensure continuous flow of concrete at delivery end of conveyor. Provide runways for wheeled concrete conveying equipment from concrete delivery point to locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.

3. Do not use chutes for distributing concrete, unless accepted by Engineer.

4. Pumping concrete is allowed, however do not use aluminum pipe for conveying concrete.

D. Placing Concrete into Forms:

1. Deposit concrete in forms in horizontal layers not deeper than 18 inches each and in manner that avoids inclined construction joints. Where placement consists of several layers, place concrete at such rate that concrete being integrated with fresh concrete while still plastic.

2. Do not allow concrete to free-fall within the form from height exceeding 4 feet. Where high-range water reducer is used to extend slump to at least 6 inches, maximum allowable free-fall of concrete is 6 feet. Use "elephant trunks" to prevent free-fall and excessive splashing of concrete on forms and reinforcing. Discontinue free-falls in excess of 4 feet if there is evidence of segregation.

3. Remove temporary spreaders in forms when concrete placing has reached elevation of such spreaders.

4. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidating concrete in accordance with applicable recommended practices in ACI 309. Vibration of forms and reinforcing is not allowed unless otherwise accepted by Engineer.

5. Where height of concrete placement in walls exceeds 14 feet, provide temporary windows in formwork to facilitate vibration. Properly close temporary windows when height of concrete approaches windows. Determine location, size, and spacing of temporary windows to suit equipment used.

6. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly-spaced locations not farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate the layer of concrete and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcing and other embedded items without causing segregation of concrete mix.

7. Do not place concrete in beam and slab forms until concrete previously placed in columns and walls is no longer plastic.

8. Prevent voids in the concrete. Force concrete under pipes, sleeves, openings, and inserts from one side until visible from the other side.

E. Placing Concrete Slabs:

1. Deposit and consolidate concrete slabs in continuous operation, within limits of construction joints, until placing of a slab panel or section is completed.

2. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcing and other embedded items and into corners.

3. Consolidate concrete placed in beams and girders of supported slabs, and against bulkheads of slabs on ground, as specified in this Article for formed concrete structures.

4. Bring slab surfaces to correct elevation and level. Smooth the surface, leaving surface free of humps or hollows. Do not sprinkle water on surface while concrete is plastic. Do not disturb slab surfaces prior to commencing concrete finishing.

5. Where slabs are placed in conditions of high temperature or wind that could lead to formation of plastic shrinkage cracks, provide evaporation retardant applied in accordance with retardant manufacturer's recommendations, when required by Engineer.

F. Quality of Concrete Work:

1. Concrete shall be solid, compact, and smooth, and free of laitance, cracks, and cold joints.

2. Concrete for liquid-retaining structures, and concrete in contact with earth, water, or exposed directly to the elements shall be watertight.

3. Cut out and properly replace to extent directed by Engineer, or repair to satisfaction of Engineer, surfaces with cracks or voids, that are unduly rough, or are defective in any other way. Thin patches or plastering are unacceptable.

4. Leaks through concrete that exhibit flowing water, and cracks, holes, or other defective concrete in areas of potential leakage, shall be repaired and made watertight.

5. Repair, removal, and replacement of defective concrete as directed by Engineer shall be at no additional cost to Owner.

G. Cold Weather Placing:

1. Protect concrete Work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures, in compliance with ACI 306 and the Contract Documents.

2. When air temperature has fallen to or may be expected to fall below 40 degrees F, provide adequate means to maintain temperature in area where concrete is being placed between 50 degrees F and 70 degrees F for at least 7 days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Maintain temporary heating and protection as necessary so that ambient temperature does not fall more than 30 degrees F in the 24 hours following the 7 day period. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.

3. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing for concrete as required to obtain concrete mixture temperature not less than 55 degrees F and not more than 85 degrees F at point of placement.

4. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Before placing concrete, verify that forms, reinforcing, and adjacent concrete surfaces are entirely free of frost, snow, and ice.

5. Do not use salt or other materials containing antifreeze agents. Do not use chemical accelerators or set-control admixtures unless approved by Engineer and tested in mix design proposed for use.

H. Hot Weather Placing:

1. When hot weather conditions exist that would impair the quality and strength of concrete, place concrete in compliance with ACI 305 and the Contract Documents.

2. When ambient air temperature is at or above 90 degrees F and rising, cool ingredients before mixing concrete to maintain concrete temperature at time of placement below 80 degrees F. When ambient air temperature is at or above 90 degrees F and falling, cool the ingredients before mixing concrete to maintain concrete temperature at time of placement below 85 degrees F. In no case shall the concrete temperature at time of placement exceed 90 degrees F.

3. Mixing water may be chilled, or chopped ice may be used to control concrete temperature provided the water equivalent of ice is calculated in total amount of mixing water. If required, reduce the time from addition of mix water to placement, or use set-retarding admixture.

4. Cover reinforcing materials with water-soaked burlap if ambient air temperature becomes too hot, so that reinforcing material temperature does not exceed ambient air temperature immediately before embedment of reinforcing in concrete.

5. Wet forms thoroughly before placing concrete.

6. Do not place concrete at temperature that causes difficulty from loss of slump, flash set, or cold joints.

7. Do not use set-control admixtures unless approved by Engineer in mix design.

8. Obtain Engineer's approval of substitute methods and materials proposed for use.

3.06 FINISHING OF FORMED SURFACES

A. Standard Form Finish:

1. Standard form finish shall be basically smooth and even, but is allowed to have texture imparted by the form material used. Repair defects in accordance with the Contract Documents.

2. Use standard form finish for the following:

a. Exterior vertical surfaces from foundation up to 1 foot below grade.

b. Vertical surfaces not exposed to view.

c. Other areas shown or indicated.

B. Smooth Form Finish:

1. Produce smooth form finish by selecting form materials that will impart smooth, hard, uniform texture. Arrange panels in orderly and symmetrical manner with minimum of seams. Repair and patch defective areas in accordance with the Contract Documents.

2. Use smooth form finish for the following:

a. Exterior surfaces exposed to view.

b. Surfaces to be covered with coating material. Coating material may be applied directly to concrete or may be a covering bonded to concrete such as waterproofing, dampproofing, painting, or other similar system.

c. Interior vertical surfaces of liquid-containers.

d. Interior and exterior exposed beams and undersides of slabs.

e. Surfaces to receive abrasive blasted finish.

f. Surfaces to receive smooth rubbed or grout cleaned finish.

g. Other areas shown or indicated.

C. Grout Cleaned Finish:

1. Provide grout cleaned finish to concrete surfaces that have received smooth form finish and where defects have been repaired, as follows:

a. Combine 1 part portland cement to 1.5 parts fine sand by volume, and mix with water to consistency of thick paint. Blend standard portland cement and white portland cement, in proportions determined by trial patches, so that final color of dry grout will closely match adjacent concrete surfaces.

b. Thoroughly wet concrete surface and apply grout uniformly by brushing or spraying immediately to wetted surfaces. Scrub surface with cork float or stone to coat surface and fill surface holes. Remove excess grout by scraping, followed by rubbing with clean burlap to remove visible grout film. Keep grout damp during setting period by using fog spray on surface for at least 36 hours after final rubbing. Complete each area the same day the area is started, with limits of each area being natural breaks in the finished surface.

2. Use grout cleaned finish for the following:

a. Interior exposed walls and other vertical surfaces.

b. Exterior exposed walls and other vertical surfaces down to 1 foot below grade.

c. Interior and exterior horizontal surfaces, except exterior exposed slabs and steps.

d. Interior exposed vertical surfaces of liquid-containing structures down to 1 foot below normal operating liquid level.

e. Other areas shown.

3.07 SLAB FINISHES

A. Float Finish:

1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently. Check and level the surface plane to tolerance not exceeding 1/4 inch in 10 feet when tested with a 10 foot straightedge placed on surface at not less than 2 different angles. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.

2. Use float finish for the following:

a. Interior exposed horizontal surfaces of liquid-containing structures, except those to receive grout topping.

b. Exterior below-grade horizontal surfaces.

c. Surfaces to receive additional finishes, except as shown or indicated.

B. Trowel Finish:

1. After floating, begin first trowel finish operation using power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over the surface.

2. Consolidate concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with surface plane tolerance not exceeding 1/8 inch in 10 feet when tested with a 10 foot straight edge. Grind smooth surface defects that would otherwise project through applied floor covering system.

3. Use trowel finish for the following:

   a. Interior exposed slabs, unless otherwise shown or indicated.

   b. Slabs that receive one of the following: resilient flooring, carpeting, or ceramic tile.

C. Non-Slip Broom Finish:

1. Immediately after float finishing, slightly roughen concrete surface by brooming in direction perpendicular to main traffic route. Use fine fiber-bristle broom, unless otherwise directed by Engineer. Coordinate required final finish with Engineer before applying finish.

2. Use non-slip broom finish for the following:

   a. Exterior exposed horizontal surfaces subject to lightweight foot traffic.

   b. Interior and exterior concrete steps and ramps.

D. Scratched Finish:

1. After providing float finish, roughen concrete surface with rake before concrete's final set. Amplitude of surface shall be 1/4 inch minimum.

2. Provide scratched finish for the following:

   a. Horizontal surfaces that will receive grout topping or concrete equipment pad.

   b. Surfaces so indicated on the Drawings or elsewhere in the Contract Documents.

3.08 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying, excessive cold or hot temperatures, and maintain without drying at relatively constant temperature for period necessary for hydration of cement and proper hardening of concrete.

2. Start curing after placing and finishing concrete, as soon as free moisture has disappeared from concrete surface. Keep surface continuously moist during entire curing period. Cure for a minimum of 10 days and in accordance with ACI 301 procedures. For concrete sections over 30 inches thick, the curing period shall be for a minimum of 14 days. Avoid rapid drying at end of final curing period.

3. For curing, use water that is free of impurities that could etch or discolor exposed concrete surfaces.

4. Confine water for curing to area being cured.

B. Curing Methods: Curing methods are specified below. Curing methods to be used on each type of concrete surface are specified elsewhere in this Article.

1. Water Curing. Cure by one of the following methods:

a. Keep concrete surface continuously wet.

b. Ponding or immersion.

c. Continuous water-fog spray.

d. Covering concrete surface with curing mats, thoroughly saturating mats with water, and keeping mats continuously wet with sprinklers or porous hoses. Place curing mats to cover concrete surfaces and edges with 4 inch horizontal lap over adjacent mats; provide 8 inch lap over adjacent mats at vertical surfaces. If necessary, weigh down curing cover to maintain contact with concrete surface.

2. Form Curing. Cure by one of the following methods:

a. Forms shall be maintained and loosened during curing period.

b. Immediately after forms are loosened or removed, continue with the required curing method as applicable, for remainder of curing period.

c. Where wood forms are kept in place, apply water to keep forms wet.

3. Moisture Retaining Cover Curing. Cure as follows:

a. Cover concrete surfaces with the required moisture retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least 3 inches and sealed using waterproof tape or adhesive. Immediately repair holes or tears during curing period using cover material and waterproof tape.

4. Liquid Compound Curing. Cure as follows:

a. Unless otherwise approved by Engineer, provide water curing or form curing. Request to use liquid curing compound will be considered by

Engineer on case-by-case basis. Construction joints, formed surfaces prior to receiving specified form finish, and concrete to receive surface treatment where surface treatment will be bonded to concrete surface (such as, but not limited to grout fill, hardener, coatings, lining, water repellent, painting, resilient flooring, terrazzo flooring, ceramic tile, quarry tile, chemical resistant coatings, or other applications) shall be water-cured or form-cured.

b. In liquid-retaining structures, provide water curing or form curing, unless other curing method is approved by Engineer. Requests to use liquid curing compound will be considered by Engineer on case-by-case basis. Request shall provide valid construction reason or safety reason for using liquid compound curing including reason why other curing methods are not viable.

c. Apply curing compounds immediately after final finishing or after terminating water curing. Apply curing compound in continuous operation by power spray equipment in accordance with curing compound manufacturer's directions. If areas are subjected to rainfall within 3 hours after completing curing compound application, area shall be recoated. Maintain coating continuity and repair areas damaged during curing period.

d. When liquid curing compound is used, apply first coat of liquid curing compound at compound manufacturer's recommended coverage rate, and subsequently apply second coat at identical rate, thus providing twice the curing compound manufacturer's recommended coverage.

e. At end of curing period, remove liquid curing compound where required.

C. Formed Surfaces: Use the following curing methods:

1. Walls That Will Retain Liquid or That are Under Ground Surface:

a. If forms are wood, form curing is allowed for entire curing period. If forms are steel, form curing is allowed for maximum of 3 days after which forms shall be removed so that concrete is free of the forms for remainder of the curing process.

b. Immediately after the forms are loosened or removed, continue with water curing for remainder of curing period.

c. When wall surface will not receive surface treatment and when allowed by Engineer, use of liquid curing compound is allowed. Before using liquid compound curing, use water curing or form curing for at least the first 3 days of curing.

2. Formed Slab Underside and Beam Surfaces Where Will Retain Liquid:

a. Form curing is allowed for the full curing period.

b. Immediately after forms are loosened or removed, continue with water curing for remainder of curing period.

c. When slab surface will not receive surface treatment and when allowed by Engineer, use of liquid curing compound is allowed.

