BTMA SEWER SYSTEM
RULES AND REGULATIONS
EFFECTIVE DATE OCTOBER 5, 2016
# BETHEL TOWNSHIP MUNICIPAL AUTHORITY SEWER SYSTEM RULES AND REGULATIONS

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CHAPTER 10

GENERAL PROVISIONS

APPENDICES REFERENCED IN CHAPTER 10:

No appendices referenced herein.

ARTICLE 1-GENERAL SYSTEM REQUIREMENTS

SECTION 10.1.01. - Required Discharge to Sewer System.

A. All Domestic Sanitary Sewage or Non-Residential Wastes from any Improved Property, after Connection of such Improved Property to the Sewer System as required by the Connection Ordinance, shall be conducted into the Sewer System, subject to any limitations or restrictions established herein or in the Connection Ordinance.

B. No Person shall place or deposit or permit to be placed or deposited upon public or private property within the Sewered Area any Domestic Sanitary Sewage, Non-Residential Wastes or Industrial Wastes.

C. No Person shall direct discharge or permit to be discharged directly into any natural drainage feature or Waters of the Commonwealth within the Sewered Area any Domestic Sanitary Sewage, Non-Residential Wastes or Industrial Wastes.

SECTION 10.1.02. - Authority Right of Access; Inspection.

The Authority, or any duly authorized agent, shall have the right of access, at all reasonable times, to any part of any Improved Property as necessary for purposes of inspection, observation, measurement, sampling and testing and for performance of other functions relating to the Building Sewer, the Plumbing System, the Connection to the Sewer System, and any service rendered by the Authority. Provided, however, that any inspection of the Plumbing System inside a dwelling will occur only in the presence of the Owner or tenant of the Improved Property, upon reasonable notice at least twenty-four (24) hours in advance of the inspection. Owners receiving notices with tenant occupied properties shall notify tenants of the inspection immediately upon receipt of notice of the inspection. If the tenant objects to the inspection, the tenant shall advise the owner who shall so inform the Authority. Authorized representatives of the Authority may obtain Grab Samples from the Building Sewer on any Improved Property at any time. If entry onto a property or into the dwelling of property is refused, the Authority by and through its authorized agent has recourse to every remedy provided by law to secure entry, including but not limited to obtaining an Administrative Search Warrant.
SECTION 10.1.03. - Suspension of Service.

The Authority may suspend the right of an Owner of an Improved Property to discharge Sewage into the Sewer System and shall have the right to disconnect the Building Sewer from the Sewer System if, in the opinion of the Authority, such action is required to stop an actual or threatened discharge of any material which presents or may present an imminent or substantial endangerment to the health or welfare of persons, or to the environment, which might cause interference to the Sewer System. In such instance, the Authority may disconnect the Building Sewer without notice to the Owner of the Improved Property, and shall give notice to the Owner as soon as practical. The suspension of such service shall continue as long as necessary in order to correct and abate the condition which resulted in the suspension of service.

SECTION 10.1.04. - Nuisance.

A violation of this Resolution shall constitute a nuisance and shall be abated in the manner provided by law.

SECTION 10.1.05. - Owner Liability.

The Owner of any Improved Property shall be held liable for all acts of tenants or other occupants of such Improved Property, as may be permitted by law, insofar as such acts shall be governed by the provisions of this Resolution.

SECTION 10.1.06. - Interceptors and Traps.

Grease, oil and sand interceptors or traps shall be provided and maintained by the Owner of any Non-residential, Industrial, Commercial or Institutional Establishment, at his or its sole cost, when required by the Authority, for the proper handling of liquid wastes containing excessive grease, inflammable wastes, sand or other harmful substances. All interceptors shall be of a type and capacity approved by the Authority, in accordance with these Regulations, and constructed or installed at a satisfactory location in accordance with plans approved by the Authority prior to installation or commencement of construction.

ARTICLE 2 - CHESAPEAKE BAY AGREEMENT AND CAP LOADS

SECTION 10.2.01. - Background.

Whereas, pursuant to The Chesapeake Bay Agreement (agreement) executed by Pennsylvania, Maryland, Virginia, the District of Columbia and the United States Environmental Protection Agency (EPA), the EPA Region III adopted the Chesapeake Bay Program which determined and established a "capload" for Pennsylvania and each of the other entities signing the agreement to limit the total nitrogen ("TN") and total phosphorous ("TP") to the Chesapeake Bay.
Moreover, within the Chesapeake Bay Watershed each point source discharge, including the Bethel Township Municipal Authorities (BTMA) wastewater treatment plants has been assigned individual "caploads" which will establish certain TN and TP limits that can be discharged within the NPDES permit issued (PADEP) for the BTMA plants. These limits as established (Chesapeake Bay) requires the BTMA to maintain a "zero" net increase in these nutrients (TN & TP) as regulated, monitored and enforced by the PADEP.

**SECTION 10.2.02. - Sewage Facility Planning Modules.**

In review and approval of Component III of the sewage facility planning modules relating to non-residential development within the service area of the Authority's Sewer System, Bethel Township Municipal Authority will calculate the concentration of Total Nitrogen (TN) at 85 mg/I, and the concentration of Total Phosphorus (TP) at 15 mg/I, unless Bethel Township Municipal Authority decides, in its sole discretion, that lower concentrations can be used for calculation purposes based upon historical information provided to Bethel Township Municipal Authority, which Bethel Township Municipal Authority finds to be adequate, and acceptable.

**SECTION 10.2.03. - Current Permits & Requirements.**

The cap loads and requirements for the Chesapeake Bay Agreement are governed by the PADEP. Furthermore, these requirements, as governed by the PADEP are regulated and monitored on a policy basis for individual plants and permits (NPDES). These policies and regulations are subject to change beyond the control of the BTMA. Therefore, the current cap load restrictions and requirements (as determined by the current NPDES permit for the BTMA plants) shall govern the level of compliance necessary for the individual users of this system (BTMA plants & facilities).

**SECTION 10.2.04. - Users of System Responsible for Costs.**

Any and all users of this system (BTMA plants & facilities) and discharging wastewater into the facilities for treatment shall be responsible for any and all extra costs associated with complying with the terms and conditions of these regulations. Moreover, the users of the system shall be responsible to the extent of their usage (flow and strength) and their contribution towards these nutrient levels and caploads (TN & TP). Any users identified in discharging higher than typical residential strengths (TN & TP) into the wastewater system for treatment shall also be surcharged accordingly for these higher contributing waste stream strengths. The costs, charges and surcharges shall be determined and applied to individual users based upon BTMA Board policy as established from time to time for this purpose.
ARTICLE 3 - MISCELLANEOUS PROVISIONS

SECTION 10.3.01. - Additional Rules and Regulations.

The Authority shall adopt, from time to time, such additional rules and regulations as it shall deem necessary and proper in connection with the use and operation of the Sewer System and the enforcement of this Resolution, which rules and regulations shall be, shall become and shall be construed as part of this Resolution.

SECTION 10.3.02. - Interpretation.

The word "shall" when used in this resolution is mandatory; the word "may" is permissive. The masculine gender shall include the feminine, and the singular shall include the plural, where indicated by the context.

SECTION 10.3.03. - Severability.

In the event, any provision, section, sentence, clause or part of this Resolution shall be held by any Court or Administrative tribunal of competent jurisdiction to be invalid, such invalidity shall not affect or impair any remaining provision, section, sentence, clause or part of this Resolution, it being the intent of the Authority that such remainder shall be and shall remain in full force and effect.

SECTION 10.3.04. - Repealer.

All resolutions or parts of resolutions of this Authority which are inconsistent herewith expressly shall be and are repealed.

SECTION 10.3.05. - Effective Date.

This Resolution shall become effective October 5, 2016.

SECTION 10.3.06. - Purpose.

It is declared that adoption of this Resolution is necessary for the protection, benefit and preservation of health, safety and welfare of the inhabitants of the Township.

SECTION 10.3.07. - Access to Records.

Distribution and access to Authority records shall be in accordance with Pennsylvania's Right-to-Know Law, 65 P.S. §§ 67.101-67.3104, and the Authority's policies and procedures adopted pursuant to such law, which are on file at the Authority office. All requests for records shall be directed to the Authority's Open Records Officer.
APPENDICES REFERENCED IN CHAPTER 20:
No appendices referenced herein.

ARTICLE 1- DEFINITIONS AND ABBREVIATIONS

SECTION 20.1.01. - Definitions & Abbreviations
Unless the context specifically and clearly indicates otherwise, the meaning of terms and phrases used in this Resolution shall be as follows:

"Ammonia Nitrogen as N" shall mean ammonia nitrogen as determined pursuant to the procedure set forth in the latest edition of "Standard Methods for the Examination of Water and Wastewater", published by the American Public Health Association, Inc.

"Authority" shall mean Bethel Township Municipal Authority, a municipality authority of the Commonwealth.

"Board" shall mean the Board of the Authority.

"B.O.D." (Biochemical Oxygen Demand) shall mean the quantity of oxygen, expressed in ppm by weight, utilized in the biochemical oxidation of organic matter under standard laboratory procedure for five (5) days at twenty degrees Centigrade (20° C). The standard laboratory procedure shall be that found in the latest edition of "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, Inc.

"Building Sewer" shall mean the sewer extension from the sewage drainage system of any Improved Property to the Lateral serving such Improved Property.

"C.B.O.D." (Carbonaceous Biochemical Oxygen Demand) shall mean the quantity of oxygen, expressed in ppm by weight, utilized in the carbonaceous biochemical oxidation of organic matter under standard laboratory procedure for five (5) days at twenty degrees Centigrade (20° C). The standard laboratory procedure shall be that found in the latest edition of "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, Inc.

"Commercial Establishment" shall mean any room, group of rooms, building or enclosure connected, directly or indirectly, to the Sewer System and used or intended for
use in the operation of a business enterprise for the sale and distribution of any product, commodity, article or service to the public or others at retail or wholesale.

"Commonwealth" shall mean the Commonwealth of Pennsylvania.

"Connection" shall mean the physical joining of any Building Sewer to the Lateral in furtherance of connecting a building to the Sewer System.

"Connection Fee" shall mean the actual cost for the physical joining of any Building Sewer to the Lateral in furtherance of connecting a building to the Sewer System. This fee is separate and distinct from the Tapping Fee or any other associated fees described herein.

"Connection Ordinance" shall mean Bethel Township Ordinance No. 2007-05, together with all amendments and/or supplements thereto, enacted by the Township that requires, among other things, certain Owners of Improved Property located in the Township to connect to the Sewer System and use the same in such manner as the Township may ordain.

"DEP" or "Department" shall mean the Department of Environmental Protection of the Commonwealth of Pennsylvania.

"Direct Discharge" shall mean the discharge of treated or untreated Domestic Sanitary Sewage or Industrial Wastes directly into the waters of the Commonwealth.

"Domestic Sanitary Sewage" shall mean normal water-carried household and toilet wastes discharged from any Improved Property. Moreover, and specifically the constituent properties of "domestic sanitary sewage shall not exceed or vary from the following listed parameters (Flow volume of 250 GPD, TSS of 240 mg/L, BOD of 240 mg/L, TP of 10 mg/L, TN of 35 mg/L).

"Dwelling Unit" shall mean any room, group of rooms, house trailer, manufactured home, apartment, condominium, cooperative or other enclosure connected, directly or indirectly, to the Sewer System and occupied or intended for occupancy as living quarters by an individual, a single family or other discrete group of persons, excluding institutional dormitories.

"Educational Establishment" shall mean any room, group of rooms, building or other enclosure connected, directly or indirectly, to the Sewer System and used or intended for use, in whole or in part, for educational purposes, including both public and private schools or colleges.

"EPA" shall mean the Environmental Protection Agency of the United States of America.
"Equivalent Dwelling Unit" or "EDU" shall mean the unit of measure by which a User Charge or Tapping Fee may be imposed upon an Improved Property, which shall be deemed to constitute the estimated, equivalent amount (flow volume and/or flow strength of concentration) of Domestic Sanitary Sewage discharged by a single-family Dwelling Unit, and which shall not exceed 250 gallons per day (volume), as may be subject to amendment if the Authority, DEP, or EPA requires a change in the volume or concentration-per-EDU rate. Moreover, for the purpose of establishing surcharge loadings (strength), the typical concentration for domestic sewage of an EDU shall be limited to wastewater discharges with the following other parameters and levels (TSS < 240 mg/L, BOD < 240 mg/L, TP < 10 mg/L & TN < 35 mg/L) and no other waste types in the waste stream. Any deviations from the waste stream (residential flow & strength of concentration) for a particular user shall be subject to adjustments in EDU's, charges, fees and surcharges all as deemed appropriate by the Authority.

"Garbage" shall mean solid waste resulting from the domestic and commercial preparation, cooking and dispensing of food and from handling, storage and sale of product.

"Grab Sample" shall mean a sample which is taken from a waste stream on a one-time basis with no regard to the flow in the waste stream and without consideration of time.

"Ground Water" shall mean water which is standing in or passing through the ground.

"Holding Tank" shall mean a tank, whether permanent or temporary, to which sewage is conveyed by a water carrying system.

"Holding Tank Waste" shall mean any waste from Holding Tanks.

"Improved Property" shall mean any property upon which there is erected a structure intended for continuous or periodic habitation, occupancy or use by human beings or animals and from which structure Domestic Sanitary Sewage and/or Industrial Wastes shall be or may be discharged, which is located within the Sewered Area and is subject to the Connection Ordinance.

"Indirect Discharge" shall mean the discharge of Domestic Sanitary Sewage or Industrial Wastes or the introduction of pollutants from any source into the Sewer System (including Holding Tank Waste discharged into the Sewer System).

"Individual Unit" shall mean each and every single residential or commercial entity or establishment devoted to a single family or business use, including the separate entities comprising a Multiple Unit Structure.
"Industrial Establishment" shall mean any Improved Property used or intended for use, wholly or in part, for the manufacturing, processing, cleaning, laundering or assembling of any product, commodity or article, or any other Improved Property from which wastes, in addition to or other than Domestic Sanitary Sewage, shall or may be discharged.

"Industrial Wastes" shall mean any and all wastes (solid, liquid, or gaseous substance or form of energy or discharge) discharged from any Improved Property, having characteristics which may have the potential to be detrimental to the WWTF and are prohibited from being disposed into the WWTF, and which may include such ground, surface, or stormwater as may be present and blended therewith.

"Institutional Establishment" shall mean any room, group of rooms, building or other enclosure connected, directly or indirectly, to the Sewer System, including institutional dormitories and Educational Establishments, which does not constitute a Commercial Establishment, a Dwelling Unit, or an Industrial Establishment.

"Lateral" shall mean that part of the Sewer System extending from a Sewer to the curbline, or if there is no curbline, to the property line or right of way line, or if no such extension is provided, then "Lateral" shall mean that portion of, or place in, a Sewer that is provided for connection of any Building Sewer.

"Lead Free" shall, when used with respect to solders and flux, mean solders and flux containing not more than 0.2% lead, and shall, when used with respect to pipes and pipe fittings, mean pipes and pipe fittings containing not more than 8% lead.

"Non-Residential User or Establishment" shall mean any user that's use of the property and/or waste composition (strength or volume) is not characteristic of a "residential" user or flow which shall generally mean any wastes discharged to the system which are in excess of the following basic parameters (Flow volume of 250 GPD, TSS of 240 mg/L, BOD of 240 mg/L, TP of 10 mg/L, TN of 35 mg/L) or any other waste or substance which is not in a typical residential waste stream as identified as non-residential wastes herein. For the purpose of these regulations reference to a "large consumer" shall also be considered a non-residential user and vice versa where appropriate and applicable.

"Multiple Unit Structure" shall mean one structural unit, comprised of two or more separate units possessed of separate inside or outside entrances, whether designed for Individual Unit ownership, or collective ownership, or rental, and shall also mean one structural unit with multiple consumption units, such as a restaurant.

"Multiple Use Improved Property" shall mean any Improved Property upon which there shall exist any combination of a Dwelling Unit, Commercial Establishment, Industrial Establishment, Educational Establishment or Institutional Establishment.
"Non-Domestic Waste" shall mean any liquid or gaseous substance, whether or not solids are contained therein, discharged from any non-domestic sewer user during the course of any industrial, manufacturing, trade or business process or in the course of development, recovery or processing of natural resources, as distinct from normal domestic waste.

"Owner" shall mean any Person vested with title, legal or equitable, sole or partial, of any Improved Property.

"Person" shall mean any individual, partnership, co-partnership, firm, company, joint stock company, association, society, trust, estate, corporation or other legal group or entity, including municipalities, municipality authorities, school districts and other units of government, or their legal representatives, agents or assigns.

"pH" shall mean the logarithm of the reciprocal of the concentration of hydrogen ions indicating the degree of acidity or alkalinity of a substance.

"Plumbing System" shall mean all piping, fixtures, and appurtenances used to transport water to, within, and from a building, including all residential and non-residential facilities and the source, transmission, treatment, and distribution facilities of water supply systems.

"Pollution" shall mean the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.

"Pollutant" shall mean any dredged soil, solid waste, dissolved waste, incinerator residue, Garbage, sewage sludge, munitions, chemical waste, biological materials, radioactive materials, heat, wrecked or discharged equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

"ppm" shall mean parts per million parts of water, by weight.

"Sewage" shall mean the normal water-carried waste from any Improved Property, including such waste from dwellings, commercial buildings, industrial facilities, and institutions, and which contains the waste products or excrement or other discharge from the bodies of human beings or animals or which contains noxious or deleterious substances being harmful or inimical to the public health, or to animal or aquatic life, or to the use of water for domestic water supply or for recreation or which constitutes pollution under The Clean Streams Law. This definition excludes, however, the effluent from septic tanks or cesspools, rain, storm, and groundwater, as well as roof or surface water, drainage or percolating or seeping waters, or accumulation thereof, whether underground or in cellars or basements. Sewage includes both Domestic Sanitary Sewage and non-residential Wastes.
"Sewer" shall mean any pipe or conduit constituting a part of the Sewer System used or usable for collection of Domestic Sanitary Sewage or non-residential Wastes.

"Sewer System" shall mean all facilities, at any particular time, acquired, constructed, operated or owned by the Authority for collecting, pumping, transmitting, treating or disposing of Domestic Sanitary Sewage or non-residential Wastes within the Sewered Area.

"Sewered Area" shall mean the geographic areas of the Township known as "Bethel" and "Frystown" served by the Sewer System and such additional geographic areas as determined and designated, from time to time, by the Township and the Authority. For purposes of the Connection Ordinance, the Sewered Area shall be deemed to be the "sewer district", as contemplated by the Connection Ordinance, as applicable.

"Slug" shall mean any discharge of water, Domestic Sanitary Sewage or non-residential Wastes that, in concentration of any given constituent or in quantity of flow exceeds for any period of duration longer than fifteen (15) minutes more than five (5) times the average twenty-four (24) hour concentration or flows during normal operation.

"State" shall mean the Commonwealth of Pennsylvania.

"Storm Water" shall mean any flow occurring during or following any form of natural precipitation and resulting therefrom.

"Street" shall mean and include any street, road, lane, court, cul-de-sac, alley, public way or public square, including such streets as are dedicated to public use and such streets as are owned by private Persons.

"Tapping Fee" shall mean the fee levied against the property owner of each Improved Property connecting to the Sewer System on or after the effective date of these regulations (or any predecessor regulations) computed on an EDU basis or on a gallons-per-day basis, which is authorized by the Authorities Act as amended from time to time, and which fee is established and amended from time to time by resolution of the Authority. Generally, this fee is for the equitable distribution of municipal infrastructure costs required to convey (conveyance component) and treat (treatment component) the sanitary sewage to each contributing user. This fee may in certain circumstances include a "special purpose" component all as governed by State Law. This fee is separate and distinct from any connection fees or any other such fees described herein.

"Total Phosphorus as P" shall mean total phosphorus as determined pursuant to the procedure set forth in the latest edition of "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, Inc.
"Total Solids" shall mean solids determined by evaporating at one hundred three degrees Centigrade to one hundred five degrees Centigrade (103° C to 105° C) a mixed sample of wastewater as determined pursuant to the procedure set forth in the latest edition of "Standard Methods for the Examination of Water and Wastewater", published by the American Public Health Association, Inc. Total Solids include floating solids, Suspended Solids, Settleable Solids and Dissolved Solids, as defined below:

(a) "Suspended Solids" shall mean the total suspended matter that floats on the surface of or is suspended in water, wastewater, or other liquids, as determined by standard laboratory procedure.

(b) "Settleable Solids" shall mean solids that settle in an imhoff cone from a standard sample of wastewater.

(c) "Dissolved Solids" shall mean solids that are dissolved constituents in water or wastewater and are in solution in the wastewater but can be determined by laboratory analysis.

"Township" shall mean the Township of Bethel, Berks County, Pennsylvania, a political subdivision of the Commonwealth, acting by and through its board of supervisors or, in appropriate cases, acting by and through its authorized representatives.

"Toxic Pollutant" shall mean any pollutant or combination of pollutants listed as toxic in regulations promulgated by the Administrator of the EPA or DEP.

"User" shall mean any Person who discharges, causes or permits the discharge of, or is required under the Connection Ordinance to discharge, wastewater into the Sewer System or the WWTF.

"User Charge" shall mean the rentals or charges imposed by the Authority hereunder, as amended from time to time, against the Owner of each Improved Property, or other User, for the use of the Sewer System and services rendered or available to be rendered thereby, including but not limited to collection, treatment and disposal of Domestic Sanitary Sewage and non-residential Wastes.

"Wastewater" shall have the same meaning as the term "sewage", as defined above.

"Waters of the Commonwealth" shall mean all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the Commonwealth or any portion thereof.

"WWTF" shall mean the wastewater treatment facilities and any other relevant sewage facilities owned and operated by the Authority.
CHAPTER 30

RATES, CHARGES AND FEES

APPENDICES REFERENCED IN CHAPTER 30:

Appendix A - Review, Permit, Inspection, User and Tapping Fees.

ARTICLE 1 - USER CHARGES

SECTION 30.1.01. - Imposition.

A. A User Charge is hereby imposed upon the Owner of each Improved Property that shall be connected to the Sewer System, and any other User, for use of the Sewer System, whether such use is direct or indirect, and for services rendered by the Authority in connection therewith, and shall be payable as provided herein. At the discretion of the Authority, such User Charge may be imposed upon the Owner of an Improved Property or other User who fails to timely connect such Improved Property to the Sewer System in violation of the Connection Ordinance, as compensation for the availability of service by the Authority in connection with the Sewer System.

B. The User Charge shall continue to be due and payable for all periods of time in which the Improved Property is capable of being occupied, whether such Improved Property is actually occupied or vacant. There will be no adjustment in the User Charge because of seasonal vacancy of the Improved Property, a perceived low volume of water usage, or other such reasons.

SECTION 30.1.02. - Commencement of User Charges.

The User Charge shall be payable by the Owner of each Improved Property or other User commencing as described below:

A. Individual Residential Users: The User Charge shall be payable by the Owner of each Improved Property commencing the earlier of:
   1) the date of the actual physical connection of an Improved Property to the Sewer System, or
   2) the date that is sixty (60) days from the date indicated in a notice to connect as described in the Bethel Township's Connection Ordinance and any amendments thereto and in any Resolutions adopted by the Authority or
   3) such later date established by the Authority for commencement of the payment of the User Charge.
B. Non-Residential Users: The User Charge shall be payable on the date that the Sewer Capacity Agreement is executed between the Authority and the Owner of each Improved Property.

SECTION 30.1.03. – Calculation of User Charges.

A. The User Charge applicable to any Improved Property shall be calculated, imposed and collected according to a flat rate or EDU basis as determined and applied by the Authority.

B. An Improved Property billed on a flat rate basis shall be charged a User Charge as a specific amount per Equivalent Dwelling Unit applicable to such Improved Property, as determined by the Authority, from time to time. The number of initial "BASE FLOW" Equivalent Dwelling Units applicable to each Improved Property shall be determined as follows:

COMPUTATION OF EQUIVALENT DWELLING UNITS

<table>
<thead>
<tr>
<th>Description of Improved Property</th>
<th>Unit of Measurement</th>
<th>Number of EDU/s Per Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Dwelling Unit</td>
<td>Each single-family dwelling, apartment, ½ of duplex or mobile home pad or lot</td>
<td>1</td>
</tr>
<tr>
<td>(year-round or seasonal, individual or multifamily)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail store, professional offices or other Commercial Establishment</td>
<td>1 to 10 employees Each additional 10 employees or fraction thereof</td>
<td>1</td>
</tr>
<tr>
<td>Hotel, motel, bed and breakfast or boarding house (not including restaurant facilities)</td>
<td>1 to 5 rental rooms Each additional 5 rooms or fraction thereof</td>
<td>1</td>
</tr>
<tr>
<td>Restaurant, club, tavern or other retail food or drink establishment</td>
<td>1 to 20 customer seats Each additional 10 seats or fraction thereof</td>
<td>1</td>
</tr>
<tr>
<td>Laundromat</td>
<td>1 to 5 washing machines Each additional 5 washing machines or fraction thereof</td>
<td>1</td>
</tr>
<tr>
<td>Description of Improved Property</td>
<td>Unit of Measurement</td>
<td>Number of EDUs Per Unit of Measurement</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Automobile service station or commercial vehicle repair shop</td>
<td>1 or 2 bays Each additional 2 bays or fraction thereof</td>
<td>1</td>
</tr>
<tr>
<td>Car Wash</td>
<td>1 or 2 bays Each additional 2 bays or fraction thereof</td>
<td>1</td>
</tr>
<tr>
<td>Beauty parlor or barber shop (if attached to or part of a Dwelling Unit)</td>
<td>1 chair and sink</td>
<td>1/2 (No partial EDUs assigned minimum 1 EDU will apply)</td>
</tr>
<tr>
<td>Beauty parlor or barber shop (if not attached to or part of a Dwelling Unit)</td>
<td>Each 2 chairs and sinks</td>
<td>1</td>
</tr>
<tr>
<td>Education/Institutional Establishment</td>
<td>Per each 15 pupils, faculty, administrators and staff or fraction thereof (with cafeteria, no gym or showers) Per each 25 pupils, faculty, administrators and staff or fraction thereof (no cafeteria, gym or showers)</td>
<td>1</td>
</tr>
<tr>
<td>Church</td>
<td>Each property (subject to review of size &amp; usage)</td>
<td>1</td>
</tr>
<tr>
<td>Fire Company/Ambulance Club</td>
<td>Each property</td>
<td>1</td>
</tr>
<tr>
<td>Community Hall</td>
<td>Each property</td>
<td>1</td>
</tr>
<tr>
<td>Funeral Home</td>
<td>Each property</td>
<td>1</td>
</tr>
<tr>
<td>Post Office</td>
<td>Each property</td>
<td>1</td>
</tr>
<tr>
<td>Industrial/Warehouse Establishment</td>
<td>1 to 10 employees Each additional 10 employees or fraction thereof (or to be based on the volume of wastewater generated)</td>
<td>1</td>
</tr>
</tbody>
</table>
C. The number of Equivalent Dwelling Units applicable to Commercial (non-residential) Establishments and Industrial Establishments shall be computed on the basis of the average daily number of full and part-time employees (including the owner(s) or employer(s)) for the calendar month preceding the date of the monthly billing. The Owners of such facilities shall be responsible for advising the Authority in writing of the number of employees upon Connection to the Sewer System and upon request of the Authority. The number of Equivalent Dwelling Units applicable to Educational and Institutional Establishments shall be computed on the highest monthly average daily attendance of pupils (plus faculty, administrators and staff) during the twelve (12) months preceding the date of the monthly billing. The Owners of such facilities shall be responsible for advising the Authority in writing of the number of employees upon Connection to the Sewer System and upon request of the Authority.

D. This chart is primarily used as a guideline but not a sole source to establish and review the "initial" EDU requirements and shall be considered the minimum initial requirements (EDU usage). Moreover, once the initial EDU requirements are established the Authority may also verify the actual usage from time to time at their discretion in order to make any upward adjustments for actual usage higher than estimated usage all in accordance with Section 30.2.04 & 30.2.05 herein. This verification of actual flows (volume and/or strength) shall he a reconciliation between the initial (estimated) base flow EDU's and the actual (verified) flows. Any property uses not listed above shall be reviewed on a case by case basis with adequate supporting documentation.

E. If the use or classification of any Improved Property changes within a billing period, the User Charge for such billing period may be prorated by the Authority. The Owner of the Improved Property shall be responsible for advising the Authority in writing of any such change affecting the User Charge payable hereunder. The appropriate credit or additional charge shall appear on the statement for the next succeeding billing period.

F. The monthly flat rate User Charge payable per Equivalent Dwelling Unit shall be set by the Authority by resolution, and may be amended from time to time by the Authority. Refer to Appendix A.

G. User Charges for any Improved Property, in the sole discretion of the Authority, may be determined on a metered rate basis calculated according to actual metered, permitted or estimated volume of wastewater discharged by the Improved Property into the Sewer System. In such case, the number of Equivalent Dwelling Units shall be the average daily wastewater discharged during a period as determined by the Authority with the highest wastewater flow by such Improved Property divided by two hundred fifty (250) gpd.

SECTION 30.1.04. - Multiple Units or Uses.

A. In the case of a Multiple Use Improved Property sharing a common connection to the Sewer System or a common structure, each such classification of Improved Property shall
pay a separate User Charge, as though it were housed in a separate structure and had a direct and separate connection to the Sewer System, computed in accordance with Section 30.1.03 of this Resolution.

B. Any Improved Property containing a structure with multiple Dwelling Units shall be required to enter a special written agreement with the Authority authorizing the discharge by such Improved Property into the Sewer System. Each Dwelling Unit in a Multiple Unit Structure, if allowed by the Authority to connect to the Sewer System, shall be billed and considered as a separate entity and subject to its own User Charge.

SECTION 30.1.05. - Volume and Strength of Waste Surcharges.

A. The Owner of any Improved Property which shall discharge wastewater into the Sewer System determined or estimated by the Authority to be in excess of a total flow of two hundred fifty (250) gallons per day per Equivalent Dwelling Unit with a peak flow rate in excess of five hundred (500) gallons per day for any ten (10) minute period, per Equivalent Dwelling Unit, as determined or reasonably estimated by the Authority, shall pay a volume surcharge in addition to the applicable User Charges. The Owner of any Improved Property that shall discharge wastewater with prohibited characteristics, as defined in Chapter 9, or discharge wastewater with strengths exceeding those of a residential nature (TSS of 240 mg/L, BOD of 240 mg/L, TP of 10 mg/L, TN of 35 mg/L) into the Sewer System shall pay a strength of waste surcharge, in addition to the applicable User Charges. Moreover, if it is determined that the surcharges (Volume and/or Strength) are consistent and ongoing as determined by the Authority, the Authority may also require an adjustment to the overall EDU's and user charges assigned to a specific property.

