



**TOWN OF CLAYTON
KENT COUNTY, DELAWARE**

PROJECT MANUAL

STORM SEWER REPAIR



**July 13, 2026
Project Number 37628**

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INVITATION TO BID

Sealed bids for the STORM SEWER REPAIR project will be received by the Town of Clayton, Delaware until 2:00 p.m. local time on August 20, 2026. The bids will then be publicly opened and read aloud in The Town of Clayton Town Hall, 414 Main Street, Clayton, Delaware 19938 for the following project:

The project is located in the Town of Clayton in Kent County, Delaware.

The work consists of, but is not limited to, the repair of approximately 3,530 linear feet of existing storm sewer mains varying from 8" to 42" diameter round and 34"x53" elliptical pipe using open cut trench replacement and Cured-In-Place-Pipe (CIPP) construction methods, traffic control, milling, hot-mix trench and roadway paving, hot-mix overlay, restoration of all surfaces disturbed by construction and other associated work.

The Contract Documents may be examined at:

Verdantas LLC
1060 South Governors Avenue, Suite 101
Dover, DE 19904

The Contract Documents and Addenda (but not the Bidding Package) may also be viewed and/or downloaded at no charge via the internet at the Verdantas Plans Room: <https://bids.verdantas.com> . The bidder shall be responsible to check for Addenda and obtain same from the web site.

An electronic file of the Bidding Package may be obtained upon payment of \$100.00 to Verdantas, LLC. Documents may be ordered by registering and paying online at <https://bids.verdantas.com>. Please contact planroom@verdantas.com or call (440) 530-2351 if you encounter any problems viewing, registering or paying for the documents.

A non-mandatory pre-bid meeting will be held at the Town of Clayton - Town Hall, 414 Main Street, Clayton, DE at 10:00 a.m. local time on August 3, 2026.

The Town of Clayton reserves the right to waive any informalities and to reject any or all bids. Each Bidder must submit a bid security of not less than ten (10) percent of the bid amount, in a form and subject to the conditions provided in the Instructions to Bidders. No bid may be withdrawn within sixty (60) days after the actual date of the bid opening.

INSTRUCTIONS TO BIDDERS

IB-A. GENERAL

Definitions

A.1. The general terms used in the Contract Documents have the meanings indicated by the definitions given in the General Conditions.

A.2. Where appropriate, supplemental definitions of a specific or technical nature are stated in the Specifications or in other portions of the Contract Documents.

Interpretations

A.3. Any questions regarding the meaning or intent of the Contract Documents shall be submitted in writing to the Engineer at least five (5) days prior to the scheduled date for opening of the bids. Any questions received less than five (5) days prior to the scheduled date of opening of bids will not be answered.

A.4. Replies from the Engineer, if issued, will be issued as Addenda to the Contract Documents and will be mailed or delivered to all parties recorded by the Engineer as having received the bidding documents.

A.5. Only responses issued by formal written Addenda to the Contract Documents will be binding. Oral and other interpretations or clarifications are not a part of the Contract Documents and will be without legal effect.

A.6. The Contract 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 Contractor or relieve the Contractor from fulfilling any of the conditions of the Contract.

Location and Description of Project

A.7. The project is located in the Town of Clayton in Kent County, Delaware.

A.8. The work consists of, but is not limited to, the repair of approximately 3,530 linear feet of existing storm sewer mains varying from 8" to 42" diameter round and 34"x53" elliptical pipe using open cut trench replacement and Cured-In-Place-Pipe (CIPP) construction methods, traffic control, milling, hot-mix trench and roadway paving, hot-mix overlay, restoration of all surfaces disturbed by construction and other associated work.

Examination of Contract Documents and Site

A.9. Before submitting a bid, each Bidder must thoroughly examine the Contract Documents and visit the site to become familiar with all local conditions that may in any way affect the performance of the work. Bidder must comply with all Federal, State, and local laws, ordinances, rules, and regulations affecting the performance of the work. Bidder must carefully correlate observations and determinations regarding the work to be performed with all the requirements of the Contract Documents.

A.10. Before preparing and submitting a bid, each Bidder will, at Bidder's own expense, make such surveys, investigations, and evaluations as Bidder may deem necessary to determine Bidder's bid prices for performance of the work within the terms of the Contract Documents.

A.11. By the submission of a bid for the project work, the Bidder makes an incontrovertible representation that Bidder has complied fully with the requirements set forth in Paragraphs A.9. and A.10. above.

Qualifications of Bidders

A.12. Only bids submitted by firms considered by the Owner to be qualified to successfully undertake and complete the project in a timely manner will be considered responsive.

A.13. All Contractors or Subcontractors who are listed on the HUD/DOL consolidated List of Debarred, Suspended, or Ineligible Contractors are ineligible to bid. All bids submitted by a debarred Contractor or Subcontractor will be rejected.

A.14. Each Bidder must be prepared to submit, within five (5) days of the Owner's request, written evidence to demonstrate Bidder's qualifications to satisfactorily undertake and complete the project. Such evidence shall include, but not be limited to, financial data, previous experience, evidence of authority to conduct business in the State of Delaware, availability of manpower, tools, plant, etc., to carry out the work in a timely fashion and the related qualifications and experience of subcontractors and suppliers proposed for significant portions of the work.

Engineer

A.15. The Engineer for this project is Verdantas LLC. The Engineer's mailing address 1060 S Governors Ave., Suite 101, Dover, Delaware 19904

IB-B. BIDDING AND AWARD

B.1. A pre-bid meeting will be held to afford Bidders the opportunity to examine the site of the project work and to discuss with the Owner and Engineer any appropriate items pertaining to the Contract Documents or the project.

B.2. The date, time, and place for the pre-bid meeting will be as stated in the Invitation to Bid.

B.3. No statements or discussions offered at the pre-bid meeting will in any way revise, supplement, or otherwise affect the project requirements as presented in the Contract Documents unless questions raised during the pre-bid meeting are answered by formal written Addenda issued to all parties recorded by the Engineer as having received the Bidding Documents. Such Addenda will become a portion of the Contract Documents and will be binding.

Preparation of Bids

B.4. The separate Bidding Package shall be returned intact with any attachments securely fastened. The Contract Documents need not be submitted with the Bidding Package.

B.5. The contract time and liquidated damages for the project are stated on the bid form.

B.6. Complete sets of the Bidding Documents shall be used in preparing bids. Neither the Owner nor Engineer assume any responsibility for errors or misinterpretation resulting from the use of incomplete sets of the Bidding Documents.

B.7. Estimates of work quantities that are stated on the bid forms are approximate only and have been used by the Engineer as a basis of estimating the cost of the work and will also be used for the purpose of tabulating and comparing the bids and awarding the contract. The Engineer has endeavored to estimate the quantities correctly according to Engineer's knowledge of the project and the information shown on the Drawings. There is no guarantee or warranty, expressed or implied, that the estimated quantities are accurate and, any Bidder relying upon the accuracy of such estimated quantities in preparing and/or submitting a bid does so at Bidder's own risk. After bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning quantities of work or of the nature of the work to be done.

B.8. The bid forms show estimates of quantities for contingent items that may be necessary for the project. All work under the contingent items will be performed only at the written direction of the Engineer. At the sole discretion of the Engineer and without jeopardy to the bid or the Agreement, the Engineer may reject unit prices bid for contingent items which Engineer considers unbalanced, unresponsive, or contrary to the best interest of the Owner.

B.9. The bid forms and other documentation must be completed in their entirety. All entries shall be made in ink or typewritten. The bid prices of each item on the form must be stated in words and numerals and, in case of a conflict, the words shall take precedence.

B.10. Bids by corporation must be executed in the corporate name by the President or other corporate officer having the necessary authority, and the corporate seal shall be affixed and attested to by the Secretary or an Assistant Secretary of the corporation. Bids by partnerships must be executed in the partnership name and signed by a Partner.

B.11. The Bidder shall:

- a. Provide an acknowledgment of receipt of all Addenda as provided on the bid form.
- b. Include with the bid a list of subcontractors for the project. If the Bidder intends to perform the work with his own forces, that should be so indicated.
- c. Include with the bid a list of suppliers of major items for the project as indicated.
- d. Include with the bid a fully executed Non-Collusion Certification as prescribed in the bidding document.
- e. Submit bid bond of not less than ten (10) percent of the bid in the form of a certified or bank cashier's check made payable to the Owner, or a bid bond issued by a Surety licensed to conduct business in the State of Delaware and named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register. The conditions of the bid bond obligations are stated on the Bid Bond form included as part of the Contract Documents. As soon as the bid prices have been compared, the Owner will return the bonds of all except the three (3) lowest responsible bidders. When the Agreement is executed the bonds of the two remaining unsuccessful bidders will be returned. Attorneys-in-fact who sign bid bonds must file with each bond a certified and effective dated copy of their power-of-attorney.

Subcontractors and Suppliers

B.12. The Bidder shall complete all entries on both the Subcontractor and Supplier Lists.

B.13. As required by the Delaware Code, Title 29, Section 6911, the names and addresses of all Subcontractors who are to perform work and labor must be provided with the Bid Form. Only one (1) Subcontractor for each item shall be named. If a subcontractor is not intended to be used for a listed item, the Bidder's name shall be inserted for that item. The work must be awarded to the subcontractor listed, or any substitution must be done in compliance with the above noted Section 6911.

B.14. Payment of an amount determined by the Owner up to but not in excess of twenty-five percent (25%) of the subcontract price for each violation will be required of the Contractor for failure to utilize any subcontractor listed in the Bidder's proposal, unless the Contractor substantiates to the satisfaction of the Owner valid conditions for substitution.

B.15. The Bidder shall complete the Supplier List by identifying the manufacturer of the equipment, not the local or regional sales representative.

Modifications and Withdrawal of Bids

B.16. Bids may be modified or withdrawn by an appropriate document prepared and duly executed in a like manner to that of the bid preparation and executed and delivered to the place where the bids are to be submitted at any time prior to the actual opening of bids.

Receipt and Opening of Bids

B.17. Bids shall be submitted at the time and place indicated in the Invitation to Bid or as modified by any Addenda. Any bid received after the time and date specified shall not be considered.

B.18. The Bidding Package, consisting of the bid forms and other required documents, shall be placed in an opaque sealed envelope. The envelope shall be marked in the upper lefthand corner with the name and address of the Bidder. The envelope shall be marked in the lower lefthand corner as follows: "Storm Sewer Repair, Town of Clayton, Delaware".

B.19. The bids will be opened and the bid amounts will be publicly announced as indicated in the Invitation to Bid or as revised by any Addenda.

B.20. No Bidder may withdraw a bid within sixty (60) days after the actual day of the bid opening. The Owner may, at Owner's sole discretion, release any bid and return the bid security prior to that date.

Award of Contract

B.21. The Owner reserves the right to reject any and all bids and waive any and all informalities or minor defects in the bidding, and reserves the right to disregard all nonconforming conditional bids or counter proposals.

B.22. The Owner, with the assistance of the Engineer, will evaluate the bids, the qualifications of the Bidders, the qualifications and experience of the subcontractors, and the qualifications and capabilities of suppliers. The Owner will conduct such investigations as the Owner deems necessary to establish the responsibility, qualifications, and financial ability of the Bidders, proposed subcontractors and other persons and organizations to do the work in accordance with the Contract Documents to the Owner's satisfaction within the prescribed time. The Owner reserves the right to reject the bid of any Bidder deemed unqualified, as being non-responsive to the Invitation to Bid.

B.23. If a contract is to be awarded, it will be awarded to the lowest responsible Bidder whose evaluation by the Owner indicates to the Owner that the award will be in the best interest of the Project.

B.24. If a contract is to be awarded, the Owner will give the apparent successful Bidder a Notice of Award within sixty (60) days after the day of the bid opening. Should there be reasons why a contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder.

B.25. The party to whom the contract is awarded will be required to execute six (6) copies of the Agreement and obtain the Performance Bond and Payment Bond within fifteen (15) 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, the Owner may consider the Bidder in default, in which case the bid bond accompanying the proposal shall become the property of the Owner.

B.26. Performance and Payment Bonds shall be in amounts at least equal to 150 percent of the Contract Price, and in such form and with such sureties as are licensed to conduct business in the State of Delaware and are named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U. S. Treasury Department. Attorneys-in-fact who sign payment bonds and performance bonds must file with each bond a certified and effective dated copy of their power-of-attorney.

B.27. All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the project throughout.

BID FORMS

The bid forms are not available online. The bid forms are available only by purchasing a set of plans and specifications at the location indicated in the Advertisement for Bids/Public Notice to Bidders.

AGREEMENT

THIS AGREEMENT, made this the _____ day of _____, 20_____,
by and between _____ Town of Clayton _____ hereinafter called "Owner", and
_____ doing business as
_____,
located in the City of _____, County of _____,
State of _____, hereinafter called "Contractor".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the Owner, the Contractor hereby agrees with the Owner to commence and complete the construction described as follows: Storm System Repair hereinafter called the Project, for the amounts in the attached Bid for Unit Price Schedule, and all extra work in connection therewith, under the terms as stated in the Contract Documents and at Contractor's proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said Project in accordance with the conditions and prices stated in the Contract Documents as prepared by Verdantas, LLC, hereafter called "Engineer" and as enumerated in the General Conditions, all of which are made a part hereof and collectively evidence and constitute this Agreement.

The Contractor hereby agrees the Project will be substantially completed within 120 consecutive calendar days completed and ready for final payment within 150 consecutive calendar days after the date when the Contract Time commences to run.

Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Project is not completed within the times specified above, plus extensions thereof allowed in accordance with the General Conditions. Owner and Contractor also recognize the delays, expense and difficulties involved in proving the actual loss suffered by Owner if the Project 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 five hundred dollars (\$500.00) for each day that expires after the time specified for Substantial Completion until the project is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse or fail to complete the Project within the time specified for completion and readiness for final payment, or any proper extension thereof granted by Owner, Contractor shall pay Owner two hundred and fifty dollars (\$250.00) for each day that expires after the time specified for completion and readiness for final payment.

Neither the Owner nor the Contractor shall, without the prior written consent of the other, assign or sublet in whole or in part his interest under any of the Contract Documents and, specifically, the Contractor shall not assign any monies due or to become due without the prior written consent of the Owner.

The Owner and the Contractor each binds himself, his partners, successors, assigns, and legal representatives to the other party hereto in respect to all covenants, agreements and obligations contained in the Contract Documents.

The Contract Documents constitute the entire agreement between the Owner and the Contractor and may only be altered, amended or appealed by a duly executed written instrument.

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

IN WITNESS WHEREOF, the parties to these presents have executed this Contract in six (6) counterparts, each of which shall be deemed an original, in the year and day first mentioned above.

ATTEST:

(SEAL)

_____ Secretary	_____ Town of Clayton Owner
_____	By: _____
_____	_____
_____ Witness as to Owner	_____
_____	_____
_____ Address	_____ 414 Main Street Address
_____	_____ Clayton, Delaware 19938

ATTEST:

(SEAL)

_____ Secretary	_____ Contractor
_____	By: _____
_____	_____
_____ Witness as to Contractor	_____
_____	_____
_____ Address	_____ Address
_____	_____

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That

(Name of Contractor)

(Address of Contractor)

a _____ hereinafter called Principal,
(Corporation, Partnership or Individual)

And _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

The Town of Clayton
(Name of Owner)

414 Main St., Clayton, DE 19938
(Address of Owner)

hereinafter called Owner, in the penal sum of _____

Dollars, \$(_____) in lawful money of
the United States, for payment of which sum, well and truly to be made, we bind
ourselves, our heirs, executors, administrators, successors, and assigns, jointly and
severally, firmly by these presents.

The condition of this obligation is such that,

WHEREAS: The Principal entered into a certain Contract with the Owner, dated the
_____ day of _____, 20_____ a copy of which is hereto
attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms,
subcontractors, and corporations furnishing materials for or performing labor in the
prosecution of the work provided for in such Contract, and any authorized extension or
modification thereof, including all amounts due for materials, lubricants, oil, gasoline,

coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any ways affect its obligation on this Bond, and it does hereby waive notice of any such change, extension or time, alteration or addition to the terms of the Contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, such one of which shall be deemed an original, this the _____ day of _____ 20____.

ATTEST:

(SEAL)

Secretary

Witness as to Principal

Address

Principal
BY _____

Address

ATTEST

(SEAL)

Secretary

Witness as to Surety

Address

Surety
BY _____
Attorney-In-Fact

Address

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 where the project is located. Date of Bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute Bond.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

The Town of Clayton
(Name of Owner)

414 Main St., Clayton, DE 19938
(Address of Owner)

hereinafter called Owner, in the penal sum of _____

_____ dollars, \$(_____) in lawful money of the United States, for payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that,

WHEREAS: The Principal entered into a certain Contract with the Owner, dated the

_____ day of _____ 20_____ a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands insured under such Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and

shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any ways affect its obligation on this Bond, and it does hereby waive notice of any such change, extension or time, alteration or addition to the terms of the Contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, such one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

(SEAL)

Secretary

Witness as to Principal

Address

Principal
BY _____

Address

ATTEST

(SEAL)

Secretary

Witness as to Surety

Address

Surety
BY _____

Attorney-In-Fact

Address

MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal,
(Corporation, Partnership or Individual)

And _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

The Town of Clayton
(Name of Owner)

414 Main St, Clayton DE 19938
(Address of Owner)

hereinafter called Owner, in the penal sum of _____

Dollars, \$(_____) in lawful money of the United States, for payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that,

WHEREAS: The Principal entered into a certain Contract with the Owner, dated the _____ day of _____, 20 ____ and

WHEREAS: the Contract provides for the construction of:

which Contract is by reference incorporated herein, and made a part hereof, and is referred to as the Contract.

WHEREAS: said Contract provides that the Principal shall furnish a maintenance bond, and

WHEREAS: said Contract has been substantially completed, and a Certificate of Substantial Completion was issued on _____.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall remedy any defects due to faulty materials or workmanship, and pay for any damages to other work resulting therefrom, which shall appear within a period of 1 year(s) from the date of the Certificate of Substantial Completion as stated herein, then this obligation to be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that the Owner shall give Principal and Surety notice of defects with reasonable promptness.

SIGNED and sealed this _____ day of _____ 20____.

ATTEST:

(SEAL)

Secretary

Witness as to Principal

Address

Principal
BY _____

Address

ATTEST

(SEAL)

Secretary

Witness as to Surety

Address

Surety
BY _____

Attorney-In-Fact

Address

RELEASE OF LIENS

The undersigned, having received payment in full for all labor, materials, supplies, or equipment supplied to _____

Contractor, or to any subcontractor, in the construction or repair of the improvements known as

upon the property located at _____

and furnished in the execution and fulfillment of the Contract between said Contractor and

Owner, dated _____, do (does) hereby release and waive any and all claims, liens, and lien rights, of any kind, nature, or description whatsoever, against said property and the Owner thereof, and against said Contractor.

Lienor or Claimant

Signature

Name (type or print)

Date

BE IT REMEMBERED That on this _____ day of _____ 20 _____, personally came before me, a Notary Public for the State of Delaware, the above subscriber, who being first duly sworn according to law, did depose and say that the person, firm or corporation that has executed the above Release has furnished, or is contracted to furnish services, labor or materials in the construction of improvements on the premises described in said Release.

SWORN to and subscribed before me the day and year first above written.

Notary Public

SEAL

GENERAL CONDITIONS

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GENERAL CONDITIONS

ARTICLE I—DEFINITIONS

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

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

1.2. *Agreement*—The written contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

1.3. *Application for Payment*—The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

1.4. *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.

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

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

1.7. *Bidding Requirements*—The advertisement or invitation to Bid, instructions to bidders, and the Bid form.

1.8. *Bonds*—Performance and Payment bonds and other instruments of security.

1.9. *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.

1.10. *Contract Documents*—The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agree-

ment, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders and ENGINEER's written interpretations and clarifications issued pursuant to paragraphs 3.5, 3.6.1, and 3.6.3 on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to paragraphs 6.26 and 6.27 and the reports and drawings referred to in paragraphs 4.2.1.1 and 4.2.2.2 are not Contract Documents.

