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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents meanings and definitions shall be taken as per applicable standards of the industry.

1.02 *Terminology*

A. The words and terms discussed, but not defined, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer/Owner any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary any provision of the Contract Documents.

C. *Defective:*

1. The word "defective," when modifying the word "Work," refers to Work that Is unsatisfactory, faulty, or deficient in that does not conform to the Contract Documents

D. *Furnish, Install, Perform, And Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor shall deliver, with copies to each additional insured identified, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request).

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 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.

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within Five (5) days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work.
2. a preliminary Schedule of any required Submittals; and
3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the constructed schedules

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract.

2.07 *Execution of Contract*

A. When the OWNER authorizes award of a Contract pursuant to the Contract Documents, the CONTRACTOR shall have five (5) consecutive calendar days from the date of Notice of Award to furnish the required number of counterparts (noted by the ENGINEER) of the executed Agreement.

2.08 *Contractor's Pre-Start Representation:*

A. CONTRACTOR represents that he has familiarized himself with and assumes full responsibility for having familiarized himself with the nature and extent of the Contract Documents, Work, locality, utilities, existing drawings, and with all local conditions and all applicable federal, state and local laws, ordinances, permits, rules and regulations that may in any manner affect performance of the Work, and represents that he has correlated his study and observations with the requirements of the Contract Documents.

B. The Contractor also represents and acknowledges that no specific tests, borings, investigations or studies were produced or used by the Design Engineer in preparing these Contract Documents. No representation or warranty of any kind is made regarding any other existing, hidden, subsurface, rock, geotechnical or utility information.

C. Subject to the approval of the Owner, prospective bidders will be permitted to explore the site as may be required at no expense to owner.

D. The Contractor shall include and it shall conclusively be presumed to have included the aforementioned allocation of risk, responsibility, and costs in the bid price offered by the Contractor.

2.09 *Starting the Project*

A. Before undertaking any part of the Work, the CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. He shall at once report in writing to ENGINEER any conflict, error or discrepancy which he may discover.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

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

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

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations: Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean those in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids).

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents. Contractor shall not proceed with the Work affected thereby (except in an emergency) until an amendment or supplement to the Contract Documents has been issued.

B. *Resolving Discrepancies:*

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

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents.

3.06 *Electronic Data*

A. Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

3.07 *Underground/Hidden Facilities:*

A. The drawings are diagrammatic in nature and attempt to show the general scope of each project. Existing underground/hidden facilities may or may not be shown. The contractor, under PA Act 287 as amended, shall be required to call the Pennsylvania Once Call System (POCS) three business days before any kind of exterior digging occurs with powered equipment. Bidders shall not make a claim for additional compensation for utilities discovered as a result additional utility marks or marks in different locations than those indicated on the plans.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS;

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

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

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Owner has identified and provided:

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

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

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

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed is of such a nature as to require a change in the Contract Documents then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such approved differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work. All adjustments must be approved by Owner in writing.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
   a. Contractor knew or should have known of the existence of such conditions at the time Contractor made a final commitment to Owner; or
   b. the existence of such condition could reasonably have been discovered or revealed, or
   c. Contractor failed to give the written notice

4.04 *Underground Facilities*

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

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. Engineer's decision shall be binding by all parties.

C. *Unforeseen Physical Conditions***:**

1. CONTRACTOR shall notify OWNER and ENGINEER in writing within twenty-four (24) hours of discovery of any subsurface or latent physical conditions, unusual or extraordinary. ENGINEER will promptly investigate those conditions and advise OWNER in writing if further surveys or subsurface tests are necessary.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. Engineer's decision shall be binding by all parties.

ARTICLE 5 – BONDS, INSURANCE AND HOLD HARMLESS

5.00 *General*

A. The insurance coverage specified in this section must be provided by an insurance company with a A+ (Excellent) or better rating of A.M. Bests Company.

B. Hold Harmless Agreement - The Contractor agrees to indemnify, hold harmless, and defend the following persons and/or entities as well as all of their agents and employees, from any and all liability, resulting from any cause associated with the project including, but not limited to; bodily injury, death and damage to property, arising out of any fault or negligent act of omission or commission by the Contractor, its employees and Subcontractors, in the performance of work undertaken under this contact.

1. Hazleton City Authority – Water Department
2. Hazleton City Authority Engineer
3. Each Municipality in which work takes place

C. Prior to execution of the Contract, the Contractor shall have his Insurance Agent forward two (2) originally signed copies of a "Certificate of Insurance" to the Owner meeting the requirements set forth herein that affirmatively asserts on the "Certificate of Insurance" that the following applies:

1. All insurance companies have a minimum A.M. Best Company rating of A+ (Excellent) or better.
2. The underlying liability limits are adequate to meet the requirements of the Umbrella Policy.
3. The Umbrella Policy provides coverage over and above each item checked on the General and Automobile Liabilities shown on the Certificate of Insurance.

D. The Contractor undertakes to permit no Subcontractor to enter upon or continue performance of this Contract, or any part thereof, unless he provides similar liability insurance coverage as required of the Contractor. All Subcontractors shall furnish the Contractor with Certificate of Insurance or copies of policies. The Contractor shall notify the Owner, in writing, that all insurance requirements have been fulfilled by Subcontractors before start of construction and shall provide Owner copies of all subcontractors insurance Certificate

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury.

B. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the contract requirements, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with all requirements.

C. Bonds required shall include:

1. **Performance Bond:** The performance bond shall be for the full amount of the Contract.
2. **Labor and Material Payment Bond:** The labor and material payment bond shall be for the full amount of the Contract.

3. Maintenance Bonds:

I. **Standard Maintenance Bond** – Less paving if applicable: This Maintenance Bond shall be in an amount equal to ten percent (10%) of the Base Contract plus Change Orders (excluding paving if applicable) or Five Thousand Dollars ($5,000), whichever is greater.

II. **Paving Maintenance Bond:** In addition to the standard maintenance bond required in Paragraph "A" above, if applicable, the CONTRACTOR will be required to guarantee all paving for a twelve (12) month period, and a separate maintenance bond for this guarantee in the amount of the one hundred (100%) percent of the installed value of the paving cost including Change Orders shall be provided by the CONTRACTOR.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured , certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

C. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

D. Requirements for Certificates:

1. Upon acceptance of the bid, the CONTRACTOR shall provide the Owner or Engineer with certificates of such insurance, acceptable to the OWNER, ENGINEER and TRUSTEE. These certificates shall contain a provision that the coverage afforded under the policies will not be cancelled, non-renewed or materially changed until at least thirty (30) days prior written notice has been given to the OWNER. The CONTRACTOR shall be required to replace any expired, non- renewed or cancelled policies in like amount and coverage to the satisfaction of the OWNER.
2. If the CONTRACTOR fails to take out and maintain for the life of the Project the insurance required hereby or to replace any such expired, non-renewed or cancelled policy, the OWNER may take out and maintain such insurance with such company as they deem satisfactory. Any amounts expended by the OWNER in payment of premiums for such insurance shall be deducted by the OWNER from

the amount due to CONTRACTOR for the Work covered by this Contract.

5.04 *Contractor's Insurance*

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

1. Claims under workers' compensation, disability benefits, and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
4. Claims for damages, 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. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph shall:

1. with respect to insurance required by Paragraphs 5.04, be written on an occurrence basis, include as additional insureds Owner and Engineer, and any other individuals or entities identified, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

C. The Contractor shall carry or cause to be carried for the duration of the Contract, in the form and minimum limits of coverage of insurance as stated herein. Insurance provided shall apply to all operations undertaken by him, his agents, employees, and Subcontractors, for the duration of the project. The General Liability Policy shall name the Hazleton City Authority – Water Department and its Engineer as additionally named insured and same shall be indicated on the Certificate of Insurance.

D. The Certificate of Insurance must show a 30-day notice of cancellation upon acceptance of the Owner in writing and shall also include a Hold Harmless Clause.

E. The CONTRACTOR shall purchase and maintain for the entire life of the project, including time extensions, until final acceptance by the OWNER, such insurance as

will protect him from claims under workers' compensation laws, disability benefit laws or other similar employee benefit laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees and from claims for injury to or destruction of tangible property and claims insured by usual comprehensive general liability coverage, including the Broad Form General Liability endorsement. This includes loss of use resulting therefrom, any or all of which may arise out of the CONTRACTOR's operations under the Contract Documents, whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be legally liable. This insurance shall be written for not less than any limits of liability specified and incorporated as part of the Contract Documents or as required by law, whichever is greater, and shall include the following:

1. General Liability including:
   A. Comprehensive Form
   B. Premises Operations
   C. Explosion and Collapse
   D. Underground Hazard
   E. Products/Completed Oper. Hazard
   F. Contractual Liability
   G. Broad Form Property Damage
   H. Independent Contractors
   I. Personal Injury

2. Automobile Liability including:
   A. Comprehensive Form
   B. Owned
   C. Hired
   D. Non-owned

3. Excess Liability: Umbrella Form

4. Workers' Compensation & Employer's Liability

5. Builder's Risk::

   a. The CONTRACTOR shall purchase and maintain "ALL RISKS" coverage, including flood, earthquake, ground subsidence, theft and water damage. The limits of liability for this insurance shall never be less than the Contract amount, including change orders thereto. This coverage shall commence ten (10) days after the issuance of the Notice of Award and shall be maintained by the CONTRACTOR for the full duration of the Contract until the OWNER has made final payment or notified the CONTRACTOR that all or portions of the project have been insured by OWNER. At no time, until final payment, shall the CONTRACTOR allow the sum of the OWNER- supplied insurance combined with the CONTRACTOR-supplied insurance to be less than the actual Contract amount. This coverage should also include automatic permission to occupy and shall cover the insurable interest of the OWNER, ENGINEER, CONTRACTOR and Subcontractor in the Work.

   b. The OWNER and CONTRACTOR waive all rights against each other for damages caused by fire or other perils to the extent payment is actually made under insurance provided under this paragraph, except such rights as they may have to the proceeds of such insurance held by the OWNER and ENGINEER. The CONTRACTOR shall require similar waivers by all Subcontractors.

   c. Contractor’s Builder’s Risk Insurance shall be over, above, and in addition to any existing building insurance of the Owner.

6. Declaration of Coverage's and Limits of Liability

A. General Liability
1. Bodily Injury
(a) Each Occurrence: $1,000,00
(b) Aggregate: $1,000,00
2. Property Damage
(a) Each Occurrence: $
(b) Aggregate: $
3. Loss of use and claims arising out of CONTRACTOR's operations under the Contract: $ 1,000,000
4. Personal Injury
(a) Aggregate: $ 1,000,000

B. Automobile Liability
1. Bodily Injury and Property Damaged Combined
(a) Each Accident or Loss: $ 1,000,000

C. Umbrella Liability
1. Bodily Injury and Property Damage Combined
(a) Each Occurrence: $ 5,000,000
(b) Aggregate: $ 5,000,000

D. Workers' Compensation and Employer's Liability
1. Workers' Compensation
(a) Statutory
2. Employer's Liability
(a) Bodily Injury By Accident: $ 1,000,000 (Each Accident)
(b) Bodily Injury By Disease: $ 1,000,000 (Each Person)
(c) Bodily Injury y Disease:$ 1,000,000 (Policy Limit)

E. Builder's Risk
1. All Risk Coverage: $5,000,000 minimum or Contract Amount Plus Change Orders.

F. Additional Insured (as noted)
1. Hazleton City Authority – Water Department

5.06 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses

and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Article 14.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Article 5 shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Article 5 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

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

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

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

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Article 1, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

5.11 A*dditional Bonds and Insurance*

A. Prior to delivery of the executed Agreement by OWNER to CONTRACTOR, OWNER may require CONTRACTOR to furnish such other Bonds and such additional insurance in such form and with such sureties or insurers as OWNER may require. If such other Bonds or such other insurance are specified by written instructions given prior to opening of Bids, the premiums shall be paid by CONTRACTOR.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

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

Contract Documents.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours.

6.03 *Services, Materials, and Equipment*

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

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established as it may be adjusted.

6.05 *Substitutes and "Or-Equals"*

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

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in

Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. A proposed item of material or equipment will be considered functionally equal to an item so named if:

2. *Substitute Items:*
   a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal", it will be considered a proposed substitute item.
   b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor.
   c. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use.

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

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity whether initially or as a replacement, against which Owner may have reasonable objection.

B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.

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

D. 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.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners,

employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

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

6.09 *Laws and Regulations*

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

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work. CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work, and at the completion of the Work, he shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, construction equipment and machinery, and surplus materials and shall

leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

6.12 *Record Documents*

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

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Values.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:
   a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and
      Samples and with the requirements of the Work and the Contract Documents;
   b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

D. *Engineer's Review:*

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents.

E. *Resubmittal Procedures:*

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

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by abuse, modification, or improper maintenance or operation by persons other than Contractor.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

6.22 *Duties of Contractor - Prevailing Wage*:

A. The Federal Davis Bacon Prevailing Wage Determination is incorporated and made a part of the contract.

B. The general prevailing minimum wage rate including contributions for employee benefits as shall have been determined by the Secretary which must be paid to the workmen employed in the performance of the Contract.

C. The CONTRACTOR shall pay no less than the wage rates as determined in the decision of the Secretary of Labor and Industry and shall comply with the conditions of the Pennsylvania Prevailing Wage Act approved August 15, 1961 (Act No. 442), as amended August 9, 1963 (Act No. 342), and the Regulations issued pursuant thereto, to assure the full and proper payment of said rates.

D. The CONTRACTOR shall pay no less than such general prevailing minimum wage rates and such other provisions to assure payment thereof set forth in this Section.

E. The Prevailing Wage requirements shall apply to all work performed on the contract by the CONTRACTOR and to all work performed on the contract by all sub-contractors.

F. The CONTRACTOR shall insert in each of his sub-contracts all of the stipulations contained in these required provisions and such other stipulations as may be required.

G. The Contractor shall provide that no workmen may be employed on the public work except in accordance with the classifications set forth in the decisions of the secretary. In the event that additional or different classifications are necessary the procedure set forth in the Regulations shall be followed.

H. The Contractor shall provide that all workmen employed or working on the public work shall be paid unconditionally, regardless of whether any contractual relationship exists or the nature of any contractor and workmen, not less than once a week without deduction or rebate, on any account, either directly or indirectly, except authorized deductions, the full amounts due at the time of payment, computed at the rates applicable to the time worked in the appropriate classifications. Nothing in the contract, the Act or these Regulations shall prohibit the payment of more than the general prevailing minimum wage rates as determined by the Secretary to any workman on public work.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Article 4 Owner shall make available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.03 *Insurance*

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

8.04 *Limitations on Owner's Responsibilities*

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

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

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

B. Bidder's by submission of bid acknowledge that the Owner's in- house engineer shall act as, on, and in behalf of the Owner for all work and responsibilities as noted, described, or required as "Engineer or Owner's Representative" throughout the Contract Documents

9.02 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

9.03 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question. All conflicts shall be resolved by Owner.

9.05 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

D. Engineer's review of Application for Payment and accompanying documentation 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.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

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

B. Minor Changes by Engineer: In giving instructions, the ENGINEER shall have authority to make minor changes in the Work without involving any claim for extra cost and not inconsistent with the purposes of the Contract. Except in an emergency endangering life or property, no extra Work or change shall be made unless pursuant to a Change Order from the OWNER signed or countersigned by the ENGINEER, and no claim for an addition to the Contract sum shall be valid unless so ordered.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the

Contract Documents as amended, modified or supplemented.

10.03 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. Within 15 days, the amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.04 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Article 14, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim.

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Article 14.

ARTICLE 11 – COST OF WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Article 11, required and necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of direct Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim, except as otherwise may be agreed to in writing by Owner.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor,

whether at the Site or in Contractor's principal or branch office for general administration of the Work

2. 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.
3. Equipment, material and labor costs not related directly to completing the work including idle equipment, machinery, etc.
4. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in this Article.

C. *Contractor's Fee:*
1. When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth below:
a. For a11 costs, the CONTRACTOR's Fee shall include no more than ten (10%) percent for overhead and ten (10%) percent for profit.

D. *Documentation:* Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

E. *Limitations* The cost of work as estimated or calculated for any line item, allowance or **change order** shall be strictly and only the costs related to completing that specific task. Costs which include any calculation of re-imbursement for idle equipment or manpower not required or used directly in or to complete the work shall not be considered in any way.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Contingency Allowance:*
1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an

amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer.

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

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

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the Owner.

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

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved
2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum;
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 as per Article 11 on the basis of the Cost of the Work plus a Contractor's fee for overhead and profit.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract.

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

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefore as provided in Article 12. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Time for

delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

12.04 *Limitations*: The cost of work as estimated or calculated for any line item, allowance or **change order** shall be strictly and only the costs related to completing that specific task. Costs which include any calculation of re-imbursement for idle equipment or manpower not required or used directly in or to complete the work shall not be considered in any way.

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

13.01 *Notice of Defects*

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

B. CONTRACTOR warrants and guarantees to OWNER and ENGINEER that all materials and equipment will be new unless otherwise specified and that all Work will be of good quality and free from faults or defects and in accordance with the Requirements of the Contract Documents and of any inspections, tests or approvals. All unsatisfactory Work, all faulty or defective Work, and all Work not conforming to the requirements of the Contract Documents at the time of acceptance thereof or of such inspections, tests or approvals shall be considered defective. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article.

13.02 *Tests and Inspections*

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

B. 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.

13.03 *Uncovering Work*

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

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material,

and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Article 10.

13.04 *Owner May Stop the Work*

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

13.05 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective.

13.06 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, repair all defective work.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall be responsible for all such costs.

13.07 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be

approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence.

13.08 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time (30 days maximum) after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

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

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Article 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

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

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

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

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's casual observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
   a. the Work has progressed to the point indicated;
   b. the quality of the Work is generally in accordance with the Contract Documents
   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

C. *Payment Becomes Due:*

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

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. If Engineer considers the Work substantially complete; Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the

Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work.

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. *Application for Payment:*
   1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents, and other documents, Contractor may make application for final payment following the procedure for progress payments.
   2. The final Application for Payment shall be accompanied by:
      a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Article 5;
      b. consent of the surety, if any, to final payment;
      c. a list of all Claims against Owner that Contractor believes are unsettled; and
      d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

B. *Engineer's Review of Application and Acceptance:*
   1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:
   1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Article 14, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
   2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:
   1. Contractor's persistent failure to perform the Work in accordance with the Contract;
   2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
   3. Contractor's repeated disregard of the authority of Engineer; or
   4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
   1. Exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
   2. Incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
   3. Complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed.

15.03 *Owner May Terminate For Convenience*

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

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

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. **GENERAL:** To the end that disputes between the OWNER and CONTRACTOR may be minimized and their prompt settlement facilitated, the parties agree that all questions or disputes arising between them shall be settled as follows:

1) whenever the CONTRACTOR shall object to any decision by the ENGINEER relating to compensation or any other money payment, he shall, within seven (7) days after the commencement of the event giving rise to the claim for additional money, file a detailed written notice of his objections or of his alleged claim, as the case may be, and in default of such notice, he shall be deemed to have ratified the decision, and to have waived the alleged breach and damages therefore, and to have waived any and all rights and remedies which he might otherwise have had. Contractor shall present all objections to the Owner who shall make all final decisions.

B. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Article 10 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement.

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

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents.

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

17.07 P*ayment of Retainage to Subcontractors*

A. In the absence of good and sufficient reasons, within ten (10) days of the receipt of payment by the Contractor, the Contractor shall pay all Subcontractors with whom he has contracted their earned share of the payment the Contractor received.

17.08 *Extra Engineering*

A. Should the completion of the work be delayed beyond the time herein specified for completion for any reason other than the act of neglect by the Owner, and regardless of any extensions of time granted the Contractor, the Contractor shall pay the Owner the actual engineering/construction oversight/construction administration expenses and Owner's expenses incurred as a result of such delay. The Owner may deduct such expenses from payments due or to become due the Contractor.

17.09 *Exclusion of Certain Aluminum and Steel Products*

A. In Accordance with the Act of July 23, 1968, P.L. 686, No. 226, as revised, no aluminum or steel products made in a foreign country which has been determined by the Commonwealth Court to discriminate shall be furnished or used in completion of any work under these contract documents.

B. Act No. 226 requires the Court to direct the Prothonotary of said Court to enter the name of any foreign country so determined in the Foreign Registry Docket maintained by the Prothonotary.

17.10 *Time for Completion and Liquidated Damages*

A. The work which the Contractor is required to perform under this Contract shall be commenced at the time stipulated by the Owner in the Notice to Proceed to the Contractor and shall be fully completed within the days indicated in the notice to proceed.

B. 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 Contract of work to be done hereunder are ESSENTIAL CONDITIONS of this Contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the Notice to Proceed.

C. 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.

D. The work on the Contract is to be completed within the number of days specified on the Project Time Line from the date of "Notice to Proceed" as issued by the Owner, or its designee. Should Contractor fail to complete all work or any part of the work by the specified completion date, then the Owner shall notify the bonding agent and assess a liquidated damage in the amount of Five Hundred Dollars ($500.00) per calendar day for each day the project remains incomplete. In addition to the liquidated damages, the Contractor shall be liable for all costs and fees incurred by the Owner due to the overrun.