B. Measurement of concentration and/or volume of Wastewater may be required for all users for verification of the waste stream being discharged into the Authority's system for treatment as more particularly described below:

1) Any and all wastewater being discharged into the wastewater system is subject to inspection, sampling, testing and verification by the Authority for the purpose of evaluating and assessing the volume, strength and composition of the waste stream from any and all users. The testing information shall be used to determine surcharges for any and all waste streams that exceed the strength and concentrations as established herein for a typical residential waste stream.

2) The testing information shall also be used for the purpose of determining compliance with any other rule or regulation of the Authority for each user.

3) All costs associated with inspecting, sampling, testing and evaluating the waste stream shall be the responsibility of the specific user being inspected and tested.

4) For the purpose of establishing volume and/or strength of wastewater surcharges, a representative sampling shall be taken. Depending upon the
user and their consistent or lack thereof use and associated waste stream will
determine how many samples are required to establish a representative sample.

C. Surcharges shall be paid in addition to all User Charges computed in accordance with
provisions of this Chapter 30 and shall be computed on such basis as the Authority may from
time to time adopt. The strength of wastewater to be used for establishing the amount of
surcharge shall be determined by the Authority periodically in the discretion of the Authority
either:

1) by suitable sampling and analysis by the Authority of such wastes for a consecutive
three (3) day period during a time of normal plant operation; or

2) from estimates made by the Authority; or

3) from known relationships of products produced to strengths of such wastes for
those industries where such factors have been established. In establishing such
waste strengths for surcharge purposes by analysis, analyses shall be made in
accordance with procedures outlined in the latest edition of "Standard Methods for
the Examination of Water and Wastewater" published by the American Public
Health Association, Inc.

D. The actual strength of the wastewater stream of a particular user shall be compared to the
typical residential strengths as identified herein (BOD, TSS, TN, TP, etc.). The surcharge
shall be based upon a ratio of the actual strength versus the typical residential strength and
costs associated with treating this higher strength waste compared with a typical residential
strength (ratio) all as determined by the Authority.

SECTION 30.1.06. - Information to be Provided.

A. The Owner of any Improved Property discharging wastewater into the Sewer System shall
furnish to the Authority, including by way of the application for permit described in the
Connection Ordinance, all information deemed essential or appropriate by the Authority for
the determination of all applicable User Charges and surcharges. The costs of obtaining such
information shall be borne by such Owner of the Improved Property. All plans, reports, and
associated information shall be provided to the Authority and paper and digital PDF format.

B. In the event of the failure of the Owner to provide adequate information, the Authority shall
estimate the applicable User Charge and surcharges based upon available information until
such time as adequate information is received. There shall be no rebate of past payments if the
Owner's refusal to provide such information results in overpayment.

SECTION 30.1.07. - Special Circumstances.

Nothing herein contained shall be deemed to prohibit the Authority from entering into separate
or special agreements with any Owners of Improved Property with respect to the User Charge
or surcharge to be imposed in those cases where, due to special or unusual circumstances, the
User Charge set forth herein shall be deemed by the Authority, in its
sole discretion, to be inequitable, or where it is in the best interests of the Authority to do so.

SECTION 30.1.08. - Billing of User Charges; Postmark Date.

A. User Charges and any applicable surcharges shall be billed to the Owner of the Improved Property, and not the tenant. User Charges and surcharges, as applicable, shall be payable on a monthly basis, on the first business day of each month, and shall cover a billing period consisting of the immediately preceding month. Bills are payable at the office of the Treasurer or other designated representative of the Authority, in the appropriate amount, computed in accordance with the current fee resolution of the Authority. Owners of Improved Property that shall be first connected to the Sewer System during any monthly period may pay a pro-rated User Charge, determined by the Authority, for service for the balance of the monthly period, plus any applicable surcharges.

B. Payment made or mailed and postmarked on or before the due date shall constitute an on-time payment. If the due date shall fall on a legal holiday or on a Sunday, then payment made on or mailed and postmarked on the next succeeding business day that is not a legal holiday shall constitute an on-time payment.

SECTION 30.1.09. - Late Fees.

If any User Charge or any applicable surcharge is not paid by the due date, a late fee equal to ten percent (10%) of the amount of the monthly User Charge and applicable surcharge from such overdue bill shall be added to such bill, which bill, plus such late fee, shall constitute the gross bill.

SECTION 30.1.10. - Interest.

Interest shall accrue on any delinquent account at the maximum rate permitted by law.

SECTION 30.1.11. - Application of Payments.

Any and all payments received on account of delinquent accounts shall be applied first to interest accrued on such account, then to the oldest outstanding gross bill, including any accumulated late fee, and each remaining gross bill thereafter in chronological order.


The Authority intends to take collection action against the Owner of every Improved Property for which sewer accounts remain delinquent for more than sixty (60) days, in accordance with the enforcement provisions of Chapter 90, Article 2.

SECTION 30.1.13. - Address Updates.

It shall be the responsibility of each Owner of an Improved Property to provide the Authority with, and thereafter keep the Authority continuously advised of, the correct mailing address of such Owner. Failure of any Owner to receive a bill for charges due and payable shall not be considered an excuse for nonpayment, nor shall such failure result in an extension of the period of time during which any bill shall be payable.
SECTION 30.1.14. - Authority to Alter Charges.

A. No officer or employee of the Authority is authorized to reduce, vary or exempt charges imposed herein or other provisions of this Resolution without official action by the Board of the Authority.

B. Every Owner of Improved Property shall remain liable for the payment of User Charges and surcharges until the later of: (1) the receipt by the Authority of written notice by such Owner that the property has been sold, containing the correct name and mailing address of the new Owner, or (2) the date on which title to the Improved Property is transferred to a new Owner. Failure to provide notice renders an Owner continuously liable for any charges that may accrue until such time as the Authority has been properly notified of any change in ownership as described above.

ARTICLE 2 - TAPPING FEES AND RESERVATION FEES

SECTION 30.2.01. - Allocation of Capacity.

The Owner or Developer of each Property in the Sewered Area which is seeking to develop said property for the purpose of requiring Sewer Capacity can secure the capacity by the following means.

A. The Owner or Developer shall submit an application for review and upon approval pay in full the then current rate (tapping fee) for each EDU of capacity required for said development.

B. The Owner or Developer shall submit an application for review and upon approval enter into an agreement with the Authority for the purpose of establishing the terms of capacity allocation.

SECTION 30.2.02. - Tapping Fee and Payment.

A. The Owner of each Improved Property in the Sewered Area which is required to be connected to the Sewer System pursuant to the Connection Ordinance then in effect requiring such connection, or which otherwise is connected to the Sewer System, shall be required to pay a Tapping Fee to the Authority in the amount for each EDU determined by the Authority by separate resolution which may be amended from time to time. The Tapping Fee shall be paid in the manner specified by the Authority.

B. The minimum Tapping Fee applicable to any Improved Property served by the Sewer System shall be the applicable amount times one (1) Equivalent Dwelling Unit. To this minimum Tapping Fee shall be added the applicable charge for each additional Equivalent Dwelling Unit that is determined to be applicable to such Improved Property.

C. The Tapping Fee shall be due and payable the earlier of:
   1) the time application is made to the Authority to make any such connection to the Sewer System, or, if applicable, the date when the Authority shall connect
any such Improved Property to the Sewer System, at the cost and expense of the Owner, when such Owner shall have failed to make such connection as required pursuant to the provisions of the Connection Ordinance then in effect requiring such connection; or

2) in the case of properties initially to be connected to the completed Sewer System, the date which is sixty (60) days after the date of issuance by the Township, of the notice to connect, or such later date established by the Township or the Authority as the final date for connection to the Sewer System.

D. Calculation and itemization of the maximum Tapping Fee, pursuant to the Municipalities Authorities Act, based on available information at this time, is included in Appendix A, which is made a part hereof, and which may be amended from time to time by Resolution and kept on file for public inspection by the Secretary of this Authority.

E. All Tapping Fees shall be payable to the "Bethel Township Municipal Authority".

SECTION 30.2.03. - Tapping Fee in addition to Connection Fee.

The Tapping Fee described and charged herein shall he separate and distinct from the actual "Connection" Fees. The Tapping fee has several components (capacity, collection, special purpose, etc) as established under the Authorities Act. Moreover, the purpose of the tapping fee is for the equitable distribution of infrastructure costs associated with collecting and treating the wastewater and is not associated with any fees to physically connect the property to the sewer system. Therefore, the tapping fee shall be in addition to any connection fees, user fees or other charges fixed or imposed by the Authority in accordance with the Authorities Act by the reason of the use or the availability for use of the sewer system for said property.

SECTION 30.2.04. - Additional Units.

In the event a property owner desires to alter his land, building or use of said land, building or processes in such a manner as to require additional sewer usage, the additional sewer flows associated with such alterations shall not be discharged into the sewer system without first completing the following items.

A. The Owner shall submit an application for review and the Authority's approval.

B. The Owner shall pay for any associated or applicable connection fees as determined by the Authority.

C. The Owner shall pay for any Tapping fees associated with the alteration as established by the Authority.

SECTION 30.2.05. - Additional Usage.

A. Original estimate of permitted flow capacity and tapping fees: All applications for connection permits submitted by owners of commercial properties and industrial properties (non-residential) shall include an estimate of the gallons per day of expected
discharge into the sewer system, which when reviewed and approved by the Authority shall become the permitted flow capacity. The tapping fee payable with respect to such applications shall be calculated on the basis of the permitted flow capacity. Such original permitted flow capacity shall be included on the permit or approval issued by the Authority.

B. Monitoring and revising permitted flow: After commercial or industrial properties (non-residential) have been connected to the sewer system, the Authority shall, on a regular basis, monitor the average daily flow from each commercial and industrial property. The average daily flow shall be determined by the Authority based upon the user and its particular operations as they affect the sewer system. If the average daily flow for any commercial or industrial property is determined by the Authority to exceed the current permitted flow capacity for the property then BTMA shall bill the property owner a tapping fee based on the flow from the most recently completed fiscal year that exceeds the current permitted flow capacity. The property owner shall have 30 days from the date of such bill to pay the Authority the additional tapping fee.

C. Payment for additional capacity and future calculations if additional capacity is purchased: Upon receipt of payment for any additional capacity purchased under the above Subsection B, the Authority shall modify the connection permit for such property to reflect the increased permitted flow capacity from such property. This increased permitted flow capacity shall become the basis upon which any future determinations of additional permitted flow capacity as required in above Subsection B shall be calculated, until which time additional permitted capacity is again purchased.

SECTION 30.2.06. - Owner Responsibility and Indemnification.

All costs and expenses of construction of the Building Sewer, and all costs and expenses of Connection of the Building Sewer to the Sewer System, shall be paid by the Owner of the Improved Property to be connected; such Owner shall indemnify and save harmless the Township and Authority from all loss or damage that may be occasioned, directly or indirectly, as a result of construction of the Building Sewer or of Connection of the Building Sewer to the Sewer System, or part thereof.

SECTION 30.2.07. - Failure to Connect.

If the Owner of any Improved Property located within the Sewered Area, which in the opinion of the Authority such Improved Property is accessible to the Sewer System, shall not have connected the Improved Property to the Sewer System within sixty (60) days after notice from the Township or Authority to connect said Improved Property, the Authority may make such Connection and may collect from the Owner the cost and expenses thereof.

SECTION 30.2.08. - Disconnection of Existing Sewage Facilities.

At the time that an Improved Property (currently serviced by private or on lot system(s)) is connected to the "Public" (BTMA) Sewer System in accordance with the Connection Ordinance, the existing house sewer line shall be disconnected from the private system,
and all existing sewage disposal systems, devices, or facilities shall be properly decommissioned and no longer be used in any manner whatsoever.

SECTION 30.2.09. - Sewer Capacity Agreement for Non-Residential Users.

No Sewer Permit will be issued until a non-residential user has entered into a Sewer Capacity Agreement in form acceptable to the Authority.

ARTICLE 3 - CONNECTION FEES

SECTION 30.3.01. - Basis of Fees & Associated Other Fees.

A. Where the Authority constructs and installs a lateral from the sanitary sewer to the right-of-way line, there is hereby imposed and fixed upon the owner of each property making connection to the sewer system a connection fee. This connection fee is separate and distinct from the tapping fee or any other fees described herein. The connection fee is generally for the purpose of payment of any and all associated costs with making the physical connection to the public sewer (within the public right of way).

B. The owner of said property (desiring to connect) shall be responsible for any and all costs associated with the physical connection to the public sewer (within the public right of way). The owner may have the option to either have the connection constructed by an approved contractor or otherwise reimbursing the Authority's contractor for making the necessary connection within the below listed conditions:

1) The Authority's contractor shall be reimbursed by the owner for any and all costs associated with the connection of the property to the public sewer.

2) The individual's contractor (if so elected) may require additional permits, insurance & bonding for working within public right of ways as necessary. The owner of said property contracting with an individual contractor shall be responsible for providing any necessary documents and fully responsible for the contractor (completion of work, payments, insurance, etc.).

3) In addition to the construction costs for the sewer connection any and all engineering, inspection & administrative costs shall be the responsibility of the owner desiring connection to the sewer system.

SECTION 30.3.02. - Payment of Connection Fees.

The connection fee shall be payable upon application to connect or otherwise when the actual costs are known (before construction). Any additional costs to connect including but not limited to connection to the sewer, engineering costs, inspection costs, administrative costs shall be payable upon issuance of invoices for the work.
ARTICLE 4 - REVIEW AND INSPECTION FEES

SECTION 30.4.01. - Engineering and Legal Review Fees.

All legal and engineering fees in connection with the review and approval of subdivision or land development plans by the Authority must be paid in full by the owner, developer or subdivider, prior to the Authority indicating its ability and willingness to serve the proposed subdivision or land development by connection to the Sewer System. Per the Connection Ordinance, such indication of the Authority's willingness to serve is a precondition to receiving Township approval of any preliminary plan.

SECTION 30.4.02. - Inspection Fees.

The costs of all construction inspections by the Authority or its Engineer, for inspections as may be required by the Connection Ordinance or these Regulations, shall be paid by the owner, builder, subdivider or developer of an Improved Property which is connected to, or in the process of being connected to, the Sewer System.

SECTION 30.4.03. - ALL OTHER Fees.

The costs of all OTHER FEES by the Authority, its Attorney, its Engineer, or AGENTS for reviews, inspections, evaluations, determinations either incidental, indirect or direct or otherwise as may be required by the implementation or administration of the Connection Ordinance or these Regulations, shall be paid by the owner, builder, subdivider or developer of an Improved Property which is connected to, or in the process of being connected to, the Sewer System.
CHAPTER 40

CONSTRUCTION STANDARDS

APPENDICES REFERENCED IN CHAPTER 40:

Appendix D - Residential Standard Details & Requirements.
Appendix E - General Standard Details & Requirements.
Appendix G – Technical Standards
Appendix H - Wastewater Pumping Station Specifications, Standards & Details (typical layouts and requirements)

ARTICLE 1- GENERAL STANDARDS

SECTION 40.1.01. - Lead Free Requirement.

No Person shall use or authorize another Person to use in the construction, modification, or repair of any plumbing system, any pipe, pipe fitting, solder or flux that is not lead free.

SECTION 40.1.02. - Materials; Workmanship.

In all new construction, materials must be new, free from defects, of first quality, and be certified as to grade, weight, gage, and quality. The construction, assembly, repair and alteration of drainage work must be thorough and workmanlike, with proper regard for alignment, uniform grades, and security or fastenings and supports. Joint and connections shall be uniform and sturdy, using fittings whose type and angle avoid distortion and strain.

SECTION 40.1.03. - Grinder Pumps.

A. Grinder pumps shall be allowed only by exception and specific approval by the Authority. The Authority shall also determine if any other improvements are needed to protect the overall sewer system by allowing the use of grinder pumps on a particular site.

B. The Owner of Improved Property within any pressurized portion of the Sewer System shall acquire, install, operate and maintain, at such Owner's cost and expense, a grinder pump or similar apparatus satisfactory to the Authority as part of the Building Sewer in the manner and at the location directed by the Authority. Such grinder pump shall be installed at the time such Improved Property is connected to the Sewer System and shall be subject to continuous inspection and approval together with the remainder of the Building Sewer.

C. The Owner shall ensure that all Domestic Sanitary Sewage or Industrial Waste is discharged through the grinder pump prior to discharge into the Sewer System. The pump shall be part of the plumbing system and Building Sewer, and the Owner of the Improved
Property will remain responsible for the future use, operation, maintenance, and repair or replacement of the pump.

SECTION 40.1.04. - Other Water Sources Prohibited.

No Person shall allow water from floor drains, sump pumps, wall gutters, roof leaders, French drains, foundation drains, perforated pipe, pools, or any source of rainwater or groundwater to be collected and discharged into the Sewer System by any direct or indirect means; nor shall any Person connect or provide connection for any of the aforementioned sources of water to the internal plumbing of any structure, Building Sewer, Lateral, or other part of the Building Sewer or Sewer System.

SECTION 40.1.05. - Grease, Oil, and Sand Interceptors or Traps.

Interceptors and traps for restaurants, hotels, boardinghouses, public eating places, service stations, garages, factory buildings and similar establishments shall be approved by the Authority, and shall be installed and maintained by the Owner of such facility. The type and size shall be consistent with the International Plumbing Code, Interceptors and Separators, as amended, unless expressly waived by the Authority. All Industrial, Commercial or Institutional Establishments shall comply with any more stringent Plumbing Code requirements of the agency having appropriate jurisdiction. All interceptors shall be readily and easily accessible for cleaning and inspection.

SECTION 40.1.06. - Separate Connections.

Except as otherwise provided in this section; each Dwelling Unit on any improved property shall be connected separately and independently to the Sewer System through a building sewer to a lateral. Groupings of more than one Dwelling Unit, or more than one Improved Property, on one Building Sewer shall not be permitted. All Owners shall maintain, repair and renew, at their own expense, their own Plumbing System, Building Sewer, clean outs, vents, grinder pumps, and check valves in such a manner and in such fashion as to prevent and correct leakage and/or hazardous conditions, in accordance with the Technical Standards, Appendix G, adopted by the Authority.

SECTION 40.1.07. - Connection at Lateral; Building Sewer Size and Slope.

A building shall be connected to the Sewer System by a Building Sewer at the place designated by the Authority and where the Lateral is provided for the discharge of Sewage from the first and higher floors. The size and slope of the Building Sewer shall be subject to approval of the Authority.

SECTION 40.1.08. - Inspection.

No Building Sewer may be covered until it has been inspected and approved by the Authority's Engineer or other designated representative, which inspection and approval
shall also include the requirement in the preceding Article that existing sewer facilities be disconnected and use thereof be discontinued as may be applicable.

SECTION 40.1.09. - Maintenance.

A. Every Building Sewer shall be maintained in a sanitary and safe operating condition by the Owner of the Improved Property.

B. If any person shall fail or refuse, upon receipt of a notice from the Township or the Authority, in writing, to remedy any unsatisfactory condition with respect to a Building Sewer, within thirty (30) days of the receipt of such a notice, the Authority may refuse to permit such person to discharge Sewage into the Sewer System until such unsatisfactory condition shall have been remedied to the satisfaction of the Authority.

SECTION 40.1.10. - Additional Requirements for Large Consumers.

A. All collection lines, pumps and other facilities necessary to convey Sewage from a Large Consumer's Improved Property to the Sewer System shall be installed at the Owner's sole expense pursuant to plans submitted to and approved by the Authority.

B. If required by the Authority, a Large Consumer shall install a sewage flow meter at the Owner's sole expense. Such meter must be of the type and in the location specified by the Authority, and must be accessible to Authority officials at all times.

C. When required by the Authority, the Owner of any Improved Property which is identified as a Large Consumer shall install, at his expense, a suitable control manhole, together with such necessary meters and other appurtenances in the Building Sewer, to facilitate observation, sampling and measurement of the waste flow by the Authority.

ARTICLE 2 - STANDARD CONSTRUCTION DETAILS

SECTION 40.2.01. - Background.

The contents as referenced herein represent the standard construction specifications, details which the Authority has adopted for use within their system. All infrastructure proposed within, adjacent to or connecting to the Authority's system shall comply with these standards and requirements. Any deviations from these standards shall require Authority approval in accordance with Section 40.2.05 below.

SECTION 40.2.02. - Residential Standard Details Referenced.

Any and all residential sewer connections shall be connected to the Authority's system in compliance with the current Residential Standard Details as attached herewith and made a part hereof by reference (Appendices D & F). The Authority has the right to amend these standards as they determine appropriate from time to time.
SECTION 40.2.03. - General Standard Details Referenced.

Any and all general sewer construction and connections shall be connected to the Authority's system in compliance with the current General Standard Details as attached herewith and made a part hereof by reference (Appendix F). The Authority has the right to amend these standards as they determine appropriate from time to time.

SECTION 40.2.04. - Wastewater Pumping Station Standards & Details Referenced.

Construction Specifications, Standards & Details (typical layouts and requirements) for Wastewater Pumping Stations are found in their entirety in Appendix H of these Rules & Regulations as attached herewith and made a part hereof by reference. The Authority has the right to amend these standards as they determine appropriate from time to time.

SECTION 40.2.05. - Waivers and Modifications of Standards.

All sewer related infrastructure proposed within, adjacent to or connecting to the Authority's sewer system shall comply with these standards and requirements. Consideration shall be given by the Authority on a case by case basis if a particular section or requirement needs to be modified for a particular site. Modifications shall be made in writing to the Authority referencing the section requested to be modified, the reasons for the modification and appropriate and adequate technical and supporting documentation justifying the modification request. The Authority shall make a decision based upon the merits of the specific request and the overall benefit or detriment the modification will have on the overall system. All modification requests shall provide for an equal or better requirement than what is the Authority's standard and shall not be detrimental to the overall sewer system all as determined solely by the Authority.
CHAPTER 50

TECHNICAL SPECIFICATIONS

APPENDICES REFERENCED IN CHAPTER 50:

Appendix D - Construction Specifications for Residential Building Sewer Connections
Appendix E - Acceptable Manufacturers
Appendix F - Construction Details and Index
Appendix G - Construction Specifications for Dedicated Sewer Systems

ARTICLE 1 - TECHNICAL SPECIFICATIONS

For the purpose of this Article the specific regulations, standards and information contained herein are made a part hereof by reference all as described below.

SECTION 50.1.01. - Residential Building Sewer Connections.

Construction Specifications for Residential Building Sewer Connections are found in Appendix D.

SECTION 50.1.02. - Acceptable Manufacturers.

A list of Acceptable Manufacturers for Sewer System materials, components and infrastructure are found in Appendix E.

SECTION 50.1.03. - Standard Details.

Standard details for the Sewer System components and infrastructure are found in Appendix F.

SECTION 50.1.04. - Dedicated Sewer Systems.

Construction Specifications for Dedicated Sewer System components and infrastructure are found in Appendix G.
CHAPTER 60
PROHIBITED WASTES

APPENDICES REFERENCED IN CHAPTER 60:

No appendices referenced herein.

ARTICLE 1 - STANDARD RESTRICTIONS

SECTION 60.1.01. - Other Water Sources Prohibited.

No Person shall discharge or shall cause to be discharged into the Sewer System any Storm Water, surface water, spring water, Ground Water, roof runoff, subsurface drainage, building foundation drainage, cellar drainage or drainage from roof leader connections or sump pumps. Furthermore, it is hereby established that no person shall discharge or cause to be discharged into the Sewer system water from Swimming Pools, Ponds, Hot Tubs, Spas or of a similar nature or source without prior review and approval by the Authority. In the case of swimming pools, ponds, hot tubs, spas, etc. specific charges and discharge limitations will be implemented if appropriate and approved at the time of request.

SECTION 60.1.02. - Prohibited Characteristics.

Except as otherwise provided, no Person shall discharge or cause to be discharged into the Sewer System any matter or substance:

A. Having a temperature higher than one hundred forty degrees Fahrenheit (140° F) or forty degrees Centigrade (40° C), or less than thirty-two degrees Fahrenheit (32° F) or zero degrees Centigrade (0° C).

B. Containing more than one hundred (100) ppm of fat, oil or grease;

C. Any liquids, solids or gases which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the WWTF or to the operation of the WWTF. At no time shall two (2) successive readings on an explosion hazard meter, at any point of discharge into the system (or at any point in the system), be more than five percent (5%), nor any single reading be over ten percent (10%), of the Lower Explosive Limits (LEL) of the meter. Prohibited materials include, but are not limited to, gasoline, fuel oil, motor oil, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, sulfides and any other substances which the Authority, the Commonwealth or the EPA has notified the User is a fire hazard or a hazard to the Sewer System or the WWTF;

D. Containing any solid wastes with particles greater than one-half inch (1/2") in any dimension, resulting from preparation, cooking and dispensing of food and from handling,
storage and sale of produce, which wastes commonly are known as Garbage, which have not been ground by household type garbage disposal units or other suitable garbage grinders;

E. Containing any solids or viscous substances which may cause obstruction to flow in the Sewer System or other interference with the proper operation of the WWTF such as, but not limited to: animal guts or tissues, paunch manure, bones, hair, hides or fleshings, feathers, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, strings, wood, plastics, gas, tar, asphalt residues, residues from refining or processing of fuel or lubricating oil, mud, glass grinding or polishing wastes, dental floss, wool, cotton, or other fibers;

F. Having a pH lower than six (6.0) or higher than nine (9.0), or having any other corrosive property capable of causing damage or hazards to structures or equipment of the Sewer System or any Sewer or to any Person engaged in operation and maintenance of the Sewer System;

G. Containing toxic or poisonous substances in sufficient quantity to injure or to interfere with any sewage transmission or treatment process, to constitute hazards to humans or animals or to create any hazards in water which shall receive treated effluent from the Sewer System;

H. Containing dyes or other materials with objectionable color from any source that will result in WWTF effluent exceeding limits in compliance with applicable State or Federal regulations;

I. Any substance which may cause the WWTF’s effluent or any other product of the WWTF’s such as residues, sludges or scums, to be unsuitable for reclamation and reuse or to interfere with the reclamation process. In no case shall a substance discharged to the WWTF be in non-compliance with sludge use or disposal criteria, guidelines or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act or Commonwealth criteria applicable to the sludge management method being used;

J. Containing radio-active substances or isotopes of such half-life or concentration that will result in a treatment plant effluent exceeding limits in compliance with applicable State or Federal regulations;

K. Having a chlorine demand in excess of twelve (12) mg/L at a detention time of twenty (20) minutes;

L. Prohibited by any permit issued by the Commonwealth or the EPA;
M. Containing wastes which are not amenable to biological treatment or reduction in existing treatment facilities, specifically non-biodegradable complex carbon compounds;

N. Having a C.B.O.D. content greater than three hundred (300) ppm;

O. Having a Suspended Solids content greater than three hundred (300) ppm;

P. Having a Total Phosphorus as P content greater than ten (10) ppm;

Q. Having an Ammonia Nitrogen as N content greater than thirty-five (35) ppm;

R. Having any waste containing toxic or poisonous substances in excess of the following limits, measured at the point of discharge to the Sewer System:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Maximum Concentration ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>0.05</td>
</tr>
<tr>
<td>Cadmium (as Cd)</td>
<td>0.1</td>
</tr>
<tr>
<td>Chromium (trivalent)</td>
<td>1.0</td>
</tr>
<tr>
<td>Chromium (hexavalent)</td>
<td>0.05</td>
</tr>
<tr>
<td>Copper (as Cu)</td>
<td>0.5</td>
</tr>
<tr>
<td>Cyanides (free CN)</td>
<td>0.05</td>
</tr>
<tr>
<td>Lead</td>
<td>0.3</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.002</td>
</tr>
<tr>
<td>Nickel (as Ni)</td>
<td>2.0</td>
</tr>
<tr>
<td>Phenolic Compounds</td>
<td>0.005</td>
</tr>
<tr>
<td>Silver</td>
<td>0.05</td>
</tr>
<tr>
<td>Zinc (as Zn)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

S. Containing any substance not mentioned in the foregoing list that will pass through the WWTF or the Sewer System and exceed the maximum permitted levels for such substance under the requirements of the Commonwealth or other governmental agencies having jurisdiction;
T. Containing any noxious or malodorous gases or substances capable of creating a public
nuisance; or

U. Any other substance prohibited by ordinance, resolution, rule or regulation of the Authority
hereafter enacted or adopted from time to time.

SECTION 60.1.03. - Prior Approval.

Under no circumstances shall any Person discharge or cause or permit to be discharged into
the Sewer System any of the substances listed in Section 60.1.02 above, without first securing
written permission to do so from the Authority.

SECTION 60.1.04. - More Stringent Limitations.

Upon the promulgation of the Federal Categorical Pretreatment Standards for a particular
industrial subcategory, the Federal Standard, if more stringent than limitations imposed under
this Resolution for sources in that subcategory, shall immediately supersede the limitations
imposed under this Resolution. The Authority shall notify all affected Users of the applicable
reporting requirements under 40 CFR, Section 403.12.

SECTION 60.1.05. - Dilution.

No User shall ever increase the use of process water or, in any way, attempt to dilute a discharge
as a partial or complete substitute for adequate treatment or pretreatment to achieve compliance
with the limitations contained in the Federal Categorical Pretreatment Standards, or in any
other pollutant-specific limitation developed by the Authority or the Commonwealth.
(Comment: Dilution may be an acceptable means of complying with some of the prohibitions
set forth in Section 60.1.02, e.g. the pH prohibition. Such practices must receive prior written
approval from the Authority).

SECTION 60.1.06. - Authorized Discharge of Prohibited Characteristics.

Whenever a Person is authorized by the Authority and the appropriate governmental agencies
to discharge any polluted water or wastewater containing any of the substances or possessing
any of the characteristics referred to in Section, 60.1.02, such discharge shall be subject to the
continuing approval, inspection and review of the Authority. If, in the opinion of the Authority,
such discharges are causing or will cause damage to the WWTF or the Sewer System, the
Authority shall order the Person causing such discharge to cease doing so forthwith, or to take
other appropriate action, including exercising the remedies provided in the Connection
Ordinance, to eliminate the harmful discharge.

SECTION 60.1.07. - Waiver by Agreement.

Nothing contained herein shall be construed as prohibiting any special agreement or
arrangement between the Authority and the Owner of an Improved Property allowing Industrial
Wastes of unusual strength or character to be admitted into the Sewer System.
SECTION 60.1.08. - Pretreatment.

A. Where necessary or appropriate, in the opinion of the Authority, the Owner of an Improved Property shall provide, at the sole expense of the Owner, suitable pretreatment facilities acceptable to the Authority.

B. Plans, specifications and any other pertinent information relating to proposed facilities for preliminary treatment and handling of Industrial Wastes shall be submitted for approval of the Authority. No construction of any such facility shall commence until approval has been obtained, in writing, from the Authority, and until approval has been obtained from any and all regulatory bodies having jurisdiction.

