

WWTP SERVICE BUILDING ADDITION PROJECT

AUGUST 2026

BIDDING DOCUMENTS

for the

**CITY OF GREENCASTLE
PUTNAM COUNTY, INDIANA**

Project No.: 26-919-01

CONSULTING ENGINEER:



**8440 Allison Pointe Blvd., Suite 200
Indianapolis, Indiana 46250
Telephone: (317) 895-2585**



8/14/2026

Paul D. Glotzbach, P.E.
Reg. Engineer No. 10100222
State of Indiana

INDEX OF SPECIFICATIONS

SECTION NUMBER	SECTION
FRONT END DOCUMENTS	
Section 00100	Advertisement for Bids
Section 00200	Information for Bidders
Section 00300	Proposal Form
Section 00310	State Form #96
Section 00400	Bid Bond
Section 00410	E-Verify Affidavit
Section 00500	Agreement Between Owner and Contractor
Section 00610	Performance Bond
Section 00620	Payment Bond
Section 00630	Notice of Award
Section 00640	Notice to Proceed
Section 00700	Standard General Conditions
Section 00710	Supplementary General Conditions
Section 00950	Certificate of Substantial Completion
DIVISION 01 – GENERAL REQUIREMENTS	
Section 01000	Summary of Work
Section 01300	Submittals
Section 01700	Project Closeout
DIVISION 02 – SITE CONSTRUCTION	
Section 02300	Earthwork
Section 02400	Sanitary Sewers
Section 02500	Sanitary Sewer Structures
Section 02530	Force Mains
Section 02900	Finish Grading & Seeding
DIVISION 03 – CONCRETE	
Section 03100	Concrete Work
DIVISION 10 – SPECIALTIES	
Section 10800	Toilet & Bath Accessories
Section 10830	Mirror Units
DIVISION 11 – EQUIPMENT	
Section 11305	Grinder Pump Stations
APPENDICES	
Appendix A	Building Design Standards, Minimum Requirements, and Submittal Expectations

ADVERTISEMENT FOR BIDS

Separate sealed Bids for the construction of the **WWTP Service Building Addition Project** will be received by the City of Greencastle at the office of the Mayor's Executive Assistant, located at 1 North Locust Street, Greencastle, Indiana 46135 until 3:00 PM (local time) on September 8, 2026. Bids will be publicly opened and read aloud at the City of Greencastle Council Chambers of City Hall beginning as soon as possible on the same date. Any Bids received later than the above time and date will be returned unopened.

Description of Work:

The project involves the construction of a 40 ft. x 46 ft. service building addition at the City of Greencastle's wastewater treatment plant. The building will be extended from an existing maintenance building. The building will include a bathroom, sanitary lateral with grinder pump, ventilation fan system, and a natural gas heating system. The structure will require a Construction Design Release from the Indiana Department of Homeland Security by the approved builder/supplier.

A Pre-Bid Meeting is scheduled for 1:00 PM (local time) on August 27, 2026 at the Greencastle Wastewater Treatment Plant, located at 510 Columbia Street, Greencastle, IN 46135. This meeting is not mandatory, but attendance is strongly recommended.

All prime contractors, subcontractors, small, minority, disadvantaged and/or women business enterprises and other interested parties are invited and encouraged to submit a proposal.

The Bidding Documents may be examined at the following locations:

- United Consulting, 8440 Allison Pointe Blvd., Suite 200, Indianapolis, Indiana 46250
- City of Greencastle, 1 N. Locust Street, Greencastle, Indiana 46135
- Eastern Engineering Supply (Plan Room)

Copies of the Bidding Documents may be obtained from Eastern Engineering Supply, 9901 Allisonville Road, Fishers, Indiana 46038, (317) 598-0661. Documents are available in either printed or electronic form by registering as a plan holder and placing online orders at <https://distribution.easternengineering.com/>. Costs of downloading, printing, and shipping shall be the Contractor's responsibility. Any questions, comments, or requests for clarification should be made to United Consulting (Paul Glotzbach, PE, paul.glotzbach@ucindy.com).

No Bid will be considered unless submitted on a copy of the printed proposal form in the Bidding Documents. Bidders must obtain bid documents from Eastern Engineering Supply to be included in the project plan holders list to ensure proper notification of any Addendum. Failure to obtain Bidding Documents in this manner may be deemed as non-responsive and may result in Bid rejection.

Each bid must include the following completed and executed items:

1. Proposal Form
2. Form 96 (State Board of Accounts)
3. Bidder's Financial Statement (if required by Form 96)
4. Bid Bond or Certified Check (5% of bid amount)
5. E-Verify Affidavit
6. Bidder's written plan for a program to test Bidder's employees for drugs in accordance with IC 4-13-18.

The Bidder to whom the Work is awarded will be required to furnish, before commencing Work, Performance and Payment Bonds in an amount equal to the Contract Price, and Certificates of Insurance required in the specifications. All Bonds and liability insurance shall remain in effect for a period of twelve (12) months following completion and OWNER acceptance of construction.

Contractors and subcontractors performing public works with a value of \$300,000 or greater must be certified by the Indiana Department of Administration (IDOA) in accordance with IC 4-13.6-4.

Failure to execute a Contract and to furnish a Performance Bond, Payment Bond, Certificates of Insurance, and General Contractor IDOA Certification, as hereinafter set out will be cause for forfeiture to the OWNER of the amount of money represented by the certified check or Bidder's Bond, as and for liquidated damages. A conditional or qualified Bid will not be accepted. No Bid may be withdrawn after the scheduled closing time for receipt of Bids for at least 60 days to allow review of Bids before announcing award of Contract.

Bidders shall be required to meet all applicable State requirements including but not limited to those in IC 4-13.6-4, IC 4-13-18, 5-16-13, 22-5-1.7 and 36-1-12.

The OWNER reserves the right to reject any or all Bids, or to make such combination of Bids as may seem desirable, and to waive any and all informalities in the bidding. The OWNER may award Bids based upon selection of any combination of Bid line items as well as mandatory alternatives. Bids shall be awarded to the Bidder or Bidders deemed to be the lowest, responsible, and responsive by the OWNER.

By the order of the City of Greencastle,

Lynda R. Dunbar, Mayor
August 2026

INFORMATION FOR BIDDERS

Bids for the construction of the WWTP Service Building Addition Project will be received by the City of Greencastle (herein called "OWNER") at the office of the Mayor's Executive Assistant at the Greencastle City Hall, located at 1 N. Locust Street, Greencastle, Indiana 46135 until 3:00 PM (local time) on September 8, 2026. Bids will be publicly opened and read aloud at the City of Greencastle Council Chambers of City Hall beginning as soon as possible on the same date.

Each Bid must be submitted in a sealed envelope, addressed to:

City of Greencastle

Each sealed envelope containing a Bid must be plainly marked on the outside as a Bid for the WWTP Service Building Addition Project and the envelope should bear on the outside the Bidder's name, address, and license number if applicable. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope and addressed to the City of Greencastle at the address given above.

All Bids must be made on a copy of the required proposal form. All blank spaces for bid prices must be filled in, in ink or typewritten, and the proposal form must be fully completed and executed when submitted.

The OWNER may waive any informalities or minor defects or reject any and all Bids. Any Bid may be withdrawn prior to the above scheduled time for the opening of the Bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be considered. No Bidder may withdraw a Bid within 60 days after the actual date of the opening thereof. Should there be reasons why the Contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and Bidder.

Bidders must satisfy themselves of the accuracy of the estimated quantities in the Bid schedule by examination of the site and a review of the Drawings and Specifications including any Addenda. The Bidder shall consider all existing subsurface information (including but not limited to soil conditions, groundwater and utilities) and shall be responsible for additional investigation prior to bid submittal should it be deemed necessary. After Bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning the quantities of Work or of the nature of the Work to be done or site conditions.

A Pre-Bid Meeting is scheduled for 01:00 PM (local time) on August 27, 2026 at the Greencastle City Hall, located at 510 Columbia Street, Greencastle, IN 46135. This meeting is not mandatory, but attendance is strongly recommended.

Any questions, comments or requests for clarification should be made in writing to United Consulting, 8440 Allison Pointe Blvd., Suite 200, Indianapolis, Indiana 46250, Telephone (317) 895-2585 (Paul Glotzbach, PE, paul.glotzbach@ucindy.com).

The OWNER shall provide to Bidders prior to bidding, all information that is pertinent to, and delineates and describes the land owned and rights-of-way acquired or to be acquired.

The Bidding Documents contain the provisions required for the construction of the Project. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the Bidder or relieve the Bidder from fulfilling any of the conditions of the Contract.

Each Bid must be completed on the appropriate proposal form and include a Bid Bond payable to the OWNER for five percent (5%) of the total amount of the Bid. As soon as the Bid prices have been compared, the OWNER will return the Bonds of all except the three lowest responsible Bidders. When the Agreement is executed, the Bonds of the two remaining unsuccessful Bidders will be returned. The Bid Bond of the successful Bidder will be retained until the Payment Bond and the Performance Bond have been executed and approved, after which it will be returned. A certified check may be used in lieu of a Bid Bond.

Each Bid must include the following completed and executed items:

1. Proposal Form
2. Form 96 (State Board of Accounts)
3. Bidder's Financial Statement (if required by Form 96)
4. Bid Bond or Certified Check (5% of BID amount)
5. E-Verify Affidavit
6. Bidder's written plan for a program to test Bidder's employees for drugs in accordance with IC 4-13-18.

A Performance Bond and a Payment Bond each in the amount of 100 percent of the Contract Price, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract. The Bonds shall remain in place for twelve (12) months following final acceptance of the Project by the OWNER.

Attorneys-in-fact who sign Bonds must file with each Bond a certified and effective dated copy of their power-of-attorney.

Contractors and subcontractors performing public works with a value of \$300,000 or greater must be certified by the Indiana Department of Administration (IDOA) in accordance with IC 4-13.6-4.

The Bidder to whom the Contract is awarded will be required to execute the Agreement and obtain the Performance Bond, Payment Bond, and Certificates of Insurance within ten (10) calendar days from the date when Notice of Award is delivered to the Bidder. The Notice of Award shall be accompanied by the necessary Agreement and Bond forms. In case of failure of the Bidder to execute the Agreement and to furnish a Performance Bond, Payment Bond, Certificates of Insurance and General Contractor IDOA Certification, the OWNER may consider the Bidder in default, in which case the Bid Bond accompanying the Bid shall become the property of the OWNER.

The OWNER within thirty (30) days of receipt of acceptable Performance Bond, Payment Bond, Certificate of Insurance, and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the Bidder may by written notice

withdraw the signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The Notice to Proceed shall be issued within twenty (20) days of the execution of the Agreement 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 Bidder.

If the Notice to Proceed has not been issued within a sixty (60) day period from the Bid submittal or within the period mutually agreed upon, the Bidder may terminate the Agreement without further liability on the part of either party.

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. 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 Agreement and to complete the Work contemplated therein. The project may be awarded utilizing any combination of Base Bid and Mandatory Alternate Items deemed to be in the best interest of the OWNER.

A conditional or qualified Bid will not be accepted.

Award will be made to the lowest, most-responsive, responsible Bidder.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout including but not limited to IC 4-13.6-4, IC 4-13-18, 5-16-13, 22-5-1.7 and 36-1-12.

Each Bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the Bidding Documents. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to its Bid.

The Indiana Department of Revenue requires that the CONTRACTOR or Subcontractors engage in a Contract with a governmental agency must submit a tax exemption certificate for construction contracts (Form SP 134) to each supplier for each exempt Project. The OWNER will cooperate with the CONTRACTOR in filing the necessary forms with the Indiana Department of Revenue, but the CONTRACTOR shall be responsible for the initiation of these proceedings. The Contract Price will be based upon a complete exemption from this tax, and if later determined that a tax must be paid by the OWNER, the Contract Price will be adjusted to reflect this liability of the OWNER.

The low Bidder shall supply the names and addresses of major material Suppliers and Subcontractors when required to do so by the OWNER or his representative.

The ENGINEER is:

United Consulting
8440 Allison Pointe Boulevard, Suite 200
Indianapolis, IN 46250
Telephone (317) 895-2585

PROPOSAL FORM

Proposal of _____ (herein called "BIDDER"),
organized and existing under the laws of the State of _____ doing business as
_____ * to the City of Greencastle (hereinafter called
"OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all work for the construction of the WWTP Service Building Addition Project in strict accordance with the Bidding Documents, within the time set forth therein, and at the prices stated below.

By submission of this Bid, each BIDDER certifies, and in the case of a joint Bid each party thereto certifies as to its own organization, that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence Work under this Contract on or before a date to be specified in the Notice to Proceed, substantially complete the entire Project within 210 consecutive days, and to fully complete the Project within 30 consecutive days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of \$1,000.00 for each consecutive calendar day thereafter for all of the required completion times as provided in Article 17 of the Supplementary General Conditions.

BIDDER Acknowledges receipt of the following Addenda:

* Insert "a corporation," "a partnership," or "an individual" as applicable.

All bid items below shall include equipment manufactures as specified in the Drawings, Specifications, or Addenda. No alternate manufacturers shall be approved as equal by the ENGINEER or OWNER until after the bid date and only if listed on the voluntary deduct page of the Proposal Form.

The bid award shall be made in the best interests of the OWNER utilizing any combination of the Base Bid amounts and Mandatory Bid Alternates if applicable. Bidder agrees to perform all the Work described in the Bidding Documents for the following unit price or lump sum amounts (all Work indicated in the Drawings and Specifications shall be performed and shall be included in the most applicable bid item).

BASE BID ITEM TABLE

Bid to include all applicable fees, labor, materials, etc. Bidders to include costs for all work materials, etc. in the most appropriate unit price or lump sum item in the following tables.

DESCRIPTION	UNIT	QTY	TOTAL PRICE
Service Building Addition	1	LS	\$

BID AMOUNT IN WORDS: _____
_____ Dollars

Voluntary Alternates

Any voluntary alternates shall include all necessary adjustments necessary to incorporate the proposed equipment or other modifications into the project. Voluntary Alternates will not be utilized for project bid award.

Item Description & Manufacturer

Item Cost Add/Deduct

Adjustment to Lump Sum Bid (+ or -)

1) _____	\$ _____
2) _____	\$ _____
3) _____	\$ _____

Respectfully Submitted:

Signature

Address

Title

Date

END OF PROPOSAL FORM



CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)

Prescribed by State Board of Accounts

PART I

(To be completed for all bids. Please type or print)

Date (month, day, year): _____

1. Governmental Unit (Owner): _____

2. County : _____

3. Bidder (Firm): _____

Address: _____

City/State/ZIPcode: _____

4. Telephone Number: _____

5. Agent of Bidder (if applicable): _____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____

(Governmental Unit) in accordance with plans and specifications prepared by _____

_____ and dated _____ for the sum of

_____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS

(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this _____ day of _____, _____, subject to the following conditions: _____

Contracting Authority Members:

_____	_____
_____	_____
_____	_____

PART II

(For projects of \$150,000 or more – IC 36-1-12-4)

Governmental Unit: _____

Bidder (Firm) _____

Date (month, day, year): _____

These statements to be submitted under oath by each bidder with and as a part of his bid.
Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

4. List references from private firms for which you have performed work.

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

SECTION IV CONTRACTOR'S NON – COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

SECTION V OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated at _____ this _____ day of _____, _____

(Name of Organization)

By _____

(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
COUNTY OF _____) ss

Before me, a Notary Public, personally appeared the above-named _____ and swore that the statements contained in the foregoing document are true and correct.

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

Notary Public

My Commission Expires: _____

County of Residence: _____

BID OF

(Contractor)

(Address)

FOR

PUBLIC WORKS PROJECTS

OF

Filed _____, _____

Action taken _____

BID BOND

KNOW ALL PEOPLE BY THESE PRESENTS, that we, the undersigned, _____
_____ as Principal, and _____
_____ as Surety, are hereby held and firmly bound unto _____
as OWNER in the penal sum of _____ for the payment of
which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and
assigns.

Signed, this _____ day of _____, _____.

The Condition of the above obligation is such that whereas the Principal has submitted to
_____ a certain BID, attached hereto and hereby made a
part hereof to enter into a contract in writing, for the _____

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; is being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

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

Principal

Surety

By: _____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Indiana.

E-VERIFY AFFIDAVIT

Pursuant to Indiana Code 22-5-1.7-11, the CONTRACTOR entering into the Agreement with the OWNER is required to enroll in and verify the work eligibility status of all its newly hired employees through the E-Verify Program. The CONTRACTOR is not required to verify the work eligibility status of all its newly hired employees through the E-Verify Program if the E-Verify Program no longer exists.

The undersigned, on behalf of the CONTRACTOR, being first duly sworn, deposes and states that the CONTRACTOR does not knowingly employ an unauthorized alien. The undersigned further affirms that, prior to entering into its Agreement with the OWNER, the undersigned CONTRACTOR will enroll in and agrees to verify the work eligibility status of all its newly hired employees through the E-Verify Program.

(CONTRACTOR)

By: _____

Printed: _____

Title: _____

Important – Notary Signature and Seal Required in the Space Below

STATE OF _____)
) SS:
COUNTY OF _____)

Subscribed and sworn to before me this _____ day of _____, 2023.

Notary Public

Printed Name

My Commission Expires: _____

My County of Residence: _____

AGREEMENT BETWEEN OWNER AND CONTRACTOR

This Agreement is dated as of the _____ day of _____ in the year 2026 by and between the City of Greencastle through its Board of Public Works (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK

CONTRACTOR shall complete all work as specified or indicated in the contract documents. The work is generally described as follows:

WWTP Service Building Addition Project City of Greencastle

ARTICLE 2. ENGINEER

The project has been developed for the OWNER by United Consulting, who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to the ENGINEER in the Contract Documents in connection with completion of the work in accordance with the contract documents.

ARTICLE 3. CONTRACT TIME

- 3.1. All Work will be Substantially completed within 210 calendar days from the date when the Contract Time commences to run as provided in Article 2 of the General Conditions, and fully completed and ready for final payment in accordance with article 14, paragraph 14.07 of the General Conditions within 240 calendar days from the date when the Contract Time commences to run.
- 3.2. Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER One Thousand and 00/100 dollars (\$1,000.00) for each calendar day that expires after the time specified in paragraph 3.1 for Substantial Completion until the work is substantially complete. After Substantial Completion if CONTRACTOR shall neglect, refuse or fail to complete the remaining work within the contract time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER One Thousand and 00/100 dollars

(\$1,000.00) for each calendar day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment.

ARTICLE 4. CONTRACT PRICE

- 4.1. OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents the sum of:

\$ _____

Contractor's Bid attached as an exhibit and made a part of this Agreement.

ARTICLE 5. PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with of the General Conditions together with properly executed claims for payment on forms prescribed by the State Board of Accounts. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

- 5.1. Progress Payments. OWNER shall make progress payments on account of the contract price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, once per month at regularly scheduled meetings during construction as provided below. All progress payments will be on the basis of the progress of the work measured by the schedule of values established in accordance with of the General Conditions.
- 5.2. Final Payment. Upon final completion and acceptance of the Work in accordance with a of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in

ARTICLE 6. INTEREST

All monies legally due but not paid when due as provided in of the General Conditions shall bear interest as provided by Indiana State Law.

ARTICLE 7. CONTRACTORS REPRESENTATIONS

In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

- 7.1. CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the Work.
- 7.2. CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities

as well as existing soil conditions. No additional examinations, investigations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions

- 7.3. CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- 7.4. CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

ARTICLE 8. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire Agreement between OWNER and CONTRACTOR concerning the work consist of the following:

- 8.1. This Agreement (pages 1 to 5, inclusive);
- 8.2. Performance and Payment Bonds, and Certificates of Insurance;
- 8.3. Notice of Award;
- 8.4. General Conditions;
- 8.5. Supplementary General Conditions;
- 8.6. Labor Standards;
- 8.7. Specific Provisions, Materials and Workmanship specifications;
- 8.8. Addenda numbers ____ to ____, inclusive;
- 8.9. Construction Drawings, prepared by ENGINEER (not attached hereto);
- 8.10 CONTRACTOR's Bid;
- 8.11 Documentation submitted by CONTRACTOR prior to Notice of Award;
- 8.12 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All written Amendments and other documents amending, modifying or supplementing the Contract Documents pursuant to Articles 2 and 3 of the General Conditions; and

- 8.13 The documents listed in paragraphs 8.2 et seq. above are attached to this Agreement (except as expressly noted otherwise above).

There are no Contract Documents other than those listed above in this article 8. The Contract Documents may only be modified or supplemented as provided in article 3 of the General Conditions.

ARTICLE 9. MISCELLANEOUS

- 9.1. Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.
- 9.2. No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought be to bound; and specifically but without limitation monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- 9.3. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.
- 9.4. This Agreement shall be governed by the laws of the State of Indiana and enforced pursuant to Indiana Code 36-1-12 and any and all other applicable state statutes and remedies under the laws of the State of Indiana.
- 9.5. CONTRACTOR and its subcontractor or any person on his behalf shall not discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, religion, color, sex, national origin or ancestry in accordance with IC 5-16-6.
- 9.6. CONTRACTOR shall comply with IC 5-16-8 in purchase of any steel products for this project.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the contract documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement will be effective on _____, 2026.

OWNER: _____

CONTRACTOR: _____

By _____

By _____

CORPORATE SEAL

CORPORATE SEAL

Attest _____

Attest _____

Address for giving notices

Address for giving notices

Performance Bond

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

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place
of Business):

OWNER (Name and Address):

CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL

Company: _____ (Corp. Seal)

Signature: _____

Name and Title:

SURETY

Company: _____ (Corp. Seal)

Signature: _____

Name and Title:

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corp. Seal)

Signature: _____

Name and Title:

SURETY

Company: _____ (Corp. Seal)

Signature: _____

Name and Title:

EJCDC No. 1910-28-A (1996 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Contract, which is incorporated herein by reference.

2. If the CONTRACTOR performs the Contract, the Surety and the CONTRACTOR have no obligation under this Bond, except to participate in conferences as provided in paragraph 3.1.

3. If there is no OWNER Default, the Surety's obligation under this Bond shall arise after:

3.1. The OWNER has notified the CONTRACTOR and the Surety at the addresses described in paragraph 10 below, that the OWNER is considering declaring a CONTRACTOR Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract. If the OWNER, the CONTRACTOR and the Surety agree, the CONTRACTOR shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the OWNER's right, if any, subsequently to declare a CONTRACTOR Default; and

3.2. The OWNER has declared a CONTRACTOR Default and formally terminated the CONTRACTOR's right to complete the Contract. Such CONTRACTOR Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in paragraph 3.1; and

3.3. The OWNER has agreed to pay the Balance of the Contract Price to:

3.3.1. The Surety in accordance with the terms of the Contract;

3.3.2. Another contractor selected pursuant to paragraph 4.3 to perform the Contract.

4. When the OWNER has satisfied the conditions of paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1. Arrange for the CONTRACTOR, with consent of the OWNER, to perform and complete the Contract; or

4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the OWNER the amount of damages as described in paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR Default; or

4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances;

4.4.1. After investigation, determine the amount for which it may be liable to the OWNER and, as soon as practicable after the amount is determined, tender payment therefor to the OWNER; or

4.4.2. Deny liability in whole or in part and notify the OWNER citing reasons therefor.

5. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond, and the OWNER shall be entitled to enforce any remedy available to the OWNER. If the Surety proceeds as provided in paragraph 4.4, and the OWNER refuses the payment tendered or the Surety has denied

liability, in whole or in part, without further notice the OWNER shall be entitled to enforce any remedy available to the OWNER.

6. After the OWNER has terminated the CONTRACTOR's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Contract. To a limit of the amount of this Bond, but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

6.1. The responsibilities of the CONTRACTOR for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional and delay costs resulting from the CONTRACTOR's Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the CONTRACTOR.

7. The Surety shall not be liable to the OWNER or others for obligations of the CONTRACTOR that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after CONTRACTOR Default or within two years after the CONTRACTOR ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1. Balance of the Contract Price: The total amount payable by the OWNER to the CONTRACTOR under the Contract after all proper adjustments have been made, including allowance to the CONTRACTOR of any amounts received or to be received by the OWNER in settlement of insurance or other Claims for damages to which the CONTRACTOR is entitled, reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Contract.

12.2. Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

12.3. CONTRACTOR Default: Failure of the CONTRACTOR, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY--Name, Address and Telephone)
AGENT or BROKER: OWNER'S REPRESENTATIVE (Engineer or other party):

Payment Bond

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

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place
of Business):

OWNER (Name and Address):

CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: _____

Name and Title:

SURETY

Company: (Corp. Seal)

Signature: _____

Name and Title:

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: (Corp. Seal)

Signature: _____

Name and Title:

SURETY

Company: (Corp. Seal)

Signature: _____

Name and Title:

EJCDC No. 1910-28-B (1996 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, the American Institute of Architects, the American Subcontractors Association, and the Associated Specialty Contractors.