17.11 *Pennsylvania Human Relations Commission*

A. Pursuant to the provisions of Act No. 222 of 1955 of the General Assembly of the Commonwealth of Pennsylvania, approved October 27, 1955, as amended, known as the "Pennsylvania Human Relations Act," and in accordance with the provisions of the regulations of the Pennsylvania Human Relations Commission set forth at 16 Pa. Code, Chapter 49, the following provisions are hereby made a part of the Specifications and all CONTRACTORS and Subcontractors agree to be bound thereby.

17.12 *Nondiscrimination Clause*

A. During the term of this Contract, CONTRACTOR agrees THAT:

1. CONTRACTOR shall not discriminate against any employee, applicant for

employment, independent contractor or any other person because of race, color, religious creed, ancestry, national origin, age, or sex. CONTRACTOR shall take affirmative action to ensure that applicants are employed and that employees or agents are treated during employment without regard to their race, color, religious creed, ancestry, national origin, age, or sex. Such affirmative action shall include, but is not limited to, the following: Employment upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training. CONTRACTOR shall post in conspicuous places available to employees, agents, applicants for employment and other persons, a notice setting forth the provisions of this nondiscrimination clause.

2. CONTRACTOR shall in advertisements or requests for employment placed by it or on its behalf state all qualified applicants will receive consideration for employment without regard to race, color, religious creed, ancestry, national origin, age, or sex.

3. CONTRACTOR shall send each labor union or workers' representative with which it has a collective bargaining agreement or other contract understanding a notice advising said labor union or workers' representative of its commitment to this nondiscrimination clause. Similar notice shall be sent to every other source of recruitment regularly utilized by CONTRACTOR.

4. It shall be no defense to a finding of a noncompliance with Contract Compliance Regulations issued by the Pennsylvania Human Relations Commission or this nondiscrimination clause that CONTRACTOR had delegated some of its employment practices to any union, training program or other source of recruitment which prevents it from meeting its obligations. However, if the evidence indicates that the CONTRACTOR was not on notice of the third party discrimination or made a good faith effort to correct it, such factor shall be considered in mitigation in determining appropriate sanctions.

5. Where the practices of a union or any training program or other source of recruitment will result in the exclusion of minority group persons so that CONTRACTOR will be unable to meet its obligations under the Contract Compliance Regulations issued by the Pennsylvania Human Relations Commission or this nondiscrimination clause, CONTRACTOR shall then employ and fill vacancies through other nondiscriminatory employment procedures.

6. CONTRACTOR shall comply with the Contract Compliance Regulations of the Pennsylvania Human Relations Commission, 16 Pa. Code Chapter 49, and with all laws prohibiting discrimination in hiring or employment opportunities. In the event of the CONTRACTOR's noncompliance with the nondiscrimination clause of this contract or with any such laws, this contract may, after hearing and adjudication be terminated or suspended in whole or in part, and CONTRACTOR may be declared temporarily ineligible for further Commonwealth contracts and such other sanctions may be imposed and remedies invoked as provided by the

Contract Compliance Regulations.

7. CONTRACTOR shall furnish all necessary employment documents and records to and permit access to its books, records and accounts by the contracting agency and the Human Relations Commission for purposes of investigation to ascertain compliance with the provisions of the Contract Compliance Regulations, pursuant to Section 49.35 of this Title (relating to information concerning compliance by contractors). If CONTRACTOR does not possess documents or records reflecting the necessary information requested, it shall furnish such information on reporting forms supplied by the contracting agency or the Commission.
8. CONTRACTOR shall actively recruit minority Subcontractors or Subcontractors with substantial minority representation among their employees.
9. CONTRACTOR shall include the provisions of this nondiscrimination clause in every Subcontract so that such provisions will be binding upon each Subcontractor.
10. The terms used in this nondiscrimination clause shall have the same meaning as in the Contract Compliance Regulations issued by the Pennsylvania Human Relations Commission, 16 Pa. Code Chapter 49.
11. CONTRACTOR obligations under this clause are limited to the CONTRACTOR's facilities within Pennsylvania or, where the contract is for purchase of goods manufactured outside of Pennsylvania, the facilities at which such goods are actually produced.

Section 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SCOPE

The Contractor is referred to conditions and requirements given throughout these Specifications insofar as such documents affect the work of this Section.

1.2 OCCUPYING PRIVATE LAND

Written consent from the proper parties shall be obtained by the Contractor and provided to the HCA prior to entering or occupying with men, tools, materials or equipment any land other than his property or that of the HCA for any purpose related to his performance of the work on this Contract.

1.3 PROTECTION OF EXISTING UTILITIES

The Contractor shall conduct his operations and take all special precautions necessary to protect equipment, utility lines, roadways and subsurface, submerged and overhead facilities which are to remain in place and undisturbed by his operations under this Contract. The Contractor shall immediately notify the owner of the facilities or areas which are disturbed, damaged or injured as a result of the Contractor's operations, and determine the proper method of replacing or repairing the affected facilities at least to the conditions which existed prior to the Contractor's operations. The Contractor shall, at his own expense, replace, repair or restore the affected facilities or areas to their original condition or shall reimburse the owner of said facilities or areas for such expenses as the said owner may accrue in performing the work, and the Contractor shall not be entitled to receive additional compensation under this Contract for such work. The Contractor shall notify all utilities fourteen (14) days prior to construction near any utility.

1.4 INTERFERENCE WITH/AND PROTECTION OF STREETS

The Contractor shall not close or obstruct any portion of a street, road or private way without obtaining permits therefore from the proper authorities. If any street or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the appropriate authority.

The Contractor shall assume full responsibility for the maintenance and restoration of those roadways within the construction area and also those roadways on which equipment must operate to reach the construction area in compliance with all Municipal regulations. Contractor bears all responsibility for obtaining and complying with any and all local and state road cut permit requirements and restoration including overlays as necessary.

Streets, roads, private ways and walks not closed shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made.

The Contractor shall, forty-eight (48) hours in advance of closing any street, notify the police and fire departments in writing, with a copy to the Engineer. He shall cooperate with the police department in the establishment of alternate routes and, at his own expense, shall provide adequate, plainly marked detour signs. The signs shall be as required by the agency that has jurisdiction over the roadway. For the proper control of traffic, the Contractor shall provide an adequate number of persons employed at his own expense.

1.5 PROTECTION OF FACILITIES AND EQUIPMENT

Until final acceptance of the work under this Contract, the Contractor shall continuously maintain adequate protection of his work and work in progress from damage and shall protect from loss or damage Contractor-furnished machinery, equipment, materials and supplies being handled as well as property of the Owner from loss or damage arising out of or in connection with the performance of his work. He shall make good any such loss or damage. He shall adequately protect adjacent private and public property as provided by law and the Contract Documents.

Since the Contractor shall not load or permit any part of any structure to be loaded with a weight that would endanger its safety, it shall be the Contractor's responsibility to verify the acceptable load-carrying capacity of any structure his equipment or work will affect.

The Contractor shall immediately report in writing, giving full details to the Owner all accidents which arise out of or in connection with the performance of the work, whether on or adjacent to the site, which cause death, serious personal injury or substantial property damage. In addition, the accident shall be reported immediately by telephone or messenger to the Engineer. If a claim is made or suit is filed by anyone against the Contractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, with a copy to the Owner, giving full details of the claim.

The Contractor shall assume all risks of loss or damage of any kind to any vehicles, machinery, equipment, materials or supplies which he shall provide in doing the work.

The Contractor shall conduct his work in such a manner as to adequately protect property owned by others on or about the Owner's premises from damage by the construction operations.

1.6 DUST CONTROL

During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities so as to minimize the creation and dispersion of dust. The Contractor shall utilize an approved and appropriate dust control method immediately when so directed by the Resident Inspector.

1.7 SANITARY

The Contractor shall provide, maintain and remove when no longer required, an adequate number of temporary, prefabricated, chemical-type toilets with proper enclosures for the use of workmen and women of all trades during construction. Locate toilets where directed. When connected to water and sewer, meet all code requirements and take precautions to prevent freezing.

The Contractor shall keep toilets clean and supplied with toilet paper at all times. Comply with all local and state health requirements and sanitary regulations.

1.8 WATER

The Contractor shall make necessary arrangements and supply all water required during the entire construction period. Provide suitable drinking water for all workers on the Project.

Installer of temporary services shall remove same when no longer required.

1.9 ELECTRICITY

The Contractor shall make necessary arrangements and supply and pay for all temporary electric service and lighting required during the entire construction period. Temporary electric service shall be of sufficient capacity and characteristics to supply proper current for various types of construction tools, motors, welding machines, lights, pumps and other items required.

Remove temporary service and lighting when no longer required.

1.10 FUEL, POWER, ETC., FOR TESTING

Unless otherwise specified, the Contractor shall pay for all fuel, potable water and electricity required for testing of installed work. Labor and supervision required for making tests shall be provided by the Contractor.

1.11 SECURITY

The Contractor shall provide and pay for an adequate level of security protection as determined by the Engineer to protect the property and material of the Contractor from pilferage, removal or damage at all times.

1.12 OFFICES AND STORAGE

The Contractor may, for his own use, provide and maintain such temporary office facilities as he may require and such watertight storage sheds with floors as may be required for storage of his materials which might be damaged by the weather. HCA's existing facility shall not be used for storage or staging.

Materials stored in the open at the Project site shall be stored on planks or other dunnage as necessary to keep materials from contact with the ground and shall be covered with tarpaulins for protection from weather.

All temporary offices and storage facilities shall be removed by their installer when no longer required and the site restored to its original condition.

SUBSURFACE EXPLORATION

PART 1 - GENERAL

1.1 TEST PITS GENERAL

A. In locations where new pipes are to be connected to existing, the Contractor will not be permitted to proceed with new construction until he has dug test pits and determined the exact location and elevation of all existing utility and other existing conditions.

B. In locations where new services are being installed by directional drilling the Contractor will not be permitted to proceed with new construction until he has dug test pit/receiving pit and determined the exact location and elevation of all existing utilities and any other condition related to installation.

C. In locations where there are existing utilities which may pose interference problems, the Contractor should be aware that all the interferences are the Contractor's responsibility and the use of test pits in these areas are required.

D. In locations where new pipes are to cross significant exiting utilities the Contractor will not be permitted to proceed with new construction until he has dug test pits and determined the exact location and elevation of existing condition.

E. In all locations where new pipes are to cross exiting utilities and/or services the Contractor will be responsible for protection and replacement/repair including offsets as may be needed to install new pipe.

F. If the contractor should damage existing utilities at any time, the contractor shall be solely and fully responsible for all associated fees, penalties, fines and costs of repairs including any third-party costs required by utility damaged.

G. Contractor shall be responsible for all road cut permit applications and shall comply with all local and state road cut permits for all subsurface exploration and test pits

H. The contractor shall not proceed with any on site construction until PaOne Call is competed and approved (cleared) by all utilities.

I. All excavation in unclassified, contractor bears full and all costs of excavation and restoration,

END OF SECTION

SHORING

PART 1 - GENERAL

1.1 REL ATED WORK

Trenching, Backfilling and Compacting and Earthwork for Utilities

1.2 QUALITY ASSURANCE

Requirements of Regulatory Agencies:

1. Shoring materials and installation work shall conform to Federal, State and local laws, rules, regulations, requirements, precautions, orders and decrees.

2. Provide material for sheet piling, sheeting, bracing and shoring and drive or set in place in accordance with Federal, State and local laws for excavation and construction; and as required to protect the workers and the public, or to maintain the trench widths regardless of whether the same is or is not considered necessary by the Contractor.

3. Contractor shall bear the duty or responsibility for inspection, determination, compliance and enforcement of Federal, State and local laws, rules, regulations, requirements, precautions, orders and decrees, see Special Conditions.

1.3 SITE CONDITION

Responsibility for Condition of Excavation:

1. The failure or refusal of HCA to suggest the use of bracing or sheeting, or a better quality, grade, or section, or larger sizes of steel or timber, or to suggest sheeting, bracing, struts, or shoring to be left in place; shall in no way or extent relieve the Contractor of his responsibility concerning the condition of excavation or of his obligations under the Contract, nor impose liability on the HCA or under the Contract, nor impose liability on HCA; nor shall a delay, whether caused by an action or want of action on the part of the Contractor, or by an act of HCA, Owner, or their agents, or employees, resulting in the keeping of an excavation open longer then would otherwise have been necessary, relieve the Contractor from the necessity of properly and adequately protecting the excavation from caving or slipping, nor from his obligations under the Contract relating to injury to persons or property, nor entitle him to claims for extra compensation.

1.4 REFERENCES

1. All OSHA excavation standards shall apply to this contract. The Occupational Safety and Health Administration (OSHA) has amended its Construction Standards for Excavation, 29 CFR, Part 1926, Subpart P.

2. The existing standards regulate the use of support systems, sloping and trenching systems and other systems of protection against excavation cave-ins. In addition, the standards regulate the means of access to and egress from excavations, and employee exposure to vehicular traffic, falling loads, hazardous atmosphere, water accumulation and unstable structures in and adjacent to excavations.

3. References to Registered Professional Engineer in OSHA specifications shall mean an Engineer employed or retained by the Contractor does not apply to the HCA.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood Materials: Use wood sheeting, sheet piling, bracing and shoring which is in good serviceable condition and timbers of sound condition, free from large or loose knots and of proper dimensions.

B. Steel Materials: Steel sheet piling and bracing of equal strength may be substituted for wood.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Using skilled labor, drive or set sheeting, sheet piling, braces or shores in place and arrange such that they may be withdrawn as the excavations are backfilled, without injury to piping and structures, and without injury to or settlement of adjacent structures and pavements.

B. When tight plank or steel sheeting is required, drive such sheeting in advance of the excavation. Make joints of tongue and groove or interlocking type and as watertight as possible.

C. Where the maximum width of trench may be exceeded under these Specifications and where permitted by Federal and State regulations, the sides of the trench may be sloped in lieu of providing sheeting and bracing. If the sloping of trench banks is permitted, the slope shall begin at a point of 12 inches above the top of the pipe. Install sheeting to support the vertical part of the excavation as required by Federal and State regulations.

D. Remove sheeting, bracing and shores as trenches and other excavations are being backfilled, except where and to such an extent as the Engineer shall require, in writing, that same be left in place or where he shall permit the Contractor to leave same in place at the Contractor's own request and cost.

1. In withdrawing sheeting and sheet piling, exercise care to ensure that all voids or holes left by planks as they are withdrawn are backfilled and thoroughly rammed with thin rammers provided especially for that purpose.

2. Exercise care to carry backfill up evenly on all sides of items installed in excavations.

E. Cut off sheeting or sheet piling left in place whenever and at such points as the Engineer shall require and remove from the work the portion cut off. No additional compensation will be allowed for such cutting and removal.

F. The shoring shall conform to the reference in Paragraph 1.4 above.

END OF SECTION

SOIL STABILIZATION

PART 1 - GENERAL

1.1 SCOPE

A. It shall be the responsibility of the Contractor to implement the proper Erosion and Sediment Control requirements in the field and meet all State and Local regulations pertaining to it. The Contractor shall assign this responsibility to a person experienced in sediment and erosion control procedures. Modifications or deviations from the plan will be allowed only if the Contractor first obtains written permission from the Agencies having jurisdiction. A copy of the plan shall be kept at the project site at all times.

1 All soil erosion and sediment control practices indicated on the construction Drawings or specified herein shall be constructed in accordance with the "Erosion and Sediment Pollution Control Program Manual" of the Commonwealth of Pennsylvania, Department of Environmental Protection, latest edition with all current revisions and amendments.

B. The Contractor shall familiarize himself and shall be responsible for carrying out all soil erosion control requirements of the project.

C. A separate bid item may be provided for erosion and sedimentation controls; the cost must be included in that item or in the unit prices for the items to which the erosion controls pertain or be included in the lump sum price of the Contract whenever applicable.

D. Particular attention should be given to areas of steep topography and highly erodible soils.

E. The Contractor shall comply with all applicable State and Local regulations relating to the prevention and abatement of pollution.

1.2 STOCKPILE

A. All stripped topsoil or excavated earthen material to be used within the project site shall be properly stockpiled. Material found to be unsuitable for subsequent use or in excess of the quantity required shall be disposed of. The location, method of disposal, and means of transport shall be in accordance with State and Local laws.

B. All soil that is to be stockpiled for a period of greater than 20 calendar days shall be temporarily stabilized as described in the "Temporary Stabilization" section of these Specifications.

C. A silt fence shall surround the base of all the stockpiles, except if they are piled and removed all in one day.

1.3 TRAFFIC CONTROL

A. Corridors for equipment travel shall be established to protect those areas that will not be disturbed. Routes for convenience shall not be allowed and those established for equipment travel corridors must be used. Workmen shall park on stabilized areas whenever possible.

PART 2 - EROSION AND SEDIMENT CONTROL MEASURES

2.1 Inlet Protection

A. All storm drainage inlets collecting sediment laden water from the project area shall be provided with inlet protection or shall be temporarily capped until permanent stabilization has been provided within the tributary area to the affected inlets.

2.2 Straw Bales

A. Staked straw bales shall be installed where indicated on the Drawings or required in the Specifications.

2.3 Silt Fence

A. Silt fence shall be provided as indicated on the Drawings, along the lower periphery of the active work area where sediment laden water may be expected to flow onto inactive areas.

B. Synthetic silt fence filter fabric shall be a pervious sheet of Propylene, Nylon, Polyester or

Ethylene yarn and produced by a reputable manufacturer for the specific purpose of being used as a silt filtering media.

C. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120° F.
D. Posts for silt fences shall be either 4-inch diameter wood or 1.33 pounds per linear foot steel with a minimum length of 5 feet. Steel posts shall have projections for fastening wire to them.
E. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.
F. Posts shall be spaced a maximum of 8 feet apart at the barrier location and driven securely into the ground (minimum of 12 inches).
G. The filter fabric shall be stapled or wired to the fence, and 8 inches of the fabric shall be extended into the toe anchor trench. Filter fabric shall not be stapled to existing trees.
H. Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately by the Contractor.
I. Sediment deposits shall be removed after each storm event. At no time shall they be permitted to reach one-half the height of the silt fence barrier.
J. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.
K. Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed up to conform with the existing grade, prepared and seeded.

2.4 EARTH SLOPE PROTECTION

A. Earth slopes shall be protected from erosion acceleration as soon as possible after the cut or fill operation. This shall be done by quick establishment of vegetative cover (temporary and/or permanent), mulches, providing jute matting or synthetic netting on steeper slopes or a combination of the above.

2.5 PIPELINE TRENCHES

A. When possible, trenches shall be backfilled above the original ground level to allow for settlement and to prevent runoff from following the trench line when backfill settles. Where the grade along the top of the backfilled trench is over 5 percent, water breaks shall be installed diagonally across the trench to divert water into adjacent areas at about a 30° angle from a line perpendicular to the trench line and spaced at proper intervals. Intervals shall not exceed one hundred feet.
B. A water break may be a crushed stone berm, 6 inches to 8 inches high, or a straw bale barrier constructed diagonally across the trench to divert runoff to one side of the trench in intervals, thus preventing a constant flow of stormwater along the side of the backfilled trench.

2.6 PRESERVATION OF EXISTING VEGETATION

A. Good stands of existing vegetation adequate to control erosion should be preserved wherever possible. Regeneration of wood plants should be encouraged where acceptable. New vegetation, soil treatments, etc., shall be done as specified on the Drawings and in the applicable sections of the Specifications.

2.7 PUMPED WATER MANAGEMENT

A. The Contractor shall be required to practice pumped water management. Pumped water shall be discharged onto a stabilized surface and then allowed to filter through rock filters or existing vegetation, straw bales, or silt fence.

END OF SECTION

EARTHWORK FOR WATER LINES

PART 1 - GENERAL

1.1 SCOPE

A. Description of Work: Provide all labor, material and equipment to excavate pipe trenches and backfill after the installation of the pipe, all in accordance with the Drawings and as specified herein. All excavation is unclassified and contractor shall bear all costs to perform all work. No additional compensation shall be considered for rock. Blasting shall not be permitted. Contractor shall remove all rock as required by other acceptable and approved means.

1.2 LINES AND GRADES

A. Grades: Pipes shall be laid true to the lines and grades shown on the Drawings. The grade shown on the profile is the invert to which the work must conform. Work not conforming to the grade shall be corrected by the Contractor at his own expense. The Contractor is responsible for maintaining the line and grade.

B. Locations of Lines: The locations of the proposed lines are shown on the Drawings. Approximate depths are shown on the Drawings. The Engineer reserves the right to make changes in lines and grades of pipe lines and in locations of pipes when such changes may be necessary or advantageous.

C. Changes In Pipe Location or Grade: The Owner will allow no claims for changes in locations or grade unless such changes are made after trenching has been done at the request of the Owner.

1.3 TRENCHING REGULATIONS

A. In open trenching on State highways, the Contractor shall be governed by the conditions, restrictions and regulations made by the Pennsylvania Department of Transportation (PA DOT). All such regulations shall be in addition to the ones set down in these Specifications. All permit restrictions and conditions are part of the Contractor's requirements and are hereby part of the construction documents. Permits are attached or available for review by the Contractor.