1.11. *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 11.9.1 in the case of Unit Price Work).

1.12. *Contract Times*—The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13.

1.13. *CONTRACTOR*—The person, firm or corporation with whom OWNER has entered into the Agreement.

1.14. *defective*—An adjective which 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 14.8 or 14.10).

1.15. *Drawings*—The drawings which show the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.

1.16. *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.

1.17. *ENGINEER*—The person, firm or corporation named as such in the Agreement.

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

1.19. *Field Order*—A written order issued by ENGINEER which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Times.

1.20. *General Requirements*—Sections of Division I of the Specifications.

1.21. *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.

1.22. *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.

1.23. *Liens*—Liens, charges, security interests or encumbrances upon real property or personal property.

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

1.25. *Notice of Award*—The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

1.26. *Notice to Proceed*—A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

1.27. *OWNER*—The public body or authority, corporation, association, firm or person with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be provided.

1.28. *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.

1.29. *PCBs*—Polychlorinated biphenyls.

1.30. *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 Wastes and crude oils.

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

1.32. *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.

1.33. *Resident Project Representative*—The authorized representative of ENGINEER who may be assigned to the site or any part thereof.

1.34. *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.

1.35. *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.

1.36. *Specifications*—Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

1.37. *Subcontractor*—An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

1.38. *Substantial Completion*—The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.39. *Supplementary Conditions*—The part of the Contract Documents which amends or supplements these General Conditions.

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

1.41. *Underground Facilities*—All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

1.42. *Unit Price Work*—Work to be paid for on the basis of unit prices.

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

1.44. *Work Change Directive*—A written directive 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 physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.23. A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in paragraph 10.2.

1.45. *Written Amendment*—A written amendment of 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.

ARTICLE 2—PRELIMINARY MATTERS

Delivery of Bonds:

2.1. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

2.2. OWNER shall furnish to CONTRACTOR up to ten copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Times; Notice to Proceed:

2.3. 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 thirty 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.

Starting the Work:

2.4. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence to run.

Before Starting Construction:

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

2.6. Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for review:

2.6.1. 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;

2.6.2. 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;

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

2.7. 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 paragraphs 5.4, 5.6 and 5.7.

Preconstruction Conference:

2.8. Within twenty 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 2.6, procedures for handling Shop Drawings and other submittals, processing Applications for Payment and maintaining required records.

Initially Acceptable Schedules:

2.9. 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 2.6. 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 the schedules are submitted to and acceptable to ENGINEER as provided below. The progress schedule will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within any specified Milestones and the Contract Times, but such acceptance will neither impose on ENGINEER responsibility for the sequencing, scheduling or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor. CONTRACTOR's schedule of Shop Drawing and Sample submissions will be acceptable to ENGINEER as providing a workable arrangement for reviewing and processing the required submittals. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance.

**ARTICLE 3—CONTRACT DOCUMENTS: INTENT,
AMENDING, REUSE**

Intent:

3.1. The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2. 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 Work, 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 furnished and performed whether or not specifically called for. When words or phrases which have a well-known technical or construction industry or trade meaning are used to describe Work, materials or equipment, such words or phrases shall be interpreted in accordance with that meaning. Clarifi-

cations and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 9.4.

3.3. Reference to Standards and Specifications of Technical Societies; Reporting and Resolving Discrepancies:

3.3.1. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or Laws or Regulations in effect at the time of 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.

3.3.2. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any Supplier referred to in paragraph 6.5, CONTRACTOR shall report it to ENGINEER in writing at once, and, CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.23) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.5 or 3.6; 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.

3.3.3. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement thereto issued by one of the methods indicated in paragraph 3.5 or 3.6, 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:

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

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

No provision of any such standard, specification, manual, code or instruction shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to OWNER, ENGINEER or any of ENGINEER's Consultants, agents or employees any duty or authority to supervise or direct the furnishing or

performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.13 or any other provision of the Contract Documents.

3.4. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved" or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment 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 furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.13 or any other provision of the Contract Documents.

Amending and Supplementing Contract Documents:

3.5. 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:

- 3.5.1. a formal Written Amendment.
 - 3.5.2. a Change Order (pursuant to paragraph 10.4), or
 - 3.5.3. a Work Change Directive (pursuant to paragraph 10.1).
- 3.6. In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:
- 3.6.1. a Field Order (pursuant to paragraph 9.5),
 - 3.6.2. ENGINEER's approval of a Shop Drawing or Sample (pursuant to paragraphs 6.26 and 6.27), or
 - 3.6.3. ENGINEER's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.7. CONTRACTOR, and any Subcontractor or Supplier or other person or organization 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, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER.

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

Availability of Lands:

4.1. OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of CONTRACTOR. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a correct 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 lien against such lands in accordance with applicable Laws and Regulations. OWNER shall identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which CONTRACTOR will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR and OWNER are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times as a result of any delay in OWNER's furnishing these lands, rights-of-way or easements, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2. Subsurface and Physical Conditions:

4.2.1. *Reports and Drawings:* Reference is made to the Supplementary Conditions for identification of:

4.2.1.1. *Subsurface Conditions:* Those reports of explorations and tests of subsurface conditions at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents; and

4.2.1.2. *Physical Conditions:* Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by ENGINEER in preparing the Contract Documents.

4.2.2. *Limited Reliance by CONTRACTOR Authorized: Technical Data:* 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:

4.2.2.1. 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

4.2.2.2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or

4.2.2.3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such data, interpretations, opinions or information.

4.2.3. *Notice of Differing Subsurface or Physical Conditions:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:

4.2.3.1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is materially inaccurate, or

4.2.3.2. is of such a nature as to require a change in the Contract Documents, or

4.2.3.3. differs materially from that shown or indicated in the Contract Documents, or

4.2.3.4. 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 conditions affected thereby or performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.23), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

4.2.4. *ENGINEER's Review:* ENGINEER will promptly review the pertinent conditions, 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.

4.2.5. *Possible Contract Documents Change:* If ENGINEER concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 4.2.3., a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

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

4.2.6.1. such condition must meet any one or more of the categories described in paragraphs 4.2.3.1 through 4.2.3.4, inclusive;

4.2.6.2. a change in the Contract Documents pursuant to paragraph 4.2.5 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment;

4.2.6.3. 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 9.10 and 11.9; and

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

4.2.6.4.1. 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

4.2.6.4.2. 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

4.2.6.4.3. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.2.3.

If OWNER and CONTRACTOR are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.3. *Physical Conditions—Underground Facilities:*

4.3.1. *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 or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

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

4.3.1.2. The cost of all of the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

4.3.2. *Not Shown or Indicated:* If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, CONTRACTOR shall, 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 6.23), 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 of the Underground Facility. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document such consequences. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and that CONTRACTOR did not know 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 the amount or length of any such adjustment in Contract Price or Contract Times, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages incurred or sustained by CONTRACTOR on or in connection with any other project or anticipated project.

Reference Points:

4.4. 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 shall make no changes or relocations

without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

4.5. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material:

4.5.1. OWNER shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material 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 and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. OWNER shall not be responsible for any such materials brought to the site by CONTRACTOR, Subcontractor, Suppliers or anyone else for whom CONTRACTOR is responsible.

4.5.2. CONTRACTOR shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by paragraph 6.23), and (ii) notify OWNER and ENGINEER (and 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 hazardous condition or take corrective action, if any. CONTRACTOR shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR special 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 the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of such Work stoppage or such special conditions under which Work is agreed by CONTRACTOR to be resumed, either party may make a claim therefor as provided in Articles 11 and 12.

4.5.3. If after receipt of such special 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 such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, 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 Articles 11 and 12. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

4.5.4. 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, employees, agents, other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from such hazardous condition, provided that: (i) any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and (ii) nothing in this subparagraph 4.5.4 shall obligate OWNER to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

4.5.5. The provisions of paragraphs 4.2 and 4.3 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site.

ARTICLE 5—BONDS AND INSURANCE

Performance, Payment and Other Bonds:

5.1. CONTRACTOR shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one 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 Supplementary Conditions. 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 Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

5.2. If the surety on any Bond furnished by CONTRACTOR is declared a 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 5.1, CONTRACTOR shall within ten days thereafter substitute another Bond and surety, both of which must be acceptable to OWNER.

5.3. Licensed Sureties and Insurers; Certificates of Insurance:

5.3.1. 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.

5.3.2. 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 in accordance with paragraph 5.4. 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 in accordance with paragraphs 5.6 and 5.7 hereof.

CONTRACTOR's Liability Insurance:

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

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

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

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

5.4.4. claims for damages insured by customary 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;

5.4.5. 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

5.4.6. 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.

The policies of insurance so required by this paragraph 5.4 to be purchased and maintained shall:

5.4.7. with respect to insurance required by paragraphs 5.4.3 through 5.4.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers and employees of all such additional insureds;

5.4.8. include 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;

5.4.9. include completed operations insurance;

5.4.10. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.12, 6.16 and 6.31 through 6.33;

5.4.11. contain a provision or endorsement that the coverage afforded will not be cancelled, 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 5.3.2 will so provide);

5.4.12. 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 13.12; and

5.4.13. 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).

OWNER's Liability Insurance:

5.5. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.4, 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.

Property Insurance:

5.6. 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:

5.6.1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

5.6.2. 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, falsework and Work in transit and shall insure against at least the following perils 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 as may be specifically required by the Supplementary Conditions;

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

5.6.4. 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

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

5.7. 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 persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

5.8. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 will contain a provision or endorsement that the coverage afforded will not be cancelled or materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.11.

5.9. OWNER shall not be responsible for purchasing and maintaining any property insurance 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. Subcontractor 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.

5.10. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraphs 5.6 or 5.7, 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.

5.11. Waiver of Rights:

5.11.1. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraphs 5.6 and 5.7 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds in such policies and will provide primary coverage for all losses and damages caused by the perils 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, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils 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 persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds 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.

5.11.2. In addition, OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them, for:

5.11.2.1. 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

5.11.2.2. loss or damage to the completed Project or part thereof caused by, arising out of or resulting from fire or other insured peril covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.10, after substantial completion pursuant to paragraph 14.8 or after final payment pursuant to paragraph 14.13.

Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in this paragraph 5.11.2 shall contain provisions to the effect that in the event of payment of any such loss, damage or consequential loss the insurers will have no rights of recovery against any of CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them.

Receipt and Application of Insurance Proceeds

5.12. Any insured loss under the policies of insurance required by paragraphs 5.6 and 5.7 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 5.13. 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.

5.13. 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 fifteen 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.

Acceptance of Bonds and Insurance; Option to Replace:

5.14. If either party (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 ten days after receipt of the certificates (or other evidence requested) required by paragraph 2.7. 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.

Partial Utilization—Property Insurance:

5.15. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use or occupancy shall commence before the insurers providing the property insurance 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 cancelled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6—CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

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

6.2. CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, 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 to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours and

CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's written consent given after prior written notice to ENGINEER.

6.4. Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all 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 furnishing, performance, testing, start-up and completion of the Work.

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

Progress Schedule:

6.6. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.9 as it may be adjusted from time to time as provided below:

6.6.1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.9) proposed adjustments in the progress schedule that will not change the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.6.2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of paragraph 12.1. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.7. Substitutes and "Or-Equal" Items:

6.7.1. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the specification or description contains or is followed by words 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 accepted by ENGINEER under the following circumstances:

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

6.7.1.2. *Substitute Items*: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under subparagraph 6.7.1.1, it will be considered a proposed substitute item. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by the ENGINEER will include the following as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall first make written application to ENGINEER for acceptance thereof, certifying that the proposed substitute will 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 evaluation and acceptance of the proposed substitute will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute.

6.7.1.3. *CONTRACTOR's Expense*: All data to be provided by CONTRACTOR in support of any proposed "or-equal" or substitute item will be at CONTRACTOR's expense.

6.7.2. *Substitute Construction Methods or Procedures*: If a specific means, method, technique, sequence or procedure of

construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.7.1.2.

6.7.3. *Engineer's Evaluation*: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.7.1.2 and 6.7.2. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitutes proposed or submitted by CONTRACTOR pursuant to paragraphs 6.7.1.2 and 6.7.2 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 accepts 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 item.

Concerning Subcontractors, Suppliers and Others:

6.8.1. CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER and ENGINEER as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

6.8.2. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials or equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement for acceptance by OWNER and ENGINEER, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's or ENGINEER'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 person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be adjusted by the difference in the cost occasioned by such

substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject *defective Work*.

6.9.1. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other person or organization, 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 person or organization except as may otherwise be required by Laws and Regulations.

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

6.10. 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.

6.11. 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 5.6 or 5.7, 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 additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils 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.

Patent Fees and Royalties:

6.12. 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, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from 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.

Permits:

6.13. 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.

Laws and Regulations:

6.14.1. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and 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.

6.14.2. 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 caused by, arising out of or resulting therefrom; 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 3.3.2.

Taxes:

6.15. 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.

Use of Premises:

6.16. CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages arising out of or resulting from 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.

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

6.18. 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.

Record Documents:

6.19. 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 (issued pursuant to paragraph 9.4) in good order and annotated to show all 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.

Safety and Protection:

6.20. CONTRACTOR shall be 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:

6.20.1. all persons on the Work site or who may be affected by the Work;

6.20.2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.20.3. 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.

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and 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 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of 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 person or organization 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 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

Safety Representative:

6.21. 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.

Hazard Communication Programs:

6.22. 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.

Emergencies:

6.23. In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER or ENGINEER, 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. 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 to document the consequences of such action.

6.24. Shop Drawings and Samples:

6.24.1. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawings and Sample submittals (see paragraph 2.9). 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 materials and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.26.

6.24.2. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be 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 6.26. The numbers of each Sample to be submitted will be as specified in the Specifications.

6.25. Submittal Procedures:

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

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

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

6.25.1.2. all information relative to CONTRACTOR's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

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.

6.25.2. Each submittal will 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.

6.25.3. At the time of each submission, 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.

6.26. ENGINEER will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by ENGINEER as required by paragraph 2.9. 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. 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. 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.

6.27. 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 submission as required by paragraph 6.25.3 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 6.25.1.

6.28. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by ENGINEER as required by paragraph 2.9, 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.

Continuing the Work:

6.29. 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 15.5 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.30. CONTRACTOR's General Warranty and Guarantee:

6.30.1. 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:

6.30.1.1. abuse, modification or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors or Suppliers; or

6.30.1.2. normal wear and tear under normal usage.

6.30.2. 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:

6.30.2.1. observations by ENGINEER;

6.30.2.3. recommendation of any progress or final payment by ENGINEER;

6.30.2.3. the issuance of a certificate of Substantial Completion or any payment by OWNER to CONTRACTOR under the Contract Documents;

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

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

6.30.2.6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13;

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

6.30.2.8. any correction of *defective* Work by OWNER.

Indemnification:

6.31. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, 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) caused by, arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage: (i) 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 (ii) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity.

6.32. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.31 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 person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.33. The indemnification obligations of CONTRACTOR under paragraph 6.31 shall not extend to the liability of ENGINEER and ENGINEER's Consultants, officers, directors, employees or agents caused by the professional negligence, errors or omissions of any of them.

Survival of Obligations:

6.34. All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with

the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Agreement.

ARTICLE 7—OTHER WORK

Related Work at Site:

7.1. OWNER may perform other work related to the Project at the site by OWNER's own forces, or let other direct contracts therefor which shall contain General Conditions similar to these, or have other work performed by utility owners. If the fact that such other work is to be performed was not noted in the Contract Documents, then: (i) written notice thereof will be given to CONTRACTOR prior to starting any such other work, and (ii) CONTRACTOR may make a claim therefor as provided in Articles 11 and 12 if CONTRACTOR believes that such performance will involve additional expense to CONTRACTOR or requires additional time and the parties are unable to agree as to the amount or extent thereof.

7.2. 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 additional 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 connect and 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 make its several parts come together properly and 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.

7.3. 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 so to report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent or nonapparent defects and deficiencies in such other work.

Coordination:

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

7.4.1. the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;

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

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

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

ARTICLE 8—OWNER'S RESPONSIBILITIES

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

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

8.3. OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.4 and 14.13.

8.4. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the site and drawings of physical conditions in existing structures at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents.

8.5. OWNER's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.10.

8.6. OWNER is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7. OWNER's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8. In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with OWNER's right to terminate services of CONTRACTOR under certain circumstances.

8.9. 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 furnishing or performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

8.10. OWNER'S responsibility in respect of undisclosed Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Materials uncovered or revealed at the site is set forth in paragraph 4.5.

8.11. 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

OWNER's Representative:

9.1. 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 shall not be extended without written consent of OWNER and ENGINEER.

Visits to Site:

9.2. ENGINEER will make visits to the site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER will endeavor for the benefit of OWNER to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing 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 on-site observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work. ENGINEER's visits and on-site observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.13, and particularly, but without limitation, during or as a result of ENGINEER's on-site visits or

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

Project Representative:

9.3. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more continuous 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 9.13 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 person will be as provided in the Supplementary Conditions.

Clarifications and Interpretations:

9.4. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree to the amount or extent thereof, if any, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or Article 12.

Authorized Variations in Work:

9.5. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR who shall perform the Work involved promptly. If OWNER or CONTRACTOR believes that a Field Order justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree as to the amount or extent thereof, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or 12.

Rejecting Defective Work:

9.6. 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 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.7. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraphs 6.24 through 6.28 inclusive.

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

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

Determinations for Unit Prices:

9.10. 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 upon OWNER and CONTRACTOR, unless, within ten days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other and to ENGINEER written notice of intention to appeal from ENGINEER's decision and: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in Exhibit GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to ENGINEER's decision, unless otherwise agreed in writing by OWNER and CONTRACTOR. Such appeal will not be subject to the procedures of paragraph 9.11.

Decisions on Disputes:

9.11. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and Claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant

to ENGINEER and the other party to the Agreement promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within sixty days after the start of such occurrence or event unless ENGINEER allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to ENGINEER and the claimant within thirty days after receipt of the claimant's last submittal (unless ENGINEER allows additional time). ENGINEER will render a formal decision in writing within thirty days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. ENGINEER's written decision on such claim, dispute or other matter will be final and binding upon OWNER and CONTRACTOR unless: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in EXHIBIT GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within thirty days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction 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 within sixty days of the date of such decision, unless otherwise agreed in writing by OWNER and CONTRACTOR.

9.12. When functioning as interpreter and judge under paragraphs 9.10 and 9.11, 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 paragraphs 9.10 or 9.11 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 14.16) 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 pursuant to Article 16.

9.13. Limitations on ENGINEER's Authority and Responsibilities:

9.13.1. 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 owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them.

9.13.2. 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 furnishing or performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

9.13.3. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.13.4. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and Other documentation required to be delivered by paragraph 14.12 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.

9.13.5. The limitations upon authority and responsibility set forth in this paragraph 9.13 shall also apply to ENGINEER's Consultants, Resident Project Representative and assistants.

ARTICLE 10—CHANGES IN THE WORK

10.1. 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. Such additions, deletions or revisions will be authorized 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).

10.2. If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Times that should be allowed as a result of a Work Change Directive, a claim may be made therefor as provided in Article 11 or Article 12.

10.3. 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 and supplemented as provided in paragraphs 3.5 and 3.6 except in the case of an emergency as provided in paragraph 6.23 or in the case of uncovering Work as provided in paragraph 13.9.

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

10.4.1. changes in the Work which are (i) ordered by OWNER pursuant to paragraph 10.1, (ii) required because of acceptance of *defective* Work under paragraph 13.13 or correcting *defective* Work under paragraph 13.14, or (iii) agreed to by the parties;

10.4.2. changes in the Contract Price or Contract Times which are agreed to by the parties; and

10.4.3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 9.11;

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 6.29.

10.5. 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, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11—CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at CONTRACTOR's expense without change in the Contract Price.