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the OWNER to pay for labor, materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the OWNER, this obligation shall be null and void if the CONTRACTOR:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies and holds harmless the OWNER from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract, provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the CONTRACTOR and the Surety, and provided there is no OWNER Default.

3. With respect to Claimants, this obligation shall be null and void if the CONTRACTOR promptly makes payment, directly or indirectly, for all sums due.

4. The Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with the CONTRACTOR:

1. Have furnished written notice to the CONTRACTOR and sent a copy, or notice thereof, to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from the CONTRACTOR, or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to the Surety and sent a copy, or notice thereof, to the OWNER, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR.

5. If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety that is sufficient compliance.

6. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1. Send an answer to the Claimant, with a copy to the OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2. Pay or arrange for payment of any undisputed amounts.

7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8. Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any Performance Bond. By the CONTRACTOR furnishing and the OWNER accepting this Bond, they agree that all funds earned by the CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the Surety under this Bond, subject to the OWNER's priority to use the funds for the completion of the Work.

9. The Surety shall not be liable to the OWNER, Claimants or others for obligations of the CONTRACTOR that are unrelated to the Contract. The OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4.1 or paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, the OWNER or the CONTRACTOR, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

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

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, the CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. DEFINITIONS

15.1. Claimant: An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2. Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

15.3. OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY--Name, Address and Telephone)

AGENCY or BROKER: OWNER'S REPRESENTATIVE (Engineer or other party):

NOTICE OF AWARD

TO:

PROJECT: **WWTP Service Building Addition Project**
City of Greencastle

The OWNER has considered the Bid submitted by you on _____ for the above described Work in response to its Advertisement for Bids and Information for Bidders.

You are hereby notified that your Bid has been accepted for items in the amount of:

\$ _____

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance Bond, Payment Bond and Certificates of Insurance within ten (10) calendar days from the date of this Notice to you at the address in your Bid.

If you fail to execute said Agreement and to furnish said Bonds and Certificates of Insurance within ten (10) days from the date of this Notice, said 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 Bond. The OWNER will also be entitled to such other rights as may be granted by law.

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

Dated this _____ day of _____, 2026

Lynda R. Dunbar, Mayor

ACCEPTANCE OF AWARD: Receipt of this Notice of Award is hereby acknowledged by:

by _____ this _____ day of _____, 2026

Title _____

NOTICE TO PROCEED

TO:

PROJECT: **WWTP Service Building Addition Project**
City of Greencastle

DATE:

You are hereby notified to commence Work in accordance with the Agreement dated _____, 2026, on or before _____, 2026 and you are to Fully Complete the Work within 240 consecutive calendar days thereafter. The date of completion of all Work is therefore _____, 2026. The date to Substantially Complete (210 consecutive calendar days) the work in accordance with the Contract Documents is _____, 2027.

Owner: City of Greencastle

By: _____
Lynda R. Dunbar

Title: Mayor

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by:

_____ on _____, 2026.

By: _____

Title: _____

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

[INSERT LOGOS]

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General [seal] Contractors of America

Construction Specifications Institute

[seal]

These General Conditions have been prepared for use with the Owner-Contractor Agreements (No. 1910-8-A-1 or 1910-8-A-2) (1996 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC User's Guide (No. 1910-50). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910-17) (1996 Edition).

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TABLE OF CONTENTS

Page

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY	6
1.01 <i>Defined Terms</i>	6
1.02 <i>Terminology</i>	8
ARTICLE 2 - PRELIMINARY MATTERS	9
2.01 <i>Delivery of Bonds</i>	9
2.02 <i>Copies of Documents</i>	9
2.03 <i>Commencement of Contract Times; Notice to Proceed</i>	9
2.04 <i>Starting the Work</i>	9
2.05 <i>Before Starting Construction</i>	9
2.06 <i>Preconstruction Conference</i>	10
2.07 <i>Initial Acceptance of Schedules</i>	10
ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE	10
3.01 <i>Intent</i>	10
3.02 <i>Reference Standards</i>	10
3.03 <i>Reporting and Resolving Discrepancies</i>	11
3.04 <i>Amending and Supplementing Contract Documents</i>	11
3.05 <i>Reuse of Documents</i>	11
ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS	11
4.01 <i>Availability of Lands</i>	11
4.02 <i>Subsurface and Physical Conditions</i>	12
4.03 <i>Differing Subsurface or Physical Conditions</i>	12
4.04 <i>Underground Facilities</i>	13
4.05 <i>Reference Points</i>	13
4.06 <i>Hazardous Environmental Condition at Site</i>	14
ARTICLE 5 - BONDS AND INSURANCE	15
5.01 <i>Performance, Payment, and Other Bonds</i>	15
5.02 <i>Licensed Sureties and Insurers</i>	15
5.03 <i>Certificates of Insurance</i>	15
5.04 <i>CONTRACTOR's Liability Insurance</i>	15
5.05 <i>OWNER's Liability Insurance</i>	16
5.06 <i>Property Insurance</i>	16
5.07 <i>Waiver of Rights</i>	17
5.08 <i>Receipt and Application of Insurance Proceeds</i>	18
5.09 <i>Acceptance of Bonds and Insurance; Option to Replace</i>	18
5.10 <i>Partial Utilization, Acknowledgment of Property Insurer</i>	18
ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES	18
6.01 <i>Supervision and Superintendence</i>	18
6.02 <i>Labor; Working Hours</i>	19
6.03 <i>Services, Materials, and Equipment</i>	19
6.04 <i>Progress Schedule</i>	19
6.05 <i>Substitutes and "Or-Equals"</i>	19
6.06 <i>Concerning Subcontractors, Suppliers, and Others</i>	20
6.07 <i>Patent Fees and Royalties</i>	21
6.08 <i>Permits</i>	21
6.09 <i>Laws and Regulations</i>	22
6.10 <i>Taxes</i>	22
6.11 <i>Use of Site and Other Areas</i>	22
6.12 <i>Record Documents</i>	22
6.13 <i>Safety and Protection</i>	23
6.14 <i>Safety Representative</i>	23
6.15 <i>Hazard Communication Programs</i>	23

6.16 Emergencies.....	23
6.17 Shop Drawings and Samples	23
6.18 Continuing the Work	24
6.19 CONTRACTOR's General Warranty and Guarantee	25
6.20 Indemnification	25
ARTICLE 7 - OTHER WORK	26
7.01 Related Work at Site.....	26
7.02 Coordination.....	26
ARTICLE 8 - OWNER'S RESPONSIBILITIES	26
8.01 Communications to Contractor	26
8.02 Replacement of ENGINEER.....	26
8.03 Furnish Data.....	26
8.04 Pay Promptly When Due	26
8.05 Lands and Easements; Reports and Tests	26
8.06 Insurance	27
8.07 Change Orders.....	27
8.08 Inspections, Tests, and Approvals.....	27
8.09 Limitations on OWNER's Responsibilities.....	27
8.10 Undisclosed Hazardous Environmental Condition.....	27
8.11 Evidence of Financial Arrangements.....	27
ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION	27
9.01 OWNER'S Representative	27
9.02 Visits to Site	27
9.03 Project Representative	27
9.04 Clarifications and Interpretations	28
9.05 Authorized Variations in Work	28
9.06 Rejecting Defective Work.....	28
9.07 Shop Drawings, Change Orders and Payments.....	28
9.09 Decisions on Requirements of Contract Documents and Acceptability of Work	28
9.10 Limitations on ENGINEER's Authority and Responsibilities	28
ARTICLE 10 - CHANGES IN THE WORK; CLAIMS	29
10.01 Authorized Changes in the Work	29
10.02 Unauthorized Changes in the Work	29
10.03 Execution of Change Orders	29
10.04 Notification to Surety	29
10.05 Claims and Disputes.....	30
ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK.....	30
11.01 Cost of the Work.....	30
11.02 Cash Allowances	32
11.03 Unit Price Work	32
ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES	33
12.01 Change of Contract Price.....	33
12.02 Change of Contract Times.....	33
12.03 Delays Beyond CONTRACTOR's Control	33
12.04 Delays Within CONTRACTOR's Control.....	34
12.05 Delays Beyond OWNER's and CONTRACTOR's Control	34
12.06 Delay Damages.....	34
ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK.....	34
13.01 Notice of Defects.....	34
13.02 Access to Work.....	34
13.03 Tests and Inspections	34
13.04 Uncovering Work	35
13.05 OWNER May Stop the Work.....	35
13.06 Correction or Removal of Defective Work.....	35

13.07 <i>Correction Period</i>	35
13.08 <i>Acceptance of Defective Work</i>	36
13.09 <i>OWNER May Correct Defective Work</i>	36
ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION.....	36
14.01 <i>Schedule of Values</i>	36
14.02 <i>Progress Payments</i>	37
14.03 <i>CONTRACTOR's Warranty of Title</i>	38
14.04 <i>Substantial Completion</i>	38
14.05 <i>Partial Utilization</i>	39
14.06 <i>Final Inspection</i>	39
14.07 <i>Final Payment</i>	39
14.08 <i>Final Completion Delayed</i>	40
14.09 <i>Waiver of Claims</i>	40
ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION.....	40
15.01 <i>OWNER May Suspend Work</i>	40
15.02 <i>OWNER May Terminate for Cause</i>	40
15.03 <i>OWNER May Terminate For Convenience</i>	41
15.04 <i>CONTRACTOR May Stop Work or Terminate</i>	41
ARTICLE 16 - DISPUTE RESOLUTION	41
16.01 <i>Methods and Procedures</i>	41
ARTICLE 17 - MISCELLANEOUS	42
17.01 <i>Giving Notice</i>	42
17.02 <i>Computation of Times</i>	42
17.03 <i>Cumulative Remedies</i>	42
17.04 <i>Survival of Obligations</i>	42
17.05 <i>Controlling Law</i>	42

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

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

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

3. *Application for Payment*--The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21. *Field Order*--A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

25. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.

30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *Site*--Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *Subcontractor*--An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.

43. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

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

46. *Underground Facilities*-- All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those

that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

1.02 Terminology

A. Intent of Certain Terms or Adjectives

1. Whenever in the Contract Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of ENGINEER as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any

such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

B. *Day*

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

C. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

D. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, "provide" is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds*

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 *Copies of Documents*

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

A. *CONTRACTOR's Review of Contract Documents:* Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless CONTRACTOR knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified in

the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:

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

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

3. a preliminary schedule of values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

2.06 Preconstruction Conference

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 Initial Acceptance of Schedules

A. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.

1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on ENGINEER responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.

2. CONTRACTOR's schedule of Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 Intent

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

3.02 Reference Standards

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there

were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

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

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

3.04 *Amending and Supplementing Contract*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) ENGINEER's written interpretation or clarification.

3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

B. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 Subsurface and Physical Conditions

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

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and
2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants with respect to:

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

4.03 Differing Subsurface or Physical Conditions

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

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

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 Underground Facilities

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

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

4.05 *Reference Points*

A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property

monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

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

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for

whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) notify OWNER and ENGINEER (and promptly thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefor as provided in paragraph 10.05.

F. If after receipt of such written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible.

Nothing in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of

paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

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

5.03 *Certificates of Insurance*

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

5.04 *CONTRACTOR's Liability Insurance*

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, 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 identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be

correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

5.05 *OWNER's Liability Insurance*

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

5.06 *Property*

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

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

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 or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals 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.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D. OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the Site,

OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.07 *Waiver of Rights*

A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by OWNER; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.05, after Substantial Completion pursuant to

paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

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

A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the

Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. CONTRACTOR shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 *Labor; Working Hours*

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.

1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with

any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 *Substitutes and Or-Equals*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. "*Or-Equal*" Items: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items*

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or equal" item under

paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

d. CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by

the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. *Engineer's Evaluation:* ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. *Special Guarantee:* OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

E. *ENGINEER's Cost Reimbursement:* ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.

F. *CONTRACTOR's Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or

entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

C. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other individual or entity, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

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

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate

agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *Patent Fees and Royalties*

A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits

and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

B. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in paragraph 10.05.

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably

encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

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

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

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

6.12 *Record Documents*

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and

clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 *Safety and Protection*

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

1. all persons on the Site or who may be affected by the Work;
2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. CONTRACTOR shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). CONTRACTOR's duties

and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

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

6.17 *Shop Drawings and Samples*

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample

submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

D. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

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

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and

Sample submitted to ENGINEER for review and approval of each such variation.

E. ENGINEER's Review

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

F. Resubmittal Procedures

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

6.18 Continuing the Work

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as

permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.19 *CONTRACTOR's General Warranty and Guarantee*

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors, Suppliers, or any other individual or entity for whom CONTRACTOR is responsible; or

2. normal wear and tear under normal usage.

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

1. observations by ENGINEER;

2. recommendation by ENGINEER or payment by OWNER of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by ENGINEER or any payment related thereto by OWNER;

4. use or occupancy of the Work or any part thereof by OWNER;

5. any acceptance by OWNER or any failure to do so;

6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER;

7. any inspection, test, or approval by others; or

8. any correction of defective Work by OWNER.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other

consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the liability of ENGINEER and ENGINEER's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

ARTICLE 7 - OTHER WORK

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

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

7.02 *Coordination*

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility for such coordination.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Replacement of ENGINEER*

A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.03 *Furnish Data*

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

8.04 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations

and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

8.06 *Insurance*

A. OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.09 *Limitations on OWNER's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *OWNER'S Representative*

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 *Visits to Site*

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

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another representative or

agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *Authorized Variations in Work*

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

9.06 *Rejecting Defective Work*

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

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

9.08 *Determinations for Unit Price Work*

A. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR, subject to the provisions of paragraph 10.05.

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

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.10 *Limitations on ENGINEER's Authority and Responsibilities*

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or

responsibility or the undertaking, exercise, or performance of any authority or responsibility by ENGINEER shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

C. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this paragraph 9.10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

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

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both,

that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

10.04 *Notification to Surety*

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

10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 60 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, 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 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11.01.

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

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of CONTRACTOR.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of

them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which are to be

considered administrative costs covered by the CONTRACTOR's fee.

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.

3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

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

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs 11.01.A and 11.01.B.

C. *CONTRACTOR's Fee:* When all the Work is performed on the basis of cost-plus, CONTRACTOR's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, CONTRACTOR's fee shall be determined as set forth in paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

11.02 *Cash Allowances*

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and

other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

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

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

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

C. OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

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

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

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR's Fee:* The CONTRACTOR's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no

fixed fee is agreed upon, the intent of paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by

Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 *Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or
2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to

CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;
2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and
3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection or approval.

D. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

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

13.05 *OWNER May Stop the Work*

A. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall

not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

B. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item

may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

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

13.09 *OWNER May Correct Defective Work*

A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.06.A, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors, and ENGINEER and ENGINEER's Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph.

C. All Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of CONTRACTOR's defective Work.

D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies under this paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied on account to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. ENGINEER will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

2. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's observations on the Site of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

3. By recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents; or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

4. Neither ENGINEER's review of CONTRACTOR's Work for the purposes of recommending payments nor ENGINEER's recommendation of any payment, including final payment, will impose responsibility on ENGINEER to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to OWNER free and clear of any Liens.

5. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests,

revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

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

C. *Payment Becomes Due*

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

D. *Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

- a. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;
- b. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens;
- c. there are other items entitling OWNER to a set-off against the amount recommended; or
- d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after

deduction of the amount so withheld. OWNER shall promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

14.03 *CONTRACTOR's Warranty of Title*

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

14.04 *Substantial Completion*

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division

of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Use by OWNER at OWNER's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER, and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the

division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. *Application for Payment*

1. After CONTRACTOR has, in the opinion of ENGINEER, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

B. *Review of Application and Acceptance*

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

C. *Payment Becomes Due*

1. Thirty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

14.08 *Final Completion Delayed*

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

14.09 *Waiver of Claims*

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

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *OWNER May Suspend Work*

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

15.02 *OWNER May Terminate for Cause*

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

1. CONTRACTOR's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate the

services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses, and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and, when so approved by ENGINEER, incorporated in a Change Order. When exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

C. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.03 *OWNER May Terminate For Convenience*

A. Upon seven days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. for all claims, costs, losses, and damages (including but not limited to all fees and charges of

engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

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

15.04 *CONTRACTOR May Stop Work or Terminate*

A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Contract and recover from OWNER payment on the same terms as provided in paragraph 15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within 30 days after it is submitted, or OWNER has failed for 30 days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may, seven days after written notice to OWNER and ENGINEER, stop the Work until payment is made of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping the Work as permitted by this paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

SUPPLEMENTARY GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1: DEFINITIONS

There are no supplementary definitions to Article 1 of the General Conditions.

ARTICLE 2: PRELIMINARY MATTERS

Copies of Documents - OWNER shall furnish to CONTRACTOR up to six (6) copies of the Contract Documents. Additional copies will be furnished upon request, at the cost of reproduction. The CONTRACTOR shall furnish each of the subcontractors, manufacturers, and material-men such copies of the Contract Documents as may be required for the work.

ARTICLE 3: CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Diagrammed Pipelines - Various pipelines are shown on the plans in diagram form. Where such pipelines are shown only in diagram, they shall be arranged clear of other pipelines, equipment and walking areas and be accessible for maintenance. Such pipelines shall be fitted and installed in a neat and workmanlike manner in accordance with approved shop drawings. An adequate number of unions shall be provided in main pipe and branch pipe runs to facilitate disturbing adjacent branch or connecting lines.

The final locations of valves and other such appurtenances included as a part of diagrammed pipelines shall be as shown on approved shop drawings or as determined in the field by the ENGINEER.

Diagrammed pipelines shall be furnished, fabricated, erected and otherwise installed to lines, elevations, locations and dimensions as shown, specified or required for a complete installation. The CONTRACTOR shall verify all dimensions shown on the plans and shall take such field dimensions as may be necessary to properly install all diagrammed pipelines.

The cost of furnishing, fabricating, locating, erecting and otherwise completely and properly installing all diagrammed pipelines shall be included in the appropriate contract item and no separate payment will be made thereto.

ARTICLE 4: AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

Surveys – The CONTRACTOR shall furnish and maintain at his own expense stakes and other such materials, and give such assistance, including qualified helpers, as may be required by the ENGINEER for setting and checking line and grade reference marks. The CONTRACTOR shall check such reference marks by such means as he may deem necessary and before using the reference marks shall call the ENGINEER'S attention to any inaccuracies. The CONTRACTOR shall at his own expense establish all working or constructing lines, grades, and right-of-ways as

required from the reference marks set by the ENGINEER, and shall be solely responsible for the accuracy thereof. The CONTRACTOR shall at his own expense establish easement limits related to the work based upon information provided to him by the ENGINEER. He shall, however, be subject to the check and review of the ENGINEER.

It is not intended to delay the work for the establishment of reference marks and the checking of lines and grades set by the CONTRACTOR, but when necessary working operations shall be suspended for such reasonable time as the ENGINEER may require for this purpose.

All elevations indicated or specified refer to the Mean Sea Level Datum Plane, 1991 General Adjustment, of the United States Coast and Geodetic Survey (NAVD88) and are expressed in feet and decimal parts thereof, or in feet and inches.

ARTICLE 5: BONDS AND INSURANCE

Bonds – Performance and Payment Bonds equal to 100 percent of the Contract Amount will be required from the CONTRACTOR. In accordance with IC 36-1-12 the bonds shall explicitly specify that:

1. A modification, omission or addition to the terms and conditions of this contract, plans, specifications, drawings or profile relating to the work
2. A defect in this Contract or
3. A defect in the proceedings preliminary to the letting and awarding of this Contract does not discharge the surety.

The bonds shall be executed by the CONTRACTOR to the OWNER approved by and for the benefit of the OWNER, in an amount equal to the contract price. It is to be deposited with the Board and must provide that the surety cannot be released until one year after the OWNER'S settlement with the CONTRACTOR.

CONTRACTOR'S LIABILITY AND INSURANCE

The CONTRACTOR shall not commence work under this contract until he has obtained all insurance required by these specifications, and until the OWNER has approved such insurance. Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the work. These certificates shall contain a provision that coverage afforded under the policies will not be canceled unless at least (15) days prior written notice has been given to the OWNER. The OWNER and ENGINEER shall be named as additional insured in all policies.

If these specifications require insurance on certain hazards ordinarily excluded in the Standard Comprehensive Public Liability Insurance policy contract, for both Bodily Injury and Property Damage, to wit: Assumption of OWNERS Liability by those CONTRACTORS having a direct contract with the OWNER, then in that event, such excluded hazards shall be included in CONTRACTOR'S Comprehensive Public Liability Insurance Policy by attachment of suitable riders or endorsements providing insurance as required.

COMPENSATION INSURANCE

CONTRACTOR shall carry in full force and effect during the period of contract operation insurance necessary to comply with the requirements of Workmen's Compensation Act of the State of Indiana and shall file with the OWNER a certificate from the Indiana Industrial Board showing the insurance is in force as required by said Workmen's Compensation Act of the State of Indiana. Also, the CONTRACTOR shall carry in full force and effect during the period of contraction operations, Occupational Diseases insurance, as set out in the Indiana Workmen's Occupational Diseases Act and shall file with the OWNER a certificate from the Indiana Industrial Board showing that such insurance is in force covering the terms of aforesaid Workmen's Occupational Diseases Act of the State of Indiana. All of these items shall be provided to the OWNER on Form 18 A.

FURTHER,

CONTRACTOR shall cause Insurance Carriers to furnish Certificates for Compensation and Occupational Diseases Insurance to OWNER; showing names of companies, expiration dates and policy numbers. Such certificates shall also show the same information regarding Public Liability and Property Damage as set out herein below.

PUBLIC LIABILITY & PROPERTY DAMAGE INSURANCE

The CONTRACTOR shall secure and maintain in force, during the life of this contract, such Public Liability-Bodily Injury and Public Liability-Property Damage Insurance (construed as including CONTRACTORS Contingent or Protective Insurance if necessary to protect the CONTRACTOR from damage claims arising from operations under this Contract) as shall protect him and any sub-CONTRACTOR performing work required by this contract. The CONTRACTOR shall hold and save harmless the OWNER, the Engineer, their agents and employees, from any and all claims and suits for damages, alleged or actual, including, but not limited to, accidental death, property injury, damage to property of the OWNER or others, which may arise from operations performed under this contract, whether such operations be by the OWNER, the CONTRACTOR, Subcontractors or anyone directly or indirectly employed by any or either of them, shall secure and maintain in force, during the life of the Contract, Insurance covering any such claims, suits, loss or damage.

The amounts or limits of such insurance shall be as follows:

<u>FORM OF INSURANCE</u>	BODILY INJURY	PROPERTY DAMAGE
CONTRACTOR Public Liability Insurance	\$1,000,000	\$1,000,000
CONTRACTORS Protective Liability	\$1,000,000	\$1,000,000
Automobile Liability Owned Equipment	\$1,000,000	\$1,000,000
Automobile Liability Non-owned Equipment	\$1,000,000	\$1,000,000
Umbrella Excess Liability	\$2,000,000	
Workers Compensation/ Employees' Liability	\$100,000/person	

Notwithstanding the insurance requirements presented above in this article, Contractor and all subcontractors and suppliers for this contract shall maintain, in accordance with Indiana Code 5-6-13, general liability insurance in at least the following amounts:

- (1) For the each occurrence limit, one million dollars (\$1,000,000.00).
- (2) For the general aggregate limit, two million dollars (\$2,000,000.00).

Contractor shall be responsible for securing the compliance of subcontractors and suppliers with these requirements.

SUB-CONTRACTOR'S INSURANCE

It shall be the responsibility of the CONTRACTOR to require all Subcontractors, if there be any, not so protected under the above types of insurance coverage's herein set out, to secure and maintain all such insurance coverage's in the same amounts, and for the same purposes.

The term "SUBCONTRACTOR" as used herein above is construed to mean any person, firm, or corporation, having no direct contract with the OWNER, but whose operations are included in the contract with a person, firm or corporation under direct contract with the OWNER.

FIRE, EXTENDED COVERAGE, VANDALISM & MALICIOUS MISCHIEF INSURANCE

The CONTRACTOR shall furnish and maintain at the CONTRACTORS expense, fire, extended coverage, vandalism and malicious mischief insurance, in the sum of 100% of the insurable portion of the contract price covering the work being performed under the terms of the contract. The insurable amount shall be established of all piping, structures, valves, equipment and

appurtenances to be installed with the project. The CONTRACTOR shall insure a value of not less than the invoice amount for the materials to be delivered and stored at any point in time. Copies of quotations for materials and a written explanation of the methodology utilized to establish this insured amount shall be submitted to the ENGINEER for approval prior to submittal of the Certificates of Insurance.

PROPERTY INSURANCE

SC-5.06.A: Delete paragraph 5.06.A of document 00700, Standard General Conditions of the Construction Contract, in its entirety and insert the following in its place.