PART 2 - PRODUCTS

2.1 BACKFILLING MATERIALS

A. Suitable Materials: Excavated material from the trench or materials from other sources shall be of good quality and free from cinders, frozen material, coal, ashes, refuse, boulders, large clods, roots, organic material, or stones larger than 6 inches.

B. Bedding Material: Bedding/trench material shall be as specified, not washed, with fines present to stabilize it in the trench. If amount of fines is insufficient, then stone screenings shall be added to extent required to stabilize it in the trench. All bedding material shall conform to PADOT classification for 2A. Sharp stones and crushed rock (larger than 3/4 inch) shall be excluded from the bedding material.

C. Select Backfill: Select backfill shall be "Select Granular Material 2-A in accordance with Section 703.3 of the Pennsylvania Department of Transportation Standard Specifications, Publication 408 (latest edition).

D. Concrete: Concrete used for thrust blocks or encasement shall be Class B concrete as specified in CAST-IN-PLACE CONCRETE. Tests of concrete for this usage are waived.

E. Note to Facility Owner and Contractor: Due to historical issues encountered in backfill of past projects, this specification now requires the entire trench over water lines to be backfilled and compacted with select material only. Suitable material shall not be used for water line trench backfill in any case. This applies to water line in paved areas as wel as outside of paved areas.

PART 3 - EXECUTION

3.1 EXCAVATION

A. General: Perform all excavation of every description and of whatever substances encountered to the depth shown on the Drawings. All excavated materials not required for fill or backfill shall be removed from the site of the work by the Contractor. All excavation, unless otherwise detailed and authorized by the Engineer, shall be made by open cut. Side walls of trenches shall be kept vertical and shall be properly sheeted and braced.

B. Trenches shall be excavated true to line so that the trench width is not more than the width shown on the associated installation detail. Where damage is liable to result from withdrawing sheeting, the sheeting shall be left in place. Sheeting shall be left in place only when agreed to or requested by the Engineer. Care shall be taken not to excavate below the depth specified.

B. Rock: Rock excavation, when needed, shall be done in accordance with ROCK EXCAVATION. No additional compensation shall be allowed for rock excavation.

C. Excavation Below Grade: Where the bottom of the trench, by mistake of the Contractor, is taken out to a greater depth than specified for a given pipe bedding the trench shall be brought back to grade with compacted bedding material. Refilling with earth to bring the bottom of the trench to the proper grade will not be permitted. This additional material required due to the over- excavation shall be furnished and installed by the Contractor at his own expense.

D. Blasting: Blasting shall not be considered for this project.

3.2 EXCAVATION NEAR EXISTING STRUCTURES

A. Attention is directed to the fact that there may be water pipes, drains and other utilities in certain locations. Some of these may have been indicated on the Drawings, but no attempt has been made to show all of the services, and the completeness or accuracy of the information given is not guaranteed.

B. All water or other utility lines shall be located on the ground with pipe-locating equipment well ahead of the work at all times. All such locations shall be plainly marked by coded paint symbols on pavement or by marked stakes in the ground. Such locations shall be established at least 50 feet in advance of all trench excavation. Arrangements for all such location work shall be provided by the Contractor and the cost for this work shall be included in the price bid for pipe.

C. As the excavation approaches pipes, conduits or other underground structures, digging by conventional trenching machine methods shall be done with extreme care. No extra compensation will be given if manual excavation is required to locate utilities and/or underground structures.

D. When excavating within two (2) feet (vertical or horizontal) of a gas or oil line, the Contractor shall use the manual method of excavation. At no time will conventional trenching equipment be permitted under these conditions. No extra compensation will be given for this manual excavation.

E. Excavation near structures will not be allowed closer to the structure than the depth of the excavation below the bottom of the foundation without shoring the excavation with sheeting.
F. The Contractor shall carefully protect from disturbance and damage all land monuments and property markers until an authorized agent has witnessed or otherwise referenced their locations. These monuments and/or markers shall then only be removed when authorized by the agent or Owner. Monuments and/or markers shall be reinstalled by the Contractor to the satisfaction of the property owner or agent.

3.3 PROTECTION OF EXISTING STRUCTURES

A. All existing pipes, poles, wires, fences, curbing, property line markers and other structures which must be preserved in place without being temporarily or permanently relocated shall be carefully supported and protected from damage by the Contractor.
B. In case of damage to any structure, the Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. If the owner of the structure wishes to make his own repairs, the Contractor shall reimburse the owner of the structure for all the time and materials required to make the repairs.
C. When the owners of the damaged structures do not wish to make the repairs themselves, all damage shall be repaired by the Contractor, or, if not promptly done by him, the Owner may have the repairs made at the expense of the Contractor.
D. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.
E. The Contractor shall not be compensated for any additional work involved if utilities or underground structures cross the trench line transversely above or below the pipe.

3.4 CARE AND RESTORATION OF PROPERTY

A. Excavating machinery and cranes shall be operated with care to prevent damage to existing structures, paving and/or wires.
B. It is suggested that to protect the pavement and shoulders, all equipment should have rubber wheels or runners and should have rubber, wood or similar protective pads between the outriggers and the surface unless otherwise authorized by the State Highway Department. In the event that other than rubber equipped machinery is authorized for use, the pavement and shoulders should be protected by the use of matting, wood or other suitable protective material having a minimum thickness of 4 inches. In any event it shall be the Contractor's responsibility to take whatever steps are necessary to protect pavement and shoulders.
C. The Contractor must exercise care not to damage paving, curb, inlets, sidewalks, etc., beyond the limits shown. Any damage to areas outside the limits shall be replaced in kind by the Contractor at his own expense to the satisfaction of the Owner.
D. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

3.5 TRENCHING

A. Trenches shall be dug to the depth required by the Contract Documents adding, however, to such depths the thickness of the pipe and the required bedding. The width of the trench shall be to limits as detailed.

B. During installation, upon encountering quicksand or a wet spongy material, the Contractor shall determine the actual depth of the soft material. Once the depth of the soft material has been determined, one of the following methods of construction work shall be used as determined by the Engineer:
    1. Installation by the quicksand excavation method
    2. Crushed stone foundation
    3. Concrete encasement

3.6 SHEETING AND SHORING

A. Where sheeting, shoring, bracing, or trench boxes are used, they must be designed by a Professional Engineer licensed to practice in the State of Pennsylvania. Said Engineer shall provide the Contractor with a certification signed and sealed by him stating that the design of the sheeting and bracing conforms to all application requirements of the Pennsylvania Construction Safety Code and the Occupational Health and Safety Act. Copies of the certification shall be submitted to the Engineer.

B. Trenches shall, at all times, be properly protected to prevent accidents, caving of the sides of trench or breaking of the ground outside of the lines of the trenches proper or damage to buildings or other structures along the line of construction. Underground structures of all types shall be protected by the Contractor, who shall use all necessary shoring, bracing or other appliances for the protection of same. Care must be taken not to damage in any way water mains, gas mains, oil mains, electric conduits or other structures encountered on the lines of the Work.

C. The Contractor must follow the proposed sheeting plans submitted. No deviations may be made from the filed procedure without first submitting a revised sheeting and bracing plan, signed and certified as required for the original submission, by the same licensed Professional Engineer who prepared the original submission.

D. No shoring shall be left in place unless so authorized by the design Engineer.

F. All sheeting and bracing not to be left in place shall be carefully removed in such a manner as not to endanger the construction or other structures. All voids left or caused by withdrawal of sheeting shall be immediately backfilled with well-compacted material.

G. When installing pipe the sheeting and shoring shall not project below a point one foot above the top of pipe, except during quicksand excavation or to stabilize trench bottom.

H. If sheeting must be placed below the pipe invert in order to stabilize trench bottoms, the sheeting shall be left in place from the trench bottom to a point 1 foot 6 inches above the top of the pipe, and the remainder of the sheeting cut and removed before final backfilling.

3.7 QUICKSAND EXCAVATION

A. Where quicksand excavation is encountered, the Contractor shall drive either tight tongue and groove wooden sheet piling or steel sheet piling to a depth which will effectually cut off the flow of sand. Well points and other methods shall then be used to dewater the trench. Excavation and construction shall follow as rapidly as possible thereafter. A satisfactory foundation must, however, be secured either by close tongue and groove planking held by piling or some other acceptable method. Where pipe is to be constructed through quicksand excavation, the trench shall be carried to a sufficient depth below the grade line to permit the pipe to be encased in concrete, on a 2-inch x 10-inch plank platform or cradle.

B. The Contractor shall comply with Paragraph 3.6 of this Section of the Specifications for design of the sheeting and shoring.

3.8 TRENCHING IN ADVANCE OF PIPE LAYING

A. The trench for the pipe lines shall not be opened for a distance of more than 50 feet at any one time. At no time will the Contractor be permitted to leave the trench open at the end of a working day. Contractor shall take adequate precautions to safely barrier end of trench at the conclusion of each work day with necessary steel plates, barriers, and safety fence. If concrete is to be installed for pipe encasement, longer lengths of trench may be left open with the Owner's approval, provided that all trenching regulations are met.

B. All trenches are properly secured and protected.

3.9 KEEPING TRENCH DRY

A. All ground water which may be found in the trenches and any water which may get into them from any cause whatsoever shall be pumped or bailed out so that the trench shall be dry during pipe-laying period. No water shall be permitted to reach concrete until it has set sufficiently. All water pumped from the trenches shall be disposed of in compliance with the applicable local regulations of the appropriate governing body. The Contractor shall provide a minimum of two pumps for each trench opened in wet ground, one operating and one standby. The standby pump shall be of a size that will replace the largest operating pump.

B. The Contractor shall provide and place all necessary flumes or other channels of adequate size to carry temporarily all streams, brooks, stormwater or other water which may flow along or across the lines of the pipeline. All flumes or channels thus utilized shall be tight so as to prevent leakage into the trenches. Water pumped from trenches shall be led to a natural watercourse in accordance with the EROSION AND SEDIMENT CONTROL PLAN or as shown on the Drawings.

3.10 PIPE BEDDING

A. General: Take care to avoid contact between the pipe and compaction equipment. The tampers shall be hand or pneumatic of the proper size to operate between trench wall and pipe. Portable or remote operated compaction equipment shall not be used without a minimum of 1’-0” cover over pipe and after pipe has been properly bedded and chalked in place.

B. Do not use compaction equipment directly over the pipe while placing the pipe bedding to insure that such equipment will not damage or disturb the pipe. Pipe bedding shall, in all cases, extend up until 1 foot of cover has been built up over the pipe. Refer to the Construction Details for bedding details.

C. The bedding shall be compacted to not less than 100% of the maximum dry density as determined by ASTM D1557.

D. Bedding/Encasement: The trench shall be excavated to the depth shown on the Construction Details. The bedding material shall be placed in the trench for its full width to uniformly support the pipe at the required line and grade. Encasement material shall be spread in 4-inch layers and each layer shall be compacted with tampers until the required total depth of bedding has been built up.

E. Concrete Encasement: Where specified or required in the field, the pipe shall be supported by concrete encasement. Concrete encasement is considered incidental to pipe installation.

F. The trench shall be excavated to a minimum depth as shown on the Construction Details. The excavated space shall then be completely filled with and the entire pipe encased in concrete such that the concrete encasement measures a minimum 1 foot above the top of the pipe. The total minimum width of the concrete encasement shall equal the width of trench excavation. Unless otherwise shown on the Drawings or specified herein, concrete shall be Class B in accordance with PA DOT. Freshly poured concrete shall be maintained

free from ground water for at least the first four hours. No backfilling of the trench shall begin until a minimum time period of 24 hours has elapsed after the encasement has been poured. Steel reinforcing, if required, shall be as shown on the Drawings or Construction Details. Wood forms shall be utilized during concrete encasement if trench width exceeds construction details. All wood forms must be removed before starting backfill.

3.11 FOUNDATIONS

A. Crushed Stone - For Foundation: Where suitable supporting soil or rock stratum occurs at a depth greater than required on the Construction Details or Drawings but less than 2 feet below the pipe or where moderately unstable soil conditions are encountered or where the trench is excavated below the specified depth or where required by the Engineer, the foundation shall be modified as follows:
   1. Except in the case of over-excavation where no extra excavation will be required, the trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Crushed stone shall be spread in 4-inch layers, and each layer shall be compacted with 20-pound hand or pneumatic tampers.
   2. The foundation shall carry vertically from the supporting stratum up to the required level.

3.12 BACKFILLING

A. General: After pipes have been checked for alignment and bedding, the backfilling may be started. Backfill material may be deposited in trench either by hand or machine. Sufficient number of men shall be available to spread the backfill in uniform layers. All backfill shall be compacted to a minimum 100% maximum dry density based on PaDot certified material and test data. At least 30 inches of cover over top of the pipe shall be provided before trench is wheel-loaded.

B. At least 48 inches of cover shall be provided before using mobile trench compactors of the hydra hammer or impactor type. These compactors shall only be used after the pipe has been properly backfilled in accordance with these Specifications.

B. Backfilling In Non-Traffic Areas (Grass, Earth Plots or Sidewalks) (Not Applicable to PA DOT Rights-of-way)
   1. Initial Backfilling of Pipe: This portion of the pipe trench shall be backfilled with PaDot 2A to provide pipe encasement compacted to 100% maximum dry density. When concrete encasement is used the initial backfill of 2A will not be required.
   2. Backfill Trench to Finished Grade: After initial backfilling has been compacted as specified above, the remainder of the trench shall be backfilled with suitable material. When the material excavated from the trench is deemed unsuitable for backfilling, the Contractor shall supply and install either, suitable material from outside sources or, at his option and expense, "Select Backfill."
   3. Final backfilling material must be compacted to not less than 100% maximum dry density in minimum lifts as detailed on the plans and required by applicable permits and regulations.
   4. Settlement: If settlement occurs, additional backfill shall be deposited and mechanically compacted to the required elevation.

C. Backfilling In All Traffic Areas, local roads, PA DOT Highways and PA DOT Improved Shoulders:
   1. Backfilling in PA DOT Highways shall be in accordance with Pennsylvania Department of Transportation Regulations, 67 PA Code, Chapter 459, and governing "Occupancy of Highways by Utilities."

2. Initial Backfilling of Pipe: This portion of the trench shall be backfilled with PaDot 2A to provide pipe encasement, installed as described in this Section. When concrete encasement is used, the initial backfill will not be required.
3. Backfilling Trench To Underside of Paving After Initial Backfilling: The trench must then be backfilled with "Select Backfill" in accordance with PA DOT requirements up to the bottom elevation of the pavement structure.

D. Backfilling in Paved Areas: When backfilling in paved areas, the backfill material shall be placed or stored on the side of the operation farthest from the road, unless otherwise authorized by the Owner or PA DOT and in such a manner that there will be no interference with the flow of water in any gutter, drain, pipe, culvert, ditch or waterway. The remaining excavated material must be removed from the site each day as the Work progresses.

3.13 COMPACTION AND TESTING IN PAVED AREAS

A. In all paved areas the backfill shall be thoroughly compacted over and around the pipe by use of vibratory tamping pads or, where these cannot be used, by mechanical or hand tamping. Backfilling shall be compacted to not less than one hundred (100%) percent of maximum dry density as determined by ASTM D1557 or as required by PaDot Pub 408 and 459

B. In addition in PA DOT Highways the more stringent requirements (Form 408 Specifications, Section 210 and/or Section 601 by PA DOT) will govern the subgrade compaction, which requires 100% compaction.

C. The optimum moisture content and the maximum density of each type of material used for trench backfill shall be determined by "Tests for Moisture-Density Relations of Soils, using 10 lb. Rammer and 18 inch Drop" (ASTM D1557 or AASHTO T-180). The Contractor shall be responsible for taking all soil density testing and shall provide a certified copy of all material tests to the Engineer before proceeding with backfilling.

D. The field moisture content of materials being compacted shall be determined by "Laboratory Determination of Content of Soil" (ASTM D2216). The field density of compacted material shall be determined by "Test for Density of Soil in Place by the Sand-Cone Method" (ASTM D1556) or test for density of soil and aggregate in place by nuclear method (Shallow Depth) (ASTM D2922).

E. A soils engineering and testing laboratory shall perform sufficient tests and inspection procedures both in the field and lab to insure that the provisions of this Specification are met.
   1. A random method using PTM No. 1 (Pennsylvania Testing Method) for selecting actual test sites shall be employed.

F. The testing and control firm shall be selected by the Engineer and paid by the Contractor. After testing is completed and reports are provided, all subgrades below the paving will be examined by the Engineer before any paving is authorized. The responsibility of the Soils Engineering and Testing Laboratory is to the Engineer, to whom that firm must promptly, faithfully and accurately report the results of its tests and inspections. The firm must, in addition, work in coordination with the Contractor, making all tests required by the Contract. The reports must state whether or not the reported results comply with Contract requirements. The testing and control firm shall promptly type and deliver all its reports to the Resident Inspector with a copy to the Contractor and shall mail two copies to the OWNER.

G. Any section of the trench or excavation which fails to reach the required compaction at the time of testing shall be deemed a failure. These areas shall have backfill material removed to a depth of 18" over pipe, replaced, and compacted until all compaction limits are achieved to the satisfaction of the Engineer.

3.14 DISPOSAL OF MATERIAL

A. Excavated material shall be so placed as not to unreasonably interfere with travel. All macadam and other street surfacing, surface loam and sod shall be kept separate from the remainder of the excavated material. Upon completion of the backfilling, the property shall be cleaned, all surplus material removed and the surface restored to the condition in which it was before ground was broken.

B. Unless otherwise specified, all materials left over shall become the property of the Contractor. Also, all underground structures removed, such as brick, concrete and pipe, shall become the property of the Contractor, unless otherwise noted on the Drawings. If the Contractor shall fail to promptly remove surplus material, the Owner may have the material removed and charge the cost thereof as money paid to the Contractor. All surplus excavation shall be removed from the site of the work by the Contractor, but none shall be deposited on private property until written consent of the property owner has been filed with the Engineer. The Contractor's disposal shall comply with all Federal, State and Local laws and regulations.

C. HCA shall have first right to take any and/or all old and removed material. All material HCA requires to be saved shall be delivered to location as designated by HCA. Equipment and material which may be salvaged shall include but not be limited to all removed Fire Hydrants, pressure regulating valves, and other items so selected by HCA.

3.15 MAXIMUM TRENCH WIDTH

A. The maximum trench widths shall set the limits of payment for various items as itemized below and shown on trench details, except for PA DOT Rights-of-way which will follow the requirements as listed below.
    1. Trench Width shall be the Limit of Payment for the following items:
        a. Sidewalks
        b. Curbs
        c. Gutters

B. Typical paving cutbacks, both sides of trench: 12 inches.

C. The Limit of Payment for paving over the trench shall be the trench width shown plus a cut back on either side of the trench.

D. Replacement work beyond Trench Width or Limit Payment for paving shall be in accordance with Paragraph 3.4, "Care and Restoration of Property."

E. For pipelines within PA DOT rights-of-way the trench width shall be equal to the bell or band of the pipe plus two (2) feet.

END OF SECTION

TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.1 RELATED WORK

A. Erosion Control
B. Concrete

1.2 DESCRIPTION

A. Definition:
   1. Items involved in the excavation such as sidewalks, curbs and street or roadway paving of whatever material is not classified as rock excavation, and no extra payment will be made for their removal.
   2. Unclassified Excavation: Removal of all materials in the excavation, including rock excavation.
   3. Unclassified Excavation Below Subgrade: Same as unclassified excavation except such excavation is performed below elevations given as subgrade.
   4. Miscellaneous Unclassified Excavation: Unclassified excavation required by the Engineer and not included in other items for payment.
   5. Subgrade: Trench bottom prepared as specified to receive first class bedding, concrete cradle or concrete encasement or the bottom of excavations prepared to received pipe line structures.

1.3 QUALITY ASSURANCE

Source Quality Control:
   1. Laboratory Tests: Aggregate materials stated herein under Products require advance examination or testing according to methods referenced, or as required by the Engineer.
      a. Testing laboratory shall furnish both Engineer and Contractor two copies of test result reports. Some reports will be considered as sufficient evidence of acceptance or rejection of materials represented.
      b. Conduct aggregate quality tests in accordance with requirements of appropriate Referenced Standard for such materials.
      c. The Engineer reserves the right to accept aggregate materials based on certification from supplier that the aggregate originates from a source approved by PA DOT and that the aggregate complies with specified PA DOT requirements.

1.4 SUBMITTALS

A. Samples: Submit aggregate samples when requested by the Engineer and other required submissions to the Engineer's business office street address:
B. Test Reports:
   1. Submit testing laboratory aggregate test reports based on requirements stated in Source Quality Control.
   2. Compaction density test reports based on method of density determination as specified in Reference Standards and the method as approved by the Engineer.
C. Certificates: Submit certificate from aggregate supplier based on requirements stated in Source Quality Control, when requested by Engineer.

D. Bonds and Licenses: Submit evidence of bonds, licenses, and experience prior to commencement of any blasting operations.

1.5 SITE CONDITIONS

A. Classification of Excavated Materials: No consideration will be given to the nature of materials encountered in trenching operation. Therefore, as unclassified trenching, no additional payment will be made for difficulties occurring in excavating and handling of materials.