3. Vertical Joint Surfaces and Surfaces to Receive Surface Treatment:

a. Form curing is allowed for entire curing period.

b. Immediately after forms are loosened or removed, continue with water curing for remainder of curing period.

4. Cure other formed surfaces using an appropriate curing method specified in the Contract Documents.

D. Unformed Surfaces: Treat with one of the following curing methods:

1. Slabs and Mats That Will Retain Liquid or are Below Ground Surface:

a. Water curing.

b. Moisture-retaining cover curing when allowed by Engineer.

c. When slab or mat surface will not receive surface treatment and when allowed by Engineer, use of liquid curing compound is allowed. Before using liquid compound curing, use water curing or form curing for at least the first 3 days of curing.

2. Construction Joint Surfaces and Slab and Mat Surfaces to Receive Surface Treatment.

a. Water curing.

b. Moisture-retaining cover curing.

3. Cure other formed surfaces using an appropriate curing method specified in the Contract Documents.

E. Temperature of Concrete During Curing:

1. When ambient temperature is 40 degrees F or less, continuously maintain concrete temperature between 50 degrees F and 70 degrees F throughout curing period. When necessary, before concrete placing provide for temporary heating, covering, insulation, or housing as required to continuously maintain specified temperatures and moisture conditions throughout concrete curing period. Provide cold weather protection in accordance with ACI 306.

2. When the ambient temperature is 80 degrees F and above, or during other climatic conditions that would cause too-rapid drying of concrete, before starting concrete placing, provide wind breaks and shading as required, and

fog spraying, wet sprinkling, or moisture retaining coverings as required. Continuously protect concrete throughout concrete curing period. Provide hot weather protection in accordance with ACI 305, unless otherwise specified.

3. Maintain concrete temperature as uniformly as possible, and protect from rapid ambient temperature changes. Avoid concrete temperature changes that exceed 5 degrees F in 1 hour and 50 degrees F in 24 hour period.

F. Protection:

1. During curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and damage by rain and flowing water. Protect finished concrete surfaces from damage by subsequent construction operations.

3.09 CONCRETE INSTALLATION TOLERANCES

A. Installation Tolerances:

1. Concrete placement tolerances, unless otherwise specified in the Contract Documents, shall be in accordance with ACI 117.

2. Notify Engineer in writing when concrete placement does not conform with required tolerances, as soon as the condition is known to Contractor.

3. When concrete installation does not conform to required tolerances, do not repair or correct by grinding unless specified in the Contract Documents or approved by Engineer in writing.

4. Verification Measurements:

a. If surfaces where tolerances are in question, obtain measurements to verify conformance with tolerances in manner acceptable to Engineer.

b. If surfaces tolerances are in question, cost of obtaining measurements shall be at no additional cost to the Owner.

c. Before obtaining measurements, obtain Engineer's acceptance of method proposed for obtaining measurements.

d. After obtaining measurements, submit measurements to Engineer.

5. Submit with verification measurements submittal proposed method to rectify out-of-tolerance concrete. Do not start repair Work without obtaining Engineer's approval.

3.10 FIELD QUALITY CONTROL

A. Field Testing Services:

1. Owner will employ testing laboratory to perform field quality control testing for concrete. Engineer will direct the testing requirements.

2. Testing laboratory will make standard compression test cylinders and entrained air tests as specified in this Article, under observation of Engineer or Resident Project Representative.

3. Testing laboratory will provide all labor, material, and equipment required for sampling and testing concrete, including: scale, glass tray, cones, rods, molds, air tester, thermometer, and other incidentals required.

4. Contractor shall provide all curing and necessary cylinder storage..

B. Quality Control Testing During Construction:

1. Perform sampling and testing for field quality control during placement of concrete, as follows:

a. Sampling Fresh Concrete: ASTM C172.

b. Slump: ASTM C143; 1 test for each concrete load at point of discharge.

c. Concrete Temperature: ASTM C1064; 1 for every 2 concrete loads at point of discharge, and when a change in the concrete is observed. Test each load when time from batching to placement exceeds 75 minutes.

d. Air Content: ASTM C231; 1 for every 2 concrete load at point of discharge, and when a change in the concrete is observed.

e. Unit Weight: ASTM C138; 1 for every 2 concrete loads at point of discharge, and when a change in the concrete is observed.

f. Compression Test Specimens:

1) In accordance with ASTM C31; make one set of compression cylinders for each 50 cubic yards of concrete, or fraction thereof, of each mix design placed each day. Each set shall be 4 standard cylinders, unless otherwise directed by Engineer.

2) Cast, store, and cure specimens in accordance with ASTM C31.

3) Test and record the following when cylinders are cast: slump, concrete temperature, air content, and unit weight.

g. Compressive Strength Tests:

1) In accordance with ASTM C39; 1 specimen tested at 7 days, and 3 specimens tested at 28 days.

2) Adjust mix design if test results are unsatisfactory and resubmit for approval.

3) Concrete that does not comply with strength requirements will be considered as defective Work.

h. Water/Cementitious Materials Ratio: Perform test when required by Engineer in accordance with AASHTO TP23.

i. Within 24 hours of completion of test, testing laboratory will submit certified copy of test results to Contractor and Engineer.

C. Evaluation of Field Quality Control Tests:

1. Do not use concrete delivered to final point of placement having slump, concrete temperature, total air content or unit weight outside specified values.

2. Water/Cementitious Materials Ratio:

a. When water content testing indicates water/cementitious materials ratio to exceed specified requirements by greater than 0.02, remaining batches required to complete concrete placement shall have water content decreased in the mix and water reducing admixture dosage increased as required to bring subsequently-batched concrete within specified water/cementitious materials ratio.

b. Perform additional testing to verify compliance with specified water/cementitious materials ratio.

c. Do not resume concrete production for further concrete placement until Contractor has identified cause of excess water in the mix and revised batching procedures, or adjusted the mix design (and obtained Engineer's associated approval) to bring water/cementitious materials ratio into conformance with the Contract Documents.

3. Compressive Strength:

a. Compressive strength tests for laboratory-cured cylinders will be acceptable if the averages of all sets of 3 consecutive compressive strength tests results equal or exceed specified 28 day design compressive strength of the associated type or class of concrete, and no individual strength test falls below required compressive strength by more than 500 pounds per square inch.

b. Questionable Field Conditions During Concrete Placement:

1) Where questionable field conditions exist during concrete placement or immediately thereafter, strength tests of specimens cured under field conditions will be required by

Engineer to check adequacy of curing and protecting of concrete placed. Specimens shall be molded at the same time and from the same samples as laboratory-cured specimens.

2) Provide improved means and procedures for protecting concrete when 28 day compressive strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders.

3) When laboratory-cured cylinder strengths are appreciably higher than minimum required compressive strength, field-cured cylinder strengths need not exceed minimum required compressive strength by greater than 500 pounds per square inch even though the 85 percent criterion may not be met.

4) If individual tests of laboratory-cured specimens produce strengths more than 500 pounds per square inch below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection and curing, provide additional measures to ensure that load-bearing capacity of the structure is not jeopardized or impaired. If likelihood of low-strength concrete is confirmed and evaluations indicate load-bearing capacity may have been reduced, perform tests of cores from the concrete in question at Contractor's expense.

c. If compressive strength tests fail to indicate compliance with minimum requirements of the Contract Documents, concrete represented by such tests will be considered defective.

D. Testing Concrete Structure for Strength:

1. When there is evidence that strength of in-place concrete does not comply with the Contract Documents, Contractor shall employ the services of concrete testing laboratory to obtain cores from hardened concrete for compressive strength determination. Cores and tests shall comply with ASTM C42 and the following:

a. Obtain at least 3 representative cores from each concrete member or suspect area of concrete at locations directed by Engineer.

b. Strength of concrete for each series of cores will be acceptable if average compressive strength is at least 85 percent of specified compressive strength and no single core is less than 75 percent of required 28 day required concrete compressive strength.

c. Testing laboratory shall submit test results to Engineer on same day that tests are completed. Include in test reports Project name and number (if any), date of sampling and testing, Contractor name, name of concrete testing laboratory, exact location of test core in

the Work, type or class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength, and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plane of concrete as placed, and moisture condition of the core at time of testing.

2. Fill core holes solid with non-shrink grout in accordance with Section 03600, Grouting, and finish to match adjacent concrete surfaces.

3. If results of core tests are unacceptable or if it is impractical to obtain cores, perform static load test and evaluations complying with ACI 318, as directed by Engineer.

E. Concrete Tolerance Verification Measurements: Refer to Article 3.09 of this Section.

F. Supplier's Services:

1. Water-Reducing Admixture Manufacturer: Furnish services of qualified concrete technician employed by admixture manufacturer to assist in proportioning concrete for optimum use of admixture. Concrete technician shall advise on proper addition of admixture to concrete and on adjustment of concrete mix proportions to meet changing conditions at the Site.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Temporary Openings:

1. Openings in concrete walls and slabs required for passage of Work are allowed only upon approval of Engineer.

2. Temporary openings made in concrete shall be provided with waterstop in below-ground or liquid-retaining members and structures. Reinforcement going through and around the opening shall be made continuous to provide continuity and shall be approved by the Engineer.

3. Temporary openings that remain in concrete structures shall be filled with the same class of concrete as the adjoining construction, after the Work causing need for temporary opening is complete, unless otherwise shown or directed by Engineer. Mix, place, and cure concrete as specified in this Section to blend with in-place construction. Provide miscellaneous concrete filling shown or required to complete the Work.

B. Bases or Pads for Piping, Panels, and Equipment:

1. Unless specifically shown or indicated otherwise, provide concrete bases or pads for equipment, floor-mounted panels, and floor-mounted supports for piping and similar construction. Provide all concrete pad and base Work not specifically included under other Sections.

2. Dimensions and Elevations:

a. Coordinate and construct bases and pads to dimensions shown or indicated, or as required to comply with equipment, panel, or piping manufacturer's requirements and elevations indicated on the Drawing.

b. Unless otherwise shown or indicated, place concrete bases for equipment up to 1 inch below the equipment manufacturer's base or mounting plate.

c. Where specific dimensions or elevations are not shown or indicated, bases and pads shall be 6 inches thick and extend 3 inches outside dimensions of the equipment, panel, or supports.

3. Finish: Bases and pads outside of areas to receive non-shrink grout shall have smooth trowel finish, unless special finish such as terrazzo, ceramic tile, quarry tile, or heavy-duty concrete topping is required. In such cases, provide appropriate concrete finish. Surfaces of bases and pads to receive non-shrink grout shall have broom finish.

C. Curbs:

1. Provide monolithic finish to interior curbs by stripping forms while concrete is still green followed by steel-troweling surfaces to hard, dense finish with corners, intersections, and terminations slightly rounded.

2. Exterior curbs shall have rubbed finish for vertical surfaces and broomed finish for top surfaces.

3.12 REPAIR OF CONCRETE PLACED UNDER THIS CONTRACT

A. Repair of Formed Surfaces:

1. Repair the following defects in all formed finishes:

a. Spalls, air bubbles, rock pockets, form depressions, and other defects that are more than 1/4 inch in depth.

b. Holes from tie rods and other form tie systems.

c. Fins, offsets, and other projections that extend more than 1/4 inch beyond designated concrete member surface.

d. Structural cracks, as defined by Engineer.

e. Non-structural cracks greater than 0.010 inch wide as defined by Engineer. In liquid-retaining structures, elevated slabs subject to the elements or washdowns, below-grade members, and cracks that evidence leakage. Where it is not possible to verify whether a crack is leaking, repair the crack.

2. Repair the following defects in smooth-finish surfaces, in addition to those listed above in this Section:

a. Spalls, air bubbles, rock pockets, form depressions, and other defects that extend to more than 1/2 inch in width in any direction, no matter how deep.

b. Spalls, air bubbles, rock pockets, form depressions, and other defects of any size that exceed three in number in a 12 inch by 12 inch area, or twelve in number in a 3 foot by 3 foot area.

c. Fins, offsets, and other projections shall be completely removed and smoothed.

d. Scratches and gouges in concrete surface.

e. Texture and color irregularities. In liquid-retaining surfaces, texture and color irregularities need not be repaired when greater than 12 inches below minimum normal operating liquid surface elevation, except where such defects are indicative of reduced durability.

3. Where smooth rubbed or grout cleaned finish is specified, minor surface defects repairable by the finishing process need not be repaired prior to finish application, when approved by Engineer.

B. Method of Repair of Formed Surfaces:

1. Immediately after removing forms, repair and patch defective areas with cement mortar or concrete repair mortar as directed by Engineer. Make repairs made to liquid-retaining structures and below-grade surfaces with repair mortar only. Repair form tie holes in liquid-retaining or below-grade surfaces with non-shrink grout in accordance with Section 03600, Grouting.