- A. CONTRACTOR shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:
1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
 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, excavation, site preparation, land grading, and materials, supplies, fixtures, and equipment in transit and shall insure against at least the following perils or causes of loss: fire, windstorm, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, earth movement, collapse, flood, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, equipment breakdown, hot testing, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER; and
 5. allow for partial utilization of the Work by OWNER;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

CONTRACTOR shall be responsible for any deductible or self-insured retention.

The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this paragraph SC-5.06 shall comply with the requirements of paragraph 5.06.C of the General Conditions.

SC-5.06.E: Delete paragraph 5.06.E of document 00700, Standard General Conditions of the Construction Contract, in its entirety.

ARTICLE 6: CONTRACTOR'S RESPONSIBILITIES

Labor

In accordance with Indiana Code 4-13-18:

- (1) Contractor shall submit with the Bid, Contractor's written plan for a program to test Contractor's employees for drugs.
- (2) Contractor shall implement the employee drug testing program described in Contractor's written plan for a program to test Contractor's employees for drugs.
- (3) Owner shall cancel the Contract if Contractor:
 - (A) fails to implement its employee drug testing program during the term of the contract;
 - (B) fails to provide information regarding implementation of the contractor's employee drug testing program at the request of Owner; or
 - (C) provides to Owner false information regarding Contractor's employee drug testing program.

In accordance with Indiana Code 22-5-1.7:

- (1) Contractor shall enroll in and verify the work eligibility status of all newly hired employees of the contractor through the E-Verify program.
- (2) Contractor is not required to verify the work eligibility status of all newly hired employees of the contractor through the E-Verify program if the E-Verify program no longer exists.
- (3) Contractor shall sign an affidavit affirming that the Contractor does not knowingly employ an unauthorized alien.

Temporary Facilities

This section specifies administrative and procedural requirements for temporary services and facilities, including such items as temporary utility services, temporary construction and support facilities, and project security and protection.

No cost or usage charges for temporary services or facilities are chargeable to the OWNER or Engineer. Cost or use charges for temporary services or facilities will not be accepted as a basis of claims for a change-order extra.

Required for use at the project site include but are not limited to the following:

Temporary enclosures
Barricades, warning signs, lights and other traffic control
Environmental protection
Employee restroom facilities

Required signs for construction and traffic control shall comply with Indiana Manual on Uniform Traffic Control Devices (IMUTCD).

Install all necessary temporary piping, valving and other facilities to insure all utility services to all property owners throughout the project area.

Provide adequate utility capacity at each stage of construction. Prior to availability of temporary utilities at the site, provide trucked-in services for start-up of construction operations.

At the earliest feasible time, and when acceptable to the OWNER and Engineer, change over from the use of temporary utility service to the use of the permanent service, to enable removal of the temporary utility and to eliminate possible interference with completion of the work.

Adjacent Structures and Landscaping Responsibility

Various underground and surface structures are shown on the plans including water and gas pipes, sewers, telephone and electrical cables and conduits, drains, culverts and miscellaneous structures. These structures are plotted on the plans for the information of the CONTRACTOR in accordance with the best information available, but the locations and dimensions shown do not purport to be absolutely correct and the information given shall not be construed as representative that such structures will be encountered as plotted.

The CONTRACTOR shall be entirely responsible for all damage to existing water pipes, electric conduits or cables, drains, sewers, gas mains, poles, telephone and telegraph lines, railroad bridges and highway bridges and culverts, building foundations, retaining walls or other structures of any kind met with during the progress of the work (whether indicated or not in the plans) and shall be liable for damages to public or private property resulting therefrom.

The cost or protection of, replacement in their original positions and conditions of, or payment for repairs of damage to pipeline and structures affected by the work and the removal, relocation and rebuilding of pipelines and structures whether called for on the plans or specified or not shall be deemed included in the appropriate contract item or items, or if no specific item is provided therefore, as part of the overhead cost of the work and no additional payment will be made therefore.

The CONTRACTOR shall at all times in performance of the work employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, damage or destruction of public utility installations and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services and shall cooperate fully with the OWNER thereof to that end.

All pipelines carrying liquid shall be adequately protected from freezing. All fire hydrants, valves and appurtenances on the various water systems shall be maintained in service, and temporary connections shall be provided where necessary.

Protection of Trees

All trees and shrubs, except those shown to be removed, shall be adequately protected by the CONTRACTOR with boxes or otherwise. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the CONTRACTOR or his employees shall be replaced by him with new stock in similar size and age, the proper season and at the sole expense of the CONTRACTOR. All shrubs, bushes, decorative trees, etc. removed by the CONTRACTOR shall be replaced at no additional cost to the OWNER.

Materials and Equipment

General – All materials, equipment, and types of construction shall be in accordance with the specifications and shall in no event be less than that necessary to conform to the requirements of any applicable laws, ordinances and codes.

All materials and equipment shall be new, unused, and correctly designed. They shall be of standard first grade quality, produced by expert workmen, and be intended for the use for which they are offered. Materials or equipment which in the opinion of the ENGINEER are inferior or of a lower grade than indicated, specified or required will not be accepted.

The quality of workmanship and materials entering into the work under this contract shall conform to the requirements of the pertinent sections, clauses, paragraphs and sentences both directly and indirectly applicable thereto in Divisions 01 through 03 of this manual, whether or not direct reference to such occurs in the Contract Documents.

Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA and other generally accepted standards and shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers and the like shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be metered.

Equipment shall be of the approximate dimensions as shown or as specified, shall fit the spaces shown with adequate clearances, and shall be capable of being handled through openings provided in the structure for this purpose. Equipment shall be of such design that piping and electrical connections, ductwork, and auxiliary equipment can be assembled and installed without causing major revisions to the location or arrangement of any of the facilities.

Machinery parts shall conform exactly to the dimensions shown on the working drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high-grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable. All grease lubricating fittings on equipment shall be of the Zerk type. All machinery and equipment shall be safeguarded in accordance with applicable federal, state and local codes.

Manufacturer – The names of proposed manufacturers, material men, suppliers and dealers not already named in the proposal who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the ENGINEER for approval as early as possible to afford proper investigation and checking.

Such approval must be obtained before working drawings will be accepted for review. No manufacturer will be approved for any materials to be furnished under this contract unless he shall be of good reputation and have a plant of ample capacity. He shall, upon the request of the ENGINEER, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

All transactions with the manufacturers or subcontractors shall be through the CONTRACTOR, unless the CONTRACTOR shall request otherwise, in writing, to the ENGINEER and the ENGINEER agrees that the manufacturer or subcontractor deal directly with the ENGINEER. Any such transactions shall not in any way release the CONTRACTOR from his full responsibility under this contract.

Any two or more pieces of material or equipment of the same kind, type of classification, and being used for identical types of services shall be made by the same manufacturer.

Installation of Equipment - The CONTRACTOR shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the plans. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units. All bearings and moving parts on equipment and appurtenances shall be completely lubricated according to the manufacturer's instructions so as to place the installed equipment in operating condition. A linen tag or heavy-duty shipping tag shall be attached to each piece of equipment showing the date of lubrication and the name and number of the lubricant used.

The CONTRACTOR shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the ENGINEER and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The CONTRACTOR shall, at his own expense, furnish all materials and labor for, and shall properly bed in nonshrink grout each piece of equipment on its supporting base that rests on masonry foundations. Grout shall fill completely the space between the equipment base and the foundation.

Progress Meeting - The CONTRACTOR shall schedule and administer monthly progress meetings. It shall be the CONTRACTOR'S responsibility to prepare agenda, distribute written notice of the meetings, make physical arrangements for meetings, and preside at the meetings. The CONTRACTOR shall record the meeting minutes and distribute copies of minutes within ten (10) days after each meeting. Regular meetings shall be scheduled at a time mutually agreed upon by the CONTRACTOR, OWNER and the ENGINEER. The ENGINEER shall call special meetings as progress of work dictates. The meetings will be held in the CONTRACTOR'S construction trailer, or as directed by the ENGINEER. The meetings will be attended by the OWNER'S representatives, the CONTRACTOR'S subcontractors as pertinent to agenda and representative of governmental or other regulatory agencies having jurisdiction as required.

Personnel: The CONTRACTOR shall provide a single point of contact for coordination of the project within his office and / or field that may be contacted during normal work hours. The person must have the authority to bind the CONTRACTOR to any negotiations or decisions made or shall coordinate with persons with such authority. This person assigned by the CONTRACTOR shall be the primary contact and shall coordinate all communication between the offices to avoid confusion. The person shall coordinate with the CONTRACTOR's field personnel with any construction issues. This person may or may not be the contact person in the field.

Equivalent Quality - Whenever material or equipment is submitted for approval as being equal to that specified, the submittal shall include sufficient information and data to demonstrate that the material or equipment conforms to the contract requirements. The decision as to whether or not such material or equipment is equal to that specified shall be made by the ENGINEER.

Neither the approval by the ENGINEER of alternate material or equipment as being equivalent to that specified nor the furnishing of the material or equipment specified shall in any way relieve the CONTRACTOR of responsibility for failure of the material or equipment due to faulty design, material, or workmanship, to perform the functions required by the contract documents.

Shop Drawings and Samples - The CONTRACTOR shall schedule, prepare and submit all shop drawings in accordance with Technical Specification Section 01300 – Submittals.

ARTICLE 7: OTHER WORK

The CONTRACTOR shall not interrupt existing collection system and other utility operations during construction and shall coordinate temporary pumping, piping and structures with the OWNER and ENGINEER. Transfer of operations from existing facilities to newly constructed facilities shall be coordinated with the OWNER and ENGINEER.

At least 51% of the work for this project shall be performed and completed by the CONTRACTOR that submits the bid on this project. All subcontractors shall be approved by the OWNER and a list shall be submitted by the GENERAL CONTRACTOR prior to executing a contract for the project with the OWNER.

Prior to starting construction, the CONTRACTOR shall audio-video all areas to be reconstructed (each street and water/sewer/drainage path). Included in the audio-video coverage shall be all sign

locations, mailboxes, drives, culverts, utilities, trees, etc. that may be impacted by the construction. The CONTRACTOR shall submit two (2) copies of the audio-video in standard DVD format to the Engineer prior to beginning construction.

ARTICLE 8: OWNER'S RESPONSIBILITIES

There are no supplementary OWNER'S Responsibilities to Article 8 of the General Conditions.

ARTICLE 9: ENGINEER'S STATUS DURING CONSTRUCTION

The Engineer will perform one punch list inspection for the purpose of identifying deficient or incomplete work. One additional site visit will be performed by the Engineer for the purpose of confirming completion of all previously identified "punch list" items. Any subsequent site visits by the Engineer required because of the CONTRACTOR'S inability to complete previously identified "punch list" items will be grounds for the OWNER to withhold money from the CONTRACTOR for the purpose of reimbursing the Engineer for additional services.

ARTICLE 10: CHANGES IN THE WORK

There are no supplementary Changes in the Work Conditions to Article 10 of the General Conditions.

ARTICLE 11: CHANGE OF CONTRACT PRICE

There are no supplementary Changes of Contract Price Conditions to Article 11 of the General Conditions. The CONTRACTOR shall be required to submit complete breakdowns of labor, materials, equipment and all other costs related to any change order items as requested by the OWNER or ENGINEER.

ARTICLE 12: CHANGE OF CONTRACT TIMES

There are no supplementary Changes of Contract Times to Article 12 of the General Conditions.

ARTICLE 13: TESTS AND INSPECTIONS: CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

Defective Works

Costs - All inspection and testing of materials furnished under this contract will be performed by the CONTRACTOR or duly authorized inspection engineers or inspection bureaus without cost to the OWNER, unless otherwise expressly specified. See Article 13 of the General Conditions.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the contract documents shall be borne by the CONTRACTOR and such costs shall be deemed to be included in the contract price.

Materials and equipment submitted by the CONTRACTOR as the equivalent to those specifically named in the contract may be tested by the OWNER for compliance. The CONTRACTOR shall reimburse the OWNER for the expenditures incurred in making such tests on materials and equipment which are rejected for noncompliance.

Inspection of Materials - The CONTRACTOR shall give notice in writing to the ENGINEER sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the ENGINEER will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials, or he will notify the CONTRACTOR that the inspection will be made at a point other than the point of manufacture, or he will notify the CONTRACTOR that inspection will be waived. The CONTRACTOR must comply with these provisions before shipping any material. Such inspection shall not release the CONTRACTOR from the responsibility for furnishing materials meeting the requirements of the contract documents.

Certificate of Manufacture - When specified or requested, the CONTRACTOR shall furnish the ENGINEER authoritative evidence in the form of certificates of manufacture that the materials to be used in the work have been manufactured and tested in conformity with the contract documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

Shop Tests of Operating Equipment – Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the contract documents. No such equipment shall be shipped to the work until the ENGINEER notifies the CONTRACTOR, in writing, that the results of such tests are acceptable.

Five (5) copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the ENGINEER for approval.

The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the CONTRACTOR.

Preliminary Field Tests - As soon as conditions permit, the CONTRACTOR shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. Preliminary field test procedures shall be approved by the ENGINEER. If the preliminary field tests disclose that any equipment furnished under this contract does not meet the requirements of the contract documents, the CONTRACTOR shall, prior to the acceptance tests, make all changes, adjustments and replacements required.

Final Field Tests - Upon completion of the work and prior to final payment, all equipment, piping and appliances installed under this contract shall be subjected to acceptance tests as specified or required to prove compliance with the contract documents.

The CONTRACTOR shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the OWNER, except as noted.

Failure of Tests - If the acceptance tests reveal defects in material or equipment, or if the material or equipment in any way, fails to comply with the requirements of the contract documents, then such deficiencies shall promptly be corrected by the CONTRACTOR. If the CONTRACTOR fails or refuses to correct the deficiencies, or if the improved materials or equipment, when tested shall again fail to meet the guarantees or specified requirements, the OWNER, notwithstanding its partial payment for work and materials or equipment, may reject said materials or equipment and may order the CONTRACTOR to remove the defective work from the site at his own expense. All costs for re-testing and reinspection of the failed equipment or piping (including ENGINEER costs) shall be the sole responsibility of the CONTRACTOR and shall be paid by the CONTRACTOR prior to issuance of final payment to the CONTRACTOR.

In case the OWNER rejects the equipment, then the CONTRACTOR hereby agrees to repay to the OWNER all sums of money paid to him for the rejected equipment on progress certificates, and upon the receipt of the sum of money the OWNER will execute and deliver to the CONTRACTOR a bill of sale of all its rights, title, and interest in and to the rejected equipment, provided, however, that the equipment shall not be removed from the premises of the OWNER until the OWNER obtains from other sources replacement equipment. The OWNER hereby agrees to obtain other equipment within a reasonable time and the CONTRACTOR agrees that the OWNER may use the equipment furnished by him without rental or other charge until the replacement equipment is obtained.

Final Inspection - The procedures for final inspection shall be in accordance with the provisions of the Article 14 of the General Conditions headed "Final Inspection." During such final inspections all pipelines and structures shall be clean and free from water. In no case will the final estimate be prepared until the CONTRACTOR has complied with all the requirements set forth and the ENGINEER has made his final inspection of the entire work and is satisfied that the entire work has been completed in general conformance with the contract documents.

ARTICLE 14: PAYMENTS TO CONTRACTOR AND COMPLETION

Progress Schedules - The CONTRACTOR shall provide the ENGINEER with a progress schedule as required by the General Conditions. In developing his schedule, the CONTRACTOR shall coordinate his schedule with other prime contractors. The OWNER shall make those schedules available to the CONTRACTOR. Final judgment in coordination of scheduling of all CONTRACTOR'S work with that of other prime contractors rests with the OWNER. The CONTRACTOR is responsible for the proper coordination of his work so as to maintain the schedule as approved.

A. Contents of Progress Schedule

The CONTRACTOR shall submit revised progress schedules with each pay application to allow process of the application. In submitting the schedule, the CONTRACTOR will evaluate the need for revisions, additional crews, additional or alternate equipment, etc. to insure that all work shall be performed and completed within the contract time periods. The CONTRACTOR'S progress schedule shall, at a minimum, indicate in detail the following:

1. The proposed sequence of the work, with a minimum of operational interruption of the existing facilities.
2. The plan of construction to be employed.
3. Construction activities, as required.
4. Estimated manpower start and completion dates for each stage of the work and each specific construction activity in order to:
 - a. Complete the work within the contract time.
 - b. Schedule progress payment and completion requirements of article 14 of the General Conditions.
 - c. Conform with General Conditions Article 2.
 - d. Provide outlay management information specified hereafter in this specification section.
5. All other requirements specified hereafter in this specification section.

B. Outlay Management

The CONTRACTOR shall provide the OWNER with a schedule of projected payments for the construction contract. The schedule must be submitted within 10 days after the effective date of the agreement and whenever actual outlays for the project vary beyond - 5 percent and +10 percent from the schedule, as determined by the OWNER.

For contract schedules that must be revised during the year because actual project performance differs from the schedule, the CONTRACTOR shall submit, along with administrative information, projections only for the quarter that remain in the year plus the annual projection for the succeeding year.

C. Project Monitoring and Updating of Schedule

Progress data shall be accumulated to update the schedule on a monthly basis, prior to submittal of the progress payment estimate. The progress data shall include:

- Activities Started
- Activities Completed
- Predicted Activity Starts
- Predicted Activity Completions
- Changes in Original Duration for Specific Activities
- Changes in Activity Sequences (or Network Logic)

- Changes in Activity Costs
- Percentage Complete on Activities

Upon review and approval of the updated schedule by the ENGINEER, the payment estimate will be processed. Included with the update schedule shall be the following reports:

1. Progress Report Bar Chart with time scale which shall graphically indicate the current status of major activities by showing the originally schedule period, and also showing the effect of the progress projected for the next two (2) reporting periods.
2. Hot List which shall be a tabular check list of all activities that must be acted upon during the next reporting period reflecting their current status by showing the following information:

Activity, Description, and Responsibility
 Percentage Completed
 Remaining Duration
 Originally Scheduled Early Start Date
 Current Finish Date (either actual or estimated)
 Total Remaining Float
 Activity Status (i.e., behind, critical, or on schedule)

3. Detail Payment Request Report which shall be a tabular listing of the progress reported during the current reporting period, progress reported to date, and the dollar value earned based on the percentage of progress reported for each activity, and projection of earnings for the next three months.

In addition to the foregoing, submittal of a monthly narrative report is required. The narrative report shall be brief and shall include:

- A description of the amount of progress during the last month.
- A description of the current and anticipated problems and delays.
- Recommended corrective actions.
- Effects of problems or corrective action on other prime contractors.

D. Review and Distribution of Updated Progress Schedules:

The CONTRACTOR shall submit to the ENGINEER two (2) review copies of the progress schedule.

Within ten (10) days after receipt of the updated progress schedule, the ENGINEER shall review and return the schedules.

If the ENGINEER required a resubmittal, the CONTRACTOR must comply within seven (7) days of receipt of reviewed schedule.

The CONTRACTOR shall distribute copies of the reviewed schedules to:

- The OWNER (5 copies);
- The ENGINEER (2 copies);
- The job site file;
- CONTRACTOR'S subcontractors;
- Other parties agreed to by the CONTRACTOR and ENGINEER.

Upon distributing copies of the reviewed schedules to the recipients, the CONTRACTOR must request the recipients to immediately report to the CONTRACTOR any inability to comply with the schedule, to provide a detailed explanation of the inability and to suggest solutions.

Schedule of Values - The CONTRACTOR shall provide the ENGINEER with a schedule of values as required by Articles 2 and 14 of the General Conditions. The schedule of values will serve as a basis of progress payments during construction.

A. Scope of Payment

1. Payment for work in place;
2. Payment for materials or equipment which have been delivered to the site, or which are stockpiled in the vicinity of the site;
3. Payment for undelivered specifically manufactured items or equipment (excluding off-the-shelf or catalog items), as work on them progresses. Payment for these items will be made only when:
 - i. The equipment is so designated in the instructions to bidders;
 - ii. The equipment to be specifically manufactured for the work could not be readily utilized on nor diverted to another job;
 - iii. A fabrication period of more than six (6) months is anticipated.

Payment for work executed under the agreement is based upon lump sum and/or unit prices. Subject to the limitations listed herein, progress payments for lump sum items shall be based upon percentage of completion at the time of request for such payments as determined by the ENGINEER, while progress payments for unit priced items shall be made for estimated quantities of such items completed and in place. The method for calculating estimated quantities shall be based upon reasonable engineering methods for such estimates as agreed upon by the CONTRACTOR and ENGINEER.

Whenever payment for any portion of the work is subject to a unit price and/or lump sum provision, and testing of that portion of the work is required, progress payments shall be determined as follows:

1. Eighty-five percent (85%) of the unit price shall be allowed for materials and equipment installed in compliance with the contract documents;
2. One hundred percent (100%) of the unit price shall be allowed when the work performed under item 1 above has been successfully tested and completed in compliance with the contract documents.

Payments for materials or equipment not incorporated into the work, but delivered and suitably stored at the site, or at some other location agreed upon in writing, are conditioned upon the submission by the CONTRACTOR of paid invoices to the ENGINEER with applicable insurance and transportation to the site. Payments for stored materials or equipment may not exceed one hundred percent (100%) less retainage of the net value of stored material or equipment.

Payments for work on undelivered, specifically manufactured items are conditional upon the submission by the CONTRACTOR of paid invoices to the ENGINEER which establish the OWNER'S interest including applicable insurance. Progress payments for specifically manufactured equipment or items shall be limited to the following:

1. A first payment upon submission by the CONTRACTOR of shop drawings for the equipment or items in an amount not exceeding fifteen percent (15%) of the contract or item price plus applicable higher tier costs;
2. Subsequent to the OWNER'S release or approval for manufacture, additional payments not more frequently than monthly thereafter, up to seventy-five percent (75%) of the contract or item price plus applicable higher tier costs.

Submission of any request for a progress payment under the above Section must be accompanied by a certification furnished by the fabricator of the equipment or item that the amount of the first progress payment claimed constitutes not more than fifteen percent (15%) of the contract or item price quoted by the fabricator, and that the cumulative amount claimed in subsequent progress payments does not exceed seventy-five percent (75%) of the contract or item price quoted by the fabricator.

Applicable higher tier costs include all expenses of contract performance which are reasonable, allowable to the contract, consistent with sound and generally accepted accounting principles and practices consistently applied, and which are not excluded by contract.

The CONTRACTOR shall provide transportation and reasonable living expenses for a representative of the ENGINEER to travel to the place of manufacture of such equipment or material to observe the progress for each billing.

The OWNER shall withhold retainage and deposit the same in an escrow account in the amount of ten percent (10%) of each progress payment until the work or designated portion thereof is fifty percent (50%) complete. Thereafter, no further retention from progress payments shall be made, provided that the CONTRACTOR is making satisfactory progress and there is no specific cause for greater withholding. In order to eliminate further retainage withholdings, the CONTRACTOR must submit a formal request and the OWNER shall make the ultimate decision to approve or deny the request. Upon execution of a Certificate of Substantial Completion, the OWNER may reduce

the retained amount to not less than two hundred percent (200%) of the cost of the work remaining to be completed. Retainage may not be reduced until the CONTRACTOR provides the OWNER with complete and legally effective releases or waivers (satisfactory to OWNER) of all liens arising out of or filed in connection with the work. This includes Final Lien Wavers from the CONTRACTOR and all Subcontractors and Suppliers.

B. Progress Payment Procedure

The CONTRACTOR shall, in accord with the General Conditions, submit to the ENGINEER a schedule of values for the various parts of the work. The schedule of values shall:

1. Be in such form as the ENGINEER and OWNER agree upon;
2. Consist of an amount for each section of the specifications, each of which shall include its proper share of overhead, insurance, profit and other general charges so that the sum of the amounts equals the contract price.

The schedule of values shall be used as the basis for the CONTRACTOR'S application for progress and final payments. The application form shall indicate stored materials separately and shall monitor materials as they are installed for proper payment and storage line item adjustments. All unit price and lump sum contract items shall be broken into line items that allow proper pay application review and project tracking. Change Orders executed throughout the project shall be entered appropriately into the application form.

Before the first application for payment, the CONTRACTOR shall select a monthly billing date, with ten (10) days prior to the last progress meeting of the month, upon which he will terminate his accumulation of charges.

Upon the monthly date agreed to by the CONTRACTOR and ENGINEER, the CONTRACTOR shall submit to the ENGINEER an itemized Application for Progress Payment in accord with the General Conditions. A Partial Waiver of Lien from the CONTRACTOR for the full amount of the payment shall accompany each Application for Progress Payment. Where wage scales are required by contract, the CONTRACTOR shall also submit weekly payrolls of all his employees and his subcontractor's employees employed on the work. These weekly payrolls shall contain certification that all wages paid to employees employed on the work are in compliance with the wage requirements contained in these contract documents.

Preliminary pay applications must be submitted by the CONTRACTOR to the ENGINEER for review at least ten (10) days prior to the scheduled meeting of the OWNER for approval.