11.2. 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 delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty days after the start of such occurrence or event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event. All claims for adjustment in the Contract Price shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will

be valid if not submitted in accordance with this paragraph 11.2.

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

11.3.1. 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 paragraphs 11.9.1 through 11.9.3, inclusive);

11.3.2. 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 11.6.2);

11.3.3. 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 11.3.2, on the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 11.6).

Cost of the Work:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by 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 11.5:

11.4.1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by 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 after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by OWNER.

11.4.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All 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.

11.4.3. Payments made by CONTRACTOR to the Subcontractors for Work performed or furnished 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 accepted. 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 paragraphs 11.4, 11.5, 11.6 and 11.7. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

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

11.4.5. Supplemental costs including the following:

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

11.4.5.2. 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.

11.4.5.3. 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, installation, dismantling and removal thereof—all 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.

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

11.4.5.5. 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.

11.4.5.6. 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 and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by OWNER in accordance with paragraph 5.9), provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts 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. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. 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.

11.4.5.9. Cost of premiums for additional Bonds and insurance required because of changes in the Work.

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

11.5.1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership 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 a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4—all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

11.5.2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.

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

11.5.4. Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

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

Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6. The CONTRACTOR's fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1. a mutually acceptable fixed fee; or

11.6.2. 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:

11.6.2.1. for costs incurred under paragraphs 11.4.1 and 11.4.2, the CONTRACTOR's fee shall be fifteen percent;

11.6.2.2. for costs incurred under paragraph 11.4.3, the CONTRACTOR's fee shall be five percent;

11.6.2.3. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraphs 11.4.1, 11.4.2, 11.4.3 and 11.6.2 is that the Subcontractor who actually performs or furnishes the Work, at whatever tier, will be paid a fee of fifteen percent of the costs incurred by such Subcontractor under paragraphs 11.4.1 and 11.4.2 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;

11.6.2.4. no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.5. 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

11.6.2.5. 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 11.6.2.1 through 11.6.2.5, inclusive.

11.7. Whenever the cost of any Work is to be determined pursuant to paragraphs 11.4 and 11.5, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowances:

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

11.8.1. 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

11.8.2. 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.

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.

11.9. Unit Price Work:

11.9.1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER in accordance with paragraph 9.10.

11.9.2. 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.

11.9.3. OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11 if:

11.9.3.1. 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

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

11.9.3.3. 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 TIMES

12.1. The Contract Times (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Times (or Milestones) shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. All time limits stated in the Contract Documents are of the essence of the Agreement.

12.3. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of 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 12.1. 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. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.4. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both 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. In no event shall OWNER be liable to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of CONTRACTOR, or (ii)

delays beyond the control of both parties including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

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

13.1. *Notice of Defects:* Prompt notice of all defective Work of which OWNER or ENGINEER have actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2. 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 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.

Tests and Inspections:

13.3. 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.

13.4. 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:

13.4.1. for inspections, tests or approvals covered by paragraph 13.5 below;

13.4.2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.9 below shall be paid as provided in said paragraph 13.9; and

13.4.3. as otherwise specifically provided in the Contract Documents.

13.5. 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. CONTRACTOR shall also 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 of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work.

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

13.7. Uncovering Work as provided in paragraph 13.6 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.

Uncovering Work:

13.8. 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.

13.9. 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 caused by, arising out of or resulting from 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, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 11. 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; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

OWNER May Stop the Work:

13.10. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, 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 or any surety or other party.

Correction or Removal of Defective Work:

13.11. If required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all *defective* Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with Work that is not *defective*. CONTRACTOR shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.12. Correction Period:

13.12.1. 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*, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) correct such *defective* Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not *defective*, and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the *defective* Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

13.12.2. 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.

13.12.3. Where *defective* Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph 13.12, 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.

Acceptance of Defective Work:

13.13. If, instead of requiring correction or removal and replacement of *defective* Work, OWNER (and, prior to ENGINEER's recommendation of final payment, also ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall

pay all claims, costs, losses and damages attributable to OWNER's evaluation of and determination to accept such *defective* Work (such costs to be approved by ENGINEER as to reasonableness). 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, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.14. 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 13.11, 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. 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. All claims, costs, losses and damages incurred or sustained by OWNER in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's *defective* Work. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14—PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 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.

Application for Progress Payment:

14.2. At least twenty 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 and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

14.3. 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.

Review of Applications for Progress Payment:

14.4. ENGINEER will, within ten 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. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by OWNER to CONTRACTOR.

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

14.5.1. the Work has progressed to the point indicated,

14.5.2. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10, and to any other qualifications stated in the recommendation), and

14.5.3. 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.

However, by recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) exhaustive or continuous on-site inspections have been made to check the quality or the quantity 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.

14.6. ENGINEER's recommendation of any payment, including final payment, shall not mean that ENGINEER is responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of Work, or for any failure of CONTRACTOR to perform or furnish Work in accordance with the Contract Documents.

14.7. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.5. ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

14.7.1. the Work is *defective*, or completed Work has been damaged requiring correction or replacement,

14.7.2. the Contract Price has been reduced by Written Amendment or Change Order,

14.7.3. OWNER has been required to correct *defective* Work or complete Work in accordance with paragraph 13.14, or

14.7.4. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.4 inclusive.

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

14.7.5. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work,

14.7.6. 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.

14.7.7. there are other items entitling OWNER to a set-off against the amount recommended, or

14.7.8. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.7.1 through 14.7.3 or paragraphs 15.2.1 through 15.2.4 inclusive;

but OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

Substantial Completion:

14.8. 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. Within a reasonable time 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 fourteen 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 fourteen 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, 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.

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

Partial Utilization:

14.10. Use by OWNER at OWNER's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) 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:

14.10.1. 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 paragraphs 14.8 and 14.9 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.

14.10.2. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of property insurance.

Final Inspection:

14.11. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will 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.

Final Application for Payment:

14.12. After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by paragraph 5.4, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.4.13, (ii) consent of the surety, if any, to final payment, and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work. In lieu of such releases or waivers of Liens and as approved by 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.

Final Payment and Acceptance:

14.13. 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 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 14.15. Otherwise, ENGINEER will return the Application 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. Thirty days after the presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to

CONTRACTOR.

14.14. 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 5.1, 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.

Waiver of Claims:

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

14.15.1. 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 14.11, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

14.15.2. a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15—SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work:

15.1. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than ninety 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 an approved claim therefor as provided in Articles 11 and 12.

OWNER May Terminate:

15.2. Upon the occurrence of any one or more of the following events:

15.2.1. if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as adjusted from time to time pursuant to paragraph 6.6);

15.2.2. if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

15.2.2. if CONTRACTOR disregards the authority of ENGINEER; or

15.2.4. if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if any,) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and 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 sustained by OWNER arising out of or resulting from 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, provided that when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

15.3. 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.

15.4. 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 Agreement. In such case, CONTRACTOR shall be paid (without duplication of any items):

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

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

15.4.3. for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and

15.4.4. for reasonable expenses directly attributable to termination.

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.

CONTRACTOR May Stop Work or Terminate:

15.5. If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within thirty days after it is submitted or OWNER fails for thirty 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 Agreement and recover from OWNER payment on the same terms as provided in paragraph 15.4. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within thirty days after it is submitted, or OWNER has failed for thirty days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may upon seven day's written notice to OWNER and ENGINEER stop the Work until payment of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.5 are not intended to preclude CONTRACTOR from making claim under Articles 11 and 12 for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this paragraph.

ARTICLE 16—DISPUTE RESOLUTION

If and to the extent that OWNER and CONTRACTOR have agreed on the method and procedure for resolving disputes between them that may arise under this Agreement, such dispute resolution method and procedure, if any, shall be as set forth in Exhibit GC-A, "Dispute Resolution Agreement," to be attached hereto and made a part hereof. If no such agreement on the method and procedure for resolving such disputes has been reached, and subject to the provisions of paragraphs 9.10, 9.11, and 9.12, 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

Giving Notice:

17.1. 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.

Computation of Times:

17.2.1. 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.

17.2.2. A calendar day of twenty-four hours measured from midnight to the next midnight will constitute a day.

Notice of Claim:

17.3. Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or

act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

Cumulative Remedies:

17.4. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.12, 6.16, 6.30, 6.31, 6.32, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to OWNER and ENGINEER thereunder, 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.

Professional Fees and Court Costs Included:

17.5. Whenever reference is made to "claims, costs, losses and damages," it shall include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs.

**EXHIBIT GC-A to General Conditions of the
Agreement Between OWNER and CON-
TRACTOR Dated _____
For use with EJCDC No. 1910-8 (1990 ed.)**

DISPUTE RESOLUTION AGREEMENT

OWNER and CONTRACTOR hereby agree that Article 16 of the General Conditions to the Agreement between OWNER and CONTRACTOR is amended to include the following agreement of the parties:

16.1. All claims, disputes and other matters in question between OWNER and CONTRACTOR arising out of or relating to the Contract Documents or the breach thereof (except for claims which have been waived by the making or acceptance of final payment as provided by paragraph 14.15) will be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining, subject to the limitations of this Article 16. This agreement so to arbitrate and any other agreement or consent to arbitrate entered into in accordance herewith as provided in this Article 16 will be specifically enforceable under the prevailing law of any court having jurisdiction.

16.2. No demand for arbitration of any claim, dispute or other matter that is required to be referred to ENGINEER initially for decision in accordance with paragraph 9.11 will be made until the earlier of (a) the date on which ENGINEER has rendered a written decision or (b) the thirty-first day after the parties have presented their evidence to ENGINEER if a written decision has not been rendered by ENGINEER before that date. No demand for arbitration of any such claim, dispute or other matter will be made later than thirty days after the date on which ENGINEER has rendered a written decision in respect thereof in accordance with paragraph 9.11; and the failure to demand arbitration within said thirty days' period will result in ENGINEER's decision being final and binding upon OWNER and CONTRACTOR. If ENGINEER renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but will not supersede the arbitration proceedings, except where the decision is acceptable to the parties concerned. No demand for arbitration of any written decision of ENGINEER rendered in accordance with paragraph 9.10 will be made later than ten days after the party making such demand has delivered written notice of intention to appeal as provided in paragraph 9.10.

16.3. Notice of the demand for arbitration will be filed in writing with the other party to the Agreement and with the

American Arbitration Association, and a copy will be sent to ENGINEER for information. The demand for arbitration will be made within the thirty-day or ten-day period specified in paragraph 16.2 as applicable, and in all other cases within a reasonable time after the claim, dispute or other matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such claim, dispute or other matter in question would be barred by the applicable statute of limitations.

16.4. Except as provided in paragraph 16.5 below, no arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder or in any other manner any other person or entity (including ENGINEER, ENGINEER's Consultant and the officers, directors, agents, employees or consultants of any of them) who is not a party to this contract unless:

16.4.1. the inclusion of such other person or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration, and

16.4.2. such other person or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings, and

16.4.3. the written consent of the other person or entity sought to be included and of OWNER and CONTRACTOR has been obtained for such inclusion, which consent shall make specific reference to this paragraph; but no such consent shall constitute consent to arbitration of any dispute not specifically described in such consent or to arbitration with any party not specifically identified in such consent.

16.5. Notwithstanding paragraph 16.4 if a claim, dispute or other matter in question between OWNER and CONTRACTOR involves the Work of a Subcontractor, either OWNER or CONTRACTOR may join such Subcontractor as a party to the arbitration between OWNER and CONTRACTOR hereunder. CONTRACTOR shall include in all subcontracts required by paragraph 6.11 a specific provision whereby the Subcontractor consents to being joined in an arbitration between OWNER and CONTRACTOR involving the Work of such Subcontractor. Nothing in this paragraph 16.5 nor in the provision of such subcontract consenting to joinder shall create any claim, right or cause of action in favor of Subcontractor and against OWNER, ENGINEER or ENGINEER's Consultants that does not otherwise exist.

16.6. The award rendered by the arbitrators will be final, judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal.

SUPPLEMENTARY CONDITIONS

SC-A. GENERAL

A.1. The Supplementary Conditions provided herein supplement, revise or modify the preceding General Conditions.

A.2. In the case of a conflict between the aforementioned document and the Supplementary Conditions, the Supplementary Conditions shall take precedence.

SC-B. CONTRACT DOCUMENTS

Drawings

B.1. Listed herein are the plans for the project dated July 13, 2026 that are part of the Contract Documents and will be the Drawings for the project:

Exhibit A	-	Cured in Place Pipe Repair
Exhibit B	-	Storm Sewer Pipe Replacement
Exhibit C	-	Trench & Repaving Detail

Specifications

B.2. Listed herein are the technical specifications for the project dated July 13, 2026 that are a part of the Contract Documents and that will be the Specifications for the project.

Division 1	-	General Requirements
Division 2	-	Site Construction

Contract Documents Furnished

B.3. The Owner shall furnish to the Contractor five (5) complete sets of the Contract Documents.

B.4. Additional copies of the Contract Documents including the Drawings and/or the bound Project Manual will be furnished to the Contractor upon request, at the cost of reproduction.

SC-C. INSURANCE

C.1. The Contractor's insurance coverage under the requirements of the General Condition shall not be less than the following limits:

- a. General Liability - Bodily Injury - \$500,000/\$1,000,000
- b. General Liability - Property Damage - \$300,000/\$500,000
- c. General Liability - Personal Injury - \$500,000
- d. Automobile Liability - Bodily Injury - \$300,000/\$500,000
- e. Automobile Liability - Property Damage - \$300,000
- f. Worker's Compensation and Employer's Liability - Statutory/\$100,000

C.2. The Contractor shall purchase and maintain property insurance upon the Project to the full insurable value thereof to satisfy the insurance requirements of the General Conditions.

C.3. All insurance coverage of the project by the Contractor shall include contractual liability insurance which shall include Owner and Engineer as additional insured parties.

SC-D. NOTICE TO PROCEED

D.1. The Engineer will provide the Contractor with a written Notice to Proceed that specifies when the Contract Time begins.

SC-E. NIGHT WORK

E.1. The Contractor shall not carry on regular construction activities during the hours between 7:00 p.m. and 7:00 a.m. without the written authorization of the Engineer. Requests for night work shall be submitted to the Engineer at least two (2) full working days in advance.

SC-F. LEGAL HOLIDAYS

F.1. The Contractor shall not carry on regular construction activities on Saturdays, Sundays, or legal holidays recognized by the Town of Clayton without the written authorization of the Engineer. Construction activities shall not be carried on within the right-of-way of State maintained roads on holidays recognized by the State of Delaware. Requests for working on Saturdays, Sundays, or legal holidays shall be submitted to the Engineer at least two (2) full working days in advance.

F.2. The following shall be legal holidays:

- a. New Year's Day
- b. Martin Luther King Day
- c.. President's Day
- d. Good Friday
- e. Memorial Day
- f. Juneteenth
- g. Independence Day
- h. Labor Day
- i. Veterans Day
- j. Thanksgiving
- k. Friday After Thanksgiving
- l. Christmas Eve (1/2 Day)
- m. Christmas Day
- n. New Year's Eve (1/2 Day)

F.3. If any of the legal holidays fall on Sunday, the Monday following shall be a legal holiday. If any of the legal holidays fall on Saturday, the Friday preceding shall be a legal holiday.

SC-G. OVERTIME WORK

G.1. The Contractor shall not schedule or carry out regular construction activities to result in a weekly work schedule in excess of 40 hours without the written authorization of the Engineer. Requests for a work period in excess of 40 hours per week should be submitted to the Engineer at least two (2) full days in advance of the start of the work week.

G.2. The Contractor shall reimburse the Owner for the added costs of inspection services and any other costs incurred by the Owner as the result of an overtime work schedule of the Contractor.

G.3. If and when the Owner orders the Contractor to perform work included in the Contract outside of regular working hours for purposes not covered by the Contract, the Contractor shall be paid an extra to the contract price. The payment for such overtime ordered by the Owner shall be at the applicable rate for overtime hours, minus the applicable rate for straight time hours. The Contractor shall not be entitled to extra compensation for overtime necessary to meet the Construction Schedule of Completion.

SC-H. PAYMENTS TO CONTRACTOR

H.1. Payments to the Contractor shall be made as provided by Article 14 of the General Conditions except as provided herein.

H.2. The Engineer shall, within ten (10) days after receipt of each Application for Payment with an invoice, either indicate in writing Engineer's recommendation of payment and present the Estimate to the Owner, or return the Estimate to the Contractor indicating in writing Engineer's reasons for refusing to recommended payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Estimate. The Owner shall, within thirty (30) days of presentation of a recommendation by the Engineer, and if payment is recommended by the Engineer, pay the Contractor the amount approved by the Engineer.

H.3. Upon application of the Contractor, and subject to sole discretion of the Engineer, payments may be made on the basis of equipment and materials not incorporated in the work but paid for, delivered and suitably stored at the site or at another location acceptable to the Engineer.

H.4. Prior to the final payment, the Owner shall retain five (5) percent of the amount of payment due the Contractor. When the progress of the work is satisfactory, the Owner may, at the Owner's sole discretion reduce the amount retained.

SC-I. MAINTENANCE BOND

I.1. The Contractor shall submit to the Engineer with each Certification of Substantial Completion for all or part of the project, a maintenance bond in an amount no less than one hundred (100) percent of the amount specified in the Certification of Substantial Completion. In the event the certification is for part of the project, the amount specified shall be no less than the total cost, delivered and installed, complete and in-place, of that part of the project but in no case less than the value identified in the approved Schedule of Values. The Engineer may require the Contractor to provide invoices, labor costs and/or such other documentation as may be necessary, in the opinion of the Engineer, to substantiate the amount specified. In the event the certification of Substantial Completion is for the entire project, the amount specified shall be 100% of the final contract price less the sum of all certificates of Substantial Completion previously approved by the Engineer. The term of each maintenance bond shall extend one year from the date of approval of each certificate of Substantial Completion.

SC-J. RELEASE OF LIENS

J.1 Prior to final acceptance of the project, the Contractor shall deliver to the Engineer, for the Owner, a release of liens in a form satisfactory to the Engineer that has been properly executed by all subcontractors and suppliers.

SC-K. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

K.1. It is hereby understood and mutually agreed, by and between the Contractor and Owner, that the date of beginning and the time for completion as specified in the Project to be done hereunder are essential conditions of the Agreement; and it is further mutually understood and agreed that the project to be performed under this Agreement shall be commenced on a date to be specified in the Notice to Proceed.

K.2. The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the Project described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

K.3. If the said Contractor shall neglect, fail or refuse to complete the Project within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part of consideration for the awarding of this contract, to pay to the Owner the amount specified in the Agreement, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the Agreement for completing the work.

K.4. The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

K.5. It is further Agreed that time is of the essence of each and every portion of this Agreement and of the specification wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this Agreement. Provided that the Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the Owner. Provided further, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

- a. To any preference, priority or allocation order duly issued by the Government.
- b. To unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and severe weather; and
- c. To any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections a and b of this article; provided further, that the Contractor shall, within ten

(10) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the contract, notify the Owner, in writing, of the cause of delay, who shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of its decision in the matter.

SPECIFICATIONS

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Storm Sewer Repair
- B. Project Location: Town of Clayton, Clayton, Delaware.
- C. Owner: The Town of Clayton, 414 Main Street, Clayton, Delaware 19938.
- D. Engineer Identification: The Contract Documents were prepared for the Project by Verdantas, LLC, 1060 South Governors Avenue, Suite 101, Dover, Delaware 19904
- E. The work consists of, but is not limited to, the repair of approximately 3,530 linear feet of existing storm sewer mains varying from 8" to 42" diameter round and 34"x53" elliptical pipe using open cut trench replacement and Cured-In-Place-Pipe (CIPP) construction methods, traffic control, milling, hot-mix trench and roadway paving, hot-mix overlay, restoration of all surfaces disturbed by construction and other associated work.

1.2 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SPECIFICATIONS

SECTION 01290 - PAYMENT PROCEDURES

PART 1 – GENERAL

1.1 Related Documents

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for preparation of Schedules of Values and for measurement and payment of unit price items.