2. Honeycombs, Rock Pockets, and Holes Left by Tie Rods and Bolts:

a. Cut out honeycomb, rock pockets, voids, and holes left by tie rods and bolts, down to solid concrete but, in no case, to depth less than 1 inch for cement mortar and 1/2 inch for repair mortar. Make edges of cuts perpendicular to concrete surface.

b. Before placing cement mortar, thoroughly clean and brush-coat area to be patched with specified bonding agent.

c. When using concrete repair mortar, use of bonding agent is optional; prepare the surface and place mortar in accordance with mortar manufacturer's recommendations.

d. Repairs at exposed-to-view surfaces shall match the color of surrounding concrete, except color matching is not required for interior surfaces of liquid-retaining surfaces up to 1 foot below typical minimum liquid level. Impart texture to repaired surfaces to match texture of existing adjacent surfaces. Provide test areas at inconspicuous locations to verify mixture, texture, and color match before proceeding with patching.

e. Compact mortar in place and strike off slightly higher than the surrounding surface.

3. Structural Cracks: Pressure-grout structural cracks using injectable epoxy installed using pressurized system. Apply in accordance with epoxy manufacturer's directions and recommendations.

4. Non-structural Cracks: Shall be pressure-grouted using hydrophobic or hydrophilic resin. Install in accordance with resin manufacturer's directions and recommendations.

5. Determination of the crack type shall be made by the Engineer.

6. Holes Through Concrete:

a. Using plunger-type gun or other suitable device, fill holes extending through concrete from least-exposed face, using flush stop held at exposed face; completely fill the hole with specified repair material.

b. At below-grade and liquid-containing members, fill holes with concrete repair mortar and use color-matched cement mortar for outer 2 inches at exposed-to-view surfaces.

7. Where power washing or scrubbing is not adequate, abrasive blast exposed to view surfaces that require removal of stains, grout accumulations, sealing compounds, and other substances marring the surfaces. Use sand finer than No. 30 and air pressure from 15 to 25 pounds per square inch.

C. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to specified tolerances for each surface and finish. Correct low and high areas in accordance with this Section.

2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using template having the required slope. Correct high and low areas in accordance with this Section.

3. Repair finish of unformed surfaces containing defects that adversely affect concrete durability. Surface defects include crazing, cracks in excess of 0.01 inch wide, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

4. Repair structural cracks in all structures and non-structural cracks in liquid-retaining structures. In liquid-retaining structures, where dry face of concrete member can be observed, repair all cracks evidencing any rate of water flow through crack. Where dry face of member cannot be observed, repair all cracks.

D. Methods of Repair of Unformed Surfaces:

1. Correct high areas in unformed surfaces by grinding, after concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

2. Correct low areas in unformed surfaces, during or immediately after completion of surface finishing, by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Where repairs are required and concrete has already set, sawcut around perimeter of area to be repaired to depth of 1/2 inch and remove concrete so that minimum thickness of repair is 1/2 inch. Apply specified concrete repair mortar in accordance with repair mortar manufacturer's directions and recommendations.

3. Repair defective areas, except random cracks and single holes not exceeding 1 inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4 inch clearance all around. Minimum thickness of repair shall be 1.5 inches. Dampen concrete surfaces in contact with patching concrete and brush with specified bonding agent. Place patching concrete while bonding agent is tacky. Mix patching concrete of same materials and proportions to provide concrete of same classification as original, adjacent concrete. Place, compact, and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

4. Repair isolated, random, non-structural cracks (in members that are not below grade or liquid-retaining), and single holes not greater than 1 inch diameter, by dry-pack method. Groove top of cracks, and cut out holes to sound concrete, and clean repair area of dust, dirt, and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack before cement grout takes its initial set. Mix dry-pack, consisting of one part portland cement to 2.5 parts fine aggregate passing No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for at least 72 hours.

5. Structural cracks shall be pressure-grouted using injectable epoxy. Apply in accordance with epoxy manufacturer's directions and recommendations.

6. Non-structural cracks in below-grade and liquid-retaining structures shall be pressure-grouted using hydrophilic resin. Apply in accordance with resin manufacturer's directions and recommendations.

7. Determination of crack type will be by Engineer.

E. Other Methods of Repair:

1. Repair methods not specified in this Section may be used when approved by Engineer.

END OF SECTIONro

SECTION 03600

GROUTING

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install grout and perform grouting Work.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before grouting Work.

C. Related Sections:

1. Section 03150, Concrete Accessories.

2. Section 03300, Cast-In-Place Concrete.

D. Application and Grout Material:

1. The following is a listing of grouting applications and the corresponding type of grout material to be provided for the associated application. Unless shown or indicated otherwise in the Contract Documents, provide grout in accordance with the following:

TABLE 03600-A, GROUT APPLICATIONS AND MATERIAL TYPES

Application	Required Grout Material Type
Beam and column (1 or 2 story height) base plates and precast concrete bearing less than 16 inches in the least dimension	Class II Non-Shrink
Column base plates and precast concrete bearing (greater than 2 story height or larger than 16 inches in the least dimension)	Class I Non-Shrink
Base plates for storage tanks and other non-motorized equipment, and motorized equipment or machinery less than 50 horsepower	Class I Non-Shrink (unless otherwise recommended by equipment manufacturer)
Motorized equipment or machinery equal to and greater than 50 horsepower, and motorized equipment or machinery equipment less than 50 horsepower subject to severe shock loads or high vibration	Class III Non-Shrink Epoxy (unless otherwise recommended by equipment manufacturer)

Application	Required Grout Material Type
Filling blockout spaces for embedded items such as railing posts, guide frames for hydraulic gates, and similar applications	Class II Non-Shrink (Class I where placement time exceeds 15 minutes)
Applications not listed above, where grout is indicated on the Drawings	Class I Non-Shrink, unless shown or indicated otherwise

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ACI 211.1, Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

2. ACI 301, Structural Concrete for Buildings.

3. ASTM C33/C33M, Specification for Concrete Aggregates.

4. ASTM C109/C109M, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or [50 mm] Cube Specimens).

5. ASTM C230/C230M, Specification for Flow Table for Use in Tests of Hydraulic Cement.

6. ASTM C531, Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

7. ASTM C579, Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

8. ASTM C827, Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

9. ASTM C882/C882M, Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.

10. ASTM C939, Text Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).

11. ASTM C1107/C1107M, Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

12. ASTM C1181, Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.

13. NSF/ANSI 61, Drinking Water System Components - Health Effects.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Grout Testing Laboratory:

    a. Independent testing laboratory employed for design and testing of grout materials and mixes shall comply with testing laboratory requirements in Section 03300, Cast-in-Place Concrete and other applicable requirements in the Contract Documents.

2. Manufacturer: Shall have a minimum of 5 years experience of producing products substantially similar to that required and shall be able to submit documentation of at least 5 satisfactory installations that have been in successful operation for at least 5 years each.

3. Manufacturer's Field Service Technician: When required, provide services of manufacturer's full-time employee, factory-trained in handling, use, and installing the products required, with at least 5 years of experience in field applications of the products required.

B. Trial Batch:

1. Construction joint grout mix proportion and design shall be verified by laboratory trial batch or field experience methods. Comply with ACI 211.1 and submit to Engineer a report with the following data:

    a. Complete identification of aggregate source of supply.

    b. Tests of aggregates for compliance with specified requirements.

    c. Scale weight of each aggregate.

    d. Absorbed water in each aggregate.

    e. Brand, type, and composition of cement.

    f. Brand, type, and amount of each admixture.

    g. Amounts of water used in trial mixes.

    h. Proportions of each material per cubic yard.

    i. Unit weight and yield per cubic yard of trial mixtures.

    j. Measured slump.

    k. Measured air content.

    l. Compressive strength developed at 7 days and 28 days, from not less than 3 test specimens cast for each 7 day and 28 day test, and for each design mix.

2. Laboratory Trial Batches: When laboratory trial batches are used to select grout proportions, prepare test specimens and conduct strength tests as specified in ACI 301.

3. Field Experience Method: When field experience methods are used to select grout proportions, establish proportions as specified in ACI 301.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Schedule of Project-specific grout applications, installation locations, and the grout type proposed for each.

b. List of grout materials and proportions for the proposed mix designs. Include data sheets, test results, certifications, and mill reports to qualify the materials proposed for use in the mix designs. Do not start laboratory trial batch testing until submittal is approved by Engineer.

c. Trial Batch Reports: Submit laboratory test reports for grout materials and mix design tests.

2. Product Data:

a. Data sheets, certifications, and manufacturer's specifications for all materials proposed for use.

B. Informational Submittals: Submit the following:

1. Manufacturer’s Instructions:

a. Special instructions for shipping, storing, protecting, and handling.

b. Installation instructions for the materials.

2. Supplier Reports:

a. Submit written report of results of each visit to Site by Supplier’s field service technician, including purpose and time of visit, tasks performed, and results obtained. Submit within 2 days of completion of visit to the Site.

3. Qualifications Statements:

a. Testing laboratory, when not submitted under other Sections.

b. Manufacturer, when submittal of qualifications is required by Engineer.

c. Manufacturer's field service technician, when submittal of qualifications is required by Engineer.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Storage of Materials: Store grout materials in a dry location, protected from weather and protected from moisture.

PART 2 PRODUCTS

2.01 NON-SHRINK GROUT MATERIALS

A. General: Non-shrink grout shall be a prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or container in which the materials are packaged. Specific formulation for each type or class of non-shrink grout specified in this Section shall be that recommended by the grout manufacturer for the particular application.

B. Class I Non-Shrink Grout:

1. Class I non-shrink grouts shall have a minimum 28 day compressive strength of 7,000 pounds per square inch. Use grout for precision grouting and where water-tightness and non-shrink reliability in both plastic and hardened states is critical, in accordance with Table 03 60 00-A in this Section.

2. Products and Manufacturer: Provide one of the following:

a. Masterflow 928, by BASF.

b. Five Star Grout, by Five Star Products, Inc.

c. Hi-Flow Grout, by Euclid Chemical Company.

d. Or equal.

3. Comply with ASTM C1107/C1107M, Grade C and B (as modified below) when tested using amount of water required to achieve the following properties:

a. Fluid consistency (20 to 30 seconds) shall be in accordance with ASTM C939.

b. At temperatures of 45, 73.4, and 95 degrees F.

4. Length change from placing to time of final set shall not have shrinkage greater than the expansion measured at 3 or 14 days. Expansion at 3 or 14 days shall not exceed the 28 day expansion.

5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.

6. Fluid grout shall pass through the flow cone, with continuous flow, 1 hour after mixing.

C. Class II Non-Shrink Grout:

1. Class II non-shrink grouts shall have minimum 28 day compressive strength of 7,000 pounds per square inch. Use grout for general-purpose grouting applications in accordance with Table 03 60 00-A in this Section.

2. Products and Manufacturer: Provide one of the following:

   a. MasterFlow 100, by BASF.

   b. FSP Construction Grout, by Five Star Products, Inc.

   c. NS Grout, by Euclid Chemical Company.

   d. Or equal.

3. Comply with ASTM C1107/C1107M and the following when tested using the quantity of water required to achieve the following properties:

   a. Flowable consistency (140 percent flow in accordance with ASTM C230/C230M, 5 drops in 30 seconds).

   b. Fluid working time of at least 15 minutes.

   c. Flowable for at least 30 minutes.

4. When tested, grout shall not bleed at maximum allowed water.

5. Non-shrink property shall not be based on chemically-generated gas or gypsum expansion.

D. Class III Non-Shrink Epoxy Grout:

1. Epoxy grout shall be a pourable, non-shrink, 100 percent solids system.

2. Products and Manufacturer: Provide one of the following:

   a. E3G, by Euclid Chemical Company.

   b. Sikadur 42 Grout Pak, by Sika Corporation.

   c. HP Epoxy Grout, by Five Star Products, Inc.

   d. Or equal.

3. Epoxy grout system shall have 3 components: resin, hardener, and specially blended aggregate, all pre-measured and prepackaged. Resin component shall not contain non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are unacceptable. Variation of component ratios is not allowed without specific recommendation by manufacturer. Manufacturer's instructions shall be printed on each container in which products are packaged.

4. The following properties shall be attained with the minimum quantity of aggregate allowed by epoxy grout manufacturer.

   a. Vertical volume change at all times before hardening shall be between 0 percent shrinkage and 4 percent expansion when measured in accordance with ASTM C827 (modified for epoxy grouts by using an indicator ball with specific gravity between 0.9 and 1.1).

   b. Length change after hardening shall be less than 0.0006 inch per inch and coefficient of thermal expansion shall be less than 0.00003 inch per inch per degree F when tested in accordance with ASTM C531.

   c. Compressive creep at 1 year shall be less than 0.001 inch per inch when tested under 400 pounds per square inch constant load at 140 degrees F in accordance with ASTM C1181.

   d. Minimum 7 day compressive strength shall be 14,000 pounds per square inch when tested in accordance with ASTM C579.

   e. Grout shall be capable of maintaining at least a flowable consistency for minimum of 30 minutes at 70 degrees F.

   f. Shear bond strength to portland cement concrete shall be greater than shear strength of concrete when tested in accordance with ASTM C882/C882M.

   g. Minimum effective bearing area shall be 95 percent.

2.02 GROUT MATERIALS OTHER THAN NON-SHRINK GROUT

A. General: Materials for grouts (other than non-shrink grouts) shall be in accordance with Section 03300, Cast-In-Place Concrete, except as otherwise specified in this Section.