C. Such facilities for preliminary treatment and handling of Industrial Wastes shall be continuously maintained, at the sole expense of the Owner, in good operating condition satisfactory to the Authority. The Authority shall have access to such facilities at reasonable times for purposes of inspecting and sampling.

SECTION 60.1.09. - Connection of Other Sewage Facilities.

No connection from any Holding Tank, retaining tank, privy vault, cesspool, sinkhole, septic tank, or similar receptacle shall be made with the Sewer System except by agreement with the Authority.
APPENDICES REFERENCED IN CHAPTER 70:

Appendix A - Review, Permit, Inspection, User and Tapping Fees.
Appendix C - Sewer Connection Application/Permit.

ARTICLE 1 - CONNECTION PERMIT

SECTION 70.1.01. - Permits Required.

No person shall uncover, connect to, make any opening into, use, alter, or disturb, in any manner, any Building Sewer or any portion of the Sewer System, without first obtaining all permits required by the Authority.

SECTION 70.1.02. - Connection Prerequisites.

A. No Person shall make or cause to be made a Connection of any Improved Property with the Sewer System, until such Person shall have fulfilled each of the following conditions:

B. Such person shall have notified the Authority, in writing, of the desire and intention to connect such Improved Property to the Sewer System.

C. Such person shall have applied for and obtained all permits required by the Authority. Application for such permit(s) shall be made on a form to be provided by the Authority. Refer to Appendix C for the Sewer Connection Permit Application. Refer to Appendix A for Review, Permit, Inspection, User and Tapping Fees.

D. Such person shall have given the Authority at least twenty-four (24) hours notice of the time when such Connection will be made so the Authority may, through its Engineer or other authorized agents, supervise and inspect the work of Connection, and to perform any necessary testing.

E. Such person shall have furnished satisfactory evidence to the Authority that any reserved capacity, connection, tapping and inspection fees, as may be applicable, which have been charged or imposed against the Owner of any such Improved Property, have been paid.
ARTICLE 2 - CONNECTION DETAILS & REQUIREMENTS

SECTION 70.2.01. - Residential Connection (single).

Any and all single residential connections shall be made in accordance with the Residential Sewer connection standards (Section 40.2.02). These standards shall apply to those residential connections which are within existing sewer collection lines and can readily connect to the existing sewer system and clearly comply with these standards and requirements. Any deviations from these standards and requirements would require separate submittals, review and approval by the Authority.

SECTION 70.2.02. - Residential Connection (multiple).

Any and all multiple residential connections shall require separate submittals, review and approval by the Authority in processing a sewer connection permit. Since these type connections (multiple) are unique and may require further reviews and additional infrastructure these type connections will also require a more extensive review of the proposed connection details to verify conformance with the Authority's standards and requirements.

Anyone desiring to make this type of connection is asked to meet with the Authority to evaluate the proposal and give further guidance on what information may be required for further reviews and approvals of this type of connection. This meeting can be an informal meeting with the Authority representatives and Engineer (as may be necessary) at the applicant's request. Otherwise detailed plans and information shall be submitted with the sewer connection permit and will be reviewed and approved accordingly.

SECTION 70.2.03. - Non-Residential (aka Large Consumer) Connection.

Any and all non-residential connections shall require separate submittals, review and approval by the Authority in processing a sewer connection permit. Since these type connections are unique and will require further reviews and additional infrastructure these type connections will also require a more extensive review of the proposed connection details to verify conformance with the Authority's standards and requirements.

Anyone desiring to make this type of connection is asked to meet with the Authority to evaluate the proposal and give further guidance on what information may be required for further reviews and approvals of this type of connection. This meeting can be an informal meeting with the Authority representatives and Engineer (as may be necessary) at the applicant's request. Otherwise detailed plans and information shall be submitted with the sewer connection permit and will be reviewed and approved accordingly.
CHAPTER 80

ADMISSION OF NON-RESIDENTIAL WASTES INTO THE SEWER SYSTEM

APPENDICES REFERENCED IN CHAPTER 80:

Appendix A - Review, Permit, Inspection, User and Tapping Fees
Appendix B - Non-Residential Sanitary Sewer Questionnaire (New and Existing Users)

ARTICLE 1- GENERAL REQUIREMENTS

SECTION 80.1.01. - Permit Required.
No person shall discharge or cause to be discharged into the Sewer System any Non-Residential Wastes without prior application for and receipt of a written permit from the Authority.

SECTION 80.1.02. - Non-Residential Wastes Questionnaire.
Any Person desiring to make or use a Connection through which Non-Residential Wastes shall be discharged into the Sewer System shall file with the Authority a completed "Non-Residential Wastes Questionnaire", furnished by the Authority, which shall supply pertinent data, including estimated quantity of flow, characteristics and constituents of the proposed discharge. Refer to Appendix B, Non-Residential Sanitary Sewer Questionnaire (New and Existing Users). The cost of obtaining all such data shall be borne by the Person desiring to make or use the Connection to the Sewer System. Refer to Appendix A, Review, Permit, Inspection, User and Tapping Fees.

SECTION 80.1.03. - Quarterly Reports.
A. Ten (10) days prior to the first day of January, April, July and October of each year, each Large Consumer or other major contributor of Non-Residential Wastes shall file with the Authority a report on the quality and quantity of its discharge. The report forms shall be supplied by the Authority and shall be similar to EPA 7550-22, page IV-1.

B. Major Contributors of Non-Residential Wastes shall consist of those whose total discharge exceeds twenty thousand (20,000) gallons per day, or have in their waste a toxic pollutant or, or have in their waste stream constituents higher than the residential strength of waste listed as follows (TSS of 240 mg/L, BOD of 240 mg/L, TP of 10 mg/L, TN of 35 mg/L),
or in the judgment of the Authority, would have a significant impact on the Sewer System or the quality of its effluent.

SECTION 80.1.04. - Sampling Facilities.

A. When required by the Authority, the Owner of any Improved Property serviced by a Building Sewer carrying Non-Residential Wastes shall install, at his expense, a suitable control manhole, together with such necessary meters and other appurtenances in the Building Sewer, to facilitate observation, sampling and measurement of the waste flow.

B. All measurements, tests and analyses of the characteristics of waters and wastes to which reference is made herein shall be determined in accordance with the latest edition of "Standard Methods for Examination of Water and Wastewater", published by the American Public Health Association, Inc., and shall be determined by or under the direct supervision of a "qualified analyst" at the control manhole provided, or upon suitable samples taken at such control manhole. In the event that no special manhole has been required, the control manhole shall be considered to be the nearest downstream manhole in the Sewer System to the point at which the Building Sewer is connected. Sampling shall be carried out by customarily accepted methods to reflect the effect of constituents upon the Sewer System and to determine the existence of hazards to life, limb and property. (The particular analyses involved will determine whether a twenty-four (24) hour composite of all outfalls of a premises is appropriate or whether a Grab Sample or samples must be taken.)

SECTION 80.1.05. - Changes in Operation; Notification.

Any Non-Residential Establishment discharging Domestic Sanitary Sewage or Non-Residential Wastes into the Sewer System and contemplating a change in the method of operation that will alter the characteristics or volume of such wastes being discharged shall notify the Authority, in writing, at least thirty (30) days prior to institution of such change.

SECTION 80.1.06. - Garbage Grinders Prohibited.

The use of mechanical garbage grinders in a Non-Residential Establishment or a Commercial Establishment shall not be permitted without prior approval from the Authority.

SECTION 80.1.07. - Equalizing Devices.

The Authority may require Non-Residential Establishments having large variations in rates of waste discharge to install suitable regulating devices for equalizing waste flows to the Sewer System.
CHAPTER 90

PENALTIES AND ENFORCEMENT

APPENDICES REFERENCED IN CHAPTER 90:

NONE

ARTICLE 1 - OFFENSES AND FINES

SECTION 90.1.01. - Injunctions.

The Authority shall also have the power to institute suits in law or in equity, to file summary citations, civil complaints and to file municipal claims and liens to restrain or prevent violations of Act 537 or these Rules and Regulations occurring within the Sewered Area.

SECTION 90.1.02. - Summary Offense; Fines.

Any Person who shall violate any provision of the Connection Ordinance, these Rules and Regulations, or Act 537, or the rules, regulations or standards promulgated pursuant thereto, or who is the Owner of an Improved Property on which a condition exists which constitutes a nuisance, or who resists or interferes with any officer, agent or employee of the Township or the Authority in the performance of his or her duties, shall be guilty of a summary offense. Upon conviction thereof, such Person shall be sentenced to pay a fine of not less than Three Hundred Dollars ($300.00) nor more than Two Thousand Five Hundred Dollars ($2,500.00) plus costs.

SECTION 90.1.03. - Violations, Remedies, Penalties, Damages & Hearings.

A. In addition to proceeding under any other remedy available at law or in equity for a violation of any provision of the Connection Ordinance, these Rules and Regulations, Act 537, or any rule or regulation promulgated thereto, or any order or permit issued by the Township or the Authority, after notice and hearing, the Authority may assess a civil penalty against any person for that violation.

B. In addition, the Authority may assess the cost of damages caused by such violation and the cost of correcting such violation. Before assessing a civil penalty or such costs, the Authority shall provide a violator with a notice of proposed assessment which cites the violation, and offers to conduct an assessment hearing to evaluate the violation and the amount of the penalty or cost. The notice of proposed assessment shall contain an explanation of the right to a hearing and appeal.

C. The Authority shall assign a representative to hold the assessment hearing. The assessment
hearing shall not be governed by the requirements for formal adjudicatory hearings and may be held at any time at the convenience of the parties. The civil penalty may be assessed whether or not the violation was willful. The civil penalty so assessed shall not be less than Three Hundred Dollars ($300.00) and not more than Two Thousand Five Hundred Dollars ($2,500.00) for each violation. In determining the amount of the penalty, the Authority shall consider:

1. the willfulness of the violation;
2. damage to Authority facilities;
3. damage to water, land or other natural resources or their uses;
4. cost of restoration and abatement;
5. savings resulting to the person in consequence of the violation;
6. deterrence of future violations; and
7. other relevant factors.

D. If a Person against whom costs or a civil penalty has been assessed after notice and hearing pursuant to the preceding subparagraph fails to pay the assessed costs or penalty in full or to perfect an appeal de novo within thirty (30) days following assessment of the civil penalty, such failure to pay or perfect an appeal shall constitute a separate violation for which an additional civil penalty may be assessed. Additional violations shall be deemed to occur and additional civil penalties may be assessed each time a person fails to pay or perfect an appeal.

E. When the Authority has assessed costs or a civil penalty pursuant to the two preceding subparagraphs, the Person assessed with the costs or civil penalty shall then have thirty (30) days to pay the costs or penalty in full. If the Person wishes to contest the penalty or the fact of the violation, the Person has a right to an appeal de novo to the full Board of Directors of the Authority under the provisions of the Local Agency Law. The Person shall forward the amount of the civil penalty to the Authority within the thirty (30) day period for placement in an escrow account with any bank in this Commonwealth, post an irrevocable letter of credit issued by a Federal or Commonwealth-chartered lending institution or post an appeal bond payable to the Authority within such thirty (30) days in the amount of the assessed penalty or other such amount as may be approved by a court of competent jurisdiction. The bond shall be executed by a surety licensed to do business in this Commonwealth and in a form satisfactory to the Authority. If through administrative or final judicial review of the proposed assessed penalty it is determined that no violation occurred or that the amount of the penalty is reduced, the Authority shall, within thirty (30) days, remit the appropriate amount to the person. Failure to make the required deposit in escrow or submit an irrevocable letter or credit or a surety bond as provided in this subsection shall result in a waiver of all legal rights to appeal the violation or the amount of the penalty or costs so assessed.

F. In any case where the Authority determines that damage resulting from the violation is of a continuing nature, the Authority may impose a weekly assessment of not more than Two Thousand Five Hundred Dollars ($2,500.00) per week for each week the violation
continues unabated by the violator. The weekly assessment shall accrue indefinitely after the
date of notice of the assessment to the violator.

G. Costs and civil penalties shall be payable to the Authority and shall be collectable in any
manner provided by law for the collection of debts. If any person liable to pay these costs or
penalty neglects or refuses to pay the same after demand, the amount of the costs or civil
penalty, together with interest and any costs that may accrue, shall constitute a judgment in
favor of the Authority upon the real property of the Person from the date it has been entered
and docketed on record by the Prothonotary of the county where such land is situated. The
Authority may, at any time, transmit to the prothonotaries of the respective counties certified
copies of all these judgments, and it shall be the duty of each Prothonotary to enter and docket
them and to index the same as judgments are indexed without requiring the payment of costs
as a condition precedent to the entry thereof.

SECTION 90.1.04. - Fines & Civil Penalties disposition.
Fines and civil penalties collected pursuant to these Rules and Regulations by the Authority
shall be placed in a restricted account and shall only be disbursed by the Township in
accordance with the requirements set forth in the Pennsylvania Sewage Facilities Act, as
amended from time to time.

SECTION 90.1.05. - Legal Fees & Charges.
Legal fees shall be charged by the Solicitor for the Township or the Authority for the services
indicated, and liened against properties in violation of these Rules and Regulations to be paid
by the delinquent account holders in connection with delinquent and overdue accounts owned
for sewer charges. Refer to Bethel Township's Ordinance (NO. 2011-01) for the appropriate
and necessary terms and provisions allowing for the charging and collection of Legal Fees by
the Bethel Township Municipal Authority.

ARTICLE 2 - COLLECTION OF DELINQUENT SEWER BILLS

SECTION 90.2.01 - Liens.
The User Charges and applicable surcharges established and imposed upon the Owner of an
Improved Property by the Authority shall be a lien upon the Improved Property which is
connected to and served by the Sewer System from the date each such charge becomes due
and payable under the provisions of this or any other Resolution of the Authority. The
Authority shall, through the assistance of the Solicitor, file a lien against any Improved
Property for which fees are more than sixty (60) days past due, by filing the required
documentation in the Office of the Prothonotary of Berks County, in the manner provided by
law for the filing and collection of municipal claims. The municipal lien shall be filed by the
Authority within three (3) years of the date on the bill notice.
SECTION 90.2.02. - Filing Suit.

The Authority shall, through the assistance of its Solicitor, file suit with the local district justice to collect any fees which are more than sixty (60) days past due. Suit filed shall include claims for the actual User Charges and any applicable surcharges, late fees, court costs, and attorneys' fees. Refer to Bethel Township's Ordinance (NO. 2011-01) for the appropriate and necessary terms and provisions allowing for the charging and collection of Legal Fees by the Bethel Township Municipal Authority.
Bethel Township Municipal Authority
Appendices Index

Appendix A
Review, Permit, Inspection, User and Tapping Fees

Appendix B
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Construction Specifications for Residential Building Sewer Connections

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Wastewater Pumping Station Specifications
REVIEW FEES

All legal and engineering fees in connection with the review and approval of subdivision or land development plans by the Authority must be paid in full by the owner, developer or subdivider, prior to the Authority indicating its ability and willingness to serve the proposed subdivision or land development by connection to the Sewer System. Per the Connection Ordinance, such indication of the Authority's willingness to serve is a precondition to receiving Township approval of any preliminary plan.

CONNECTION PERMIT FEES

Each separate residential or nonresidential connection to the Authority's Sewer System shall pay a connection permit fee of $100.00 upon application for a permit to connect to the Sewer System.

TAPPING FEES

Tapping Fees payable by the Owner of an Improved Property described shall be $7,500.00 per EDU (Equivalent Dwelling Unit) of wastewater to be collected and treated from such Improved Property or alternatively in the amount of the then current fee established by the Authority by Resolution and may be amended from time to time by the Authority.

CONNECTION FEES

Each separate residential or nonresidential connection to the Authority's Sewer System shall pay a connection fee to be established based upon the actual price determined for the physical connection to the Sewer System. This fee varies for each individual site and shall be determined and paid prior to connection into the sewer system is made.

USER FEES

The User Charge payable per Equivalent Dwelling Unit is set by the Authority by resolution, and may be amended from time to time by the Authority. The current User Charge is $85.00 per EDU.

INSPECTION FEES

The costs of all construction inspections by the Authority or its Engineer, for inspections as may be required by the Connection Ordinance or these Regulations, shall be paid by the owner, builder, subdivider or developer of an Improved Property which is connected to, or in the process of being connected to, the Sewer System. The rates shall be the rates established by resolution from time to time by the Authority as they appoint their designated engineer and their respective rates and charges.
BTMA Non-Residential Sanitary Sewer Questionnaire

BUSINESS NAME:_________________________________________________________________

Contact Name:                                                Contact Phone Number & E-Mail:

Business Street Address:

Business Mailing Address:

The following form was developed based on the Tapping Fee Resolution and the information will be used in
developing the Equivalent Dwelling Unit (EDU) value which will be assessed to your business. Please complete
this form (which ever category(s) is associated with your business) to the best of your knowledge and submit the
completed form to the Bethel Township Municipal Authority and/or their engineering consultant.

<table>
<thead>
<tr>
<th>Business Category</th>
<th>Number of Employees</th>
<th>What number of the following items does your business have?</th>
<th>Fill in the number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive Service Station or Commercial Vehicle Repair Shop</td>
<td></td>
<td># of Bays</td>
<td></td>
</tr>
<tr>
<td>Beauty / Barber Shop</td>
<td></td>
<td># of Customer Chairs</td>
<td></td>
</tr>
<tr>
<td>Carwash</td>
<td></td>
<td># of Bays</td>
<td></td>
</tr>
<tr>
<td>Church</td>
<td></td>
<td># of Students / # of Staff</td>
<td>/</td>
</tr>
<tr>
<td>Community Hall</td>
<td></td>
<td># of Employees</td>
<td>/</td>
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<tr>
<td>Education/Institutional Establishment (not including Bus Drivers)</td>
<td></td>
<td># of Students</td>
<td></td>
</tr>
<tr>
<td>Fire Company / Ambulance</td>
<td></td>
<td># of Employees</td>
<td></td>
</tr>
<tr>
<td>Funeral Home</td>
<td></td>
<td># of Employees</td>
<td></td>
</tr>
<tr>
<td>Hotel / Motel / Bed &amp; Breakfast or Boarding House (Not Including Restaurant)</td>
<td></td>
<td># of Guest Rooms</td>
<td></td>
</tr>
<tr>
<td>Industrial/Warehouse Facility</td>
<td></td>
<td># of Employees / # of Truck Drivers</td>
<td>/</td>
</tr>
<tr>
<td>Laundromat</td>
<td></td>
<td># of Washers</td>
<td></td>
</tr>
<tr>
<td>Post Office</td>
<td></td>
<td># of Employees</td>
<td></td>
</tr>
<tr>
<td>Restaurant/Club/Tavern or Other Food or Drink Establishment</td>
<td></td>
<td># of Seats</td>
<td></td>
</tr>
<tr>
<td>Retail Store, professional offices or Other Commercial</td>
<td></td>
<td># of Employees</td>
<td></td>
</tr>
<tr>
<td>Education/Institutional Establishment (not including Bus Drivers)</td>
<td></td>
<td># of Students</td>
<td></td>
</tr>
</tbody>
</table>

1. TYPE OF BUSINESS: __________ INDUSTRIAL __________ COMMERCIAL __________ PROFESSIONAL

• NUMBER OF EMPLOYEES: ________________ FULL TIME ________________ PART TIME

• NUMBER OF SHIFTS PER DAY: ____________________________________________
BTMA Non-Residential Sanitary Sewer Questionnaire

• WHAT PRODUCTS ARE MANUFACTURED OR SERVICES SUPPLIED:_____________________________

• PLEASE PROVIDE A BRIEF DESCRIPTION OF THE PROCESS WHICH RESULTS IN A LIQUID INDUSTRIAL WASTE:


2. WATER SOURCE:
   a. MUNICIPAL - Average gallons used per day ______________
   b. OTHER SUPPLY – WELLS
      STREAMS __________gal/day on average
      IMPOUNDMENTS __________gal/day on average

3. WATER USE:
   a. PROCESS OR MFG:______________ average gallons used per day
   b. COOLING:______________ average gallons used per day
   c. DOMESTIC:______________ average gallons used per day
   d. OTHER:______________ average gallons used per day

4. WASTE DISCHARGE:

   • ARE CHEMICALS USED THAT ARE CONTAINED IN THE WASTE WATER?
     YES  NO  UNKNOWN

   • DOES THE WASTE WATER CONTAIN ANY OF THE FOLLOWING?
     a. FATS, OILS, GREASE- YES  NO  UNKNOWN
     b. GASOLINE OR FLAMMABLE PRODUCTS- YES  NO  UNKNOWN
     c. DYE OR DYE WASTE- YES  NO  UNKNOWN
     d. RADIOACTIVE MATERIAL- YES  NO  UNKNOWN
     e. PESTICIDES YES  NO  UNKNOWN
     f. SOAPS OR DETERGENTS YES  NO  UNKNOWN
     g. METAL SOLUTIONS YES  NO  UNKNOWN
     h. ACIDS, ALKALINE, CORROSIVE MATERIAL YES  NO  UNKNOWN

   • DOES THE WASTE WATER CONTAIN ANY OF THE FOLLOWING?
     CHECK ALL THAT APPLY
     ___CHROMATE ___TRIVALENT CHROMIUM ___ARSENIC ___SULFATE
     ___COPPER ___CYANIDE ___IRON ___LEAD
     ___ZINC ___CHLORIDE ___INSECTICIDES
     ___MAGNESIUM
     ___HEXAVALENT CHROMIUM
PLEASE LIST ANY OTHER TOXIC SUBSTANCES NOT COVERED IN THE ABOVE GROUP KNOWN OR ANTICIPATED TO BE PRESENT IN YOUR DISCHARGE:

WASTE DISCHARGE: (continued)
- DOES THE WASTE CONTAIN NOXIOUS OR MALODOROUS GAS CAPABLE OF CREATING A PUBLIC NUISANCE?
  IF SO, EXPLAIN

- SPECIFY THE CONCENTRATIONS OF THE FOLLOWING WHICH ARE FOUND IN THE WASTE WATER:
  - BOD
  - SUSPENDED SOLIDS
  - DISSOLVED SOLIDS
  - pH
  - TEMPERATURE

THE INFORMATION CONTAINED IN THIS APPLICATION IS FAMILIAR TO ME AND TO THE BEST OF MY KNOWLEDGE AND BELIEF IS TRUE, COMPLETE, AND ACCURATE.

__________________________  ___________________________  Date:___________
Signature of Applicant      (position)
BETHEL TOWNSHIP MUNICIPAL AUTHORITY (RULES & REGULATIONS)
APPENDIX C: SEWER CONNECTION APPLICATION/PERMIT

BETHEL TOWNSHIP MUNICIPAL AUTHORITY - SEWER CONNECTION PERMIT
APPLICATION FOR PERMIT TO CONNECT TO THE WASTE WATER FACILITIES

BTMA Mailing Address: P.O. Box 274
Bethel, PA 19507

BTMA Office Address: 60 Klahr Road
Bethel, PA 19507

PART I - APPLICANT COMPLETE FOLLOWING:

PROPERTY LOCATION: __________________________
PROPERTY OWNER: __________________________
OWNER ADDRESS: __________________________
WATER SUPPLY: Private □ Public □
CONNECTION TO SERVE (#EDUs): ___________
TYPE OF USE SERVED:
Residential □
Commercial □ (more data required)
Other □ (Describe: ___________

PART II - AUTHORITY COMPLETE FOLLOWING:

TAPPING FEE: $__________
INSPECTION FEE: $__________
PAYMENT METHOD: □ CASH □ CHECK
PERMIT FEE: $__________
DATE OF PAYMENT: __________
Check #: __________

PART III – ENGINEER COMPLETE FOLLOWING:

SEWER SERVICE LINE (LATERAL) DATA
(COMPLETED AT TIME OF INSPECTION)

PIPE SIZE: _______ TYPE OF PIPE: _____________
DEPTH OF LATERAL @ STREET R/W: _______ FT
DEPTH OF HOUSE SEWER @ POINT OF CONNECTION: _______ FT.
LENGTH OF SERVICE LATERAL: _______ FT
AVG GRADE OF LATERAL: _______"/FT (1/8" per foot MIN)
INSTALLER: __________________________
INSPECTED BY: __________________________

NOTE: All depths, grades and distances supplied by the Authority are to be considered approximate. Prior to lateral excavation, the contractor/permittee shall carefully verify the depth of the 6" PVC mainline lateral end cap.

AS APPLICANT for a permit to connect to the Bethel Township Municipal Authority sewer system, I hereby acknowledge awareness of the requirements of the rules, regulations and specifications governing mandatory connection to, construction of, and use of the service lateral serving my property, and certify that the service lateral will be installed under this permit either by myself or my contractor/plumber, in full compliance with Authority regulations.

APPLICANT: __________________________
DATE: __________________________

I. Applicant has paid the required TAPPING FEE and is therefore authorized to make connection to the
Authority sewer, following receipt of the official "NOTICE TO CONNECT."
II. Applicant has completed the connection/repair of their sewer lateral in accordance with pertinent Bethel Township Municipal Authority rules, regulations and specifications. The construction and testing of the connection/repair has been inspected by an authorized representative of the Authority, and found to be complete and ready for use. The Applicant is therefore authorized to discharge their wastewater through the newly constructed connection/repair to the Authority Sewer System this ______ day of ____________________, Year ____________

BETHEL TOWNSHIP MUNICIPAL AUTHORITY BY: ________________________________
(Engineering Representative)

RESPONSIBILITY FOR DAMAGES: INDEMNIFICATION

In consideration of the granting of permits to connect to and discharge sewage into the sewer lines and/or other facilities of the BETHEL TOWNSHIP MUNICIPAL AUTHORITY ("BTMA"), the LANDOWNERS covenant and agree that they shall indemnify and hold BTMA harmless as to any and all loss or damage which may occur or which BTMA may suffer as a result of any damage of its sewer lines and/or other facilities, caused by the LANDOWNERS, or the LANDOWNERS' employees, agents, servants, workmen, or any contractor or subcontractors employed by the LANDOWNERS for the purpose of installing any lateral, connecting any building sewer to any lateral, or connecting any lateral to the sewer lines and/or other facilities belonging to BTMA. And the LANDOWNERS will defend, indemnify and hold BTMA, its employees, representatives, and agents harmless from and against all claims, liabilities, losses, damages, fines, penalties, payments, costs, expenses and reasonable legal fees, including liabilities under any applicable environmental law, resulting from bodily injury or property damage caused by the LANDOWNERS, their employees, agents, servants, workmen, or any contractor or subcontractors employed by the LANDOWNERS, while engaged in the work of installing any lateral, connecting a building sewer to any lateral, or connecting any lateral to the sewer lines and/or other facilities belonging to BTMA.

IN WITNESS WHEREOF the said LANDOWNERS have hereunto set their hand and seal the day and year first above written.

______________________________
(SEAL)
Signature of Landowner

______________________________
(SEAL)
Signature of Landowner
SECTION 1.01 General Specifications

A. Equipment and Materials
   1. The use of equipment and materials other than those specified or beyond the scope of these specifications must be approved by Bethel Township Municipal Authority (BTMA) in writing. See Section 1.03 for details regarding the waiver process.
   2. All materials shall be new and pipe shall be legibly and permanently marked in ink with the following minimum information:
      a. Manufacturer's name or trademark and production code
      b. Nominal size (for example, 4”)
      c. The PVC Cell classification (for example, 12454)
      d. The legend "SDR-35 PVC Sewer Pipe" ASTM D 3034

B. Delivery, Storage, and Handling of Equipment and Materials
   1. Contractor must transport and handle products in accordance with the manufacturer’s instructions.
   2. Contractor must inspect products to ensure they comply with specified requirements and are not damaged.
   3. Contractor must provide equipment and personnel to handle and store products by methods to prevent soiling, disfigurement, or damage.
   4. Contractor must store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible.
   5. Contractor must protect products from vandalism, contamination by dirt, dust, or water, damage from heat or cold, and damage from direct sunlight.

C. Minimum Pipe Size:
   1. Service Line (resident): Four (4) - inch diameter.
   2. Lateral (Authority): Six (6) - inch diameter.
   3. In all cases, the Line must be of adequate size to carry projected sewer flows.
   4. Grinder pump service lines shall have a minimum size of 1 ¼ inches

D. Pipe Material: Polyvinyl Chloride (PVC)
   1. Pipe: Type PVC SDR-35, ASTM ASTM D 2665, D3034
   2. Fittings: Conforming to the same applicable ASTM Specification requirements for
pipe.


4. **Trap**: Solvent welded PVC Schedule 40 Pipe and Fittings or PVC SDR-35 Pipe and Fittings. Trap must have a one (1) piece return.

**E. Pipe Material: Polyethylene (HDPE)**

1. **Pipe**: Polyethylene pipe shall conform to ASTM D3350.

2. **Fittings**: Conforming to the same applicable ASTM Specification requirements for pipe.

3. **Joints**: Pipes shall be thermal butt-fusion in accordance with ASTM D3261

**F. Saddle Materials**

1. Ductile Iron: ASTM A48, Class 35B, coated inside and out to prevent corrosion and correctly contoured for outside diameter of pipe and incorporating a gasket and band assembly. Band and all assembly components shall be type C 304 stainless steel.

2. PVC: molded PVC solvent weld 45-degree saddle wye with a captive rubber O-ring flange gasket and stainless steel straps and bolts. Fittings shall meet ASTM D3034

**G. Existing Building Sewer Line Connection Point**: The connection to the existing sewer line shall be made in accordance with the following two (2) selected options:

1. **Outside of Existing building**: Any connections to existing sewer lines outside of the existing building shall be made within two (2) feet of the outside building wall and will also require the use of a Fernco, Inc. 5000 Series Connector at the existing connection.

2. **Inside of Existing building**: Any connections to existing sewer lines inside of the existing building shall NOT require the use of the Fernco, Inc. 5000 Series Connector but will allow for the use of an appropriate connection device.

3. **Refer to Appendix F, Construction Details, for Typical Residential Building Sewer Connection.**

**H. Grinder Pumps**:

1. Grinder pumps for individual sewer service to private properties are used only when gravity service is not available or is not a viable option. The grinder pump for this type of service is the E-1 Grinder Pump, Model GP DH071, as manufactured by Environment One Corporation, or approved equal. The installation of the pump and its operation, maintenance, and power costs are not the responsibility of the Authority, but that of the property owner and shall be installed contingent upon approval.

**I. Service Line Check Valve**:

1. Sewer service line check valves shall only be installed when plumbing fixtures are
installed on a floor with a finished floor elevation below the elevation of the manhole cover of the next upstream manhole in the public sewer system, or at the discretion and sole responsibility of the home/property owner in accordance with applicable plumbing and building codes.

2. Sewer service check valve shall be installed in a horizontal portion of the sewer service line, between the trap and right of way line, and shall prevent the reverse flow of wastewater into the structure.