1.3 MEASUREMENT AND PAYMENT

A. General Provisions

1. All work shown on the Drawings and described in the Contract Documents is to be paid for under the bid items listed on the proposal forms. The absence from the proposal form of a bid item specifically describing work shown on or required by the Contract Documents means that the cost of any such work shall be included in the prices bid for adjacent, associated, or related items for which quantities have been established.
2. Payment for the materials furnished and the work performed under the Contract Documents will be made as stipulated in the Contract Documents for the amount of materials supplied and the work actually done under authorization of the Engineer and in accordance with the actual measurements.
3. The Contractor shall not proceed with any quantities of work beyond that specifically shown on or specifically described in the Contract Documents without the written authorization of the Engineer. Any such work undertaken without authorization shall be subject to exclusion from measurement for payment under the terms of these Contract Documents at the discretion of the Owner.
4. All work completed under the Contract shall be measured by the Engineer according to United States standard measure. The method of measurement and computations to be used in the determination of quantities of materials furnished and of work performed under the Contract will be those methods generally recognized as conforming to good engineering practices.
5. All material that is to be measured by weight shall have a weight ticket signed by an approved certified weigh master and shall be presented to the Engineer when received on the job site.
6. When requested by the Contractor and approved by the Engineer in writing, material specified to be measured by the cubic yard may be weighed and such weights will be converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.
7. As described elsewhere in these Contract Documents, the Contractor is required to submit a parts list and printed instructions and diagrams covering the operation and maintenance of each item of equipment and controls supplied. The Owner reserves the right to withhold payment in part or in total for any delivered equipment for which the foregoing documents have not been provided to the Engineer in the number described.

B. Mobilization

1. Mobilization shall consist of initiating the Contract and may include such portions of the following as are required at the beginning of the project setting up the Contractor's general plant; project signs; shops; storage areas; sanitary and other facilities as required by the Contract Documents, by local or state law, or by regulation, providing access to the site; obtaining necessary permits and licenses, and payments of fees; protecting existing materials; and providing required insurance and bonds.

SPECIFICATIONS

2. Payment for Mobilization will be made at the lump sum price bid for the item, which price shall include full payment for this item as described. The provisions for payment for this item supercede any provisions elsewhere in the Contract Documents for including the costs of these initial services and facilities in the various items scheduled in the bid.
3. The lump sum price bid for mobilization, less retainage, shall be payable to the Contractor in accordance with the following schedule:
 - a. Fifty percent (50%) of the lump sum price for the item "Mobilization" shall be payable to the Contractor upon his successful completion of five percent (5%) of the awarded contract work. For purposes of this item, five percent (5%) of the work shall be considered completed when the total of payments earned, exclusive of the amount done, shall exceed five percent (5%) of the total price bid for the awarded contract.
 - b. The remaining fifty percent (50%) of the lump sum price bid for the item "Mobilization" shall be payable to the Contractor in two (2) increments of twenty-five percent (25%) each. Each of the increments shall be payable to the Contractor upon his successful completion of forty percent (40%) and seventy percent (70%) of the awarded contract work. Percent completion of the awarded contract work shall be computed as defined previously.
 - c. The lump sum price bid for mobilization shall not exceed five percent (5%) of the total price bid for the awarded contract.

C. Storm Sewers

1. The unit prices for the furnishing and installing of storm sewers shall include clearing and grubbing of the surface, saw cutting and removal of pavement and concrete, excavation, removal, storage, rehauling, and replacement of all materials encountered during excavation of the trenches, stone bedding, disposal of excess material not suitable for refill or in excess of the quantities required for reuse, demolition and abandonment of existing storm pipe, fittings, and appurtenances, furnishing and placing of all pipe and jointing materials, concrete encasement where indicated on the Drawings, furnishing and placing of all concrete thrust blocking, pumping or other disposal of water, accommodation and maintenance of travel, the support and protection of all utilities and structures and their restoration in case of damage, the restoration of mailboxes, road signs, drainage structures, saw cutting and replacement of damaged sidewalk, curbs and gutters, saw cutting and replacement of driveways to original conditions, compacted refill, temporary repaving where indicated on the Drawings, topsoil, topsoiling, seeding, and mulching unpaved areas, testing and other incidental work.
2. Measurement for length of storm sewer shall be made as the horizontal distance taken along the centerline of the pipe including fittings.
3. Payment for storm sewer pipe will be on the linear foot basis depending on the size of the appropriate unit price bid.

D. Cured in Place Piping (CIPP) Liner

1. The unit price for the liner shall include mobilization and demobilization, light cleaning, pre-lining and post-lining CCTV inspection, preparation of storm sewer pipe prior to lining, installation of CIPP liner, on-road and off-road restoration, labor, equipment and maintenance of traffic.
2. Measurement by linear foot measured horizontally along centerline of storm sewer pipe lined.
3. Payment for shall be made on a linear foot basis depending on the size of the storm pipe at the appropriate unit price bid.

E. Pipe Grouting Prior to Lining

1. The unit prices for the installation of chemical pipe grouting shall include all measures required to apply grout and seal infiltration at all defect locations and joints prior to installing CIPP liner, storage, testing, labor, maintenance of traffic, and up to two (2) gallons of chemical grout per defect.
2. Measurement shall be made on a per each basis.

SPECIFICATIONS

3. Payment shall be made on a per each basis in accordance with the size of pipe being grouted, at the appropriate unit price bid.

F. Pavement Milling

1. The unit price for pavement milling shall include all labor, tools, materials, transportation, supplies, equipment and appurtenances necessary for milling or planning of existing bituminous concrete and portland cement concrete pavement as required by the Contract Documents and as directed by the Engineer in association with the construction of storm sewers, and appurtenances. Pavement milling as elected by the Contractor, but not required by the Contract Documents or not as directed by the Engineer, shall not be eligible for payment under this item.
2. Measurement of pavement milling shall be determined by the actual number of square yards per inch of depth shown on the Drawings, or as directed by the Engineer. Any additional depth, not approved by the Engineer, shall not be measured.
3. Payment for pavement milling shall be made at the appropriate unit price per square yard per inch depth, based on the accepted measurement.

G. Repaving

1. The unit prices for the furnishing and installation of temporary repaving and hot-mix trench repaving shall include graded aggregate Type B, BCBC intermediate course, compacted Type C hot mix, removal and disposal of temporary fill, striping and markings, and all labor, tools, equipment, hauling, placing and incidentals necessary to complete the item of work.
2. Measurement for temporary repaving and hot-mix trench repaving shall be made on a square yard basis for the repaved area actually necessary for the excavation. Areas outside the accepted line of excavation will not be included in the Measurement for Payment. The allowable trench widths and finished paving width for payment are:

Pipe Diameter	Trench Width	Trench Paving Width
8"	44"	92"
10"	46"	94"
12"	48"	96"
15"	51"	99"
18"	54"	102"

3. Measurement for hot-mix overlay shall be determined by the actual number of square yards per inch depth shown on the Drawings, or as directed by the Engineer. Any additional depth, not approved by the Engineer, shall not be measured.
4. Payment for all types of repaving shall be made at the appropriate unit price per square yard bid, based on the accepted measurement.

Payment for hot-mix overlay shall be made at the appropriate unit price per square yard per inch depth, based on the accepted measurement.

H. Heavy Cleaning

1. The unit price for heavy cleaning shall include mobilization and demobilization, use of heavy equipment such as bucket machines, heavy root cutters, scrapers, augers, spraying of root areas, and the removal of sludge, dirt, sand, grease, and other materials from the downstream manhole. All collected debris shall be removed from site.
2. Measurement for length of heavy cleaning shall be made as the horizontal distance taken along the centerline of the pipe.
3. Payment for heavy cleaning will be on the linear foot basis.

SPECIFICATIONS

I. Contingent Work

1. General Provisions

- a. Items of contingent work included herein are those for which the requirement of approximate quantity cannot be determined in advance of construction. The items are included solely for the purpose of establishing a unit price and method of measurement in the event any or all of the items are required. There is no guarantee, expressed or implied, that any items of Contingent Work will be authorized.
- b. In the event any Contingent Work unit prices are considered by the Owner to be unbalanced or excessive, the Owner reserves the right to take the following actions after award of the Contract but before issuing the Notice to Proceed:
 - i. Negotiate lower, mutually agreeable unit prices for any or all items of Contingent Work.
 - ii. Direct the Contractor to perform any or all items of Contingent Work with measurement and payment to be made in accordance with Article 11 of the General Conditions of these Contract Documents.
- c. The Contractor shall not be paid under the terms and conditions of this subdivision for work performed to replace defective work, work done without the required authorization, and work which is beyond the dimensions shown on the Drawings or properly authorized.
- d. No payment will be made under the provisions of this subdivision for work which is required to be included under other payment items by these Contract Documents.

2. Backfill Borrow

- a. The unit price for Backfill Borrow shall include furnishing, placing, and compacting DeIDOT Type C Backfill Borrow in accordance with the requirements of the Contract Documents when directed in writing by the Engineer. The unit price includes the disposal of excess material not suitable for reuse or in excess of the quantities required for reuse.
- b. Measurement for Backfill Borrow shall be calculated by multiplying the width times the depth times the length of backfill authorized in writing by the Engineer.
- c. Payment for Backfill Borrow shall be at the stipulated unit price bid per cubic yard indicated on the Bid form.

3. Concrete

- a. The unit price for Concrete includes furnishing and placing Class B Concrete as specified by DeIDOT Standard Specifications for Road and Bridge Construction, most recent edition, for encasement, backfill or to prevent flotation in accordance with the Contract Documents when directed by the Engineer in writing and where not otherwise specifically shown on the Drawings or required by the Contract Documents. The unit price includes the disposal of excess material not suitable for reuse or in excess of the quantities required for reuse.
- b. Measurement for concrete shall be determined by the actual number of cubic yards authorized in writing by the Engineer.
- c. Payment for Concrete shall be made at the stipulated unit price per cubic yard indicated on the Bid Form.

4. Catch Basin Frame and Grates

- a. The unit price bid for the furnishing and installing of storm sewer catch basins, frames and grates, shall include clearing and grubbing of the surface, excavation, removal, storage, rehauling and replacement of all material not suitable for refill or in excess of the quantities required for refill, connection of all pipes, construction of flow channels, placing and removal of sheeting, shoring

SPECIFICATIONS

and bracing, pumping or other disposal of water, the support and protection of all utilities and structures and restoration in case of damage, compacted refill, testing and other incidental work.

- b. Measurement for catch basins, frames and grates, and appurtenances shall be on a per each basis.
- c. Payment for catch basins, junction boxes, frames and grates shall be made on a per each basis at the appropriate unit price bid.

J. Payments to Contractor

- 1. The Engineer shall, within ten (10) days after receipt of each Application for Payment with an invoice, either indicate in writing his recommendation of payment and present the Application to the Owner, or return the Application to the Contractor indicating in writing his reasons for refusing to recommend payment. In the latter case, the Contractor may make the necessary corrections and resubmit the Application. The Owner shall expedite payment to the Contractor in the amount approved by the Engineer.
- 2. Upon application of the Contractor, and subject to sole discretion of the Engineer, payments may be made on the basis of equipment and materials not incorporated in the work but paid for, delivered and suitably stored at the site or at another location acceptable to the Engineer.
- 3. The Owner shall retain five (5) percent of the amount of payment due the Contractor. When the progress of the work is satisfactory, the Owner may, at the Owner's sole discretion reduce the amount retained.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SPECIFICATIONS

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Section 01290 "Payment Procedures" for submitting Applications for Payment.
 - 2. Section 01770 "Closeout Procedures" for submitting warranties, Project Record Documents and operation and maintenance manuals.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Engineer's responsive action.
- B. Informational Submittals: Written information that does not require Engineer's approval. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. General: Electronic files of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows.
 - 1. Time for review shall commence on Engineer's receipt of submittal.
 - 2. Initial Review: Allow 15 working days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - 3. Identification: Place a permanent label or title block on each submittal for identification.
 - 4. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 5. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
- D. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

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- E. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal. Additional copies submitted will be marked with action taken and will be returned.
- F. Transmittal: Package each submittal individually and appropriately for shipping and handling. Transmit each submittal using a transmittal form. Submittals received from sources other than Contractor will be returned without Engineer's review.
 - 1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 - 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents. The Engineer may approve the Contractor's use of a rubber stamp to place the contractor's certification on submittals.
 - 3. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Remarks.
 - i. Signature of transmitter.
 - j. Relevant specification section or Contract Drawing number.
- G. Use for Construction: Use only final approved submittals with mark indicating action taken by Engineer in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
 - 1. Number of Copies: Submit an electronic copy of each submittal, unless otherwise indicated. Engineer will distribute four (4) copies.
 - 2. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 3. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 4. Mark each copy of each submittal to show which products and options are applicable.
 - 5. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.

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- j. Standard product operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
- C. Samples: Prepare physical units of materials or products, including the following:
 - 1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - 2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - 3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Engineer's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 - 4. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.

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5. Number of Samples for Initial Selection: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
6. Number of Samples for Verification: Submit three sets of Samples. Engineer will retain two Sample sets; remainder will be returned.
 - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
7. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- D. Contractor's Construction Schedule: Submit within ten (10) calendar days of the effective date of the Agreement and not less than seven (7) calendar days before the scheduled start of construction. Contractor shall not proceed with the Work until the construction schedule has been approved, in writing, by the Engineer.
- E. Schedule of Payments: Submit a schedule of payments that the Contractor anticipates will be earned during the course of the Work at least fourteen (14) calendar days prior to submission of the first Application for Payment.
- F. Applications for Payment: Comply with requirements in Section 01290 "Payment Procedures."

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit an electronic copy.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Engineers and owners, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

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- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- I. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- J. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."
- M. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- N. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- O. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.

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- 7. Other required items indicated in individual Specification Sections.
- P. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- Q. Material Safety Data Sheets: Submit information directly to Owner. If submitted to Engineer, Engineer will not review this information but will return it with no action taken.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal to evaluate compliance with Contract Documents, make marks to indicate corrections or modifications required, and return it. The Engineer's review and notations with respect to shop drawings and other submittals do not relieve the Contractor of fully satisfying the Contract Documents in any way and all respects. Engineer will stamp each submittal with an action stamp to indicate action taken, and additional submittal requirements, if any, will be marked as follows:
 - 1. If the returned item is marked "Rejected", the Engineer has determined that the submittal is not adequate to establish that there is compliance with the Contract Documents and a new submission is required.
 - 2. If the returned item is marked "Revise and Resubmit", it signifies that substantial changes in the shop drawing or other submittals are necessary and that the item must be resubmitted to the Engineer for further review.
 - 3. If the item is marked "Returned with Notations", it signifies that the Engineer has noted minor changes or additions to the item that are necessary to satisfy the Contract Documents and that a resubmittal is not necessary unless otherwise noted.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01330

SPECIFICATIONS

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the General Conditions.
- B. "Approved": When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the General Conditions.
- C. "Directed": A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- J. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of five (5) previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- K. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

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- C. **Conflicting Requirements:** If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.
- D. **Abbreviations and Acronyms for Standards and Regulations:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	(888) 293-6498 (302) 512-1530
DOD	Department of Defense Specifications and Standards Available from Defense Automated Printing Service www.astimage.daps.dia.mil/online	(215) 697-6257
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Defense Automated Printing Service www.astimage.daps.dia.mil/online Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm Available from National Institute of Building Sciences www.nibs.org	(215) 697-6257 (202) 619-8925 (202) 289-7800
MILSPEC	Military Specification and Standards Available from Defense Automated Printing Service www.astimage.daps.dia.mil/online	(215) 697-6257
UFAS	Uniform Federal Accessibility Standards Available from access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

1.3 ABBREVIATIONS AND ACRONYMS

- A. **Industry Organizations:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AASHTO	American Association of State Highway and Transportation Officials www.aashto.org	(202) 624-5800
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ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineers www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS – International Approval Services) www.csa-international.org	(800) 463-6727 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700

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HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
IEEE	Institute of Electrical and Electronics Engineers, Inc.) www.ieee.org	(212) 419-7900
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NFPA	National Fire Protection Association www.nfpa.org	(800) 344-3555 (617-770-3000)
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
UL	Underwriters Laboratories Inc. www.ul.com	(800) 704-4050 (847) 272-8800
UNI	Uni-bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700

- B. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
GSA	General Services Administration www.gsa.gov	(202) 708-5082
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999

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RUS	Rural Utilities Service (See USDA)	(202) 720-9540
USDA	Department of Agriculture www.usda.gov	(202) 720-2791

- C. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DelDOT	Delaware Department of Transportation www.deldot.gov	(302) 760-2080
DNREC	Delaware Department of Natural Resources And Environmental Control www.dnrec.state.de.us	(302) 739-4506

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

SPECIFICATIONS

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, field offices and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 2. Electric power service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Storage and fabrication sheds.
 - 2. Dewatering facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Storm water control.
 - 3. Tree and plant protection.
 - 4. Security enclosure and lockup.
 - 5. Barricades, warning signs, and lights.
- E. Related Sections include the following:
 - 1. Section 01330 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 2. Section 01700 "Execution Requirements" for progress cleaning requirements.
 - 3. Section 02240 "Dewatering" for disposal of ground water at Project site.

1.2 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 - 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if acceptable to Engineer. Provide materials suitable for use intended.
- B. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fence fabric; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line

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posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide concrete bases for supporting posts.

2.2 EQUIPMENT

- A. General: Provide new equipment. Undamaged, previously used equipment in serviceable condition may be used if acceptable to Engineer. Provide equipment suitable for use intended.
- B. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- C. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- E. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- F. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Secure portable or mobile buildings when used. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

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2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
- C. Drinking-Water Facilities: Provide drinking water, water containers and paper cups for use by all workmen employed on the project.
- D. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
 1. Install electric power service underground, unless overhead service must be used.
 2. Install power distribution wiring overhead and rise vertically where least exposed to damage.
- E. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
 1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
 2. Provide warning signs at power outlets other than 110 to 120 V.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities within the project area as approved by the Owner.
- B. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near Project site.
- B. Storm Water Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.
- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.
- D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

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3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Pay all installation, maintenance and operation costs for the Engineer's field offices, including but not limited to telephone service (local and long-distance calls), electrical service, sanitary facilities, drinking water, heating fuel, etc.
- C. Maintenance: Maintain and clean temporary facilities, furnishings, equipment, and services weekly until removal. Protect from damage caused by freezing temperatures and similar elements.
- D. Termination and Removal: Remove temporary facilities, contents, and services when no longer needed, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor.
 - 2. Remove foundations and debris from temporary facilities. Clean site and grade to required elevations.
 - 3. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

END OF SECTION 01500

SPECIFICATIONS

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selecting products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. See Division 1 Section 01770 "Closeout Procedures" for submitting warranties for contract closeout.
- C. See Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
- D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.3 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

SPECIFICATIONS

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 5. Store products to allow for inspection and measurement of quantity or counting of units.
 - 6. Store materials in a manner that will not endanger Project structure.
 - 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 9. Protect stored products from damage.