B. Construction Joint Grout:

1. Construction joint grout shall be comprised of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned with similar cementitious characteristics as Class "A" concrete specified in Section 03 30 00, Cast-In-Place Concrete. Mix design shall result in grout that is flowable with high mortar content. Mix requirements are:

   a. Minimum Compressive Strength: 5,000 pounds per square inch at 28 days.

   b. Maximum Water-Cement Ratio: 0.4 by weight.

   c. Coarse Aggregate: ASTM C33/C33M, No. 8 size.

   d. Fine Aggregate: ASTM C33/C33M, approximately 60 percent by weight of total aggregate.

e. Air Content: 7 percent (plus or minus 1 percent).

f. Minimum Cement Content: 752 pounds per cubic yard.

g. Slump for Construction Joint Grout: 7 inches (plus or minute 1 inch).

2.03 CURING MATERIALS

A. Curing materials shall comply with Section 03300, Cast-in-Place Concrete, and shall be as recommended by the manufacturer of prepackaged grouts.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrate and conditions under which grouting will be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. General:

1. Place grout as shown and indicated, and in accordance with Laws and Regulations and grout manufacturer's instructions. If manufacturer's instructions conflict with the Contract Documents, obtain clarification or interpretation from Engineer before proceeding.

2. Consistency of non-shrink grouts shall be as required to completely fill the space to be grouted for the particular application. Do not install grout for dry-packing without approval of Engineer. When dry-packing is approved by Engineer, dry-pack consistency shall be such that grout has sufficient water to ensure hydration and grout strength development, and remains plastic, moldable, and that does not flow.

3. Grouting shall comply with temperature and weather limitations in Section 03 30 00, Cast-In-Place Concrete.

4. Cure grout in accordance with grout manufacturer’s instructions for prepackaged grout.

B. Columns and Beams:

1. After shimming columns and beams to proper elevation, securely tighten anchors. Properly form around base plates allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of base plate and top of concrete base to assure that void is completely filled with non-shrink grout.

C. Equipment Bases:

1. Install equipment in accordance to manufacturer's recommendations, Laws, and Regulations, and the Contract Documents. After shimming equipment to proper elevation, securely tighten anchors. Properly form around base plates, allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of equipment base and top of concrete base to ensure that voids are completely filled with non-shrink grout.

D. Handrail Posts:

1. After posts have been properly inserted into holes or sleeves, fill annular space between posts and sleeve with non-shrink grout. Bevel grout at juncture with post so that water will flow away from post.

E. Construction Joints:

1. Place a 6 inch minimum thick layer of construction joint grout over contact surface of concrete at interface of horizontal construction joints in accordance with Section 03150, Concrete Accessories, and Section 03300, Cast-In-Place Concrete.

3.03 FIELD QUALITY CONTROL

A. Field Testing Services:

1. Owner will employ testing laboratory to perform field quality control testing for grout. Engineer will direct the testing requirements.

2. Contractor shall provide all curing and necessary cube storage.

B. Field Testing Services:

1. Contractor shall employ an independent testing laboratory to perform field quality control testing for grout. Engineer will direct where samples are to be obtained.

2. Contractor shall provide all curing and necessary cube storage.

3. Comply with testing laboratory requirements in Section 03300, Cast-In-Place Concrete for required testing laboratory qualifications.

4. Non-shrink Grout: Perform sampling and testing for field quality control during non-shrink grout placing as follows:

a. Perform compression testing of non-shrink grout in accordance to ASTM C109/C109M at intervals during construction as selected by Engineer. Make a set of 4 specimens for testing compressive strength at a period of time selected by the Engineer.

b. Perform compression tests on epoxy grout and fabricate specimens for epoxy grout testing in accordance with ASTM C579, Method B, at intervals during construction as selected by the Engineer. Make a set

of 4 specimens for testing compressive strength at a period of time selected by Engineer.

C. Evaluation of Field Quality Control Tests:

1. Do not use grout, delivered to final point of placement, having slump or total air content that does not comply with the Contract Documents.

2. Compressive strength tests for laboratory-cured cubes will be acceptable if averages of all sets of 3 consecutive compressive strength test results equal or exceed the required 28 day design compressive strength of the associated type of grout.

3. If the compressive strength tests do not comply with the requirements in the Contract Documents, the grout represented by such tests will be considered defective and shall be removed and replaced, or subject to other action required by Engineer, at Contractor's expense.

D. Manufacturer's Services:

1. Manufacturers of proprietary materials shall make available upon 72 hours notification the services of qualified, full time employee, experienced in serving as a field service technician for the products required, to aid in assuring proper use of products under the actual conditions at the Site.

END OF SECTION

SECTION 05053

ANCHOR SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install anchor systems.

2. This Section includes all anchor systems required for the Work, but not specified under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before anchor systems Work.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ACI 318, Building Code Requirements for Structural Concrete.

2. ACI 350, Code Requirements for Environmental Engineering Concrete Structures.

3. ACI 355.2, Qualification of Post-Installed Mechanical Anchors in Concrete.

4. ASTM A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

5. ASTM A276, Specification for Stainless Steel Bars and Shapes.

6. ASTM A493, Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging.

7. ASTM A563, Specification for Carbon and Alloy Steel Nuts.

8. ASTM A1011, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

9. ASTM B633, Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

10. ASTM C307, Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

11. ASTM C579, Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

12. ASTM C881, Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

13. ASTM D695, Test Method for Compressive Properties of Rigid Plastics.

14. ASTM D790, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

15. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.

16. ASTM E488, Test Methods for Strength of Anchors in Concrete and Masonry Elements.

17. ASTM F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

18. ASTM F594, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

19. ASTM F1554, Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength.

20. FS A-A-1922A, Shield, Expansion (Caulking Anchors, Single Lead).

21. FS A-A-1923A, Concrete Expansion Anchors.

22. FS A-A-1925A, Shield, Expansion (Nail Anchors).

23. FS A-A-55614, Shield, Expansion (non-drilling expansion anchors).

24. ICC-ES AC01, Acceptance Criteria for Expansion Anchors in Masonry Elements.

25. ICC-ES AC58, Acceptance Criteria for Adhesive Anchors in Masonry Elements.

26. ICC-ES AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.

27. ICC-ES AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

28. ISO 3506-1, Mechanical Properties of Corrosion-Resistant Stainless Steel Fasteners -- Part 1: Bolts, Screws and Studs.

29. ANSI/MSS SP-58, Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.

30. NSF/ANSI 61, Drinking Water System Components – Health Effects.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Testing Laboratory: Shall comply with ASTM E329 and shall be experienced in tension testing of post-installed anchoring systems.

2. Post-installed Anchor Installer: Shall be experienced and trained by post-installed anchor system manufacturer in proper installation of manufacturer's products. Product installation training by distributors or manufacturer's representatives is unacceptable unless the person furnishing the training is qualified as a trainer by the anchor manufacturer.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Listing of all anchor systems products intended for use in the Work including product type, intended location in the Project, and embedded lengths.

2. Product Data:

a. Manufacturer's specifications, load tables, dimension diagrams, acceptable base material conditions, acceptable drilling methods, and acceptable bored hole conditions.

b. When required by Engineer, copies of valid ICC ES reports that presents load-carrying capacities and installation requirements for anchor systems.

B. Informational Submittals: Submit the following:

1. Certificates:

a. For each type of anchor bolt or threaded rod, submit copies of laboratory test reports and other data required to demonstrate compliance with the Contract Documents.

b. Post-installed anchor system manufacturer's certification that installer received training in the proper installation of manufacturer's products required for the Work.

2. Manufacturer's Instructions:

a. Installation instructions for each anchor system product proposed for use, including bore hole cleaning procedures and adhesive

injection, cure and gel time tables, and temperature ranges (storage, installation and in-service).

3. Field Quality Control Submittals:

a. Submit results of field quality control testing and inspections performed by testing laboratory.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection:

1. Keep materials dry during delivery and storage.

2. Store adhesive materials within manufacturer's recommended storage temperature range.

3. Protect anchor systems from damage at the Site. Protect products from corrosion and deterioration.

PART 2 PRODUCTS

2.01 SYSTEM PERFORMANCE

A. General:

1. At locations where conditions dictate that Work specified in other Sections is to be of corrosion resistant materials, provide associated anchor systems of stainless steel materials, unless other corrosion-resistant anchor system material is specified. Provide anchor systems of stainless steel materials where stainless steel materials are required in the Contract Documents.

2. Stainless Steel Nuts:

a. For anchor bolts and adhesive anchors, provide ASTM A194, Grade 8S (Nitronic 60) stainless steel nuts for stainless steel anchors used for anchoring equipment, gates, and weirs, and other locations, if any, where the attachment will require future removal for operation or maintenance. Provide lock washer or double nuts on each anchorage device provided for equipment, as required by equipment manufacturer.

b. For other locations, provide for each anchorage device a nut as specified or as required by anchor manufacturer. When ASTM A194, Grade 8S (Nitronic 60) nuts are not required for anchor bolts and adhesive anchors as specified in this Section, provide anti-seizing compound where stainless steel rods are used with stainless steel nuts of the same type.

B. Design Criteria

1. Size, Length, and Load-carrying Capacity: Comply with the Contract Documents. When size, length or load-carrying capacity of anchor system is not otherwise shown or indicated, provide the following:

    a. Anchor Bolts: Provide size, length, and capacity required to carry design load based on values and requirements of Paragraph 3.2.A of this Section. For conditions outside limits of critical edge distance and spacing in Paragraph 3.2.A of this Section, minimum anchor bolt embedment as shown or indicated in Paragraph 3.2.A of this Section apply and capacity shall be based on requirements of Laws and Regulations, including applicable building codes.

    b. Adhesive Anchors, Expansion Anchors, or Concrete Inserts: Provide size, length, type, and capacity required to carry design load. Anchor capacity shall be based on the procedures required by the building code in effect at the Site. Where Evaluation Service Reports issued by the ICC Evaluation Service are required in this Section, anchor capacities shall be based on design procedure required in the applicable ICC Evaluation Service Report.

        1) General: Determine capacity considering reductions due to installation and inspection procedures, embedment length, strength of base fastening materials, spacing, and edge distance, as indicated in the manufacturer's design guidelines. For capacity determination, concrete shall be assumed to be in the cracked condition, unless calculations demonstrate that the anchor system will be installed in an area that is not expected to crack under any and all conditions of design loading.

        2) Concrete Adhesive Anchors: Unless otherwise shown or indicated in the Contract Documents or approved by Engineer, provide minimum embedment depth of the greater of the following: required to develop tensile strength of anchor, or a minimum embedment of 10 anchor diameters; and minimum anchor spacing and edge distance of 12 anchor diameters.

2. Design Loads. Comply with the Contract Documents. When design load of supported material, equipment, or system is not otherwise shown or indicated, provide the following:

    a. Equipment Anchors: Use design load recommended by equipment manufacturer. When equipment can be filled with fluid, use loads that incorporate equipment load and load imposed by fluid.

    b. Pipe Hangers and Supports: Use full weight of pipe, and fluid contained in pipe that are tributary to the support plus the full weight of valves and accessories located between the hanger or support being anchored and the next hanger or support.

c. Hangers and Supports for Electrical Systems, and HVAC, Plumbing, and Fire Suppression Systems and Piping: Use the full weight of supported system that is tributary to the support plus the full weight of accessories located between the hanger or support being anchored and the next hanger or support. When piping or equipment is to be filled with fluid, anchor systems shall be sized to support such loads in addition to the weight of the equipment, piping, or system, as applicable.

d. Delegated Design: When anchor systems are used for supporting materials, equipment, or systems delegated to a design professional retained by Contractor, Subcontractor, or Supplier, provide anchor system suitable for loads indicated in delegated design documents and consistent with the design intent expressed in the Contract Documents.

C. Application:

1. Anchor Bolts:

a. Where anchor bolt is shown or indicated, use cast-in-place anchor bolt unless another anchor type is approved by Engineer.

b. Provide anchor bolts as shown or indicated, or as required to secure structural element to appropriate anchor surface.

2. Concrete Adhesive Anchors:

a. Use where adhesive anchors are shown or indicated for installation in concrete.

b. Suitable for use where subject to vibration.

c. Suitable for use in exterior locations or locations subject to freezing.

d. Suitable for use in submerged, intermittently submerged, or buried locations.

e. Do not use in overhead applications, unless otherwise shown or approved by Engineer.

f. Do not use for pipe hangers, unless otherwise shown or approved by Engineer.

2.02 MATERIALS

A. Anchor Bolts:

1. Exterior, Buried, Submerged Locations, or When Exposed to Wastewater: Provide stainless steel straight threaded rods complying with ASTM F593, AISI Type 316, Condition A, with ASTM F594, AISI Type 316, stainless steel nuts. Provide ASTM A194/A194M, Grade 8S (Nitronic 60) stainless steel nuts

where required. Other AISI types may be used when approved by Engineer. Hooked bolts are unacceptable.

2. Equipment: Provide anchor bolts complying with material requirements of this Section and equipment manufacturer's requirements relative to size, embedment length, and anchor bolt projection. Anchor bolts shall be straight threaded rods with washers and nuts as specified in this Section. Hooked bolts are unacceptable.