C. Lump Sum Provisions

The term "lump sum" when used as an item of payment will mean complete payment for each item so designated in the contract documents.

D. Unit Price Provisions

If the contract documents require that a unit price cover and be considered compensation for certain work or material essential to the item, this same work or material will not also be measured or paid for under any other provision. If the CONTRACTOR and OWNER agree in writing that the quantities of certain items or portions of items of work as set forth in the contract documents are in substantial agreement with actual quantities of work performed, compensation therefore will be based on the quantities set forth in the contract documents, without measurement thereof upon completion of the work. Compensation based on contract document quantities as agreed shall be accepted as full payment for such terms or portions of items.

ARTICLE 15: SUSPENSION OF WORK AND TERMINATION

There are no supplementary suspension of work and termination conditions to Article 15 of the General Conditions.

ARTICLE 16: DISPUTE RESOLUTION

There are no supplementary dispute resolution conditions to Article 16 of the General Conditions.

ARTICLE 17: MISCELLANEOUS

Liquidated Damages - OWNER and CONTRACTOR recognize that time is of the essence of this agreement and that OWNER will suffer financial loss if the work is not completed within the times specified, plus any extensions thereof allowed in accordance with article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER one thousand and 00/100 dollars (\$1,000.00) for each day that expires after the time specified for Substantial Completion until the work is substantially complete. After Substantial Completion if the CONTRACTOR shall neglect, refuse or fail to complete the remaining work within the contract time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER one thousand and 00/100 dollars (\$1,000.00) for each day that expires after the time specified for completion and readiness for final payment.

END OF SECTION 00710

CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE OF ISSUANCE: _____

OWNER: _____

CONTRACTOR: _____

Contract: _____

Project: _____

OWNER's Contract No. _____ ENGINEER's Project No. _____

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

To _____
OWNER

And To _____
CONTRACTOR

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

DATE OF SUBSTANTIAL COMPLETION

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

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees shall be as follows:

OWNER: _____

CONTRACTOR: _____

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

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

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

Executed by ENGINEER on _____
Date

ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on _____
Date

CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Substantial Completion on _____
Date

OWNER

By: _____
(Authorized Signature)

APPENDIX A:

Building Design Standards, Minimum Requirements, and Submittal Expectations

City of Greencastle - WWTP Service Building Addition

Building Design Standards, Minimum Requirements, and Submittal Expectations

1. Purpose

This document establishes the minimum design standards, material requirements, and submittal expectations for the construction of a new service building in the City of Greencastle's Wastewater Treatment Plant. This document can act as a reference for the General Contractor (GC) in preparing a design package to secure an Indiana Department of Homeland Security Construction Design Release (CDR).

2. General Contractor Responsibilities

2.1. Construction Design Release

- The GC must secure a Construction Design Release from the Indiana Department of Homeland Security that satisfies all requirements for a Class 1 structure.
 - Before submitted the CDR, contractor must provide the design package for United to review
- Requires licensed design professionals to certify plans who have filled out Design Professional Certificates

2.2. Applicable Codes

The GC must comply with at least the following Indiana codes:

- [Indiana Building Code](#) (675 IAC 13)
- [Indiana Plumbing Code](#) (675 IAC 16)
- [Indiana Electrical Code](#) (675 IAC 17)
- [Indiana Mechanical Code](#) (675 IAC 18)
- [Indiana Energy Conservation Code](#) (675 IAC 19)
- [Indiana Fire Prevention Code](#) (675 IAC 22)

3. Minimum Building Requirements

3.1. Building Dimensions

- Footprint: 46' by 40'
- Wall Height: 16'
- Roof Pitch
 - i. Match existing building roof slope of 5 / 12

3.2. Structural System

- Post-frame structure: Service building addition shall be a post-frame type structure matching the architectural character of existing buildings on site.
- Design Loads:
 - i. Roof system shall support no less than 30psf balanced roof snow load.
 - ii. Wind load of 115mph, Exposure C
- Posts and Spacing:

- i. Maximum post spacing of 8' on center in either direction, unless smaller spacing is required to meet design loads
 - ii. Post size must be designed to meet design loads.
- Girts, purlins, and trusses
 - i. Wall girt sized to meet wind and lateral load demands.
 - ii. Roof purlin sized and spaced to satisfy roof load and deflection criteria. Spacing not to exceed 24" unless otherwise engineered.
 - iii. Trusses shall be spaced at 8' maximum, designed and sealed by a truss engineer, and coordinated with purlin layout.

3.3. Foundations

The building foundation type must be a cast in place concrete foundation wall. The structural foundation elements must extend to a minimum depth of 48" below finished grade.

- Concrete Slab
 - i. The floor slab shall be designed in accordance with the Indiana Building Code (675 IAC 13). All structural concrete shall comply with ACI 318, and slab-on-ground construction shall follow ACI 302. Refer to specification section 03100 - Concrete Work for additional requirements.
 - ii. The slab shall be engineered to support large truck wheel loads typical of a municipal maintenance facility. Minimum performance criteria include:
 - 10" slab thickness
 - 4,000 psi concrete
 - Reinforced with a continuous rebar grid (No.5 bars with 12" spacing, 3" above the bottom of the slab)
 - 6" of compacted granular base
 - Saw-cut control joints per ACI 302

3.4. Exterior Envelope

- Metal Panel Requirements
 - i. 26-gauge steel panels for walls and roof
- Panel Finish
 - i. Factory-applied, corrosion-resistant coating (ASTM A755)
 - ii. Siding and roof color to match existing building using manufacturer's standard colors.
- Insulation requirements
 - i. Spray foam style insulation with fireproof coating ([675 IAC 22-2.5-9](#))
 - ii. Must meet or exceed Indiana Energy Code minimum R-values.

- iii. Weatherproofing required through roof underlayer and wall moisture barrier.
Trim and sealants to maintain continuous weather resistance
- iv. Refer to specification section 07200 – Insulation for additional requirements.
- Exhaust Fan System
 - i. Provide an exhaust fan with closable shutters on the northwest wall of the building and a matching louver with closable shutters on the southeast wall. Position the fan and the louver as far away as possible to maximize airflow through the building. The installed ventilation system shall provide a minimum of 15,000 CFM, sufficient to achieve 24 air changes per hour (ACH) for the proposed building interior when the fan and louver are the only wall openings in use.
- Downspouts from roof to be daylighted in open area behind building to match existing downspout drainage.

3.5. Doors and Openings (adhering to [675 IAC 13-2.6-11](#))

- Three fiberglass 36”x84” exterior man doors with embedded windows are to be installed as shown on the plan sheets to match the style of the existing doors on the adjacent building. An additional man door without an embedded window is to be installed in the interior of the building that leads into the bathroom, as shows on the plans.
- Two 14’x14’ overhead garage doors are to be installed on the northeastern face of the building as shows on the plan sheets. The doors are to match the existing style of the existing adjacent garage doors, including the addition of in-door windows.
- Yellow bollards to be installed on the edges of the garage door approach matching the existing size and style of existing bollards.
- Refer to specification section 08018 - Fiberglass (FRP) Doors and Frames for additional requirements.
- GC to provide:
 - i. Door schedule
 - ii. Manufacturer cut sheets
 - iii. Electrical requirements

3.6. Mechanical Systems (adhering to [675 IAC 18](#))

- Natural gas heating system to be extended from existing adjacent building’s heating system
- GC to provide:
 - i. Gas piping layout
 - ii. Combustion air system
 - iii. Venting and clearance requirements

3.7. Plumbing (adhering to [675 IAC 16](#))

- GC to tie into existing adjacent building's water connection
 - i. 5/8" hose bib to be installed on the back interior wall of building, to be centered between the garage bays.
 - ii. Full plumbing detail for bathroom needed
 - iii. Connection to proposed grinder pump outside of building
 - iv. Bathroom to include:
 - ADA Toilet
 - Elevated mop basin sink with hot and cold water
 - Soap dispenser
 - Paper towel roll holder
 - Toilet paper roll holder
 - 24" by 24" mop drainage basin with hose faucet hose spigot
 - 30" by 40" mirror unit

3.8. Electrical Work (adhering to [675 IAC 17](#))

- Outlets spaced a maximum of 12' apart from each other
 - i. Outlets placed near ceiling for overhead doors
- Low-Bay LED strip fixtures
 - i. 4 rows with 3 fixtures per row to match existing building's pattern
- Exterior site light set to be on from dusk to dawn that illuminates overhead door approach
- Existing electrical utility (connection to westernmost garage) to be relocated
- Electrical connection for grinder pump
- GC to provide:
 - i. Service routing layout
 - ii. Shop drawings of all electrical equipment
 - iii. Electrical equipment operating manuals

3.9. Adjacent Building Connection

- GC to provide designs for an enclosed breezeway that will function as a passageway between the proposed service building and the existing building while maintaining a consistent building façade with the buildings that it connects.
- Relocation of storm drain clean out and electrical utility will be necessary.
 - i. Weatherproofing at enclosed breezeway connecting corridor
 - Moisture barrier continuity
 - Sealants

4. Other Required Submittals for City/United Review

4.1. Architectural

- Plans
- Elevations
- Building cross sections
- 4.2. Structural
 - Foundation Plan
 - Truss Sheets
 - Framing Plans
- 4.3. Mechanical
 - Heating Specifications
 - Venting Diagrams
- 4.4. Electrical
 - Panel Detail Sheet
 - Lighting Plan
 - Overhead Door Electrical Detail Sheet
- 4.5. Plumbing
 - Water Service Routing
 - Schedule of Bathroom Fixtures
- 4.6. Site / Civil
 - Grading requirements
 - Utility Connections Site Plan



SECTION 01000 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK UNDER THIS CONTRACT

- A. CONTRACTOR shall furnish all labor, materials, equipment and means to construct the pipeline(s) and other Work as described in the Contract Documents and shown on the Drawings. The Work includes, but is not limited to, the following:
1. Development and implementation of groundwater dewatering measures, as required, during construction.
 2. Development and implementation of sewer flow control measures, as required, during construction.
 3. Protection of all existing utilities, including all appurtenances and service lines.
 4. Excavation and field identification of utilities that cannot be precisely located by OWNER.
 5. Guarding and protecting the work site, equipment and stored materials.
 6. Excavation and backfilling of trenches and pits including removal and disposal of surplus excavated material. Provide an install granular and clean backfill as required.
 7. Sheeting, bracing and support of adjoining ground where necessary to protect workers, newly installed utilities, as well as existing utilities, roadways, structures, or other appurtenances, etc.
 8. Unloading, loading, hauling, distributing, laying and testing the pipe and appurtenances within the project area. Use of private property in any way shall be done only if written approval is obtained from the property owner by the CONTRACTOR.
 9. Installation of gravity drainage pipes, a sanitary manhole, a grinder pump station, low pressure force main, and all appurtenances necessary to supply a complete and operable system as specified in the Plans and Specifications.
 10. Testing as specified in the Plans and Specifications.
 11. Site cleaning and maintenance on a regular basis such that all activities are completed and left in a workmanlike manner each day.
 12. Installation and maintenance of all required erosion control facilities, materials and practices.
 13. Maintenance of street or other surfaces as required.
 14. Restoration of paved surfaces, when disturbed or damaged.
 15. Ground restoration, planting and watering.
 16. Submit schedules, shop drawings, pay applications, record drawings and other required paperwork.
 17. Compliance with all permitting agency requirements including the Indiana Department of Homeland Security and the OWNER.
 18. Provide and install all equipment and materials required for complete, functioning systems.
 19. Coordinate with existing utilities and services and relocate as necessary.

20. All construction staking, lay-out and surveying required for the work.

- B. The above general outline of principal features does not in any way limit the responsibility of the CONTRACTOR to perform all Work and furnish the required materials, equipment, labor and means as shown or required by the Contract Documents.
- C. Materials, equipment, labor, etc., obviously a part of the Work and necessary for the proper operation and installation of same, although not specifically indicated in the Contract Documents, shall be provided as if called for in detail without additional cost to the OWNER.

1.2 WORK BY OWNER

A. OWNER will perform certain items of Work related to this project as follows:

- 1. Provide the CONTRACTOR access to the WWTP site and existing utility tie-in points

1.3 LOCATIONS

- A. Work is to be performed on within the project area at the Greencastle Wastewater Treatment Plant shown on the drawings and described in other portions of the Contract Documents. Work shall be performed by the CONTRACTOR within these limits.
- B. It is the obligation and responsibility of the CONTRACTOR to determine the exact limitations of the project area and any conditions limiting or affecting the use thereof by the OWNER and/or the CONTRACTOR. The CONTRACTOR agrees to indemnify and hold harmless the OWNER and ENGINEER against any claims made by any property owner, including, without limiting the generality hereof, any claim that the CONTRACTOR has failed to keep his work, equipment, materials, or workmen within the limits authorized by the right-of-way and/or easement or any claim that the CONTRACTOR has failed to comply with any condition or requirement, or agreement respecting the right-of-way and/or easement.
- C. Some of the locations shown or described in the Contract Documents, such as connections to the existing systems, are approximate and the CONTRACTOR shall be responsible for locating and connecting to the exact locations.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Specifications for the materials and equipment to be provided by the CONTRACTOR are detailed in the respective Specification Sections. Any materials or equipment

necessary for the project, but not specifically referenced in the contract documents and plans shall comply with the City, County, Indiana Department of Homeland Security, IDEM or INDOT standards as applicable. In absence of such standards, the ENGINEER shall determine the necessary standard of quality required.

PART 3 - EXECUTION

3.1 FIELD SURVEY WORK

- A. CONTRACTOR will be responsible for the laying out of the Work in accordance with the General and Supplemental General Conditions. Construction staking and surveying shall be included in the CONTRACTOR's bid.

3.2 COORDINATION

- A. CONTRACTOR will be required to coordinate his work, to phase the construction operations, and provide, install and maintain any temporary connections necessary to prevent interference to operation of existing facilities, and to properly test the system. Temporary plugging and reconnection of connections to provide for the required testing shall be performed as necessary at no additional cost to the OWNER. Any construction work requiring the shutdown of facilities must be scheduled and performed only at such times as shall be authorized by the OWNER, in order to reduce or eliminate any disturbance to utility customers. Such Work must be completed during the specific periods authorized by the OWNER. Interruption to existing water and sanitary sewer users will only be allowed if expressly indicated in the plans.

END OF SECTION 01000

SECTION 01300 - SUBMITTALS

PART 1 – GENERAL

1.1 CONSTRUCTION SCHEDULE

- A. CONTRACTOR shall prepare and submit detailed progress schedules, schedule of values and shop drawing and sample submittal schedules to the ENGINEER for approval in accordance with the General Conditions, Supplemental General Conditions and other applicable sections of these specifications. The schedule shall be in bar graph form showing material delivery schedules and starting and completion dates for all phases of construction.
- B. If, in the opinion of the ENGINEER, the CONTRACTOR falls behind the progress schedule, the CONTRACTOR shall take such steps as may be necessary to improve his progress, which may require him to increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction planned, and to submit for approval such supplementary schedule or schedules as necessary to demonstrate the manner in which the agreed rate to progress will be regained, all without additional cost to the OWNER. Scheduling that requires work beyond the typical 40-hour work schedule of the OWNER will only be allowed if requested and approved in writing. Approval of overtime schedules to complete the project within the contract time limits shall be at the sole discretion of the OWNER and the OWNER may require the CONTRACTOR to reimburse any additional costs for inspection.

1.2 SHOP DRAWINGS

- A. The CONTRACTOR shall promptly supply to the ENGINEER for approval, shop drawings with details and schedules for all materials and equipment for the project in the Drawings and/or Specifications and/or required by the ENGINEER. The shop drawings shall be of sufficient detail to assure that the item complies with the specifications and shall provide the necessary data for installation, operation and maintenance.
- B. Reproducible Documents are required. Blueprints (white lines on a blue background) are not acceptable. When the CONTRACTOR submits shop drawings with multiple products or material classes, all copies of the shop drawing must be marked or highlighted by the CONTRACTOR to indicate the product being proposed.
- C. A complete schedule of shop drawing submissions shall be submitted, on a form acceptable to the ENGINEER, to the ENGINEER within 10 days after the signing of the agreement by the OWNER.
- D. Shop Drawings shall be submitted via one of the following methods. Submittal method shall be established by the ENGINEER during the preconstruction meeting.

1. Electronic Submittal
 - a. The CONTRACTOR shall submit in PDF format all drawings schedules and brochures for approval. The submittal process will be determined during the preconstruction meeting, or prior to the first submittal if no meeting is held.
2. Paper Copy Submittal
 - a. CONTRACTOR shall submit copies of all drawings, schedules and brochures shall be submitted for approval. The exact number of copies required for submittal shall be established during the preconstruction meeting, or prior to the first submittal if no meeting is held.
- E. All shop drawings shall be submitted with a letter of transmittal. Letter of transmittal shall contain the following:
 1. Project name, workmanship and materials section number.
 2. Submittal Date and Revision Date.
 3. Name of CONTRACTOR.
 4. The list of drawings submitted including contract specification, submittal identification number and titles.
 5. CONTRACTOR's certification to review of submittal, certification of field measurements and complete compliance with the contract documents.
 6. Requests for any approval of departures from the Contract requirements and any other pertinent information.
- F. Shop drawings shall be numbered consecutively and shall accurately and distinctly present the following:
 1. All working and erection dimensions.
 2. Arrangements and sectional views.
 3. Necessary details, including complete information for making connections between work under this contract.
 4. Electrical wiring connections between all equipment furnished under the contract, including all internal wiring between internal components of equipment.
 5. Specific materials and finishes.
 6. Parts lists and description thereof.
 7. Spare parts to be provided.
- G. Shop drawings for mechanical and electrical equipment shall present, where applicable, such data as dimensions, weight and performance characteristics. These data shall show conformance with the performance characteristics and other criteria incorporated in the plans and specifications.
- H. Each shop drawing or page shall include:

1. Identification of equipment, product or material; if multiple part or product numbers exists CONTRACTOR shall specifically identify part or product to be used.
 2. Name of SUBCONTRACTOR, if applicable.
 3. Name of Supplier and Manufacturer.
 4. Relation to adjacent structure or material.
 5. Field dimensions, clearly identified.
 6. ASTM, Federal and other specification references.
 7. Identification of deviations from the contract documents.
 8. Location at which the equipment or materials are to be installed; Location shall mean both physical location and location relative to other connected or attached material.
 9. Tests, installation lists and other specification requirements for the equipment.
- I. Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
- J. The CONTRACTOR shall be responsible for review of the submittals prior to submittal to the ENGINEER. **The submittals will include certification by the CONTRACTOR that he has reviewed the submittal and approved the submittal for complete compliance with the Contract Documents.** It is the CONTRACTOR's responsibility to specifically note any proposed deviations from the Contract Documents.
- K. Failure to comply with these submittal review requirements may result in return of the submittals to the CONTRACTOR before further review by the ENGINEER. The CONTRACTOR shall be responsible for any additional costs to the ENGINEER for multiple submittal review due to his negligence in this Contractual responsibility, or for consideration of contractor alternate submittals, or for pre-approval of equipment and/or materials or for proposed deviations from the initial submittals. The CONTRACTOR shall also be solely responsible for project delays created by lack of proper submittal review and preparation.
- L. ENGINEER shall determine that the submittal review requirements have been met.
- M. If a submittal meets the submittal review requirements the submittal shall be reviewed and one of the following actions shall be taken by the CONTRACTOR.
1. No Exceptions
 - a. Submittals returned with "No Exceptions" requires no further action by CONTRACTOR; materials, methods or equipment included with the submittal are sufficient to meet project requirements.
 2. Exceptions Noted – Resubmittal Not Required

- a. Submittals returned with “Exceptions Noted – Resubmittal Not Required” requires no further submittal by CONTRACTOR; however CONTRACTOR shall be responsible for addressing the exceptions noted during construction.
- 3. Submit Specified Item
 - a. Submittals returned with “Submit Specified Item” require CONTRACTOR to submit items as specified in the contract documents. The items included with the submittal do not meet the contract specifications or have been submitted as a voluntary alternate and are not acceptable substitutes for the items specified in the contract documents.
- 4. Exceptions Noted – Resubmittal Required
 - a. Submittals returned with “Exceptions Noted – Resubmittal Required” require CONTRACTOR to make revisions to the submittal based upon the exceptions noted by the ENGINEER and resubmit entire submittal for review.

1.3 SAMPLES

- A. When required by the ENGINEER or where noted in other Sections of these Specifications, samples of materials shall be submitted for approval.

1.4 PRE-CONSTRUCTION VIDEO

- A. Prior to commencement of work the CONTRACTOR shall submit to ENGINEER audio-video in standard digital format (flash drive, 2 copies). The audio-video coverage shall be continuous and provided with audio descriptions of the site and areas of potential disturbance. Generally, the video shall be taken along the center line of the proposed pipe trench and should capture all existing features of the sites such as mailboxes, curbing, lawns, driveways, signs, culverts, landscaping beds, rock beds etc. If in the ENGINEER’s determination, the pre-construction video is not sufficient to document existing conditions, the CONTRACTOR shall provide another pre-construction video or photographs as directed by the ENGINEER, at no additional cost to the OWNER.
- B. The pre-construction audio-video survey will not be paid directly as a part of the contract, rather costs associated with the audio-video survey and reproduction shall be included in the cost of the most appropriate item in the Itemized Bid Proposal.

1.5 LIST OF REQUIRED SHOP DRAWINGS

- A. The final page of this specification section includes a “LIST OF REQUIRED SHOP DRAWINGS”. This list is meant a simple guide, and the actual required shop drawings shall not be limited to this list. The OWNER and/or ENGINEER may add additional items to the list as deemed necessary. All products and materials planned for

installation as a part of this project shall have shop drawing prepared and submitted in accordance with the General Conditions, Supplemental Special Conditions, this specification section and all other specification sections contained within this project manual or within the plan set.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

LIST OF REQUIRED SHOP DRAWINGS

The following list is meant as a general guide, and is not all inclusive. All drawing submittals must be prepared in accordance with the general conditions, all specification sections, and as required for items on the plans. When the CONTRACTOR submits shop drawings with multiple products or material classes, all copies of the shop drawing must be marked or highlighted to indicate the product being proposed.

<u>Section</u>	<u>Item</u>
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02300	Bedding, Backfill Materials
02500	Storm and Sanitary Manholes, Adjusting Rings, Steps and Connectors
02500	Manhole and Inlet Castings
02531	Force Main, Force Main Fittings
02900	Seeding Mix
03100	Concrete Mix Design, Reinforcement Layout
10800	Bathroom Fixtures
10830	Mirror Unit
11305	Grinder Pump

Appendix A	Construction Design Release Design Package, Architectural Plans and Elevations, Truss Sheets, Framing Plan, Lighting Plan, Water Service Routing, Exhaust Fan and Louver System, Natural Gas Heating System Piping Layout, Electrical Routing Layout
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END OF SECTION 01300

SECTION 01700 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 CLEANING UP

- A. The CONTRACTOR shall periodically, or as directed during the progress of the Work, remove and properly dispose of the resultant dirt and debris and keep the premises reasonably clear. Upon completion of the Work, he shall remove all temporary construction facilities and unused materials provided for the Work and put the premises in a neat and clean condition and do all cleaning required by the Specifications. Trash and combustible materials shall not be allowed to accumulate in construction locations.

1.2 GUARANTEES AND WARRANTIES

- A. The CONTRACTOR expressly warrants that all workmanship and materials performed or furnished under this Contract will conform to the Specifications, Drawings, samples and other applicable descriptions furnished or adopted by the CONTRACTOR and with all applicable laws, provisions and requirements of the Contract Documents. The CONTRACTOR shall remedy any defects due to faulty materials or workmanship which shall appear within a period of one year from the date of OWNER acceptance of the Work hereunder and pay for any damage to other Work resulting therefrom. The OWNER shall give notice of observed defects with reasonable promptness. The CONTRACTOR's warranty hereunder is in addition to, and not in limitation of, any obligations found elsewhere in the Contract Documents, any special guarantees provided by the CONTRACTOR, and any obligations imposed by law.
- B. In addition to the above requirements, the CONTRACTOR shall assign material and equipment guarantees and warranties from all manufacturers and suppliers to the OWNER and deliver copies of such guarantees and warranties and the assignments thereof to the OWNER in order to assure the OWNER of the full benefit of such guarantees and warranties.

1.3 RESTORATION

- A. The CONTRACTOR shall restore and/or replace paving, curbing, sidewalks, gutters, shrubbery, bushes, ornamental trees, fences, sod or other disturbed surfaces and structures to a condition equal to that before the Work began and to the satisfaction of the ENGINEER and property owners for the project location and shall furnish all labor and materials incidental thereto. If in restoring improved surfaces, new pavement is required, no permanent bituminous top paving shall be placed within twenty (20) days, or other specified time frame required by law, after the backfilling shall have been completed, except by order of the ENGINEER. Temporary paving will be installed prior to the placement of permanent surfaces when required by the ENGINEER or by any federal, state or local governing body having jurisdiction over the site where the work is being performed. In any event, all permanent bituminous top paving shall be

placed within forty-five (45) days or other specified time after the backfill has been completed unless otherwise ordered by the ENGINEER.