1.5 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section 01770 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 - 1. Provide products complete with accessories, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

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4. Where products are accompanied by the term "as selected," Owner will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Owner's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named. Substitutions may be considered, unless otherwise indicated.
 2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements. Substitutions may be considered, unless otherwise indicated.
 3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements. Substitutions may be considered, unless otherwise indicated.
 4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Substitutions may be considered, unless otherwise indicated.
 5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
 6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
 7. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product. Substitutions may be considered, unless otherwise indicated.
 8. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a proposed product matches satisfactorily.
 - a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
 9. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

SPECIFICATIONS

- a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Owner will select color, pattern, or texture from manufacturer's product line that does not include premium items.
- b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Owner will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Engineer will consider requests for substitution if received within 15 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Engineer.
- B. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

- A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SPECIFICATIONS

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
 - 8. Maintenance of Traffic
 - 9. Preconstruction and progress meetings.
 - 10. Progress schedules.
 - 11. Construction phasing and operation of existing facilities.
- B. Related Sections include the following:
 - 1. Division 1 Section 01330 "Submittal Procedures" for submitting surveys.
 - 2. Division 1 Section 01770 "Closeout Procedures" for submitting Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

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- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than two (2) days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
- C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Engineer. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 UTILITIES

- A. The Contractor shall plan for and implement all necessary requirements to prevent damage to any existing underground utility including, but not limited to, the following:
 - 1. To request from the office of each operator having a utility in the area, the location and other pertinent information regarding these utilities not less than two (2) working days but no more than ten (10) working days prior to the day of commencement of work in the area.
 - 2. To inform each person employed by the Contractor at the site of such work of the information obtained regarding the location of utilities and other pertinent information.
 - 3. To report any break, leak, dent, gouge, groove, or other damage to the operator immediately.
 - 4. To alert immediately the occupants of the premises as to any emergency that the Contractor may create or discover.
- B. The Contractor's attention is directed to the fact that the locations of existing utilities and other structures shown on the Drawings are approximate only. Prior to any construction activities, the Contractor shall have the utility company locate them or determine the location of the utilities. The Contractor shall take all necessary measures to protect utilities or arrange for relocation during construction. Any damage to utilities shall be repaired by the Contractor at his expense according to the requirements of the utility specifications. The following utilities are located in or adjacent to the construction site.
 - 1. Electric Service – Town of Clayton
 - 2. Telephone Services - Verizon - Delaware
 - 3. Storm Drainage – DelDOT, Town of Clayton
 - 4. Water Service – Artesian Water Co., Inc.
 - 5. Sewer System – Town of Clayton
 - 6. Gas Utility – Chesapeake Utilities

3.4 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.

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- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify Engineer when deviations from required lines and levels exceed allowable tolerances.
 - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

3.5 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Engineer before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.6 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated..
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

SPECIFICATIONS

- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - 2. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

SPECIFICATIONS

- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

3.11 MAINTENANCE OF TRAFFIC

- A. The Contractor shall indicate on the proposed schedule for construction any significant disruptions to the normal flow of traffic. The streets affected and the duration of the disruptions shall be indicated. The overall schedule for such disruptions, and any revisions, shall be approved in writing by the Engineer. The Contractor shall notify the Engineer at least 48 hours prior to any proposed disruption of traffic.
- B. Any disruption of the traffic shall be fully indicated by signs, barriers, and flagmen as approved by the Engineer.

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- C. The Contractor shall provide for and maintain ingress and egress to and from the properties abutting the construction project after working hours. Construction activities, which may temporarily interfere with property access, shall be coordinated in advance with the property owners.
- D. All work within the right-of-way of State maintained roadways shall be done in full conformance with the specifications and requirements of the Delaware Department of Transportation.

3.12 PRECONSTRUCTION CONFERENCE

- A. Before any work at the site is started, a conference attended by the Contractor, Engineer, Owner and others as appropriate will be held to establish a working understanding among the parties as to the Work, procedures for handling shop Drawings and other submittals, processing Applications for payment and maintaining other records.
- B. The Contractor shall submit a proposed progress schedule for the work at the Preconstruction Conference. No work shall commence until the progress schedule has been reviewed and accepted by the Engineer.
- C. The Contractor shall submit a preliminary schedule of Shop Drawing and Sample submittals at the Preconstruction Conference. The schedule shall list each required submittal and the times for submitting, reviewing, and processing each submittal.

3.13 PROGRESS MEETINGS

- A. Progress meetings shall be held monthly unless otherwise required by the Owner or Engineer.
- B. The Contractor shall provide a revised progress schedule at each progress meeting which reflects actual work completed and any proposed adjustments for future work.

END OF SECTION 01700

SPECIFICATIONS

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project Record Documents.
 - 3. Warranties.
 - 4. Maintenance Bond
 - 5. Release of Liens
 - 6. Manufacturer's Field Reports.
- B. Related Sections include the following:
 - 1. Division 1 Section 01290 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1 Section 01330 "Submittal Procedures".
 - 3. Division 1 Section 01700 "Execution Requirements" for progress cleaning of Project site.
 - 4. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of substantial completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list) and reasons why the Work is not complete.
 - 2. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 3. Complete startup testing of systems.
 - 4. Submit test/adjust/balance records.
 - 5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 6. Touch up and repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for substantial completion. On receipt of request, Owner and Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by, that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for Final Acceptance.

1.3 FINAL COMPLETION

- A. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Owner and Engineer will either proceed with inspection or notify Contractor of

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unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- B. The date of Final acceptance of the total project, or partial acceptance of individual systems shall be determined by the Engineer.

1.4 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.
 1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- C. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

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- C. The Contractor shall warrant that all workmanship, material, and equipment furnished and installed under the Contract Documents shall be free of defects for a period of one (1) year after the date of Final Acceptance by the Owner. In the event there is more than one certificate of Final Acceptance issued, the warranty shall be for one (1) year after each acceptance date. Should such defects appear, the Contractor shall repair or replace such defects at no cost to the Owner.

1.6 MAINTENANCE BOND

- A. Contractor shall furnish the maintenance bond in accordance with the Supplementary Conditions.

1.7 RELEASE OF LIENS

Contractor shall furnish the executed release of liens form in accordance with the Supplementary Conditions.

PART 2 - PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION 01770

SPECIFICATIONS

SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, ground covers, plants and grass to remain.
2. Removing existing trees, shrubs, ground covers, plants and grass.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:

1. Division 1 Section 01500 "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and temporary erosion and sedimentation control procedures.
2. Division 1 Section 01700 "Execution Requirements" for verifying utility locations and for recording field measurements.
3. Division 2 Section 02300 "Earthwork" for soil materials, excavating, backfilling, and site grading.
4. Division 2 Section 02920 "Lawns and Grasses" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.

1.2 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.3 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

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- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section 02300 "Earthwork."
- B. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
- D. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. The Contractor shall, in accordance with the Delaware Erosion and Sediment Control Handbook, plan and implement all necessary requirements under the Delaware Sediment and Storm Water Regulations. The Contractor shall minimize erosion of the disturbed construction areas and shall prevent sediment from entering water courses or areas beyond the project site. The Contractor shall comply with all applicable Federal, State, and local regulations pertaining to sediment and erosion control.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.

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- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.
 - 1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by Engineer.

3.4 TRANSPLANTING

- A. Transplant small trees and shrubs located either within construction lines or which may be damaged during construction to a new location on the same property.
 - 1. New locations for transplanting shall be determined in the field by the Engineer.
 - 2. Perform the necessary excavation to remove and transplant the various designated small trees and bushes as shown and required by the Contract Documents.
- B. Take all precautions customary in good trade practice in preparing plants for transplanting. Plants transplanted with workmanship that fail to meet the highest standards will be rejected. All plants shall have firm, natural balls of earth of ample proportions and diameter not less than as specified in the "USA Standard for Nursery Stock". Plants with cracked, broken, or crushed balls which occur either before or during planting operations, will be rejected and shall be removed from the site immediately. Bare root plants shall be dug with sufficient spread and depth of roots as to insure full and prompt recovery and development of the plants. All plants shall be handled so that roots are adequately protected and moist at all times. Material that cannot be planted immediately after delivery shall be adequately protected by covering with canvas, wet straw, burlap, moss, or other suitable material and kept covered until ready to be planted. Trees shall not be planted with frozen earth balls.
- C. Where specified the plants shall be located as indicated on the Drawings, but may be shifted to avoid utilities subject to the approval of the Engineer. In all mass plant areas, the plants shall be evenly spaced to give uniform cover in the planting bed area. No excavation shall commence until all locations are approved.
- D. Plant all trees and shrubs in pits excavated with vertical sides as detailed on the Drawings. They shall be of such a depth that when planted and settled, the crown of the plant shall bear the same relation to finished grade as it did to soil surface in its place of growth. All backfill topsoil shall be covered with waterproof material after mixing. Pits shall be backfilled with specified soil mix and compacted firmly, especially under ball of roots to establish a firm foundation. Plants shall be set in the center of pits in a vertical position so that the crown of the plant is level with the finished grade after allowing for watering and settling of soil. The soil mixture shall be carefully and firmly worked and tamped under and around the base of the ball to fill all voids. When partially backfilled and compacted, the burlap shall be removed from the sides and tops of the balls and cut away to prevent air pockets, but no burlap shall be pulled from under the balls. A ring of earth shall be formed around the plant to produce a dish for watering. All plants shall be thoroughly watered immediately after planting. This shall mean complete saturation of all

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backfill in the pits and beds during the same day of planting. Care shall be taken during all planting operations to insure that no excavated material is dumped on any grassed area unless a suitable type of matting or protective underlay is used. The Contractor will be responsible for all damage to any grassed, planted, or other landscape area caused by these operations and shall repair any damage so caused in a manner satisfactory to the Engineer at the Contractor's own expense.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Blasting shall not be permitted as a method of removal. Backfill the excavated area with select granular material specified in Section 02300.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
 - 5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

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3.8 DISPOSAL

- A Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - 1. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 02230

SPECIFICATIONS

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses.
 2. Excavating and backfilling for buildings and structures.
 3. Drainage course for slabs-on-grade.
 4. Subbase course for concrete pavements.
 5. Subbase and base course for asphalt paving.
 6. Subsurface drainage backfill for walls and trenches.
 7. Excavating and backfilling for utility trenches.
- B. Related Sections include the following:
1. Division 1 Section 01500 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
 2. Division 2 Section 02300 "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
 3. Division 2 Section 02920 "Lawns and Grasses" for finish grading, including preparing and placing topsoil and planting soil for lawns.
 4. Division 2 Sections for installing underground utilities.

1.2 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.

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- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that cannot be efficiently removed by normal job equipment such as power shovels (e.g. Caterpillar 235C) or bulldozers (e.g. Caterpillar D9N with ripper attachment).
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 SUBMITTALS

- A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 1557 for each borrow soil material proposed for fill and backfill.

1.4 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
 - 3. Contact utility-locator service for area where Project is located not less than two (2) days and not more than ten (10) days before excavating. The phone number for Miss Utility is 1-800-257-7777.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- C. Topsoil: Original surface, friable loam topsoil of uniform quality, free from heavy clay, coarse sand, stones over two (2) inch, lumps, frozen clods, plants, roots, sticks, and foreign materials harmful to plant growth.
 - 1. Topsoil shall be reasonably free from two (2) inch or larger fragments of hot-mix, concrete pavement and surface treatment and shall not contain objectionable plant materials, or vegetable debris undesirable or harmful to plant life.

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2. Topsoil shall be reasonably free of noxious perennial weeds or woody vegetation and completely void of Johnson grass (*Sorghum halapense*).
3. The topsoil shall have an acidity range of pH 6.0 to pH 7.5.
4. Topsoil shall contain not less than 2 percent nor more than 30 percent organic matter as determined in accordance with AASHTO T267 test method.
5. The method of testing topsoil shall be in accordance with the requirements of AASHTO T88, Modified, AASHTO T89, Method B; AASHTO T90 and meet the following specified grading:

<u>Sieve Size</u>	<u>Minimum Percent Passing</u>
2 inch	100
No. 4	90
No.10	80

6. Topsoil sand, silt and clay contents shall be as follows:

	<u>Minimum Percent</u>	<u>Maximum Percent</u>
Sand	15	65
Silt	10	60
Clay	5	40

7. Topsoil shall not be delivered until samples have been reviewed by the Engineer.
8. Topsoil shall be secured from areas from which topsoil has not been previously removed either by erosion or mechanical methods, and it shall not be removed to a depth in excess of the depth approved.
9. The area or areas from which topsoil is secured shall possess such uniformity of material depth, color, texture, drainage, and other characteristics as to offer assurance that when removed in commercial quantities, the product will be homogeneous in nature and will conform to the requirements of these specifications.

- D. Borrow for Embankments and Subgrades: The uses, classification, characteristics, and definitions of terms for borrow materials obtained shall be in accordance with the requirements of AASHTO M 57, Modified; M145, Modified, M146; and M147, Modified. Materials having a dry weight less than 90 pounds per cubic foot, materials with liquid limits in excess of 50 and materials containing detrimental quantities of frozen material, rubbish, boulders in excess of 6" or organic matter such as leaves, roots, grass or sewage shall be excluded from use. The method of testing materials shall be in accordance with the requirements of AASHTO T 88, modified; T 89, modified; T 90, modified; and T 99, Method C, modified. In addition to the above requirements, which will be applicable for use in all types of embankment construction, the following borrow types will be subject to the additional requirements noted:

1. Borrow Type A shall be bank-run gravel slag, quarry waste, stone screenings or other acceptable granular material which has between 95 to 100% inclusive by dry weight passing a 2-1/2" sieve and a maximum of 35% by dry weight passing the No. 200 sieve.
2. Special Fill, Borrow Type B, material shall have 100% by dry weight passing a 3" sieve and a maximum of 10% by dry weight passing the No. 200 sieve.
3. Backfill, Borrow Type C, material shall have between 85 and 100% inclusive by dry weight passing a 1" sieve and a maximum of 25% by dry weight passing the No. 200 sieve.
4. Borrow Type D, material for concrete stabilization shall have 100% dry weight passing a 3" sieve and between 8 to 30% inclusive by dry weight passing the No. 200 sieve.
5. Common Borrow, Borrow Type F, material shall meet general requirements as specified under Section 2.1 D.

- E. Graded Aggregate Base Courses: Coarse crushed stone, crushed slag fragments, or portland cement concrete fragments blended with crushed particles of the same origin.

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1. Gradation Requirements as follows in accordance with AASHTO T2 , T27 and T96:

<u>Sieve Size</u>	<u>Percent Passing</u> TYPE B (Crusher Run)
2-1/2"	—
1-1/2"	100
1"	—
3/4"	50 - 95
No. 4	20 - 50
No. 10	15 - 40
No. 20	—
No. 100	2 - 20

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

- A. Explosives shall not be used on this project.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

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1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs on grade.
 - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.

Excavate trenches to uniform widths to provide clearance on each side of pipe or conduit as indicated on Drawings. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade. Bell holes shall be provided at each joint to permit proper joint assembly and alignment. Any part of the trench bottom excavated below subgrade shall be backfilled to subgrade and shall be compacted as required to provide firm pipe support.

3.8 SUBGRADE INSPECTION

- A. Notify Engineer when excavations have reached required subgrade.

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- B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
- B. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of standing water, mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

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- A. Place backfill on subgrades free of standing water, mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
- D. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.
 - 2. Coordinate backfilling with utilities testing.
- E. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

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1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1 inch.
 3. Pavements: Plus or minus ½ inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10-foot straightedge.

3.17 BASE COURSE

- A. Place base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements and walks as follows:
 1. Place base course 6 inches or less in compacted thickness in a single layer.
 2. Place base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 3. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
- C. The subgrade shall be properly shaped and uniformly and thoroughly compacted in conformity with the lines and grades as shown on the Drawings and/or as established in the field before any subbase, base, or surfacing material is placed. The subgrade shall be free from boulders, large rocks, muck, vegetation, or other materials that would prove detrimental to the road. Depressions that develop during the rolling shall be filled with suitable material and the subgrade shall be rolled until no depressions develop.
- D. Where excavation to the finished graded section results in a subgrade of unsuitable soil, the Engineer may require the Contractor to remove the unsuitable materials and backfill to the finished graded section with approved material. The Contractor shall conduct his operations in such a way that the Engineer can take the necessary cross-sectional measurements before the backfill is placed.
- E. When directed by the Engineer, test roll the prepared subgrade prior to the placement of any base or subbase material.

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- F. Test roll with self-propelled equipment of adequate size, type, and weight to reveal any soft, yielding, or spongy areas.
- G. If the test rolling shows the subgrade to be unstable, scarify, disc, aerate, or add moisture and recompact the subgrade to the extent that when retested by the above methods it will be stable, the cost of which will be at the Contractor's expense.
- H. If, in the opinion of the Engineer, there are areas to be removed or undercut, they may be ordered excavated and replaced; however, as determined by the Engineer, areas which become soft, or spongy due to the Contractor's methods of operation shall be removed and/or repaired at the Contractor's expense.
- I. The subgrade must be maintained in such condition that it will drain. Prior to the formation of the final subgrade or of the cutting of any box section in which the subbase or base will be placed, all side ditches parallel to the center line of the project shall be cut to their plan gradient. Temporary ditches permitting drainage from box sections to side ditches shall be provided at intervals as required. All facilities necessary for complete drainage of the construction areas shall be provided and maintained by the Contractor.
- J. In no case shall vehicles be allowed to travel in a single track and form ruts in the subgrade, and if any sharp irregularities are formed the subgrade shall be scarified and recompact.
- K. The graded aggregate base course as spread shall be well graded, have no pockets of fine material, and be so handled that there will be no segregation of fine or coarse particles. No base course material shall be spread more than 1,000 feet in advance of rolling and filling, except by written permission by the Engineer. No materials shall be placed adjacent to structures until they have been set to the required grade and alignment.
- L. The graded aggregate base course shall be rolled with a self-propelled roller weighing not less than ten (10) tons or approved vibratory equipment may be used. The rolling shall begin at the edges of the courses and on the final course the outside wheel of the roller shall cover equal parts of the material and the shoulder. The roller shall run forward and backward along the edge until the shoulder and course material are bound together firmly. When the sides have been firmly rolled, the rolling shall progress gradually toward the center, parallel with the center line of roadway, uniformly lapping each preceding track and covering thoroughly the entire surface with the rear wheel, and continuing until the entire surface does not creep nor wave ahead of the roller.
- M. The development of a spongy condition in the rolling process will justify either a discontinuance of the rolling for a period of time sufficient to permit the drying of the subgrade, or the complete removal of the base course and a treatment of the subgrade, all of which will be done under the direction of the Engineer.
- N. After the premixed material has been thoroughly rolled, it may be necessary to apply screenings gradually over the surface in such amounts as will completely fill the interstices of the rolled material.
- O. Immediately after the voids of each course have been filled with screenings, the premixed material shall be sprinkled with an approved sprinkling device. The sprinkling and rolling shall be continued and additional screenings applied where necessary until the course material is well bonded and firmly set. The quantity of screenings and water necessary for each course shall be determined by the Engineer. In no event shall the screenings remaining on the final surface be of such thickness as to be picked up by truck wheels or the finisher after the base course has been tack-coated. At all times the rolling shall begin at the sides, overlapping the shoulders and progressing toward the center, thoroughly covering the entire surface with the rear wheels.
- P. Should the subgrade become soft and mixed through the premixed base course material, the Contractor shall, without additional compensation, remove the mixture, reshape and compact the subgrade, and replace the materials removed with clean aggregate which shall be rolled, broomed, and filled until compacted satisfactorily and uniformly with the surrounding surface.

SPECIFICATIONS

- Q. The finished surface of the base course shall not vary from that required on the plans by more than 1/2" when tested with a 10' straightedge applied to the surface parallel to the center line of the pavement and with a template cut to the cross-section of the roadway and applied to a transverse direction. Such portions of completed base course which are defective, or which do not comply in all respects with the requirements of the Contract Documents, shall be taken up, removed, and replaced with a suitable material, properly laid in accordance with the Contract Documents. The transverse template shall be equal in length to the full width of the roadway, except the template lengths may be limited to a 24' maximum. The Contractor shall designate one employee whose duty it will be to perform the checking operation as required.

3.18 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the locations and frequencies directed by the Engineer.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

SPECIFICATIONS

SECTION 02630 - STORMWATER DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stormwater drainage piping.

B. Related Requirements:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 DEFINITIONS

A. PE: Polyethylene Plastic

B. RCP: Reinforced Concrete Pipe

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO HS-20 – Traffic Loading Conditions
2. AASHTO M170 – Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
3. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
4. AASHTO M207 – Standard Specification for Reinforced Concrete, Elliptical Culvert, Storm Drain, and Sewer Pipe.
5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
6. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 12- to 60-in. Diameter.
7. AASHTO T241 - Standard Method of Test for Helical Continuously Welded Seam Corrugated Steel Pipe.
8. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.