3. Anchoring of Structural Elements: Provide anchor bolts of size, material, and strength shown or indicated in the Contract Documents.

B. Concrete Adhesive Anchors:

1. General:

a. Adhesive anchors shall consist of threaded rods anchored into hardened concrete using an adhesive system.

2. Products and Manufacturers: Provide one of the following:

a. HIT-RE 500-SD Injection Epoxy Adhesive Anchoring System, by Hilti Fastening Systems, Inc.

b. SET-XP Epoxy-Tie Adhesive, by Simpson Strong-Tie Company, Inc.

c. Or equal.

3. Adhesive:

a. Adhesive system shall use two-component adhesive mix.

b. Epoxy adhesives shall comply with physical requirements of ASTM C881, Type IV, Grade 2 and 3, Class A, B, and C, except gel times.

c. Adhesives shall have a current evaluation report by ICC Evaluation Service for use in both cracked and uncracked concrete with seismic recognition for SDC A through F as tested and assessed in accordance with ICC-ES AC308.

d. Adhesives shall have minimum bond strength and minimum design bond strength (bond strength multiplied by strength reduction factor) in accordance with Table 05053-A:

TABLE 05053-A:
ADHESIVE BOND STRENGTH [1,2]

Anchor	Uncracked Concrete		Cracked Concrete	
Rod Diameter / Dowel Size	**Bond Strength (psi)**	**Design Bond Strength (psi)**	**Bond Strength (psi)**	**Design Bond Strength (psi)**
3/8-inch / #3	2040	1300	1090	700
1/2-inch / #4	1920	1200	920	560
5/8-inch / #5	1830	1150	710	390
3/4-inch / #6	1760	1050	710	460
7/8inch / #7	1670	900	610	340
1-inch / #8	1650	1050	850	460
- / #9	1900	1000	800	400
1.25-inch/ #10	1580	1000	730	400

Table Notes:
1. Bond strengths listed for hammer-drilled, dry hole.
2. Bond strengths listed for maximum short term concrete temperature of 110 degrees F and maximum long term concrete temperature of 75 degrees F.

4. Anchor:

a. Provide continuously-threaded, AISI Type 316 stainless steel adhesive anchor rod. Threaded rods shall comply with the concrete adhesive anchor manufacturer's specifications as included in the ICC Service Evaluation Report for the anchor submitted. Nuts shall have specified proof load stresses equal to or greater than the minimum tensile strength of the stainless steel threaded rod used. Provide ASTM A194, Grade 8S (Nitronic 60) stainless steel nuts where required.

C. Unless approved by Engineer, do not use power-actuated fasteners or other types of bolts and fasteners not specified in this Section.

D. Anti-Seizing Compound:

1. Products and Manufacturers: Provide one of the following:

a. Pure Nickel Never-Seez, by Bostik.

b. Nickel-Graf, by Anti-Seize Technology.

c. Or equal.

2. Provide pure nickel anti-seizing compound.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine conditions under which materials will be installed and advise Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Anchor Bolts:

1. Provide anchor bolts as shown or indicated in the Contract Documents, or as required to secure structural element to the appropriate anchor surface.

2. Locate and accurately set anchor bolts using templates or other devices as required, prior to placing concrete. Wet setting of anchor bolts is unacceptable.

3. Protect threads and shank from damage during installation and subsequent construction operations.

4. Unless otherwise shown or approved by Engineer anchor bolts shall comply with Table 05053-B:

TABLE 05053-B:
SINGLE ANCHOR ALLOWABLE LOADS ON ANCHOR BOLTS [1]

Bolt Diameter (inch)	F1554 Grade 36				F1554			
	F593 Type 316, Condition A				Grade 55			
	Minimum Embedment (inch)	Minimum Edge Distance and Spacing[2] (inch)	Shear[3,4] (lb)	Tension[3] (lb)	Minimum Embedment (inch)	Minimum Edge Distance and Spacing[2] (inch)	Shear[3] (lb)	Tension[3] (lb)
1/2	6	9	1,262	2,420	8.5	12.75	1,660	3,190
5/8	7.5	11.25	2,010	3,860	10.5	15.75	2,640	5,080
3/4	9	13.5	2,974	5,720	13	19.5	3,910	7,520
7/8	10.5	15.75	4,106	7,890	15	22.5	5,400	10,390
1	12	18	5,386	10,360	17	25.5	7,090	13,450
1 1/8	13.5	20.25	6,787	13,052	19	28.5	8,930	16,580
1 1/4	15	22.5	8,617	16,572	21	31.5	11,340	20,040

Table Notes:

1. Table is based on ACI 318, f'_c = 4000 psi. Table 05053-B is not applicable to anchor bolts embedded in grouted masonry.
2. Critical edge distance and spacing are indicated in the table. Capacity of anchor bolts for other combination of edge distances and spacing shall be evaluated in accordance with ACI 318.
3. Values for shear and tension listed are not considered to act concurrently. Interaction of tension and shear will be evaluated by Engineer in accordance with ACI 318.

B. Adhesive Anchors – General:

1. Prior to drilling, locate existing reinforcing steel in vicinity of proposed holes. If reinforcing conflicts with proposed hole location, obtain Engineer's approval of alternate hole locations to avoid drilling through or damaging existing reinforcing bars.

C. Adhesive Anchors:

1. Comply with manufacturer's written installation instructions and the following.

2. Drill holes to adhesive system manufacturer's recommended drill bit diameter to the specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits that comply with the tolerances of ANSI B212.15. Core-drilled holes are unacceptable.

3. Before setting adhesive anchor, hole shall be made free of dust and debris by method recommended by adhesive anchor system manufacturer. Hole shall be brushed with adhesive system manufacturer-approved brush and blown clean with clean, dry, oil-free compressed air to remove all dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.

4. Before injecting adhesive, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.

5. Prior to injecting adhesive into the drilled hole, dispense, to a location appropriate for such waste, an initial amount of adhesive from the mixing nozzle, until adhesive is uniform color.

6. Inject adhesive into hole through injection system-mixing nozzle and necessary extension tubes, placed to bottom of hole. Discharge end shall be withdrawn as adhesive is placed but kept immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled from hole during anchor placement.

7. Twist anchors during insertion into partially-filled hole to guarantee full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.

8. Provide adequate curing in accordance to adhesive system manufacturer's requirements prior to continuing with adjoining Work that could place load on installed adhesive anchors. Do not begin adjoining Work until adhesive anchors are successfully tested or when allowed by Engineer.

9. Limitations:

a. Installation Temperature: Comply with manufacturer's instructions for installation temperature requirements. Provide temporary protection and other measures, such as heated enclosures,

necessary to ensure that base material temperature complies with anchor systems manufacturer's requirements during installation and curing of adhesive anchor system.

b. Oversized Holes: Advise Engineer immediately if size of drilled hole is larger than recommended by anchor system manufacturer. Cost of corrective measures, including but not limited to redesign of anchors due to decreased anchor capacities, shall be paid by Contractor.

c. Embedment depths shall be based on installation in normal-weight concrete with compressive strength of 2,500 pounds per square inch when embedded in existing concrete, and 4,000 pounds per square inch when embedded in new concrete.

D. Anti-Seizing Compound:

1. Provide anti-seizing compound in accordance with anti-seizing compound manufacturer's installation instructions, at locations indicated in Paragraph 2.1.B of this Section.

2. Do not use anti-seizing compound at locations where anchor bolt or adhesive anchor will contact potable water or water that will be treated to become potable.

3.03 CLEANING

A. After embedding concrete is placed, remove protection and clean bolts and inserts.

3.04 FIELD QUALITY CONTROL

A. Site Tests:

1. Owner Will employ testing agency to perform field quality tensile testing of post-installed anchors at the Site.

a. Testing shall comply with ASTM E488.

b. Test at least ten percent of all types of post-installed anchors. If one or more post-installed anchors fail the test, Contractor shall pay cost of testing, or at Engineer's option Contractor may arrange for testing paid by Contractor, for all post-installed anchors of same diameter and type installed on the same day as the failed anchor. If anchors installed on the same day as the failed anchor also fail the test, Engineer may require retesting of all anchors of the same diameter and type installed in the Work. Contractor shall be responsible for retesting costs.

c. Test post-installed anchors to 50 percent of ultimate tensile capacity of post-installed anchor. Engineer will direct which anchors are to be tested.

d. Apply test loads with hydraulic ram.

e. Displacement of post-installed anchors shall not exceed D/10, where D is nominal diameter of anchor being tested.

2. Correct defective Work by removing and replacing or correcting, as directed by Engineer.

3. Contractor shall pay for all corrections and subsequent testing required to confirm integrity of post-installed anchors.

4. Testing agency shall submit test results to Contractor and Engineer within 24 hours of completion of test.

B. Manufacturer's Services:

1. Provide at the Site services of qualified adhesive manufacturer's representative during initial installation of adhesive anchor systems to train Contractor's personnel in proper installation procedures. Manufacturer's representative shall observe to confirm that installer demonstrates proper installation procedures for adhesive anchors and adhesive material.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install structural steel framing, including surface preparation and shop priming.

2. Structural steel framing is the Work defined in AISC 303, Section 2, and as shown or indicated in the Contract Documents. The Work also includes:

a. Providing openings in and attachments to structural steel framing to accommodate the Work under this and other Sections, and providing for structural steel framing items such as anchorage devices, studs, and all items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before structural steel framing Work.

C. Related Sections:

1. Section 03600, Grouting.

2. Section 05053, Anchor Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AISC 303, Code of Standard Practice for Steel Buildings and Bridges.

2. AISC 325, Steel Construction Manual.

3. AISC 360, Specification for Structural Steel Buildings.

4. ASME B46.1, Surface Texture (Surface Roughness, Waviness and Lay).

5. ASTM A6, Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

6. ASTM A36, Specification for Carbon Structural Steel.

7. ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

8. ASTM A108, Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

9. ASTM A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

10. ASTM A325, Specification for Structural Bolts, Steel, Heat-Treated, 120/105 ksi Minimum Tensile Strength.

11. ASTM A490, Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

12. ASTM A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

13. ASTM A563, Specification for Carbon and Alloy Steel Nuts.

14. ASTM A572, Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

15. ASTM A992, Specification for Structural Steel Shapes.

16. ASTM E329, for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.

17. ASTM F436, Specification for Hardened Steel Washers.

18. ASTM F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

19. ASTM F959, Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

20. ASTM F1852, Specification for "Twist off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

21. AWS D1.1/D1.1M, Structural Welding Code-Steel.

22. CMAA 74, Specifications for Top Running & Under Running Single Girder Electric Traveling Cranes Utilizing Under Running Trolley Hoist.

23. ISO 2859-1, Sampling Procedures for Inspection by Attributes -- Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-Lot Inspection.

24. ISO 4017, Hexagon Head Screws -- Product Grades A and B.

25. RCSC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Steel Fabricator:

a. Structural steel fabricating plant shall possess current certificate from AISC stating that the fabrication facility complies with requirements for certification of "Standard for Steel Building Structures (STD)" of AISC's quality certification program. Fabricating plant shall maintain this certification throughout time of fabrication for this Project.

2. Welders and Welding Processes:

a. Qualify welding processes and welding operators in accordance with AWS D1.1/D1.1M, Section 5, Qualification.

b. Each welder employed on or to be employed for the Work shall possess current AWS certification in the welding process with which welder will be working. Certifications shall be current and valid throughout the Work.

3. Surveyor:

a. Engage a registered professional land surveyor legally qualified to practice in the same jurisdiction as the Site, and experienced in providing surveying services of the kind indicated.

b. Responsibilities include but are not necessarily limited to:

1) Performing or supervising performance of field survey work to check lines and elevations of concrete and masonry bearing surfaces, and locations of anchorage devices and similar devices, before steel erection proceeds.

2) Notifying Contractor and Engineer in writing when surveyed Work does not comply with the Contract Documents.

3) Submit to Contractor field survey reports.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Complete details and schedules for fabrication and shop assembly of members and details, schedules, procedures, and diagrams showing proposed sequence of erection. Shop Drawings shall not be reproductions of Contract Drawings.

b. Include complete information for fabrication of the structure's components, including but not limited to location, type, and size of bolts, details of blocks, copes and cuts, connections, camber, holes, member sizes and lengths, and other pertinent data. Clearly indicate welds using standard AWS notations and symbols, and clearly show or indicate size, length, and type of each weld.

c. Setting drawings, templates, and directions for installing anchorage devices.

B. Informational Submittals: Submit the following:

1. Certificates.

a. Fabricator's AISC quality certification.

b. Welders' certifications.

c. Certified reports of laboratory tests on previously-manufactured, identical materials, and other data as necessary, to demonstrate compliance with the Contract Documents for the materials listed below:

1) Structural steel of each type, including certified mill reports indicating chemical and physical properties.

2) High-strength bolts of each type, including nuts and washers.

2. Supplier Instructions:

a. Installation data, handling, and storage instructions.

3. Source Quality Control Submittals:

a. When performed or when required by Engineer, submit results of source quality control testing and inspections performed at the mill or shop.