1.4 MAINTENANCE OF SURFACES

- A. Following the certification of substantial completion by the ENGINEER, the CONTRACTOR shall, unless otherwise stipulated by the ENGINEER, maintain the surfaces of paved and unpaved trenches and adjacent curbs and gutters, sidewalks, fencing, lawns, sod and other disturbed surfaces for a period of one (1) year thereafter or as required by state, county or local authorities. All material and labor required for the maintenance of the trench surfaces and structures shall be supplied by the CONTRACTOR. The work shall be done in a manner and timing satisfactory to the ENGINEER. Any subsidence occurring over the trench or other excavated area shall, upon notification, be promptly brought back to an even grade and the appropriate original surface placed thereon. Such restoration will be required when the subsidence presents an inconvenience or concern to the property owner, or results in pooling of water or erosion. For lawn areas, if subsidence and related restoration occur during periods not acceptable for reseeding, temporary erosion control measures (burlap matting or similar material acceptable to the ENGINEER) shall be placed until the season is acceptable for seeding.

PART 2 - PRODUCTS

- A. Not Used.

PART 3 - EXECUTION

- A. Not Used.

END OF SECTION 01700

SECTION 02300 - EARTHWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of earth is as indicated on drawings or as required as a part of the proposed improvements.
- B. Preparation of subgrade for structural footings and foundations, building slabs, walks, and pavements is included as a part of this work.
- C. Drainage fill course for support of building slabs is included as a part of this work.
- D. Backfilling of trenches within building lines is included as a part of this work.
- E. Site work related to cut and/or fill activities is included as a part of this work.
- F. Excavation for Mechanical/Electrical Work: Excavation and backfill required in conjunction with underground mechanical and electrical utilities, and buried mechanical and electrical appurtenances is included as work of this section.
- G. Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal and/or regrading of materials removed.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service: Employ, at CONTRACTOR's expense, testing laboratory to perform soil testing and inspection service for quality control testing during earthwork operations.

1.4 SUBMITTALS

- A. Test Reports-Excavating: Upon request, submit the following reports directly to ENGINEER from the testing services, with copy to CONTRACTOR:
 - 1. Test reports on borrow material
 - 2. Field density test reports
 - 3. One optimum moisture-maximum density curve for each type of soil encountered

4. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested

1.5 JOB CONDITIONS

- A. Site Information: Any data available on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that OWNER will not be responsible for interpretations or conclusions drawn therefrom by CONTRACTOR.
- B. The CONTRACTOR may make test borings and/or other exploratory operations at no additional cost to OWNER.
- C. Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
- D. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- E. Do not interrupt existing utilities serving facilities occupied and used by OWNER or others, during occupied hours, except when permitted in writing by ENGINEER and then only after acceptable temporary utility services have been provided.
- F. Provide minimum of 48-hour notice to ENGINEER, and receive written notice to proceed before interrupting any utility.
- G. Demolish and completely remove from site existing underground utilities indicated or otherwise required to be removed. Coordinate with utility companies for shut-off of services if lines are active.
- H. Use of Explosives: The use of explosives is not permitted.
- I. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
- J. Operate warning lights and provide traffic control as required by authorities having jurisdiction.
- K. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- L. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or "dryout" to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

- M. Replace any trees, as necessary, within maintained lawn area or as indicated on the plans if removed.
- N. Decorative landscaping (stone, rock, timbers, yard ornaments, etc), bushes, trees, mailboxes, signs, yard lights shall be maintained as necessary, or replaced if damaged, within maintained lawn areas or as indicated on the plans if removed.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory soil materials are defined as those complying with ASTM D2487, latest edition, soil classification Groups GW, GP, GM, SM, SW and SP.
- B. Unsatisfactory soil materials are defined as those complying with ASTM D2487, latest edition, soil classification groups GC, SC, ML, MH, CL, CH, OL, OH and PT.
- C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.
- D. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.
- E. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter.

PART 3 - EXUCUTION

3.1 EXCAVATION

- A. Excavation is Unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Excavation Classifications: The following classifications of excavation will be made when rock excavation is encountered in work.
- C. Earth Excavation includes excavation of pavements and other obstructions visible on ground surface; underground structures, utilities and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.
- D. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42" wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90 HP flywheel power and 30,000 lb. drawbar pull.

Trenches in excess of 10'-0" in width and pits in excess of 30'-0" in either length or width are classified as open excavation.

- E. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modern track-mounted heavy-duty excavating equipment without drilling, blasting or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170HP flywheel power and developing 40,000-lb. break-out force (measured in accordance with SAE J732C).
- F. Typical of materials classified as rock are boulders 1/2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
- G. Rock Excavation shall be paid for using unit prices indicated in the bid documents. The Bidding Contractors are responsible for soil borings, spot excavations, etc. as they deem necessary to further quantify the rock extents. **NO ADDITIONAL PAYMENTS WILL BE MADE FOR ROCK REMOVAL.**
- H. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of ENGINEER. Unauthorized excavation, as well as remedial work directed by ENGINEER, shall be at CONTRACTOR's expense.
- I. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to ENGINEER.
- J. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by ENGINEER.
- K. Additional Excavation: When excavation has reached required subgrade elevations, notify ENGINEER who will make an inspection of conditions.
- L. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by ENGINEER.
- M. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Adherence to all IOSHA requirements shall be the sole responsibility of the CONTRACTOR.
- N. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- O. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

- P. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
- Q. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
- R. Provide permanent steel sheet piling or pressure creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops as required and leave permanently in place.
- S. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
- T. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- U. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.
- V. Material storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape all stockpiles for proper drainage. Adhere to all permitting agency requirements for storage.
- W. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
- X. Dispose of excess soil material and waste materials as herein specified.
- Y. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
- Z. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
- AA. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

- BB. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.
- CC. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
- DD. Where rock is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of No. 8 stone or sand as indicated in the plan details prior to installation of pipe. After installation of pipe, backfill with material as indicated in the plans.
- EE. For pipes or conduit 5" or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
- FF. For pipes or conduit 6" or larger in nominal size, tanks and other mechanical/electrical work indicated to receive subbase, excavate to subbase depth indicated, or, if not otherwise indicated, to 6" below bottom of work to be supported.
- GG. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is not less than 4'-0" below finished grade.
- HH. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.
- II. Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing. Concrete is specified in Division 3.
- JJ. Do not backfill trenches until tests and inspections have been made and backfilling authorized by ENGINEER. Use care in backfilling to avoid damage or displacement of pipe systems.
- KK. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 deg F (1 deg C).

3.2 COMPACTION

- A. Control soil compaction during construction providing minimum percentage of density specified for each area classification as indicated below.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) and for soils which will not exhibit a

well-defined moisture-density relationship (cohesionless soils) determined in accordance with ASTM D1557, latest revision.

- C. Structures, Building Slabs and Steps, Pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum density for cohesive material or 98% relative density for cohesionless material.
- D. Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 85% maximum density for cohesive soils and 90% relative density for cohesionless soils.
- E. Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 95% maximum density for cohesive material or 95% relative density for cohesionless material.
- F. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
- G. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- H. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.3 BACKFILL AND FILL

- A. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below or as otherwise indicated or shown on construction drawings.
 - 1. In excavations, use satisfactory clean excavated or borrow material
 - 2. Under grassed areas, use satisfactory clean excavated or borrow material
 - 3. Under walks and pavements, use subbase material, or satisfactory excavated or borrow material, or combination of both.
 - 4. Material and material placement shall meet the current standards of the Indiana Department of Transportation (INDOT). Granular backfill shall meet the gradation requirements of INDOT Specification Section 904.05
 - 5. Under steps, use subbase material
 - 6. Under building slabs, use drainage fill material
 - 7. Under piping and conduit, use material in accordance with the plans and other sections of these specifications
- B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation
 2. Inspection, testing, approval, and recording locations of underground utilities
 3. Removal of concrete formwork
 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials
 5. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 6. Removal of trash and debris
 7. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
- C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
- D. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- E. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.
- F. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- G. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

3.4 GRADING

- A. Uniformly grade all areas within the limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- B. In areas adjacent to building lines grading shall promote drainage away from structures and to prevent ponding.
- C. Finish surfaces free from irregular surface changes, and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevations.
 2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.
 3. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation. For 10' width or greater pavement widths, the Contractor shall provide auto-leveling equipment capable of performing proper installation.
- D. Grade surface of fill under building slabs smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.
- E. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.5 PAVEMENT SUBBASE COURSE

- A. Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.
- B. See other Division 2 sections for paving specifications.
- C. During construction, maintain lines and grades including crown and cross-slope of subbase course.
- D. Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12" width of shoulder simultaneously with compacting and rolling of each layer of subbase course.
- E. Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
- F. When a compacted subbase course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.6 FIELD QUALITY CONTROL

- A. Quality Control Testing during Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
- B. Perform field density tests in accordance with ASTM D1556, (sand cone method), ASTM D2167 (rubber balloon method), or ASTM D6938 (nuclear method) as applicable.

- C. Structural Areas Subgrade: Make at least one field density test of subgrade for every 2000 sq. ft. of paved area, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlaying structural or paved area, but in no case less than 3 tests per structure.
- D. If in opinion of the ENGINEER, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, provide additional compaction and testing at no additional expense to the OWNER. Testing requirements can be re-enacted at any time if in the opinion of the ENGINEER the methods or materials or end-results have changed.

3.7 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.
- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible. If settlement below structures occurs, the CONTRACTOR will provide a written report to the OWNER detailing the proposed corrective measures to be taken. All corrections for settlement within the warranty period shall be done at no additional cost to the OWNER. If the CONTRACTOR does not repair the settled areas within a reasonable period in the opinion of the OWNER and ENGINEER, the OWNER may elect to utilize a portion of the Contractor's Contract total to make the necessary corrections.

3.8 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it beyond the right-of-way and the private property within the project limits.

END OF SECTION 02300

SECTION 02400 -SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 1 and Division 2 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of sanitary sewer work is shown on drawings. Work includes trench excavation, bedding, pipe installation, backfill, and testing.

1.3 SUBMITTALS

- A. Shop drawings and manufacturer's literature shall be submitted to the ENGINEER for approval in accordance with Section 01300.

PART 2 - PRODUCTS

2.1 INTRODUCTION

- A. The following section provides a description of materials acceptable for the construction of gravity sanitary sewers and their appurtenances. Use of other materials not specified herein will be allowed only with the written approval and authorization of the ENGINEER and OWNER. Materials shall be as specifically indicated on the plans. If a discrepancy exists, the plans shall govern.

2.2 GRAVITY SANITARY SEWERS

- A. The ENGINEER currently allows the use of the following pipe materials meeting or exceeding the minimum requirements/specifications set forth herein for the construction of gravity sanitary sewers:
 - 1. Polyvinyl Chloride Pipe (PVC)
- B. In general, all gravity sanitary sewer pipes shall be the bell and spigot type with elastomeric seal joints and smooth interior walls meeting or exceeding all requirements set forth in the latest ASTM Standard referenced herein.
- C. Each length of pipe shall be marked per the requirements of the respective ASTM standard.

- D. The CONTRACTOR at his own expense shall furnish the ENGINEER with copies all material tests required by the applicable ASTM standards and manufacturer's certification stating that the pipe supplied meets or exceeds all requirements of the applicable ASTM standards and these specifications.

2.3 POLYVINYL CHLORIDE PIPE (PVC)

- A. Material: Polyvinyl chloride (PVC) gravity sanitary sewer pipe shall be the integral wall bell and spigot type with elastomeric seal joints and smooth inner walls meeting or exceeding all of the requirements set forth in ASTM D-3034. Where noted, PVC material shall be pressure rated SDR-21 complying with ASTM D-2241 or DR-18 complying with AWWA C900.
1. Pipe shall have a minimum cell classification of 12454 as defined in ASTM D-1784.
 2. The minimum wall thickness for PVC sewer pipe and lateral sewer pipe shall conform to SDR-35/PS46 as specified in ASTM D-3034.
 3. PVC sanitary sewer pipe shall have a minimum pipe stiffness of 46 psi for each diameter when measured at 5% vertical ring deflection and tested in accordance with ASTM D-2412.
- B. PVC Gravity Sewer Pipe Joints: Flexible gasketed joints shall be compression type so that when assembled, the gasket inside the bell will be compressed radially on the pipe spigot to form a watertight seal. The assembly of joints shall be in accordance with the pipe manufacturer's recommendation and ASTM D-2321. The gaskets sealing the joint shall be made of rubber of special composition having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five (5) years experience in the manufacture of rubber gaskets for pipe joints. The gasket shall be a continuous ring of flexible joint rubber of a composition and texture which is resistant to common ingredients of sewage, industrial wastes and groundwater, and which will endure permanently under the conditions likely to be imposed by this service. The gasket shall conform to the requirements of ASTM F-477. The joint design for pressure rated pipe conforms to the requirements of ASTM D-3139.
- C. All field-cutting of pipe shall be done in a neat, trim manner using a hand or power saw, and the cut end shall be beveled using a file or wheel to produce a smooth bevel of approximately 15° and be a minimum depth of one-third the pipe wall thickness. Field cut pipe will only be allowed to be installed at manholes, at prefabricated tees and wyes, and at the connection of new sanitary sewer to existing sanitary sewer. Insertion line(s) shall be re-marked using an uncut stick of pipe from the same manufacturer as a template.
- D. PVC Gravity Sewer Pipe Fittings: Only manufactured fittings made of PVC plastic having a cell classification of 12454 as defined in ASTM D-1784. All PVC fittings shall be SDR-26 heavy wall type fittings. Saddle connections shall not be allowed for new construction.

- E. PVC Gravity Sewer Markings: The date of manufacture, cell class of pipe, specification, stiffness designation (or SDR), size of pipe, name or trademark of manufacturer, and identification of plant/location shall be legibly marked on the outside of each pipe section in accordance with the ASTM D-3034.

PART 3 - EXECUTION

3.1 LAYING PIPING

- A. Installation shall be in accordance with ASTM D-2321, manufacturer's requirements, and as indicated on the plans and specified herein.
- B. The CONTRACTOR shall provide proper implements, tools, and facilities for the safe and expeditious prosecution of the work.
- C. Every pipe, fitting, and valve shall be cleaned of all debris, dirt, and other foreign material before being laid and shall be kept clean until accepted in the completed work.
- D. Lay and maintain pipe to the lines shown on the drawings, except as specified in this Article. Lay and maintain pipe to the grade shown on the drawings or to the minimum depth specified in this Article. Install fittings and valves in the locations shown on the drawings.
- E. Where the piping is to be constructed parallel to and close to existing buried utilities, the exact location of which is unknown, adjust the alignment of the piping to least interfere with these utilities, unless otherwise shown or specified. All desired field adjustments must be approved by the ENGINEER and OWNER.
- F. Proposed sewers shall be laid at least ten feet horizontally from any existing or proposed potable water piping. Proposed potable water piping shall be laid at least ten feet horizontally from any existing or proposed sanitary sewer or sewage force main. The distance shall be measured from edge of pipe to edge of pipe. Proposed or existing potable water piping crossing proposed or existing sanitary sewers or sewage force mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the potable water piping and the outside of the sewer force main. The 18-inch separation shall apply whether the potable water piping is over or under the sewer or force main. Lay potable water piping at crossings of sewers and force mains so a full length of pipe is centered on the sewer.
- G. Do not lay pipe in water or when the trench or weather conditions are unsuitable for proper installation.
- H. Lower pipe, fittings, and valves into the trench by hand, by means of hoists or ropes, or by other suitable tools or equipment that will not damage products, coatings, or linings. Do not drop or dump pipe, fittings, or valves into the trench.

- I. Open excavation shall be satisfactorily protected at all times. At the end of each day's work, the open ends of all pipes shall be protected against the entrance of animals, children, earth, or debris by bulkheads or stoppers and shall be properly backfilled. The bulkheads or stoppers shall be perforated to allow passage of water into the installed pipeline to prevent flotation of the pipeline. Any earth or other material that may find entrance into the main sewer or into any lateral sewer through any such open end of unplugged branch must be removed at the CONTRACTOR's expense. The cost of all such plugs, and the labor connected therewith, must be included in the regular bid for the sewers.

3.2 PIPE BEDDING AND HAUNCHING

- A. Each pipe section shall be laid in a firm foundation of bedding material and haunched and backfilled with care.
- B. Prior to pipe installation, carefully bring bedding material to grade along the entire length of pipe to be installed. To provide adequate support for the pipe, the following bedding procedures are required.
- C. Take care with bedding material to provide uniformly compacted bedding. Excavate the bedding material or place it to a point above the pipe bottom, determining such point by the depth of loose material resulting in the preparation of the bedding and the amount of compaction that will be required to bring the material to grade. Use hand or mechanical tamping to compact the bedding material to a minimum 85% Standard Proctor Density or as specified on the plans.
- D. Slightly damp material will generally result in a maximum compaction with a minimum of effort. If water is added to improve compaction or if water exists in the trench, take care to avoid saturation of backfill material, which could result in the loss of stability. Check grade of bedding after compaction.
- E. In yielding subsoils, the trench bottom shall be undercut to the depth necessary and backfilled with graded, crushed stone to form a firm foundation. No additional payment shall be made for stabilizing yielding subsoils.
- F. Where excavation occurs in rock or hard shale, the trench bottom shall be undercut and a minimum of 6 inches crushed stone bedding placed prior to pipe installation. No additional payments shall be made for rock removal.
- G. Bell holes shall be excavated in advance of pipe laying so the entire barrel will bear uniformly.
- H. Pipe shall be bedded in accordance with the plans.

3.3 TESTING PROCEDURES

- A. The CONTRACTOR shall schedule all tests with the ENGINEER to allow a representative of the ENGINEER to be present and witness the tests. Unwitnessed tests

will not be accepted. The CONTRACTOR shall test the system prior to scheduling the ENGINEER's presence to ensure any defective work or faulty test equipment has been corrected. CONTRACTOR shall be responsible for costs of the ENGINEER and OWNER to witness retests of failed sewer segments.

3.4 LOW PRESSURE AIR TEST

A. All gravity sanitary and plant drain sewers shall be tested for infiltration by means of low-pressure air test as generally described herein. Any other infiltration test procedure will only be allowed following the submittal of the procedure for review and upon written approval by the ENGINEER and OWNER.

B. Equipment

1. The CONTRACTOR shall be responsible for providing all equipment and supplies necessary for the performance of a Low Pressure Air Test including but not limited to the following: mechanical or pneumatic plug, air control panel, shut-off valve, pressure regulative valve, pressure relief valve, and input pressure gauge.
 - i. The pressure regulator or relief valve set shall be set no higher than 9 psig to avoid over pressurization. Continuous monitoring pressure gauge having a range of 0 to at least 10 psi. The gauge shall be no less than 4 inches in diameter with minimum divisions of 0.10 psi and an assurance of ± 0.04 psi.
 - a. To reduce the potential for sewer line over-pressurization, two (2) separate hoses shall be used to: (1) connect the control panel to the sealed line for introducing low pressure air, and (2) a separate hose connection for constant monitoring of air pressure buildup in the line.
 - b. If pneumatic plugs are utilized, a separate hose shall be required to inflate the pneumatic plugs.

C. Test Procedure

1. Following are general procedures to be employed in the performance of the test.
 - i. Plug Installation and Testing
 - a. After a segment of pipe has been backfilled to final grade, prepared for testing, and the specified waiting period has elapsed, the plugs shall be securely placed in the line at the end of each segment to be tested.
 - b. It is advisable to seal test all plugs before use. Seal testing may be accomplished by laying one length of pipe on the ground and sealing it at both ends with the plugs to be checked. The sealed pipe should be pressurized to 9 psig. The plugs shall hold against this pressure without bracing and without any movement of the plugs out of the pipe. No persons shall be allowed in the alignment of the pipe during plug testing.
 - c. It is advisable to plug the upstream end of the line first to prevent any upstream water from collecting in the test line. This is particularly important in high groundwater situations.

- d. When plugs are being placed, the pipe adjacent to the manhole shall be visually inspected to detect any evidence of shear in the pipe due to differential settlement between the pipe and the manhole. A probable point of leakage is at the junction of the manhole and the pipe. This fault may be covered by the pipe plug, and thus not revealed by the air test.

D. Line Pressurization

1. Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any groundwater above the pipe, but not greater than 9.0 psig.

E. Pressure Stabilization

1. After a constant pressure of 4.0 psig is reached, the air supply shall be throttled to maintain that internal pressure for at least 2 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall.

F. Timing Pressure Loss

1. When Temperatures have been equalized and the pressure stabilized at 4.0 psig (greater than the average groundwater back pressure), the air hose from the control panel to the air supply shall be shut off or disconnected.
2. A predetermined required time for a specified pressure drop shall be used to determine the line's acceptability. Traditionally, a pressure drop of 1.0 psig has been specified. However, other pressure drop values may be specified, provided that the required holding times are adjusted accordingly. If the specified pressure drop is 0.5 psig rather than the traditional 1.0 psig, then the required test times for a 1.0 psig pressure drop must be halved. Specifying a 0.5 psig pressure drop is desirable in that it can reduce the time needed to accomplish the air test without sacrificing test integrity.

G. Determination of Line Acceptance

1. If the time calculated by the equation in section K.1 below, for the designated pipe size and length, elapses before the air pressure drops 1.0 psig (or 0.5 psig), the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued once the prescribed time has elapsed even though the 1.0 psig (or 0.5 psig) drop has not occurred.

H. Determination of Line Failure

1. If the pressure drops 1.0 psig (or 0.5 psig) before the calculated time has elapsed, the air loss rate shall be considered excessive, and the section of pipe shall be determined to have failed the test.

I. Test Times

1. Test Time Criteria

- i. The Ramseier test time criteria required that no test section shall be accepted if it loses more than "Q" cubic feet per minute per square foot of internal pipe surface area for any portion containing less than 625 square feet internal pipe surface area. The total leakage from any test section shall not exceed 625 Q cubic feet per minute.

J. Allowable Air Loss Rate

1. A "Q" value of 0.0015 cubic feet per minute per square foot shall be utilized to assure the OWNER of quality pipe materials, good workmanship, and tight joints.

K. Test Time Calculation

1. All test times shall be calculated using Ramseier's equation:

$$T = (0.085) (D * K)/Q$$

Where: T = Shortest time, in seconds, allowed for the air pressure to drop 1.0 psig

K = 0.000419 DL, but not less than 1.0,

Q = 0.0015 cubic feet/minute/square feet of internal surface,

D = Nominal pipe diameter in inches, and

L = Length of pipe being tested in feet

2. For more efficient testing of long test sections and/or sections of larger diameter pipes, a timed pressure drop of 0.5 psig may be used in lieu of the 1.0 psig timed pressure drop. If a 0.5 psig pressure drop is used, the appropriate required test times shall be exactly half as long as those obtained using Ramseier's equation for "T" cited above.

3.5 MANDREL TEST FOR SELECT PIPE

- A. A five (5) percent "GO-NO-GO" Mandrel Deflection Test shall be performed on all flexible gravity sanitary sewer pipe (PVC, PP, etc.).
- B. These pipes shall be mandrelled with a rigid device sized to pass five percent (5%) or less deflection (or deformation) of the base inside diameter of the pipe. The mandrel test shall be conducted no earlier than thirty (30) days after reaching final trench backfill grade, provided that in the opinion of the ENGINEER sufficient water densification or rainfall has occurred to thoroughly settle the soil throughout the entire trench depth. If densification, in the opinion of the ENGINEER, has not been achieved within the thirty (30) day time frame, the mandrel size shall be increased to measure a deflection limit of three percent (3%).
- C. The mandrel (GO-NO-GO) device shall be cylindrical in shape and constructed with nine (9) or ten (10) evenly spaced arms or prongs. Mandrels with fewer arms shall not be allowed due to being insufficiently accurate. The mandrel diameter dimension "D"

shall be equal to the inside diameter of the sanitary sewer. Allowances for pipe wall thickness tolerances or ovality (from heat, shipping, poor production, etc.) shall not be deducted from the "D" dimension but shall be counted as part of the 5% or lesser deflection allowance. Each pipe material/type required to be Mandrel tested shall be tested with a mandrel approved by the pipe manufacturer and meeting the requirements of this Section. The "D" mandrel dimension shall carry a tolerance of ± 0.01 inches.

- D. The mandrel shall be hand pulled through all sewer lines and any section of sewer not passing the mandrel shall be uncovered, replaced or repaired to the ENGINEER's satisfaction and retested.
- E. The contact length (L) shall be measured between points of contact on the mandrel arm. The length shall not be less than that required by the ENGINEER.
- F. The CONTRACTOR shall provide proving rings to check the mandrel. Drawings of mandrels with complete dimensions shall be furnished by the CONTRACTOR to the ENGINEER upon request for each diameter and specification of pipe.