B. Removal of Obstructions:

1. Remove, realign or change the direction of above or below ground utilities and their appurtenant supports, if such is required in the opinion of the Engineer. Perform such work as extra work unless such work is done by the Owner of the obstruction without cost to the Contractor. However, uncover and sustain the obstruction at own expense prior to the final disposition of the obstruction. The Contractor is not entitled to claims for damage or extra compensation due to the presence of such obstruction or delay in the removal or rearrangement of same. Additional precautions concerning obstructions as follows:
    a. Due not interfere with persons, firms, corporations or utilities employing protecting measures, removing, changing or replacing their property or structures, but allow said persons, firms, corporations or utilities to take such measures as they may consider necessary or advisable under the circumstances; which shall not relieve the responsibilities of the Contract.
    b. Without extra compensation, break through and reconstruct if necessary, the invert or arch of a sewer, culvert or conduit that may be encountered if the same structure is in such a position, in the judgment of the Engineer, as not to require its removal, realignment or complete reconstruction.

B. Environmental Requirements:

1. Do not perform trenching, backfilling or compacting when weather conditions or the condition of materials are such, in the opinion of the Engineer, that work cannot be performed satisfactorily.
2. Do not use frozen materials as backfill nor wet materials containing moisture in excess of the amount necessary for satisfactory compaction.
3. Prior to use, moisten dry backfill material not having sufficient moisture to obtain satisfactory placement or compaction.
4. Plan work so as to provide adequate protection during storms with provisions available for preventing flood damage. Protect installed piping and other work against damage from uplift due to high ground water levels.
5. Accommodation of Drainage: Keep gutters, sewers, drains and ditches open for surface drainage. Do damming or ponding or water in gutters or other waterways will be permitted, except where stream crossings are necessary and then only to an extent which the Engineer shall consider necessary. Do not direct water flows across or over pavements except through approved pipes or properly constructed troughs. When so required, provide pipes or troughs of such sizes and lengths as required, and place the same as required at no expense to the Owner. Perform grading in the vicinity of trenches so that the ground surface is properly pitched to prevent water running into the trenches.
6. Pumping: Keep excavation free from water during the performance of the work under this Contract at no expense to the Owner. Build dams and other devices necessary for this purpose, and provide and operate pumps of sufficient capacity for dewatering the excavations. Provide for the disposal of the water removed from excavations in such manner as not to cause injury to the public health, to public or private property, to the work of others, to the portion of the work completed or in progress or produce an impediment to the use of streets, roads and highways.
7. When it is necessary to haul soft or wet soil material over roadways, use suitably tight vehicles to prevent spillage. Clear away spillage of materials on roadways caused by hauling.

8. Provide effective dust control by sprinkling water, use of calcium chloride or other method approved by Engineer. Employ dust control when, where and in a manner required by Engineer.
9. Do not dispose of water in trenches by draining through completed portions of sewer piping.

C. Protection: Assume the risks attending and presence or proximity of overhead or underground public utility and private lines, pipes, conduits and support work for same, existing structures and property of whatever nature. Damages and expenses for direct or indirect injury to such structures or to any person or property by reason of them or by reason of injury to them; whether such structures are or are not shown on the Drawings, by work of this Contract, rests solely with the Contractor.
   1. Outside Rights-of-Way: Take necessary precautions to protect trees, shrubs, lawns and such other landscaping from damage. Restitution work for damages rests solely with the Contractor and at no expense to the Owner.
   2. Pipe Supports: Adequately support underground pipes or conduits exposed as a result of excavations. Provide adequate support along their entire exposed length by timber or planking. Install such supports in such manner that backfilling may be performed without dislodging such pipes or conduits. Place and carefully compact Clean Earth Backfill or Aggregate Backfill, as required, around the supports, and leave such supports in place as a guard against breakage due to backfill settlement. No additional payment will be due the Contractor for support material left in place will be due the Contractor for support material left in place or for the labor of installing and maintaining supports.
   3. Temporary Protective Construction:
      a. Temporary Fence Barricade: Erect and maintain substantial temporary fences surrounding excavation to prevent unauthorized persons entering such areas.
      b. Barricades: Furnish and erect substantial barricades at crossings of trenches, or along trenches, to protect the traveling public.
      c. Excavation Covers: Cover open excavation when work therein is suspended or left unattended, such as at the end of a work day. For such covers, use materials of sufficient strength and weight to prevent their removal by unauthorized persons.
      d. Remove temporary protective construction at the completion of work on the project.

D. Structure Supports: Where passing buildings or any structure which by their construction or position might bring a great pressure upon the trenches, the right is reserved by the Engineer to require that such buildings or structures, be underpinned or that supported and protected, or special sheeting be driven or that short lengths of trench be opened at one time.

E. Accommodation of Traffic: Do not obstruct streets, roads and highways. Unless the Municipality or Governing Agency authorizes in writing the complete closing of the street, road or highway, employ such measures at no expense to the Owner as may be necessary to keep the street, road or highway open and safe for traffic. Maintain a straight and continuous passageway on sidewalks and over crosswalks, at least three feet wide and free from obstructions. DO NOT OBSTRUCT FIRE HYDRANTS.

F. Explosives and Blasting:
   1. Blasting will not be permitted on this project. Contractor shall make all other provisions for removal of rock by other methods.

G. Removal of Rock by Means Other Than Blasting: Where removal of rock by means other than blasting is required, in accordance with the requirements of State and local laws, rules and regulations, and utility owner requirements, remove by the use of mechanical surface impact equipment, or by drilling and hydraulic rock splitting equipment, or by other

methods.

H. Excavation Condition: Condition and results of excavation are solely the responsibility of the Contractor. Remove slides and cave-ins at whatever time and under whatever circumstance they occur.

I. Excess Materials: No right of property in materials is granted the Contractor of excavated materials prior to backfilling. This provision does not relieve the Contractor of his responsibility to remove and dispose of surplus excavated materials.

J. Borrow Material: When the required quantity of backfill material exceeds the quantity of suitable on site material, provide borrow material. If borrow material is needed, notify the Engineer sufficiently in advance to permit the Engineer to verify such need and to view the proposed borrow pit to determine the material suitability. Borrow excavation will be subject to the Engineer's approval whose written consent shall be obtained prior to its use.

K. Change of Trench Location or Depth:
   1. Should the Engineer require a change in location of a trench from that indicated on the Drawings due to the presence of an obstruction, or from other cause and such change is made before the excavation is begun, the Contractor shall not be entitled to extra compensation or to a claim for damages.
   2. If a change in trench location made at the requirement of the Engineer involves the abandonment of excavation already made, such abandoned excavation, together with the necessary refill will be classed as miscellaneous unclassified excavation and refill, in case the width of the trench has been abandoned. If the full width of trench has been abandoned, the excavation and refill shall be classed as excavation and refill for trenches of the size and depth classification of excavation.
   3. The Contractor shall have no claim for additional compensation as a result of changes in trench depths other than the unit price bid for trenches of the revised depth. However, if the change results in abandonment of excavation already made, such abandonment excavation together with the necessary refill will be classed as miscellaneous unclassified excavation and refill.
   4. If a changed location of a trench is authorized by the Engineer upon the Contractor's request, the Contractor shall not be entitled to extra compensation or to a claim for damage. If such change of trench location involves the abandonment of excavation already made, the abandoned excavation and refill shall be at the Contractor's expense.

L. Restoration: The Contractor shall restore all areas within and outside of the construction right-of-way to their original condition at no additional charge to the Owner.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Backfill: On site excavated soil or soil rock mixed materials free of topsoil, vegetation, lumber, metal and refuse; and free of rock or similar hard objects larger than six inches in greatest dimension. Rock to soil ratio shall not exceed one part rock to three parts soil.

B. Clean Earth Backfill: On site excavated material free of vegetation, lumber, metal and refuse; and free of rocks or similar hard objects larger than one inch in greatest dimension. Rock to soil ratio shall not exceed one part rock to three parts soil.

C. Aggregate Backfill: Select Granular Material (2A) conforming to PDT Section 703.3.

D. Pipe Bedding:
   1. First Class Bedding: 2A modified.

E. Concrete Cradle and Encasement: Per requirements of Cast-in-Place Concrete: Section 03300 and of the following class:
   1. Class A: 3000 psi.

F. Unsuitable Bearing Replacement: AASHTO No. 3 Coarse Aggregate conforming to PDT Section 703.2.

G. Underground Warning Tape:
1. Printed polyethylene tape, three inches minimum width, color coded, one inch minimum lettering, printed with name of utility buried below, and suitable for installation in all soil types.
2. Magnetic.
3. Provide for:
a. Water lines - blue.

PART 3 - EXECUTION

3.1 PREPARATION

A. For Pipe Lines and Grades: Layout and maintain lines and grades as follows:
1. By Contractor: Use computed depths of cut as guides for rough excavation, allowing for excavating to accommodate the first class bedding, and for concrete cradles or concrete encasements where indicated or required by the Engineer. Mark station and depth of cut on stakes or paint on paved surface.
a. Batter Boards and Grade Stakes: As rough excavation is completed, set grade stakes or batter boards of No. 2-Grade or equal lumber across the trench opposite the control point. Securely set up and support each board to prevent accidental displacement and to insure board being leveled equidistant above the pipeline invert. Run a taut string line between boards directly over the proposed pipeline centerline. Use the string line as a control for maintaining pipeline grade and horizontal alignment. Use a grade stake or pole, with a true right-angled offset designed to rest on the pipe invert, to check the vertical distance from string line to invert. Use a plumb line from the string line to the center of pipe to maintain horizontal alignment.
b. Methods used to lay out and maintain lines and grades of pipelines, other than centerline batter board method specified previously, will be permitted; however, such methods will be subject to the approval of the Engineer.
If use of laser beam is approved by Engineer, check beam position every fifty feet of line by batter board or survey.

B. For Force Main Pipe Lines and Grades: Layout and maintain lines and grades as required. Maintain 4.5 feet of cover over the crown of the force main.

3.2 PERFORMANCE

A. Perform sheeting and shoring in accordance with requirements of Shoring.
B. Perform soil erosion control work in accordance with requirements of Erosion Control: .
C. Excavating: Perform excavation and backfilling using machinery except that hand excavation and backfilling may be required where necessary to protect existing structures, utilities or private or public properties; and except that backfilling shall be done by hand to the extent hereinafter specified.
1. Begin excavation in trenches at the control point having the lower invert and proceed upgrade.
2. Remove surface materials of whatever nature over the line trenches and other excavations and properly separate and store removed materials as suitable for use in backfilling or other purposes.
3. Remove subsurface materials of whatever nature down to subgrade elevation. Properly separate and store removed subsurface materials as suitable for use in backfilling.
4. Remove rock to subgrade at least 25 feet in advance of pipe laying.
5. Remove rock subgrade if shattered due to rock removal operations, and in the opinion of the Engineer it is unfit for foundations. Backfill to subgrade with Class

C Concrete per requirements of Cast-in-Place Concrete, or other material acceptable to the Engineer. No separate or additional payment will be made for such removal and backfill.

6. If clay seams are encountered in bedrock below load bearing structures, those seams shall be excavated and backfilled as directed and requried.
7. Excavate rock in miscellaneous excavations to the extent required by the Engineer.
8. Remove and waste or otherwise dispose of such excavated materials not required for backfill.

D. Excavated Material Storage:
1. In streets, roads and highways or in any other locations where working space is limited, remove the excavated materials from the first 100-feet of any opening, when required by the Engineer, as soon as such is excavated; store and return same for backfilling when required, at no expense to the Owner. In no case will the Contractor be allowed to cast excavated material beyond the curb or right-of-way lines or on sidewalks or lawns.
2. Where more material is excavated from trenches than can be backfilled or stored on the street or within rights-of-way limits, leaving space for traffic and drainage, remove and store such excess material; return same for backfilling when required, at no expense to the Owner.

E. Subgrade Preparation: In trenches, both earth and rock, provide First Class Bedding as pipe foundations. In lieu of first class bedding provide concrete encasement or concrete cradle or other type of bedding as shown on the Drawings or required by the Engineer. If maximum trench widths specified in Table A (following) are exceeded, provide concrete cradle or concrete encasement in such locations, at no expense to the Owner. Construct First Class Bedding, concrete encasement and concrete cradle in accordance with Detail Drawings.

F. Trench Width and Depth: From subgrade elevation at least twelve inches above the top of the outside barrel of the pipe, excavate trench banks to vertical lines and not less than the minimum no more than the maximum widths specified in Table A. If sheeting is required, the following Table A dimensions apply to the inside face of sheeting.

THE FOLLOWING TABLES ARE FOR PAYMENT WIDTH ONLY

TABLE A

Diameter of Pipe	Minimum Trench Width (Outside Diameter of Pipe at the Barrel Plus)	Maximum Trench Width (Outside Diameter of Pipe at the Barrel Plus)
4 through 24 inches	12 inches	16 inches
27 through 36 inches	20 inches	24 inches

1. From a point twelve inches above the top of the outside barrel of the pipe, keep trench banks as nearly vertical as possible for trenches made in paved or unpaved roadways and in no case shall trench width at the top exceed the outside diameter of the pipe at the barrel plus the dimensions in Table B. When the excavation limits of Table B cannot be held, install temporary sheeting at no additional expense to the Owner.

TABLE B

Diameter of Pipe	Maximum Trench Width at Top of Trench (Outside Diameter of Pipe at the Barrel Plus)
4 through 24 inches	40 inches

2. When pipe lines are constructed in rights-of-way or easements in open country, the maximum top of trench width as specified previously may be exceeded only if the construction is kept entirely within the limits of rights-of-way or easements and can be carried on without damage to adjoining property.
3. No additional compensation will be paid for excavation beyond Table B trench width maximums, such maximums are waived by the Engineer or when the trench walls are sloped at the Contractor's option.
4. Excavate rock for manhole installation one foot outside the exterior lines of the manhole walls and to a depth of the outside bottom.

G. Additional Excavation:
1. Do not excavate below depths indicated or specified except where unstable or unsuitable material is encountered at subgrade. Excavate such material to the increased depth as may be required by the Engineer and refill to the proposed subgrade with thoroughly compacted Foundation Backfill material or construct timber foundation as required by the Engineer.
2. If excavations are carried below indicated or specified subgrades without written permission, refill to proper subgrade with thoroughly compacted Foundation Backfill material at no expense to the Owner.

H. Length of Open Trench: The Engineer shall have the right to limit the amount of trench opened in advance of pipe laying and the amount of pipe laid in advance of backfilling, but in no case shall these amounts exceed 300 feet and 100 feet respectively. Complete trench excavation at least twenty-five feet in advance of pipe laying and keep trenches free from obstructions, except that at the end of a work day or at the discontinuance of work, the pipe laying may be completed to within five feet of the end of the open trench. Additional open trench limitations as follows:
1. The Engineer is empowered to require trench refilling over completed pipe lines if in his judgment such action is necessary. No claim for extra compensation will be allowed for such trench refilling even though work must be stopped elsewhere as a result.
2. If Work is stopped on a trench, except as required by the Engineer, and the excavation is left open for the unreasonable period in advance of construction in the opinion of the Engineer, the Engineer may order trench refilling at the Contractor's expense and not allow trench reopening until ready for actual use.

J. Backfilling: Perform trench backfilling and backfilling excavations for other in line structures by methods which will result in thorough compaction of backfill material without displacement of the grade and alignment of the pipeline and its appurtenances and minimum settlement of backfilled material. Displacement of the pipeline and settlement of backfill shall be considered evidence of improper workmanship or inclusion of unsuitable backfill materials, or both, and will require regrading and realigning the pipeline, and removing and recompacting settled material at no expense to the Owner.
1. Following pipe bedding and piping and inline structure installation, backfill trenches to a height at least one foot above the top of the outside barrel of the pipe with Initial Backfill material placed in four inch layers. This backfill shall be carefully placed in trenches in such manner as not to damage or disturb the pipe.
2. Refill remainder of the trench using backfill materials specified below. Exercise care to carry backfill up evenly on opposite sides of the piping.

a. Within the right-of-way limits of state highways and municipal streets.
   1) Paved Areas: Aggregate Backfill compacted in four inch layers to the bottom of the temporary or permanent pavement.
   2) Unpaved Shoulders: Aggregate Backfill compacted in four inch layers to existing grade.
   3) Unpaved Areas: Aggregate Backfill compacted in four inch layers to bottom of topsoil. Replace topsoil to approximate depth of existing as final refill operation and crown to such height as required by the Engineer. Maintain crowned surface to the satisfaction of Engineer, during the guarantee period.

b. Bituminous Parking Area: Backfill compacted in six inch layer to within 6" of the bottom of the temporary or permanent pavement.

c. Stone Parking Areas: Backfill compacted in six inch layers to a point six inches below the adjacent existing surface. Refill the remaining six inches with AASHTO No. 57 Coarse Aggregate.

d. Sidewalks and Slope Wall: Backfill compacted in six inch layers to a point eight inches below the adjacent existing surface. Aggregate Backfill and specified replacement pavement.

e. Unpaved Areas: Backfill compacted in six inch layers to bottom of topsoil. Replace topsoil to approximate dept of existing as final refill operation and crown depth of existing as final refill operation and crown to such height as required by the Engineer. Maintain crowned surface to the satisfaction of the Engineer, during the guarantee period.

3. Do not use in backfilling work materials such as house ashes, putrescible refuse and such other materials considered unsatisfactory by the Engineer. Do not permit excavations to be used as dumping areas for refuse.
4. Do not use frozen backfill materials or place backfill materials on frozen subgrade or trench surfaces.
5. Should there be a deficiency of proper backfill material, provide acceptable borrow material at no additional expense to the Owner.
6. No bulkheads or retaining walls for backfilling will be allowed in the trenches over piping, except for temporary use.

K. Clay Dikes: Construct clay dikes composed of high clay content clean earth backfill material.
   1. Location - As shown on the plans.
   2. Construct clay dikes in accordance with Detail Drawing.
   3. Place clay dike material by hand and compact with proper tools designed for such purpose.

L. Stream Crossings: Excavate trenches in stream crossings to the depth shown on the Drawings or otherwise required by the Engineer.
   1. Material excavated may be used as backfill unless specifically prohibited by the state agency having jurisdiction.
   2. Make all necessary provisions for cofferdaming, dewatering and removal of excess excavated material.
   3. Maintain the flow in the stream.
   4. Construct stream crossing in accordance with additional requirements of Soil Conservation District.

M. Compacting: During the course of backfilling and compacting work, the Engineer may, at various locations or depths of trenches, make tests to determine whether the Contractor's compaction operations are sufficient to meet specified requirements. Compact trench backfill as follows:
   1. Trench excavation and backfill within State Highway right-of-way will be subject to inspection by representatives of the Commonwealth of Pennsylvania, Department of Transportation, and the work must be performed in accordance with the requirements of that department without additional payment even though such

requirements may entail more labor or services than the methods herein described.

2. Solidly tamp each layer of Initial Backfill around the pipeline with proper tamping tools made specifically for this purpose.
3. Thoroughly compact Aggregate Backfill with a vibratory compactor of a type and size satisfactory to the Engineer and the Pennsylvania Department of Transportation. Compacting of this Aggregate Backfill by puddling or jetting will not be permitted.
4. Where required, use mechanical tampers to compact backfill materials in trench refill operations to produce a density of backfill at the bottom of each layer of not less than 90 percent of maximum density obtained at optimum moisture content as determined by AASHTO T 99. Perform field determinations of density, when requested by the Engineer, in accordance with AASHTO Standards.
5. The use of HYDRA-HAMMER for compacting backfill in trenches is prohibited.
6. The use of puddling or jetting for compacting backfill in trenches is prohibited.

N. Cleanup:

1. Remove surplus excavated material, rubbish and other construction debris and keep such removed to a point not more than two hundred feet from the open trench, unless otherwise authorized by the Engineer.
2. After trenches and other excavations are refilled and the work completed, remove surplus excavated materials, rubbish or such other materials from the work in such manner as the Contractor may elect or provide, but subject to the Engineer's approval. Dispose of such materials off the site in a lawful manner.
3. Evenly spread and leave in neat, smooth condition excavated material disposed of lawfully on public property.
4. Furnish and place topsoil, fertilize and seed grassed areas, both within and outside rights-of-way affected by construction. Reseed and refertilize areas that fail to show a uniform stand of grass. Water, mow, rake, weed and otherwise maintain grass until final acceptance by Contract.
5. Restore the area covered by both temporary and permanent rights-of-way over private property to as near the original conditions as is practical. Bring area up to original conditions as is practical. Bring area up to original grade, place topsoil, seed, replant or replace shrubbery, repair or replace walks, driveways, fences and other improvements, damaged or removed.
6. Do topsoiling, liming, fertilizing and seeding in a manner consistent with acceptable trade practices for the area involved.
7. When the repaving over trenches and excavation has been completed, sweep paved surfaces having been affected by the work using hand or power sweepers, and, if required by the Engineer, flush the water to remove dust and small particles.

O. Maintenance: It is the Contractor's responsibility for injury or damage resulting from the lack of trench maintenance during the guarantee period. If trench surfaces are not satisfactorily maintained or repairs are not begun within three days after written notice from the Engineer, such repairs may be made by the Owner and the cost therefore charged against the Contractor.