4. Field Quality Control Submittals:

a. Written field survey reports for all bearing surfaces surveyed, verifying tolerance requirements, areas out of tolerance, and corrective measures required.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage:

1. Protect steel members and packaged materials from corrosion and deterioration.

2. Do not store materials in or on the building or structure in manner that may cause distortion or damage to structural steel members, building, or supporting structures.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Types:

1. W-Shapes and WT-Shapes: ASTM A992/A992M.

2. S-shapes and Channels: ASTM A572/A572M, Grade 50.

3. Hollow Structural Sections: ASTM A500/A500M, Grade B.

4. Angles, Plates, and Bars: ASTM A36/A36M.

5. Steel Pipe: ASTM A53/A53M, Grade B.

B. Anchorages, Fasteners, and Connectors:

1. Anchorage Devices: Refer to Section 05053, Anchor Systems.

2. High-Strength Threaded Fasteners: Heavy hexagonal structural bolts, heavy hexagon nuts, and hardened washers, as follows:

a. Unless otherwise indicated, fasteners shall be quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A325, Type I, nuts complying with ASTM A563C, A563DH or A194/A194M 2H, and hardened washers complying with ASTM F436. Bolts, nuts and washers shall be hot-dip galvanized where shown or indicated.

C. Electrodes for Welding: E70XX complying with AWS D1.1/D1.1M.

2.02 FABRICATION

A. Shop Fabrication and Assembly:

1. General:

a. Fabricate and assemble structural assemblies in the shop to greatest extent possible. Fabricate items of structural steel in

accordance with AISC 325, the Contract Documents, and as shown on approved Shop Drawings. Provide camber in structural members as shown or indicated.

b. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize handling of materials for storage and minimize handling at the Site.

c. Where finishing is required, complete the assembly, including welding of units, before commencing finishing operations. Provide finish surfaces of members exposed-to-view in the completed Work that are free of markings, burrs, and other defects.

B. Connections:

1. Shop Connections:

a. Unless otherwise shown or indicated, shop connections may be welded or high-strength bolted connections. Welds shall be 3/16 inch minimum.

b. Where reaction values of beam are not shown or indicated, connections shall be detailed to support one-half the total uniform load capacity tabulated in tables contained in AISC 325 for allowable loads on beams for the associated shape, span, and steel specified for the beam.

c. Shop-welded connections shall be detailed to eliminate or minimize eccentricity in the connection.

d. End-connection angles fastened to webs of beams and girders, and the thickness of angles, size, and extent of fasteners or shop welds, shall comply with tables of "Framed Beam Connections" in AISC 325. Connections shall be two-sided, unless otherwise shown or indicated.

2. Field Connections:

a. Field connections, unless otherwise shown or indicated, shall be made with high-strength bolts, and shall be bearing-type connections.

b. Use field welding only where shown or indicated or where approved by Engineer.

3. High-Strength Bolted Construction:

a. Provide high-strength threaded fasteners in accordance with RCSC Specifications for Structural Joints using ASTM A325 or ASTM A490 Bolts.

b. High-strength bolt design shear values shall be as specified in AISC 325 for bolts with threads in the shear plane for bearing type connections, or as specified in this Section for slip-critical connections.

c. Minimum bolt diameter shall be 3/4-inch, unless otherwise shown or indicated.

4. Welded Construction: Comply with AWS D1.1/D1.1M for procedures, appearance, and quality of welds, and methods used in correcting defective welding Work.

5. Where rigid connections are required by stresses shown or indicated, provide web shear reinforcement and stiffeners in accordance with AISC 360.

6. Moment connections shown but not detailed on the Drawings shall be detailed for bending moments and shears indicated on the Drawings.

C. Bracing:

1. Bracing for which stress is not shown or indicated shall have minimum 2 bolt connection, or shop-welded connection of equivalent strength.

2. Vertical bracing and knee braces connecting to columns shall be on the centerline of columns, unless otherwise shown or indicated.

3. Knee braces shall be at 45 degree angle, unless otherwise shown or indicated.

4. Gussets shall be not less than 3/8 inch thick, unless otherwise shown or indicated.

D. Columns: Column shafts shall have finished bearing surface roughness not greater than 500 micro-inch in accordance with ASME B46.1, and ends shall be square within tolerances for milled ends in accordance with ASTM A6/A6M at the base and at splice lines.

E. Structural Tubing: Properly seal structural tubing to protect internal surfaces.

F. Holes and Appurtenances for Other Work:

1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on the approved Shop Drawings. If large block-outs are required and approved, reinforce the webs to develop specified shears. Provide threaded nuts welded to framing and other specialty items as shown or indicated to receive other work.

2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.03 FINISHING

A. Surface Preparation and Shop Priming: Structural steel shall be primed in the shop.

2.04 SOURCE QUALITY CONTROL

A. Inspection and Testing at the Mill or Shop:

1. Perform fabricator's standard procedures for source quality control, including inspections and testing.

2. Materials and fabrication procedures shall be subject to inspection and tests in mill and shop, conducted by a qualified inspection laboratory. Such inspections and tests do not relieve Contractor of responsibility for providing the Work in accordance with the Contract Documents.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which the Work will be performed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 ERECTION

A. General: Comply with AISC 303, AISC 360, and the Contract Documents.

B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy-lines to achieve proper alignment of structures as erection proceeds.

C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete the Work. Provide sufficient planking to comply with Laws and Regulations, and provide tightly-planked substantial floor within two stories or 30 feet, whichever is less, below each tier of steel beams on which work is performed.

D. Anchorage Devices:

1. Provide anchorage devices, including anchor bolts, and other connectors required for securing structural steel to foundations and other in-place construction.

2. Provide templates and other devices necessary for presetting anchorage devices to accurate locations.

3. Refer to Section 05053, Anchor Systems, for anchorage requirements.

E. Setting Bases and Bearing Plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

2. Set loose and attached base plates and bearing plates for structural members on steel wedges or other adjusting devices.

3. Tighten anchorage devices after supported members are positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

4. Place grout between bearing surfaces and bases or plates in accordance with Section 03600, Grouting. Finish exposed surfaces, protect installed materials, and allow to cure in accordance with grout manufacturer's instructions, and as otherwise required.

5. Do not use leveling plates or wood wedges.

F. Field Assembly:

1. Set structural frames accurately to the lines and elevations shown and indicated. Align and adjust the various members forming part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

2. Level and plumb individual members of structure within tolerances as specified in AISC 325. For members requiring accurate alignment, provide clip angles, lintels, and other members, with slotted holes for horizontal adjustment at least 3/8 inch in each direction, or more when required.

3. Splice members only where shown or indicated.

G. Erection Bolts: On exposed-to-view, welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

H. Connections:

1. Comply with AISC 325 for bearing, adequacy of temporary connections, alignment, and the removal of paint on surfaces adjacent to field welds.

2. Do not enlarge inadequate holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

I. Gas Cutting: Do not use gas-cutting torches for correcting fabrication defects in structural framing. Cutting will be allowed only on secondary members that are

not under stress, as approved by Engineer. Finish gas-cut sections equal to a sheared appearance, when allowed.

J. Touch-up Painting:

1. Unless otherwise specified, comply with touch-up painting requirements.

2. Immediately after erection, clean field welds, bolted connections, and damaged or abraded areas of shop-applied paint. Apply paint to exposed areas with the same paint or coating material applied in the shop. Apply by brush or spray to provide not less than the dry film thickness.

3.03 FIELD QUALITY CONTROL

A. Site Tests and Inspections: Materials and erection procedures shall be subject to inspection and tests at the Site conducted by qualified inspection laboratory. Such inspections and tests do not relieve Contractor of responsibility for providing the Work in accordance with the Contract Documents.

1. Owner will engage independent testing and inspection laboratory to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

a. Testing laboratory shall conduct and interpret tests, prepare and state in each report of results whether test specimens comply with the Contract Documents and specifically indicate all deviations.

b. High-strength Bolted Connections: Each high-strength bolted connection shall be visually inspected. Inspection shall identify whether the Work complies with Sections 2, 3, and 8 of RCSC Specifications for Structural Joints Using ASTM A325 or A490 Bolts.

1) For connections that are slip-critical or subject to axial tension, inspector shall verify proper pre-tensioning.

2) For connections that are not slip critical and not subject to direct tension, bolt does not need to be inspected for bolt tension, but shall be visually inspected to verify that plies of connected elements are in snug contact.

3) Where bolts or connections are defective, correct defective workmanship, remove and replace, or correct as required defective bolts and connections. Contractor shall pay for correcting defective Work and tests required to confirm integrity of corrected Work.

c. Welds: Each weld shall be visually inspected.

1) Where visually defective welds are evident, further test welds using non-destructive methods. If welds are

determined to be acceptable, Owner will pay for non-destructive testing. When welds are defective, Contractor shall pay for non-destructive testing.

2) Correct, or remove and replace, defective Work as directed by Engineer.

3) Contractor shall pay for corrections and subsequent tests required to determine weld compliance with the Contract Documents.

END OF SECTION

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SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish miscellaneous metal fabrications including surface preparation and shop priming.

2. The Work also includes:

a. Providing openings in miscellaneous metal fabrications to accommodate the Work under this and other Sections, and attaching to miscellaneous metal fabrications all items such as sleeves, bands, studs, fasteners, and all items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate the Work to be installed with, or attached to miscellaneous metal fabrications Work.

2. Hot-dip Galvanizing: Coordinate with steel fabricator detailing for and fabrication of assemblies to be hot-dip galvanized, to minimize distortion during galvanizing process.

C. Related Sections:

1. Section 03600, Grouting.

2. Section 05053, Anchor Systems.

3. Section 05525, Aluminum Handrails and Railings.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ANSI A14.3, Ladders – Fixed –Safety Requirements.

2. ANSI Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components.

3. ASTM A36, Specification for Carbon Structural Steel.

4. ASTM A53, Specification for Pipe Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

5. ASTM A123, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

6. ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

7. ASTM A240, Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

8. ASTM A276, Standard Specification for Stainless Steel Bars and Shapes.

9. ASTM A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

10. ASTM A320, Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service.

11. ASTM A384, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.

12. ASTM A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

13. ASTM A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.

14. ASTM A572, Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

15. ASTM A793, Specification for Rolled Floor Plate, Stainless Steel.

16. ASTM A992, Specification for Structural Steel Shapes.

17. ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

18. ASTM B211, Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire.

19. ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

20. ASTM B308, Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

21. ASTM B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

22. ASTM B632, Specification for Aluminum-Alloy Rolled Tread Plate.

23. AWS D1.1, Structural Welding Code – Steel.

24. AWS D1.2, Structural Welding Code – Aluminum.

25. AWS D1.6, Structural Welding Code – Stainless Steel.

26. NAAMM, Metal Finishes Manual.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Welding:

a. Qualify welding processes and welding operators in accordance with AWS D1.1, D1.2, or D1.6, as applicable.

b. When requested by Engineer, provide certification that each welder employed on or to be employed for the Work have satisfactorily passed AWS qualification tests within previous 12 months. Ensure that all certifications are current.

B. Regulatory Requirements: Conform to the following:

1. 29 CFR 1910, Occupational Health and Safety Standards.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Fabrication and erection details for assemblies of miscellaneous metal Work. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Include setting drawings and templates for locating and installing miscellaneous metal items and anchorage devices.

2. Product Data:

a. Copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions for products to be used in miscellaneous metal Work.

B. Informational Submittals: Submit the following:

1. Test and Evaluation Reports:

a. Mill test report that indicate chemical and physical properties of each type of material, when requested by Engineer.

2. Qualifications Statements:

a. Copies of welder's certifications, when requested by Engineer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver products to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in other construction in ample time to prevent delaying the Work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel:

1. W-Shapes and WT-Shapes: ASTM A992.

2. S-Shapes and Channels: ASTM A572, Grade 50.

3. Hollow Structural Sections: ASTM A500, Grade B.

4. Angles, Plates, Bars: ASTM A36.

5. Steel Pipe: ASTM A53, Grade B.

B. Aluminum:

1. Aluminum Shapes: ASTM B308, Alloy 6061-T6, ASTM B 221, Alloy 6061-T6.

2. Aluminum Tubes and Pipes: ASTM B429, Alloy 6061-T6.

3. Aluminum Bars and Rod: ASTM B211, Alloy 6061-T6.

4. Aluminum Plates: ASTM B209, Alloy 6061-T6.

C. Stainless Steel:

1. Bars and Shapes: ASTM A276.

2. Pipes: ASTM A312.

3. Tubes: ASTM A544.

4. Plates and Sheets: ASTM A240.

5. Stainless Steel Type 304L or Type 316 stainless steel.

a. Submerged or Intermittently Submerged: Type 316 stainless steel.

b. Non-submerged: Type 304L stainless steel.

D. Stainless Steel Fasteners and Fittings: ASTM A320, Type 304L or Type 316 Stainless Steel.

E. Zinc-coated Hardware: ASTM A153.

2.02 MISCELLANEOUS METAL ITEMS

A. Shop Assembly:

1. Pre-assemble items in the shop to the greatest extent possible to minimize field-splicing and field-assembly of units at the Site. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Manhole Steps:

1. Provide manhole steps as shown on the Drawings. Conform to requirements of 29 CFR 1910 and ANSI A14.3.

2. Products and Manufacturers: Provide one of the following:

a. R-1982-W, manufactured by Neenah Foundry Company.

b. Or equal.