3.6 CCTV INSPECTION

- A. All sanitary sewers shall be cleaned and inspected by closed-circuit television (CCTV) prior to final acceptance. CCTV inspection shall be performed in accordance with NASSCO PACP standards. Video and inspection logs shall be submitted to the ENGINEER for review. Any deficiencies identified shall be corrected and the affected sections re-inspected at no additional cost.
- B. Where sanitary sewers are connected to active service laterals impacting the ability to perform the low-pressure air test, the CONTRACTOR may request approval from the ENGINEER to accept the post installation CCTV inspection of the sanitary sewer in lieu of the low-pressure air test. The mandrel deflection test shall still be completed in accordance with this specification.

END OF SECTION 02400

SECTION 02500 – SANITARY MANHOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section. Sanitary manholes shall comply with all applicable requirements of 327 IAC 3-6-16.

1.2 DESCRIPTION OF WORK

- A. Extent of sanitary manhole installation is shown on Drawings. Work includes excavation, bedding, manhole installation, connections, backfill, and testing.

1.3 SUBMITTALS

- A. Shop drawings and manufacturer's literature shall be submitted to the ENGINEER for approval in accordance with Section 01300.

PART 2 - PRODUCTS

2.1 TYPES OF MANHOLE CONSTRUCTION

- A. The ENGINEER will accept/allow either Monolithic (Cast-in-Place) and/or Precast manholes conforming to the specifications herein.

2.2 MONOLITHIC (CAST-IN-PLACE) MANHOLES

- A. Should a CONTRACTOR elect to build monolithic manholes, shop drawings showing at a minimum the concrete mix, steel reinforcement details, pipe connections and manhole dimensions shall be submitted to the ENGINEER for approval of each structure to be built. The shop drawings are to be reviewed and certified by a Professional Engineer registered in the State of Indiana prior to submittal to the ENGINEER. Verification of pipe sizes and depths as well as grade shall be the CONTRACTOR's responsibility prior to manufacture of structures.

2.3 PRECAST MANHOLES

- A. Precast reinforced concrete manholes including bases, risers/barrels, cones and flat slabs shall be constructed of either wet or dry cast Class A concrete meeting or exceeding the requirements of ASTM C478, latest revision.
- B. Precast reinforced concrete manholes shall be manufactured, tested and marked in accordance with ASTM C478.

- C. The manhole precaster shall adequately size and design structures for the proposed penetrations. Manhole size shall be increased as necessary to allow proper installation without damage to the structure.
- D. Precast manholes shall be constructed with the base and the first riser section as one complete precast unit.
- E. Where used, precast manhole cones shall be the eccentric cone type.
- F. No "see through" lift holes shall be allowed on precast concrete manholes 48 inches in diameter or less. All lift holes shall be thoroughly wetted and completely filled with non-shrink mortar or epoxy grout; then smoothed and covered, both inside and out, with a trowelable grade butyl rubber base backplaster material to ensure water tightness.
- G. All joints between precast manhole elements shall be made with an approved rubber gasket in accordance with ASTM C443, latest edition, and a 1/2-inch diameter non-asphaltic mastic (Kent Seal or approved equal) conforming to AASHTO M-198 and Federal Specifications SS-521-A.
- H. All manhole sections shall be steam or heat-and-water-mist cured and shall not be installed until at least five (5) days after they are cast.
- I. The CONTRACTOR shall field apply a waterproof coating (ConSeal CS-1200, CS-1800, or approved equal) to the entire exterior surface of all sanitary manhole structures prior to backfill. Factory applied waterproof coatings may be accepted by the ENGINEER, but the CONTRACTOR shall physically seal the joints and any damaged coating areas following the placement of the structure.

2.4 MANHOLE BASES, INVERTS AND FLOW CHANNELS/BENCH WALLS

- A. Monolithic or Precast manhole bases shall be of 6" minimum thickness for 48" diameter and 8" minimum thickness for larger diameters, and shall be constructed of Class A concrete having a minimum compressive strength of 4,000 psi, in accordance with ASTM C478.
- B. The bottom invert of all pipe entering a manhole shall be at least three (3) inches above the top of the base slab so that the finished sewer channel may be installed and shaped. The installation of the final sewer channel may be done at the point of fabrication of the precast base or cast-in-place.
- C. The flow channels within manholes shall be an integral part of the precast base. The channels shall be shaped and formed for a clean transition with proper hydraulics to allow the smooth conveyance of flow through the manhole. Slope through each manhole shall comply with that indicated in the plans. The bench wall shall be formed to the crown of the inlet and outlet pipes to form a "U" shaped channel. The bench wall shall slope back from the crown at minimum 1/2 inch per foot to the manhole wall.

- D. For connections to existing manholes, flow channels shall be required and shaped as if it were a new manhole.

2.5 ADJUSTING RINGS

- A. Where one (1) solid riser or barrel section cannot be used, final adjustments in elevation of the frame and cover shall only be accomplished by the use of precast concrete adjusting rings conforming to ASTM C478. Riser rings other than those specified may be accepted based upon written approval of the ENGINEER.
- B. Rings shall be of a nominal thickness of not less than four (4) inches and not more than twelve (12) inches total of adjusting rings shall be allowed for adjustment of the manhole frame and cover to required elevation.
- C. A watertight seal shall be provided between the cone and riser ring, each adjoining riser ring and riser ring and casting by the use of two (2) rows of 1/2 inch extrudable preformed gasket material. Adjusting rings shall be manufactured with a keyway to prevent lateral movement.
- D. As an alternative to adjusting rings, a cast-in-place section may be used.

2.6 CASTING, FRAME AND COVER

- A. All castings shall conform to the following requirements:
 - 1. Casting shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion or other defects. They shall be smooth and well cleaned by shot blasting or other approved method.
 - 2. Casting shall be imprinted with the words "SANITARY SEWER" on the lid. Minimum letter height shall be 1.5 inches.
 - 3. All casting lids shall be provided with watertight, concealed pickholes. Casting lids with open pickholes will not be accepted.
 - 4. All manhole casting frames and lids shall be provided with a gasketed "Self-Sealing" application.
- B. The standard type of frame and cover to be used shall be Neenah R-1772, or approved equal with machined bearing surface. Where indicated in the plans, the frame and cover shall be of watertight design Neenah R-1916-C, or approved equal.

2.7 MANHOLE STEPS

- A. Manhole steps shall be polypropylene; polypropylene coated steel reinforcing or an approved non-corrosive fiberglass material. The copolymer polypropylene shall meet the requirements of ASTM D4101 reinforced with deformed 3/8-inch minimum diameter reinforcing steel conforming to the requirements of ASTM A615, Grade 60. Cast Iron steps are not acceptable. Manhole steps shall be 12" on center (maximum), no more than 24" from the top of casting, and no more that 24" from the lowest invert elevation.

2.8 PIPE-TO-MANHOLE CONNECTIONS

- A. The connectors shall meet or exceed the requirements of ASTM C923 “Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals”, latest edition. A gasketed, flexible, and watertight connection shall be provided between all pipes entering/leaving the manhole and the manhole walls where shown on the plans. The connector shall be provided at the appropriate size(s), dimension(s) and diameter(s) for the planned use, in accordance with manufacturer recommendations. All steel connection bands/clamps shall be made of non-magnetic 304 stainless steel, as necessary. The connectors shall be installed in accordance with the manufacturer’s recommendations. Acceptable connections include: Kor-N-Seal 1 or 2; cast-in-place Dura-Seal gasket; “A”-LOK or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Manhole sections shall contain manhole steps accurately positioned and embedded in the concrete.
- B. No more than two lift holes may be cast or drilled in each section. No “See Through” lift holes will be allowed in precast concrete manholes 48” diameter or less.
- C. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of the barrel.
- D. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.
- E. The tops of the bases shall be suitably shaped by means of accurate bell-ring forms to receive the barrel sections.
- F. Excavating for manholes shall be of sufficient size to adequately accommodated installation and proper centering and for compacting backfill.
- G. Floors and channels of the manholes shall be constructed of concrete as shown on the plans and as specified. The floor of the manholes shall be shaped to provide a slope of at least 1/2" per foot from manhole sides to main sewer channels and shall be wood float finished to provide a smooth and well-drained surface.

3.2 SETTING PRECAST MANHOLE SECTIONS

- A. Precast-reinforced concrete manhole sections shall be set vertical and with sections and steps in true alignment.

- B. Rubber gaskets and non-asphaltic mastic shall be installed in all joints in accordance with the manufacturer's recommendations.
- C. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or with no shrink mortar. The mortar shall be one part hydraulic cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces. The hole repair areas shall be waterproofed in accordance with these specifications.

3.3 SETTING FRAMES AND COVERS

- A. Manhole frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface or as indicated on the plans or as directed. Frames shall be set concentric with the top of the masonry and on a double row of non-asphaltic mastic and made watertight.
- B. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on top of the bottom flange. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.
- C. Manhole covers shall be left in place in the frames on completion of other work at the manholes.

3.4 MANHOLE TESTING REQUIREMENTS

- A. All sanitary manholes installed in this project shall be air tested in accordance with ASTM C1244, *Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test* to insure water tightness and integrity. Tests shall be conducted prior to acceptance and placement into service. The CONTRACTOR shall notify the OWNER and ENGINEER prior to test and no test results will be accepted unless witnessed by the OWNER's Representative and/or the ENGINEER's Representative. All testing costs for equipment, labor, etc. shall be included in the CONTRACTOR's bid price to the OWNER. Any manholes failing the test shall be corrected in a manner acceptable to the ENGINEER and shall be retested by the CONTRACTOR until satisfactory test results are achieved. The CONTRACTOR shall be responsible for any costs incurred by the OWNER and ENGINEER for testing of failed manholes.
- B. The procedure for testing shall be in accordance with the following steps:
 - 1. Each manhole shall be tested immediately after assembly and prior to backfilling if possible. If the CONTRACTOR elects to perform tests after backfilling, he shall be responsible for re-excavation to locate and correct any leaks that may be necessary.
 - 2. All lift holes shall be plugged with non-shrink grout.
 - 3. All pipes entering the manhole shall be plugged and adequately braced within the manhole.

4. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.
5. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off.
6. The time for the vacuum to drop from 10 inches to 9 inches of mercury shall be measured. The manhole shall pass if the following times are exceeded:

Manhole Size	Minimum Time for Drop
42"	52 seconds
48"	60 seconds
60"	78 seconds
72"	98 seconds

- i. This table governs the size of manholes referenced to depths up to 24 feet. If larger diameter or deeper manholes are tested, compliance shall be measured in accordance with TABLE 1 of ASTM C1244 or as otherwise directed by the OWNER's Representative.
- C. The OWNER's Representative shall witness all tests. All equipment used shall be specifically designed for the purpose of testing manholes. If a test fails, corrections shall be made and the manhole shall be retested until a satisfactory test is achieved. No manhole shall be placed into service or accepted by the OWNER until it has passed the testing requirement.

END OF SECTION 02500

SECTION 02530 – FORCE MAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including but not limited to General and Supplementary Conditions, Division 1 Specification sections, and Division 2 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The CONTRACTOR shall provide all investigation, planning, geotechnical work, equipment, labor, etc. necessary to properly install the proposed sewers and force mains as indicated in these bid documents.

1.3 SUBMITTALS

- A. Shop drawings and manufacturer's literature shall be submitted to the ENGINEER for approval in accordance with Section 01300.

PART 2 - PRODUCTS

2.1 SANITARY SEWER FORCEMAINS

- A. The ENGINEER currently allows the use of the following pipe materials, meeting or exceeding the minimum requirements set forth herein, for the construction of sanitary sewer forcemains:
 - 1. High-Density Polyethylene Pipe (HDPE)
- B. Each pipe segment shall be clearly marked per the requirement of the respective ASTM, AWWA and/or ANSI Standard.
- C. Each pipe material acceptable for forcemain construction is described in the following individual subsections for ease of discussion and revisions: Materials utilized shall be as specifically shown on the plans.

2.2 RESTRAINTS

- A. Forcemains shall be anchored to resist thrusts that develop at bends, angles, tees, etc. in the forcemain pipe. The magnitude of the forces to be resisted shall be calculated and provided as part of the shop drawing submittal. The required anchorage shall be attained by installing restrained pipe joints, based upon sound engineering practices. Anchorage design at forcemain fittings shall be based on pipeline pressures of at least 50 percent greater than the maximum pump design shut off head plus a water hammer allowance with an appropriate factor of safety. As indicated in the plans, mechanically restrained

joints shall be utilized where appropriate pipe lengths exist to provide for the thrust resistance. Cast-in-place concrete thrust blocks may be accepted where these distances do not exist and where indicated in the plans. Cast-in-place thrust blocks shall be formed and shall be installed to avoid sealing of mechanical fastened joints and fittings. Unless indicated in the plans, Cast-in-place thrust blocks will only be acceptable upon written approval of the ENGINEER. Mechanically restrained joints to be utilized for the project include:

1. Ductile Iron Pipe: Field Lok 350 lock gaskets as manufactured by US Pipe or approved equal.
2. Ductile Iron Mechanical Joints: Series 1100 Megalug as manufactured by EBAA Iron Sales, Inc. or approved equal.
3. C-900 PVC Pipe: Series 2000PV Megalug as manufactured by EBAA Iron Sales, Inc. or approved equal.
4. SDR-21 PVC Pipe: Series 6500 ductile iron retainers as manufactured by EBAA Iron Sales, Inc. or approved equal.

2.3 HIGH DENSITY POLYETHYLENE (HDPE) FORCEMAIN

A. Pipes

1. HDPE forcemain pipe sizes 3" DIPS/4" IPS and larger shall have a manufacturing standard of ASTM F714, while IPS pipe 3" and smaller shall be manufactured to the dimensional requirements listed in ASTM D3035. The pipe shall be ductile iron pipe size (DIPS) for pipe diameters 4" and greater and iron pipe size (IPS) for pipe diameters less than 4". Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) shall be as specified on plans. The minimum pressure class/DR rating acceptable shall be Class 200/DR 11.
2. Pipe material shall be manufactured from a PE 4710 resin. The resin material shall meet the specifications of ASTM D3350 with a minimum cell classification of 445474C or 445574C. HDPE pipe and fittings shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent. The manufacturer of the HDPE resin shall certify the cell classification indicated. The pipe shall be manufactured with a green stripe to indicate sewer application.
3. The pipe fittings shall be pressure rated in accordance with recommendations of the Plastic Pipe Institute. Pressure class and standard dimension ratios (SDR) shall be as follows:
 - a. Class 250: DR 9
 - b. Class 200: DR 11

B. Joints

1. Joints shall be of a heat fusion joining system. Pipe and fittings shall be thermal butt fusion, saddle fusion, or socket fusion according to manufacturer's recommended procedures. At the point of fusion, the outside diameter and minimum wall thickness of the fitting shall match the outside diameter and minimum wall thickness specifications of ASTM F-714 and ASTM D-3035 for the same size pipe.
2. The butt fusion equipment should be capable of meeting all conditions recommended by the manufacturer, including but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 psi. The fusion joining shall produce a joint weld strength equal to or greater than the tensile strength of the pipe itself.
3. The manufacturer shall provide fusion training. The CONTRACTOR and the onsite joint inspector shall be trained by the manufacturer or manufacturer's authorized representative.
4. The fusion equipment and operator shall be required to demonstrate successful field experience. Regarding fusion over 36" capability, the fusion unit shall be field tested for a period of five years and the fusion operator shall have pipe size experience of the same size pipe on this project for five years or longer.

C. Fittings:

1. All fittings shall be provided as indicated on the plans. HDPE fittings shall be of the same material and class as the pipe and shall be manufactured by the manufacturer of the pipe. HDPE elbows, tees, and wyes shall be manufactured by mitered fabrication. The manufacturer shall have a written specification for all standard mitered fittings, which establishes Quality Control criteria and tolerances. The manufacturer may be required to demonstrate its ability to produce product required by this specification.
2. Mechanical joint anchor fittings (MJ Adapter or Harvey Adapter) shall be used to transition from ductile iron to HDPE and from HDPE to PVC. The fitting shall be stronger than the pipe in that when it is subjected to tensile stress the pipe will pull apart before the fitting will pull out and the pipe will blow before the fitting will rupture under pressure.
3. The MJ Adapter shall have a pre-installed stainless-steel stiffener, in accordance with Plastic Pipe Institute (PPI) recommendations, to neutralize point-loading, creep and loss of gasket seal due to diameter contraction. The stiffener shall be engineered sufficiently thick to avoid radial buckling due to gasket pressure.
4. The MJ Adapter requires longer bolts and shall be sold with the modified longer bolt kit to avoid construction crew delays or improper installation with too short bolts.
5. All fittings for low-pressure sanitary sewers, forcemains or pressure rated fittings shall be derated according to the manufacturer's written specifications, and clearly labeled on the fittings as such.

- D. Installation: The installation shall conform to the requirements of the manufacturer, the AWWA Standard, and as indicated on the plans and specified herein.
- E. Marking and Certification: Each length of HDPE sanitary sewer shall be clearly marked with the Manufacturer's Name, Tradename or Trademark, Nominal pipe size, Pipe Stiffness, Production Code/Extrusion Code, Material Cell Class Designation and ASTM number.
- F. The pipe manufacturer shall provide certification that the stress regression testing has been performed on the specific product. The said certification shall include a stress live curve per ASTM D-2837. The stress regression testing shall have been performed in accordance with ASTM D-2837, and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis of 1,600 psi as determined by ASTM D-2837. This certification shall also state that the pipe was manufactured from one specific resin in compliance with these specifications. The certificate shall state the specific resin used and its source.

2.4 TRACER WIRE & IDENTIFICATION/WARNING TAPE

- A. The CONTRACTOR shall install tracing wire and identification ribbon along with mainline pipe installations.
- B. Tracer wire for open-trench installation shall be a 12 AWG solid, soft-drawn, 21% IACS, copper clad steel conductor with an AISI 1006 low carbon steel core (required to meet break load and flexibility) and minimum break load of 282 lbs. Conductor shall have minimum 30 mil, high molecular weight, high density polyethylene (HMW-HDPE) insulation pursuant to ASTM D1248. Insulation color shall meet the APWA color code standard for identification of buried utilities. Tracer wire shall be rated for direct burial use at 30 volts and RoHS compliant. Tracer wire shall be PRO-TRACE® HF-CCS PE30 as manufactured by Pro-Line Safety Products; SUPERFLEX 1230 as manufactured by Copperhead Industries; or approved equal.
 - 1. Tracer wire shall be attached to each pipe at a maximum of 15' intervals to ensure it stays in place during backfill.
- C. Tracer wire for installation via horizontal directional drilling (HDD) shall be minimum two (2) solid, hard-drawn, 21% IACS, copper clad steel (CCS) conductors each with an AISI 1065 high carbon steel core. Conductors shall have minimum 45 mil, high molecular weight, high density polyethylene (HMW-HDPE) insulation pursuant to ASTM D1248. Insulation color shall meet the APWA color code standard for identification of buried utilities. Tracer wire shall be rated for direct burial use at 30 volts and RoHS compliant. Tracer wire shall be PRO-TRACE HDD-CCS PE45 as manufactured by Pro-Line Safety Products; SOLOSHOT EHS as manufactured by Copperhead Industries; or approved equal.
 - 1. Tracer wires shall be attached to each pipe at a maximum of 15' intervals and 180 degrees apart to ensure it stays in place during horizontal directional drilling (HDD).

2. No splices shall be allowed in HDD or pipe bursting installations.
 3. CONTRACTOR shall over-ream the bore as necessary to ensure that the tracer wire is installed successfully with the bore.
 4. CONTRACTOR shall be responsible for performing a continuity test after the bore is completed.
- D. Wire sizes shall be based on HDD length and shall meet the minimum break load as indicated below.

≤ 1,000 LF	12 AWG CCS (2-wires, min 1,330 lb break each)
> 1,000 LF up to 2,000 LF	10 AWG CCS (2-wires, min 1,940 lb break each)
> 2,000 LF up to 3,500 LF	8 AWG CCS (2-wires, min 2,785 lb break each)

- E. At valves, the tracing wire shall be brought to one (1) foot below grade on the outside of the riser. A ½" diameter hole shall be cut in the side of the riser and the tracing wire looped and knotted on the inside of the riser to keep the tracing wire at this elevation. A minimum 12" loop of tracing wire must be left inside of the valve box riser. The tracing wire should continue down the valve box in a continuous run to the pipe on the opposite side of the valve.
- F. The tracing wire shall be installed without buried connections.
- G. Locator signal stations shall be installed so that there is a maximum distance of 1,000 feet between locations in which a signal generator can be used to determine sewer location.
1. A locator signal station shall be required at each side of all bore locations.
 2. Locator signal stations do not need to be placed within 1,000 feet of a valve box in which the tracer wire has been installed as described in this Section, unless required due to bore proximity, where installed within the right-of-way.
 3. Locator signal stations shall be installed within 2 feet horizontally of the right-of-way or easement line to avoid future damage.
- H. The CONTRACTOR will not be required to provide any electronic signal generation equipment or locator devices as a part of this project. The CONTRACTOR will be required to install locate wire and signal stations (for use with the OWNER's equipment) as shown in the plans and specifications.
1. The CONTRACTOR shall also install an identification/warning utility marker tape between 12-inches and 18-inches above and centered over the proposed pipe. In paved areas, the marker tape is to be installed directly under the pavement base. The marker tape shall be 3-inches wide, 4-mm thick and non-detectable. Rolls shall be tied together as necessary in the field to form a continuous tape over the proposed utility line. Utility tape shall say "Caution Sewer Line Buried Below" and be green in color, for sewer lines

PART 3 - EXECUTION

3.1 LAYING PIPING

- A. Installation shall be in accordance with ASTM D-2321, ASTM D-2774, manufacturer's requirements, and as indicated on the plans and specified herein.
- B. The CONTRACTOR shall provide proper implements, tools, and facilities for the safe and expeditious prosecution of the work.
- C. Every pipe, fitting, and valve shall be cleaned of all debris, dirt, and other foreign material before being laid and shall be kept clean until accepted in the completed work.
- D. Lay and maintain pipe to the lines shown on the drawings, except as specified in this Article. Lay and maintain pipe to the grade shown on the drawings or to the minimum depth specified in this Article. Install fittings and valves in the locations shown on the drawings.
- E. Where the piping is to be constructed parallel to and close to existing buried utilities, the exact location of which is unknown, adjust the alignment of the piping to least interfere with these utilities, unless otherwise shown or specified. **The CONTRACTOR shall be completely responsible for protection and replacement of existing utilities and field drainage tiles shown or not shown in the plans. All efforts to protect the integrity of the existing forcemain and utilities shall be the responsibility of the CONTRACTOR.**
- F. Potable water piping shall be at least ten feet horizontally from any existing sanitary sewer or sewage forcemain. The distance shall be measured from edge of pipe to edge of pipe. Proposed potable water piping crossing sanitary sewers or sewage forcemains (or proposed sewers crossing existing watermain) shall be laid to provide a minimum vertical distance of 18 inches between the outside of the potable water piping and the outside of the sewer forcemain. The 18-inch separation shall apply whether the potable water piping is over or under the sewer or forcemain. Lay proposed potable water piping at crossings of sewers and forcemains so a full length of pipe is centered on the sewer pass through or come in contact with any part of a sanitary sewer manhole.
- G. Lay pressure piping to a depth so not less than 5'-0" of cover is provided over all pipe unless otherwise shown. Cover shall be measured as the vertical distance from the top of the pipe to the finish grade elevation or as the shortest distance from the pipe to the nearest finish grade elevation (that is, the diagonal distance from the pipe to the nearest sloped finish grade elevation).
- H. Do not lay pipe in water or when the trench or weather conditions are unsuitable for proper installation.

- I. Lower pipe, fittings, and valves into the trench by hand, by means of hoists or ropes, or by other suitable tools or equipment which will not damage products, coatings, or linings. Do not drop or dump pipe, fittings, or valves into the trench.
- J. Provide thrust restraint in accordance to Section 2.2 of this specification at horizontal and vertical deflection fittings and at tees, plugs, tapping sleeves, and tapping saddles and as indicated in the plans.
- K. Open excavation shall be satisfactorily protected at all times. At the end of each day's work, the open ends of all pipes shall be protected against the entrance of animals, children, earth, or debris by bulkheads or stoppers. The bulkheads or stoppers shall be perforated to allow passage of water into the installed pipeline to prevent flotation of the pipeline. Any earth or other material that may find entrance into the main sewer or into any lateral sewer through any such open end of unplugged branch must be removed at the CONTRACTOR's expense. The cost of all such plugs, and the labor connected therewith, must be included in the regular bid for the sewers.