3. The check valve shall be supplied in a kit from one manufacturer consisting of a valve body, disk, disk seat and upper collar. It shall comply with CSA B181-4, and the plastic materials shall conform to ASTM D1784, cell classification 12454-B and NSF 14.

4. The check valve shall include an access sleeve that is a pipe opening through which access is gained to the disk or valve seat. The access sleeve shall be cut to length in the field and attached to the socket on the top of the valve body.

5. A 6-inch PVC Female Adapter (solvent welded to 6-inch PVC access sleeve) and a removable (threaded) 6-inch PVC Cover Plug are required but are not included in the Kit provided by the Authority. Solvent welded Caps or Plugs to the access sleeve are not acceptable.

6. The collar, insert pipe and disk assembly shall be designed to fit inside the access sleeve, the removable assembly shall consist of a length of insert pipe permanently attached to the access collar on the top and a disk assembly on the bottom. It is then removed vertically from the access sleeve, the attached disk assembly is also removed allowing above grade repair. The internal lifting device is self-aligning, self-seating and provided with an alignment indicator located with 12 inches of the upper access opening. Refer to Appendix F, Construction Details, for Sewer Cleanout and Cover Details.

7. The check valve shall be installed on horizontal sewer service lines with uniform slope. The access sleeve shall terminate above grade and shall have a maximum length of 12 feet.

SECTION 1.02 Installation and Inspection

A. GENERAL REQUIREMENTS (CONDUCT OF WORK):

1. A Sewer Connection Permit MUST be obtained from the Bethel Township Municipal Authority prior to any work being completed on the sanitary sewer connection. No work shall commence without this permit.

2. Contractor must exercise caution at all times to protect persons and property in accordance with applicable laws and codes. Contractor is responsible for compliance with the safety provisions of applicable laws and building and construction codes.

3. Contractor must take precaution and furnish and maintain all guards, barricades, handrails, lights, and other appurtenances, required by law for the protection of the traveling public and properly at or near the property. The Contractor is responsible to obtain any applicable highway opening, or municipal street opening permits as
required by PennDOT or the applicable municipal agency.

4. Contractor is responsible to ensure that all equipment, tools, and supplies are operated or handled in such a manner that at no time will they be permitted to contact power, telephone, or other lines.

5. Contractor is responsible for the repair of all damages to public or private property resulting from construction operations. Damaged property shall be restored to a condition equal to or better than that which existed prior to construction. If the damage is done to trees or shrubs, the Contractor shall replace with specimens of same type and size.

6. Contractor is responsible for locating all existing underground structures and utilities including, but not limited to water, steam, oil, natural gas mains, sanitary and storm sewers, and telephone and electrical conduits, which may be encountered during construction operations.

7. Contractor is responsible for providing adequate protection against damage to utilities encountered during the course of construction and shall repair, at his own expense, any utilities damaged during the course of construction.


B. GENERAL REQUIREMENTS (DESIGN):

1. Unless otherwise noted, all designs shall conform to standard engineering practice, shall meet the requirements of PA DEP and OSHA, and shall conform to the requirements contained herein.

2. All sewers, unless otherwise noted, shall consist of a four-inch service line and six-inch lateral sewer, each having a minimum cover of three feet at any point along its entire length and a minimum grade of 1%. All wye connections shall be placed as indicated on the standard detail sheets contained herein, using six-inch bends. All lateral sewers shall discharge to a gravity sewer main. Direct connection of a lateral sewer to a manhole will not be permitted except through special exception by the Authority.

3. The Service Line shall have:
   a. Minimum Cover (at any point along entire length of service line): Three (3) feet typical.
   b. Minimum Slope (at any point along entire length): 1% (1/8" per foot) typical.
c. If cover is in excess of 12 feet, the developer shall submit pipe manufacturer's certification that material is capable of withstanding imposed loads without suffering damage.

4. Clean-Outs and Directional Changes - Clean-outs, consisting of a wye branch fitting, a curved fitting, riser pipe and a watertight cap are required for every 75 feet of sewer installed and at all directional changes greater than 45 degrees. No 90-degree bends shall be permitted except on an inside vertical end of run.

5. Grinder pump systems shall be sized by a professional knowledgeable on the correct application and installation of these pump systems. The homeowner is responsible for the proper sizing, maintenance and repair of the pump systems, control panels and piping.

C. INSTALLATION (TRENCH EXCAVATION):

1. **Width of Trench:** Pipe trenches shall be sufficiently true in alignment to permit the pipe to be laid in the approximate center of the trench. The trench shall be wide enough to provide a free working space on each side of the pipe, the trench width from the trench bottom to a point 12 inches above the top of the outside barrel of the pipe shall not exceed 24 inches (4" – 8" nominal pipe diameter).

2. **Pipe Bedding:** The trench shall be excavated to a depth of six (6) inches below the outside diameter of the pipe barrel. The resultant subgrade shall be undisturbed or compacted. The bedding shall then be placed as specified below under "Backfilling Methods." Bedding shall provide uniform and continuous bearing and support for the pipe at every point between bell holes.

3. **Unsuitable Subgrade:** Where the bottom of the trench at subgrade is found to be unstable, or to include ashes, cinders, any type of refuse, vegetable, or other organic material, or large pieces of fragments of inorganic material, such unsuitable material shall be removed to the width and depth recommended by the BTMA representative. Before the pipe is laid, the subgrade shall be adjusted by backfilling with aggregate material, thoroughly tamped, and the bedding prepared as specified.

4. **Backfilling Methods:**
   a. **Pipe Bedding Beneath and to Centerline of Pipe (PennDOT No. 1B or AASHTO No. 8 Stone):** All trenches shall be backfilled, from the bottom of the trench to the centerline of the pipe with bedding material (PennDOT No. 1B or AASHTO No. 8 Stone) and compacted by hand tamping to six (6) inches. Bedding material shall be deposited in the trench for its full width on each side of the pipe and fittings simultaneously.
   
   b. **Initial Backfill Over Pipe (PennDOT No. 1B or AASHTO No. 8 Stone):** From the centerline of the pipe and fittings to a depth of one (1) foot above the top of the pipe, the trench shall be backfilled by hand or by approved mechanical methods with PennDOT No. 1B or AASHTO No. 8 Stone. The Contractor shall

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use special care in placing this portion of the backfill so as to avoid injuring or moving the pipe. The backfill shall be compacted by hand tamping or other approved mechanical methods.

c. Aggregate Backfill to Restoration Depth (Recommended for Paved, Gravel and areas subject to vehicular traffic): From one (1) foot above the top of the pipe to restoration depth, the trench shall be backfilled by hand or by approved mechanical methods. Consolidation methods using water, such as jetting or puddling, are not permitted. Consolidation shall proceed from the center of the trench to the sides to prevent arching.

d. Excavated (suitable) Backfill Material to Restoration Depth (Recommended for Lawn and Unimproved Areas): From one (1) foot above the top of the pipe to the restoration depth, the trench shall be backfilled by hand or by approved mechanical methods. Consolidation methods using water, such as jetting or puddling, are not permitted. Consolidation shall proceed from the center of the trench to the sides to prevent arching.

5. Compacting: Use mechanical tampers, to compact materials in trench backfill 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 T99.

D. INSTALLATION (PIPE LAYING):

1. Metal Marking Tape shall be placed 12-inches above the pipe for the entire horizontal run.

2. General: All pipes shall be laid to uniform line and grade, bell ends upgrade, with a firm and even bearing along the barrel of the pipe, close joints and smooth invert. The spigot end of the pipe shall be centered in, shoved tight and secured against the bell of the previously laid pipe. The interior of each pipe shall be cleaned of all excess joint and foreign material before the next pipe is laid. The pipe shall be laid in the backfill materials as specified. Pipe-laying shall commence at the lowest point and proceed upgrade. At the close of each day's work and at such other times when pipe is not being laid, the open end of the pipe shall be protected with a close-fitting stopper.

3. Pipe Clearance in Rocks: Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least six (6) inches below and on each side of all pipe and fittings for pipes 24 inches in diameter or less. This specified minimum clearance is the minimum clear distance which will be permitted between any part of the pipe or fitting being laid and any part, projection, or point of such rock, boulder, or stone.

4. Existing Sewer Line Connection Point: The connection to the existing sewer line shall be made in accordance with the following two (2) selected options:

   a. Outside of Existing building: Any connections to existing sewer lines outside of the existing building shall be made within two (2) feet of the outside building wall and will also require the use of a Fernco, Inc. 5000 Series Connector at the
existing connection.

b. **Inside of Existing building:** Any connections to existing sewer lines inside of the existing building shall NOT require the use of the Fernco, Inc. 5000 Series Connector but will allow for the use of an appropriate connection device.

5. **Connection of the Lateral Sewer to the Main Sewer:** The connection shall be made via 45 degree 8” x 6” wye connection, two Fernco 5000 series “Strongback” couplings with Class A concrete cradles poured 12” on either side of the pipe/coupling interface and to the spring line of the Main Sewer pipe. Saddle connections may be approved and installed as specified herein, but only by approval of the Authority. Direct connection of laterals to manholes will be made only with approval of the Authority.

6. **Sewer Laterals and Water Services:** Sewer laterals and water services shall be allowed in the same trench provided that they are separated 2 feet both horizontally and vertically, with the sewer lateral being installed vertically beneath the water service, and in accordance with applicable PA DEP guidelines.

7. **Service Lateral Under Driveway or Roadway:** If a service line is to be installed under a driveway or roadway, where the service is located under the driveway or roadway it must be constructed of material demonstrated to be of sufficient strength to withstand the extra vehicular loads, or as directed by the Authority.

8. **Long-term Responsibility:** Upon completion of the Work and Contract, the Owner of the property where work is performed is responsible for any lateral repairs due to settlement of land or other geologic changes to the site.

E. **INSPECTION:** The Sewer Service Line (outside line) must be inspected by an authorized BTMA representative before covering any trench or connecting the Service Line to the Lateral Line (which is already connected to the Sewer Main Line). The Contractor must give the BTMA representative at least 24-hour notice for a final inspection.

1. Each building sewer is required to be tested before the trench is backfilled. The test will require placement of an inflated test ball at both the transition "T" to the existing sewage discharge and the test "T" at the transition to the Service Lateral, as well as the cleanout fittings. One of the test balls shall be equipped with air pressure gauge, calibrated to 0.1 lbs/sq. in. and standard air hose connection to pressurize the Building Sewer, and an air release valve.

2. It may be required to place stone bedding over the pipe at several locations (pipe joints), to avoid separation during the test. Air pressure shall be slowly introduced until there is a uniform gauge pressure of 5.0 psi. A minimum of two (2) minutes must be allowed for equilibrium of the air temperature with the pipe wall. If no loss of pressure is observed, allow test to continue for six (6) minutes. The service line shall be deemed acceptable if this pressure is maintained for six minutes without a drop in pressure of more than 0.5 psi. For service lines in excess of 400 feet in length and/or greater than six feet in depth, the Authority shall set the test pressure in accordance with site conditions.
F. RESTORATION AND CLEANUP: The contractor completing the work shall be responsible for restoration and cleanup following completion of the Building Sewer Connection work, including State Highways, Township streets, alleys and right-of-ways, yards, driveways and all other disturbed areas.

G. GREASE INTERCEPTORS

1. Grease interceptors shall be watertight, cast in place concrete or precast concrete structures and engineered to withstand the applicable traffic loading. Protective coating shall be applied inside and out at the plant following the same specifications and requirements for manholes and other concrete structures. A two-way cleanout tee is required at both the inlet and outlet.

2. All grease interceptors shall be properly sized in accordance with the Uniform Plumbing Code. The minimum size of the interceptor shall be 1,000 gallons of effective volume.

3. The grease interceptor shall have a frame and cover meeting the following requirements:
   b. Include indented top design with lettering cast into cover, using wording equivalent to "INTERCEPTOR/SANITARY SEWER."
   c. Protective Coating: Foundry-applied.

H. OTHER PERMITS & INSPECTIONS: Nothing in these regulations is intended to preclude, forego or supersede permits and inspections as may be required by other agencies should the proposed work require such other permits and inspections. It is the responsibility of the contractor to secure any other necessary permits and inspections as appropriate to the work being completed.

I. INSURANCE: It is the responsibility of the contractor completing the work to ensure his insurance coverage is adequate and appropriate in type and amount for the type of work being completed. Any damage claims as a result of the work completed will be the responsibility of the contractor.

SECTION 1.03 Waiver Requests
The use of equipment, materials and construction methods other than those specified or beyond the scope of these specifications must be approved by Bethel Township Municipal Authority (BTMA) in writing. Waiver requests shall be made in writing and forwarded to the BTMA for consideration prior to any construction is begun on any site seeking waiver approval.
The following is a list of acceptable manufacturers:

1. Gasketed Joint PVC SDR 35 Pipe:
   a. Push-on Joint Pipe
      i. Diamond Plastics Corporation
      ii. Johns Mansfield (J-M Pipe) Company
      iii. National Pipe and Plastics, Inc.
      iv. Approved Equal

2. Gasketed Sewer Pipe Fittings
   a. GPK Products, Inc.
   b. Harco
   c. Approved Equal

3. Flexible Pipe Couplings
   a. Fernco, Inc. 5000 Series Connector
   b. Approved Equal

4. Service Line Check Valve
   a. Clean Check, Inc. (Rectorseal)
   b. Approved Equal

5. Protective Sleeve for Cleanout (Frame and Cover)
   a. East Jordan Iron Works
   b. Neenah Foundry Company
   c. Approved Equal

6. Heat-Shrinkable Sleeve for Joint Sealing
   a. Canusa W Rapid Seal

7. Other Materials shall be Reviewed by Authority prior to installation
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26-inch Diameter Heavy Duty Cast Iron Frame and Cover - Self Sealing</td>
</tr>
<tr>
<td>2</td>
<td>Watertight Manhole Frame &amp; Cover</td>
</tr>
<tr>
<td>3</td>
<td>Manhole Frame With Grade Rings</td>
</tr>
<tr>
<td>4</td>
<td>Self Sealing Manhole Cover</td>
</tr>
<tr>
<td>5</td>
<td>Standard Precast Concrete Manhole 8&quot;-24&quot; Sewers</td>
</tr>
<tr>
<td>6</td>
<td>Sampling Manhole</td>
</tr>
<tr>
<td>7</td>
<td>Precast Manhole with Force Main Discharge</td>
</tr>
<tr>
<td>8</td>
<td>Air Release Valve Vault (Force Main Only)</td>
</tr>
<tr>
<td>9</td>
<td>Terminal Manhole</td>
</tr>
<tr>
<td>10</td>
<td>Precast Doghouse Manhole (By Special Approval)</td>
</tr>
<tr>
<td>11</td>
<td>Precast Doghouse Bottom (By Special Approval)</td>
</tr>
<tr>
<td>12</td>
<td>New Manhole on Existing Main</td>
</tr>
<tr>
<td>13</td>
<td>Inside Splash/Drop Manhole</td>
</tr>
<tr>
<td>14</td>
<td>6&quot; Lateral Into New Manhole (By Special Approval)</td>
</tr>
<tr>
<td>15</td>
<td>Force Main Connection to Manhole</td>
</tr>
<tr>
<td>16</td>
<td>Precast Channel</td>
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<tr>
<td>17</td>
<td>Manhole Step Reinforced Polymer Polypropylene Plastic</td>
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<td>18</td>
<td>Trench Restoration for Lawn, Cultivated &amp; Meadow Areas</td>
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<tr>
<td>19</td>
<td>Trench Restoration for Pavement &amp; Vehicular Areas</td>
</tr>
<tr>
<td>20</td>
<td>Combination Force Main &amp; Gravity Sewer Trench</td>
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<td>21</td>
<td>Concrete Encasement</td>
</tr>
<tr>
<td>22</td>
<td>Gravity Sewer Pipe Connection to Existing Manhole Connection</td>
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<tr>
<td>23</td>
<td>Pipe Adapter</td>
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<td>24</td>
<td>Gravity Sewer at Utility Crossing</td>
</tr>
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<td>25</td>
<td>Force Main (FM) Crossing at Utility (Using Deflecting Joints)</td>
</tr>
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<td>26</td>
<td>Restrained Pipe Length Schedule</td>
</tr>
<tr>
<td>27</td>
<td>Horizontal &amp; Vertical Up Restraint Thrust Blocking - Elbows (FM)</td>
</tr>
<tr>
<td>28</td>
<td>Horizontal Restraint Thrust Blocking - Tees (FM)</td>
</tr>
<tr>
<td>29</td>
<td>Vertical Down Restraint Thrust Blocking - Elbows (FM)</td>
</tr>
<tr>
<td>30</td>
<td>Typical Residential Building Sewer Connection</td>
</tr>
<tr>
<td>31</td>
<td>Lateral Connection</td>
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<tr>
<td>32</td>
<td>Lateral Riser</td>
</tr>
<tr>
<td>33</td>
<td>Typical Lateral Connection to Low Pressure Force Main</td>
</tr>
<tr>
<td>34</td>
<td>Typical Individual Grinder Pump Service Line to Gravity Sewer Schematic (By Special Approval)</td>
</tr>
<tr>
<td>35</td>
<td>Typical Grinder Pump Service Line to Low Pressure Sewer Schematic (By Special Approval)</td>
</tr>
<tr>
<td>36</td>
<td>Sewer Cleanout Cover</td>
</tr>
<tr>
<td>37</td>
<td>Sewer Cleanout in Existing Paved Areas</td>
</tr>
<tr>
<td>38</td>
<td>Manhole Frame/Cover Protection Prior to Final Paving</td>
</tr>
<tr>
<td>39</td>
<td>Manhole Protection Posts (Field Areas)</td>
</tr>
<tr>
<td>40</td>
<td>Pipe Cradle in Casing</td>
</tr>
<tr>
<td>41</td>
<td>Sewer Line @ Stream Crossing</td>
</tr>
<tr>
<td>42</td>
<td>Clay Dike Detail</td>
</tr>
<tr>
<td>43</td>
<td>Concrete Anchors for Steeply Sloped Pipes</td>
</tr>
<tr>
<td>44</td>
<td>Service Drive Detail</td>
</tr>
</tbody>
</table>

October 5, 2016
(4) 1/2"-13 HEX HD SS CAP SCREWS W/WASHERS

(2) PICKHOLES

2" SHARP FACE
GOTHIC

1 1/2"

(4) EQUALLY SPACED
Ø 1" HOLES ON
Ø 32 3/4" BOLT CIRCLE

FRAME SECTION

Ø26" 1/2

Ø26 1/4"

7"

Ø24"

Ø28 1/4"

Ø36"

COVER SECTION

Ø1/4" NEOPRENE GASKET

NOTES
1. CAST IRON MEETS ASTM SPEC A-48-76
   CLASS 35B, AASHTO M-356
   AASHTO HIGHWAY LOADING HS-25
2. APPROVED MANUFACTURER: EJ, INC. OR
   EQUAL
3. CAST IRON FRAME TO BE BOLTED TO
   MANHOLE W/ 8" ANCHOR BOLTS (MIN.)
4. CASTING AND GRADE RINGS TO BE
   SEALED TO MANHOLE W/ PREFORMED
   PLASTIC SEALING COMPOUND
5. PROVIDE WATERTIGHT MANHOLE
   FRAME AND COVER IN ALL AREAS
   PRONE TO FLOODING

WATERTIGHT MANHOLE
FRAME & COVER

BETHEL TOWNSHIP
MUNICIPAL AUTHORITY

2

SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016
REFER TO MANHOLE FRAME AND COVER DETAILS FOR MANHOLE FRAME AND COVER REQUIREMENTS.

NOTES:
1. ANCHOR BOLT HOLES SHALL BE DRILLED WITH A PERCUSSION OR ROTARY HAMMER DRILL, UTILIZING A CARBIDE DRILL BIT. CORD DRILLING, OR ROTATIONAL ONLY DRILLING, OF ANY KIND, IS NOT ALLOWED.
2. FRAME ANCHORS SHALL BE TIGHTENED PRIOR TO CURING OF NON-SHRINK GROUT.

HEAT SHRINKABLE MANHOLE SEAL (WRAPID SEAL OR EQUAL)

NON-SHRINK GROUT APPLY PRIOR TO PLACING GRADE RINGS (TYP)

TROWEL EDGE (TYP)

(4) INSERTS W/ 3/4" Ø STN STL THREAD ROD & NUT OR (4) 3/4" Ø STN STL EXPANSION ANCHORS

MANHOLE RISER CONE SECTION

FRAME AND COVER - COVER TO BE FLUSH AFTER INSERT PLACED.

LAWN/PAVED AREAS

PARAPET OUTSIDE OF GRADE RINGS WITH NON-SHRINK GROUT & TO TOP OF FRAME MANIFOLD

PRECAST GRADE RING REQ.

PREFORMED BUTYL RUBBER SEALING COMPOUND - 2 STRIPS WIDE THICKNESS AS REQUIRED FOR COMPLETE SEALING, IF LEVELING REQUIRED (TYP)

MANHOLE INSERT
1. All precast reinforced concrete manhole sections shall comply with ASTM A-216.
2. Cement shall be type II or III, air entrained, with a permeability of 2 cc. at 28 days.
3. Reinforcement shall be 60 per ASTM A-615.
4. 30" dia. cast iron frame and cover per ASTM A-46, Class 30, for H-20 loading.
5. Cast iron frame to be bolted to manhole with pin anchor bolts.
6. Casting and grade rings to be sealed with performed plastic sealing compound.
7. All joints (inside & outside) shall be sealed with performed plastic sealing compound.
8. Line manhole interior w/t-lock PVC or HDPE liner system to provide continuous impermeable lining.
9. All piping between the force main and air release valve shall be Schedule 80 316 stainless steel.
10. Fill all holes with non-shrink grout.
11. All exposed interior concrete surfaces (i.e., floor, ramp, etc.) to receive corrosion resistant epoxy coating.
NOTES:

1. FOR INSTALLATIONS WITH PLANNED FUTURE DEVELOPMENT, INSTALL 2 FOOT PIPE STUB WITH END CAP. MATCH SIZE OF EFFLUENT PIPE.

2. INSTALL PRECAST CHANNEL PER BTMA CHANNEL DETAIL.

3. FOR INSTALLATIONS WITH NO FUTURE DEVELOPMENT, MANHOLE SHALL BE MANUFACTURED WITH ONLY OUTLET ORIFICE(S) AS REQUIRED.

SEE MANHOLE FRAME AND COVER DETAILS

SEE PRECAST MANHOLE DETAILS

PIPE BEDDING (TYP)

MIN. SLOPE = 1%

6" MIN AASHTO NO.8 COARSE AGGREGATE

SECTION
1. INSTALL MANHOLE ON EXISTING LINES BY EYEMARKING FLOW, CUTTING PIPE AND INSTALLING MANHOLE WITH PRECAST BASE. DOGHOUSE MANHOLE AS SHOWN IN THIS DETAIL MAY BE USED ONLY BY SPECIAL AUTHORITY APPROVAL.

2. ADJUST TO GRADE WITH CONC. RINGS (MAX. VERT. ADJUST 6") SEE MANHOLE FRAME AND COVER DETAILS.

3. MECHANICALLY VIBRATED PRECAST CONC. SHALL CONFORM TO A S T M SPEC. C-476.

4. IF INCOMING INJECT EXCESS OUTGOING INJECT BY GREATER THAN OR EQUAL TO 6", SEE INSIDE SPLASH HEDGE DROP MANHOLE DETAILS.

5. FOR MANHOLE WHERE TOP OF LM TO INFER DISTANCE IS LESS THAN 5'-0", USE PLANT TOP MANHOLE IN LIEU OF CORE TOP.

6. FILL ALL LIFTING HOLES W/ NON-SHRINK GROUT AND SEAL ALL JOINTS WITH HEAT SHRINKABLE MANHOLE SLEEVE AS MANUFACTURED BY CANUSA, INC. OR APPROVED EQUAL.

PREFORMED BUTYL RUBBER SEALING COMPOUND (TYP) ALL JOINTS INSIDE & OUT.

PREFORMED BUTYL RUBBER SEALING COMPOUND (TYP)

NEW SANITARY SEWER PIPE

NON-SHRINK GROUT

CONCRETE BENCHING

SEE PRECAST CHANNEL DETAILS

OLD SANITARY SEWER PIPE

6' MINIMUM #1 B STONE BEDDING

PREFORMED BUTYL RUBBER SEALING COMPOUND IN DEPRESSED AREA.

#5 @ 12' E.W. T&B

SEE MANHOLE FRAME AND COVER DETAILS

LAWN/PAVED AREAS

FIELD AREAS

BITUMASTIC COATING (TYP)

SAW CUT TOP OF PIPES AFTER DOGHOUSE INSTALLED

PLACE MANHOLE OVER EXISTING PIPES USING DOGHOUSE OPENINGS AS MFGD.

12' THICK CONCRETE SLAB CLASS "B" 3000 LB

UNDISTURBED EARTH / COMPACTED SUBGRADE

10

PRECAST DOGHOUSE DETAIL
(BY SPECIAL APPROVAL)

BETHLEHEM TOWNSHIP MUNICIPAL AUTHORITY

SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016

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NOTES:
1. INSTALL MANHOLES ON EXISTING LINES BY BYPASSING FLOW, CUTTING PIPE AND INSTALLING MANHOLE WITH PRECAST BASE. DOUGLAS MANHOLES AS SHOWN IN THIS DETAIL MAY BE USED ONLY BY SPECIAL AUTHORITY APPROVAL.
2. ADJUST TO GRADE WITH CONC. GRADE RINGS (MAX. VERT. ADJUST: 6") SEE MANHOLE FRAME AND COVER DETAIL.
3. MECHANICALLY VIBRATED PRECAST CONC. SHALL CONFORM TO A.A.T.M. SPEC. C-478.
4. IF INCOMING INVERT EXCEEDS OUTGOING INVERT BY GREATER THAN OR EQUAL TO 6", SEE INSIDE SPLASH/INSIDE DROP MANHOLE DETAILS.
5. FOR MANHOLES WHERE TOP OF RIM TO INVERT DISTANCE IS LESS THAN 6'-0", USE FLAT TOP MANHOLE IN LIEU OF CONE TOP.
6. FILL ALL LIFTING HOLES WITH NON-SHRINK GROUT.

PREFORMED BUTYL RUBBER SEALING COMPOUND (TYP ALL JOINTS INSIDE & OUT)
NON-SHRINK GROUT
PREFORMED BUTYL RUBBER SEALING COMPOUND IN DEPRESSED AREA.
CONCRETE BENCHING SEE PRECAST CHANNEL DETAILS
NEW SANITARY SEWER PIPE
PIPE BEDDING (TYP)
PREFORMED BUTYL RUBBER SEALING COMPOUND IN DEPRESSED AREA.
#5 @ 12" E.W. & T&B
6" MIN. AASHTO #8 COARSE AGGREGATE

SECTION 2 OF 2

BITUMASTIC COATING (TYP)
EX.SANITARY SEWER PIPE
12" THICK CONCRETE SLAB CLASS "B" 3000 LB
UNDISTURBED EARTH / COMPACTED SUBGRADE
NOTES:
1. INSTALL MANHOLE ON EXISTING SEWER MAIN AS FOLLOWS:
   A. BYPASS FLOW
   B. CUT EXISTING PIPE
   C. INSTALL MANHOLE W/PRECAST BASE, AS SHOWN ON DETAIL.

2. DOGHOUSE MANHOLES MAY BE USED ONLY BY SPECIAL APPROVAL FROM AUTHORITY.
SEE MANHOLE FRAME AND COVER DETAILS

SEE PRECAST MANHOLE DETAILS

GROUT ALL PIPE PENETRATIONS AND PROVIDE TAPER OVER PIPE.

PIPE BEDDING

6" LATERAL SEWER CROWN SHALL MATCH OUTLET PIPE CROWN

PIPE CONNECTION MADE WITH RUBBER GASKET.

PROVIDE PRECAST CHANNEL FOR LATERAL SEWER - SEE PRECAST CHANNEL DETAILS

6" MIN PADOT 2A COARSE AGGREGATE

SECTION
NOTES:

1. THREE INLET PIPES AND ONE OUTLET PIPE MAX. INTO MANHOLE.

2. NO LATERALS INTO MANHOLES, EXCEPT BY SPECIAL APPROVAL OF AUTHORITY.

3. MIN. 12" SEPARATION FROM EDGE OF PIPE PENETRATION TO EDGE OF PIPE PENETRATION.

4. MIN. CHANNEL DROP THROUGH MANHOLE: STRAIGHT THROUGH - 0.1 FEET BEND - 0.2 FEET

5. ALL CHANNELS SHALL BE PRECAST, UNLESS OTHERWISE SPECIFICALLY NOTED OR APPROVED.

6. THESE DETAILS APPLY TO PRECAST CHANNELS IN NEW MANHOLES AND FIELD-FORMED CHANNELS IN EXISTING MANHOLES.

7. CHANNEL BENCH AT PIPE SHALL MATCH 3/4 CROWN ELEVATION OF PIPE AND RISE 1/8" MIN. PER FT. TO THE MANHOLE WALLS.

8. CHANNELS SHALL MATCH THE CROSS - SECTIONAL DIMENSIONS OF THE PIPES ENTERING AND EXITING THE MANHOLE. SMOOTH TRANSITIONS SHALL BE PROVIDED BETWEEN CHANGES IN PIPE SIZES.

9. USE 5 FT. DIA. MANHOLE FOR MANHOLES WITH MORE THAN TWO LINES.

SCALE: NOT TO SCALE
DATE: OCTOBER 5, 2016
TRENCH RESTORATION FOR PAVED & VEHICULAR AREAS

BETHEL TOWNSHIP MUNICIPAL AUTHORITY

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NOTE:
1. BACKFILL & PAVEMENT RESTORATION IN STATE ROADS SHALL BE SPECIFIED BY PennDOT.

2. BACKFILL & PAVEMENT RESTORATION IN TOWNSHIP ROADS, ACCESS DRIVES, PARKING AREAS AND OTHER PAVED OR STONE AREAS SHALL BE AS SPECIFIED IN THE BETHEL TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCE OR DRIVEWAY ORDINANCE.

3. IN STONE VEHICULAR AREAS, SUBSTITUTE STONE FOR PAVING. INSTALL STONE ON CLASS 2 TYPE "A" FILTER FABRIC OVER COMPACTED SUBBASE AS REQUIRED.