P. R-4 Restoration: R-4 restoration shall be performed on all stream crossings.

END OF SECTION

WATER MAINS AND APPURTENANCES

PART 1 - GENERAL

1.1 SCOPE

A. Description of Work: Provide all labor, materials and equipment necessary to furnish and lay all water mains and appurtenances to lines and at depths indicated as specified herein and/or shown on the Plans. Work shall include all permits, fees, inspection costs, excavation, furnishing and laying of mains and appurtenances, testing, backfill, compaction of same, rough and finish grading and replacement of all paving, curbs, gutters and sidewalks and all incidental work.

B. All work shall be laid to true line and grade and special care exercised where mains are laid along or under roads to secure adequate compaction of backfill to prevent any settlement of pavement.

1.2 SUBMITTALS

A. Shop Drawings: Submit shop drawings, cuts and/or samples of all materials to be used in the construction of the water lines. Submittal shall indicate conformance with these specifications and shall be submitted to HCA for acceptance.

B. Test Reports: Tests of the ductile iron pipe shall be made by the pipe manufacturer in accordance with requirements of AWWA. Certified copies of the tests made by the manufacturer shall be submitted to the Engineer prior to the first shipment of pipe as follows:

1. Hydrostatic Test and Tensile Test, Impact Test (70° F and -40° F)
4. Tests shall be conducted throughout the manufacture of pipe.

PART 2 - PRODUCTS

2.1 PIPE

A. Ductile-Iron Pipe shall conform to "Ductile-Iron Pipe Centrifugally Cast In Metal Molds or Sand-Lined Molds, For Water or Other Liquids," ANSI A21.51, (AWWA C151). Thickness Class of pipe shall be Class 350 Thickness Class 52 and shall sustain a working pressure of 250 psi plus a 100 psi surge allowance and an overall safety factor of 2.0. Pipe and fittings shall be US Pipe, Atlantic States Pipe, Griffin Pipe or approved equal.

B, Where indicated on the construction drawings as restrained joint, pipe joints shall be Push-on Restrained Joints. Joints shall be "TR Flex" or approved equal.

B. All other pipe shall be push-on gasketed type. Joints shall be "Tyton Joint" pipe. The rubber gaskets shall conform to ANSI A21.11 (AWWA C111).

C. Fittings and pipe shall be US Pipe, Atlantic States, Griffin Pipe or approved equal. Compact fittings are allowed except at 90 Degree bends.

D. JOINT BOLTS AND NUTS: All ductile iron fittings, and appurtenances (valves, hydrants, restrained joints, etc.) shall be installed with COR-BLUE (COR-TEN) bolts, nuts, and washers. Bolts and appurtenances shall be NSS Industries COR-BLUE (COR-TEN) Bolts, or as approved, coated with a ceramic-filled baked-on fluorocarbon resin.

E. All pipe and fittings shall be coated on the outside with a bituminous coating in accordance with ANSI A21.51 (AWWA C151). The pipe and fittings shall have a <u>double</u> cement lining in accordance with ANSI A21.4 (AWWA C104).

F. All restrained joint pipes that are cut and do not have the factory weld bead on the spigot end shall be provided with TR Flex Gripper Rings or approved equal. All fittings and valves in areas of restrained joint pipe shall be installed with approved restrained joint.

G, All fittings at all valves, T's, crosses,, etc shall be restrained mechanical joints MEGALUG with Mega-Bond Coating System as manufactured by EBAA Iron, Inc., or as approved, of ductile iron and with a working pressure of at least 250 psi and a minimum safety factor of 2:1.

G. **POLYETHYLENE ENCASEMENT**: Provide AWWA C105, 8 mil linear low-density polyethylene tube or 4 mil high density, cross-linked polyethylene tube; 2 inch wide plastic-backed, adhesive tape, bond to both metal surfaces and polyethylene film.

2.2 SERVICE LINES

A. All service lines shall be "Type"K" Copper, no exceptions

2.2 VALVES

A. **Gate Valves:** All buried line gate valves shall be non-rising stem type with rubber encapsulated solid ductile iron gate and thermoplastic gate guide inserts, ductile iron body, vertical configuration, in sizes as indicated. **All valves shall be left open – right closed configuration.** Valves shall be rated for a working pressure of 250 psi and tested to 500 psi. Valves shall have thermoplastic cartridge incorporated O-ring seals between stem and bonnet conforming to AWWA C515 Ductile Iron., and shall be replaceable under full operating pressure. All valve surfaces inside and out shall be protected with fusion bonded epoxy coating conforming to AWWA C550 and acceptable by the Food and Drug Administration for installation in potable water. Valve shall have symmetrical seal to prevent damage and promote long term durability and operation. Valves shall be equipped with "O" Ring cartridge stem seal. Valves shall be direct burial and shall be provided with standard 2" square operating nut. Contractor shall include all costs in off-setting pipe to allow valves to be installed with a minimum of 18 inches of cover over the top of operating nut. Valves shall be U.S. Pipe METROSEAL 250 Resilient Seat Gate Valves or approved equal.

B. **Valve Boxes:** Exterior valve boxes shall be **two piece 2-1/4" cast iron** type with circular base. All boxes shall be complete with flanged cover, adjustable top section, and base section. All covers shall be clearly stamped "WATER."

C. **Certification**: Valve manufacturer shall provide notarized certification that all valves are in full compliance with this specification and are suitable for the pressure, flow, and installation intended.

2.2 SADDLES

A. All services and service corporation stops shall be attached to the water main by means of a dual stainless steel strap saddle constructed of high strength ductile iron. Gasket shall be heavy duty Buna-N "O" Ring rubber gasket. Saddles shall be rated for a minimum of 300 psi. Saddles shall be NSF-61 approved MUELLER® BR2B SERIES BRONZE DOUBLE STRAP SERVICE SADDLES - or approved equal and shall be submitted for approval before installation**. All saddle straps shall be double nut bolted with certified stainless steel nuts and shall then be asphalt coated prior backfill.**

B. Install polyethylene encasement for all buried saddles and assemblies as specified for water main pipe and fittings.

C. Install polyethylene encasement even if not provided for adjacent piping. Comply with AWWA C105 Method A and manufacturer's instructions. Completely tape all overlaps and seams. Repair all rips, punctures, and other damage to the polyethylene and extend minimum 3 feet along copper service.

2.3 SACRIFICAL ANNODES AT SADDLES:

A. Provide and install a magnesium and/or zinc sacrificial buried anode in water permeable cardboard tube as designed and recommended by Interprovincial Corrosion Control Company Limited**,** (ICCC) minimum 9D3GG or approved equal. Securely attach wire to water main and/or copper service as recommended by manufacturer to reduce corrosion reaction on saddle and copper service.
B. Provide and install a sacrificial zinc-anode "Core-Collar" or approved equal as designed and recommended by Interprovincial Corrosion Control Company Limited**,** (ICCC). Provide on end of each threaded saddle connection.

2.4 FIRE HYDRANTS:

A. Manufacturers: Owner has standardized on Mueller Super Centurion 250.
B. AWWA C502, compression type, 5-1/4 inch valve opening, 5-sided operating nut open by turning left (counterclockwise); traffic model with frangible barrel section and stem coupling; positive operating drain valve installed in open position; 6 inch mechanical joint base, designed so water hammer will be prevented when properly operated.
C. Two 2-1/2 inch hose nozzles, supplier shall note that each municipality requires specific threads. Contractor shall provide one factory installed integral 5 inch **Storz** quick connect steamer fitting. Coordinate with Fire Chief in municipality being installed.
D. Suitable for setting in trenches of depths and in locations shown; Contractor responsible for determining hydrant depth of bury based on locations shown.
E. Verify that the direction of opening, hydrant pumper nozzle, operating nut, outlet nozzle cap nuts and hose threads conform to those in the system before the new hydrants are shipped.
F. Factory Finish: Each hydrant shall be given two coats of good quality weatherproofing paint before leaving the factory and another coat after installation.
G. The portion of hydrants Below ground shall be painted with black paint; the portion above ground shall be painted to match existing hydrants municipality (bright yellow). The color shall be submitted to the Owner and Municipality Fire Chief for approval prior to application on the new hydrant.
H. Provide and install HCA standard Hye-Viz top mounted 4 foot hydrant marker in Owner's standard colors with all stainless steel attachments.

2.5 POLYETHYLENE ENCASEMENT TUBING

A. Protect all DIP metallic pipe in with blue polyethylene encasement tubing
B. 27" lay flat width, 0.179 lb/foot continuous length cut to fit.
C. Tubing shall be slipped over the pipe, extended and taped as per manufacturer recommendations.
D. Overlap each joint approximately two feet and tape. Extend wrap a min, 3 feet along service.
E. Trumbull Industries, Inc or approved equal.

PART 3 – EXECUTION

3.1 PREPARATION

A. String pipe sections along the route of the mains so as to interfere least with pedestrian and vehicular traffic and to protect the pipe.
B. Excavate trenches to a depth of 6 inches minimum below the outside bottom of the pipe barrel and bell when the pipe is laid on its final grade to allow for bedding material. Minimum depth of cover **over the bell** shall be 4 feet 6 inches.

C. Ensure all rock, edges, and protruding surfaces are removed before placing a minimum of 6" to 8" of bedding material.
D. Do not install service connections until new mains have been successfully tested,

disinfected, and placed in service.

E. Verify that polyethylene encasement is in place, where required, before placing bedding. F. Water Main Minimum Height of Cover: 4 feet 6 inches.

3.2 BEDDING

A. Place minimum of 6-8" depth of 2A bedding material at trench bottom and shape for accurate placement and proper support of pipe.
B. Place bedding material under, beside, and to 12 inches over the pipe sewer for the full width of the trench; place in 6 to 12-inch layers, loose measure, and work the bedding around the pipe to provide even support, to fill all voids, and to lightly compact the backfill (by hand).
C. Carefully place and tamp so as not to puncture polyethylene encasement, or damage or displace joints or pipe. Do not drop material directly on pipe.
D. Construct thrust blocks and plugs as detailed. Place against firm, undisturbed soil. Protect end of plug from concrete adhesion at pipe to allow for future removal.
E. Construct concrete encasement under ditches as shown.

3.3 INSTALLATION - WATER MAIN PIPE AND FITTINGS

A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
B. Install water mains at a minimum 10 foot horizontal distance from sewers and manholes and at a minimum 18-inch vertical distance from sewers at their crossing, both as measured between the outside of pipe walls. At crossings, install one full length of water line pipe so both joints will be as far from the sewer as possible.
C. Install pipe in locations and at grades shown or specified, except as otherwise permitted or ordered by the Engineer to avoid existing or proposed utility lines or other obstructions encountered; to secure a more readily accessible position for trenching; or to facilitate the location of various pipe appurtenances; avoid high and low points in the main.
D. Use suitable fittings, usually 1/8 bends, when abrupt grade changes of the pipe are necessary to avoid existing utilities or other obstructions, so as to secure an easy flow of liquid and to provide sufficient cover below same unless noted otherwise.
E. Install pipe to allow for expansion and contraction without stressing pipe or joints.
F. Deflect pipe joints in strict accordance with pipe manufacturer's instructions.
G. Locate pipe to maintain a minimum clearance of 18 inches in all directions, with respect to other utilities, to allow for taps to be inserted.
H. With push-on joints, wipe surfaces that contact rubber gasket clean and dry just prior to making joint. Use a lubricant in accordance with the manufacturer's instructions when making joint.
I. With mechanical joints, brush surfaces that contact rubber gasket with soapy water to remove all sand and grit just prior to making joint.
J. Install tracer tape continuous over top of pipe; locate 18 inches below finished grade.
K. Install polyethylene encasement for all ductile iron pipe, fittings, and appurtenances; comply with AWWA C105 Method A and manufacturer's instructions. Completely tape all overlaps and seams. Repair all rips, punctures, and other damage to the polyethylene.
L. Provide polyethylene encasement for each ductile iron fitting for a distance of 5 feet each side thereof; comply with AWWA C105 Method A and manufacturer's instructions. Completely tape all overlaps and seams. Repair all rips, punctures and other damage to the polyethylene.

M. Clean all pipes thoroughly inside and outside before lowering into trench; keep pipes clean during and after laying; and seal the pipe end with a water-tight plug when pipe laying is stopped for any reason.
N. From the top of the bedding to a point 5 feet below the adjacent ground level, backfill trenches in and within 5 feet of the edge of existing and proposed paved or stoned streets,

alleys, driveways, sidewalks, and parking areas with granular material Padot approved material. Place the bedding material in maximum 24-inch layers, loose measurement. Mechanically level the backfill and compact each layer with an excavator-mounted vibratory plate compactor that produces a rated compactive force of at least 9 psi. Each layer shall receive a minimum of two complete passes, except where indicated on the Drawings.

O. The trench shall be backfilled with approved bedding material placed in maximum 12-inch loose layers and mechanically compact to not less than 100 percent of the maximum dry unit weight as determined in accordance with ASTM D698 (Standard Proctor), except where indicated on the Drawings.

P. For trenches within 5 feet from the edge of existing and proposed paved or stoned streets, alleys, driveways, sidewalks, and parking areas, backfill with compacted granular material as specified above for trenches coming within same.

Q. For backfilling trenches specifically detailed as not requiring compacted bedding material, replace as much of the excavated material as possible. Until backfilling has progressed to a depth of at least 3 feet over the top of the pipe barrel, use finely divided material, free of stones 3 inches or greater in any dimension, boulders and other harmful debris, and place in 24-inch layers, loose measurement, and compact by mechanical tamping. Place remainder of backfill in maximum 12-inch layers, loose measurement, and compact by mechanical tamping.

R. Contractor is responsible for disinfection of the water main in accordance with AWWA C651. Attention is directed to Section 4 - Preventive and Corrective Measures during Construction, of AWWA C651. If, in the Owner's opinion, the pipe contains dirt that may not be removed by subsequent flushing, clean and swab the pipe interior as necessary with a 1 percent chlorine solution (10,000 mg/l) prepared by mixing 1 pound of high-test calcium hypochlorite (65-70 percent Cl) and 8 gallons of water.

S. Provide access fittings to permit testing and disinfection and bacteria sampling and flushing assemblies.

T. When necessary to cut pipe at fittings, valves, or elsewhere, the remaining portions may be used to minimize the number of scrap pieces when the Work is complete; however, scrap pieces less than 5 feet in length shall not be used.

U. Backfill trench for Work of this Section as specified.

3.4 INSTALLATION - VALVES AND FIRE HYDRANT ASSEMBLIES

A. Maximum spacing between fire hydrants shall be no greater than 500 feet center to center distance as measured along the centerline of water main or at locations indicated on the plans.

B. Maximum spacing for mainline valves shall be installed no greater than 1,000 feet center to center distance as measured along the center of water main.

C. Set valves plumb and on solid bearing; center and plumb valve box over valve; set box cover flush with finished grade. Provide expansion joint material around portion of box in concrete pavement or sidewalks. Provide a concrete collar around valve box located in asphalt or stone pavement.

D. Set hydrants plumb and to grade of curb, street, alley, highway, or right-of-way with pumper nozzle toward middle line of street, highway, or right-of-way.

E. Set hydrant and auxiliary valve on native hardwood or concrete blocking; provide clean stone fill up to drainage port and wrap in geotextile to prevent fines from entering stone.

F. If necessary, as determined by Owner, to set a fire hydrant at a greater depth of bury as a result of changing hydrant location from that shown, adjust elevation by furnishing and installing the fire hydrant manufacturer's standard barrel and stem extensions.

G. Install polyethylene encasement for all buried auxiliary valves and fire hydrant assemblies as specified for water main pipe and fittings.

H. Install polyethylene encasement for all buried gate and butterfly valves even if not provided for adjacent piping. Comply with AWWA C105 Method A and manufacturer's instructions.

Completely tape all overlaps and seams. Repair all rips, punctures, and other damage to the polyethylene.

I. Paint fire hydrant exterior above ground level with two coats manufacturer recommended standard paint; hydrant shall be painted yellow with bonnet painted color based on flow classification.

3.5 BACTERIA SAMPLING AND FLUSHING ASSEMBLIES; BLOW-OFF ASSEMBLIES

A. Install assemblies as shown or noted; comply with component manufacturer's instructions.
B. Valve shall be located to allow individual taking sample to turn valve on-off while holding sampling jar.
C. Remove bacteria sampling and flushing assemblies after notice from Owner that mains have passed all tests and have been placed in service.

3.6 CONNECTION TO EXISTING MAINS

A. Connect new mains to existing mains using proper fittings and in a manner acceptable to the Engineer.
B. Expose existing mains at connection points 5 days prior to making connections to determine elevation, verify type of pipe, confirm outside diameter of pipe, and identify type of restraints existing. Backfill test excavation or properly plate and maintain until final connection is complete.
C. No cut-ins or connections to existing mains shall be made unless at least 48 hours' notice is given to the Owner.
D. Plan all connecting work to reduce number of shutoffs.
E. Two days prior to shutting valves on existing lines, notify all affected property owners and the Owner of such shutoff.
F. Keep shutoff time to a minimum and do at off-peak hours.
G. A representative of the Owner will operate existing valves. Contractor shall not operate existing valves.
H. The Owner provides no guarantee or assumes no responsibility for any delay occasioned by special requirements or conditions which must be met in making connections including inability of existing valves to properly close.
I. Take extreme care in making connections to prevent contamination of existing mains.

3.7 TRENCHES

A. Trenches for the water mains shall be constructed in accordance with EARTHWORK FOR UTILITIES.

3.8 LAYING PIPE

A. Pipe, fittings, and valves shall be carefully handled and lowered into trench. Ends of pipe shall abut against each other in such manner that there shall be no shoulder or unevenness on the outside of main. In no case shall the water main have a cover of less than four and one half (4-1/2) feet.
B. Special care shall be taken to insure that the pipes are well bedded on a solid foundation, and any defects due to settlement shall be made good by Contractor at his own expense. Special precautions shall be exercised to prevent any pipe from resting on rock.

C. Proper and suitable tools and appliances for the safe and convenient handling and laying of pipes and fittings shall be used. Great care shall be taken to prevent pipe lining and coating from being damaged and any lining or coating damaged in any way shall be repaired by Contractor.
D. Pipes and fittings shall be thoroughly cleaned before they are laid and shall be kept clean until acceptance of completed work. Each length of pipe or fitting in water mains shall, just before being lowered into trench, be placed on blocks or other supports and the whole internal surface thoroughly cleaned out. If the Engineer determines that the pipe or valve is still not sufficiently clean, the Contractor shall swab out the interior with a solution of

chloride in proportion of three (3) ounces per gallon of water by means of a mop mounted on a long handle.

E. Solution shall be made up fresh daily and any left over at the end of day shall be wasted. Pipe or fitting, after being thoroughly swabbed out, shall then be carefully lowered into trench so as to exclude dirt and other foreign substances, and after it has been "homed," ends shall be kept closed with a tight stopper until the next length is laid. At close of work each day end of pipe line shall be tightly closed with a pneumatic air expansion stopper so that no dirt or other foreign substances may enter line, and this stopper shall be kept in place until pipe laying is again resumed.

F. Whenever a pipe requires cutting to fit in line or to bring it to required location, work shall be done in satisfactory manner so as to leave a smooth end and without extra compensation.

G. No springing of bell and spigot joints to effect a change in direction will be allowed.

3.9 JOINTS

A. All joints shall be made with specified joint, installed in strict accord with manufacturer's instructions by workmen skilled in this type of work. Joints shall be "Tyton" or "TR-Flex" or approved equal, as indicated.

3.10 JOINT RESTRAINTS

A. Joint restraints shall be made at all pipe joints as specified herein and detailed on the drawings. TR Flex restrained joints or equal, and Thrust Blocks at all changes of alignment or grade.

B. All fittings at valves, T's, crosses,, etc shall be restrained mechanical joints **MEGALUG** with Mega-Bond Coating System as manufactured by EBAA Iron, Inc., or as approved, or with a working pressure of at least 250 psi and a minimum safety factor of 2:1.

3.5 BLOCKING

A. In setting pipe, fittings, etc., such masonry blocking and wedges as may be required shall be used. Blocking and wedges shall be of such material and dimensions as may be necessary to support pipe, fittings, etc., properly. Blocking shall be placed immediately back of each bell before the joint is made. All valves shall be supported as indicated or as specified by Engineer. No wood blocking will be allowed to remain in the trench.

3.6 DEFECTIVE WORK

A. Any defective work shall be replaced or repaired by Contractor at his own expense. Any leaks occurring after conditional acceptance but before final acceptance due to either blown joints or cracked pipe or fittings shall be repaired by Contractor at his own expense. When pipe or fittings are damaged in any respect they shall be replaced by new at expense of the Contractor. If any of the above repair work is done by the Owner the actual cost of replacing such materials and making such installations will be deducted from any amount of money retained by Owner.

3.7 AS-BUILTS

A. Contractor shall provide full as-built drawings with dimensions, swing ties, changes, etc. prior to final acceptance by HCA.

PART 4 - DISINFECTION AND TESTING

4.1 TESTING

A. The water main and appurtenances installed under this Section of the Specifications shall be tested in accordance with ANSI/AWWA C600 (latest issue) "Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances," Section 4 - "Hydrostatic Testing."