3. Vertical separation of steps shall be uniform at maximum of 12 inches on centers. Steps shall project evenly from manhole or chamber walls.

4. Material: Extruded aluminum.

C. Bollards:

1. Provide Schedule 80 galvanized steel pipe filled with concrete as shown on the Drawings. Paint as required in accordance ith Section 09 91 00, Painting. Unless otherwise shown or specified, finish-paint bollard "Safety Yellow."

D. Miscellaneous Framing and Supports:

1. Provide miscellaneous metal framing and supports that are not part of structural steel framework and are required to complete the Work.

2. Fabricate miscellaneous units to sizes, shapes, and profiles shown on the Drawings or, if not shown, of required dimensions to receive adjacent grating, plates, tanks, doors, and other work to be retained by the framing.

3. Except as otherwise shown, fabricate from structural shapes, plates, and bars, of all-welded construction using mitered corners, welded brackets, and splice plates and minimum number of joints for field connection.

4. Cut, drill, and tap units to receive hardware and similar items to be anchored to the Work.

5. Furnish units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units are to be installed after concrete is placed.

a. Except as otherwise shown, space anchors, 2 feet on center, and provide units the equivalent of 1.25 inch by 1/4 inch by 8 inch strips.

b. Galvanize exterior miscellaneous frames and supports.

c. Where shown or indicated, galvanize miscellaneous frames and supports that are not to be installed outdoors.

6. Miscellaneous steel framing and supports shall be hot-dip galvanized and finish-painted, unless otherwise shown or indicated.

7. For railings, refer to Section 05525, Aluminum Handrails and Railing.

8. Surface preparation and painting of galvanized surface.

E. Stainless Steel Raised-pattern Floor Plate:

1. Provide raised-pattern floor plate conforming to ASTM A793 and manufacturer's standards. Provide plates of thicknesses shown.

2. Products and Manufacturers: Provide products of one of the following:

a. 4-Way Safety Stainless Steel Plate, by Ryerson Tull Company.

b. Raised Pattern Floor Stainless Steel Plate, by Central Steel and Wire Company.

c. Or equal.

3. Provide removable plates at locations and sizes shown. Provide perforated plates where shown.

4. Provide each plate section with four lifting handles as recommended by manufacturer. Lifting handles shall be recessed, drop-handle type. Maximum weight of checkered plate or plank section shall be 150 pounds.

5. Finish: Mill.

F. Fasteners and Hardware: Provide Type 316 stainless steel fasteners for aluminum fabrications and zinc-coated hardware for galvanized fabrications, unless otherwise shown or specified.

G. Anchors and Expansion Anchors: Refer to Section 05053, Anchor Systems.

2.03 FINISHING

A. Surface Preparation and Shop Priming: Perform surface preparation and apply primer coat to miscellaneous metal fabrications in the shop. Conform to surface preparation and shop priming requirements.

B. Galvanizing:

1. Galvanizing of fabricated steel items shall comply with ASTM A123.

2. Details of fabrication of steel items and assemblies to be hot-dip galvanized shall conform to recommendations of ASTM A384 to minimize the potential for distortion.

C. Aluminum Finish: Provide natural mill finish for aluminum Work unless otherwise shown or specified.

2.04 SOURCE QUALITY CONTROL

A. Tests and Inspections:

1. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures complying with the Contract Documents.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine conditions under which the Work is to be performed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install miscellaneous metal fabrications accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork where fabrications are to be built into concrete, masonry, or other construction.

B. Anchor securely as shown and as required for the intended use, using concealed anchors where possible.

C. Fit exposed connections accurately together to form tight, hairline joints. Field-weld steel connections that are not to be exposed joints and cannot be shop-welded because of shipping size limitations. Comply with AWS D1.1, D1.2 and D1.6, as applicable to the material being welded. Grind steel joints smooth and touch-up shop paint coat. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

D. Protection of Aluminum from Dissimilar Materials:

1. Coat surfaces of aluminum that will contact dissimilar materials such as concrete, masonry, and steel.

END OF SECTION

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SECTION 05525

ALUMINUM HANDRAILS AND RAILINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install aluminum handrail and railing systems. The Work also includes:

a. Providing openings in, and attachments to, aluminum handrail and railing systems to accommodate the Work under this and other Specification Sections. Provide all items for aluminum handrails and railings, including anchorages, fasteners, studs, and other items required for which provision for is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before aluminum handrails and railings Work.

2. Aluminum handrail and railing locations shall comply with Laws and Regulations.

C. Related Sections:

1. Section 03600, Grouting.

2. Section 05053, Anchor Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AA, Aluminum Design Manual.

2. ASTM B26/B26M, Specification for Aluminum-Alloy Sand Castings.

3. ASTM B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.

4. ASTM B136, Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.

5. ASTM B137, Standard Test Method for Measurement of Coating Mass per Unit Area on Anodically Coated Aluminum.

6. ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

7. ASTM B241/B241M, Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

8. ASTM B244, Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.

9. ASTM B247, Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and rolled Ring Forgings.

10. ASTM B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

11. ASTM E 935, Standard Test Methods for Permanent Metal Railing Systems and Rails for Buildings.

12. NAAMM/Architectural Metal Products Division (AMP), Pipe Railing Manual.

13. NAAMM/AMP AMP 501 Finishes for Aluminum.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:

a. Upon request manufacturer shall submit document at least five years successful experience in fabricating aluminum handrail and railing systems of scope and type similar to that required.

b. Manufacturer shall be capable of providing custom detail drawings for the products required.

2. Professional Engineer:

a. CONTRACTOR or handrail and railing manufacturer shall retain a registered professional engineer legally qualified to practice in same state as the Site. Professional engineer shall have at least five years experience designing aluminum handrails and railings.

b. Responsibilities include:

1) Reviewing aluminum handrail and railing system performance and design criteria stated in the Contract Documents.

2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to ENGINEER by CONTRACTOR.

3) Preparing or supervising preparation of design calculations verifying compliance of aluminum handrail and railing system with requirements of the Contract Documents.

4) Signing and sealing all calculations.

5) Certifying that:

a) Design of aluminum handrail and railing system was performed in accordance with performance and design criteria stated in the Contract Documents, and

b) Design conforms to all applicable local, state, and federal Laws and Regulations, and to prevailing standards of practice.

3. Installer:

a. Retain a single installer trained and with record of successful experience in installing aluminum handrail and railing systems.

b. Installer shall have record of successfully installing aluminum handrail and railing systems in accordance with recommendations and requirements of manufacturer, or shall provide evidence of being acceptable to the manufacturer.

c. Installer shall employ only tradesmen with specific skill and successful experience in the type of Work required.

d. When requested by ENGINEER, submit name and qualifications of installer with the following information for at least three successful, completed projects:

1) Names and telephone numbers of owner and architect or engineer responsible for each project.

2) Approximate contract cost of the aluminum handrail and railing systems for which installer was responsible.

3) Amount (linear feet) of aluminum handrail and railing installed.

B. Component Supply and Compatibility:

1. Obtain all materials furnished under this Section regardless of component manufacturer, from a single aluminum handrail and railing system manufacturer.

2. Aluminum handrail and railing system manufacturer shall review and approve or prepare all Shop Drawings and other submittals (except for delegated design submittals, when professional engineer is retained by other than handrail and railing manufacturer) for all components furnished under this Section.

3. Components shall be specifically constructed for specified service conditions and shall be integrated into overall assembly by aluminum handrails and railings manufacturer.

C. Regulatory Requirements: Comply with Laws and Regulations including:

1. OSHA Part 1910.23, Guarding Floor and Wall Openings and Holes.

D. Certifications:

1. Submit certification, signed by authorized officer of manufacturer and notarized, stating that handrail and railing systems comply with the design prepared by the professional engineer.

2. Submit certification, signed by authorized officer of CONTRACTOR and notarized, stating that all components and fittings are furnished by the same manufacturer.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Drawings for fabrication and installation of aluminum handrail and railing systems with sizes of members, pipe wall thickness, information on components, and anchorage devices. Show all anchorages. Provide details drawn at scale of 1.5-inch equal to one foot.

b. Indicate required location of posts.

c. Indicate locations and details of all expansion joints, if any.

d. Indicate locations and details of gaps across seismic joints, if any.

e. Profile drawings of aluminum handrail and railing system components.

f. Custom detail drawings. Details of forming, jointing, sections, connections, internal supports, trim and accessories. Provide details drawn at scale of 1.5-inch equal to one foot.

2. Product Data:

a. Manufacturer's specifications, standard detail drawings, and installation instructions for aluminum handrail and railing systems.

b. Manufacturer's catalogs showing complete selection of standard and custom components and miscellaneous accessories for selection by ENGINEER.

3. Delegated Design Submittals:

a. Design Data:

1) Design computations or complete structural analysis of handrail and railing systems, signed and sealed by professional engineer. Professional engineer's seal shall be clearly legible, including state of registration, registration number, and name on seal.

2) Certification by professional engineer that professional engineer has performed design of aluminum handrail and railing systems in accordance with performance and design criteria stated in the Contract Documents, and that design conforms to all local, state, and federal Laws and Regulations, and to prevailing standards of practice.

B. Informational Submittals: Submit the following:

1. Certificates:

a. Certification on source of supply, as specified in Article 1.3 of this Section.

b. Manufacturer certification specified in Article 1.3 of this Section.

2. Qualifications Statements: Submit qualifications for the following:

a. Manufacturer, when requested by ENGINEER.

b. Professional engineer.

c. Installer, when requested by ENGINEER. Qualifications statement shall include record of experience with references specified.

C. Closeout Submittals: Submit the following:

1. Maintenance Manuals: Furnish detailed maintenance manuals that include the following:

a. Product name and number.

b. Detailed procedures for routine maintenance and cleaning, including cleaning materials, application methods and precautions in use of products that may be detrimental to finish when improperly applied.

c. Handrail and railings systems manufacturer's current catalog including individual parts.

2. Guarantee: Provide in maintenance manual the guarantee specified.

1.05 DELIVERY, STORAGE AND HANDLING

A. Storage and Protection:

1. Keep products off ground using pallets, platforms, or other supports. Protect products from corrosion and deterioration.

B. Handling of Products:

1. Do not subject handrail and railing products to bending or stress.

2. Do not damage edges or handle products in a manner that will cause scratches, warping, or dents.

3. Protect handrails and railings by paper or coating as acceptable to handrail and railing manufacturer, against scratching, splashes of mortar, paint, and other marring during transportation, handling, and erection. Protect until completion of adjacent work.

1.6 GUARANTEE

A. Guarantee: Manufacturer shall provide written guarantee of availability of replacement parts and components for period of at least five years after completion of the Project.

PART 2 PRODUCTS

2.01 SYSTEM PERFORMANCE

A. System Description: Aluminum handrail and railing system shall consist of top and bottom rail with vertical pickets with totally concealed mechanical fasteners, internal threaded tubular rivets, and components fastened to posts spaced no more than five feet on centers and system of handrails supported from adjacent construction by mounting brackets spaced at no more than five feet on centers.

B. Design Criteria and Performance Criteria:

1. Design, fabricate, and install aluminum handrail and railing systems to withstand the most critical effects resulting from the following loads (loads listed below do not act concurrently):

a. Uniform Load: 50 pounds per foot, applied at top in any direction.

b. Concentrated Load: 200 pounds single load, applied at any point along the top in any direction.

c. Components: Intermediate rails (all rails except the handrail), balusters, and panel fillers, if any, shall withstand horizontally-applied normal load of 50 pounds on an area equal to one square foot, including openings and space between rails. Reactions due to this loading are not required to be superimposed to loading specified for main supporting members of handrails and railings.

d. Comply with AA Aluminum Design Manual for determining allowable stresses and safety factors for aluminum structural components.

e. Limit deflection in each single span of railing and handrail to 1.5-inch maximum, and to 1/4-inch maximum on railing posts. Applied loads shall not produce permanent deflection in the completed Work when loads are removed.

2. Thermal Control: Provide adequate expansion within fabricated systems that allows for thermal expansion and contraction caused by material temperature change of 140 degrees F to -20 degrees F without warp or bow of system components. Distance between expansion joints shall be based on providing 1/4-inch wide joint at 70 degrees F, which accommodates movement of 150 percent of calculated amount of movement for specified temperature range.

3. Where handrail and railing systems cross expansion joints in the building or structure, provide expansion joints in handrail and railings systems.

4. For posts located at or near end of runs as shown, uniformly space intermediate posts as required to conform to loading and deflection criteria specified, at intervals no greater than maximum post spacing specified. Where posts are shown for handrails along both sides of walkways and other similar locations, locate posts opposite each other; do not stagger post locations.

2.02 MANUFACTURERS

A. Products and Manufacturers: Provide one of the following:

1. Custom Fabricated Connectorail System, by Julius Blum & Company, Inc.

2. Custom Fabricated Series 550 Non-Welded Aluminum Pipe Aluminum handrails and railing systems, by Superior Aluminum Products, Inc.