DATE: OCTOBER 5, 2016
CONCRETE ENCASEMENT

BETHEL TOWNSHIP MUNICIPAL AUTHORITY

21

SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016

NOTE:
BEGIN SIDE SLOPES, IF USED, APPROXIMATELY 18" ABOVE TOP OF PIPE (TYPICAL ALL BEDDING TYPES).
NOTES:

1. CUT HOLE IN EXISTING MANHOLE WITH CORING MACHINE
2. INSTALL RESILIENT GASKET TYPE SEAL PER ASTM C-923. PSX DIRECT DRIVE MANHOLE CONNECTOR OR EQUAL
3. CAULK ANNUAL SPACE WITH PREFORMED PLASTIC SEALING COMPOUND.
4. FORM NEW CHANNEL W/ NON SHRINK GROUT. SEE PRECAST CHANNEL DETAIL.
EXTERIOR COMPLETELY COATED WITH SAND BONDED TO PVC SURFACE

PER MANUFACTURER

TYPICAL SECTION
NOTES:
1. A 10' HORIZONTAL SEPARATION IS REQUIRED BETWEEN SEWER LINE AND ALL UTILITIES.
2. IF 10' SEPARATION CAN NOT BE ACHIEVED WITH POTABLE WATER LINE, SEWER LINE MUST BE INSTALLED BELOW WATER LINE WITH A MINIMUM OF 18" OF CLEARANCE.
3. WATERLINE CROSSINGS OF SEWER LINES WITH LESS THAN 18" CLEARANCE SHALL BE ENGAGED IN CONCRETE TEN (10) FEET BEYOND THE CROSSING IN EACH DIRECTION.
4. ALL OTHER UTILITIES THAT HAVE LESS THAN 18" CLEARANCE WITH THE SANITARY LINE SHALL REQUIRE CONCRETE ENCASMENT OF THE SANITARY LINE TO THE NEXT JOINT IN THE SANITARY LINE BEYOND TEN (10) FEET.
5. MAINTAIN SLOPE OF NEW SEWER AT ALL CROSSINGS.
6. REFER TO CONCRETE ENCASMENT DETAILS AS REQUIRED.
NOTES:
1. A 10' HORIZONTAL SEPARATION IS REQUIRED BETWEEN SEWER LINE AND ALL UTILITIES.
2. IF 10' SEPARATION CANNOT BE ACHIEVED WITH POTABLE WATER LINE, SEWER LINE MUST BE INSTALLED BELOW WATER LINE WITH A MINIMUM OF 18".
3. WATERLINE CROSSINGS OF SEWER LINES WITH LEGS MORE THAN 15' CLEARANCE SHALL BE ENGAGED IN CONCRETE TEN (10) FEET BEYOND THE CROSSING IN EACH DIRECTION.
4. ALL OTHER UTILITIES THAT HAVE LESS THAN 18" CLEARANCE WITH THE SANITARY LINE SHALL REQUIRE CONCRETE ENCASEMENT OF THE SANITARY LINE TO THE NEXT JOINT IN THE SANITARY LINE BEYOND TEN (10) FEET.
5. MAINTAIN SLOPE OF PROPOSED SEWER AT ALL CROSSINGS.
6. REFER TO CONCRETE ENCASEMENT DETAILS AS REQUIRED.

FORCE MAIN (FM) CROSSING AT UTILITY USING DEFLECTING JOINTS

BETHEL TOWNSHIP MUNICIPAL AUTHORITY

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SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016
NOTE: RESTRAINED PIPE LENGTH BASED ON 150 P.S.I. WORKING PRESSURE PLUS 50% WATER HAMMER ALLOWANCE.

### Horizontal Restained Pipe Length Schedule

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>Horizontal Elbow Deflection Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
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<tr>
<td>4&quot;</td>
<td>19'</td>
</tr>
<tr>
<td>6&quot;</td>
<td>27'</td>
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<tr>
<td>8&quot;</td>
<td>35'</td>
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<td>10&quot;</td>
<td>42'</td>
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<tr>
<td>12&quot;</td>
<td>49'</td>
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</table>

### Vertical Restained Pipe Length Schedule

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<tr>
<th>Pipe Diameter</th>
<th>Vertical Elbow Deflection Angle</th>
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<tbody>
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<td></td>
<td>45°</td>
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<tr>
<td>4&quot;</td>
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<tr>
<td>8&quot;</td>
<td>37'</td>
</tr>
<tr>
<td>10&quot;</td>
<td>44'</td>
</tr>
<tr>
<td>12&quot;</td>
<td>52'</td>
</tr>
</tbody>
</table>

NOTE: FOR PIPE SIZES GREATER THAN 12", SUBMIT ENGINEERING CALCULATIONS TO VERY PROPOSED RESTRAINED PIPE LENGTHS.
### Thrust Blocks for Horizontal Bends and Lower Vertical Bends

**Nominal Pipe Size (Inches)**

<table>
<thead>
<tr>
<th>Pipe Size (Inches)</th>
<th>Minimum Required Bearing Area (50% FT)</th>
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<tbody>
<tr>
<td>4</td>
<td>4.00 2.9 2.0 1.6 1.1 0.6 0.4</td>
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<td>8</td>
<td>9.05 10  7  6  4  3  1.4</td>
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<tr>
<td>12</td>
<td>13.20 15 13 8  6  3</td>
</tr>
<tr>
<td>18</td>
<td>19.50 18 16 8  6  3</td>
</tr>
<tr>
<td>20</td>
<td>21.00 18 16 8  6  3</td>
</tr>
<tr>
<td>24</td>
<td>25.50 20 18 8  6  3</td>
</tr>
</tbody>
</table>

**Notes:**

1. Maximum Test Pressure = 15 x 150 PSI
2. Minimum Allowable Soil Bearing Pressure = 2000 PSF
3. Bearing Area = A x B
4. C shall be greater than A/2 and B/2.

---

### Engineering Your Success

**Bethel Township Municipal Authority**

**Engineering & Vertical Up Restraint Thrust Blocking Elbows (FM)**

**Scale:** Not to Scale

**Date:** October 5, 2016

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THRUST BLOCK DIMENSION
SCHEDULE-ELBOWS*
(FORCE MAIN PIPE)

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<th>8&quot;</th>
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<tr>
<td>A</td>
<td>36&quot;</td>
<td>42&quot;</td>
<td>60&quot;</td>
<td>96&quot;</td>
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<tr>
<td>B</td>
<td>18&quot;</td>
<td>24&quot;</td>
<td>60&quot;</td>
<td>42&quot;</td>
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</tbody>
</table>

(*) THRUST BLOCK DESIGN BASED ON THE MINIMUM SOIL HORIZONTAL BENDING STRENGTH OF 3000 PSF AND 150 PSI WORKING PRESSURE PLUS 50% WATER HAMMER ALLOWANCE.

FOR PIPE SIZES GREATER THAN 12" SUBMIT ENGINEERING CALCULATIONS TO VERIFY PROPOSED THRUST BLOCK SIZES.

HORIZONTAL RESTRAINT THRUST BLOCKING - TEES
(FM)

BETHEL TOWNSHIP MUNICIPAL AUTHORITY

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SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016
**THRUXT BLOCK DIMENSION SCHEDULE-ELBOWS (FORCE MAIN PIPE)**

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<th>DIM.</th>
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<tbody>
<tr>
<td>A</td>
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<td>18&quot;</td>
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(*) THRUXT BLOCK DESIGN BASED ON THE MINIMUM SOIL HORIZONTAL BEARING STRENGTH OF 3000 PSF AND 150 PSI WORKING PRESSURE PLUS 50% WATER HAMMER ALLOWANCE.

FOR PIPE SIZES GREATER THAN 12" SUBMIT ENGINEERING CALCULATIONS TO VERIFY PROPOSED THRUST BLOCK SIZES.

---

engineer.png

**VERTICAL DOWN RESTRAINT THRUST BLOCKING - ELBOWS (FM)**

**BETHLEHEM TOWNSHIP MUNICIPAL AUTHORITY**

**DATE: OCTOBER 5, 2016**
TYPICAL RESIDENTIAL BUILDING SEWER CONNECTION

NOTES:
1. CLEANOUT REQUIRED EVERY 75 FEET AND AT ANY CHANGE IN DIRECTION. CLEANOUTS RECOMMENDED TO BE INSTALLED OUTSIDE FOUNDATION WALL WHEN CLEANOUT NOT PROVIDED INSIDE THE HOUSE.
2. PROVIDE 6" OF AASHTO NO. 8 (OR PennDOT NO. 1B) STONE BELOW PIPE AND 12" ABOVE ENTIRE LENGTH OF PIPE.
3. SEWER SERVICE CHECK VALVE, WHERE REQUIRED, SHALL BE INSTALLED IN A HORIZONTAL PORTION OF THE SEWER SERVICE LINE, BETWEEN "A" AND "B" ABOVE, AND SHALL PREVENT THE REVERSE FLOW OF WASTEWATER INTO THE STRUCTURE.
4. CLEANOUTS REQUIRED IN CHANGES OF DIRECTION AND MAXIMUM HORIZONTAL BEND RECOMMENDED IS 45 DEGREES.
5. PROTECTIVE SLEEVES (COVERS) ARE REQUIRED:
   a. FOR CLEANOUTS SUBJECT TO VEHICULAR TRAFFIC.
   b. FOR CLEANOUTS IN PAVED OR GRAVEL AREAS.
   c. WHEN CLEANOUTS ARE PLACED FLUSH WITH THE GROUND SURFACE
6. FERNCO 5000 SERIES CONNECTOR SHALL BE REQUIRED ON EXISTING OUTSIDE BUILDING CONNECTIONS ONLY AND NOT NECESSARY WHEN EXISTING SEWER LINE IS REPLACED THROUGH BUILDING LINE.
NOTES:
1. ALL PVC CONNECTIONS SHALL BE SOLVENT WELDED UN LESS NOTED OTHERWISE.
2. PROVIDE 6" OF AASHO NO. 8 (OR PennDOT NO.18) STONE BELOW PIPE AND 12" ABOVE ENTIRE LENGTH OF PIPE.

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SEWER CLEANOUT COVER

BETHEL TOWNSHIP
MUNICIPAL AUTHORITY

36

SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016

NOTE:
1. EAST JORDAN IRON WORKS IS AN ACCEPTABLE MANUFACTURER AND AN AUTHORITY APPROVED EQUAL WILL BE ACCEPTED.

PAVED OR VEHICLE AREAS:
HEAVY DUTY VENTED CAST IRON FRAME AND COVER SUITABLE FOR H-25 LOADING.

OTHER AREAS REQUIRING PROTECTIVE SLEEVE:
LIGHT DUTY VENTED CAST IRON FRAME AND COVER SUITABLE FOR H-10 LOADING.

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FINISHED PAVED SURFACE

PAVING CROSS SECTION (VARIES)

CAST IRON FRAME AND COVER (SUITE FOR H20 TRAFFIC LOADING). SEE CLEANOUT COVER DETAIL.

12"

PVC CLEANOUT HUB WITH THREADED PLUG

36" SQ. BCBC STABILIZING PAD

RISER PIPE

6" AASHTO #8 CRUSHED STONE AROUND RISER PIPE

BEND AS REQUIRED TO MAKE RISER VERTICAL

SERVICE LINE

SEWER CLEANOUT IN EXISTING PAVED AREAS

BETHEL TOWNSHIP MUNICIPAL AUTHORITY

SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016
MANHOLE FRAME / COVER PROTECTION PRIOR TO FINAL PAVING

BETHEL TOWNSHIP MUNICIPAL AUTHORITY

TEMPOARY PAVING FOR MANHOLE FRAME/COVER PROTECTION

5'-0" MIN

MANHOLE COVER

TEMPOARY PAVING TO BE FLUSH WITH MANHOLE COVER

GRADE PRIOR TO FINAL PAVING

BASE COURSE

PLAN

SECTION

SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016
NOTES:
1. INSTALL IN FIELD AND MEADOW AREAS OR AS OTHERWISE REQUIRED BY BTMA.
2. INSTALL ON THE DOWNSTREAM SIDE OF MANHOLE.

MIN. EMBED.

MANHOLE

CONCRETE FOOTING

6" MIN.

6"

MIN. EMBED.

SLOPE TOP OF FOOTER TO SHED WATER

SLOPE TOP OF CONCRETE TO SHED WATER

MIN. 4" DUCTILE IRON OR STEEL PIPE FILLED WITH CONCRETE AND PAINTED YELLOW (TWO COATS)

FINISH GRADE

ELEVATION

MANHOLE PROTECTION POST
(FIELD AREAS)

BETHEL TOWNSHIP
MUNICIPAL AUTHORITY

39

SCALE: NOT TO SCALE

DATE: OCTOBER 5, 2016
PIECE BELL DIAMETER
CARRIER PIPE
MFG. CASING SPACER.
MATERIAL SHALL BE
AS REQUIRED AND
RECOMMENDED PER
MFG. FOR CARRIER
PIPE
CASING PIPE

NOTES:
1. FOR PIPES CROSSING STATE ROADS
OR RAILROADS ADDITIONAL
REQUIREMENTS (IF ANY) IMPOSED BY
HIGHWAY OR RAILROAD OWNER MUST
BE MET.
2. DIAMETER OF CASING SHALL BE IN
ACCORDANCE WITH HIGHWAY OR
RAILROAD OWNER'S STANDARDS.

FILL VOID BETWEEN CARRIER PIPE AND
CASING WITH CLEAN NATURAL SAND OR 1/4"
(NO FINE) STONE CHIPS
CRADLE (2 PER LENGTH OF PIPE MIN.)
STEEL CASING PIPE (ASPHALT COATED)
CARRIER PIPE
MANUFACTURED CASING SPACER.

PROFILE
PROVIDE MIN. 2" ANNULAR-
SPACE AROUND CARRIER
PIPE. CAULK WITH
PREFORMED FLEXIBLE
PLASTIC SEALING
COMPOUND (TYP)
1/4 PIPE LENGTH (TYP)
SEAL ENDS OF
CASING PIPE WITH
BRICK AND MORTAR

PIPE CRADLE IN CASING
BETHEL TOWNSHIP
MUNICIPAL AUTHORITY

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DATE: OCTOBER 5, 2016

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NOTES:

1. STREAM BYPASS BY EITHER A PIPED OR PUMPED
STREAM BYPASS AND ITS ACCOMPANYING FILTERS
COFFERDAM AND DEWATERING SYSTEM SHALL BE
INSTALLED TO REDUCE THE VOLUME OF SEDIMENT
CREATED BY THE CONSTRUCTION RELEASED DIRECTLY
INTO THE STREAM IN ACCORDANCE WITH LOCAL
CONSERVATION DISTRICT APPROVAL.

2. ALL PIPING WITHIN CONCRETE ENCASEMENT SHALL BE CL
32 DUCTILE IRON PIPE WITH CERAMIC EPOXY LINING.

3. ALL AREAS ADJACENT TO THE STREAM CROSSING SHALL
BE STABILIZED AS REQUIRED.

4. TRENCH PLUGS SHALL BE INSTALLED AT THE LOW END OF
PIPE CROSSING TO PREVENT WATER FROM ENTERING
PIPE BEDDING.

SEWER LINE AT STREAM CROSSING
BETHEL TOWNSHIP
MUNICIPAL AUTHORITY

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SCALE: NOT TO SCALE
DATE: OCTOBER 5, 2016
NOTES:

1. COMPACTED CLAY DIKES SHALL EXTEND VERTICALLY FROM UNDISTURBED GROUND AT BOTTOM OF TRENCH TO WITHIN TWO (2') OF FINAL GRADE, AND FROM UNDISTURBED GROUND ON TRENCH SIDES FOR FULL WIDTH OF TRENCH.

2. EACH CLAY DIKE SHALL CONSIST OF CLAY CONTAINING NO MORE THAN 15% (BY VOLUME) STONE NOT LARGER THAN TWO (2") INCHES IN DIAMETER / CLAY SHALL BE PLACED IN SIX (6") INCH LiftS AND COMPACTED BY MECHANICAL TAMPER TO NOT LESS THAN 95 PERCENT OF MAXIMUM DENSITY AT OPTIMUM MOISTURE CONTENT.
MAXIMUM SPACING
36’ C.C. FOR 20% TO 35% SLOPES
24’ C.C. FOR 35.1% TO 50% SLOPES
16’ C.C. FOR 50.1% OR GREATER SLOPES

UNDISTURBED EARTH/COMPACTED SUBGRADE
5/8” STAINLESS J-BOLT

SECTION
ELEVATION

3” WIDE X 1/4” THICK STAINLESS STEEL STRAP
STAINLESS STEEL NUT AND WASHER

UNDISTURBED EARTH/COMPACTED SUBGRADE

BETHEL TOWNSHIP MUNICIPAL AUTHORITY
CONCRETE ANCHORS FOR STEEPLY SLOPED PIPES

43

SCALE: NOT TO SCALE
DATE: OCTOBER 5, 2016
20' WIDE SANITARY SEWER EASEMENT

14' WIDE SERVICE DRIVE

3:1 MAX. SLOPE

SEWER PIPE
(DEPTH VARIES)

10" 2A CRUSHED STONE
SERVICE DRIVE (SLOPE
VARIES-SLOPE TO DRAIN)

UNDISTURBED EARTH OR
COMPACTED SUBGRADE

NOTE:
1. PROVIDE SERVICE DRIVES IN AREAS WHERE
SPECIFICALLY REQUIRED BY AUTHORITY.

SERVICE DRIVE DETAIL
BETHEL TOWNSHIP
MUNICIPAL AUTHORITY

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SCALE: NOT TO SCALE
DATE: OCTOBER 5, 2016

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SANITARY SEWER SYSTEM
TECHNICAL STANDARDS

Adopted: October 5, 2016
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Reference is made herein to BTMA Standard Construction Details in Appendix 'F' of the BTMA Rules and Regulations which are made part hereof by reference.
ARTICLE 1
Boring, Jacking, Tunneling

PART 1 GENERAL

1.1 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Approach trench excavation.

2. Installation of casing pipe or liner.

3. Installation of carrier pipe.

B. Related work specified elsewhere.

1. Trenching, Backfilling & Compacting: Article 2

C. Applicable Standard Details

1. Boring/Casing details.

D. General

1. Installation of pipelines shall be by open-cut methods unless boring, jacking, and/or tunneling is approved or required by the Township, PennDOT, railroad company, or other entity having jurisdiction over a particular location where a pipeline is being installed. Prior to the start of such construction, complete plans and specifications shall be submitted to and approved by the appropriate entity.

1.2 QUALITY ASSURANCE

A. Contractor Qualifications.

1. Construction operations shall be undertaken only by a Contractor well experienced in operations of similar magnitude and condition under transportation arteries and surface areas which cannot be disturbed.

B. Design Criteria

1. Pipe and joints of leakproof construction, designed for the earth and/or other pressures present, plus highway H20 loading or railway E80 loading with the associated recommended impact loading.

2. Design bracing, backstops, and use jacks of sufficient rating so that the jacking can proceed without stoppage, except for adding pipe sections
and as conditions permit, to minimize the tendency of the ground material to "freeze" around the casing pipe.

C. **Allowable Tolerances.**
   1. Do not overcut excavation by more than 1" greater than the outside diameter of the casing pipe.
   2. Install casing pipe with the determined vertical and horizontal alignment prior to installation of the carrier pipe.

D. **Reference Codes and Specifications.**
   1. Comply with applicable Federal, State and Local ordinances, codes, statues, rules and regulations, and affected jurisdictional bodies.
   2. Pennsylvania Department of Transportation Publication No. 408 Specifications.

1.3 **SUBMITTALS**

A. Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.

B. Submit description of proposed construction methods, including methods to establish and maintain vertical and horizontal alignment.

C. Submit tunnel liner design calculations and manufacturer’s data on tunnel liner place showing sizes, shapes, methods of attachment and connection details and details of grout holes.
   1. Highway Crossings: Design tunnel for earth and/or other pressure loads present, plus AASHTO H20 live loading.
   2. Railroad Crossings: Design tunnel for earth and/or other pressure loads present, plus Cooper's Railroad E80 live loading with 50 percent added for impact.

1.4 **JOB CONDITIONS**

A. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger the integrity of surface or subsurface structures or utilities, and landscape in the immediate or adjacent areas.
B. When boring, jacking or tunneling under State highways and railroads, comply with all applicable rights-of-way occupancy permits. The Contractor shall familiarize himself with all procedures and requirements of the governing agency or company having jurisdiction over the roadway, railroad structure, or obstruction involved, and shall furnish all materials, equipment, and work necessary to perform the work in accordance with those procedures and requirements.

C. If boring is obstructed, relocate or jack tunnel crossing as approved by the Owner. The Contractor shall receive approval by the Owner for any tunneling with liner plate or boring operation not so indicated on the Contract Drawings.

D. When water is known or expected to be encountered, pumps of sufficient capacity to handle the flow shall be maintained at the site. When dewatering, close observation shall be maintained to detect any settlement or displacement of roadway embankment, etc.

**PART 2 PRODUCTS**

2.1 **STEEL CASING PIPE**

A. ASTM A53; 35,000 psi minimum yield strength.

B. Full circumference welded joints.

C. Diameter and wall thickness as required to complete the Work.

D. Asphalt coated.

2.2 **REINFORCED CONCRETE CASING PIPE**

A. ASTM C76

B. Determine pipe class from "Concrete Pipe Design Manual" prepared by the American Concrete Pipe Association.

C. Tongue and groove joints. To avoid concentrated loads at the joints insert strips of plywood, asphalt roofing paper or similar resilient materials around the circumference in the joints.

2.3 **STEEL TUNNEL LINER PLATE**

A. Plates:

Unless otherwise indicated on the Contract Drawings, proposed sizes and thickness of plates shall be submitted to the Engineer along with Shop
Drawings for approval. In no event shall the liner plate thickness be less than 0.1048 inches. All plates shall be formed from one piece of metal to provide longitudinal and circumferential flanges. The shape of the plates shall be such that erection and assembly of the liner plate structure can be completely and readily effected from inside the tunnel.

1. Plates shall be accurately curved to suite the tunnel cross sections, and all dimensions shall be of such size and accuracy that plates of similar curvature will be interchangeable. All plates shall be connected by bolts on both the longitudinal and circumferential joints.

2. The tunnel liner plates shall be fabricated from structural quality, hot rolled steel, suitable for cold forming in closed dies and shall conform to ASTM A570 Grade B for sheets or ASTM A283 Grade B for plates.

3. The tunnel liner plate shall be galvanized to meet AASHTO M190 specifications. Such coating to be a minimum thickness of 0.05 inches.

B. Bolts and Nuts:

Bolts and nuts shall not be less than 1/2 inch in diameter for 7 gauge plates and lighter, and not less than 5/8 inch in diameter for liner plates heavier than 7 gauge. They shall be quick-acting coarse threads and conform to ASTM A307, Grade A. The nuts and bolts shall be hot dip galvanized to conform to ASTM Specification A153.

2.4 TIMBER SKIDS

A. Pressure treated, cut to a cross-sectional size to allow placement of the carrier pipe in the case and to support the barrel of the carrier pipe.

1. Provided with notches to accommodate fastening. Treat notches at time of pipe installation.

B. Creosoting: AASHTO M133

2.5 STEEL STRAPPING: ASTM A36

2.6 SAND (Fine Aggregate)

A. Section 703.1, Publication No. 408 Specifications. Type A.

2.7 GROUT

A. One part portland cement (ASTM C150), and 6 parts mortar sand mixer
with water to a consistency applicable for pressure grouting.

PART 3 EXECUTION

3.1 APPROACH TRENCH

A. Excavate approach trench using methods as site conditions require.

B. Ensure pipe entrance face as near perpendicular to alignment as conditions permit.

C. Establish a vertical entrance face at least one (1) foot above top of casing or tunnel lining.

D. Install adequate excavation supports as specified in Article 2 - Trenching.

3.2 CASING PIPE INSTALLATION METHODS

A. Boring:

1. Push the pipe into the ground with a boring auger rotating within the pipe to remove the spoil. Do not advance the cutting head ahead of the casing pipe except for that distance necessary to permit the cutting teeth to cut clearance for the pipe. The machine bore and cutting head arrangement shall be removable from within the pipe. Arrange the face of the cutting head to provide a barrier to the free flow of soft material.

2. If unstable soil is encountered during boring, retract the cutting head into the casing to permit a balance between the pushing pressure and the ratio of pipe advancement to quantity of soil.

3. If voids should develop greater than the outside diameter of the pipe by approximately one inch, grout to fill voids. Grouting to fill voids will be at the expense of the Contractor.

B. Jacking:

1. Construct adequate thrust wall normal to the proposed line of thrust.

2. Impart thrust load to the pipe through a suitable thrust ring that is sufficiently rigid to ensure distribution of the thrust load on the pipe.

C. Drilling and Jacking:

1. Use an oil field type rock roller bit or plate bit made up of individual roller cutter units solidly welded to the pipe which is turned and pushed for its entire length by the drilling machine to give the bit the
necessary cutting action.

2. Inject a high density slurry (oil field drilling mud) to the head as a cutter lubricant. Inject slurry at the rear of the cutter units to prevent jetting action ahead of the pipe.

D. Mining and Jacking:

1. Utilize manual hand-mixing excavation from within the casing pipe as it is advanced with jacks, allowing minimum ground standup time ahead of the casing pipe.

3.3 TUNNELING

A. Advance excavation for the tunnel liner in increments sufficient for the erection of one ring of liners and install liner plates immediately after each increment of excavation. Carry on excavation in such a manner that voids behind the liner plates are held to a minimum. Completely fill such voids with grout followed immediately by grout placed under pressure.

B. Excavate to the lines, grades, dimensions and tolerances as specified and shown, to accommodate the initial support and permanent lining.

C. Installation of Tunnel Linings:

1. Install the tunnel lining in a manner that will not damage the lining or coating.

2. Ensure that the edges are clean and free from material that could interfere with proper bearing.

3. Install bolts for liner plates in accordance with liner plate manufacturer’s recommendations and retention or replaced if necessary any bolt which does not meet the requirements.

D. Place concrete invert as required.

3.4 DEWATERING

A. Intercept and divert surface drainage precipitation and groundwater away from excavation through the use of dikes, curb walls, ditches, pipes, sumps or other means.

B. Develop a substantially dry subgrade for the prosecution of subsequent operations.

C. Comply with Federal and State requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment
control.

3.5 **PRESSURE GROUTING**

A. Pressure grout the annular space between the casing pipe and surrounding earth.

3.6 **CARRIER PIPE INSTALLATION**

A. All provisions regarding cleaning, inspection and handling specified under pipe material sections apply to this work.

B. Place the carrier as shown on the Contract Drawings. Exercise care to prevent damage to pipe joints when carrier pipe is placed in casing.

C. Support pipeline within casing so that no external loads are transmitted to carrier pipe. Attach wooden skids to barrel of carrier pipe; do not rest carrier pipe on bells.

D. After the pipe has been installed in the encasing conduit and has been tested, fill the encasing conduit with 1/4 inch clean stone chips or sand meeting the requirements of PennDOT Form 408 Section 703, Specification for Type A Fine Aggregate.

1. Close one end of encasing conduit with brick and mortar before filling with fine aggregate. Close the other end of the encasing conduit with brick and mortar after filling with fine aggregate or as operation dictates.
ARTICLE 2
Trenching, Backfilling, Compacting

PART I GENERAL

1.1 DESCRIPTION

A. The work of this section includes, but is not limited to:
   1. Cutting paved surfaces
   2. Blasting
   3. Trench excavation, backfill and compaction
   4. Support of excavation
   5. Pipe bedding requirements
   6. Control of excavated material
   7. Rough grading

B. Related work specified elsewhere
   1. Boring, Jacking, Tunneling: Article 1
   2. Rock Removal: Article 3
   3. Grading & Seeding: Article 4
   4. Paving and Resurfacing: Article 5

C. Applicable Standard Details
   1. Pipe trenching, bedding and concrete encasement details.

1.2 QUALITY ASSURANCE

A. Testing Agency
   1. Compaction testing shall be performed by a Soils Testing Laboratory engaged and paid for by the Contractor and approved by the Owner/Engineer.
B. Reference Standards
1. Pennsylvania Department of Transportation (PennDOT)
   a. Regulations Governing Occupancy of Highways by Utilities (67 PA Code, Chapter 459)
   b. Publication 408 Specifications
   c. Pennsylvania Test Method, PTM 106
   d. Pennsylvania Test Method, PTM 402
   e. Publication 213, Work Zone Traffic Control

   a. ASTM C33 Specs. for Concrete Aggregates
   b. ASTM D1557 Test for Moisture-Density Relations
   c. ASTM D1556 Test for Density of Soil in Place by the Sand-cone Method.
   d. ASTM D2922 Test for Density of Soil and Soil Aggregate in Place by Nuclear Methods

C. Compaction Testing
   1. Conduct one test for each 1,000 linear feet of pipeline. Conduct compaction tests at locations as directed by the Owner/Engineer during backfilling operations.
   2. Determine compaction in state highways and shoulders by the testing procedure contained in Pennsylvania Test Method, PTM 106, Method B or PTM 402.
   3. Determine compaction in areas other than State highways and shoulders by the testing procedure contained in ASTM 1557 or ASTM D2922.

1.3 SUBMITTALS

A. Certificates
   1. Submit certification attesting that the composition analysis of pipe bedding and select material stone backfill materials meet specification requirements.
2. Submit certified compaction testing results from the soils testing laboratory.

B. Compaction Equipment List

1. Submit a list of all equipment to be utilized for compacting, including manufacturer’s lift thickness limitations.

1.4 JOB CONDITIONS

A. Compaction of Backfill

1. The degree of compaction required at each location is as follows:
   a. In all roadways, proposed roadways, and shoulders 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 at least ninety-five percent (95%) of maximum density at optimum moisture content. Testing of trenches in State Highways shall be in accordance with PennDOT specifications.
   b. At stream crossings, the pipe shall be encased in concrete in accordance with the Approved/ Authority Detail Drawings. Areas above the pipe shall be backfilled with suitable backfill compacted to at least ninety-five percent (95%) of maximum density at optimum moisture content.
   c. All other areas shall be backfilled from top of bedding materials to a minimum of 1'-0" above the top of the pipe with the required backfill material and compacted to at least ninety-five (95%) of maximum density at optimum moisture content. Backfilling shall continue from a minimum of 1'-0" above the top of the pipe to the required grade with the specified material and compacted to at least eighty-five (85%) percent of maximum density at optimum moisture content.
   d. 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. Hammer and 18 inch Drop" (ASTM D1557 or ASSHO T-180).
   e. The field moisture content of materials being compacted shall be determined by "Laboratory Determination of Moisture 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).

f. Lift Thickness Limitations - Submit a list of the Compaction Equipment to be utilized on the Project, the recommendations of the equipment manufacturer as to the maximum lift thickness which can be placed, and the method of compaction to be used with this equipment to achieve the required compaction. In no case shall maximum lift thickness placed exceed the maximum limits specified by the manufacturer’s recommendations. However, if the equipment manufacturer’s lift thickness recommendation is followed and the specified compaction is not obtained, the Contractor shall, at his own expense, remove, replace and retest, as many times as is required, to obtain the specified compaction.

B. Control of Traffic

1. Employ traffic control measures in accordance with Pennsylvania DOT Publication 213, "Work Zone Traffic Control", and local municipality regulations.