B. ASTM International:

1. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A536 - Standard Specification for Ductile Iron Castings
4. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
5. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

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6. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
7. ASTM C890 – Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
8. ASTM C913 – Standard Specification for Precast Concrete Water and Wastewater Structures
9. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
10. ASTM C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
11. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
12. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
13. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
14. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
15. ASTM D4101 - Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials
16. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
17. ASTM F405 - Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings.
18. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
19. ASTM F667/F667M - Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.
20. ASTM C1479 – Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer information describing pipe, pipe accessories, and catch basins.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Manufacturer Instructions: Submit special procedures required to install specified products.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of pipe runs, connections, catch basins, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform all work in accordance with State of Delaware Department of Transportation Standard Specifications.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. Protection:
 - 1. Provide additional protection according to manufacturer instructions.

1.8 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPING

- A. Reinforced Concrete Piping:
 - 1. Pipe:
 - a. Comply with AASHTO M170 for circular pipes and AASHTO M207 for elliptical pipe.
 - b. Use Class III pipe unless otherwise noted.
 - c. Reinforcement: Welded wire
 - d. Inside Nominal Diameter: As indicated on drawings.
 - 2. Joints:
 - a. Comply with ASTM C443
 - b. End connection: Bell and spigot
 - c. Gaskets: Rubber, compression
- B. Corrugated Dual Wall PE Piping
 - 1. Pipe:
 - a. Comply with AASHTO M294
 - b. Type: Smooth interior.
 - c. Inside Nominal Diameter: As indicated on drawings
 - d. Fittings: PE.
 - 2. Joints:
 - a. Comply with AASHTO M294
 - b. End connection: Watertight bell and gasketed spigot
 - c. Joint system shall meet a 10.8 PSI test pressure per ASTM D3212

SPECIFICATIONS

2.2 CATCH BASINS

- A. Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading.
 - 1. Joint Sealants: ASTM C 990, bitumen or butyl rubber.
 - 2. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match frame and grate.
 - 3. Steps: Individual FRP steps or ASTM A 615, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, Polypropylene, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
 - 4. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- B. Frames and Grates: ASTM A 536, Grade 80-55-06, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.
 - 1. Size: Contractor shall field verify existing frame and grate sizes.
 - 2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2.3 FINISHES

- A. Steel Galvanizing:
 - 1. Comply with ASTM A123.
 - 2. Hot-dip galvanized after fabrication.
- B. Galvanizing for Nuts, Bolts, and Washers: Comply with ASTM A153.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 2 Section "Earthwork"

3.2 INSTALLATION OF PIPING

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install gravity-flow, non-pressure drainage piping in accordance with the following:

SPECIFICATIONS

1. Install piping pitched down in direction of flow.
2. Install PE corrugated sewer piping in accordance with ASTM D2321
3. Install reinforced-concrete sewer piping in accordance with ASTM C1479 and ACPA's "Concrete Pipe Installation Manual"

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure drainage piping in accordance with the following:
 1. Join corrugated-PE piping in accordance with ASTM D3212 for push-on joints.
 2. Join reinforced-concrete sewer piping in accordance with ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
- B. Correct over-excavation with coarse aggregate.
- C. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

3.4 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use the procedure below:
 1. Close open ends of piping with at least 8-inch thick masonry bulkheads.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use the procedure below:
 1. Remove manhole or structure and close open ends of remaining piping.
- C. Backfill to grade as specified in Division 2 Section "Earthwork"

3.5 IDENTIFICATION

- A. Arrange for installation of green warning tape directly over piping and at outside edges of underground structures.
 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.6 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place. Provide video inspection of pipelines at completion of project.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Based on pipe manufacturer standards.

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- c. Damage: Crushed, broken or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Reinspect and repeat procedure until results are satisfactory.

3.7 CLEANING

- A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION 02630

SPECIFICATIONS

SECTION 02741 - HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Hot-mix asphalt paving.
 - 2. Hot-mix asphalt patching.
 - 3. Hot-mix asphalt paving overlay.
 - 4. Asphalt surface treatments.
 - 5. Bituminous surface treatment.
 - 6. Pavement-marking.
 - 7. Pavement milling of existing hot-mix asphalt pavement.
- B. Related Sections include the following:
 - 1. Division 2 Section "Earthwork" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.2 DEFINITIONS

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.
- B. Temporary repaving shall consist of 8-inches of graded aggregate Type B base course with Hot-mix, Bituminous concrete, Type B, Type C and/or Cold-laid, bituminous concrete, at the Contractor's option, compacted to a finished thickness of not less than 2 inches to final grade. Temporary paving shall be placed where shown on the Drawings on the same day as the road opening is made.
- C. Hot-mix trench repaving for state-maintained roads shall consist of 8-inches of graded aggregate Type B base course with 12-inches Hot-mix, hot-laid, bituminous concrete, Type BCBC, laid in two (2) 6-inch lifts and compacted to not less than 2-inches below final grade.
- D. Hot-mix trench repaving shall consist of 8-inches of graded aggregate Type B base course with 1 1/2 inches hot-mix, hot-laid, bituminous concrete, Type B, compacted to not less than 1 1/2 -inches below final grade.
- E. Hot-mix overlay shall consist of one (1) course of hot-mix, hot-laid, bituminous concrete, Type C compacted to a finished thickness of not less than 2-inches to final grade as shown on the Drawings.
- F. Hot-mix driveway repaving shall consist of 5-inches of graded aggregate, Type B base course with one (1) course of hot-mix, hot-laid, bituminous concrete, Type C, compacted to a finished thickness of not less than 2-inches to final grade as shown on the Drawings.
- G. Pavement-milling shall consist of furnishing a pavement-milling machine and cold milling or planning the existing bituminous concrete pavement at the location and to the depths shown on the Drawings or as directed by the Engineer.

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1.3 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of the State of Delaware Department of Transportation (DelDOT) "Specifications for Road and Bridge Construction," latest edition and all subsequent addenda thereto.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: DelDOT certification of approval of each job mix proposed for the Work.
- C. Qualification Data: For manufacturer.
- D. Material Certificates: For each paving material, signed by manufacturers.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be a paving-mix manufacturer registered with and approved by Del DOT.
- B. Regulatory Requirements: Comply with Standard Specifications of Delaware Department of Transportation for asphalt paving work.
- C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 deg F.
 - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for paint, 50 deg F for thermoplastic alkyd type materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

SPECIFICATIONS

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Aggregates for Hot Mix Bituminous Concrete:
1. Coarse Aggregate: All material retained on the 2.36 mm sieve, conforming to the requirements of AASHTO M 80, except no gravel, crushed gravel or crushed concrete shall be used. Percentage of wear, Los Angeles test, shall not be more than 45%.
 2. Fine Aggregate: All material passing the 2.32 mm sieve consisting of clean, hard, durable, crushed stone. Conform to DelDOT Standard Specifications, Section 823, Article 823.03.
- C. Aggregates for Bituminous Surface Treatment:
1. Coarse Aggregate shall conform to the following:
 - a. Coarse aggregate for initial treatment shall consist of crushed slag composed of clean, tough, durable pieces of air-cooled blast furnace slag, reasonably uniform in density and quality and free of glassy particles, coke, dirt or other objectionable matter.
 - b. Crushed slag in dry condition shall weigh not less than 1120 kg/cubic meter when tested according to AASHTO T 19 / T 19M, Rodded Method.
 - c. Coarse aggregate for initial treatment may also be crushed stone or crushed gravel weighing not less than 1520 kg/ cubic meter when tested according to AASHTO T 19 / T 19M.
 - d. The slag, crushed stone or crushed gravel shall conform to the grading requirements of Delaware No. 57 or 67.
 - e. Coarse aggregate for the two treatments following the initial application shall consist of crushed chips composed of crushed stone, crushed gravel or crushed slag conforming to the requirements of Delaware No. 8.
 2. Fine aggregate shall conform to the requirements of AASHTO M 6, fineness modulus 2.3 to 3.1, except the grading requirements shall be:

<u>Sieve Size</u>	<u>Percent Passing</u>
9.5 mm	100
4.75 mm	95 - 100
300 um	5 - 30
150 um	1 - 10
75 um	0 - 4

2.2 ASPHALT MATERIALS

- A. Asphalt Cement PG Graded: Conforming to AASHTO M320, Table 1 and tested per AASHTO R29.
- B. Asphalt Cement MSCR Graded: Conforming to AASHTO M332 and tested per AASHTO R29
- B. Tack Coat: AASHTO M208 grade CSS-1h or CSS-1 or AASHTO M316 CRS-2P .
- C. Asphalt for Bituminous Surface Treatment: RC-70, or CRS-1, for prime coats and RC-250, or CRS-2, for seal coats.
1. Emulsified asphalt shall meet the requirements of AASHTO M140 for anionic emulsions or AASHTO M208 for cationic emulsions.
 2. Cutback asphalt shall conform to AASHTO M 81 for rapid-curing (RC) types, and AASHTO M 82 for medium-curing (MC) types.
 3. The material used shall be applied within the following temperature limits: RC-70, 80-150°F; RC-250, 100-175°F; CRS-1 70-140°F; CRS-2 125-185°F

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- D. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Sand: AASHTO T176
- B. Joint Sealant: AASHTO M208 grade CSS-1h or CSS-1 or AASHTO M316 CRS-2P .
- C. Pavement-Marking Paint: Latex, waterborne emulsion, ready mixed, glass beads conforming to AASHTO M247 . Do not use paint containing any of the materials listed in the Environmental Protection Agency CFR 40, Section 261.24, Table 1.
 - 1. Color: White, Yellow, or Blue as indicated.
- D. Pavement Marking Paint: Epoxy, epoxy resin composition specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures.
- E. Alkyd Type Thermoplastic Pavement-Marking Material: Thermoplastic material homogeneously composed of pigment, filler, resins, and glass reflectorizing spheres, tested in accordance with AASHTO T 250 and M 249, or with appropriate method in FED-STD-141. Conform to DelDOT Standard Specifications .
- F. Glass Spheres: AASHTO M 247, Type 1.

2.4 HOT MIX BITUMINOUS CONCRETE MIXES

- A. Job Mix Formulas BCBC, B, C, and C (Thin Lift): shall comply with the following requirements:
 - 1. The general composition limits prescribed hereunder are master ranges of tolerance to govern mixtures made from raw materials conforming to these specifications. The composition limits are maximums and minimums in all cases. Closer control may be required for job materials used for specific projects according to the job mix formula. No work within State rights-of-way shall be started, nor any mixture accepted until the proposed job mix formula has been approved by DelDOT. The Contractor shall submit a written proposal To DelDOT indicating the single definite percentage for each sieve fraction for aggregate and for the asphalt in the mix. The proposal shall also indicate the temperature at which the Contractor shall furnish the mixture at the plant. DelDOT approval of the job mix formula shall bind the Contractor to furnish paving mixtures that not only meet the master ranges, but also meet the exact formula set for the Project, within the allowable tolerances. Percentages for aggregate are based on total aggregate weight; percentages for asphaltic cement are based on the total weight of the mix.
 - 2. Job Mix Formulas
 - a. BCBC (25.0 mm)
 - b. Type B (19.0 mm)
 - c. Type C (9.5 mm)

SPECIFICATIONS

3. Nominal Maximum Aggregate Size Control Points, % Passing

Mix Name	BCBC		B		C	
	25.0 mm		19.0 mm		9.5 mm	
Sieve Size	Min	Max	Min	Max	Min	Max
37.5 mm	100	-	-	-	-	-
25.0 mm	90	100	100	-	-	-
19.0 mm	-	90	90	100	-	-
12.5 mm	-	-	-	90	100	
9.5 mm	-	-	-	-	90	100
4.75 mm	-	-	-	-	-	90
2.36 mm	19	45	23	49	32	67
1.18 mm	-	-	-	-	-	-
0.075 mm	1	7	2	8	2	10
BCBC - Bituminous Concrete Base Course						

4. Volumetric Property Requirements

Volumetric Property	Target Value	Plant Production Tolerance
Air Voids (V_a) at N_{design} (%)	4	+/-2
Voids in Mineral Aggregate (V_{MA}) at N_{design}		
25.0 mm Bituminous Concrete Base Course	12.5	-1.5 to +/-2.0 from target
19.0 mm Type B Bituminous Concrete	13.5	
9.5 mm Type C Bituminous Concrete	15.5	

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before pavement milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 - 1. Mill to the depth indicated on the drawings.
 - 2. Mill to a uniform finished surface free of gouges, grooves, and ridges.
 - 3. Control rate of milling to prevent tearing of existing asphalt course.
 - 4. Repair or replace curbs, manholes, and other construction damaged during pavement milling.
 - 5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
 - 6. Keep milled pavement surface free of loose material and dust.

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3.3 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
 - 1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseal pieces firmly.
 - 2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings.
 - 3. Remove spillages and clean affected surfaces.
- D. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
 - 1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.
 - 1. Clean cracks and joints in existing hot-mix asphalt pavement.
 - 2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
 - 3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 - 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. Yd. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure for 72 hours minimum.

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1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 2. Protect primed substrate from damage until ready to receive paving.
- C. Tack Coat: Apply uniformly to all dry and broom-cleaned portland cement concrete and bituminous pavement surfaces at a rate of 0.05 to 0.15 gal./sq. yd.
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
 3. Tack coat shall be applied only as far in advance of the hot mix operation as is anticipated for the current day's operation.
 4. In residential areas, the tack coat shall be applied only as far in advance of the operation as directed by the Engineer.

3.6 PLACING BITUMINOUS MIXTURES

- A. Prior to the delivery of the mixtures on the job, the underlying course shall have been brought to line, grade, and cross-section, and all excess patching material, joint material, dirt, or foreign material shall be removed. All major cracks shall be cleaned. The mixtures shall be placed only upon a surface which is dry, and only when weather conditions are suitable.
- B. Hot-mix, hot-laid bituminous concrete shall be transported from the mixing plant to the project site in tight vehicles previously cleaned of all foreign materials, and each load shall be covered with canvas or other approved material of sufficient size to protect it from the weather. The cover shall be tightly secured on all sides to prevent loss of heat. No loads shall be sent out so late in the day as to interfere with spreading and compacting the mixture during daylight unless satisfactory artificial light is provided. The mixture shall be delivered at the spreader with a loss of not greater than 20° F from that temperature determined at the plant by the Engineer or his agents.
- C. Each year after September 30th, loads shall be delivered in insulated trucks. The Engineer may permit work to continue when overtaken with sudden rain, up to the amount of material which may be in transit from the plant at the time, and provided the mixture is within the temperature limits specified.
- D. The methods employed in performing the work and all equipment, tools, and machinery used in handling materials and executing any part of the work shall be subject to approval before the work is started and whenever found unsatisfactory, shall be changed or improved as required by the Engineer. All equipment, tools, and machinery used must be maintained in a satisfactory working condition.
- E. The bituminous concrete spreading and finishing equipment shall be of an approved, self-propelled type and capable of spreading the mixture true to the line, grade, width, and crown specified. This equipment shall also be provided with means for heating the screened members so that it will prevent the accumulation of bituminous material. All paving materials shall be equipped with automatic grade and slope controls unless approved otherwise in writing by the Engineer. Both the grade and slope controls shall be in working order at all times, except that, in the event of mechanical failure of the automatic controls, the Contractor will be permitted to finish the day's work using manual controls.
- F. Upon arrival, the mixture shall be dumped into the approved mechanical spreader and immediately spread thereby and struck off in a uniform layer to the full width required. Machine methods of spreading and screening will be required unless otherwise permitted.
- G. Hand spread with lutes where irregularities or obstacles make the use of pavers impractical. The use of garden rakes shall not be permitted.

SPECIFICATIONS

- H. Contact surfaces of curbing, gutters, manholes, etc., shall be painted with a thin, uniform coat of hot asphalt cement or other approved material just before the mixture is placed against said surfaces.
- I. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at minimum temperature of 250 deg F.
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- J. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
- K. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.
- L. The Contractor shall fill low places in the base with a leveling material which shall consist of binder course or surface material of hot-mix bituminous concrete. The locations along the base course to receive this leveling course material, the type of material to be used, and the method to be employed in each case shall be as directed by the Engineer. Hot-mix bituminous concrete shall be placed as directed, around all manholes, catch basins, valves, etc. when they are adjusted to the proper grade. This material shall be removed if directed and such removal shall be incidental to the work.
- M. After the hot-mix bituminous concrete binder course is placed, it shall not lay exposed for a period longer than ten (10) days. If due to conditions of emergency, more than ten (10) days elapse, an asphaltic tack coat may be required to be sprayed on the binder course so exposed, before placing the wearing course of hot-mix bituminous concrete. There will be no additional compensation for the tack coat.
- N. When placing the hot-mix bituminous binder on wearing courses, one lane shall not be carried ahead of the other a distance greater than one (1) day's run unless approved by the Engineer.
- O. No hot-mix bituminous concrete shall be placed on any frozen surface, when the ambient temperature is below 40° F for wearing course and 32° F for binder course or when the weather conditions prevent the proper handling or finishing of the mixture.
- P. At locations where the hot mix is tapered to meet an existing roadway, a tack coat of asphaltic material shall be applied on the tapered areas at the rate of approximately 0.15 gallon per square yard.

3.6 JOINTS

- A. Placing of bituminous concrete shall be as nearly continuous as possible and the roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint between old and new pavements or between successive days' work, the joint shall be made by means of placing a bulkhead or by tampering the course in which case the edge shall be cut back to its full depth and width on a straight line to expose a vertical surface. In both methods all contact surfaces shall be sprayed with an approved asphaltic tack coat material before placing any fresh mixture against the joint.

SPECIFICATIONS

- B. Longitudinal joints shall be rolled directly behind the layering operations. The first lane shall be true to line and grade and have vertical face. The material being placed in the abutting lane shall be tightly compacted against the vertical face of the previously placed lane. The finishing machine shall be positioned so that in spreading, the material overlaps the edge of the lane previously placed by 1" to 2" and shall be left sufficiently high to allow for compaction. Before rolling, the material overlapping the joint shall be carefully moved with a broom or lute onto the surface of the unrolled lane. When the abutting lane is not placed the same day, or the joint is distorted by traffic or other means, the edge shall be carefully trimmed to line and sprayed with a thin coat of approved asphaltic tack coat material.
- C. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 2. Joints in completed surfacing shall be at the lane line
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
 - 5. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. Immediately after the bituminous mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.
- B. The surface shall be rolled when the mixture is in a workable condition and when the rolling does not cause undue displacement, cracking or shoving. All roller marks shall be rolled out.
- C. The number, weight, and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition. All rollers shall be approved prior to use and shall be continuously maintained in a satisfactory working condition and shall bear the manufacturer's name plate on which shall be stamped the model number and the weight without ballast. Each roller shall be operated by a competent and experienced roller operator. All rollers shall be kept in good condition and shall weigh not less than 250 pounds per inch width of tread.
- D. The sequence of rolling operations and the selection of roller types shall provide the specified pavement density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. 92 percent of reference maximum theoretical density according to AASHTO T 209 for surface courses.
 - 2. 90 percent of reference maximum theoretical density according to AASHTO T 209 for base courses.
- E. Delays in rolling freshly spread mixtures shall not be permitted. Rolling shall start longitudinally at the sides and proceed toward the center of the work, overlapping on successive trips by at least one-half the width of the roller. Alternate trips of the roller at all times shall be slow enough to avoid displacement of the hot mixtures, and any displacement occurring as a result of the reversing of the direction of the roller, or from any other cause shall at once be corrected by the use of lutes and of fresh mixture when required. To prevent adhesion of the mixture to the wheels of the roller, they shall be kept properly moistened, but excess water shall not be permitted.
- F. Along curbs, manholes, and similar structures and at all places not accessible to the roller, thorough compaction must be secured by means of approved tampers, and at all contacts of this character the joints between these structures and the mixture must be effectively sealed.