3.2 PIPE BEDDING AND HAUNCHING

- A. Each pipe section shall be laid on a firm foundation of bedding material and haunched and backfilled with care.
- B. Prior to pipe installation, carefully bring bedding material to grade along the entire length of pipe to be installed. To provide adequate support for the pipe, the following bedding procedures are required.
- C. Take care with bedding material to provide uniform compacted bedding. Excavate the bedding material or place it to a point above the pipe bottom, determining such point by the depth of loose material resulting in the preparation of the bedding and the amount of compaction that will be required to bring the material to grade. Use hand or mechanical tamping to compact the bedding material to a minimum 85% Standard Proctor Density.
- D. Slightly damp material will generally result in a maximum compaction with a minimum of effort. If water is added to improve compaction or if water exists in the trench, take care to avoid saturation of Class II material, which could result in the loss of stability. Check grade of bedding after compaction.
- E. In yielding subsoils, the trench bottom shall be undercut to the depth necessary and backfilled with graded, crushed stone to form a firm foundation. No additional payment shall be made for stabilizing yielding subsoils.
- F. Where excavation occurs in rock or hard shale, the trench bottom shall be undercut and a minimum of 6 inches crushed stone bedding placed prior to pipe installation. No additional payments shall be made for rock removal.
- G. Bell holes shall be excavated in advance of pipe laying so the entire barrel will bear uniformly.

- H. Pipe shall be bedded in accordance with the plans. Pipe bedding and backfill requirements vary with the required pipe material.

3.3 TESTING PROCEDURES

A. Pressure and Leakage Testing

1. The CONTRACTOR shall test all piping, valves and appurtenances installed under these Contract Documents. Testing shall be performed concurrent with installation. Unless otherwise approved by the ENGINEER no more than 3 miles of pipe shall be installed without being tested. Typically, tests shall be performed valve to valve. Pipeline shall be installed upstream and downstream from the test portion to restrain the section under test conditions.
2. Each section of pipe shall pass a pressure and leakage test in accordance with the most recent requirements of AWWA Standard C600 (Ductile Iron), C605 (PVC) and ASTM F-2164 (HDPE) and PPI Handbook of Polyethylene Pipe Chapter 2.
3. The piping shall be complete, and thrust blocks shall have been in place for not less than 10 days prior to being tested.
4. Hydrostatic testing must be witnessed by the OWNER and ENGINEER or their designated representative. The CONTRACTOR shall notify the OWNER, local water department and ENGINEER at least 72 hours prior to testing. The CONTRACTOR shall reschedule the testing if any of the required parties cannot attend on the requested date.
5. The pump, pipe connections, and all necessary apparatus for the pressure and leakage tests, including gauges and metering devices, shall be furnished by the CONTRACTOR. The CONTRACTOR shall make all excavations and backfills, and furnish all necessary assistance for conducting the tests.
6. All temporary restraints, plugs, etc. shall be provided by the CONTRACTOR to allow testing of the proposed forcemain prior to its connection to the existing sewer.

B. Filling and Testing (Non-HDPE Pipe)

1. Each segregated section of pipeline will be slowly filled with water ensuring that all air is expelled. Extreme care must be taken to ensure all air is expelled from the pipeline during the filling of pipe with water. The line shall stand full of water for twenty-four hours prior to testing to allow all air to escape. If necessary, tap the main at points of highest elevation so that air can be expelled as the pipe is filled with water. After successful completion of filling and air expulsion, but prior to testing, the corporation stops shall be removed and the taps tightly plugged.
2. The specified test pressure, measured at the point of lowest elevation, will then be applied by means of a pump connected to the pipe in a manner satisfactory to the ENGINEER. If the elevation of the high point of the pipeline being tested is such that the pressure during testing will be below 85% of the required test pressure the ENGINEER will require a separate test to be performed on this section of pipeline. In lieu of a separate test the test pressure measured at the lowest elevation may be

increased, within the pressure rating of the pipeline material, such that resulting pressure at the highest point exceeds 85% of the required test pressure. The test pressure will not vary by more than ± 5 psi and the test will be of at least two-hour duration.

3. A leakage test will be conducted concurrently with the pressure test. Leakage is defined as the quantity of the water measured as make-up water (volumetrically in a container or meter) that must be supplied into the newly laid pipeline to maintain the original test pressure after the air in the pipeline has been expelled and the pipe filled with water.
4. No pipeline installation will be accepted by the ENGINEER if the leakage is greater than that shown in the following table:

Allowable Leakage per 1000 feet of Pipe Length*, gph								
Average Test Pressure, psi	Nominal Pipe Diameter, in.							
	4	6	8	12	14	16	20	24
100	0.30	0.45	0.60	0.90	1.05	1.20	1.50	1.80
125	0.34	0.50	0.67	1.01	1.18	1.34	1.68	2.01
150	0.37	0.55	0.74	1.10	1.29	1.47	1.84	2.21
175	0.40	0.59	0.80	1.19	1.39	1.59	1.98	2.38
200	0.43	0.64	0.85	1.28	1.48	1.70	2.12	2.55
225	0.45	0.68	0.90	1.35	1.58	1.80	2.25	2.70
250	0.47	0.71	0.95	1.42	1.66	1.90	2.37	2.85
300	0.52	0.78	1.04	1.56	1.82	2.08	2.60	3.12

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

5. The table has been generated from the formula:
$$L = \frac{SD(P)^{1/2}}{133,200}$$

where L is the allowable leakage in gallons per hour, S equals the length of pipe in feet, D is the nominal pipe diameter in inches and P is the test pressure in PSIG.

6. Should any test disclose damaged or defective materials or leakage greater than that permitted, the CONTRACTOR shall at his own expense, locate and repair and/or replace defective materials. Any leaks shall be repaired by removal and replacement of the leaking pipe, joint, gasket or other fitting; no clamps shall be allowed for repair of leaks or of defects in assembly or materials. The tests shall be repeated until the leakage is within the permitted allowance and is satisfactory to the ENGINEER.

C. Filling and Testing (HDPE Pipe)

1. Expel all air from the piping prior to the application of test pressure. Tap the piping at high points, if necessary, to release all air from the piping. Plug taps after the test is successfully completed. Plugs shall be watertight. The ends of

- piping being tested shall have test plugs or caps adapted with a tap of adequate diameter to fill and pressurize the system with water.
2. Water shall be introduced into the section to be tested at the lower end. The upper end shall have an orifice at the top of the plug or cap to expel air when filling the system with water. All air shall be expelled from the pipe.
 3. The test procedures consist of two steps; the initial expansion and the test phase.
 - i. For the initial expansion phase, the test section is pressurized to test pressure and make-up water is added to the system at hourly intervals to maintain the test pressure for 4 hours. After 4 hours, initial expansion should be complete and the actual test can start.
 - ii. For the test phase, the test pressure is reduced by 10 psi. This is the target test pressure. If the pressure remains steady (within 5% of the target test pressure) for an hour, leakage is not indicated.
 4. If the pressure leak test is not completed due to leakage, equipment failures, etc., the test section should be de-pressurized and permitted to “relax” for 8 hours prior to the next testing sequence.
- D. Hydrostatic test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed in such a way as to prevent blowouts. In as much as a force of 2,500 pounds is exerted on an 8-inch plug by an internal pipe pressure of 50 psi, it should be realized that sudden expulsion of a poorly installed plug or cap can be dangerous. As a safety precaution, no one shall be allowed in the manholes or open trench when the pipe is pressurized.

3.4 COORDINATION

- A. The CONTRACTOR shall coordinate activities with the OWNER and ENGINEER. A minimum of forty-eight (48) hours advance notice shall be provided by the CONTRACTOR to the OWNER, when working near existing facilities, or requesting operation of existing valves or other system components. No shutdowns of the existing sanitary sewer system or wastewater treatment plant shall be allowed without prior approval by the OWNER. All work is to be performed between the hours of 7:00 AM to 5:00 PM local time Monday through Friday, unless approved in advance by the OWNER.

END OF SECTION 02530

SECTION 02900 - FINISH GRADING AND SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, General Requirements, and all other Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. CONTRACTOR is responsible for restoration of all removed, damaged, or disturbed vegetation.

1.3 SUBMITTALS

- A. Shop drawings and manufacturer's literature shall be submitted to the ENGINEER for approval in accordance with Section 01300.

1.4 JOB CONDITIONS

- A. Proceed with and complete site restoration work as rapidly as portions of site become available, working within seasonal limitations for work required.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil will be stockpiled for re-use in restoration work. A minimum of 8" of topsoil shall be stripped and replaced prior to restoration. If quantity of stockpiled topsoil is insufficient, provide additional topsoil shall be provided by the CONTRACTOR as required to complete restoration work.
- B. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and composed of 12-parts nitrogen, 12-parts phosphate, and 12-parts potash by weight (12-12-12). Incorporate into the topsoil as specified at the rate of 600 pounds per acre by mechanical spreader. The fertilizer shall be uniformly worked into the top 4-inches of topsoil.
- C. Temporary Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide one of the following seed options, based on the quick germination, growth and optimum time of year to be seeded:

<u>Temporary</u> <u>Seed Option</u>	<u>Seed Species and Mixtures</u>	<u>Rate per Acre</u>	<u>Optimum Dates</u>
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*WWTP Service Building Addition Project
City of Greencastle
United Consulting
Project No. 26-919-01*

1	Wheat or Rye	150 lbs.	9/15 to 10/30
2	Spring Oats	100 lbs.	3/1 to 4/15
3	Annual Ryegrass	40 lbs.	3/1 to 5/1; 8/1 to 9/1
4	German Millet	40 lbs.	5/1 to 6/1
5	Sudangrass	35 lbs.	5/1 to 7/30

- D. Permanent Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide a blend of Kentucky bluegrass, perennial ryegrass, and fescues as follows based on the germination, growth, and optimum soil conditions. Total application rate shall be a minimum of 150 lbs per acre.

<u>Seed Species and Mixtures</u>	<u>Blend Composition</u>
Kentucky Bluegrass	30-40%
Perennial Ryegrass	15-25%
Turf Type Tall Fescue	25-35%
Fine Fescue	10-20%

- E. Sod: Provide material in accordance with INDOT Standard Specification Section 914.07. All sod to be installed per INDOT Standard Specification Section 621.

- F. Erosion Control Materials:

1. Erosion Control Blanket:
 - i. Short-term double net erosion control blanket shall be a machine-produced mat of 100% agricultural straw between biodegradable natural fiber top and bottom nets designed to provide up to 12 months of erosion protection and mulching. Erosion control blanket shall be Bionet S150 BN, or approved equal installed using Staple Pattern "C" per manufacturer's recommendations.
2. Geotextile Fabric:
 - i. Riprap/Gabions/Stone: Mirafi 180N, or approved equal in accordance with INDOT Standard Specification Section 918.02.
 - ii. Underdrains: Mirafi 135N, or approved equal in accordance with INDOT Standard Specification Section 918.03.
 - iii. Stone Access Drive: Mirafi HP270, or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.
- B. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.
- C. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.
- D. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.2 SEEDING NEW LAWNS

- A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.
- B. Sow seed using a spreader or seeding machine. Do not seed when wind velocity exceeds 5 mi. per hr. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
- C. Sow not less than the quantity of seed specified or scheduled.
- D. Rake seed lightly into top 1/8" of soil, roll lightly, and water with a fine spray.
- E. Protect seeded areas against erosion by spreading mulch after completion of seeding operations. Erosion control blanket shall be used in lieu of mulch where seeding is completed on side slopes or drainage ditches with depths greater than 12".
- F. Mulch shall consist of:
 - 1. Dry straw or hay of good quality and at the rate of two and one half (2 1/2) tons per acre; or
 - 2. Wood cellulose or cane fiber mulch at the rate of one thousand (1,000) pounds per acre; or
 - 3. Manufactured mulch materials such as soil retention blankets, erosion control netting, or others that may be required on special areas of high water concentration or unstable soils. (When these materials are used, follow the manufacturer's recommendation for installation).
- G. The seeded area shall be watered, maintained and patched as directed by the ENGINEER until the CONTRACTOR's work is completed and accepted.

3.3 TEMPORARY GRASS MAINTENANCE

- A. CONTRACTOR shall inspect periodically after planting to see that vegetative stands are adequately established. CONTRACTOR shall check for erosion damage after storm events and repair. CONTRACTOR shall re-seed problem areas, if necessary.
- B. CONTRACTOR shall water, maintain, and patch the seeded areas as directed by the ENGINEER until the CONTRACTOR's work is completed and accepted. The CONTRACTOR is responsible for providing the necessary watering services until the grass is well established and viable, as determined by the ENGINEER.

3.4 PERMANENT GRASS MAINTENANCE

- A. CONTRACTOR shall inspect periodically, and after each rain event, until the strand is successfully established. CONTRACTOR shall repair damaged, bare or sparse areas by filling any gullies, re-fertilizing, over- or re-seeding, and mulching.
- B. CONTRACTOR shall water, maintain, and patch the seeded areas as directed by the ENGINEER until the CONTRACTOR's work is completed and accepted. The CONTRACTOR is responsible for providing the necessary watering services until the grass is well established and viable, as determined by the ENGINEER. Within three months after the work is completed and during the one (1) year warranty period, the CONTRACTOR shall schedule a grass seed maintenance inspection. After the grass seed maintenance inspection, the CONTRACTOR shall be required to correct any defective work, such as bare spots in grass coverage, erosion, gullies, etc.

END OF SECTION 02900

SECTION 03100 - CONCRETE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. The extent of concrete work is shown on drawings.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
 - 1. ACI 301 "Specifications for Structural Concrete for Buildings"
 - 2. ACI 318 "Building Code Requirements for Reinforced Concrete"
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice"
 - 4. ACI 350 "Environmental Engineering Concrete Structures"
- B. Concrete Testing Service: Engage a testing laboratory acceptable to ENGINEER to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting, as directed by ENGINEER, at anytime during progress of work. Allow free access to material stockpiles and facilities. Tests, including retesting of rejected materials and installed work, shall be done at CONTRACTOR's expense.

1.4 SUBMITTALS

- A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by ENGINEER.
- B. Shop Drawings; Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required and openings through concrete structures.
- C. Shop Drawings; Formwork: Submit shop drawings prepared by a registered professional engineer for fabrication and erection of forms for specific finished concrete surfaces as indicated. Show general construction of forms including jointing,

special form joint or reveals, location and pattern of form tie placement, and other items which affect exposed concrete visually.

- D. ENGINEER's review is for general applications and features only. Design of formwork or structural stability and efficiency is CONTRACTOR's responsibility.
- E. Samples: Submit samples of materials as specified and as otherwise requested by ENGINEER, including names, sources and descriptions.
- F. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test as specified.
- G. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by ENGINEER. Material certificates shall be signed by manufacturer and CONTRACTOR, certifying that each material item complies with, or exceeds, specified requirements.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
- B. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class I.
- C. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- D. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- E. Forms for Textured Finish Concrete: Form textured finish concrete surfaces with units of face design, size, arrangement and configuration as shown on drawings or as required to match ENGINEER's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- F. Cylindrical Columns and Supports: Form round-section members with metal, fiberglass reinforced plastic, or paper or fiber tubes. Construct paper or fiber tubes of laminated plies using water-resistant adhesive with wax-impregnated exterior for

weather and moisture protection. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation.

- G. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Galvanized Reinforcing Bars: ASTM A 767, Class II (2.0 oz. zinc psf) hot-dip galvanized, after fabrication and bending.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 775.
- D. Steel Wire: ASTM A 82, plain, cold-drawn, steel.
- E. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.
- F. Welded Deformed Steel Wire Fabric: ASTM A 497.
- G. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications, unless otherwise acceptable.
- H. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
- I. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I, unless otherwise acceptable to ENGINEER.
- B. Use one brand of cement throughout project, unless otherwise acceptable to ENGINEER.
- C. Fly Ash: ASTM C 618, Type C or Type F.
- D. Limit use of fly ash to not exceed 25% of cement content by weight. 3
- E. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.

- F. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to ENGINEER.
- G. Lightweight Aggregates: ASTM C 330.
- H. Water: Potable.
- I. Air-Entraining Admixture: ASTM C 260.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - i. "Sika Aer"; Sika Corp.
 - ii. "MB-VR or MB-AE"; Master Builders.
 - iii. "Dorex AEA"; W.R. Grace.
 - iv. "Edoco 2001 or 2002"; Edoco Technical Products.
- J. Water-Reducing Admixture: ASTM C 494, Type A, and contain not more than 0.1% chloride ions.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - i. "Eucon WR-75"; Euclid Chemical Co.
 - ii. "Pozzoloth 344"; Master Builders.
 - iii. "Plastocrete 160"; Sika Chemical Corp.
 - iv. "Chemtard"; Chem-Masters Corp.
- K. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G and contain not more than 0.1% chloride ions.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - i. "WRDA 19"; W.R. Grace
 - ii. "PSP"; Protex Industries Inc.
 - iii. "Super P"; Anti-Hydro
 - iv. "Sikament"; Sika Chemical Corp.
 - v. "Mighty 150"; ICI Americas Corp.
 - vi. "Eucon 37"; Euclid Chemical Co.
 - vii. "PSI Super"; Gifford-Hill
 - viii. "Pozzoloth 400"; Master Builders
- L. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.1% chloride ions.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - i. "Accelguard 80"; Euclid Chemical Co.

- ii. "Pozzolith 500"; Master Builders.
- M. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and contain not more than 0.1% chloride ions.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - i. "Edoco 20006"; Edoco Technical Products.
 - ii. "Pozzolith 300-R"; Master Builders.
 - iii. "Eucon Retarder 75"; Euclid Chemical Co.
 - iv. "Daratard"; W.R. Grace.
 - v. "Plastiment"; Sika Chemical Co.
 - 2. Certification: Provide admixture manufacturer's written certification that chloride ion content complies with specified requirements.
 - 3. Calcium chloride or admixtures containing more than 0.1% chloride ions are not permitted.

2.4 RELATED MATERIALS

- A. Waterstops: Provide flat, six (6) inch dumbbell type or centerbulb type waterstops at construction joints and other joints as indicated.
- B. Rubber Waterstops: Corps of Engineers CRD-C 513.
 - 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - i. The Burke Co.
 - ii. Progress Unlimited.
 - iii. Williams Products.
 - iv. Edoco Technical Products.
- C. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.
 - 1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - i. AFCO Products
 - ii. The Burke Co.
 - iii. Edoco Technical Products.
 - iv. Greenstreak Plastic Products.
 - v. Harbour Town Products.
 - vi. W. R. Meadows.
 - vii. Progress Unlimited.
 - viii. Schleigel Corp.
 - ix. Vinylex Corp.

- D. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials that are resistant to decay when tested in accordance with ASTM E 154, as follows:
1. Polyethylene sheet not less than 8 mils thick.
 2. Water resistant barrier paper consisting of heavy Kraft papers laminated together with glass fiber reinforcement and over-coated with black polyethylene on each side.
- E. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.
1. Products: Subject to compliance with requirements, provide one of the following:
 - i. Metallic
 - a. "Vibrofoil"; A.C. Horn.
 - b. "Metallic Spec. Grout"; The Burke Co.
 - c. "Embeco 636"; Master Builders.
 - d. "Ferrolith G"; Sonneborn-Contech.
 - e. "Firmix"; Euclid Chemical Co.
 - f. "Kemox G"; Sika Chemical Co.
 - g. "Ferrogrout"; L & M Const. Chemical Co.
 - ii. Non-metallic
 - a. "Masterflow 713"; Master Builders.
 - b. "Sonogrout"; Sonneborn-Contech.
 - c. "Euco-NS"; Euclid Chemical Co.
 - d. "Crystex"; L & M Const. Chemical Co.
 - e. "Sure-Grip Grout"; Dayton Superior Corp.
 - f. "Horngrout"; A.C. Horn.
- F. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicates per gal.
1. Products: Subject to compliance with requirements, provide one of the following:
 - i. "Surfhard"; Euclid Chemical Co.
 - ii. "Lapidolith"; Sonneborn-Contech.
 - iii. "Saniseal"; Master Builders.
 - iv. "Burk-O-Lith"; The Burke Co.
- G. Non-slip Aggregate Finish: Provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for non-slip finish with emery aggregate containing not less than 40% aluminum oxide and not less than 25% ferric oxide. Use material that is factory-graded, packaged, rustproof and non-glazing, and is unaffected by freezing, moisture and cleaning materials.

H. Colored Wear-Resistant Finish: Packaged, dry, combination of materials, consisting of portland cement, graded quartz aggregate, coloring pigments and dispersing agents. Use coloring pigments that are finely ground, non-fading mineral oxides, interground with cement. Color, as selected by ENGINEER, unless otherwise indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

- i. "Colorcron"; Master Builders.
- ii. "Harcot Redi-Mixed"; Sonneborn-Contech.
- iii. "Surflex"; Euclid Chemical Co.
- iv. "Colorundum"; A.C. Horn, Inc.
- v. "Quartz Plate"; L & M Const. Chemical Co.
- vi. "Lithochrome"; L.M. Scofield Co.

I. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

1. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

- i. Waterproof paper.
- ii. Polyethylene film.
- iii. Polyethylene-coated burlap.

J. Liquid Membrane Forming Curing Compound: Liquid type membrane- forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to ENGINEER. Moisture loss not more than 0.055 gr./sq. cm. when applied to 200 sq. ft./gal.

1. Products: Subject to compliance with requirements, provide one of the following:

- i. "Masterseal"; Master Builders.
- ii. "A-H 3 Way" Sealer"; Anti-Hydro Waterproofing Co.
- iii. "Ecocure"; Euclid Chemical Co.
- iv. "Clear Seal"; W.R. Grace.
- v. "J-20 Acrylic Cure"; Dayton Superior.
- vi. "Sure Cure"; Kaufman Products Inc.
- vii. "Spartan-Cote"; The Burke Co.
- viii. "Sealkure"; Toch Div. - Carboline.
- ix. "Kure-N-Seal"; Sonneborn-Contech.
- x. "Polyclear"; Upco Chemical/USM Corp.
- xi. "L&M Cure"; L & M Construction Chemicals.
- xii. "Klearseal"; Setcon Industries.
- xiii. "LR-151"; Protex Industries.
- xiv. "Hardtop"; Gifford - Hill.

K. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.

1. Products: Subject to compliance with requirements, provide one of the following:

- i. "J-40 Bonding Agent"; Dayton Superior Corp.
 - ii. "Weldcrete"; Larsen Products.
 - iii. "Everbond"; L & M Construction Chemicals.
 - iv. "EucoWeld"; Euclid Chemical Co.
 - v. "Hornweld"; A.C. Horn.
 - vi. "Sonocrete"; Sonneborn-Contech.
 - vii. "Acrylic Bondcrete"; The Burke Co.
- L. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - i. "Epoxite"; A. C. Horn.
 - ii. "Edoco 2118 Epoxy Adhesive"; Edoco Technical Prod.
 - iii. "Sikadur Hi-Mod"; Sika Chemical Corp.
 - iv. "Euco Epoxy 463 or 615"; Euclid Chemical Co.
 - v. "Patch and Bond Epoxy"; The Burke Co.
 - vi. "Sure-Poxy"; Kaufman Products Inc.

2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to ENGINEER for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to ENGINEER.
- B. Submit written reports to ENGINEER of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by ENGINEER.
- C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
 - 1. Structural Use:
 - i. 4000 psi 28-day compressive strength; W/C ratio, 0.50 maximum (non-air-entrained), 0.42 maximum (air-entrained).
 - 2. Non-Structural Use:
 - i. 3000 psi 28-day compressive strength; W/C ratio, 0.65 maximum (non-air-entrained), 0.54 maximum (air-entrained).

- D. Lightweight Concrete: Proportion mix as herein specified. Design mix to produce strength and modulus of elasticity as noted on drawings, with a split-cylinder strength factor (F_{ct}) of not less than 5.5 and a dry weight of not less than 95 lbs. or more than 110 lbs. after 28 days. Limit shrinkage to 0.03% at 28 days.
- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by CONTRACTOR when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to OWNER and as accepted by ENGINEER. Laboratory test data for revised mix design and strength results must be submitted to and accepted by ENGINEER before using in work.
- F. Admixtures
 - 1. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.
 - 2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
 - 3. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus-or-minus 1-1/2% within following limits:
- G. Concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:
 - 1. 5.5% (severe exposure) 1-1/2" max. aggregate.
 - 2. 6.0% (severe exposure) 1" max. aggregate.
 - 3. 6.0% (severe exposure) 3/4" max. aggregate.
 - 4. Other Concrete: 2% to 4% air.
- H. Use admixtures for water reducing and set-control in strict compliance with manufacturer's directions.
- I. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - i. Ramps, slabs, and sloping surfaces: Not more than 3".
 - ii. Reinforced foundation systems: Not less than 1" and not more than 3".
 - iii. Concrete containing HRWR admixture (super plasticizer): Not more than 8" after addition of HRWR to verified 2"-3" slump concrete.
 - iv. Other concrete: Not more than 4".

2.6 CONCRETE MIXES

- A. Job-Site Mixing: Mix materials for concrete in appropriate drum type batch machine mixer. For mixers of one cu. yd., or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-

1/2 minutes of mixing time by 15 seconds for each additional cu. yd., or fraction thereof.