C. Protection of Existing Utilities and Structures

1. Take all precautions and utilize all facilities required to protect existing utilities and structures. In compliance with Act 287, as amended, of the General Assembly of Pennsylvania, advise each Utility at least 3 working days in advance of intent to excavate, do demolition work or use of explosives and give the location of the job site. Request cooperative steps of the Utility and suggestions for procedures to avoid damage to its lines.

2. Advise each person in physical control of powered equipment or explosives used in excavation or demolition work of the type and location of utility lines at the job site. Request cooperative steps of the Utility and procedures to follow to prevent damage to existing utilities.

3. Immediately report to the Utility and the Owner/Engineer any break, leak or other damage to the lines or protective coatings made or discovered during the work and immediately alert the occupants of premises of any emergency created or discovered.

4. Allow access to Utility personnel at all times for purposes of maintenance, repair and inspection.

5. Excavating machinery and cranes shall be operated with care to prevent damage to existing structures, paving and/or wires.
6. On paved surfaces, the Contractor shall not use or operate tractors, bulldozers or other power-operated equipment of which the treads or wheels will cut or otherwise damage such surfaces.

7. The Contractor must exercise care not to damage paving, curb, inlets, sidewalk, pavement, miscellaneous site improvements, etc. Any damages to areas outside the limit of trench width shall be replaced in kind by the Contractor at his own expense, to the satisfaction of the Owner/Engineer.

8. The restoration of existing property or structures shall be done as promptly and as practicable as possible and shall not be left until the end of the construction period. In no case shall restoration of areas not be completed within 45 days following the installation of the pipe except if weather does not permit final restoration.

PART 2 PRODUCTS

2.1 PIPE BEDDING MATERIALS

A. AASHTO No. 8 (PennDOT No. 1B) Aggregate a minimum of 6" beneath outside diameter of a pipe and up to a minimum of one (1) foot above the pipe.

2.2 BACKFILL MATERIAL

A. Select Material Backfill (Select Backfill for State Roads and Township Roads)

1. From one (1) foot above pipe to pavement subgrade elevation or restoration depth.

   a. PennDOT 2A

   b. PennDOT 2B stone - (acceptable for unpaved shoulders, driveways and parking lots in lieu of PennDOT 2A)

   c. Native material excavated from the trench free of roots or stones larger than 6-inches in size and free of wet, frozen, or organic materials - (acceptable for new roadways)

B. Suitable Backfill Material (Other than State Roads and Township Roads)

1. From one (1) foot above pipe to road subgrade elevation or restoration depth.

   a. Native material excavated from the trench free of roots or stones larger than 8-inches in size and free of wet, frozen, or organic materials. No more than 20% rock by volume. Top of
restoration area shall be restored to finish grade with minimum 6-inches of topsoil in lawn areas. When possible match existing depths of topsoil in cultivated fields and meadows using excavated material, however in no case install less than 6-inches of topsoil.

2.3 SHEETING AND BRACING

A. Wood Sheeting and Bracing

1. Shall be sound and straight; free from cracks, shakes and large or loose knots; and shall have dressed edges where directed.

2. Shall conform to National Design Specifications for Stress Grade Lumber having a minimum fiber stress of 1200 pounds per square inch.

B. Steel Sheeting and Bracing

1. Shall be sound.

2. Shall conform to ASTM A 328 with a minimum thickness of 3/8 inch.

PART 3 EXECUTION

3.1 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Coordinate the work to insure the least inconvenience to traffic and maintain traffic in one or more unobstructed lanes unless closing the roadway is authorized.

B. Maintain access to all streets and private drives.

C. Provide and maintain signs, flashing warning lights, barricades, markers, and other protective devices as required to conform with construction operations and to keep traffic flowing with minimum restrictions.

D. Comply with state and local codes, permits and regulations, including but not limited to PennDOT Publication 213.

3.2 CUTTING PAVED SURFACES

A. Where installation of pipelines, miscellaneous structures, and appurtenances necessitate breaking a paved surface, make cuts with a sawcut machine in a neat uniform fashion forming straight lines parallel with the centerline of the trench. Cut offsets at right angles to the centerline of the trench.

B. Protect edges of cut pavement during excavation to prevent raveling or breaking; square edges prior to pavement replacement.
C. The requirements for neat line cuts may be waived if the final paving restoration indicates overlay beyond the trench width.

3.3 BLASTING

A. Verify site conditions and note and document irregularities affecting work of this Section. Beginning work of this Section means acceptance of existing condition.

B. If rock is uncovered requiring the explosives method for rock disintegration, notify the Owner/Engineer and execute as follows:

1. Conduct Seismic Survey
2. Advise owners of adjacent buildings or structures in writing prior to setting up seismographs. Describe blasting and seismic operations.
3. Disintegrate rock and remove from excavation.
4. Conduct blasting operations to avoid injury to persons and property.
5. Use explosive quantity and strength required to break rock approximately to intended lines and grades and yet leave rock in unshattered condition.
6. Cover rock with logs or mats, or both where required.
7. Issue sufficient warning to all persons prior to detonating a charge.
8. Store caps and exploders separately from explosives.
9. Remove all explosives from site at completion of blasting operations.
10. Comply with additional and or more strict requirements of governing authorities as applicable to work.
11. Provide copies of insurance certificate indicating Contractor and any subcontractors all fully covered for blasting damage. Insurance policy shall be for a minimum of $2,000,000.

C. Blasting will be permitted except in areas as specified where the proximity of structures, underground facilities, or public safety preclude the use of explosives. Blasting will not be permitted in areas specifically listed on the Approved/ Authority Detail Drawings or Specifications. Nothing in this section shall relieve the Contractor of his responsibilities for damages.

D. Blasting work shall be supervised by licensed and experienced personnel and performed in conformance with applicable Federal, State
and local codes, including but not limited to:

1. PaDEP Rules and Regulations, Chapters 210 and 211
3. OSHA Construction Industry Standards & Interpretations, 29 CFR, 1926.900 Explosive and Blasting Agents
4. PA Act 287
5. PA Labor and Industry Code, Chapter 4, Subchapter D, Explosives; Subchapter E - Excavation and Construction

E. Before any blasting is carried out the Contractor shall complete the following:

1. Submit to the Owner/Engineer a report prepared by a professional Owner/Engineer licensed to practice in the State of Pennsylvania or Geologist containing specified recommendations for blasting. Should the report indicate potential damage to existing facilities, the Owner will not allow blasting.

F. All blasting in open cuts shall be properly covered and protected with approved blasting mats.

G. Charges shall be of such size that the excavation will not be unduly large and shall be so arranged and timed that adjacent rock, upon or against which pipelines or structures are to be built, will not be shattered.

H. In accordance with Pa Title 67, Chapter 459, Paragraph 7(14);

1. No blasting will be performed within 25 feet of any bridge, box culvert or well.

2. No blasting shall be conducted within any PennDOT road right-of-way, unless authorized by the Highway Occupancy Permit. If the Contractor desires to undertake blasting within the road right-of-way, he shall post the necessary bonds and assist the Owner in applying for and obtaining a revised Occupancy Permit prior to the initiation of blasting activities.

3. If the Contractor desires to undertake blasting activities within 100 feet of any bridge, box culvert or well, a detailed plan, prepared by a professional Owner/Engineer experienced in blasting, of excavating, shoring, blasting and backfilling shall be submitted to the Owner/Engineer. Work may not be initiated until approval has been received.
I. Blasting will not be permitted within 25 feet of pipelines or structures.

J. Pre-blast surveys shall be conducted of all structures within 1000 feet of the blasting permit area to satisfy the regulations of the PA Explosives and Blasting Laws.

K. All blasting shall be field monitored using seismographic type equipment and shall be performed under the supervision of a professional Owner/Engineer, licensed to practice in the State of Pennsylvania or a geologist.

L. Keep and submit to the Owner/Engineer an accurate record of each blast. The record shall show the general location of the blast, the depth and number of drill holes, the kind and quantity of explosive used, ground velocity and displacements, and other data required for a complete record.

M. Repair of Damages Due to Blasting

1. Any injury or damage to the work or to existing pipes or structures or wells shall be repaired or rebuilt by the Contractor at his own expense.

2. Whenever blasting may damage pipes, structures, or wells, blasting shall be discontinued and the rock removed by drilling, barring, wedging or other methods.

N. Explosives

1. The maximum amount of explosives to be kept at the site shall not exceed the expected one day’s usage. Such explosives shall be stored, handled and used in conformity with all applicable laws and regulations.

2. Accurate daily records shall be kept showing the amounts of explosives on hand, both at a site and at any storage magazine, the quantities received and issued, and the purpose for which issued.

3. The Contractor shall be responsible for any damage or injury to army persons, property or structures as a result of his handling, storage or use of explosives.

O. Rock Clearance in Trenches

1. Ledge rock, boulders and large stones shall be removed from the sides and bottom of the trench to provide clearance for the specified embedment of each pipe section, joint or appurtenance; but in no instance shall the clearance be less than 9-inches. Additional clearance at the pipe bell or joint shall be provided to allow for the
proper make-up of the joint.

3.4 TRENCH EXCAVATION

A. Excavation of Topsoil

1. Topsoil on private property is to be excavated and stockpiled in the area in which it was removed and shall be used for topsoil restoration of that trench.

2. Imported topsoil must be screened and must meet PennDOT specifications. Contractors shall provide material certifications prior to placement of topsoil.

3. Comply with the requirements of the approved Erosion and Sedimentation Control Plan. Do not deviate from the approved Sequence of Construction.

B. Depth of Excavation

1. Gravity Pipelines
   a. Excavate trenches to the depth and grade shown on the profile drawings for the invert of the pipe plus that excavation necessary for placement of pipe bedding material.

2. Pressure Pipelines
   a. Excavate trenches to the minimum depth necessary to place required pipe bedding material and to provide 4 feet from the top of the pipe to the finished ground elevation, except where pipe is shown at a greater depth on the drawings.

3. Where unsuitable bearing material is encountered in the trench bottom, continue excavation until the unsuitable material is removed, solid bearing is obtained or can be established, or concrete cradle can be placed. If no concrete cradle is to be installed, refill the trench to required pipeline grade with pipe bedding material.

4. Where the Contractor, by error or intent, excavates beyond the minimum required depth, backfill the trench to the required pipeline grade with pipe bedding material at no extra cost to the Owner.

B. Width of Excavation

1. Excavate trenches, including laterals, to a width necessary for placement and joining of the pipe, and for placing and compacting
pipe bedding and trench backfill around the pipe, but not less than 16" plus the outside pipe diameter. If sheeting is required, the forgoing dimensions shall be applicable to the inside faces of the sheeting.

2. Shape trench walls completely vertical from trench bottom to at least 2” above the top of the pipe.

3. Trenches should be dug to accommodate pressure pipeline fittings, such that a thrust block, of size consistent with the details, is able to be installed against undisturbed soil (trench wall).

C. Open Trench

1. At no time shall the trench be left open at the end of a work day.

3.5 SUPPORT OF EXCAVATION

A. Support excavations with sheeting, shoring, and bracing or a "trench box" as required to comply with Federal and State laws and codes.

B. Where sheeting, shoring, bracing or trench boxes are used, they must be designed and sealed by a professional Owner/Engineer licensed to practice in Pennsylvania.

C. Install adequate excavation supports to prevent ground movement or settlement to adjacent structures, pipelines or utilities. Damage due to settlement because of failure to provide support or through negligence or fault of the Contractor in any other manner, shall be repaired at the Contractor’s expense.

D. Withdraw shoring, bracing, and sheeting as backfilling proceeds unless otherwise directed by the Owner/Engineer.

3.6 CONTROL OF EXCAVATED MATERIAL

A. Keep the ground surface, within a minimum of 2 feet of both sides of the excavation free of excavated material.

B. Provide temporary barricades to prevent excavated material from encroaching on private property, walks, gutters, and storm drains.

C. Maintain accessibility to all fire hydrants, valve pit covers, valve boxes, curb boxes, fire and police call boxes, and other utility controls at all times. Keep gutters clear or provide other satisfactory facilities for street drainage. Do not obstruct natural water courses. Where necessary, provide temporary channels to allow the flow of water either along or across the site of the work.
D. In areas where pipelines parallel or cross streams, ensure that no material slides, is washed, or dumped into the stream course. Remove stream diversion berms immediately upon completion of pipeline construction within the stream area.

3.7 DEWATERING

A. Keep excavations dry and free of water. Dispose of precipitation and subsurface water clear of the Work.

B. Maintain pipe trenches dry until pipe has been jointed, inspected, and backfilled, and concrete work has been completed. Prevent trench water from entering pipelines under construction.

C. Intercept and divert surface drainage away from excavations. Design surface drainage systems so that they do not cause erosion on or off the site, or cause unwanted flow of water.

D. Comply with Federal and State requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.

3.8 PIPE BEDDING REQUIREMENTS

A. General

1. Backfilling shall not be done in freezing weather except by permission of the Township, and shall not be done with frozen material. Do not backfill when material already in the trench is frozen.

2. Install pipe bedding and backfill material type and depth specified in Part 2, Products and Backfill trenches below.

3.9 PIPE LAYING

A. Care shall be taken to lay the pipe to true lines and grades to maintain a minimum slope of 1/4” per foot for gravity lines, unless indicated otherwise on Approved/ Authority Detail Drawings. Every pipe laid shall be tested as to grade and alignment. Care must be taken to fit the joints together properly so that the centers of the pipes shall be in one and the same straight line, and so as to give an opening of even thickness, all around between spigot end of pipe and the socket end of specials and fittings. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints. Any pipe that has its grade or joints disturbed after laying, shall be taken up and relaid. The interior of all pipe shall be thoroughly cleaned of all foreign matter, before being lowered into the trench, and shall be kept clean during laying operations by means of plugs or other approved methods. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions, or the weather, is
unsuitable for such work. In all cases, water shall be kept out of the trench until the concrete, where used, has hardened. Every precaution necessary to obtain watertight construction for all joints must be taken. This same precaution must be taken for all connections with manholes.

3.10 THRUST RESTRAINT

A. Provide pressure pipe with concrete thrust blocking or use restrained joint fittings at all bends, tees, valves, and changes in direction, in accordance with the Detail Drawings.

3.11 BACKFILLING TRENCHES

A. After pipe installation and inspection, hand place remaining pipe bedding material in accordance with the bedding specified, and carefully hand compact around pipe to provide specified compaction around and under the pipe.

B. For standard trenches not in paved areas, for PVC pipe backfill to a minimum of 12 inches above the top of the pipe with PENNDOT 2A coarse aggregate and carefully compact to at least ninety-five percent (95%) of maximum density at optimum moisture content. For ductile iron pipe and above the 2A stone where PVC pipe is utilized, backfill the remainder of the trench with suitable material in maximum 12" lifts and compact to at least eighty-five percent (85%) of maximum density at optimum moisture content.

C. For trenches in unpaved shoulders, unpaved driveways and parking lots for PVC pipe backfill to a minimum of 12 inches above the top of the pipe with PennDOT No. 2A Coarse Aggregate and carefully compact to at least ninety-five percent (95%) of maximum density at optimum moisture content. For ductile iron pipe and above the 2A stone where PVC pipe is utilized, backfill the remainder of the trench with PENNDOT 2B stone material in maximum twelve (12") inch lifts and compact to at least ninety-five percent (95%) of maximum density at optimum moisture content.

D. For trenches in paved highways, shoulders and driveways owned and maintained by the TOWNSHIP or PENNDOT backfill the entire trench from the top of the bedding material to the finished subgrade elevation as shown on the Detail Drawings with ASSHTO 2RC Coarse Aggregate, except as approved in New Roadways. All material shall be hand placed and carefully compacted to at least ninety-five percent (95%) of maximum density at optimum moisture content. Backfill shall be placed in lifts, the depth of which shall be determined by the compaction equipment to be used in the field. Under no circumstances shall the depth of a lift exceed twelve (12) inches. Upon completion of the backfill operation replace road surface in accordance with section entitled "Paving and Resurfacing".
E. For other trenches in paved roadways, shoulders and driveways, and as approved for New Roadways for PVC pipe backfill to a minimum of 12” above the top of the pipe with PennDOT No. 2A Coarse Aggregate and carefully compact to at least ninety-five percent (95%) of maximum density at optimum moisture content. For ductile iron pipe and above the 2A stone where PVC pipe is utilized, backfill the remainder of the trench with suitable backfill material in maximum twelve (12”) inch lifts and compact to at least ninety-five percent (95%) of maximum density at optimum moisture content.

F. For trenches in streambed backfill from the top of the concrete encasement to existing streambed with suitable backfill and compact to at least ninety-five percent (95%) of maximum density at optimum moisture content.

G. Unsuitable Backfill Material

1. Where the Owner/Engineer deems backfill material to be unsuitable and rejects all or part thereof due to conditions prevailing at the time of construction, remove the unsuitable material and replace with select material stone backfill or suitable backfill material.

3.12 DISPOSAL OF EXCAVATED MATERIAL

A. Excavated material remaining after completion of backfilling shall remain the property of the Contractor, removed from the construction area, and legally disposed of.

3.13 ROUGH GRADING

A. Rough grade areas disturbed by construction to a uniform finish. Form the bases for terraces, banks, lawns, and paved areas.

B. Grade areas to be paved to depths required for placing subbase and paving materials.

C. Rough grade areas to be topsoiled and seeded to the required depth below finish contours.

3.14 RESTORATION OF SURFACES

A. Restore surfaces disturbed by construction to at least equal the surface condition prior to construction in the opinion of the Owner/Engineer.

B. Restore grassed areas in accordance with Owner/Engineer requirements as specified in the specification entitled "Grading and Seeding - Article 4."
ARTICLE 3
Rock Removal

PART 1  GENERAL

1.1  DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Removal of identified and/or discovered rock during excavation.

2. Rock removal to the widths and depths identified in the Approved Documents or as directed by the Owner/Engineer, including the loosening, removing, transporting, storing and disposal of all materials requiring barring, or wedging for removal from their original beds.


B. Related work specified elsewhere


C. Definitions of Rock Excavation

NOT APPLICABLE FOR PRIVATE/DEVELOPER PROJECTS (AUTHORITY USE ONLY)

1. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with 30" wide bucket equipped with a ripper and penetrating "tiger" teeth on tract-mounted power excavator equivalent to Caterpillar Model 322L, rated at not less than 148 horsepower flywheel power.

2. When a questions arises concerning classification of material to be excavated, the Owner/Engineer shall be notified and their decision shall be final. No extra payment will be allowed unless a formal change order is prepared and issued by the Owner/Engineer and approved by the Owner.

3. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Owner/Engineer. Unauthorized excavation, as well
as remedial work directed by the Owner/Engineer shall be at the Contractors expense.

PART 2 MATERIALS (NOT USED)

PART 3 EXECUTION

3.1 EXCAVATION & BACKFILL

A. Rock Clearance in Trenches

1. Ledge rock, boulders and large stones shall be removed from the sides and bottom of the trench to provide clearance for the specified embedment of each pipe section, joint or appurtenances; but in no instance shall the clearance be less than 9 inches. Additional clearance at the pipe bell or joint shall be provided to allow for the proper makeup of the joint.

B. Rock Clearance at Structures

1. Concrete for structures shall be placed directly on the rock and the excavation shall be only to the elevations and grades shown on the Approved/ Authority Detail Drawings.

C. Rock removal and backfilling shall be performed in accordance with the applicable provisions of Article 2 entitled "Trenching, Backfilling and Compacting".

1. Acceptable Methods of Rock Removal Include

   a. Blasting only where indicated on the Approved/ Authority Detail Drawings.

   b. Barring or wedging.

   c. Rock removal using pneumatic vibrating chippers.

   d. Ram Hammer Methods - Removal of rock using boom mounted pneumatic, impact hammer equipment.

D. The rock excavated which cannot be incorporated into the backfill material, as specified, shall be disposed of as spoil and shall be replaced with the quantity of acceptable material required for backfilling at no additional cost. The cost of these items shall be included in the unit price for rock excavation, rock disposal and supplying of backfill.
ARTICLE 4
Grading & Seeding

PART 1 GENERAL

1.1 DESCRIPTION
A. The work in this section includes, but is not limited to:
   1. Stripping and stockpiling topsoil.
   2. Placing existing and new topsoil.
   4. Maintaining seeded areas until acceptance.
B. Restore unpaved surfaces to a condition similar to or better than that prior to construction activities.
C. Related Work
   1. Clearing and Grubbing.
   2. Trenching, Backfilling and Compacting.

1.2 DELIVERY, STORAGE AND HANDLING
A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging. Damaged or open packages are not acceptable.
B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer. Damaged or open packages are not acceptable.

1.3 EXISTING CONDITIONS
A. Beginning work means acceptance of existing conditions.

PART 2 PRODUCTS

2.1 SOIL SUPPLEMENTS
A. Pulverized Agricultural Limestone
   1. Pulverized Agricultural Limestone shall be supplied in accordance with PennDOT Specifications Publication No. 408, as amended,
Section 804.2(a).1.

B. Fertilizer

1. Fertilizer shall be supplied in accordance with PennDOT Specifications Publication No. 408, as amended, Sections 804.2(a).2 and 804.2(a).3.

C. A shop drawing shall be submitted for each supplement used.

2.2 SEED

A. Seed shall be supplied in accordance with Section 804.2.(b) PennDOT Specifications Publication No. 408, as amended.

B. A shop drawing shall be submitted for each seed used.

C. See attached Table 2.02-1 for seed formulas, rates, seeding dates and seeding locations.

2.3 HERBICIDES

A. Herbicides shall be in accordance with Section 804.2.(d) of PennDOT Specifications Publication No. 408, as amended.

B. A shop drawing shall be submitted for each herbicide used.

2.4 EXISTING TOPSOIL

A. Existing topsoil shall be stripped and stockpiled in accordance with Section 801 of PennDOT Specifications Publication No. 408, as amended and in conformance with all rules and regulations at the local conservation district having jurisdiction.

2.5 NEW TOPSOIL

A. Having a pH of between 6.0 and 7.0; containing not less than 2% nor more than 10% organic matter as determined by AASHTO T194.

B. New topsoil shall comply with Section 802.2 of PennDOT Specifications, Publication No. 408, as amended.

C. Topsoil shall be provided from an approved outside source and shall be accompanied by a grading analysis report showing the minimum percent passing through the specified sieve screens and the minimum and maximum percent of sand, silt and clay material passing the No. 10 sieve.

D. A shop drawing shall be submitted for the topsoil.

2.6 MULCHING MATERIALS
A. Mulches for seeded materials shall be in accordance with Section 805.2(a).1 of PennDOT Specifications, Publication No. 408, as amended.

B. Mulches for planting and other areas shall be in accordance with Section 805.2(a).2 of PennDOT Specifications, Publication No. 408, as amended.

C. Mulch binders shall be in accordance with Section 805 of PennDOT Specifications, Publication No. 408, as amended.

D. A shop drawing shall be submitted for each mulch used.

2.7 SOD

A. Sod shall be in accordance with Section 809 of PennDOT Specifications, Publication No. 408, as amended, and shall conform to all requirements of the most current edition of the American Sod Producers Association’s Guideline Specifications to Sodding.

1. Certified sod cultivated of two or more approved Kentucky bluegrass varieties.

2. Containing not more than 10% of other fine turf grass species.

3. Entirely free from weeds, as defined in the Pennsylvania Seed Act of 1965 and amendments.

4. Free from harmful insects, disease, and nematodes.

5. Cultured in mineral soil.

6. Certified by the Pennsylvania Department of Agriculture or the Department of Agriculture of the state from which sod is obtained.

7. Rectangular machine sections 12 to 24 inches wide, 2 to 6 feet long with a uniform soil thickness of approximately 3/4 inch excluding top growth and thatch. Broken sections or sections having torn or uneven ends will not be accepted.

8. Grass height, maximum 1 ½ inches.

9. Relatively free of thatch (up to ½ inch uncompressed thickness acceptable).

B. Sod shall be provided from an approved outside source and be accompanied by a certification that the sod provided meets or exceeds the American Sod Producers Association’s Guideline
Specifications.
C. A sample shall be supplied to the Owner and no sod shall be placed until approval from the Owner/Engineer is received in writing.

2.8 SLOPE EROSION PROTECTION AND SWALE PROTECTION

A. Protection Materials shall be in accordance with Section 806 of PennDOT specifications, Publication No. 408, as amended.

B. Type supplied, unless otherwise noted on the plans, shall be Geojute/ Anti-wash as manufactured by Belton Industries of Atlanta, GA, or equal.

C. Contractor shall submit a shop drawing for each type of Protection Material being used. Additionally, Contractor shall include all runoff calculations used to design the slope protection. No slope protection shall be installed until Contractor receives acceptance from the Owner/Engineer in writing specifically identifying the area and material to be used.

2.9 SELECTIVE TREE REMOVAL AND TRIMMING

A. Stump or basal treatment herbicide shall be in accordance with Section 810.2 of PennDOT Specifications, Publication No. 408, as amended.

B. Contractor shall not remove or trim any tree or bush/shrub unless directed by the Owner in writing.

2.10 TEMPORARY PROTECTIVE FENCING

A. Fencing shall conform to Section 811 of PennDOT Specifications, Publication No. 408, as amended.

B. Prior to the start of the Work, fencing shall be placed as indicated or directed by the Owner/Engineer or Owner/Engineer's representative in the field, unless approved otherwise.

C. A shop drawing shall be submitted for all fencing used.

2.11 GEOTEXTILES

A. Geotextile material shall conform to Section 212 and Section 735 of PennDOT Specifications, Publication No. 408, as amended.

B. A shop drawing shall be submitted for each geotextile fabric used.

2.12 ROCK LINING

A. Rock material shall conform to Section 850 of PennDOT
Specifications, Publication No. 408, as amended.
B. All rock supplied shall be accompanied by a certification, from the supply quarry, as to the gradation and class of the rock supplied. No rock shall be delivered to site until Contractor receives acceptance from the Owner/Engineer in writing.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect existing underground improvements from damage.

B. Remove foreign materials, plants, roots, stones, and debris from site. Do not bury foreign material.

C. Existing topsoil should be stripped and stockpiled.

D. After installation of utility, backfilling shall be completed in accordance with Article 2 - Trenching, Backfilling and Compacting.

3.2 TIME OF OPERATIONS

A. Spring Seeding:

1. Preliminary operations for seed bed preparation may commence as soon after March 15 as ground conditions permit, but shall end by May 30, unless approved otherwise.

B. Fall Seeding:

1. Preliminary operations for seed bed preparation may commence after August 15, but shall end by October 15, unless approved otherwise.

C. All Other Period

1. If construction is completed at times of the year other than noted above, temporary cover work shall be performed to provide interim soil coverage. The temporary cover work shall be followed by a second seeding in accordance with Table 2.02-1 during the above noted time periods.

3.3 PLACING OF SOIL SUPPLEMENTS

A. Place soil supplements in accordance with Section 804 of PennDOT Specifications, Publication No. 408, as amended and as follows:
1. Uniformly apply supplements to the areas to be seeded, except areas to be seeded with Formula E, as identified in Table 2.02-1.

2. On topsoiled areas, blend the initial soil supplements into the soil at least 2" by disking or harrowing or by another acceptable method approved by the Owner/Engineer in writing. The blending of the supplements may be performed during tillage operations.

3. Prior to project completion, apply slow-release, nitrogen fertilizer to the surface of Formula B, D, L and W seeded areas.

4. Apply soil supplements as follows:

   Pulverized Agricultural Limestone 800 lbs/1,000 sy
   10-20-20 Analysis Commercial Fertilizer 140 lbs/1,000 sy
   38-0-0 Ureaform Fertilizer 50 lbs/1,000 sy
   or
   32-0-0 to 38-0-0 Sulta Coated 50 to 591bs/1,000 sy
   Urea Fertilizer (as per Mfg. recommended)
   or
   3 1-0-0 IBUDU Fertilizer 60 lbs/1,000 sy

3.4 TILLAGE

A. Perform tillage on topsoiled areas in accordance with Section 804 of PennDOT Specifications, Publication No. 408, as amended and as follows:

1. Correct surface irregularities by filling any depressions and leveling rough or uneven areas. Remove all metal objects, woody material, stones larger than 2 inches and any other debris detrimental to restoration operations.

2. Topsoil areas 3:1 and flatter thoroughly loosen the surface to a depth of not less than 2 inches by utilizing a Tufline TW5 Series Tandem Disc Harrow, or equal and compact utilizing a P10 Series Single Gauge Pulverizer (Culti-Packer) as manufactured by Brillion Mfg., or equal.

3.5 SEED APPLICATION

A. Apply seed in accordance with Section 804.3(a) of PennDOT Specifications, Publication No. 408, as amended and as follows:
1. Spread seeds at the rates specified in Table 2.02-1.

2. Sow seeds uniformly on the prepared areas by hydraulic placement, broadcasting, drilling or hand seeding trench areas in accordance with manufacturer’s recommendations.

3. Areas other than trench or similar narrow restoration areas shall be seeded in two applications-have in one direction and the other half at right angles.

4. Spread seeds within the following dates:

   Formula B, D, & L  March 15 to May 30
   August 15 to October 15

   Formula C  Ryegrass Portion;  March 15 to October 15
              Crownvetch Portion;  Anytime except
              September and October

5. Upon completion of sowing, cover seed to an average depth of 1/4 inch by hand raking or approved mechanical methods.

6. On topsoiled areas, where temporary seeding or mulching has been applied, use tillage and soil supplements prior to permanent seeding.

7. On un-topsoiled areas, where temporary seeding or mulching has been applied, permanent seed and/or soil supplements may be applied without tilling.

8. After seeding, roll topsoiled areas with a roller, weighing not more than 65 lbs. per foot width, or through the utilization of a Culti-Packer attachment or by another method approved by the Owner/Engineer in writing.

9. Seeded area shall be watered with a fine spray in such a manner as not to wash out the seed area. Seeding and watering operations shall be done on a still day.

10. Maintain grass areas within grading limits until the area has been accepted by the Owner. Mow and water as needed or directed. Control prohibited and noxious weed growth within the restored area to achieve a uniform lawn/grass area.

3.6 APPLICATION OF HERBICIDES
A. Apply herbicides in accordance with Section 8043(h) of PennDOT Specifications, Publication No. 408, as amended and as follows:

1. Apply herbicides where weed growth is prominent. Application shall be by licensed personnel and with equipment specifically designed for the spread of herbicides.

3.7 EXISTING TOPSOIL

A. Stripping and Stockpiling

1. Strip and stockpile existing topsoil in accordance with Section 801.3 of PennDOT Specifications, Publication No. 408, as amended and as follows:

   a. After clearing operations have been completed and prior to any other work activities, remove topsoil from area of construction operations and stockpile.

   b. Provide soil erosion controls as indicated on the plans. Seed stockpiled topsoil in accordance with County Conservation District requirements.