B. The water mains installed under this Section of the Specifications will be permitted a leakage allowance equal to that specified under the above-referenced Section.
C. The system working pressure at the point of testing shall be 150 psi with a minimum system test pressure of 200 psi at highest point. The test pressure shall not be less than 1.5 times the working pressure at the highest point along the test. Test pressures under 200psi must be pre-approved by HCA.
D. The Contractor shall use the latest issue of C600 when performing the pressure test.

4.2 DISINFECTION

A. Upon completion of the newly installed water system and appurtenances under this Section and after the system has satisfactorily passed the pressure test, including all necessary repairs, the pipe shall be disinfected according to the instructions listed in AWWA C651, "Disinfecting Water Mains," of the latest issue.

END OF SECTION

CONCRETE

PART 1 - GENERAL

1.1 SCOPE

A. This Section specifies cast-in place concrete including formwork, reinforcing, mix design, placement procedures, and finishes.

B. Cast-in-place concrete includes the following:

1. Foundations and footings.
2. Slabs-on-grade.
3. Retaining walls.

Provide all labor, material and equipment to furnish and install all concrete as shown on the Drawings and specified herein.

1.2 APPLICABLE SPECIFICATIONS

A. The Contractor shall follow the practices and standards of the following American Concrete Institute Specifications which are made part of this specification:

1. ACI-214, "Recommended Practice for Elevation of Compression Test Results of Field Concrete"
2. ACI-304, "Recommended Practice for Measuring, Mixing and Placing Concrete"
3. ACI-305, "Recommended Practice for Hot Weather Concrete"
4. ACI-306, "Recommended Practice for Cold Weather Concrete"
5. ACI-613, "Recommended Practice for Selecting Proportions for Concrete"

B. ASTM C150, "Specification for Portland Cement"

C. ASTM C33, "Specification for Concrete Aggregates"

D. ASTM A615, "Specification for Deformed Billet Steel Bars for Concrete Reinforcement"

1.3 SUBMITTALS

A. All submittals shall be in accordance with this section.

Submittals shall include, but also not be limited to, the following:

1. Type and brand of cement used
2. Design mix
3. Delivery tickets

B. General: Submit the following:

1. Shop drawings for reinforcement detailing fabrication, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual for Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bend bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.

2. Laboratory test reports for concrete materials and mix design test.
3. Material certificates in lieu of material laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings".
2. ACI 318, "Building Code Requirements for Reinforced Concrete".
3. Concrete Reinforcing Steel Institute (CRS) "Manual of Standard Practice".

B. Concrete Testing Service: Engage a testing agency acceptable to Engineer to perform material evaluation tests and to design concrete mixes.

C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

1.5 CLASS OF CONCRETE

Use Class “A” for the following items:

A. Concrete Cradle
B. Concrete Encasement
C. Concrete for Miscellaneous Uses

Use Class AA for the following:

A. All foundations and walls.

Use Class “AAA” for all floors.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement shall be an acceptable brand of Portland Cement, ASTM C150, Type I. In the event field conditions require and the Engineer finds it acceptable, a high-early strength Portland Cement, Type III may be used. Only one brand of cement shall be used in this work.

B. Water shall be clean, free from organic or vegetable matter, acid, alkali, or other injurious elements.

C. Fine Aggregate shall be clean hard natural sand or manufactured sand or a combination of both and shall conform to ASTM C33.

D. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptance

material. Provide lumber dressed on at least two edges and one side for a tight fit.

E. Form Release Agent: Provide commercial formulation form release agent with a maximum 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

F. Forms Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.

Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

G. Coarse Aggregate shall be hard, durable, uncoated crushed stone, gravel or air cooled blast-furnace slag conforming to ASTM C33. Maximum size of coarse aggregate shall not be larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear distance between reinforcing bars, whichever is least. In no case shall the maximum size exceed 1-1/2 inches.

H. All reinforcing bars shall conform to ASTM A615 Grade 60.

I. Wire for fabrication of the welded wire fabric shall conform to ASTM A82.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

C. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in space. Use wire bar-type supports complying with CRSI specifications.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type 1.

Use one brand of cement throughout project unless otherwise acceptable to Engineer.

B. Fly Ash: ASTM C 618, Type F.

C. Normal-Weight Aggregate: ASTM C 33 and as specified. Provide aggregates from a single source of exposed concrete.

1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Engineer.

D. Water: Potable.

E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to:

a. Air-Tite, Cormix Construction Chemicals.
b. Air-Mix or Perma-Air, Euclid Chemical Co.
c. Darex AEA or Daravair, W.R. Grace & Co.
d. MB-VR or Micro-Air, Master Builders, Inc.
e. Sealtight AEA, W.R. Meadows, Inc.
f. Sika AER, Sika Corp.

G. Water-Reducing Admixture: ASTM C 494, Type A.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Chemtard, ChemMasters Corp.
b. PSI N, Cormix Construction Chemicals.
c. Eucon WR-75, Euclid Chemical Co.
d. WRDA, W.R. Grace & Co.
e. Pozzolith Normal or Polyhead, Master Builders, Inc.
f. Metco W.R., Metalcrete Industries.
g. Prokrete-N, Prokrete Industries.
h. Plastocrete 161, Sika Corp.

H. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Super P, Anti-Hydro Co., Inc.
b. Cormix 200, Cormix Construction Chemicals.
c. Eucon 37, Euclid Chemical Co.
d. WRDA 19 or Daracem, W.R. Grace & Co.
e. Rheobuild or Polyheed, Master Builders, Inc.
f. Superslump, Metalcrete Industries.
g. PSPL, Prokrete Industries.
h. Sikament 300, Sika Corp.

I. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Q-Set, Conspec Marketing & Manufacturing Co.
b. Lubricon NCA, Cormix Construction Chemicals.
c. Accelguard 80, Euclid Chemical Co.
d. Daraset, W.R. Grace & Co.
e. Pozzutec 20, Master Builders, Inc.

f. Accel-Set, Metalcrete Industries.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. PSI-R Plus,Cormix Construction Chemicals.
b. Eucon Retarder 75, Euclid Chemical Co.
c. Daratard 17, W.R. Grace & Co.
d. Pozzolith R, Master Builders, Inc.
e. Protard, Prodrete Industries.
f. Plastiment, Sika Corporation.

2.4 RELATED MATERIALS

A. Absorptive Cover: Surlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.
4. Burlap

C. Liquid Membrane-Forming Curling Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type 1, Class A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.

1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 mg per liter.

2. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. A-H 3 Way Sealer, Anti-Hydro Co., Inc.
b. Spartan-Cote, The Burke Co.
c. Conspec #1, Conspec Marketing & Mfg. Co.
d. Sealco 309, Cornix Construction Chemicals.
e. Day-Chem Cure and Seal Dayton Superior Corp.
f. Eucocure, Euclid Chemical Co.
g. L&M Cure R, L&M Construction Chemicals, Inc.
h. Horn Clear Seal, A.C. Horn, Inc.
i. Masterkure, Master Builders, Inc.
j. CS-309, W.R. Meadows, Inc.
k. Seal N Kure, Metalcrete Industries.
l. Kure-N-Seal, Sonneborn-Chemrex.
m. Stontop CS2, Stonhard, Inc.

D. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type 1, Class B.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Highseal, Conspec Marketing and Mfg. Co.
b. Sealco - VOC, Cormix Construction Chemicals.
c. Safe Cure and Seal, Dayton Superior Corp.
d. Aqua-Cure, Euclid Chemical Co.
e. Masterkure 100W, Master Builders, Inc.
f. Vocomp-20, W.R. Meadows, Inc.
g. Metcure, Metalcrete Industries.
h. Stontop CS1, Stonhard, Inc.

E. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Aquafilm, Conspec Marketing & Mfg. Co.
b. Eucobar, Euclid Chemical Co.
c. E-Con, L&M Construction Chemicals, Inc.
d. Confilm, Master Builders, Inc.
e. Waterhold, Metalcrete Industries.

F. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for application from 1 inch thick to feathered edges.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. K-15, Ardex, Inc.
b. Self-Leveling Wear Topping, W.R. Bonsal Co.
c. Conflow, Conspec Marketing & Mfg. Co.
d. Corlevel, Cormix Construction Chemicals.
e. LevelLayer II, Dayton Superior Corp.
f. Flo-Top, Euclid Chemical Co.
g. Gyp-Crete, Gyp-Crete Corp.
h. Levelex, L&M Construction Chemicals, Inc.
i. Underlayment 110, Master Builders, Inc.
j. Stoncrete UL1, Stonhard, Inc.
k. Concrete Top, Symons Corp.
l. Thoro Underlayment Selt-Leveling, Thoro System Products.

G. Bonding Agent: Polyvinyl acetate or acrylic base.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. Polyvinyl Acetate (Interior Only):

1) Superior Concrete Border, Dayton Superior Corp.
2) Euco Weld, Euclid Chemicals Co.
3) Weld-Crete, Larsen Products Corp.
4) Everweld, L&M Construction Chemicals, Inc.
5) Herculox, Metalcrete Industries.
6) Ready Bond, Symons Corp.

b. Acrylic or Styrene Butadiene:

1) Acrylic Bondcrete, The Burke Co.
2) Strongbond, Conspec Marketing & Mfg. Co.
3) Day-Chem Ad Bond, Dayton Superior Corp.
4) SBR Latex, Euclid Chemical Co.
5) Daraweld C, W.R. Chemical & Co.
6) Hornweld, A.C. Horn, Inc.
7) Everbond, L&M Construction Chemicals, Inc.
8) Acryl-Set, Master Builders Inc.
9) Intralok, W. R. Meadows, Inc.
10) Acrylpave, Metalcrete Industries
11) Sonocrete, Conneborn-Chemtrex.
12) Stonlock LB2, Stonhard, Inc.
13) Strong Bond, Symons Corp.

H. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

1. Burk Epoxy M.V., The Burke Co.
2. Spec-Bond 100, Conspec Marketing and Mfg. Co.
3. Resi-Bond (J-58), Dayton Superior.
4. Euco Epoxy System #452 or #620, Euclid Chemical Co.
5. Epoxtite Binder 2390, A.C. Horn, Inc.
6. Epabond, L&M Construction Chemicals, Inc.
7. Concresive Standard Liquid, Master Builders, Inc.
8. Rezi-Weld 1000, W.R. Meadows, Inc.
9. Metro Hi-Mod Epoxy, Metalcrete Industries.
10. Sikadur 32 Hi-Mod, Sika Corp.
11. Stonset LV5, Stonhard, Inc.
12. R-600 Series, Symons Corp.

2.5 PROPORTIONING AND DESIGNING MIXES

A. Concrete mix shall have a consistency enabling it to be readily worked into all corners of the form and around all reinforcing by usual methods of placing and consolidating without permitting segregation or excessive free water.

B. All concrete on project shall be air-entrained, and the air content shall be 5% $\pm$ 1%.

C. Concrete mix shall be proportioned by an acceptable independent testing and/or inspection laboratory at the Contractor's expense. The design shall provide the following minimum 28 day compressive strengths:

D. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix design.

Limit use of fly ash to not exceed 25 percent of cement content by weight.

E. Design mixes to provide normal concrete with the following properties as indicated on drawings and schedules:

3000-psi (foundations, foundation walls, and retaining walls) and 4000-psi (slabs, 28-day compressive strength; water-cement ratio, 0.44 maximum (non-air-entrained), 0.35 maximum (air-entrained).

F. Water-Cement Ratio: Provide concrete for the following conditions with maximum water-cement (W/C) ratios as follows:

1. Subjected to freezing and thawing: W/C 0.45.
2. Subjected to deicers/watertight: W/C 0.40.
3. Subjected to brackish water, salt spray, or deicers: W/C 0.40.

G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
2. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.
3. Concrete containing high-range water-reducing admixture (super plasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3 inch slump concrete.
4. Other concrete: Not more than 4 inches.

H. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in Work.

Class B Concrete - 3000 psi

Regardless of the strengths shown by testing, all Class B concrete shall have a maximum water cement ratio of 6 gallons per sack of cement and a minimum cement factor of 5 sacks per cubic yard of concrete.

The slump of the concrete mix shall be 4 inches.

Concrete design mix shall be submitted to the Engineer for review before work commences. No concrete shall be placed until the Engineer has reviewed and accepted the design mix.

2.6 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (super plasticizer) in concrete, as required, for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F (10 degrees C).

C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.

D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of

placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:

1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure;

    a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) for 1-1/2 inch maximum aggregate.
    b. 4.5 percent (moderate exposure); 6.0 percent (severe exposure) for 1 inch maximum aggregate.
    c. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4 inch maximum aggregate.
    d. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) for 1/2 inch maximum aggregate.

2. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent air.

E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.3 NON-SHRINK GROUT

Non-Shrink, Non-Metallic Grout shall be "Sika Grout 212" by Sika Corporation, Lyndhurst, NJ, or equal.

The epoxy compound shall be "Sikadur 32, Hi-Mod" by Sika Corporation, Lyndhurst, NJ.

2.4 GROUT

Grout shall be a Portland Cement Grout made from Type 2 cement, sand and 3/8 inch crushed stone plus a water reducer. Mix shall be designed for a 28 day strength of 4000 psi with a minimum cement content of 700 pounds per cubic yard, and a slump of four (4) inches.

PART 3 - INSTALLATION

3.1 DELIVERY OF CONCRETE

A delivery ticket shall be submitted with each batch at the time of delivery. Failure to render such ticket to the Contractor's Job Superintendent shall automatically be cause for rejection of the concrete. The delivery ticket shall show the following:

A. Amount of aggregate water

B. Amount of batch water

C. Quantities of sand, stone and cement

D. Design strength

E. Time that truck left batch plant

The Contractor's Job Superintendent shall write on the back of the delivery ticket:

A. The time of arrival of the truck mixer on the site

B. The time of deposit of the concrete from the truck

C. The place of deposit of the concrete

The completed delivery ticket shall be delivered to the Engineer. Failure to deliver such completed ticket to the Engineer will be cause for the Engineer to reject the deposited concrete at any time and cause it to be removed and replaced at the Contractor's expense.

No concrete shall be deposited on the job when it has contained its mix water longer than 60 minutes.

3.2 PLACING CONCRETE

A. Before placing concrete, all construction debris, water and ice shall be removed from the places to be occupied by the concrete.

Rock surfaces upon which concrete is to be placed shall be level, free from oil, water, mud, loose semi-detached or unsound rock fragments and rough enough to assure bond with concrete.

Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete", and as specified.

Where reinforcing bars are required, said bars shall be securely tied to prevent displacement during the pouring operation.

Deposit concrete continuously or in layers of such thickness that new concrete will be placed on concrete that has not hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation as its final location.

B. Placing Concrete Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding and tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

C. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.

2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows.

3. Maintain reinforcing in proper position on chairs during concrete placement.

D. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

E. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

F. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Engineer.

3.3 CONCRETE MIXING

A. Job Site Mixing: Mix concrete materials in appropriate drum-type batch machine mixer. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part is released. For mixers of capacity larger than 1 cu. yd. increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd.

Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

B. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and deliver time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C) reduce mixing and delivery time to 60 minutes.

C. Concrete, when deposited, shall have a temperature ranging between a minimum of 50° F. and a maximum of 90° F.

D. When the temperature of the surrounding air is below 40° F. or above 90° F., concreting shall be done in accordance with the recommendations noted in ACI-306 and ACI-305 respectively.

3.4 GROUTING

Grout shall be installed in accordance with ACI 302.

3.5 PROTECTION OF NEW WORK

All freshly placed concrete shall be adequately protected from mechanical injury or by action of the elements until such time as the concrete is thoroughly set.

3.6 CONCRETE CURING AND PROTECTION

A. Curing shall be started immediately upon completion of the finishing operation. Curing shall continue uninterrupted for a minimum period of 14 days unless a longer period is hereinafter specified. Rapid drying upon completion of the curing period shall be prevented. At no time during the curing period shall the temperature of the concrete be permitted to drop below 40° F.

B. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

C. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less that 7 days.

D. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture retaining cover curing, or by combining these methods, as specified.

E. Provide moisture curing by the following methods:

1. Keep concrete surface continuously wet by covering with water.

2. Use continuous water-fog spray.

3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.

F. Provide moisture-retaining cover curing as follows:

Cover concrete surfaces with moisture-retaining for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

G. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:

1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

H. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

I. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.7 DEFECTIVE CONCRETE

Defective concrete is defined as concrete in place which does not conform to strength, shapes, alignments and/or elevations as shown on the Drawings.

All defective concrete shall be removed and replaced in a manner meeting with the Engineer's satisfaction.

PART 4 - EXECUTION

4.1 GENERAL

Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

4.2 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Engineer.

D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A tolerances for concrete surfaces exposed to view.

2. Provide Class C tolerances for other concrete surfaces.

G. Concrete shall be deposited in approximately horizontal layers not to exceed 18 inches in thickness to avoid flowing.

H. Falling concrete shall be closely confined in a drop chute of the proper size to within two or three feet of the place of deposit in the forms and the final drop must be vertical to avoid segregation of aggregates. In no case shall concrete be deposited from a height that will cause separation of the aggregates.

I. Concrete shall be mixed in such quantities as required for immediate use and shall be placed while fresh before loss of slump occurs. Retempering by adding water to restore slump lost during excessive mixing or due to too long a lapse of time since initial mixing will not be permitted.

J. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

K. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.

L. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

M. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

N. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

O. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, dust, dirt or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

4.3 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Engineer.

B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip replacements.

C. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

D. Insolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

E. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depths or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.

1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

3. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

4.4 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Install dovetail anchor slots in concrete structures as indicated on drawings.

C. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-ff templates or compacting-type screeds.

4.5 PREPARING FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.

Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

4.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, damp proofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that have been received smooth-form finish treatment.

1. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.

2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

4.7 MONOLITHIC SLAB FINISHES

Trowel Finish: Apply a trowel-finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.

After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over the surface. Consolidate concrete

surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) (floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.

4.8 MISCELLANEOUS CONCRETE ITEMS

Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

4.9 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports and as specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Engineer.

D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

4.10 SHORES AND SUPPORTS

A. General: Comply with ACI 347 for shoring and reshoring in multistory construction, and as specified.

B. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.

4.11 REMOVING FORMS

A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine

potential compressive strength of in-place concrete by testing, field-cured specimens representative of concrete location or members.

C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

4.12 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces.

4.13 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Engineer.

B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.

1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.

2. For surfaces exposed to view, blend white portland cement and standard cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surfaces, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with a dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

Repair concealed form surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repair Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete

durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Engineer.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Removable defective areas with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

4.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: The Contractor will employ a testing agency to perform tests and to submit test reports.

B. Sampling and testing for quality control during concrete placement may include the following, as directed by Engineer.

Sampling Fresh Concrete: ASTM C 172, except modified for slumps to comply with ASTM C 94.

a. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.

b. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

C. Test results will be reported in writing to Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

E. Additional Tests: The testing agency will make additional tests in place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

SUBMITTALS

PART 1 - GENERAL

1.1 SCHEDULES

The Contractor shall be responsible for preparing a Progress or Work Schedule for the entire project and clearly indicate a timeline for water main installation.

1.2 SHOP DRAWINGS

The Contractor shall process the Shop Drawings required by his Contract to the Owner Engineer and upon their review and acceptance submit them to HCA for approval. Owner/Contracotr shall be responsible for their timely submission.

Any proposed deviations/substitutions from that specified shall be clearly noted on the cover letter transmitting the shop drawing. Failure to so note will be cause for rejection of equipment, materials, etc., after installation.

All submissions shall be marked with the Specification Section Number containing the item submitted for review.

Revised shop drawings submitted for review shall be marked "RESUBMISSION."

Contractor shall submit shop drawings for approval as per the specifications to include as a minimum sufficient detail for pipe, valves, gates, seed, fittings, bedding, and all other relevant construction materials required to complete the water main installation and as may be requested and or required by HCA.

1.3 CONSTRUCTION PHOTOGRAPHS

The Contractor shall be responsible for daily construction progress photographs and development of an electronic photo file documentary. At a minimum, contractor's photographs shall be taken on a regular daily schedule. The Contractor shall save each phot file by the location taken.

1.4 SUBMITTAL PROCEDURES

All submittals shall be delivered first to the Owner/Engineer and then to HCA.

The Engineer will screen the submittals to ensure that they have been properly certified and identified by the Contractor. If they are submitted properly, the items will be processed for review.

The processed submittals will be returned to the Contractor.

PART 2 - SCHEDULE

2.1 PREPARATION

The Contractor shall prepare a Progress or Work Schedule for the entire Project showing the order in which he proposes to carry on his work and salient features, including submissions of shop drawings and samples and procurement of materials to meet date of completion.

Each activity in the Progress or Work Schedule shall be identified and a time for the performance of such activity indicated. Each activity shall be preceded by all work that must be accomplished prior to that activity. All abbreviations, codes and/or symbols used shall be described on the Schedule.