- B. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- C. Ready-Mix Concrete: Comply with requirements of ASTM C 94 and as herein specified.
- D. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.
- E. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

2.7 FLOWABLE FILL

- A. Flowable fill shall consist of Portland cement, fly ash, sand, and water, proportioned to produce a self-leveling, self-compacting, non-segregating slurry suitable for backfilling applications. Controlled Low Strength Material (CLSM), Controlled Density Fill (CDF), or slurry backfill shall be used only where approved by the ENGINEER.
- B. Applications:
 - 1. Removable (Excavatable) CLSM: Low-strength material that can be re-excavated using conventional equipment. 28-day compressive strength: 100-150 psi.
 - 2. Non-Removable CLSM: Higher-strength material intended for permanent backfill or structural replacement where removal is not anticipated. 28-day compressive strength: up to 300 psi, unless otherwise specified.
 - 3. Pipe Abandonment Fill: Highly flowable CLSM used to fill abandoned pipes or conduits to eliminate voids and prevent future settlement or collapse. May be a neat cement slurry, or cellular concrete (foamed) to reduce density, as approved by ENGINEER.
- C. Place flowable fill in lifts not to exceed 4 feet unless otherwise permitted. When used around piping or structures subject to flotation, place in staged lifts or use restraint methods as required to prevent displacement.
- D. Do not vibrate or compact flowable fill. Allow flowable fill to self-level and flow into all voids. Protect adjacent surfaces and structures from uncontrolled flow or displacement. Flowable fill shall have a minimum flow consistency of 8-inches when tested per ASTM D6103.
- E. Allow flowable fill to harden sufficiently before placement of subsequent lifts or application of loads. Minimum curing time before backfilling or surface traffic shall be 12-24 hours, or as directed by ENGINEER.

PART 3 - EXECUTION

3.1 FORMS

- A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
- C. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.
- F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Form Ties: Factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
- H. Unless otherwise indicated, provide ties so portion remaining within concrete after removal is 1" inside concrete and will not leave holes larger than 1" diameter in concrete surface.
- I. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.
- J. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is

placed. Retighten forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

3.2 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.3 JOINTS

- A. Construction Joints: Locate and install construction joints, as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to ENGINEER.
- B. Provide keyways at least 1-1/2" deep in construction joints in walls, slabs and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints.
- D. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
- E. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.

- F. Joint filler and sealant materials are specified in Division-7 sections of these specifications.
- G. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use inserts 1/8" to 1/4" wide x 1/4 of slab depth, unless otherwise indicated.
- H. Contraction (Control) Joints in Walls: Construct contraction joints in walls as indicated on the plans and in accordance with ACI 350.
- I. Form contraction joints by inserting premolded plastic, hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
- J. Contraction joints may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
- K. Joint sealant material shall be a 2-part polysulfide in treatment tanks.

3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.5 PREPARATION OF FORM SURFACES

- A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

- A. **Preplacement Inspection:** Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moistened wood forms immediately before placing concrete where form coatings are not used.
- B. **Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.**
- C. **General:** Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
- D. **Placing Concrete in Forms:** Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- E. **Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding or tamping.** Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
- F. **Do not use vibrators to transport concrete inside forms.** Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- G. **Placing Concrete Slabs:** Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- H. **Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.**
- I. **Bring slab surfaces to correct level with straightedge and strikeoff.** Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- J. **Maintain reinforcing in proper position during concrete placement operations.**

- K. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
- L. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C), and not more than 80 deg F (27 deg C) at point of placement.
- M. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
- N. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.
- O. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
- P. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is CONTRACTOR's option.
- Q. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
- R. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.
- S. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.7 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view (from finished grade) in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

- C. Smooth Rubbed Finish: Unless otherwise indicated, provide smooth rubbed finish to all exposed to view (from finished grade) concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal.
- D. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process. Surfaces shall have an "architectural" appearance.
- E. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces that have received smooth form finish treatment.
- F. Combine one part portland cement to 1-1/2 parts fine sand by volume, and mix with water to consistency of thick paint. Proprietary additives may be used at CONTRACTOR's option. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
- G. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- H. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
- B. After placing slabs, plane surface so that depressions between high spots do not exceed 1/2" under a 10' straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.
- C. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
- D. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Check and level surface plane so that depressions between high spots do not exceed 5/16" under a 10' straightedge. Cut down high spots and fill

low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

- E. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thinfilm finish coating system.
- F. 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 surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a level surface plane so that depressions between high spots do not exceed 1/8" under a 10' straightedge. Grind smooth surface defects that would telegraph through applied floor covering system.
- G. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- H. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with ENGINEER before application.
- I. Chemical-Hardener Finish: Apply chemical-hardener finish to newly poured interior concrete floors. Apply liquid chemical- hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water (parts of hardener/water as follows), and apply in 3 coats; first coat, 1/3-strength; second coat, 1/2-strength; third coat, 2/3-strength. Evenly apply each coat, and allow 24 hours for drying between coats.
- J. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.
- K. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.
- L. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.
- M. After completion of float finishing, and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100-sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.
- N. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.

- O. Colored Wear-Resistant Finish: Provide colored wear-resistant finish to monolithic slab surfaces where indicated.
- P. Apply dry shake materials for colored wear-resistant finish at rate of not less than 60 lbs. per 100-sq. ft., unless greater amount is recommended by material manufacturer.
- Q. Immediately following first floating operation, uniformly distribute approximately 2/3 of required weight of dry shake material over concrete surface, and embed by means of power floating. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material at right angles to first application, and embed by power floating.
- R. After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by dry shake hardener manufacturer, waiting up to 48 hours (depending on humidity and drying) before application. Do not use moisture-cover or moisture curing methods.

3.9 CONCRETE CURING AND PROTECTION

- A. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- B. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- C. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
- D. Provide moisture curing by following methods.
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Continuous water-fog spray.
 - 3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
- E. Provide moisture-cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- F. Provide curing and sealing compound to interior slabs with resilient flooring, carpet over cushion or left exposed; and to exterior slabs, walks, and curbs, as follows:
 - 1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
- G. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to ENGINEER.
- H. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- I. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.
- J. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover, unless otherwise directed.
- K. Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

3.10 REMOVAL OF FORMS

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28-days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.11 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to ENGINEER.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in- place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
- D. Sleeves and Inserts: When the contract requires the placing of conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors and other like work in floors, roofs, or walls of buildings and structures, they shall be promptly installed in conformity with the construction program. To facilitate such work the erection of floors, roofs and walls shall be fully coordinated with the installation requirements of such appurtenances. The installation of such appurtenances shall be arranged in strict conformity with the construction schedule to avoid interference with the work of others.
- E. In the event timely delivery of sleeves and other materials cannot be made, and to avoid delay boxes or other forms may be set at the locations where the appurtenances are to pass through or into the floors, roofs, walls, or other work. Upon the subsequent installation of these appurtenances, the CONTRACTOR shall fill around them with materials as required, at no additional cost to the OWNER.
- F. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

- G. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.
- H. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.13 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to ENGINEER.
- B. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
- C. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- D. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of ENGINEER. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
- E. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- F. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.
- G. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

- H. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
- I. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to ENGINEER.
- J. Repair defective areas, except random cracks and single holes not exceeding 1" 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" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- K. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- L. Perform structural repairs with prior approval of ENGINEER for method and procedure, using specified epoxy adhesive and mortar.
- M. Repair methods not specified above may be used, subject to acceptance of ENGINEER.

3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. The CONTRACTOR will employ a testing laboratory to perform tests and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by ENGINEER.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.

*WWTP Service Building Addition Project
City of Greencastle
United Consulting
Project No. 26-919-01*

3. Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, and when 80 deg F (27 deg C) and above; and each time a set of compression test specimens made.
 4. Compression Test Specimen: ASTM C 31; one set of 3 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 5. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. over and above the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, one specimen tested at 28 days, and one specimen retained in reserve for later testing if required.
 6. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 7. When total quantity of a given class of concrete is less than 50 cu. yd., strength test may be waived by ENGINEER if, in his judgment, adequate evidence of satisfactory strength is provided.
 8. When strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.
- D. Test results will be reported in writing to ENGINEER and CONTRACTOR within 24 hours that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by ENGINEER. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. CONTRACTOR shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

3.15 CRACK REPAIR

- A. CONTRACTOR shall be responsible for any crack repairs necessary due to cracking. Structures for treatment tanks are to be watertight. If repairs are required, the CONTRACTOR shall submit in writing detailed information for the correction procedure. The correction procedure shall be used only if acceptable to the OWNER.

END OF SECTION 03100

SECTION 10800 – TOILET & BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this section.

1.2 SUMMARY

- A. Extent of each type of toilet accessory is indicated on drawings and schedules.
- B. Types of toilet accessories for each restroom required include the following:
 - 1. Paper towel dispenser.
 - 2. Toilet tissue dispenser.
 - 3. Grab bars
 - 4. Soap dispenser.
- C. Mirrors are specified in Section, “Mirror Units”.

1.3 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.
- B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.
- C. Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless otherwise acceptable to Engineer.

1.4 SUBMITTALS

- A. Submittals shall be made in accordance with Specification Section 01300.
- B. Product Data: Submit manufacturer’s technical data and installation instructions for each toilet accessory.
- C. Samples: Submit full-size samples of units to Engineer for review of design and operation. Acceptable samples will be returned and may be used in the work.
- D. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide toilet accessories by one of the following or an approved equal:
1. A & J Washroom Accessories.
 2. American Specialties, Inc.
 3. Bobrick Washroom Equipment, Inc.
 4. Bradley Corporation.
 5. Franklin Brass Mfg. Co.
 6. Hallmack-Nutone/Div. Scovill.
 7. G. M. Ketcham Co., Inc.
 8. McKinney/Subsidiary Kidde, Inc.
 9. Parker-Scovill.
 10. Watrous, Inc.

2.2 MATERIALS, GENERAL

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gage (.034") minimum, unless otherwise indicated.
- B. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- C. Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

2.3 TOILET TISSUE DISPENSERS

- A. Single-Roll Dispenser: Size to accommodate core tissue to 5" diameter roll.
1. Fabrication: Spindleless chrome-plated zinc alloy construction with tension spring delivery control; designed for surface mounting.

2.4 GRAB BARS

- A. Stainless Steel Type: Provide grab bars with wall thickness not less than 18 (.050") gage and as follows:
1. Mounting: Concealed, manufacturer's standard flanges and anchorages
 2. Clearance: 1-1/2" clearance between wall surface and inside face of bar.
 3. Gripping Surfaces: Smooth, satin finish.
 4. Medium-Duty Size: Outside diameter of 1-1/4".

2.5 SOAP DISPENSERS

- A. Liquid Soap Dispenser, Horizontal Tank Type: Fabricate for surface mounting, sized for 40 fl. oz. minimum capacity. Provide stainless steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action. Provide cover type 304 stainless steel in #4 finish, with unbreakable window-type refill indicator.
- B. Equip unit with push type valve for dispensing soap in liquid form.

2.6 FABRICATION

- A. General: Only an unobtrusive stamped logo of manufacturer, as approved by the Engineer, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all welded construction, without mitered corners. Hang doors or access panels with full-length stainless steel piano hinge. Provide anchorage which is fully concealed when unit is closed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations indicated.

3.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces after removing temporary labels protective coatings.

END OF SECTION 10800

SECTION 10830 – MIRROR UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of mirror units is indicated on drawings. Each restroom requires one (1) 40"x30" mirror.
- B. Types of mirror units required include the following:
 - 1. Stainless steel framed mirrors.
 - 2. Adjustable Tilt Mirrors.
- C. Mirror glass for custom installations is specified in Division 8.
- D. Toilet accessories are specified elsewhere in Division 10.

1.3 QUALITY ASSURANCE

- A. General: Provide mirror units produced by single manufacturer for entire project.

1.4 SUBMITTALS

- A. All submittals shall be in accordance with Specification Section 01300.
- B. Product Data: Submit manufacturer's technical data, detail drawings, and installation instructions for mirror units.
- C. Schedule: Submit schedule indicating mirror types, quantities, sizes and installation locations for each mirror to be provided for project.

1.5 SPECIFIED PRODUCT WARRANTY

- A. Provide manufacturer's written 5-year warranty against silver spoilage of mirrors, agreeing to replace any mirrors which develop visible defects within warranty period.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering mirror units which may be incorporated in the work include, but are not limited to, the following:
1. A & J United Machine & Metal Products Corp.
 2. American Dispenser Co., Inc.
 3. Bobrick Washroom Equipment, Inc.
 4. Bradley Corp.
 5. Hallmack-NuTone/Div. Scovill
 6. G.M. Ketcham Company, Inc.
 7. F.H. Lawson co.
 8. Meek Manufacturing Co., Inc.
 9. McKinney/Kidde, Inc.
 10. Parker – Scovill
 11. P.D. Metal Industries
 12. Tubular Specialties Mfg., Inc.
 13. Watrous, Inc.

2.2 MATERIALS

- A. Mirror Glass: 1/4" thick, Type I, Class 1, Quality q2, conforming to FS DD-G-451, with silvering, copper coating, and protective organic coating complying with FS DD-M-411.
- B. Stainless Steel Framing: AISI Type 302/304, with polished No. 4 finish.

2.3 FABRICATION

- A. General:
- B. Edge Protection: Fabricate frames for glass mirrors to accommodate wood, felt, plastic, or other glass edge protection material.
- C. Backing: Provide mirror backing and support system which will permit rigid, tamperproof glass installation and prevent accumulation of moisture, as follows:
1. Galvanized steel backing sheet, not less than 22 gage and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.
- D. Hangers: Provide system of mounting mirror units which will permit rigid, tamperproof and theftproof installation, as follows:

1. One-piece galvanized steel wall hanger device with spring action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- E. Stainless Steel Framed Mirrors:
- F. Heavy-Duty Type: Fabricate frame with angle shapes of not less than 18 gage (0.050”), with square corners mitered, welded, and ground smooth. Provide in No. 4 satin polish finish.
- G. Adjustable Tilting Type: Fabricate frame with angle or channel shapes of not less than 20 gage (0.040”), with square corners carefully mitered to hairline joints, welded and ground smooth. Furnish continuous stainless steel piano hinge at bottom of unit and adjustable elbow hinge at each side to permit pivot ranging from vertical to not less than 6” outward at top.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Secure mirrors to walls in a concealed tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer’s instructions for type of substrate involved.

3.2 ADJUST AND CLEAN

- A. Verify that adjustable tilting mirrors are properly installed and are operating smoothly.
- B. Clean exposed surfaces of mirror in compliance with manufacturer’s recommendations.

END OF SECTION 10830

SECTION 11305 - GRINDER PUMP STATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall furnish and install all materials, equipment, and incidentals required to provide residential submersible grinder pumping stations as specified herein. The grinder system shall be a complete system furnished as a packaged unit by the manufacturer of the pumps. The selected manufacturer shall also furnish the motor control panel to insure suitability and assurance of single source responsibility for the equipment.
- B. Each grinder unit furnished shall consist of one (1) sewage grinder pump core unit containing the pump, motor grinder, motor controls, check valve, anti-siphon valve, electrical quick disconnect and associated wiring. The grinder unit shall utilize a level control pressure switch, 1 1/4-inch stainless steel discharge piping, a shutoff valve, etc.; all to be installed in a factory fabricated high density polyethylene (HDPE) basin. All materials subject to exposure to raw sewage shall be of corrosion resistant construction.
- C. All maintenance tasks for the grinder pump station shall be possible without entry into the grinder basin.

1.2 GENERAL REQUIREMENTS

- A. All Work shall be inspected, tested, and approved as required by federal, state and local rules and regulations and as specified in this section. Unless otherwise approved in writing before testing begins, all tests shall be witnessed by the OWNER, ENGINEER, and others as necessary. Test results shall be recorded and reports or appropriate certificates shall be submitted to the OWNER in triplicate.
- B. All piping shall be tested in accordance with Section 02530. All underground piping shall be backfilled or properly secured to avoid damage during testing. Should underground piping fail test, CONTRACTOR shall be responsible for removal and replacement of backfill as required. All piping, interior or exposed, shall be subject to test before being covered with insulation, or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks.
- C. All piping shall be flushed or blown out after installation prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents as required for testing.
- D. Location of grinder pump stations will be as indicated in the plans and as coordinated by the CONTRACTOR as included in section 02530 of these specifications.

1.3 SUBMITTALS

- A. Prior to ordering materials, the CONTRACTOR shall submit four (4) sets of shop drawings, detailed specifications, pump warranty, and performance characteristics for all equipment and components to be furnished and installed.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. The CONTRACTOR shall exercise adequate care during transportation, handling, storage, and installation to ensure equipment and materials are not damaged.
- B. If any part or parts of equipment or materials become damaged or otherwise before or during installation, then repair and/or replacement shall be at CONTRACTOR's expense before proceeding further.

PART 2 - PRODUCTS

2.1 PUMP SELECTION

- A. The pump and grinder system shall be Models DH071 (typical) as manufactured by Environment One (EONE) Corporation or approved equal.
- B. The pumps shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head. The pumps shall be 1 HP, operate at a maximum of 1,750 rpm, and use 240 Volt, single phase, 60 Hz power. The system shall be designed to operate on a 30 amp 240 V single phase circuit or 30 amp 120 V single phase circuit if requested by the property owner (CONTRACTOR to coordinate).

2.2 PUMP

- A. The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil Nominal dry thickness, wet applied. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

2.3 GRINDER

- A. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wear and corrosive resistant properties.
- B. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:
1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
 2. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.
 3. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.
 4. The impeller mechanism must rotate at a nominal speed of no greater than 1,800 rpm.
- C. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of “foreign objects,” such as paper, wood, plastic, glass, wipes, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

2.4 ELECTRIC MOTOR

- A. As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the

pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted.

2.5 MECHANICAL SEAL

- A. The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

2.6 TANK AND INTEGRAL ACCESSWAY

- A. The tank shall be a Wetwell/Drywell design made of high density polyethylene, with a grade selected to provide the necessary environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. The corrugations of the outside wall are to be a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be 0.250" thick (minimum). All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.
- B. The tank shall be furnished with one EPDM grommet fitting to accept a 4.50" OD DWV or Schedule 40 pipe. The tank capacities shall be as shown on the contract drawings.
- C. The Drywell accessway shall be an integral extension of the Wetwell assembly and shall include a lockable cover assembly providing low profile mounting and watertight capability. The accessway design and construction shall enable field adjustment of the station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.
- D. The station shall have all necessary penetrations molded in and factory sealed. To ensure a leak free installation no field penetrations will be acceptable.
- E. All discharge piping shall be constructed of 304 stainless steel. The discharge shall terminate outside the accessway bulkhead with a stainless steel, 1-1/4" Female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 235 psi WOG; PVC ball valves or brass ball/gate will not be accepted. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

- F. The accessway shall include a single NEMA 6P Electrical Quick Disconnect (EQD) for all power and control functions, factory installed with accessway penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with 32', 25' of useable Electrical Supply Cable (ESC) outside the station, to connect to the alarm panel. The ESC shall be installed in the basin by the manufacturer. Field assembly of the ESC into the basin is not acceptable because of potential workmanship issues. The EQD shall require no tools for connecting, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. A junction box shall not be permitted in the accessway due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required. The accessway shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.

2.7 CHECK VALVE

- A. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless steel discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

2.8 ANTI-SIPHON VALVE

- A. The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.9 CORE UNIT

- A. The grinder pump station shall have a cartridge type, easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is

not acceptable because of potential workmanship issues and increased installation time. In some cases, stations taller than 96" may be shipped on their side without the cores assembled in the basin for freight purposes but this is the only exception. The core unit shall seal to the tank deck with a stainless steel latch assembly. The latch assembly must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

2.10 CONTROLS

- A. All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. Locating the motor starting controls in a plastic enclosure is not acceptable. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. The level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. The use of PVC for the level sensing housing is not acceptable.
- B. Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.
- C. All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW

cable, pre-wired and watertight to meet UL requirements with a FACTORY INSTALLED NEMA 6P EQD half attached to it.

2.11 STAINLESS STEEL CURB STOP/CHECK VALVE ASSEMBLY (UNI-LATERAL)

- A. The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi.
- B. The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4" passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.
- C. Factory Test – The stainless steel, combination curb stop/check valve component shall be 100 percent hydrostatically tested to 150 psi in the factory.
- D. Engineered Thermoplastic Fittings – All plastic fitting components are to be in compliance with applicable ASTM standards.
- E. All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A split-collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.
- F. High Density Polyethylene Pipe (Supplied by others) – Pipe shall be have a working pressure of 160 psi minimum and shall be classified SDR per ASTM D 3035.

2.12 ALARM PANEL

- A. Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The CONTRACTOR shall coordinate with each property owner and install at their desired location (wall or pole mounted) within 20' of the station installation. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5" W x 14" H x 7" D, or 12.5" W x 16" H x 7.5" D if certain options are included.
- B. The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core's power circuit and one 15-amp, single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.
- C. The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm

capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.
 2. The audible alarm may be silenced by means of the externally mounted, push-to-silence button.
 3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.
- D. The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).
- E. The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

PART 3 - EXECUTION

3.1 FACTORY TEST

- A. Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit's dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.
- B. The ENGINEER reserves the right to inspect such testing procedures with representatives of the OWNER, at the GRINDER PUMP MANUFACTURER'S facility.

3.2 INSTALLATION

- A. Earth excavation and backfill are specified under Specification Section 02300, but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.

- B. The CONTRACTOR shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.
- C. The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the ENGINEER or OWNER.
- D. Remove packing material. User instructions MUST be given to the OWNER. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4" inlet grommet (4.50" OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.
- E. Installation shall be accomplished so that 1 inch to 4 inches of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.
- F. A 6" inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.
- G. A concrete anti-flotation collar and sized according to the manufacturer's instructions, shall be required and shall be pre-cast to the grinder pump or poured in place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes.
- H. If the concrete is poured in place, the unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.
- I. The CONTRACTOR will provide and install a 4-foot piece of 4-inch SCH 40 PVC pipe with water tight cap, to stub-out the inlet at the proper depth required for connection by the property owner.
- J. Each installation requires that an E/One Uni-Lateral assembly (E/One part number NB0184PXX or NC0193GXX) or E/One Redundant Check Valve (E/One part number PC0051GXX) or approved equal be installed in the pipe lateral outside the home between the pump discharge and the street main on all installations.
- K. The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the CONTRACTOR. An alarm device is required on every installation, there shall be NO EXCEPTIONS. It will be the responsibility of the to coordinate with the individual property owner(s) to determine the optimum location for the Alarm Panel.

- L. The CONTRACTOR shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32 feet, 25 feet of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a FACTORY INSTALLED EQD half to connect to the mating EQD half on the core.

3.3 BACKFILL REQUIREMENTS

- A. Proper backfill is essential to the long-term reliability of any underground structure. Several methods of backfill are available to produce favorable results with different native soil conditions. The most highly recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern, Class 1B is a better choice when the native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone offers an added benefit in that it doesn't need to be compacted.
- B. Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density. If the native soil condition consists of clean compactible soil, with less than 12 percent fines, free of ice, rocks, roots and organic material, it may be an acceptable backfill. Soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 85 percent and 90 percent. Heavy, non-compactible clays and silts are not suitable backfill for this or any underground structure such as inlet or discharge lines.
- C. If you are unsure of the consistency of the native soil, it is recommended that a geotechnical evaluation of the material is obtained before specifying backfill.
- D. Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augured holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped more than 4 feet from the discharge to the bottom of the hole to avoid separation of the constituent materials.
- E. Backfill of clean native earth, free of rocks, roots, and foreign objects shall be thoroughly compacted in lifts not exceeding 12" to a final Proctor Density of not less than 85 percent. Improper backfilling may result in damaged accessways. The grinder pump station shall be installed at a minimum depth from grade to the top of the 1 1/4" discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.
- F. All restoration will be the responsibility of the CONTRACTOR. Per unit costs for this item shall be included in the CONTRACTOR'S bid price for the individual grinder pump stations. The properties shall be restored to their original condition in all respects,

including, but not limited to, curb and sidewalk replacement, landscaping, loaming and seeding, and restoration of the traveled ways, as directed by the ENGINEER.

3.4 START-UP AND FIELD TESTING

- A. The MANUFACTURER shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the OWNER'S personnel in the operation and maintenance of the equipment before the stations are accepted by the OWNER.
- B. All equipment and materials necessary to perform testing shall be the responsibility of the CONTRACTOR. This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.
- C. The services of a trained factory-authorized technician shall be provided at a rate of 40 hours for every 100 grinder pump stations supplied.
- D. Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:
 - 1. Make certain the discharge shut-off valve in the station is fully open.
 - 2. Turn ON the alarm power circuit and verify the alarm is functioning properly.
 - 3. Turn ON the pump power circuit. Initiate the pump operation to verify automatic "on/off" controls are operative. The pump should immediately turn ON.
 - 4. Consult the Manufacturer's Service Manual for detailed start-up procedures.
- E. Upon completion of the start-up and testing, the MANUFACTURER shall submit to the ENGINEER the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

END OF SECTION 11300