B. Placing Stockpile Topsoil

1. Place stockpiled topsoil in accordance with Section 803 of PennDOT Specifications Publication No. 408, as amended and as follows:

   a. Remove topsoil from stockpiles using an acceptable method which does not mix topsoil with foreign materials.

   b. After placing topsoil, provide tillage and soil supplements prior to commencing any seeding operations.

3.8 PLACING NEW TOPSOIL

A. Topsoil shall be placed in accordance with Section 802.3 of PennDOT Specifications, Publication No. 408, as amended and as follows:

1. Grade the areas to be covered with topsoil. Loosen soil to a depth of not less than 2" before placing the topsoil. Remove stones 2 inches or larger and dispose of unsuitable and surplus material, unless approved otherwise.

2. Place topsoil on the prepared areas to the required depth.
3. Compact with a roller weighing not over 120 lbs. per foot of width or to other acceptable methods.

4. Provide tillage and soil supplements to the new topsoil prior to commencing any seeding operations.

3.9 PLACEMENT OF MULCH

A. Place mulch in accordance with Section 805.3 of PennDOT Specifications, Publication No. 408, as amended and as follows:

1. Mulching seeded areas.
   a. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose over topsoiled areas.
   b. Place straw or hay uniformly, in a continuous blanket, at a rate of 1,200 lbs per 1,000 square yards. Anchor straw or hay with acceptable materials at the following rates:

      Emulsified Asphalt, not less than 31 gallons per 1,000 sy. Wood Cellulose, 160 lbs per 1,000 sy.

      Chemical mulch binders or a light covering of topsoil may be used for anchorage when the size of the area precludes the use of mechanical equipment.
   c. Apply wood cellulose fiber hydraulically at a rate of 320 pounds per 1,000 square yards.
   d. Incorporate as an integral part of the slurry after seed and soil supplements have been thoroughly mixed.
   e. When mulch is applied to grass by blowing equipment, the use of cutters in the equipment will be permitted to the extent that a minimum of 95% of the mulch is 6" or more in length.

3.10 PLACEMENT OF SOD

A. Place sod in accordance with Section 809.3 of PennDOT Specifications, Publication No. 408, as amended and as follows:

1. Sod shall be placed within 36 hours after having been cut.
2. Keep sod moist, during temporary storage protect from drying.
3. Provide sod bed grading such that, after placement, the top of sod is flush with the surrounding finished grade.

4. Apply soil supplements to areas to be sodded, till and moisten soil prior to placing sod.

5. Do not cut or place sod when the temperature is lower than 32°F.

6. Place sod by hand with tight joints, in straight lines with rows placed parallel to and tight against each other. Crooked lines will not be accepted.

7. After placing, saturate sod with water to its full depth.

8. After initial watering tamp to obtain a smooth even surface then use a roller weighing not more than 65 pounds per foot of width to complete firming and smoothing the sod.

9. In ditches and on slope areas (3:1 or greater), stake each strip of sod securely. Drive stakes flush with the top of the sod, with the wide face parallel to the slope contour.

10. Properly maintain sodded areas until the project has been accepted. This includes repeated watering, moving and repairs or replacement to any areas.

11. Which fail to show a uniform growth of grass. Do not mow sodded areas until sod is firmly rooted and secure. Maintain grass at 1 1/2 " in height.

3.11 PLACEMENT OF EROSION PROTECTION

A. Placement of erosion protection materials shall be in accordance with Section 806.3 of PennDOT Specifications, Publication No. 408, as amended and as follows:

1. Place erosion control materials after the slope or swale has been dressed.

2. Place erosion control materials to conform to the shape of the soil surface.

3. Spread out materials evenly and smoothly.

4. Unroll materials parallel to the flow direction.

5. Drive all staples flush with the soil surface.
6. Install upslope ends and overlap edges per the Manufacturer’s recommendations.

3.12 SELECTIVE TREE REMOVAL & TRIMMING

A. Tree removal and trimming shall be in accordance with Section 810.3 of PennDOT Specifications, Publication No. 408, as amended and as follows:

1. Contractor shall not burn any debris onsite unless approval has been granted by the Owner.
2. Fall trees in a manner that will avoid damage to trees, shrubs and other installations which are to be retained.
3. Trees in construction zones or rights-of-way shall not be removed until inspected and/or tagged by the Owner.

B. No trees shall be removed within the construction zone or rights-of-way except the following:

1. Trees within an excavated area such as footing or trench.
2. Trees whose root system will be destroyed by the excavation.
3. Trees that interfere with the movement of the Contractor's equipment with the approval of the Owner. Any trees that interfere with the movement of the Contractor's equipment shall be reviewed by the Owner before they are removed.
4. All trees bordering any construction zone or right-of-way shall be protected by acceptable methods. (Trees damaged by the Contractor will be either repaired or replaced as determined by the Owner at the Contractor's expense).

5. Stumps

a. Stumps required to be removed shall be to a depth of 18 inches. This depth shall be measured from the existing ground surface or the proposed finished grade, whichever is the lower. All stumps in lawn areas shall be removed.

b. Engineering requirements shall control removal of stumps under fills, foundations, or army construction in contact with the stumps.

6. When required, with the Owner's approval, trees shall be trimmed to remove branches or roots which interfere with construction or traffic.
Paint all cut branches and roots with a coating as recommended for this application.

7. Material which is to be salvaged, as a result of the clearing operations, shall include the following items which are to be turned over to the property owner, if the property owner so desires.
   a. Logs over 12 inches, butt diameter
   b. Branches over 6 inches, butt diameter
   c. Parts suitable for use as a mulch
   d. Live parts suitable for replanting

8. All salvageable material not desired by the property owner shall be removed as part of the Work. Cut logs and branches into cordwood, 2 feet 6 inches in length and store on site where acceptable to the Owner.

3.13 INSTALLATION OF PROTECTIVE FENCING
   A. Protective fencing shall be installed in accordance with Section 811 of PennDOT Specifications, Publication No. 408, as amended.

3.14 INSTALLATION OF GEOTEXTILES
   A. Geotextile shall be installed in accordance with Section 212 of PennDOT Specifications, Publication No. 408, as amended and as per the manufacturers recommendations.

3.15 SPECIFIC AREAS OF RESTORATION
   A. Final Restoration of Lawn Areas
      1. After installation of proposed improvements, prepare subbase by tilling a minimum of 2" in depth.
      2. Removal all debris and rock in excess of 2" in any direction.
      3. Place Topsoil on prepared area, spread and compact to a 4" uniform depth.
      4. Compact with a roller weighing not over 120 lbs. per foot of width.
      5. Provide tillage and soil supplements to the new topsoil prior to commencing any seeding operations.
6. Apply seed (Formula "B") or sod at the recommended rates within the recommended seeding dates.

7. Upon completion of sowing, cover seed to an average depth of 1/4" by hand raking or approved mechanical method.

8. Water as needed.

9. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose at the recommended rates.

10. Maintain restored areas within grading limits until the entire project is accepted.

B. Final Restoration of Open Field Areas

1. After installation of proposed improvements, prepare subbase by tilling a minimum of 2" in depth.

2. Removal all debris and rock in excess of 2" in any direction.

3. Place topsoil on prepared area, spread and compact to a 4"-6" uniform depth.

4. Compact with a roller weighing riot over 120 lbs. per foot of width.

5. Provide tillage and soil supplements to the new topsoil prior to commencing any seeding operations.

6. Apply seed (Formula "W") at the recommended rates within the recommended seeding dates.

7. Upon completion of sowing, cover seed to an average depth of 1/4" by hand raking or approved mechanical method.

8. Water as needed.

9. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose at the recommended rates.

10. Maintain restored areas within grading limits until the entire project is accepted.

C. Final Restoration of Wooded Areas
1. After installation of proposed improvements, prepare subbase by tilling a minimum of 2" in depth.

2. Remove all debris and rock in excess of 2" in any direction.

3. Place topsoil, spread and compact to a 4"-6" uniform depth.

4. Apply seed (Formula "W") at the recommended rates within the recommended seeding dates.

5. Upon completion of sowing, cover seed to an average depth of 1/4" by hand raking or approved mechanical method.

6. Water as needed.

7. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose at the recommended rates.

8. Maintain restored areas within grading limits until the entire project is accepted.
ARTICLE 5
PAVING AND RESURFACING

PART I GENERAL
SPECIFIC PAVING ITEMS ARE NOT APPLICABLE FOR
PRIVATE/DEVELOPER PROJECTS (AUTHORITY USE ONLY) BUT
INCIDENTAL PAVING ITEMS (Paving Rings, etc.) ARE APPLICABLE.

1.1 DESCRIPTION
A. The work of this section includes, but is not limited to:
   1. Temporary Paving
   2. Permanent Paving
   3. Shoulder Restoration
   4. Curb and Sidewalk Restoration
B. Related work specified elsewhere:
   2. Concrete For Utility Construction: Article 12.
C. The Contractor and Owner/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 and kept on file at the Owner/Engineer’s office for possible future reference. Contractor shall not disturb areas prior to the existing conditions being documented.
D. Restoration of State Highways shall be in accordance with Pennsylvania rules and regulations, PennDOT requirements, and the provisions of the highway occupancy permit. Restoration of Township Streets and other paved surfaces shall be in accordance with the requirements of the Township having jurisdiction. Permits will be necessary from the appropriate parties (PENNDOT, Township, etc. as may be applicable).

1.2 QUALITY ASSURANCE
A. Referenced Standards, as amended:
   1. Pennsylvania Department of Transportation:
a. Publication 408 Specifications

b. Publication 27 - Specification for Bituminous Mixtures (Bulletin 27)


d. Publication 213 - Work Zone Traffic Control

1.3 SUBMITTALS

A. Certificates:

1. Submit certification from bituminous and aggregate suppliers attesting that materials conform to the State specifications.

1.4 JOB CONDITIONS

A. Control of Traffic:

1. Take measures to control traffic during repaving operations. Do not allow traffic on repaved areas until authorized by the Owner/Engineer.

2. Employ traffic control measures in accordance with Publication 213 - "Work Zone Traffic Control" and the Approved/Authority Detail Drawings.

3. Unless otherwise noted on the plans, Contractor shall submit details of all traffic control measures to be utilized. No traffic control measures may be used until Contractor receives approval from the Owner/Engineer in writing.

3. Restore existing paving outside the limits of the work, that is damaged by the Contractor's operations, to its original condition at the expense of the Contractor.

PART 2 PRODUCTS -

2.1 CONCRETE

A. The concrete materials for streets shall conform to the applicable provisions of Section 704, CEMENT CONCRETE AND READY MIX CEMENT CONCRETE, in Commonwealth of Pennsylvania, Department of Transportation Specifications, Form 408 as amended.
B. The concrete materials for walks, curbing and driveways shall be Class A, 3300 psi Concrete and shall conform to the specifications of Article 12.

2.2 CRUSHED STONE BASE COURSE
A. Crushed stone base course shall be PennDOT No. 2A Crushed Stone or AASHTO 2RC stone and shall be in accordance with Section 350 - Subbase of PennDOT Specifications, Publication No. 408, as amended.
B. Crushed slag shall not be used for this material.

2.3 BITUMINOUS CONCRETE BASE COURSE
A. Bituminous concrete base course shall conform to Section 305 of PennDOT Specifications, Publication No. 408, as amended.

2.4 BITUMINOUS BINDER COURSE ID-2
A. Bituminous binder course ID-2 shall conform to Section 421 of PennDOT Specifications, Publication No. 408, as amended.

2.5 BITUMINOUS TACK COAT
A. Bituminous tack coat shall conform to Section 460 of PennDOT Specifications, Publication No. 408, as amended.

2.6 BITUMINOUS WEARING COURSE ID-2
A. Bituminous wearing course ID-2 shall conform to Section 420 of PennDOT Specifications, Publication 408, 1990.

2.7 MILLING OF BITUMINOUS PAVEMENT SURFACE
A. Milling of bituminous pavement surface shall conform to Section 491 of PennDOT Specifications, Publication 408, 1990.

2.8 JOINT SEALING
A. Joint sealing shall conform to Section 401 of PennDOT Specifications, Publication No. 408, as amended.

2.9 CRACK FILLING AND SEALING
A. Crack filling and sealing shall conform to Section 464 of PennDOT Specifications, Publication No. 408, as amended.

2.10 BITUMINOUS PAVED SHOULDERS TYPE 6 and TYPE 61
A. Paved shoulders Type 6 and Type 61 shall conform to Section 656 of PennDOT Specifications, Publication 408, 1990.

2.11 CONCRETE SHOULDERS
A. Concrete shoulders shall conform to Section 658 of PennDOT Specifications, Publication No. 408, as amended.

2.12 CEMENT CONCRETE SIDEWALKS
A. Cement concrete sidewalks shall conform to Section 676 of PennDOT Specifications, Publication No. 408, as amended.

2.13 EXPANSION JOINT MATERIAL
A. Expansion joint material shall conform to Section 705 of PennDOT Specifications, Publication No. 408, as amended.

2.14 WELD WIRE FABRIC
A. Weld wire fabric shall conform to Section 709 of PennDOT Specifications, Publication No. 408, as amended.

2.15 CONCRETE
A. Concrete shall conform to Section 704 of PennDOT Specifications, Publication No. 408, as amended.

2.16 LINE PAINTING
A. Line painting shall conform to Section 962 of PennDOT Specifications, Publication No. 408, as amended.

2.17 MANHOLE ADJUSTING RINGS
A. For raising manhole covers an acceptable manhole raising device shall be provided. The device shall be a solid adjusting ring or an adjustable manhole extension device.

2.18 RAISING MANHOLE COVERS AND VALVE BOXES
A. Install the adjusting rings in all sewer manholes that require adjusting to meet the elevation of the repaving.

B. Coordinate the raising of all valve boxes and/or manhole covers belonging to other utilities.

C. The Contractor shall be responsible to see that all such items as mentioned above, and those affected by the Work are adjusted to the new paving
PART 3  EXECUTION

3.1  MISCELLANEOUS

A. All materials of construction shall conform to all applicable sections of PennDOT Specifications, Publication 408, 1990.

B. Restore existing paving outside the limits of the work, that is damaged by the Contractor's operation, to the original condition, at the expense of the Contractor.

C. Temporary material, if used, must be removed prior to permanent repair.

D. For temporary street cut or repair, a base course of bituminous concrete may also function as wearing course if installed to level of existing roadways.

E. All new joints shall be sawcut to form neat and straight lines.

F. All finish paving shall be completed to match the finish grade of the adjacent existing pavement.

G. The Contractor shall seal all joints between new pavement and existing pavement, including roads, driveways, manholes, inlets, curbs, water boxes, etc. in accordance with Section 401 of the PennDOT Specifications, Publication 408. This work is incidental to the installation of the bituminous material.

H. Upon completion of the paving, any stretch marks, cracks, open seams, etc. which allow the penetration of water and dirt shall be repaired in accordance with instruction by the Owner.

I. Contractor shall continuously maintain temporary paving to the satisfaction of the Authority. Temporary paving shall remain in place and be maintained for 90 days before final restoration occurs.

J. All restored areas shall be maintained by the Contractor until expiration of the maintenance bond period as required by the Owner.

3.2  SURFACE PREPARATION

A. The surface shall be prepared and cleaned by the Contractor.

B. The Contractor shall apply a tack coat to the existing bituminous pavement prior to placing the new wearing course.
C. The Contractor shall cut joints at all paved road connections. This work is incidental to the wearing course installation.

D. All waste material removed from the roadway area shall be disposed of at a site provided by the Contractor.

E. The road surface shall not be muddy or otherwise unsatisfactory when the binder and/or wearing course is placed thereon. Contractor shall clean road surface in preparation of paving.

3.3 TRAFFIC CONTROLS

A. The Contractor shall provide traffic controls as previously approved by the Owner. All traffic controls shall meet PennDOT criteria. The Owner and municipality shall be notified a minimum of three (3) days in advance of any construction in the roadway.

3.4 ROADWAY EXCAVATION AND SUBBASE PREPARATION

A. The Contractor shall smooth cut the existing pavement at all limits of work. This work is incidental to the excavation of the roadway.

B. The Contractor shall excavate and remove the existing road materials, rubble, stone and rock to the depth shown on the Approved Drawings or suitable subgrade. The length and width limits of excavation shall be as indicated on the Approved/Authority Detail Drawings.

C. All waste material removed from the road excavation shall be disposed of at a site provided by the Contractor.

D. The Contractor shall recompact the subgrade using equipment and methods in accordance with Section 210 Subgrade and approved by the Owner.

E. The subgrade shall not be muddy or otherwise unsatisfactory when the stone subbase is placed thereon.

F. The Contractor shall construct a subbase where indicated on the Approved Drawings of approved aggregate to the depth and width shown. The trench for the installation of the stone shall have a minimum width of 36". The stone shall be compacted and brought to the grade as shown on the Approved/Authority Detail Drawings. The minimum size roller shall be a small vibrating trench roller approved by the Owner. All materials and methods of construction shall conform to all applicable sections of PennDOT Specifications, Publication No. 408.

G. For Permanent trench restoration in paved roadway areas, excavation shall
include removal of the existing pavement surfaces 12-inches back from the sides of the trench, exposing disturbed subgrade. Existing roadway shall be sawcut to the bottom of the existing base course. The detached material shall be removed, prior to installation of new paving material.

3.5 STONE ACCESS AND PARKING AREAS

A. Stone parking areas shall be 10" of PennDOT No. 2A stone over Class 2 Type "A" Filter Fabric on approved and compacted subbase or as indicated on the Approved/ Authority Detail Drawings.

B. Parking areas shall extend to the limits as shown of the Approved/ Authority Detail Drawings.

3.6 DRIVEWAYS

A. Driveways shall be restored to existing dimensions or reconstructed to the limits as shown on the Approved/ Authority Detail Drawings as directed by the Owner. (Driveway depths shall be restored to existing depths, unless not meeting minimum depths otherwise required by the Township, Owner or PennDOT. Refer to Township Driveway Ordinance and PennDOT Standards.)

1. Bituminous Driveways

   a. Bituminous driveways shall be 2" of 12.5 mm wearing course over 6" of PennDOT No. 2A stone on approved and compacted subbase. (minimum)

   b. Seal all joints.

2. Concrete Driveways

   a. Concrete driveways shall be 6" of Class A, 3300 psi Concrete with 6 x 6 WWF over 6" of PennDOT No. 2A stone on approved and compacted subbase.

   b. Provide performed expansion joint, where new concrete joins existing concrete and at intervals as directed by Owner/Engineer.

   c. Form joints with a 1/4" radius edging tool.

   d. Provide light broom finish.


   a. Stone driveways shall be 10" of PennDOT 2A stone over
4. **Concrete Driveway Apron.**

   a. Apron extends from depressed curb or joint with street to the furthest most point of the sidewalk.

   b. Concrete apron shall be 6" of Class F, 3300 psi Concrete with 6 x 6 WWF over 6" of PennDOT No. 2A on approved and compacted subbase.

   c. Provide expansion joint where new concrete joins existing concrete and at intervals as directed by the Owner/Engineer.

   d. Form joints with a 1/4" radius edging tool.

   e. Provide light broom finish.

3.7 **SIDEWALKS**

   A. Sidewalks shall be replaced to original limits or installed to the limits indicated in the Approved/Authority Detail Drawings as directed by the Owner.

   1. **Concrete Sidewalks.**

      a. Concrete sidewalks shall be 4" Class A, 3300 psi Concrete over 4" PennDOT #57 stone on approved and compacted subbase.

      b. Provide a light broom finish.

      c. Form outside edges and joints with a 1/4" radius edging tool.

      d. Form joints at 5 feet intervals, approximately 1/8" and 1" deep.

      e. Provide full depth 1/2" thick premolded expansion joints at 20", and stagger with expansion joints in curbing, unless approved otherwise.

      f. Sidewalks to be a minimum 4' wide.

   2. **Bituminous Sidewalks.**

      a. Bituminous sidewalks shall be 1 1/2" of 9.5 mm wearing course over 6" of PennDOT No. 2A on approved and compacted subbase.
subbase.

b. Seal all new or cut joints.

c. Sidewalks to be a minimum 4' wide.

3. Handicapped Ramps

a. Ramps shall comply with ADA standards.

3.8 CONCRETE CURBING

A. Curbs shall be replaced or installed to the limits indicated on the Approved/ Authority Detail Drawings as directed by the Owner.

B. New concrete curbing shall be 8" wide x 18" deep and shall have an 8" reveal. This reveal shall have a 1" offset making the top thickness 7" (or comply with local/PennDOT standards where applicable).

C. Provide ½" thick premolded expansion joints at 20' and stagger with expansion joints in sidewalk.

D. Curbs shall be Class A, 3300 psi Concrete.

E. Place depressed curbs for drives or curb cuts where indicated or directed by Owner.

F. Curb depressions shall be provided with a smooth transition. This transition shall be over a minimum of 36", unless approved otherwise.

G. Existing concrete curbing damaged by construction shall be replaced to match existing.

H. Reconstruct curbs to the first expansion joint on either side of damaged portion and install new expansion joint material.

3.9 CONCRETE SWALES (where appropriate & approved)

A. Concrete swales shall be replaced or installed to the limits indicated on the Approved/ Authority Detail Drawings as directed by the Owner.

B. Existing swales which are removed shall be replaced with similar.

C. Existing swales shall have saw cut straight joint lines parallel to the centerline of the swale.

D. Reconstruct swales to the first expansion joint on either side of the area to be removed and install new expansion joint material.
E. New concrete swales shall be a minimum of 36" wide and shall be 6" Class "A", 3300 psi Concrete over 6" of PennDOT 2A on approved and compacted subbase.

F. Provide expansion joint where new concrete joins existing concrete.

G. Provide ½ " thick premolded expansion joints at 20'-0".

3.10 BITUMINOUS SWALES (where appropriate & approved)

A. Bituminous swales shall be replaced or installed to the limits indicated on the Approved/ Authority Detail Drawings.

B. Existing swales which are removed shall be replaced in kind.

C. Existing swales shall have saw cut straight joint lines parallel to the centerline of the swale.

D. New swales shall be 1 ½" ID-2 wearing course over 6" PennDOT 2A on approved and compacted subbase.

E. All joints shall be sealed.

3.11 RESTORATION OF STATE ROADS AND TOWNSHIP ROADWAYS

A. Roadways shall be reconstructed to the limits indicated on the Approved/Authority Detail Drawings as directed by the Owner.

B. Existing roadway shall have saw cut straight joint lines parallel to the centerline of the trench.

C. Roadway restoration shall conform to PennDOT, Township and/or owner standards as may be applicable.

D. The roadway shall have the existing wearing course removed for a minimum of 1'-0" on either side of trench. A bituminous tack coat shall be applied to this area after which the new surface course shall be applied over the entire trench area or otherwise as specified by the township, State or owner.

E. All joints shall be sealed. Sealant shall be applied for a minimum width of 4".

3.12 SHOULDER RESTORATION OF STATE ROADS

A. The shoulder areas shall he reconstructed to the limits indicated on the Approved/ Authority Detail Drawings as directed by the Owner.
B. Should restoration shall conform to PennDOT, Township and/or owner standards as may be applicable.

C. When trench is within the shoulder of a State road, Contractor shall mill the road surface 1 ½” deep from the edge of trench to the centerline of the road. A bituminous tack coat shall be applied to the milled area after which the surface course of 1 ½” 9.5 mm wearing course shall be applied or as otherwise required by the Township, State or owner.

D. All joints shall be sealed. Sealant shall be applied for a minimum width of 4”.

3.13 SHOULDER RESTORATION TOWNSHIP ROAD

A. Shoulders shall be reconstructed to the limits indicated in the Approved/Authority Detail Drawings as directed by the Owner.

B. Existing shoulders and roadway shall have saw cut straight joint lines parallel to the centerline of the trench.

C. Shoulder restoration shall conform to PADOT, Township and/or owner standards as may be applicable.

D. Seal all joints for a minimum width of 4-inch each side of the joint.

3.14 SWALES

A. Swales shall be restored to the limits indicated on the Approved/Authority Detail Drawings as directed by the Owner.

B. Swales which are not paved shall be restored to the lines and grades that existed prior to construction. They shall be brought to within 12” of existing grade and lined with rip-rap (minimum size R-4) for a minimum thickness of 12”. The swale width shall be equal to the swale width prior to construction.

C. Rip rap shall extend 3-0” in either direction longitudinally beyond the disturbed area.

D. If flows in swale exceed that which R-4 can stabilize, Owner may direct Contractor to utilize a larger rock within the swale.

3.15 TEMPORARY PAVING

A. Temporary paving shall be installed to the limits indicated on the Approved/Authority Detail Drawings as directed by the Owner.

B. Temporary paving shall be installed immediately after trench backfill is brought to needed grades in paved areas.
C. Shape and compact subgrade material, then place and compact crushed stone base course to the required thickness.

D. The temporary paving between March 1 and October 31 shall consist of hotmixed, hot laid, bituminous concrete, and maintained for a minimum of forty-five (45) days.

E. The temporary paving between November 1 and the end of February shall consist of bituminous stockpile patching material in accordance with PennDOT Bulletin 27, Section 484, or 485 of Form 408 placed on top of the compacted backfill, and maintained until trench is permanently restored.

F. Place temporary paving material. Impact to required minimum thickness with trench roller having minimum 300 pounds per inch-width of compaction roll.

G. Continuously maintain temporary paving to the satisfaction of the Owner/Engineer and the State and local road departments. Temporary paving on State roads must remain in place for a minimum of 45 days.

3.16 TEMPORARY ACCESS ROADS NEEDED BY CONTRACTOR

A. Access roads shall be installed where needed by the Contractor to perform the Work.

B. Temporary access road shall be AASHTO No. 1 rock a minimum of 8" over Class 2, Type A Filter Fabric.

C. Access road shall be maintained until Contractor has progressed sufficiently enough as to no longer need the road to complete the Work.

3.17 LINE PAINTING

A. Line painting shall be in accordance with Section 962 of PennDOT Specifications. Publication No. 408.

B. Line painting shall take place and be completed the same day as temporary paving and/or paving, unless approved otherwise.

C. Utilize Type I- Traffic Zone Paint, color to match existing.

3.18 PROPERTY MARKERS

A. Property markers which are removed as a result of construction activities shall be replaced by a licensed surveyor in accordance to Township standards.
3.19 **DRIVEWAY PIPES**

A. Driveway pipes which are removed as a result of construction activities shall be replaced.

B. Driveway pipes damaged by the Contractor shall be replaced with concrete pipes of similar size. Minimum size of replacement pipe shall be 15", unless approved otherwise.

C. Swales adjacent to driveway pipes shall be regraded and stabilized to provide smooth transition entering and exiting pipe.

3.20 **ROADWAY SIGNS**

A. All roadway signs which must be removed in order to perform construction activities shall be replaced with same.

B. If required, new signs shall be in accordance with Sections 1103 of PennDOT Specifications, Publication No. 408, as amended, and the latest revision of PennDOT Publication 68, Title 67, Chapter 212 - Official Traffic Control Devices.

3.21 **DELIVERY TICKET (PAVING MATERIAL)**

A. A delivery ticket indicating the quantities and types of paving material shall be submitted at the time of delivery. The complete delivery ticket shall be delivered to the Owner/Engineer. Failure to deliver such complete ticket to the Owner/Engineer will be cause for the Owner/Engineer to reject paving material.

3.22 **SURFACE IDENTIFICATION**

A. In accordance with "Occupancy of Highways by Utilities", 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 within the improved surface of a State Highway.

B. The paint shall be of a durable wearing quality and shall be color coded as follows:

1. Blue - Water Lines
2. Green - Sewer Lines
3. Yellow - Gas or Petroleum lines
4. Red - Electric lines
5. Orange - Communication Lines

6. Otherwise and all else in accordance with PA1 Call guidelines.
ARTICLE 6
MANHOLES

PART 1 GENERAL

1.1 DESCRIPTION
A. The work of this section includes, but is not limited to:
   1. Precast Concrete Manholes
   2. Concrete Manhole Bases
   3. Manhole Steps
   4. Manhole Covers and Frames
B. Related Work Specified Elsewhere

1.2 QUALITY ASSURANCE
A. Reference Standards
   1. Pennsylvania Department of Transportation Pub. 408 Specifications.
      a. A48 Specification for Gray Iron Castings
      b. C32 Sewer and Manhole Brick
      c. C33 Concrete Aggregate
      d. C139 Concrete Masonry Units for Construction of Catch Basins and Manholes
      e. C270 Specifications for Mortar for Unit Masonry
      f. C478 Specifications for Precast Reinforced Concrete Manhole Sections
g. C923  Specification for Resilient Connections Between Reinforced Concrete Manhole Structures and Pipes

h. C827 Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.

i. A615  Specifications for Carbon Steel Bar Reinforcement

j. Federal Reference Standard FS-SS-S-210 Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints (Type 1 Rope Form)

1.3 SUBMITTALS

A. Certificates

1. Submit certification from material suppliers attesting that materials meet or exceed specification requirements.

2. Submit certification from independent qualified testing company that flow monitoring devices are accurately functioning upon installation of testing manholes.

B. Shop Drawings

1. Submit detailed shop drawings of manhole sections, and precast bases if used.

2. Submit detail shop drawings of manhole frames and covers. Submit detailed shop drawings of manhole steps. Submit manufacturers' descriptive literature for the pipe to manhole flexible connections.

3. Submit manufacturers' descriptive literature for the joint sealant compound.

4. Submit detailed shop drawings of the manhole inserts.

PART 2 PRODUCTS

2.1 BASIC MATERIALS

A. Crushed Stone Subbase

1. AASHTO #8/PennDOT 1B, or AASHTO #57/PennDOT 2B where specified.
B. Masonry Mortar: ASTM C270, Type N.

C. Cement Concrete: Article 12 entitled "Concrete for Utility Construction".

D. Joint Sealant Compound: FS SS-S-00210, performed, flexible, self-adhering, cold- applied.


2.2 FABRICATED PRODUCTS

A. Precast Concrete Manhole Sections: ASTM C478.
   1. 5.5% +/- 1% air-entrained cement concrete.
   2. Eccentric cone or flat slab top sections; minimum 24” access opening unless otherwise indicated.
   3. Precast riser sections of length to suit.
   4. Precast bases of a design similar to the precast riser sections.
   5. The sections shall be a minimum of four feet in diameter, unless indicated otherwise. Sampling Manholes shall be a minimum of five feet in diameter.
   6. Joints shall be sealed with a preformed flexible, self-adhering, cold applied, joint sealant compound.
   7. Manholes are to be PennDOT approved, constructed in accordance with Publication 408, Publication 72M and Standards for Roadway Construction RC-39M.