3. Or equal.

2.03 MATERIALS

A. Extruded Aluminum Architectural and Ornamental Shapes: ASTM B221, Alloy 6063-T52.

B. Aluminum Forgings: ASTM B247.

C. Extruded or Drawn Aluminum Pipe and Tube:

1. ASTM B429 or ASTM B241/B241M, Alloy 6063-T5, 6063-T52, or 6063-T832 as required by loadings, deflections, and post spacing specified.

2. Provide Schedule 40 pipe, minimum, unless conditions of detail and fabrication require extra-heavy pipe to comply with Specifications. Rails and posts shall have minimum outside diameter of 1.90 inches.

D. Reinforcing Bars: Solid, circular profile, two feet long, 6061-T6 aluminum reinforcing bars with same outside diameter as inside diameter of post.

E. Anchors and Fastenings:

1. For anchors and fasteners, use Type 316 stainless steel; minimum 3/8-inch diameter.

2. Provide minimum of four bolt fasteners per post where surface-mounted posts are shown. Components shall be in accordance with manufacturer's recommendations and as approved or accepted (as applicable) by ENGINEER on submittals.

3. Anchors: In accordance with Section 05053, Anchor Systems.

F. Castings:

1. Provide high-strength aluminum alloy brackets, flanges, and fittings suitable for anodizing as specified.

2. Aluminum alloy sand castings: ASTM B26/B26M.

G. Connector Sleeves: Schedule 40, five-inch long by 1.610-inch diameter.

H. Sockets: Provide six-inch deep by 2.5-inch outside diameter aluminum sockets with 3.5-inch wide socket cover on bottom of each socket and on top and bottom of removable post sockets.

I. Chain, Snaps, and Eye Bolts: Provide oblong 1/4-inch welded link, Type 316 stainless steel chain weighing 57 pounds per cubic foot, each link 1.25-inch by 7/16-inch. Provide Type 316 stainless steel eyebolts, 1/4-inch stainless steel threaded quick links and heavy-duty swivel snaps with spring loaded latch.

J. Gates: For each gate in handrail or railing system, provide the following:

1. Hinges: Two-self closing aluminum hinges.

2. Latches and Stops: One latch and stop with rubber bumper and one-inch diameter plastic knobs.

K. Custom Cover Flanges: 1/4-inch high by four-inch diameter, aluminum.

L. Adhesive: Two-part waterproof epoxy-type as recommended by handrail and railing systems manufacturer.

M. Non-shrink Grout: Comply with Section 03600, Grouting.

N. Toeboards:

1. Provide extruded Alloy 6063-T5 or T52 aluminum alloy toeboards, unless railing is mounted on curbs or other construction of sufficient height and type to comply with OSHA 1910.23. Bars or plates are not acceptable.

2. Unless otherwise specified, toeboards shall comply with OSHA 1910.23, Section (e).

O. System Components and Miscellaneous Accessories: Provide complete selection of manufacturer's standard and custom aluminum handrail and railing systems components and miscellaneous accessories required. Show type and location of all such items on Shop Drawings and other submittals as applicable.

2.04 FABRICATION

A. General: Unless otherwise shown or specified, provide typical non-welded construction details and fabrication techniques recommended in NAAMM/AMP Pipe Railing Manual and NAAMM/AMP AMP 501.

B. Fabricate handrail and railing systems true to line and level, with accurate angles surfaces and straight edges. Fabricate corners without using fittings. Provide bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work. Form elbow bends and wall returns to uniform radius, free from buckles and twists, with smooth finished surfaces, or use prefabricated bends. Provide not less than four-inch outside radius.

C. Provide chains across openings in railings where shown. Attach one end of each chain to an eyebolt in post and other end attached by means of swivel eye snap hook to similar eyebolt in opposite post.

D. Remove burrs from exposed edges.

E. Close aluminum pipe ends by using prefabricated fittings.

F. Weep Holes:

1. Fabricate joints that will be exposed to weather to exclude water.

2. Provide 15/64-inch diameter weep holes at lowest possible point on each post in handrail and railing systems.

3. Provide pressure relief holes at closed ends of handrail and railing systems.

G. Toeboards:

1. Provide manufacturer's standard toeboard, that accommodates movement caused by thermal change specified without warping or bowing toeboards.

2. Provide manufacturer's standard toeboard, which accommodates storage for removable socket covers.

3. Coordinate and cope toeboard as required to accommodate cover flanges at posts.

4. Toeboards shall follow curvature of railing. Where railing is shown to have curved contours at corners, or other locations, toeboard shall likewise be curved to follow line of railing system.

H. Reinforcing Bars: Provide reinforcing bar friction-fitted at each post in railing system. Extend reinforcing bars of tubes six inches into cast-in-place sleeves or other types of supporting brackets.

I. Mechanically Fitted Component Pipe Handrail and Railing System:

1. Use non-welded pipe handrail and railing system with posts, top and intermediate rail(s), and flush joints.

2. Provide top and bottom rail with 0.675-inch diameter pickets spaced 0.75 feet on centers. Pressure fit pickets in shop fabricated channel adapters by hydraulic ram. Loose fit is not acceptable. Fasten picket sections into top and bottom rails by using tubular rivets 12 inches on centers maximum, but uniformly spaced between posts beginning 6.0 inches from centerline of post.

3. Do not use blind rivets, pop rivets, or other exposed fastening devices in the Work under this Section. Fasteners used for side-mounting fascia flanges where shown or specified may be exposed in the Work. Provide internal threaded aluminum rivets, stainless steel through-bolts with lock nuts, stainless steel sheet metal screws with lock washers, and epoxy adhesive for fastening components of the Work.

2.05 FINISHES

A. General:

1. Prepare surfaces for finishing in accordance with recommendation of aluminum producer and the aluminum finisher or processor.

2. Adjust and control direction of mechanical finishes specified to achieve best overall visual effect in the Work.

3. Color and Texture Tolerance: Provide uniform color and continuous mechanical texture for aluminum components. ENGINEER reserves the right to reject aluminum materials because of color or texture variations that are visually objectionable, but only where variation exceed range of variations established by manufacturer prior to fabrication, by means of range of Samples approved by ENGINEER.

4. Anodize aluminum components.

B. Finish:

1. Mechanically finish aluminum by wheel or belt polishing with aluminum oxide grit of 180 to 220 size, using peripheral wheel speed of 6,000 feet per minute; AA Designation - M32 Medium Satin Directional Texture.

2. Hand-Rubbed Finish: Where required to complete the Work and provide uniform, continuous texture, provide hand-rubbed finish to match medium satin directional texture specified to even out and blend satin finishes produced by other means.

C. Cleaning:

1. Provide non-etching chemical cleaning by immersing aluminum in inhibited chemical solution, as recommended by coating applicator, to remove lard oil, fats, mineral grease, and other contamination detrimental to providing specified finishes.

2. Clean and rinse with water between steps as recommended by aluminum manufacturer.

D. Exposed Aluminum Anodic Coating: Provide anodic coatings as specified that do not depend on dyes, organic or inorganic pigments, or impregnation processes to obtain color. Apply coatings using only the alloy, temperature, current density, and acid electrolytes to obtain specified colors in compliance with designation system and requirements of NAAMM/AMP Pipe Railing Manual and NAAMM/AMP AMP 501. Comply with the following:

1. Provide Architectural Class I high density anodic treatment by immersing the components in tank containing solution of 15 percent sulfuric acid at 70 degrees F with 12 amperes per square foot of direct current for minimum of sixty minutes; AA Designation A41 Clear.

2. Physical Properties:

a. Anodic Coating Thickness, ASTM B244: Minimum of 0.7-mils thick.

b. Anodic Coating Weight, ASTM B137: Minimum of 32 mg/sq. in.

c. Resistance to Staining, ASTM B136: No stain after five minutes dye solution exposure.

d. Salt Spray, ASTM B117: 30,000 hours exposure with no corrosion or shade change.

3. Seal finished anodized coatings using deionized boiling water to seal pores and prevent further absorption.

4. Products and Manufacturers: Provide one of the following:

a. Alumilite 215 Clear by Aluminum Company of America, Inc.

b. Or equal.

2.06 SOURCE QUALITY CONTROL

A. Allowable Tolerances:

1. Limit variation of cast-in-place inserts, sleeves and field-drilled anchor and fastener holes to the following:

   a. Spacing: Plus-or-minus 3/8-inch.

   b. Alignment: Plus-or-minus 1/4-inch.

   c. Plumbness: Plus-or-minus 1/8-inch.

2. Minimum Handrails and Railings Systems Plumb Criteria:

   a. Limit variation of completed handrail and railing system alignment to 1/4-inch in 12 feet with posts set plumb to within 1/16-inch in 3.0 feet.

   b. Align rails so variations from level for horizontal members and from parallel with rake of stairs and ramps for sloping members do not exceed 1/4-inch in 12.0 feet.

3. Provide "pencil-line" thin butt joints.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine conditions under which Work will be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Verify to ENGINEER the gage of aluminum pipe railing posts and rails brought to the Site by actual measurement of on-Site material in presence of ENGINEER.

3.02 INSTALLATION

A. General:

1. Do not erect components that are scarred, dented, chipped, discolored, otherwise damaged, or defaced. Remove from Site railing and handrail system components that have holes, cuts, gouges, deep scratches, or dents of any kind. Repairs to correct such Work will not be accepted. Remove and replace with new material.

2. Comply with installation and anchorage recommendations of NAAMM/AMP Pipe Railing Manual and NAAMM/AMP AMP 501 in addition to requirements specified and approved or accepted (as applicable) submittals.

B. Fastening to In-Place Construction:

1. Remove protective plastic immediately before installing.

2. Adjust handrails and railings prior to securing in place, to ensure proper matching at butting joints and correct alignment throughout their length. Plumb posts in each direction. Secure posts and rail ends to building or structure as follows:

a. Side-mount posts by fastening them securely in brackets attached to steel or concrete fascia as shown and in accordance with approved or accepted (as applicable) submittals.

b. Provide posts set in concrete with an aluminum floor cover flange.

3. Use devices and fasteners recommended by handrail and railing systems manufacturer and as shown on approved or accepted (as applicable) submittals.

C. Cutting, Fitting, and Placement:

1. Perform cutting, drilling and fitting required for installation. Set the Work accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels.

2. Fit exposed connections accurately together to form tight hairline joints. Do not cut or abrade surfaces of units that have been finished after fabrication, and are intended for field connections.

3. Make permanent field splice connections using manufacturer's recommended epoxy adhesive and five-inch minimum length connector sleeves. Tight press-fit field splice connectors and install in accordance with manufacturer's written instructions. Follow epoxy manufacturer's recommendations for requirements of installation and conditions of use.

4. Make splices as near as possible to posts, but not exceeding 12 inches from nearest post.

5. Field welding is not allowed. Make splices using pipe splice lock employing a single allen screw to lock joint.

6. Provide hinged gates as shown.

7. Provide chain sections as shown. Provide one chain length with fastening accessories for top and each intermediate rail.

8. Secure handrails to walls with wall brackets and end fittings as shown. Drill wall plate portion of the bracket to receive one bolt, unless otherwise shown for concealed anchorage. Locate brackets as shown or, if not shown, at not more than five feet on centers. Provide flush type wall return fittings with same projection shown for wall brackets. Secure wall brackets and wall return fittings to building or structure. Refer to Section 05 05 33, Anchor Systems.

9. Securely fasten toeboards in place with not more than 1/4-inch clearance above floor level.

10. Drill one 15/64-inch diameter weep hole not more than 1/4-inch above top of location of solid reinforcing bar or tube in each post.

D. Fastening to Existing Construction:

1. Provide heavy-duty floor flange and anchorage devices and fasteners where necessary for securing handrail and railing systems components to existing construction; including stainless steel threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as required. Refer to Section 05053, Anchor Systems.

2. Use devices and fasteners recommended by handrail and railing systems manufacturer and as shown on approved or accepted (as applicable) submittals.

E. Expansion Joints:

1. Provide slip joint with internal sleeve extending not less than two inches beyond joint on each side.

2. Construct expansion joints as for field splices, except fasten internal sleeve securely to one side of rail only.

3. Locate joints within six inches of posts.

F. Protection from Dissimilar Materials:

1. Coat aluminum surfaces in contact with dissimilar materials such as concrete, masonry, and steel.

2. Do not extend coating beyond contact surfaces. Remove coating where exposed-to-view in the finished Work.

3.03 CLEANING AND REPAIRING

A. Cleaning:

1. Clean exposed surfaces of handrail and railing systems after completion of installation. Comply with recommendations of both handrail and railing system manufacturer and finish manufacturer. Do not use abrasives or unacceptable solvent cleaners. Test cleaning techniques on an unused section of railing before employing cleaning technique.

2. Remove stains, dirt, grease, and other substances by washing handrails and railings systems thoroughly using clean water and soap; rinse with clean water.

3. Do not use acid solution, steel wool, or other harsh abrasives.

4. If stain remains after washing, remove defective sections and replace with new material complying with this Section.

B. Handrails and railings shall be free of dents, burrs, scratches, holes, and other blemishes. Replace damaged or otherwise defective Work with new material that complies with this Section at no additional cost to OWNER.

C. Prior to Substantial Completion, replace adjacent work marred by the Work of this Section.

END OF SECTION

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