SPECIFICATIONS

- G. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- H. Repairs: Any mixture which becomes loose and broken, mixed with dirt, or in any way defective, shall be removed and replaced with a fresh, hot mixture, which shall be immediately compacted to conform with the surrounding area. Areas showing an excess of asphalt cement shall be removed and replaced with a fresh, hot mixture, which shall be immediately compacted to conform with the surrounding area. Areas showing an excess of asphalt cement shall be removed and replaced at the Contractor's expense.
- I. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm
- J. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked

3.8 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus ½ inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 3/8 inch.
 - 2. Surface Course: 1/4 inch.

3.9 ASPHALT CURBS

- A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at minimum temperature of 250 deg F.
 - 1. Asphalt Mix: Job mix formula Type E
- B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.10 SURFACE TREATMENTS

- A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. to existing asphalt pavement and allow to cure. With a fine sand, lightly dust areas receiving excess fog seal.
- B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.
 - 1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.11 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.
- B. Sweep and clean surface to eliminate loose material and dust.

SPECIFICATIONS

- C. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal..

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.
 - 1. Laboratory calculation of maximum theoretical voidless density will be determined in accordance with AASHTO T 209 from samples of the hot-mix asphalt-paving mixtures. In addition to laboratory testing by the Owner's testing agency, contractor or contractor's hot-mix asphalt supplier shall provide the maximum theoretical voidless density when requested by the Owner or Owner's testing agency.
 - 2. Field density of in-place compacted pavement shall be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.13 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 02741

SPECIFICATIONS

SECTION 02920 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Seeding.
 - 2. Lawn renovation.
- B. Related Sections include the following:
 - 1. Division 2 Section "Site Clearing" for topsoil stripping and stockpiling.
 - 2. Division 2 Section "Earthwork" for excavation, filling and backfilling, and rough grading.

1.2 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

SPECIFICATIONS

PART 2 - PRODUCTS

2.1 SEED

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

2.2 TOPSOIL

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

2.3 INORGANIC SOIL AMENDMENTS

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

2.4 PLANTING ACCESSORIES

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

2.5 FERTILIZER

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

2.6 MULCH

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

2.7 EROSION-CONTROL MATERIALS

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding overspray.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

SPECIFICATIONS

3.3 LAWN PREPARATION

- A. Limit lawn subgrade preparation to areas to be planted.
- B. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.
- C. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 SEEDING

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

3.5 HYDROSEEDING

- A. Refer to details and specification on the Drawings and the Delaware Erosion and Sediment Control Handbook details and specifications dated July 2023 or latest edition.

3.6 LAWN RENOVATION

- A. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - 1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.
- B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.
- C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- D. Mow, dethatch, core aerate, and rake existing lawn.
- E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- H. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.
- I. Apply seed and protect with straw mulch as required for new lawns.
- J. Water newly planted areas and keep moist until new lawn is established.

3.7 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches.
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

SPECIFICATIONS

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove erosion-control measures after grass establishment period.

END OF SECTION 02920

SPECIFICATIONS

02955 – SEWER MAIN REHABILITATION BY LINING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Section includes requirements for lining of sewer mains by Cured in Place Pipe (CIPP) lining and installation of a resin-impregnated flexible tube.

1.2 DEFINITIONS

- A. Mainline: Sewer main.

1.3 QUALITY ASSURANCE

- A. Follow national standards and as specified herein.
- B. Personnel Involved in Installation of Pipe Liner: Certified by liner manufacturer successful completion of training in handling, insertion, trimming, reinstatement of laterals and finishing pipe liner.
- C. Engineer:
 - 1. May inspect factory materials, wet-out procedure, and loading.
- D. Internally inspect host pipe prior to lining and post-lining.

1.4 SUBMITTALS

- A. Working drawings showing design calculations, soil impacts, live load, dead load, ground water impacts, materials selected, and thickness of liner.
- B. Catalog data showing manufacturer's clarifications and updates, ASTM references, material composition, specifications, physical properties and chemical resistance of liner.
- C. Manufacturer's recommended procedures for handling, storing, repairing, and installing materials selected.
- D. Method of construction.
 - 1. Access catch basins and site locations.
 - 2. Work dimensions.
 - 3. Existing utilities. Size of working area.
 - 4. Impacted portions of existing sewer. Site access points.
- E. Emergency plan detailing procedures followed in event of health and safety emergency, pump failures, sewer overflows, service backups, and sewage spillage. Maintain copy on site for duration of project.

SPECIFICATIONS

1. Address dangers associated with sewer rehabilitation work (i.e. working with large boiler trucks).
 2. Identify Health and Safety officer (i.e. crew chief)
 3. Designated Health and Safety officer:
 - a) Responsible for providing health and safety oversight of personnel participating on project team.
 - b) Perform and document routine work area inspections, conduct safety meetings, and provide safety orientations for team members.
 - c) Have in easily accessible place following contact information;
 - i. Non emergency number.
 - ii. Contractor's health and safety representative name and number.
 - iii. Occupational health clinic number(s). Submit for review;
- F. Method of proposed point repair with details.
- G. Termination or transition details between cured in place point repair and existing sewer.
- I. Stock sheets, order forms, delivery forms, invoices, and Safety Data Sheets (SDS) for material used.
- J. Shipping manifest with;
1. Date shipped.
 2. Origination and delivery locations. Shipping method and carrier.
 3. Shipping order number. Purchase order number. Shipped item.
 4. Stock number. Lot number.
 5. Manufacturer.
 6. Any shipping, storage, or safety requirements. Received by, and date.
 - a) Signature of receiver.
- K. Source Quality-Control Submittals: Indicate results of factory tests and inspections
- L. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- M. Qualification statements: Manufacturers approval of installer
- N. Curing Logs
1. Heat cured liners
 - a) Record temperatures and pressure readings per unit of time during curing process.
 2. UV cured liners
 - a) Record the curing speed, intensity and wattage of lamps and curing temperatures per unit of time.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of each service connection

SPECIFICATIONS

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect, store, and handle materials during transportation and delivery, while stored on-site, and during installation following manufacturer's recommendations.
- B. Continuously monitor liner materials during transport and storage with temperature recorder and data storage or strip printer.
 - 1. Furnish Engineer with recorder readings before installation.
 - 2. Material exposed to temperatures outside of manufacturer's limits: Rejected.
- C. Material found to be defective or damaged due to manufacture or shipment:
 - 1. When Engineer deems repairable: Repair following manufacturer's recommendations.
 - 2. When Engineer deems not repairable: Rejected, removed from Contract site, and replaced under Engineer's direction.
 - 3. Repair or replacement of defective or damaged material will be at no additional cost to Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Mainline (CIPP): Follow ASTM F1216, ASTM F1743 and ASTM F2019 as appropriate to insertion method, liner tube material and resin material proposed for fully deteriorated pipe condition.
 - 1. Wet-out liner material in controlled factory environment.
 - 2. Resin-Catalyst-Colorant-Additive Mixture:
 - a. Tested to certify liner material follows design standards before wet out.
 - b. Quantity of resin used for tube impregnation: Sufficient to fill volume of air voids in felt tube with additional 10 to 15 percent allowances for polymerization shrinkage and loss of resin through cracks and irregularities in original pipe wall.
 - 3. Heat cured liners, required amount of resin mixture: Vacuumed into felt liner material.
 - a. Point of vacuum: No further than 25 feet from point of initial resin introduction to ensure thorough resin saturation throughout length of felt tube.
 - b. Vacuum point: No further than 75 feet from leading edge of resin after vacuum in tube is established.
 - 4. UV cured liners, fiberglass liner: Saturated with appropriate resin using resin bath to minimize air entrapment and delivered to site ready for installation.
 - a. Vacuum methods: As recommended by the manufacturer.
 - 5. Leading edge of resin slug:
 - a. As near to perpendicular as possible.
 - b. Wet-out liner is fed onto conveyor system and through roller gap set following design (minimum 2.3 x lining thickness in mm).
 - (1) Ensure uniform distribution of resin throughout pre-cured liner.
 - (2) Pack pre-cured liner on ice within automatically monitored refrigerated truck with ice bags between pre-cured liner folds.
 - c. Alternate resin impregnation method: Proven, inspected, and with Engineer's approval.
 - d. Colorant: Dark yellow.

SPECIFICATIONS

- (1) Add to catalyst before mixing catalyst with resin.
 - (2) Pigmentation: Produces color that is clearly distinguishable from dry felt.
 - (3) Wall color of interior pipe surface of CIPP after installation: Light reflective color to allow clear detailed examination with closed circuit television inspection equipment.
 6. Additives for resin enhancement, viscosity control, safety, chemical resistance, physical resistance, or extending shelf life are permitted with Engineer's approval.
 7. Liner Tube.
 - a. Felt Tubes.
 8. Seams as described herein.
 - a. Liner to run continuously from manhole to manhole.
 - b. Does not use overlapping section of liner felt tube or longitudinal seams that cause lumps in final product.
 9. Impermeable, flexible membrane outside layer that will contain resin and monitor resin saturation at factory during resin impregnation procedure.
 10. Fiberglass Tubes.
 - a. Consist of flexible fiberglass tubes made spirally or by overlapping layers.
 - b. Include exterior and interior film that contains resin in tube, are impervious to airborne styrene and serves as ultraviolet blocking material.
 11. Cured Liner: 50-year life span.
 - a. Chemically resistant to internal exposure to sewage containing small quantities of hydrogen sulfide, carbon dioxide, methane, mercaptans, kerosene, moisture, and diluted sulfuric acid.
- B. Internal Spot Repair: Follow ASTM F1216 and as noted herein.
1. Tube fabricated from resin impregnated fiberglass/carbon patch sheet to a size which, when installed will closely approximate the internal circumference of the conduit specified.
 - a. Make allowance for changes in circumference of the conduit by free overlap during inflation of the tube.
 2. Minimum Length: Determined to effectively span the designated defective section, plus one foot at either end.
 - a. Verify lengths in field before pulling tube into pipe.
- C. Miscellaneous Materials.
1. Finishing material for transitioning, filling, and sealing liners entering manholes.
 - a. Chemically inert, non-shrinking, and able to cure in presence of water.
 - b. Material: Quickset H₂S resistant, epoxy resin or mortar.
 - c. Design mix: Minimum 500-psi compressive strength in 28 days.
 - i. Additives may be added to improve flow properties when minimum compressive strength requirements are met, with Engineer's approval.
- D. CIPP Liner Calculations.
1. Layers of cured CIPP: Uniformly bonded.

SPECIFICATIONS

- a. Structural Properties: Use deteriorated design condition, following design equations in appendix of ASTM F1216. If equation is less than minimum liner thickness noted on table below use minimum as noted.
 - i. Design Assumptions.
 - a) Water table: At manhole rim
 - b) Buckling resistance: AWWA M45, Appendix A
 - c) Design Safety Factor: 2.0
 - d) Ovality: 2 percent
 - e) Live Load: H20 Highway

Felt Liner and Ambient Temperature, Steam or Hot Water Cured CIPP	
Host Pipe Diameter	Minimum Liner Thickness
18" diameter	10.5 mm
24" diameter	12 mm
42" diameter	16.5 mm
34"x53" diameter	18 mm

PART 3 EXECUTION

3.1 MAINLINE PREPARATION

- A. Access: Through existing manholes.
- B. CCTV Internal Inspection.
 - 1. Perform after cleaning sewer: Follow Section 02956 and specified herein.
 - a. Pre-lining recordings: Indicate mainline is ready for lining.
 - b. Engineer approval of pre-lining recordings: Required prior to liner installation.
 - 2. Pre-Lining internal intruding tap and offset joint removal.
 - a. Remove, by internal process, intruding taps that reduce internal diameter of liner by 10 percent or more.

3.2 MAINLINE LINER INSTALLATION.

- A. Method of Lining.
 - 1. Invert tube by inversion: Follow ASTM F1216
 - a. Erect scaffold or elevated platform at upstream or downstream access point
 - b. Invert pre-cured tube using inversion elbow at bottom of manhole or inversion ring above ground with water pressure.
 - i. Ensure tube is;
 - a) Fully extended to termination point and expanded to inside pipe diameter with no annular space between liner and host pipe.
 - b) Dimpled to show locations of service laterals needing restoration.
 - 2. Pull-In Place: Follow ASTM 1743, F2019.

SPECIFICATIONS

- a. Install slip sheet on bottom half of pipe prior to liner insertion. Pull liner into place with constant tension winch capable of recording strain used during insertion.
 - b. Use end plugs to cap each end of liner. Both plugs and liner restrained during pressurization of line.
 - c. Measure laterals for reinstatement.
 3. Use hydrophilic water stop around exterior of liner material at liner termination in each manhole to prevent passage of groundwater infiltration past liner termination, regardless of insertion methodology used.
- B. Install and cure resin impregnated tube into liner: Follow manufacturer's recommendations and specified herein.
 1. Protect tube and lining material from damage during installation.
 2. Insert tube without twisting, cutting, tearing, separating, kinking, gouging, overstressing, resin loss, or double-ups.
 3. Engineer may request installed tube be retrieved for inspection.
 4. If tube is damaged during removal, repair tube to Engineer's approval or replace damaged tube with new tube at no cost to the Owner.
- C. Loss or discharge of resin, other lining materials, or by-products downstream is not permitted.
 1. Stop, collect, and remove at next downstream manhole.
 2. Transportation and disposal of debris: Follow jurisdiction requirements and as approved by Engineer.
- D. Notify Engineer of any construction delay, problems, or contract deviations taking place during insertion before curing operations.
 1. Such delays or problems may require sampling and testing of portions of cured liner by independent laboratory at Engineer's direction at no additional cost to the Owner.
 2. Sample test failures or lack of immediate notification of delay may result in rejection of that portion of work.
 3. Engineer has option to require removal of liner tube and reinstallation.
 4. If tube is damaged during removal, repair tube to Engineer's approval or replace damaged tube with new tube at no cost to the Owner.
- E. Cure.
 1. Liners cured with hot water or steam: Follow ASTM F1216 or ASTM F1743 as specified.
 - a. Recirculation Equipment: Capable of uniformly raising temperature of re-circulated water, and maintaining recommended cure temperature for duration to produce cured resin.
 - b. Water/Steam Temperature in Tube during Cure Period: Follow manufacturer's guidelines and specified herein.
 - i. Follow minimum and maximum standards for curing CIPP including temperature requirements determined by resin/catalyst system employed.
 - ii. Bring temperature up slowly through stages until exothermic reaction is achieved and then maintain.
 - a) Evidence of exothermic reaction: When

SPECIFICATIONS

inspection of exposed portions of CIPP appear hard and sound and sensor indicates temperature has reached magnitude to realize exothermic set following resin manufacturer's curing tables.

F. Process Monitoring Sensors.

1. Use to monitor and maintain curing temperature and internal pressure throughout length of liner following manufacturer's recommendations.
2. Heat Source: Fitted with suitable monitors to gauge temperature of incoming and outgoing heat exchanger circulating water.
3. Placement: Between tube and host pipe in downstream manhole at or near bottom. Extra temperature gauges: Inside tube at invert level of each end.
4. Electronically record continuous or specified pressure and temperature reading on printout.
 - a. Start time.
 - b. Gradual build up to curing period with maximum temperature and pressure. Time of gradual dropping of curing temperature.
 - c. Cool down duration along with relaxing temperature and pressure.
 - d. Start time of gradual release of curing pressure. Ending time.
5. If electronic recording fails, record temperature and pressure readings on log every 10 minutes starting before pressure is added to liner and ending 20 minutes after pressure is relieved.
6. Provide digital thermometer or other means of accurately and quickly checking temperature of exposed portions of liner.

G. Cooling and Relaxation of Liners:

1. Cool finished CIPP to temperature within 10 degrees of ambient temperature before relieving static head in inversion standpipe.
2. Cool-down may be accomplished by introduction of cool water into standpipe to replace water/steam being drained or vented from downstream end.
3. Caution is advised in release of static head so vacuum will not be developed with potential to damage newly installed liner.
4. After liner has cooled and relaxed, except for manhole indicated as line-through, cut cured liner flush with inside wall of manholes.
5. Fill voids between manhole channel, bench, or wall and liner with quick setting, H₂S resistant, epoxy mortar to form watertight seal.
6. Trowel grout to form smooth transition between manhole base or channel and liner to ensure sewage flow with no collection points for solids.

H. Finish liner.

1. Ensure liner is continuous over length of reconstructed pipe and follows material requirements specified herein.
2. Repair leaks at interface of manhole and liner.

3.3 POST INSPECTION OF MAIN

- A. Follow Section 02956 and specified herein.
- B. Verify system is sealed and free of leaks.

SPECIFICATIONS

1. Show liner at manhole wall is sealed with no leakage.

3.2 ACCEPTANCE

- A. Inspect sewer main by CCTV inspection.
- B. Infiltration of groundwater: None.
- C. Defects When Engineer Deems Repairable: Repair defect or replace liner interface at no additional cost to the Owner.

END OF SECTION 02955

SPECIFICATIONS

SECTION 02956

TELEVISION INSPECTION OF SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipeline flushing and cleaning.
2. Television inspection of storm sewer pipelines.
3. Audio-video recording of pipeline interior.

B. Related Requirements:

1. Section 02630 Stormwater Drainage

1.2 DEFINITIONS

- A. DVD: An optical disc storage format, offering higher storage capacity than compact discs (CDs) while having the same dimensions.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01290 – Payment Procedures: Contract Sum/Price modification procedures.

1.4 COORDINATION

- A. Coordinate Work of this Section with the Town of Clayton Department of Public Works.

1.5 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Requirements for submittals.

- B. Sample of television survey log, DVD rom, and equipment list for approval before commencement of work.

C. Inspection Logs:

1. Submit cleaning and television inspection logs for each section of storm sewer line to be rehabilitated.
2. Include following minimum information:
 - a. Stationing and location
 - b. Date and clock time references.
 - c. Pipe joints.
 - d. Infiltration/inflow defects.
 - e. Cracks.
 - f. Leaks.
 - g. Offset joints.

SPECIFICATIONS

1.6 QUALITY ASSURANCE

- A. Operator performing CCTV inspection: Certified by National Association of Sewer Service Companies (NASSCO) in the following:
 - 1. PACP for inspection of sewer mains.
 - 2. MACP for inspection of manholes.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General.
 - 1. Provide equipment to perform inspections of sewer mains from mainline located in streets, street rights-of-way, and off road easements.
 - a. Including but not limited to portable CCTV equipment, vehicles capable of transporting TV equipment and accessing remote easements, and adequate cleaning equipment.
 - 2. Have DVD and necessary playback equipment readily accessible for review by Engineer.
 - 3. Certify that backup equipment is available and can be delivered to site within 48 hours.
- B. Software Requirements.
 - 1. Follow National Association of Sewer Service Companies (NASSCO).
 - a. Sewer Mains: Follow Pipeline Assessment Certification Program (PACP)
 - b. Manholes: Follow Manhole Assessment Certification Program (MACP)
 - 2. Video: Recorded in MPEG1/PPEG2 format.
- C. Sewer Main CCTV.
 - 1. Color Video Camera:
 - a. Specifically designed and constructed for this application.
 - b. Camera, Television Monitor, and Other Components: Capable of producing minimum 470H-line resolution color video picture.
 - c. Able to inspect laterals as small as 3-inches up to 70 feet from sewer mainline.
 - d. Pan and tilt type, capable of turning at right angles to pipe's axis over an entire vertical circle (minimum pan of 270 degrees and rotation of 360 degrees).
 - e. Lighting: Suitable to allow clear picture of entire inner pipe wall extending at least 10 feet in front, including black High Density Polyethylene (HDPE) pipe.
 - f. Operative in 100 percent humidity conditions.
 - g. Image: Capable of self righting itself.
 - h. Include data view display feature capable of showing following information.
 - (i) Lateral addresses.
 - (ii) City and state.
 - (iii) Date and time.
 - (iv) Project name.
 - (v) Contractor's name.
 - (vi) Inside pipe diameter and type.
 - (vii) Manhole identification (upstream manhole to downstream manhole).
 - (viii) On-going footage counters accurate within 0.2 foot.
 - (ix) Operator narration capability: Follow NASSCO standards.
 - i. Naming conventions for lateral pipes following Town protocol.
 - (i) Each asset assigned an ID.
 - (a) Lateral.
 - (b) Cleanout.