The Progress or Work Schedule shall be a time line bar chart document. The schedule shall indicate start date, end date, and time duration of each task. Schedule shall start from date of Notice to Proceed and extend for the duration of the Contract. The schedule shall have no single task which exceeds ten (10) calendar days. Installation of pipe shall be broken down by station into ten-day maximum durations; designate starting and ending stations. The schedule must conform to Contract documents. The schedule must be submitted and approved by the Engineer and accepted by HCA prior to start of construction. At a minimum the schedule shall include but not be limited to the following items (this list may be modified by the Engineer for each specific contract):

1. Mobilization
2. Bonding and Permit Acquisition
3. Clearing & Grubbing
4. Soil & Erosion Control
5. Ties to Existing Water Mains
6. Pipe Installation (10-day duration)
7. Valve Installation
8. Seeding/Sodding
9. Final Restoration
10. Cleanup & Closeout
11. Shop Drawing Submittals
12. Equipment Procurement
13. Equipment/Material Delivery

In addition to the schedule described above, the Contractor shall submit a schedule and list all shop drawings he proposes to submit which shall include the following:

Specification Section Number

1. Description of all items within section.
2. Approximate date of each submittal.

2.2 SUBMISSION

Submit three (3) copies of Schedule to the Engineer for review within thirty (30) days after award of Contract. Update and resubmit Schedule monthly thereafter until completion of the work. Updated Schedule shall have completed activities removed or indicated as such. Whenever modifications are made to the Contract which add or delete activities and/or revise time of completion, Schedule shall be revised and resubmitted to the Engineer within ten (10) days after such modification is authorized.

In the event that the Engineer determines the work is behind the approved schedule, the Contractor shall modify his work efforts in the field to bring the project back on schedule. The Contractor, whether or not informed by the Engineer shall through the use of overtime work or by other means, ensure that the project is completed within the Contract time. All overtime required for the contractor to bring the project back on schedule under these circumstances shall be performed at no additional cost to the Owner.

All schedule updates shall be promptly provided to HCA for review and acceptance.

PART 3 - SHOP DRAWINGS

3.1 GENERAL

Shop drawings are defined as drawings, diagrams, illustrations, schedules, performance charts, brochures and other data prepared by the Contractor which illustrate how specific portions of the work shall be fabricated and/or installed.

Shop drawings are not part of the Contract Documents but are a supplementary means of communication to assist in the understanding of what the Contractor proposes to provide and to establish that whatever he intends to install either does or does not conform to the Drawings and Specifications.

In the instance of a request for a substituted item, the Contractor shall verify that it will fit into the space allocated to the originally required item giving due regard to all other trades' requirements. Where modifications to the Contract Documents are proposed, the Contractor must clearly indicate such deviation in writing in his transmittal letter. If the modification and/or substitutions are agreed to by the Engineer, the Contract Documents will be appropriately modified. However, when additional work is required, the Contractor is advised that he must pay the Engineer for redesign to accommodate the revised substitution as well as pay other contractors for extra work required by them for the change. No increase in Owner's construction cost will be allowed.

3.2 CATALOG SHEETS

For standard manufactured items considered by the Engineer as not requiring special Shop Drawings, the Contractor shall submit at least four (4) copies of the manufacturer's catalog sheets showing model numbers and illustrated cuts of the items to be furnished, scale details, sizes, dimensions, performance characteristics, capacities, wiring and control diagrams and all other pertinent information. This information shall be highlighted on all four (4) copies when appropriate. The Engineer will retain three (3) copies and return one (1) to the Contractor submitting the catalog sheets.

3.3 SUBMITTALS

A. Pipe and Appurtenances
B. Valves - Isolation, Air Release, etc.
C. Fire Hydrants

PART 4 - CERTIFICATION AND TESTS

4.1 GENERAL

Two (2) copies of certifications and reports of tests when required under the various sections of the Specifications shall be submitted.

PART 5 - CONSTRUCTION PHOTOGRAPHS

5.1 GENERAL

The Contractor shall provide pre-construction photographs submitted in duplicate of the entire construction area before any work begins.

In addition the Contractor shall provide to the Engineer with copies to HCA, from commencement of the Project through completion of the work, clear, sharp color photographs taken daily or as directed.

Each photograph shall have the following information clearly noted on the picture or in a separate document describing each phot.

A. Date photo was taken and photo number
B. Client/Owner
C. Project Title and Contract number
D. Contractor
E. Location of Photo and relation to plan
F. Description of what is shown on the photo including viewing direction

5.2 NUMBER OF VIEWS

Provide from three to six views for each working crew every month depending on the progress of the Work as directed and selected by the Engineer. In addition, Contractor shall provide enlarged photographs indicating views of the entire length of construction for that particular construction period.

RECORD DOCUMENTS

PART 1 - GENERAL

A. Record Drawings: Comply with the following:

1. Initial submittal: Owner/Applicant shall provide two (2) final sets of water line plans as approved by the Manin Line extension Agreement.
2. Final submittal: Owner/Applicant shall provide two (2) final sets of marked-up record prints of final water line construction as built and approved/accepted by HCA Director of Operations.
3. Number of Copies: Submit copies of record Drawings as follows:

    a. Initial Submittal:

        1) Submit two (2) paper-copy sets of waterline design plans as issued for construction.
        2) Submit a complete set of plans in PDF electronic file format.
        3) Submit design plans in Autocad dwg format georeferenced to Pa State Plane HARN Coordinate System.

    b. Final Submittal:

        1) Submit two (2) paper-copy sets of waterline design plans representing as-built conditions with all changes in red as constructed.
        2) Submit a complete set of plans in PDF electronic file format.
        3) Submit final revised plans in Autocad dwg format georeferenced to Pa State Plane HARN Coordinate System.
        4) Print each drawing, whether or not changes and additional information were recorded.
        5) Final sets must indicate dimensions to water main and to all valves from fixed assets in the field such as telephone poles, buildings, etc.

1.2 RECORD DRAWINGS

A. Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Pipe size and routing.
    i. Locations of concealed internal utilities crossed or within 10 feet from pipeine.
    j. Changes made.
    k. Details not on the original Contract Drawings.
    l. Field records for variable and concealed conditions.
    m. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before final inspection and acceptance by HCA, review marked-up record prints with Contractor. Prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: DWG, Version 2021 Windows operating system.
3. Format: Annotated PDF electronic file with comment function enabled.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

1.3 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.

B. Format: Submit record Specifications as annotated PDF electronic and scanned PDF electronic file(s) of marked-up paper copy of Specifications.

1.4 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

C. Format: Submit record Product Data as annotated PDF electronic file and scanned PDF electronic files of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.5 MISCELLANEOUS RECORD SUBMITTALS

A. 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.

B. Format: Submit miscellaneous record submittals as PDF electronic file and scanned PDF electronic files of marked-up miscellaneous record submittals.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.6 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for HCA as necessary during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017839

SIZE	A	B	C	D	F	G	H	I	J	K	L	M	N	O	P
3	8.50	2.50	8.37	.38	11.50	10	.86	8	N/A	N/A	8.50	N/A	3.09	N/A	N/A
4	9.25	2.50	9.81	.41	13.81	13	.86	9	11	3.50	9.09	10.31	4.02	N/A	N/A
6	10.50	2.50	13	.44	15.25	19	1.00	10.50	12.38	3.50	10.75	11.46	6.06	N/A	N/A
8	11.50	2.50	15.62	.50	20.18	25	1.00	11.50	14	3.75	12.50	13.06	8.06	N/A	N/A
10	14.50	2.50	19.43	.63	25.50	32	1.18	13	14.38	3.88	13.75	14	10.09	N/A	N/A
12	15	2.50	21.12	.69	26.31	37	1.18	14	14.88	3.88	14.50	14.75	12.09	N/A	N/A
14	22	3.50	25.62	.84	35.37	50	1.50	22	N/A	N/A	22	N/A	14.18	N/A	N/A
16	22	3.50	25.62	.84	35.37	50	1.50	16	23	5	19	19 7/32	16.09	28.40	7.95
18**	19.25	3.50	34.25	.97	43.50	62	1.75	19.12	N/A	N/A	19.25	N/A	18.31	N/A	N/A
20**	18.50	3.50	34.25	.97	43.50	62	1.75	19.50	23	5	19	N/A	20.16	30	8.50
24**	28.25	3.50	43.75	1.08	49.50	74	2.00	21.56	30.65	5	24.88	N/A	24.12	38.38	9

**GEAR REDUCTION RECOMMENDED

ITEM NO.	NAME OF PART	QTY. REQ'D	MATERIAL	SPECIFICATION
1	BODY	1	DUCTILE IRON	ASTM A536
2	BONNET	1	DUCTILE IRON	ASTM A536
3 *	GATE, RUBBER COVERED	1	DUCTILE IRON	ASTM A536
4 Δ	STEM (70T, 30Y)	1	MANG. BRONZE	ASTM B584 C865-MOD.
5	STEM NUT	1	BRONZE	ASTM B584 C836
6	OPERATING NUT	1	CAST IRON	ASTM A126 CL. B
8	CARTRIDGE	1	"DELRIN"	DUPONT CO.
9	THRUST WASHER	1	"DELRIN"	DUPONT CO.
10	RETAINER RING	1	"DELRIN"	DUPONT CO.
11	DIRT SEAL	1	RUBBER	SBR ASTM D2000
12	PIN, "SHEARPROOF"	1	STEEL	ZINC PLATED ASTM B633
13	BONNET SEAL	1	RUBBER	NBR ASTM D2000
14	"O"RING (CARTRIDGE)	1	RUBBER	NBR ASTM D2000
15	"O"RING (STEM)	2	RUBBER	NBR ASTM D2000
16	BOLT, HEX HEAD		STN. STL.	ASTM A-276 (18-8)
17	NUT, HEX		STN. STL.	

* 3" GATE MATERIAL IS BRONZE ASTM B584 C836/8345
Δ 14-24 STEM MATERIAL ASTM B584 C86200

LEFT - OPEN

6 OPERATING NUT:
1 11/16"SQ. TOP
1 3/4"SQ. BOTTOM

G=NUMBER OF TURNS TO OPEN

CAST IN RAISED LETTERS
USP
YEAR
D.I.
(BODY OR BONNET)
SIZE
WP
AWWA

"H"=ROOT DIA.
3 THDS/INCH

"N" DIA

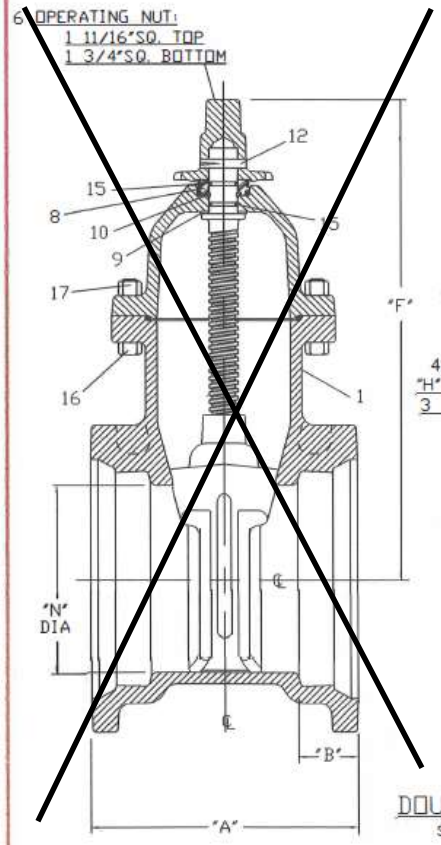
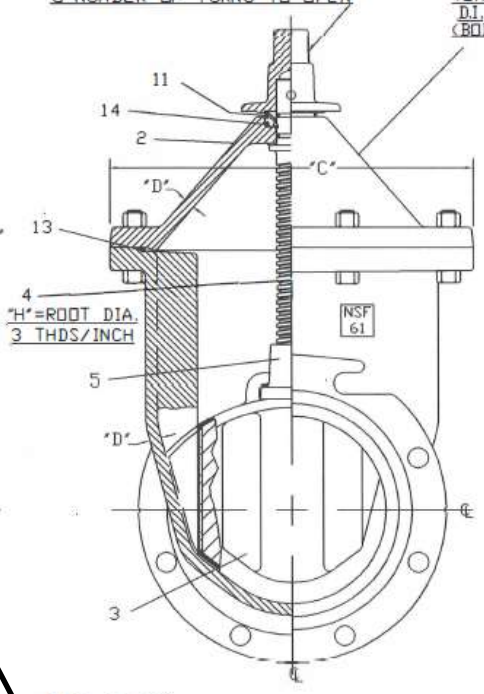


FIG. 5460
DOUBLE MECHANICAL JOINT
SEE NOTE "B", & "C"



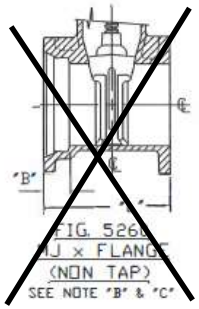


FIG. 5260
MJ x FLANGE
(NON TAP)
SEE NOTE "B" & "C"

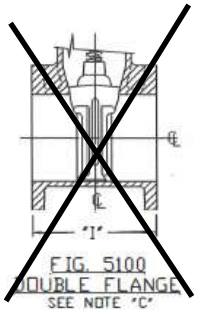


FIG. 5100
DOUBLE FLANGE
SEE NOTE "C"

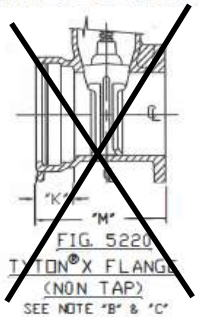


FIG. 5220
TYTON® X FLANGE
(NON TAP)
SEE NOTE "B" & "C"

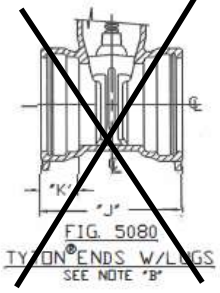


FIG. 5080
TYTON® ENDS W/LUGS
SEE NOTE "B"

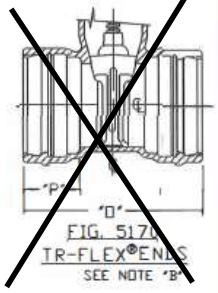


FIG. 5170
TR-FLEX® ENDS
SEE NOTE "B"

NOTE "A": BODY(1) AND BONNET(2) ARE COATED ON ALL SURFACES WITH PERMAFUSE® (FUSION BONDED EPOXY) IN COMPLIANCE WITH AWWA C550 ("HOLIDAY FREE" IF SPECIFIED ON ORDER)

NOTE "B": MECHANICAL JOINT, TR® FLEX, AND TYTON® ENDS PER ANSI/AWWA C111/A21.11

NOTE "C": FLANGES ARE CLASS 125 PER ANSI/AWWA C115/A21.15. USE ONLY U.S.PIPE'S FLANGETYTE® GASKET, 1/8"THICK FULL FACE, OR RING GASKET PER ANSI/AWWA C110/A21.10

NOTE "D": 3"-16"VALVES RATED FOR 250 PSI WORKING AND 500 PSI TEST PRESSURE. STANDARD 18"-24"VALVES ARE RATED FOR 150 PSI WP AND 300 PSI TEST.

ALL VALVES ARE NSF-61 LISTED

DRAWN	DATE	UNITED STATES PIPE AND FOUNDRY CO.
KLC	4/7/00	CHATTANOOGA VALVE & FITTINGS
CHECKED	DATE	VALVE & HYDRANT DEPARTMENT
DJD	4/7/00	CHATTANOOGA, TENNESSEE 37408
APPROVED	DATE	3"-24" METROSEAL® 250
JJP	4-7-00	RESILIENT SEATED GATE VALVES
REV.	DATE	PER ANSI/AWWA C509
		VARIOUS ENDS SHOWN

MASS. WATER RESOURCE AUTHORITY | DWG. NO. 860524

PAVING

PART 1 - GENERAL

1.1 SCOPE

A. Provide all labor, material and equipment to furnish and install all repaving in areas of paving disturbed or damaged by the construction work and as indicated in the field or directed by HCA or its designee.

B. All work shall be in accordance with all Contract Documents and/or as specified herein.

C. The Contractor and Engineer shall, prior to construction, make a visual reconnaissance of all paved areas, determining the actual condition of the paving. Notes, photographs, etc., shall be made by the contractor and provided as supporting documents with each invoice. Coordination of inspection shall be the responsibility of the Contractor.

D. If during the construction work the Contractor damages existing paving outside the limits of paving, even though he previously determined that he would not damage the paving, it shall be his responsibility to replace the paving outside the paving limits to its original condition. No additional compensation shall be provided for replacing the paving in kind outside the limits of paving.

E. It shall be the Contractor's responsibility to comply with all applicable PENNDOT specifications.

1.2 QUALIFICATIONS

A. Applicable Specifications

Commonwealth of Pennsylvania, Department of Transportation Specifications, Pub. 408.

Commonwealth of Pennsylvania, Department of Transportation, "Occupancy of Highways by Utilities," 67 PA Code Chapter 459.

Commonwealth of Pennsylvania, Department of Transportation, "Bituminous Concrete Mixtures, Design Procedures and Specifications For Special Bituminous Mixtures," Bulletin 27.

Commonwealth of Pennsylvania, Department of Transportation, "Specifications for Bituminous Materials," Bulletin 25.

B. Qualifications

Contractor shall have a minimum of five (5) years' experience in paving and must own, lease, and use the proper equipment as required by Pennsylvania Department of Transportation. It is the intent to enter into this agreement directly with the contractor completing the repair work. General Contractors who sub-contract the excavation and/or paving will not be accepted due to the required response time guarantee and potential delay due to other commitments of sub-contractors.

Contractor shall submit certified copies of all insurance coverage as required by this contract and shall immediately notify the HCA of any and all changes to coverage or carrier.

By submitting a bid for this annual contract contractor acknowledges that he will mobilize

and respond to each repair as directed within three (3) business days or less of verbal or written notice to proceed. The HCA may, solely at its option and discretion, submit a claim on the contractor's annual performance bond for 10% of the amount of each repair not addressed within three (3) business days.

1.3 NOTIFICATIONS

The Contractor shall be responsible to notify all companies and authorities that have existing utilities in the street repair area to raise their valve boxes, manholes or other affected system appurtenances as required and if necessary. .

The Contractor shall be responsible to meet a representative of HCA on site of each repair and identify the limits each repair and agree on final quantity. Limits of repair shall be clearly marked by a white painted outline with the PaOne Call limits clearly identified. Contractor shall then be solely responsible for immediately completing the PaOne Call notification for each street repair.

1.4 SUBMITTALS

Contractor shall submit complete list of all suppliers for acceptance by the HCA. Contractor shall have a minimum of two (2) sources approved. Shop drawings of all proposed materials showing compliance with PaDot standards shall be submitted for approval from each supplier. Certified backfill "proctor" and "Sieve/gradation" analysis shall be provide with maximum density estimates.

Contractor shall submit for the HCA/Engineer's review all hot mix paving designs and the type of "Winter Mix" temporary repaving that will be used during the winter months.

Contractor shall provide two (2) originals of all required insurances. Contractor shall at the time of request for final payment provide a twelve (12) month paving maintenance/guarantee bond for all final pavement restoration (excluding any temporary pave).

Contractor shall submit delivery tickets to HCA\Owner or designated inspector daily. Delivery must be directly from the plant, no off site or temporarily stored material shall be allowed. A copy of all delivery slips shall be included with any application for reimbursement. Payment will not be considered without delivery slips.

Contractor/Bidders shall base their quote on the PennDot's Zone 1 (Districts 3-0, 4-0, 5-0, 6-0, and 8-0) posted monthly index price for asphalt cement (PG 64-22) using price data obtained on the due date of the bids. The Owner shall waive the 100 ton provision limiting application of this adjustment. Bidders shall submit certification of the posted index price with their bid. Each application for payment shall include the certification of adjustment calculations in accordance with Pub 408 section 110.04 based on tons placed.

1.5 DEFINITIONS

The word "shall" is always mandatory and not merely directory.

Whenever in this Specification the words "directed", "required", "permitted", "ordered", "designated", "prescribed" or words of the like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the HCA/Owner is intended; and similarly, the words "approved", "acceptable" or "satisfactory" or words of like import shall mean approved by, acceptable to or satisfactory to the HCA/Owner.

The following words, terms and phrases when used in this Specification shall have the meaning ascribed to them in this section, except where the context clearly indicates a different meaning:

APPLICATION FOR A PAVE CUT PERMIT - A form provided to Contractor by the Municipality noting pertinent data for the purposes of inspection and control by the Municipality and

constituting a receipt for services performed by the Municipality.

MUNICIPALITY - The Municipality in which the road repair is located. HCA may elect to authorize work in any location of new or proposed water utilities including but not limited to: City of Hazleton, Hazle Township, West Hazleton Borough, Beaver Meadows, Mahanoy Township, Jeddo Borough, Freeland Borough, Banks Township, Foster Township, Delano Township, Packer Township, Lusanne Township, and Butler Township.

MUNICIPALITY PAVE CUT LOG - A chronological record of pave cuts as reported to the Municipality, containing pertinent data as required by the Municipality for the purposes of inspection and control.

CONTRACTOR – Any individual person, entity, organization, corporation, limited liability company or partnership, whether in business for profit or not, hired, contracted or merely performing a job, supplying labor and materials and providing staff if needed to also include any general, independent and approved sub-contractor.

EMERGENCY REPAIR - Work necessitated by the rupture or sudden malfunction of existing underground facilities and so declared by the HCA/Owner.

EXCAVATION – The act or process of excavating by the cutting, scooping, removing or digging out of any material whatsoever.