SPECIFICATIONS

- j. Recording of single section of sewer onto more than one DVD/CD-ROMs will not be acceptable.
- k. Clearly label each DVD as approved by Engineer.
- l. Mounting:
 - (i) Launched from within mainline sewer: Mounted on tread tractor that moves through sewers and positions inspection camera launcher opposite lateral line connection.

PART 3 EXECUTION

3.1 GENERAL

- A. Perform work in one phase as listed.

- 1. Phase I
 - a. Perform internal CCTV inspection of mainline sewer in accordance with PACP standards following CCTV preconstruction survey requirements below.
 - b. Submit inspection records and survey information to Owner promptly upon completion of work for evaluation.

3.2 CCTV PRECONSTRUCTION SURVEY

- A. CCTV Procedure.
 - 1. Sewer Mainline.
 - a. Before repair work, light clean and inspect sewer line from manhole to manhole, preferably upstream to downstream, one section at a time. Light cleaning includes up to three passes with hydraulic jet cleaner.
 - (i) If light cleaning is ineffective in cleaning sewer, heavy cleaning method may be needed.
 - (a) Heavy cleaning uses non-hydraulic jet efforts such as porcupines, cutters, power rodding, clam buckets and other mechanical means.
 - (ii) Remove sludge, dirt, sand, grease, root and other material from downstream manhole of sewer section being cleaned.
 - (iii) Collect debris and remove from site.
 - (a) Transportation and disposal of debris: Follow jurisdiction requirements and Engineers approval.
- B. Camera.
 - 1. Placement.
 - a. Manhole:
 - (i) Place at center of manhole and commence video before entering pipe.
 - (ii) Start footage counter at manhole wall.
 - b. Mainline.
 - (i) Mount on transport platform that will keep it centered along longitudinal axis of sewer mainline and above water.
 - 2. Operation.
 - a. Record section of sewer in its entirety with no breaks or interruptions.
 - b. Show inside of manhole walls, manhole channel, and pipe connection to wall at both upstream and downstream manhole and lateral connections.
 - c. Move through line at speed no greater than 30 feet per minute stopping for minimum 10 seconds to record lateral connections, mainline connections, defects, and features and points of interest.
 - d. Maintain technical quality, sharp focus, and distortion free picture.
 - e. Pan, tilt, and rotate as necessary to best view and evaluate lateral connections, defects, features, and points of interest.
 - f. Use power winches, powered rewinds, tractors, or other devices that do not obstruct camera view or interfere with proper documentation of sewer conditions to move camera through sewer.

SPECIFICATIONS

- (i) Whenever non-remote powered and controlled winches are used set up suitable means of communication between manholes.
 - g. Use hydraulic jet nozzle if necessary to remove standing water from line.
 - h. Eliminate steam in line for duration of inspection.
 - (i) Utilize blower as needed to defog sewer line.
 - i. Measurement for location of defects and service laterals:
 - (i) Engineer-approved footage counter or metering device taken at ground level.
 - (ii) Measurement meters: Accurate to 0.2 foot over length of section being televised.
 - (iii) Use measuring target in front of television as exact measurement reference point.
 - 3. Movement.
 - a. Mainline.
 - (i) Stop camera at lateral connections and inspect with pan and tilt camera.
 - (ii) Stop camera at all joints and inspect entire joint.
- C. Defects.
 - 1. If roots, sludge, or sediment material impedes inspection withdraw camera and re- clean mainline by hydraulic jet.
 - a. Upon completion of re-cleaning operation resume internal inspection.
 - b. Furnish media confirmation for heavy cleaning to Engineer.
 - 2. If protruding tap impedes inspection trim protruding tap to 1/2 inch.
 - 3. If obstructions are not passable and cannot be removed by sewer cleaning or reaming, withdraw CCTV equipment and perform inspection from opposite end.
 - a. Cost involved in extracting camera stuck in sewer line: At no additional cost to the Owner.
 - b. When additional obstructions are encountered after re-deployment of equipment, and no means are available for passing obstructions, remand to Engineer for resolution.
- D. Field Documentation.
 - 1. Submit original records, logs, and electronic inspection data to Engineer within 10 working days.
 - a. Provide the following at minimum.
 - (i) Contract Number and Project Name.
 - (ii) Street Name
 - (iii) Contractor.
 - (iv) Operator name.
 - (v) Date and time (begin to end inspections).
 - (vi) Weather conditions.
 - (vii) Q.A. Reviewer name.
 - (viii) DVD number and index.
 - 2. General physical conditions.
 - 3. Footage locations, clock position, and descriptions of defects and estimated leakage rates for visible point sources of infiltration/inflow.
 - a. Mainline. In addition to information listed above, include;
 - (i) Inside pipe diameter and type.
 - (ii) Manhole identification (upstream and downstream manhole)
 - (iii) Follow PACP.
 - 4. DVD/CD-ROM
 - a. Once recorded, DVD/CD ROM becomes property of the Owner.
 - b. Use observation terminology during audio narration consistent with PACP, MACP and LACP.
 - (i) Naming convention for lateral connections: Referenced to access from mainline (AML) or downstream manhole (AMH). Do not use naming convention for access from cleanout (ACO) or other access point.

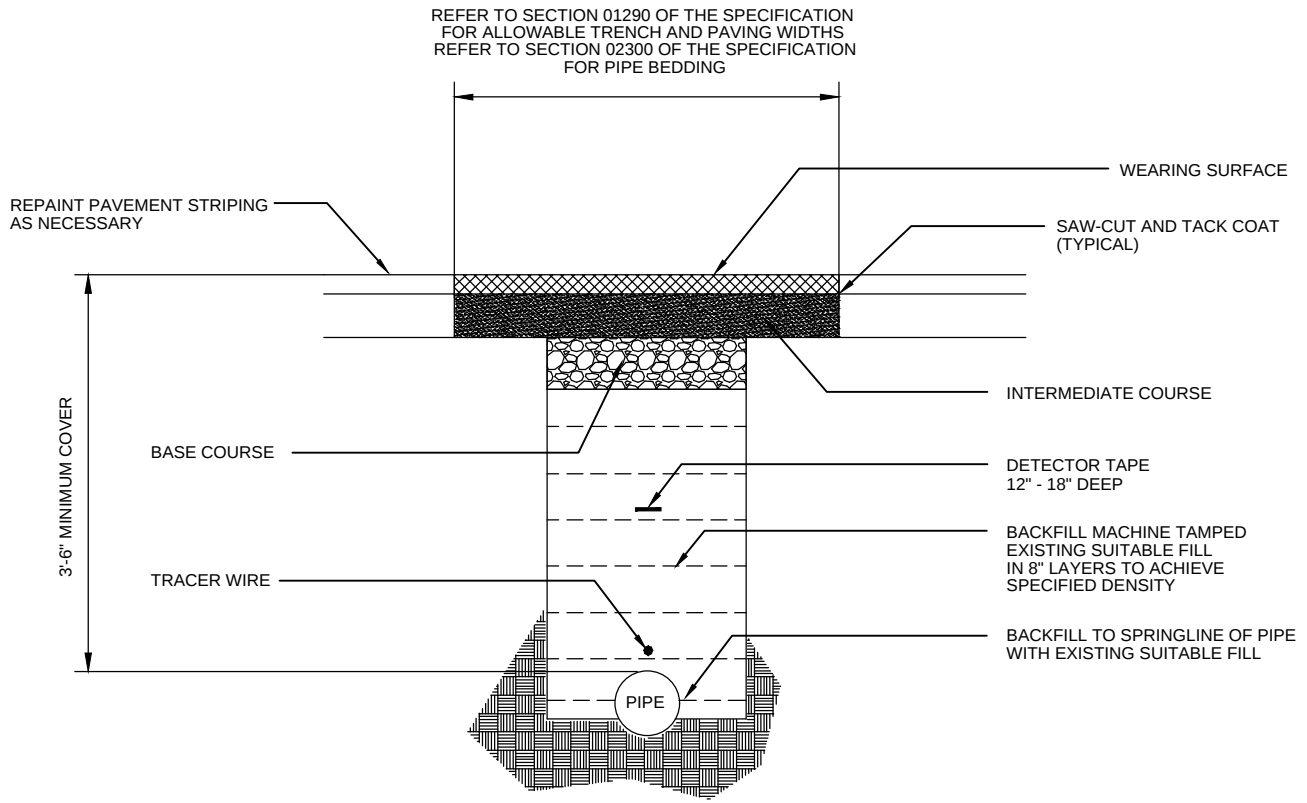
SPECIFICATIONS

- c. Clearly label each DVD/CD ROM as approved by Engineer.
- d. Recording of single section of sewer on more than one DVD/CD ROMS: Not acceptable.
- e. DVDs displaying poor video quality (Includes but not limited to; grease or debris on lens, camera under water, image too dark, washed out, distorted or out of focus, lines improperly cleaned or poor/no audio).
 - (i) Re-televisé line and resubmit at no cost to Owner.
 - (ii) Rejection by Engineer of original recording for failure to comply with requirements herein will incur charge based on current hourly fee for additional review time.

3.3 POST-CONSTRUCTION SURVEY

- A. Follow procedures as specified for pre-construction survey above, except as specified below.
 - 1. Sewer Mains.
 - a. Operation of Camera.
 - (i) Stop camera (minimum 10 seconds) at beginning and end of repairs and inspect repaired section.
 - 2. Associated Pipe Segments CCTV.
 - a. After completion of CCTV inspection, reset camera for pipe segment inspection.
 - b. Begin with largest diameter outgoing pipe segment.
 - c. Center camera on pipe as reasonably possible while keeping it above flow.
 - d. Adjust focus and lighting to observe most distant point in pipe and bring focus and zoom to nearest point of interest.
 - e. Capture and record individually special features noted.
 - f. Record defects noted using standard PACP nomenclature.
 - g. Record minimum of 60 seconds per pipe segment.
 - h. After inspecting outgoing pipe segment, rotate camera clockwise to locate next pipe segment and repeat inspection process.
 - i. Repeat clockwise rotation until all pipe segments in manhole are documented utilizing the same procedure.

END OF SECTION



RESTORATION	BASE COURSE	INTERMEDIATE COURSE	WEARING SURFACE/OVERLAY
HOT-MIX FLEXIBLE REPAVING	8 INCHES GRADED AGGREGATE, TYPE B	1 1/2 INCHES HOT-MIX, HOT-LAID, BITUMINOUS CONCRETE, TYPE B	1 1/2 INCHES HOT-MIX, HOT-LAID, BITUMINOUS CONCRETE, TYPE C
NON-PAVED AREAS	-----	-----	6" TOPSOIL, SEED AND MULCH

TRENCH AND REPAVING DETAIL
NO SCALE

verdantas

TOWN OF CLAYTON ~ KENT COUNTY ~ DELAWARE

Trench & Repaving Detail

Wastewater Collection System Repair
Phase 3

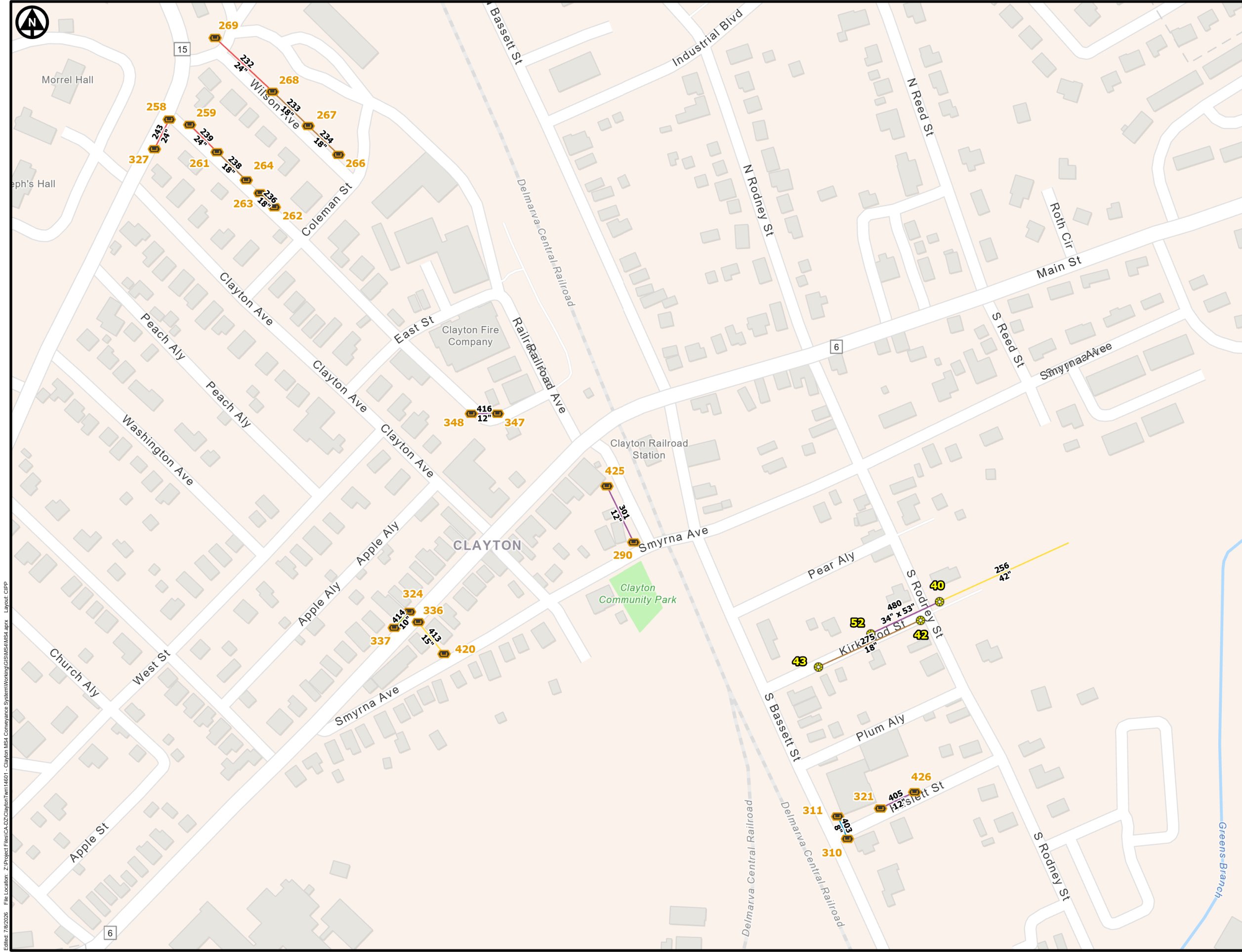
Project Number
37628

Date
7/13/2026

Author
CAP

Scale
NTS

Exhibit
C



Edited: 7/8/2026 File Location: Z:\Project Files\CA-02\Clayton\Twin11601 - Clayton MS4 Conveyance System\Working\GIS\MS4\MS4.aprx Layout: CPP

- Storm Manholes
- Storm Inlets

Stormwater System - Storm Gravity Mains

Diameter

- 8"
- 10"
- 12"
- 15"
- 18"
- 24"
- 42"
- 34" x 53"

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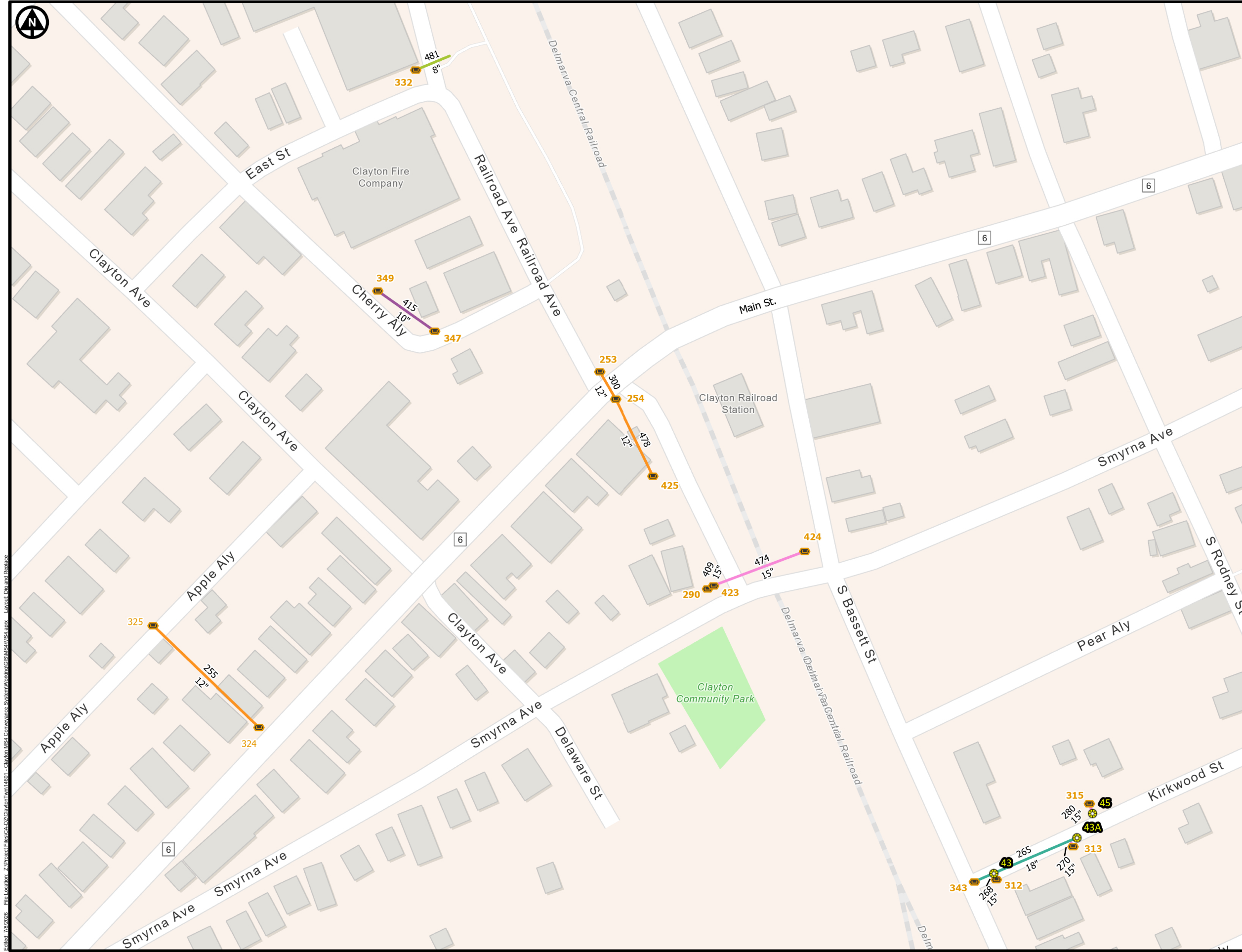


Town of Clayton

Cured in Place
Pipe Repair

Project Number	37628
Date	7/13/2026
Author	lwunder
Scale	1 in = 300 ft
Exhibit	

A



Edited: 7/8/2026 File Location: Z:\Project Files\CA-07\Clayton\Town16691 - Clayton MS4 Conference System\Working\GIS\MS4\MS4.aprx Layout: D:\Hard\Baldara

Storm Manholes

Storm Inlets

Storm Gravity Mains

Diameter

8"

10"

12"

15"

18"

Pipe ID	Ex. Material	Pr. Material	Dia.
481	VCP	HDPE	8"
415	VCP	HDPE	10"
255	RCP	RCP	12"
300	RCP	RCP	12"
478	VCP	RCP	12"
268	RCP	RCP	15"
270	RCP	RCP	15"
280	RCP	RCP	15"
409	VCP	RCP	15"
474	RCP	RCP	15"
265	RCP	RCP	18"

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Town of Clayton

Storm Sewer Pipe Replacement

Project Number
37628

Date
7/13/2026

Author
lwunder

Scale
1 in = 150 ft

Exhibit
B