FACILITIES - All the plant and equipment of a public utility, including all tangible and intangible real and personal property without limitations and any and all means and instrumentalities in any manner owned, operated, leased, licensed, controlled, furnished or supplied for, by or in connection with the business of any public utility.

INSPECTION - A careful or critical investigation not necessarily confined to optical observation but is understood to embrace tests and examination for the purpose of ascertaining quality and compliance as prescribed in this specification and discovering and correcting errors.

MUNICIPAL CORPORATION - All cities, municipalities, towns, townships or counties of this Commonwealth and also any public corporation, authority or body whatsoever created or organized under any law of this Commonwealth for the purpose of rendering any service similar to that of a public utility.

PAVEMENTS - Riding surfaces of machine-laid asphalt over a base of concrete, brick, Belgian block, crushed stone, bituminous concrete or oil and stone. Any hard surface structured in such a way to form the surface of a street as defined herein to also include the shoulder.

PENNDOT - The Commonwealth of Pennsylvania Department of Transportation.

PERSON - Individuals, partnerships or associations other than corporations and includes their lessees, assignees, trustees, receivers, executors, administrators or other successors in interest.

PUBLIC UTILITY:

(1) Persons or corporations now or hereafter owning or operating in the Commonwealth equipment or facilities for:
   (a) Producing, generating, transmitting, distributing or furnishing natural or artificial gas, electricity or steam for the production of light, heat or power to or for the public for compensation.
   (b) Diverting, developing, pumping, impounding, distributing or furnishing water to or for the public for compensation.
   (c) Transporting or conveying natural or artificial gas, crude oil, gasoline or

petroleum products by pipe lines or conduit for the public for compensation.

(d) Conveying or transmitting messages or communications by telephone or telegraph to the public for compensation including cable television signals.

(e) Sewage collection, treatment or disposal for the public for compensation.

(2) The term "public utility" shall not include:

(a) Any person or corporation not otherwise a public utility who or which furnishes services only to himself or itself;

(b) Any bona fide cooperative association which furnishes services only to its stockholders or members on a nonprofit basis; or

(c) Any producer of natural gas not engaged in distributing such gas directly to the public for compensation.

SERVICE - Used in this Specification in its broadest and most inclusive sense and includes any and all acts done, rendered or performed and any and all things furnished or supplied and any and all facilities used, furnished or supplied in the performance of their duties under this Specification to their patrons, employees, other public utilities and the public, as well as the interchange of facilities between two (2) or more of them.

SPECIAL PAVEMENT - Riding surfaces of concrete, brick, Belgian block or cobblestone.

STREET - Includes any street, highway, road, lane, court, alley or place of whatever nature, whether dedicated or not, open to the use of the public as a matter of right for purposes of vehicular travel.

UTILITY – Any entity that provides services such as, but not limited to, water, sewer, gas, electricity to members of the public to also include any general, independent, sub-contractor, or any entity included in the definition of Contractor that is performing services on behalf of any utility.

UTILITY RELOCATION/REPAIR - The adjustment, repair, replacement or relocation of utility facilities as required, such as removing or reinstalling the facility, moving or rearranging existing facilities, changing the type of facility and any necessary safety and protective measures, and repair of broken or damage pipe by the HCA/Owner. It shall also mean the construction of a replacement facility functionally equal to the existing facility where necessary for the continuous operation of the utility service, the project economy or sequence of street construction.

WORK - The furnishing of all materials, labor, equipment and other incidentals necessary or convenient to the successful completion of the project and the fulfillment of all duties and obligations imposed by this Specification

1.5 PERMITS

A. PERMIT REQUIRED

Contractor shall notify each municipality where the work is located and shall be responsible for all contractor permits/licenses. Contractor shall be responsible to notify PaDot of all work in PaDot right of way.

B. INSURANCE PROTECTION

The applicant shall protect, defend, indemnify and save harmless the HCA, Owner, Engineer, and Municipality, its officers and/or agents thereof from all claims, suits, actions and proceedings of every nature and description which may be brought against the HCA or Municipality, its officers or agents thereof for or on account of any injuries or damages to persons or public or private property because of any materials or appliances used in the work or

by or on account of improper materials or workmanship or for or on account of any accident or any other act, negligence or omissions of said contractor or his agents, servants or employees, and the Owner shall not in any way be liable therefor during the period of the work progress and the one year guaranty period following the completion of the work.

C. SAFETY PRECAUTIONS

During the progress of the work, the applicant shall provide and maintain such barricades, warning signs and flag persons necessary to prevent accidents to the public and/or adjoining tenants. At a minimum, precautions must include, but should not be limited to, advance warning signs on all approaches to the work, safe crossing for pedestrians with barricades, and flashers on the exposed traffic side of all work at a minimum of 50 foot intervals. All precautions shall be in accordance with the Manual of Uniform Traffic Control Devices as adopted by the United States Department of Transportation Federal Highway Administration, 1971, Part IV, Traffic Controls for Street and Highway Construction and Maintenance Operations. All safety precautions shall be subject to approval by the Municipality.

D. ROAD CLOSING PROHIBITED; LANE CLOSING RESTRICTIONS

No Street in the Municipality may be completely closed to traffic at any time. One (1) lane of traffic must be able to pass unobstructed at all times. Flag persons must be posted at the limits of work at all times to direct traffic through the work area, and all established traffic patterns must be maintained at all times. If all other means of traffic control have been exhausted, the contractor must obtain written approval of the municipality to completely close the road temporarily.

E. **TIME LIMITS FOR COMPLETING WORK**

For small area pave cuts (under 50 feet), the Contractor shall be required to complete the restoration as directed within two (2) days of issuance of the Notice to Proceed and within forty-eight (48) consecutive hours of the initial cut, whichever comes first. Work on long cuts, those over fifty (50) feet in length, shall proceed in a continuous manner from the first cut. All work shall only occur during normal business hours (7 am to 5 pm) Monday thru Friday and excluding any holiday or other day the Municipality is closed.

F. **SCHEDULING**

All excavations shall be commenced and completed by the use of reasonable work force and shall only occur during normal business hours (7 am to 5 pm) Monday thru Friday and shall not occur on any holiday or other day the Municipality is closed. Adequate steel plates installed as per PaDot guidelines shall be required over the excavation while it is not being worked to ensure full traffic flow. The maximum length of the opening in the roadway shall be one hundred (100) feet unless otherwise authorized by the municipality in writing. .

G. REMOVAL OF EXCAVATED MATERIAL; BLOCKING OF HYDRANTS PROHIBITED

All excavated material shall be removed daily at the cessation of work. Contractor shall provide certification of the disposal of all material and written acceptance by the owner of the land receiving the material. All gutters and drainage devices shall be kept clean of all debris and excavated material. Fire hydrants adjacent to the work shall be at all times readily accessible to fire apparatus, and no materials or obstructions shall be placed within fifteen (15) feet of any hydrant.

H. WASTE MATERIAL (EXCAVATED)

Excavated material shall be considered waste and shall be properly disposed and documented by the contractor. In no case shall waste material be left or disposed of at the work site. Complete cleanup and disposal is solely the responsibility of the contractor.

I. EQUIPMENT USED FOR OPENINGS

Power-driven saws or air hammers shall be used on all cuts in Portland cement or asphalt pavements. The full depth cuts must be of sufficient depth to provide a smooth edge. Openings in brick or Belgian block based streets shall be of sufficient width to expose one-half (1/2) row of undisturbed interlocking stone. No pavement busters, such as drop hammers, hoe rams and the like, shall be used in any way.

J. PRESERVATION OF SPECIAL TYPE PAVEMENTS

The removed riding surface of brick, Belgian block or cobblestone, tiles or other special surface shall be preserved at the work site for restoration after the opening has been backfilled.

K. EXCAVATION AND DEWATERING OR SHORING

The contractor shall provide all necessary pumps, dams, drains, ditches, flumes, well points and other means for excluding and removing water from trenches and other parts of the work and for preventing the slopes from sliding or caving. Contractor shall in all cases of dewatering used a properly sized sediment bag on all discharges of dewatering pumps. The contractor shall furnish and employ such stay-bracing, sheeting, shoring, pumps, etc., as may be necessary for the proper completion of work, the protection of property and the safety of the public and employees of the contractor and of the Municipality; all in accordance with the current regulations of the applicable safety code and pertinent local, state or federal ordinances and regulations.

L. RESPONSIBILITY FOR DAMAGES

In the event that a cut is made and, upon inspection, damage to another utility's underground facilities is discovered, it shall be the responsibility of the party making the cut to contact the all concerned pertinent utilities to instruct them to have representatives inspect the condition before any backfilling is begun. The flow of all sewers, drains, gas, house connections, utility lines and laterals and watercourses met with shall be maintained and provided for by the contractor without damage or nuisance to other parties. All existing connections shall be restored at no additional cost to HCA/owner.

PART 2 - PRODUCTS

2.1 MATERIAL FOR BACKFILLING

All work must be completed within the confines of the specifications of the Pennsylvania Department of Transportation (PA DOT) as set forth in 67 Pa. Code, Chapter 459 governing occupancy of highways by utilities and Department of Transportation Design Manual part 5 – Utility Relocation, as well as Section 401.3(f), 305, 421, and 420 of the Pennsylvania Department of Transportation Publication 408. All work areas must be cleanly and neatly saw cut to full depth of existing pave.

The preferred and backfill method is utilizing PA DOT approved flowable concrete backfill. After placement of flowable fill Contractor shall mill and provide steel plate covers for minimum 24 hours curing period prior to placement of final pavement restoration. (No temporary pave would be required). Steel plate covers are to be hot patched and or pinned as required. Saw cut shall be to a depth of one and a half (1½”) or the depth of the existing paving, whichever is greater, for the length of the opening. Use of flowable fill requires only initial saw cut.

2.2 AGGREGATE

The crushed aggregate shall conform to the applicable provisions of Section 703, AGGREGATES, in Commonwealth of Pennsylvania, Department of Transportation Specifications, Publication 408.

2.3 BITUMINOUS MATERIALS

The bituminous materials shall conform to the applicable provisions of Bulletin No. 25 of the

Commonwealth of Pennsylvania, Department of Transportation.

2.4 CONCRETE MATERIALS FOR STREETS

The concrete materials for streets shall conform to the applicable provisions of Section 704, CEMENT CONCRETE, in Commonwealth of Pennsylvania, Department of Transportation Specifications, Publication 408.

PART 3 - EXECUTION

3.1 GENERAL

A. Permanent bituminous paving mixtures shall not be placed between October 31 and April 1 without approval from the Authority.

B. Backfill shall be compacted by means of mechanical rammers, vibrators or by pneumatic tampers. Hand tampers only shall be used around the pipe or structure or as approved by the Owner until a minimum of 18" cover above the pipe is reached. All voids along the sides of the trench, behind sheeting, under bracing or other objects, shall be completely and carefully filled, using such fine materials, hand labor and tools as may be necessary. Backfill shall be placed in layers not to exceed six (6") inches if a tamper or wacker is used or in layers not to exceed twelve (12") inches if approved vibratory compaction equipment is used. All backfill materials shall be compacted to one hundred percent (100%) of the maximum dry density as determined by AASHTO T-99 Method C. Backfill material shall not be allowed to be dropped into the trench from a height greater than five (5) feet from the top of the existing backfill in the trench.

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3.2 PERMANENENT PAVEMENT RESTORATION

A. Permanent pavement restoration shall be required as directed and shall be performed by the Contractor as follows:

The Contractor shall restore all areas disturbed by the work; such restoration shall meet Department of Transportation specifications, for both materials and workmanship. All pavement design shall meet 0.3 to 3 million ESAL's. All existing pavement shall be saw cut back 1'-0" on each side as per sketch attached to this Ordinance labeled "Pavement and Trench Detail", entire work area shall be milled to depth of one and one-half inch (1-1/2"), all edges shall be tack coated prior to any pavement restoration, and all final edges of work shall be sealed.

1. Prior to replacement of the base course, if alternate restoration is used, an additional one (1) foot outside of each edge of the opening shall be saw cut, in a neat straight line, to the top elevation of the existing aggregate subbase or stone base course, and the detached material shall be removed. All existing pavement edges shall be tack coated prior to restoration.

    a. Exposed vertical and horizontal surfaces shall be prepared under Section 401.3(f) of PennDOT Publication 408.

2. The base course shall consist of bituminous concrete meeting the requirements of Section 305 of PennDOT Publication 408. The base course material shall consist of hot mix, hot laid superpave 25.0 mm base material and shall have a minimum depth of five (5) inches or a depth equal to the existing base course, whichever is greater.

3. If required by existing conditions or directed by the Municipality or Owner/HCA,

a binder course shall also be provided consisting of 19.0 mm material meeting the requirements of Section 421 of PennDOT Publication 408. The binder course shall have a minimum depth of two and a half (2½") inches or depth equal to the existing binder course, whichever is greater.

4. If required by existing conditions any rock choke base, brick, or concrete shall be replaced with new 3,000 psi concrete at a depth to match existing and doweled 18" o.c. to any existing concrete as per applicable PA DOT Standard.

5. Wearing Course. Any surface course shall consist of constructing a wearing course of hot-mixed, hot-laid Superpave 9.5 mm wearing course on the above prepared base course to a depth of not less than one and a half (1½"), after compaction. The materials and construction methods shall be in strict accordance with the requirements of Section 409 – "Superpave Mixture Design, Standard and Restricted Performance Specification (RPS) Construction of Plant Mixed HMA Courses" of PA DOT Specifications. The bituminous surface course shall be rolled with a vibratory roller.

B. **Additional restoration**. Additional permanent pavement restoration shall be required and shall be performed by the Contractor in accordance with the contract at no additional cost as follows:

(1) Additional disturbed portions of the street, including but not limited to slopes and appurtenances and structures such as guide rails, curbs, signs, markings, drain pipes, driveways and vegetation, shall be restored by the utility or contractor to a like new condition.

(2) All damaged areas outside of trench installation caused directly or indirectly by work of this Contractor shall be restored in kind.

(3) Aggregate used in a bituminous overlay wearing course shall comply with skid resistance level (SRL) criteria specified in PennDOT Design Manual, Part 2, Chapter 11.

(4) If an opening is made in a bituminous concrete pavement within three (3) feet from the edge of pavement or other longitudinal joint or opening, the surface restoration shall be extended to the edge of pavement and full width of lane. Any restoration adjacent to a curb shall be sealed in accordance with item eight (8) below.

(5) At each end of an overlay, the Contractor shall provide a minimum three (3) foot overlay transition with a diagonal paving notch, under PennDOT Roadway Construction Standard RC-28M, by milling or other authorized method.

(6) The transition areas at each end of an overlay shall follow the contour of the surrounding surface.

(7) When any pavement markings are covered or destroyed by the permitted work, including overlays, they shall be replaced with temporary pavement markings, under PennDOT 203.72 (relating to temporary pavement markings) before opening the disturbed pavement to traffic. When the pavement surface is restored, pavement markings that were covered or destroyed shall be replaced in their former location. All removed road marking shall be replaced in kind after completion of final paving.

(8) Sealing. Restored openings in the pavement or paved shoulder shall be sealed under Section 401.3(j)(3) of PennDOT Publication 408 in the case of bituminous concrete or Section 501.3(n) of PennDOT Publication 408 in the case of cement concrete.

C. **Full Lane Overlay**: If the contractor opens pavement having a bituminous concrete surface and if directed by the Owner/HCA, in addition to the restoration conditions outlined in this Ordinance, contractor shall provide full lane or road width milling to a depth of one and one half (1½") inches and overlay the pavement in accordance with the following conditions (see sketches attached to this ordinance)

(a) When a longitudinal opening as indicated has been made in the pavement, the Contractor shall notch each end, mill and overlay the full width of the traffic lanes in which the opening was made, for a distance of three (3') feet beyond the end of the excavation or sawcut in both directions of the street that was opened.

(b) When one transverse opening has been made, the Contractor shall diagonally notch, mill and overlay the full width of the traffic lanes in which the opening was made for three (3') feet from the trench saw cut in both directions.

(c) When two (2) or more transverse openings have been made within one hundred (100) linear feet of each other, the Contractor shall diagonally notch, mill and overlay the full width of the traffic lanes in which the openings were made, for the entire length of street between the openings and for a distance of three (3') feet in both directions from the sawcut.

(d) When two (2) or more emergency openings have been made by the Contractor within a ninety-day period within one hundred (100) linear feet of pavement, the Contractor shall diagonally notch mill and overlay the full width of the traffic lanes in which the openings were made, for the entire length of street between the openings, and for a distance of three (3') feet in both directions from the saw cut.

(e) If directed Contractor shall overlay the adjacent undisturbed lane. The Contractor shall saw cut, mill, notch and overlay both lanes as directed.

(f) If disturbed lanes adjacent to undisturbed lanes are overlaid, the edge of the disturbed lane shall be saw cut or milled to a depth of one and one-half (1½") inches or the depth of the existing surface course, whichever is less, for the length of the opening to insure a smooth joint, with proper elevation and cross section. A full-width overlay may be authorized on various streets instead of saw cutting or milling the disturbed lane.

(g) If disturbed lanes adjacent to shoulders are overlaid, the shoulder shall be raised, with material and in an approved manner matching the type of existing shoulder, so that the overlaid pavement and shoulder edges are at the same elevation.

(h) If disturbed lanes adjacent to shoulders are milled and overlaid, the shoulder shall be repaired with material and in a manner of the type to match the existing shoulder, so that the overlaid pavement and shoulder edges are at the same elevation.

D. Courts and alleys. Permanent restoration in courts and alleys shall be required, to the greatest extent possible and consistent with the standards set forth in this specification.

E. Special restoration. The permanent restoration of special type pavements, such as concrete, brick, Belgian block, cobblestone gutters or tiles, shall consist of relaying the original wearing course in accordance with the original installation specifications in such a manner as to prevent settlement or other deterioration.

F. Testing and inspection. The Owner/HCA or designee may inspect all cuts.

3.4 SURFACE PREPARATION

A. In preparation for permanent paving, temporary bituminous paving and any cold patch material installed for temporary paving shall be removed.

B. Prior to the replacement of the base course the edges of the existing base and surface courses must be prepared as follows:

1. The edges shall be sawed one foot on each side of the trench and tack coated.
2. Remove all material within the trench and "cut back" area to sub-grade ready for the base course.
3. The subgrade for all repaved areas shall be thoroughly compacted to the proper distance below and parallel with the prescribed level of the base course. The subgrade shall be completely tamped in an approved manner prior to placing the base course. Compaction shall conform to the Density Requirements in Section 210, SUBGRADE, in Commonwealth of Pennsylvania, Department of Transportation Specifications, Publication 408, which requires the subgrade to be compacted to not less than 100% of the determined dry-weight density. Backfill shall be tested in compliance with PaDot standards.

3.5 SITE CLEANUP

A. The site of the work will be cleaned of all rubbish and surplus or unsuitable materials and promptly restored to its original condition as backfilling proceeds and work progresses. Pavements adjacent to the site of the work shall be constantly swept so as to prevent scarring of the pavement by scattered stones. The work zone shall be broom cleaned, street swept, and/or adequately washed down as required.

3.6 DRIVES AND SHOULDERS

A. Shoulders, stone and gravel drives shall be covered to their existing original surface with compacted 2-A stone.

B. Paved drives shall be repaired in kind back to right of way and shall match the existing drive and the surface course shall be feathered to match existing grade. All other areas damaged by the contractor shall be repaired in kind at the discretion and approval of the Owner/HCA.

3.7 DELIVERY TICKET (PAVING MATERIALS)

A. A delivery ticket indicating the quantities and types of paving materials shall be submitted at the time of delivery. The complete delivery ticket shall be delivered to the Engineer. Failure to deliver such complete ticket to the Engineer will be cause for the Engineer to reject paving material.

3.8 SURFACE IDENTIFICATION

A. In accordance with “Occupancy of Highway by Utilities,” PA Code, Chapter 459, a mark of identification shall be placed at the nearest edge of the cut closest to the edge of the improved surface for each opening or impairment made.

B. The paint shall be of a durable wearing quality and shall be colored coded as follows: Blue – Water Lines.

END OF SECTION

CONTRACTOR'S CERTIFICATION OF FINAL COMPLETION

To: **Hazleton City Authority - Water Department** Date:
400 East Arthur Gardner Parkway
Hazleton, PA 18201 Project: _____

C/O: _____
Chairman

ATTN: _____
Director of Operations

From: _____.
(Firm or Corporation)

This is to certify that I, _____ , am an authorized official of

_____.

working in the capacity of _____

and have been properly authorized by said firm or corporation to sign the following statements pertaining to the subject Contract:

I know of my owner personal knowledge, and do hereby certify, that the Work of the Contract described above has been completely performed, and materials used and installed in every particular, are in accordance with, and in conformity to, the contract Drawings and Specifications.

The Contract Work is now complete in all parts and requirements, and ready for your final inspection.

I understand that neither the determination by the Engineer that the Work is complete, nor the acceptance thereof by the Owner, shall operate as a bar to claim against the Contractor under the terms of the guarantee provisions of the Contract Documents.

Submitted by Contractor:
.

BY _____

ATTEST: _____

Accepted by Owner:
Hazleton City Authority - Water Department

BY _____
, Chairman

ATTEST: _____