B. Anchor Bolts
   1. Anchor bolts for bolting manhole frame to the precast or brick manholes shall be made of 3/4-inch diameter all-thread steel rods with a minimum 3-inch projection through the frame. The all-thread steel rods shall have a 5-inch hook for embedment when brick manholes are used. The all-thread steel rod, washer and nuts shall be galvanized or stainless steel.
   2. The concrete inserts for use in pre-cast manholes shall be in accordance with Federal Spec. WW-H-171C (Type 18).
C. Manhole Steps

1. Aluminum: Alloy 6061-T6. ALCOA 160278 or 15785.

2. Plastic Coated Steel: Deformed steel reinforcing bar encapsulated with injection molded polypropylene. Serrated tread and end hugs to prevent feet from slipping off.

3. Minimum of 12-inches wide, and projecting a maximum of 6-inches from inside face of manhole.

4. Step spacing shall be 12” on center, unless otherwise approved by the Authority or the Authority’s Engineer.

D. Manhole Frames and Covers

1. Domestic cast iron castings: ASTM A48-76, Class 30 or better: free of bubbles, sand and air holes, and other imperfections. Designated for H-20 loadings & M305 as designated by ASSHTO.

2. Contact surfaces machined and matched.

3. Cast cover inscription with pipeline service to read “SANITARY SEWER”

4. Manholes shall be equipped with cast iron manhole frames and self-sealing covers unless otherwise indicated on the Approved/Authority Detail Drawings. All manhole frames and covers shall be as manufactured by EJ, Inc., or approved equal. The manhole cover shall be a solid lid. All manhole frames and covers shall be coated with an asphalt base metal coating shall be watertight and self-sealing. All manhole frames and covers must have an inscription that identifies the manufacturer and or country-of-origin.

5. All Manholes as designated on the Approved/Authority Detail Drawings shall be equipped with a watertight frame and cover and shall be self-sealing. Watertight frames and covers shall be as manufactured by EJ, Inc., or approved equal. The manhole cover shall be a solid lid. All manhole frames and covers shall be coated with an asphalt base metal coating. All manhole frames and covers must have arm inscription that identifies the manufacturer and or country-of-origin.

E. Manhole Inserts

1. Manholes shall be equipped with a Parson Manhole Inserts as manufactured by Parson Environmental Products, Inc. or
approved equal. The type of insert shall be the deep bowl style with ventilation holes only (i.e., mmo pressure or vacuum relief valves).

F. Precast Manhole Bases

1. The bases shall be integrally cast reinforced concrete and shall consist of a manhole bottom and a wall which shall extend a minimum of 6 inches above the top of the highest inflowing sewer. The top of the base section shall be carefully formed to receive the tongue of the barrel section. There shall be a minimum distance of 4 inches between the invert of the lowest outflowing sewer and floor of the precast base to provide for the construction of a formed invert and bench wall within the manhole. There shall be a drop of 0.1 feet between the invert of the primary inlet pipe and the invert of the outlet pipe straight through the manhole and a drop of 0.2 feet for bends in the manhole. No more than two lift holes shall be cast in the bases.

   a. Manholes 4 feet in diameter shall have a bottom at least 8 inches thick and a wall at least 5 inches thick.

   b. Manholes 5 feet in diameter shall have a bottom at least 8 inches thick and a wall at least 6 inches thick.

   c. Steel reinforcement used in the manufacture of precast concrete manhole bases and precast concrete riser and top sections shall conform to time requirements specified in Section 6 of ASTM C478.

G. Joint Sealant Compound

1. The joint sealant compound shall be as manufactured by A-Lok Products, Inc. ("Butyl-Lok"), K.T. Snyder Company, Inc. ("Ram-Nek") or approved equal.

H. Heat Shrinkable sleeve

1. Heat shrinkable wraparound sleeve, manufactured by Canusa, Inc. or equal, shall be installed at all pre-cast concrete section joints and at frame/cone joint in accordance with the manufacturer’s installation recommendations.

I. Pipe Connections to Precast Manhole Bases and/or Sections

1. Integral resilient pipe to manhole connection gasket conforming to ASTM C923.
PART 3 EXECUTION

3.1 EXCAVATION

A. Perform excavation to the line and grade shown on the Approved/Authority Detail Drawings and as specified in Article 2 entitled "Trenching, Backfilling & Compaction".

B. Location and depth of manholes as shown on the drawings.

3.2 CONSTRUCTION

A. Construct watertight manholes of precast concrete sections and of the type shown on the Approved/Authority Detail Drawings.

B. Provide watertight manhole frame and covers in areas prone to flooding.

C. Construct drop connections of the required type as shown on the Approved Drawings or Authority Detail Drawings.

D. Install a minimum of 6" of AASHTO No. 8 subbase.

E. Provide cast-in-place concrete or precast concrete bases.

   1. Construct cast-in-place bases as shown on the Approved/Authority Detail Drawings.
      a. Cast-in-place bases may be constructed with a special form for a joint to match the manhole cylinder sections.

   2. Install precast bases as shown on the Approved/Authority Detail Drawings.
      a. Set the precast base on a crushed stone subbase.
      b. Provide a sealed, flexible resilient connection between pipe and precast base section.

F. Form flow channels in manhole bases. Slope channels uniformly from influent invert to effluent invert. Construct bends of the largest possible radius. Form channel sides and invert smooth and uniform; free of cracks, holes or protrusions.

   1. The minimum depth of flow channel shall be equal to 3/4 the diameter of the largest sewer in the manhole to which it connects. The channel shall be graded to give a smooth, uninterrupted flow through the
manhole.

2. Bench walls shall be pitched a minimum of 1 inch per foot from the inside periphery of the manhole to the edge of the flow channel.

G. Do not permit pipe to project more than 2” into the manhole.

H. Seal joints between precast concrete manhole sections with preformed rubber gaskets or joint sealant compound.

1. Place joint sealant compound on lower section to be squeezed by the weight of the upper section.

I. Bitumastic Coating

1. Prior to setting the precast sections in place each section shall have the exterior Concrete surface blown free of all dirt and debris and brushed clean and then coated with coal tar epoxy.

2. The coating shall be Bitumastic 3000M as manufactured by Kop-Coat Carboline Company or approved equal.

3. At least two (2) coats shall be applied giving a total dry film thickness of a minimum of 16 mils.

4. After installation, damaged surfaces shall be recoated in accordance with the coating manufacturer’s recommendation to give the required 16 mils dry film thickness.

5. The Contractor shall provide a certification to the Owner/Engineer stating that he has installed the exterior manhole coating in accordance with the manufacturer’s recommendations and that there is a minimum of 16 mil of material on all manholes. Coating may be applied by the manhole supplier.

J. Interior manhole surfaces shall be coated with 2 coats of a white epoxy. The coating shall be Hi-Gard Epoxy as manufactured by Kop-Coat Carboline Company or approved equal. Install in accordance with the coating manufacturer’s recommendation to give a required 12 mils dry film thickness.

K. Install manhole sections with steps in proper vertical alignment.

L. Use masonry or precast manhole rings to achieve elevation shown for frame and cover. Do not adjust elevation more than 12-inches or less than 3-inches with masonry or precast rings.

M. Install manhole frames, covers and steps.
1. Set top of frames at finished grade elevation or other elevation shown on the drawings.

2. Manhole frames and covers shall be brought to proper grade as previously noted, set in double ring of joint sealant compound, and anchored in place with the four (4) 3/4 inch diameter anchor bolts which shall be securely embedded in the top of the manhole.

3. Provide interior and exterior of the grade rings with a 1" thick coat of mortar and apply a coal tar epoxy protective coating on the exterior parging to be buried.

4. Watertight manhole frame and covers shall be used in areas prone to flooding. Use waterproof type "M" mortar to seal grade rings after applying butyl rubber compound.

5. Manhole frame shall be mortared to the top of the flanged manifold and precast grade rings shall be parged if installed.

6. Contractor shall provide a heat shrinkable manhole encapsulation system, Wrapid-Seal or equal, in accordance with manufacturer's recommendations.

N. Where new manholes are to be constructed on existing pipelines, carefully excavate around existing pipeline for placement of the new manhole base. Take all measures necessary to control flow through the existing pipeline and to prevent leakage into the new base. After completion of the manhole, carefully remove the top portion of the existing pipeline.

O. Connection to Existing Manhole. The manhole-to-pipe connection shall be as shown on the Approved/ Authority Detail Drawings.

3.3 BACKFILLING

A. Backfill and compact backfill material only after examination of the manhole by the Owner/Engineer.

B. Perform backfilling as specified in Article 2 entitled "Trenching, Backfilling & Compacting".

3.4 TESTS

A. General

1. After the gravity sewers and manholes have been installed and backfilled. The manholes shall be tested for leakage.

B. Test Procedure (Vacuum Test)
1. The testing shall be done after assembly of the manhole.

2. All lift holes shall be plugged with a non-shrinking mortar, as approved by the Owner/Engineer.

3. The Contractor shall plug the pipe openings, taking care to securely brace the plugs and the pipe.

4. With the vacuum tester set in place:
   a. Inflate the compression band to effect a seal between the vacuum base and the structure.
   b. Connect the vacuum pump to the outlet port with the valve open.
   c. Draw a vacuum to 10" of Hg. and close the valve.

5. The test shall pass if the vacuum remains at 10" Hg. or drops to 9" Hg. in a time specified for the particular size manholes listed.

   **VACUUM TEST TABLE**

<table>
<thead>
<tr>
<th>Manhole Diameter</th>
<th>Test Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>48&quot;</td>
<td>60 sec.</td>
</tr>
<tr>
<td>60&quot;</td>
<td>75 sec.</td>
</tr>
<tr>
<td>72&quot;</td>
<td>90 sec.</td>
</tr>
</tbody>
</table>

6. If the manhole fails the initial test, the Contractor shall locate the leak and make proper repairs. Testing shall continue until the manhole passes the aforementioned criteria.

7. Testing of manholes by the Contractor shall be performed in the presence of the Owner/Engineer or Project Representative.
ARTICLE 7
SANITARY SEWER PIPE

PART 1 GENERAL

1.1 DESCRIPTION
A. The work of this section includes, but is not limited to:
   1. Sanitary sewer gravity pipelines
   2. Sanitary sewer pressure pipelines
   3. Laterals/service connections

B. Related Work Specified Elsewhere
   1. Trenching, Backfilling & Compaction: Article 2
   2. Manholes: Article 6
   3. Sewer Pipeline Testing: Article 8

1.2 QUALITY ASSURANCE
A. Reference Standards
   1. American National Standards Institute (ANSI):
      A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
      A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for water or other liquids.
      A53 Specification for Pipe, Steel, Black and Hot-Dipped Zing-Coated, Welded and Seamless
      A74 Specification for Cast Iron Soil Pipe and Fittings
A746-09 Specification for Ductile Iron Gravity Sewer Pipe

ASTM C564 Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings

D1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120

D2241 Specification for Poly(vinyl Chloride) (PVC) Plastic Pipe for (SDR-PR)

D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity Flow Applications

D2464 Specification for Treaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80

D2466 Specification for Socket-Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40

D2729 Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

D2855 Standard Practice for Making Solvent Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings

D3033 Specification for Type PSP Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

D3034 Specifications for Solid Wall Polyvinyl Chloride (PVC) Gravity Sewer Pipe, SDR 35 15" diameter and smaller, SDR 26 12" diameter and smaller

D3139 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals


F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

F585 Standard Practice for Insertion of Flexible Polyethylene Piping into Existing Sewers

F679 Specifications for Solid Wall Polyvinyl Chloride (PVC) Gravity Sewer Pipe, SDR 35 18" diameter through 27"

F1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing

F2620-06 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

3. American Water Works Association (AWWA)

C900 Standard Specifications for Polyvinyl Chloride (PVC) Pressure Pipe, 4" diameter through 12" diameter.

C905 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 Inch through 48 Inch for water and other liquids.

B. Reject materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, or acid solder.

1.3 SUBMITTALS

A. Certificates

1. Submit 2 copies of each manufacturer’s certification attesting that the pipe, pipe fittings, joints, joint gaskets and lubricants meet or exceed specification requirements.

B. Test Reports

1. Tests of pipe shall be made by the pipe manufacturer in accordance with requirements of ASTM and/or AWWA.

2. Certified copies of the tests made by the manufacturer, or by a reliable commercial laboratory acceptable to the Owner/Engineer, shall be submitted to the Owner/Engineer prior to the first shipment of pipe.
1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling

1. Do not place materials on private property without written permission of the property owner.

2. During loading, transporting and unloading, exercise care to prevent damage to materials.

3. Do not drop pipe or fittings. Avoid shock or damage at all times.

4. Take measures to prevent damage to the exterior surface or internal lining of the pipe.

B. Storage

1. Pipe may be strung along alignment where approved by the Owner/Engineer.

2. Do not stack pipe higher than recommended by the pipe manufacturer.

3. Store gaskets for mechanical and push-on joints in a cool, dry location out of direct sunlight and not in contact with petroleum products.

PART I PRODUCTS

2.1 DUCTILE IRON PIPE

A. Pipe: ANSI A21.51, Minimum thickness Class 50, with push-on type joints with rubber gaskets. For stream crossings, minimum thickness is Class 54.

B. Fittings

1. Ductile-iron or gray-iron, ANSI A21.10

C. Coating: All Ductile Iron Pipe and Fittings shall be coated outside only with a bituminous seal coat in accordance with ANSI A21.51. Provide 8 mil polyethylene encasement at direction of Engineer in areas of corrosive soil or cathodic protection.

C. Joints: ANSI A21.11

1. Where not specifically shown on the Approved/ Authority Detail Drawings, joints shall be push-on joint, except fittings which shall be mechanical joints.
D. Rubber gaskets, Lubricants, Glands, Bolts and nuts: ANSI A21.11

E. Lining (inside)
   1. Pipe: Protecto 401 Ceramic Epoxy Lining 40 mils nominal dry film thickness or approved equal.
   2. Bell Sockets and Spigot Ends: 6 mils nominal, 10 mils maximum Protecto Joint Compound on bell interior and spigot exterior up to 6 inches back from end of the spigot end, or approved equal.

2.2 POLYVINYL CHLORIDE (PVC) SEWER PIPE

A. Gravity Sewer Pipe and Fittings
   1. If PVC pipe is used for the building sewer, the entire building sewer line must be constructed of PVC material.
   3. Pipe 6" to 15" diameter: ATSM D3034, SDR-35, SDR-26 or DR-18 (min), Type PSM Poly (vinyl chloride) (PVC).
   4. 6" diameter pipe required for units with 5 to 10 EDU's.
   6. 6" x 4" gasketed adapter must be used for normal lateral/building sewer transition.

B. Pressure Pipe and Fittings (4" and Greater)
   1. Outside Diameter Dimension Pipe: AWWA C900 (4 inch – 12 inch), AWWA C905 (14 inch through 48 inch) Pressure Class 150 and conform to the requirements of DR 18.
   2. Fittings:
      a. Polyvinyl Chloride (PVC) Fittings, Pressure Class 150 and conform to the requirements of DR 18.

C. Pressure Pipe and Fittings (3" and Smaller)
1. Pipe: ASTM D2241 (SDR 26 - Class 160)
2. Gaskets: ASTM F477

2.3 STEEL CASING PIPE
A. Pipe: ASTM A53; 35,000 psi minimum yield strength, asphalt coated.
   1. Wall thickness as indicated on the Design Plans.
B. Joints: Electric resistance welded.

2.4 CAST IRON SOIL PIPE
A. Pipe Fittings: ASTM A74 Heavy Duty, Service Class
   1. If Cast Iron Pipe is used for the building sewer, entire building sewer line must be constructed of cast iron material.
   2. Hub and Spigot or Double Hub
B. JOINTS: DOUBLE SEAL COMPRESSION GASKETS
   1. Gaskets: Conforming to physical requirements of ASTM C564

2.5 HIGH DENSITY POLYETHYLENE PIPE (HDPE)
A. Pipe: ASTM D3350 and AWWA C901 for diameters 1 1/4 inch to 3 inch. AWWA C906 and ASTM F714 for diameters 4 inch and greater. SDR 11 with corresponding operating pressure of 160 unless otherwise approved or designated.
B. Joints: Fusion techniques, unless otherwise noted, butt fusion joints shall be used between pipes or fittings in accordance with ASTM D2657. Termination to valves and fittings shall be flange assemblies of same pressure rating as adjacent pipe.
C. Fittings: Fittings shall conform to all applicable ASTM D3261 (HDPE) and other ASTM specifications. Fittings shall have plain ends for thermal butt-fused joining. Fittings shall have the same type, grade and class of PE compound. Mechanical compression fittings shall be used only when joining to different piping materials.

PART 3 EXECUTION

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3.1 **PREPARATION**

A. Perform trench excavation to the line and grade indicated on the Approved/Authority Detail Drawings and as specified in Article 2.

B. Provide pipe bedding in accordance with Article 2. Place aggregate in a manner to avoid segregation, and compact to the maximum practical density so that the pipe can be laid to the required tolerances.

C. All pipe shall be carefully inspected for defects prior to laying. If any pipe is found to be defective, it shall be laid aside and replaced with acceptable pipe at no cost to the Owner.

3.2 **LAYING PIPE IN TRENCHES**

A. Give minimum 48 hour notice to the Owner/Engineer in advance of pipe laying operations.

B. Maintain no less than three batter boards or their equivalent between adjoining manholes during pipe laying operations, or use laser alignment instruments.

C. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe.

D. Lay pipe proceeding up-grade with the bell or groove pointing upstream.

E. Lay pipe to a true uniform line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.

F. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.

G. Clean and inspect each section of pipe before joining. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Use lubricant recommended by the pipe or fitting manufacturer for making joints. If unusual joining resistance is encountered or if the pipe cannot be fully inserted into the bell, disassemble joint, inspect for damage, re-clean joint components, and reassemble joint.

H. Assemble joints in accordance with recommendations of the manufacturer.
   1. Push-on Joints
a. Clean the inside of the bell and the outside of the spigot. Insert rubber gasket into the bell recess.

b. Apply a thin film of gasket lubricant to either the inside of the gasket or the spigot end of the pipe, or both.

c. Insert the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.

2. Mechanical Joints

a. Wash the socket and plain end. Apply a thin film of soapy water. Slip the gland and gasket over the plain end of the pipe. Apply soapy water to gasket.

b. Insert the plain end of the pipe into the socket and seat the gasket evenly in the socket.

c. Slide the gland into position, insert bolts, and finger-tighten nuts.

d. Bring bolts to uniform tightness. Tighten bolts 180-degrees apart- alternately.

3. Coupled Joints

a. Assemble in accordance with the manufacturer's recommendations.

I. Disassemble and remake improperly assembled joints using a new gasket.

J. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed grade as shown on the drawings, or deflection of pipe joints, will be cause for rejection.

K. Place sufficient compacted backfill on each section of pipe, as it is laid, to hold firmly in place.

L. Clean interior of the pipe as work progresses. Where cleaning after laying is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull forward past each joint immediately after the jointing has been completed.

M. Keep trenches and excavations free of water during construction.
N. When the work is not in progress, and at the end of each work day, securely plug open ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.

1. Deflection

2. When it is necessary to deflect pressure sewer mains from a straight alignment horizontally or vertically, do not exceed the following limits:
   a. Ductile Iron Pipe: deflections shall not exceed 5 degrees.
   b. PVC: Deflections shall not exceed 2.5 degrees.

3.3 COMBINATION TEE WYE BRANCHES AND TAPS

A. Install combination tee wye branches at locations designated by the Owner/Engineer concurrent with pipe laying operations. Use standard fittings of the same material and joint type as the pipeline into which they are installed. Saddles shall not be installed in lieu of combination tee wyes for new pipelines.

B. For taps or repairs to an existing pipeline, use a gasketed wye or tee and/or gasketed PVC coupling to splice into the main. Saddles shall not be utilized for connections or repairs into existing pipelines.

3.4 LATERALS

A. Construct laterals from the combination tee wye branch to a terminal point as indicated on the drawings or as directed by Owner/Engineer. A special adapter will be required where DIP pipe joins cast-iron pipe or PVC pipe.

B. Residential check valve shall be installed as appropriate all in accordance with the BTMA residential standards and requirements.

C. Where the depth of the main pipeline warrants, construct riser type laterals from the combination tee wye branch in accordance with details. The determination as to the type of riser, slope, and depth of lateral pipe at the termination point shall be as directed by the Owner/Engineer.

D. Install an approved watertight gasketed cap, braced to withstand pipeline test pressure thrust, at the termination of the lateral. Install a temporary marker stake extending from the end of the lateral to 1 foot above finished grade. Indicate on stake the depth from finished grade to the lateral invert.

3.5 BUILDING SEWERS

A. Construct Building Sewers from the lateral beginning with a 6" x 6" x 6" "T".
Incorporated with the "T" should be a 6" clean-out extending 12" above grade with a threaded plug. If conditions exist that dictate maintaining a cleanout at grade, incorporate the use of a 10" iron frame and cover such as East Jordan Ironworks, Inc. Product No. 1566, or approved equal. A heavy duty iron frame and cover meeting H-25 loading requirements must be used in paved area and travel lanes. A 6" x 4" gasketed adapter must be installed immediately after the 6" x 6" x 6" "T".

B. Continue with the 4" building sewer line incorporating clean-outs spaced seventy five (75') feet apart (including riser length).

C. A vented running trap is to be used as the last clean-out before the sewer line enters the building.

D. Residential check valve shall be installed as appropriate all in accordance with the BTMA residential standards and requirements.

E. A slope of 1/4 " per foot minimum must be maintained throughout the entire building sewer. (exceptions to a 1% minimum slope allowed where not practical)

3.6 CAST-IN-PLACE CONCRETE CONSTRUCTION

A. Conform to time applicable requirements of Article 12.

3.7 CRADLES AND ENCASEMENT

A. Provide concrete cradles and encasement for pipeline where indicated on the drawings, or as directed by the Owner/Engineer.

3.8 THRUST RESTRAINT

A. Provide thrust blocking or restrained joints for pressure pipeline at all bends, tees, and changes in direction.

3.9 CARRIER PIPE IN CASINGS

A. Applicable to casing pipe installed in open cut trenches. For installation by boring, jacking, or tunneling - see Article 1.

B. Provisions regarding pipe laying specified above also apply to carrier pipe installed in casings.

C. Excavate trench to the additional depth and width necessary to accommodate the casing pipe and to maintain the line and grade of the carrier as indicated on the Approved/Authority Detail Drawings.

D. Minimum inside diameter of the casing pipe: 4" greater than the largest outside diameter of the carrier pipe joints (Otherwise diameter of casing
shall be in accordance with highway or railroad owner's standards).

E. Support pipeline within casing so that no external loads are transmitted to the carrier pipe. Attach wooden skids to barrel of carrier pipe; do not rest carrier pipe on pipe joint bells.

F. Close ends of casing.

3.10 STREAM CROSSINGS

A. Construct sanitary sewer pipeline stream crossings in accordance with approved and permitted Stream Crossing Detail Plan.

3.11 BACKFILLING TRENCHES

A. Backfill pipeline trenches only after examination of pipe laying by the Owner/Engineer.

B. Backfill trenches as specified in Article 2.

3.12 UTILITY AND SEWER LINE RELATIONSHIP

A. All sewers shall be installed in accordance with PADEP regulations and guidelines relative to the separation distances between water mains and sanitary sewers or alternatively (whichever is more restrictive) as listed below.

B. Horizontal Separation

1. Do not install any sewer line closer than 10 feet horizontally to any potable water line.

C. Vertical Separation

1. Where site conditions prohibit 10-foot horizontal separation, with the approval of the Authority, install the sewer line so that the top of the sewer line is at least 18 inches vertically below the bottom of the potable water line.

D. Waterline crossings of sewer lines with less than 18-inch clearance shall be encased in concrete, ten (10) feet beyond the crossing in each direction.

E. All other utility crossings that have less than 18-inches of clearance with the sanitary line shall require concrete encasement of the sanitary line to the next joint in the sanitary line beyond ten (10) feet.

F. When a water service line and a sewer lateral share the same trench, they
shall be separated by at least two feet horizontal and vertical.

3.13 TESTING

A. All sewer pipelines shall be tested in accordance with Article 9, Sewer Pipeline Testing.
ARTICLE 8
INDIVIDUAL GRINDER PUMP SYSTEMS

PART 1 GENERAL

1.1 DESCRIPTION

A. The Work of this section includes, but is not limited to:
   1. Approval and installation of individual grinder pump systems.

B. The Authority may allow grinder pumps to be installed in applications where the Authority deems that gravity sewer service is not feasible.

C. The use of individual grinder pumps will be reviewed on a case-by-case basis by the Authority.

D. Plans and specifications for all proposed grinder pump systems must be reviewed and approved by the Township prior to installation.

1.2 SUBMITTALS

A. When a low-pressure sewer system is proposed by a homeowner or Developer, sufficient information must be submitted to the Authority to permit a thorough evaluation of the proposed system. This information shall include, but not be limited to, the following:

   1. A detailed explanation as to why individual grinder pump units are proposed in lieu of gravity sewers and/or a conventional pumping station.

   2. Plans showing the location of the lots to be served by grinder pump systems.

   3. Detailed plans and profiles of the proposed low-pressure sewer system and individual grinder pump systems.

   4. Technical specifications for the proposed grinder pump units and low-pressure sewer system.

   5. Shop drawings for all components of the pump package and the individual service lines and force main must be submitted to the Authority for approval prior to installation of the units.
PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 GENERAL

A. Grinder pump systems shall be located within an appropriate wet-well structure.

B. The electrical control panels of individual grinder pump units shall be installed in a location where the failure strobes can easily be seen if activated. The control panels shall include a permanently attached label indicating that "All maintenance costs for individual grinder pump systems are the homeowner's responsibility."

C. The pressurized discharge lines from the individual grinder pump systems shall connect to the gravity sewer lateral at the right-of-way line. The pressurized portion of the discharge line shall be tested by the same methods as other force mains.

D. The ownership, maintenance and repair of individual grinder pump systems shall remain the property and responsibility of the owner.
PART 1  GENERAL

1.1  DESCRIPTION

A. The Work of this section includes, but is not limited to:

1. Testing Gravity Sewer Pipelines
   a. Low-pressure air test

2. Testing Pressure Pipelines
   a. Hydrostatic leakage test

3. Deflection Testing of Pipe
   a. Mandrel test

B. Related Work Specified Elsewhere

1.2  Sanitary Sewer Pipe: Article 7.

1.3  QUALITY ASSURANCE

A. Test Acceptance

1. No test will be accepted until the results are below the specified maximum limits.

2. The Contractor shall, at his own expense, determine and correct the causes of test failure and retest until successful test results are achieved.

1.4  SUBMITTALS

A. Testing procedures

B. List of test equipment
C. Testing sequence schedule
D. Provisions for disposal of flushing and test water
E. Certificate of test gauge calibration
F. Deflection testing mandrel drawings and calculations

1.5 JOB CONDITIONS
A. Do not allow personnel in manholes during pressure testing.
B. Provide relief valves set at 10 psig to avoid accidentally over-pressurizing gravity sewer line during low pressure air testing.

PART 2 PRODUCTS

2.1 AIR TEST EQUIPMENT
A. Air compressor
B. Air supply line
C. Pressure relief valve
D. Pressure regulator
E. Shut-off valve
F. Pressure gauge, calibrated to 0.1 lbs/sq. in.
G. Plugs
H. Stop watch

2.2 DEFLECTION TEST EQUIPMENT
A. Go, No-Go mandrels
B. Pull/retrieval ropes

2.3 HYDROSTATIC TEST EQUIPMENT
A. Hydro pump
B. Pressure hose
C. Water meter
D. Test connections
E. Pressure gauge, calibrated to 0.1 lbs/sq. in.
F. Pressure relief valve
PART 3 EXECUTION

3.1 PREPARATION

A. Backfill trenches in accordance with Article 2.

B. Provide pressure pipeline with concrete reaction support blocking.

C. Flush pipeline to remove debris. Collect and dispose of flushing water and debris.

D. Clean pipelines by propelling a snug fitting rubber ball through the pipeline with water from the upstream manhole to the downstream manhole. Investigate and correct any stoppage of the cleaning ball. Collect and dispose of cleaning water and debris.

E. Lamping

1. When required by the Owner/Engineer, after flushing and cleaning, lamp gravity pipeline in the presence of the Owner/Engineer.

2. Assist the Owner/Engineer in the lamping operation by shining a light at one end of each pipeline section between manholes. The Owner/Engineer will observe the light at the other end. Pipeline that has not been installed with uniform line and grade will be rejected. Remove and re-lay rejected pipeline sections. Re-clean and lamp until pipeline section achieves a uniform line and grade to the satisfaction of the Owner/Engineer.

F. Plug outlets, wye-branches and laterals. Brace plugs to offset thrust.

3.2 TESTING GRAVITY SEWER PIPELINES

A. Low Pressure Air test

1. Test each newly installed section of gravity sewer line between manholes.

2. Slowly introduce air pressure to approximately 5.0 psig. If ground water is present, determine its elevation above the spring line of the pipe by means of a piezometric tube. For every foot of ground water above the spring line of the pipe, increase the starting air test pressure reading by 0.43 psig. Do not increase pressure above 10 psig.

3. Allow pressure to stabilize for at least one (1) minute. Adjust
pressure back to 5.0 psig or the increased test pressure as determined above if groundwater is present and start the test.

4. Test
   a. The test shall pass if the air pressure remains at 5.0 psig for a period of five (5) minutes.
   b. If the line fails, determine the source of the air leakage, make corrections and retest. The Contractor has the option to test the section in incremental stages until the leaks are isolated. After the leaks are repaired, retest the entire section between manholes.

B. Testing Pipe Over 36" Diameter
   1. Pipe over 36" diameter shall be subjected to a visual interior inspection.

C. Mandrel Testing Procedures
   1. Mandrel test shall be performed a minimum of thirty (30) days after sanitary sewer pipe is installed. Mandrel testing is not required for ductile iron pipe.
   2. Use Go-No-Go device in accordance with pipe manufacturer's requirements. Method to be approved by OWNER/ENGINEER prior to testing.
   3. Repair and retest sections of sewer not meeting test requirements.

3.3 DEFLECTION TESTING OF SEWER PIPE
   A. Perform vertical ring deflection testing on all portions of sewer piping, in the presence of the ENGINEER, after backfilling has been in place for at least 30 days but not longer than 12 months.
   B. The maximum allowable deflection for installed sewer pipe shall be limited to 5% of the original vertical internal diameter.
   C. Perform deflection testing with a deflectometer, calibrated television, or a properly sized "Go, No-Go" mandrel. The mandrel(s) shall be constructed at the CONTRACTOR's expense and subject to the approval of the ENGINEER.
   D. Pipe exceeding the allowable deflection shall be located, excavated, replaced, and retested at the sole expense of the CONTRACTOR.

3.4 TESTING PRESSURE SEWER PIPELINES
A. Hydrostatic Leakage Test

1. Test each newly laid pressure pipeline, including any valved section thereof, hydrostatically at 1.5 times the working pressure of the pipeline based on the elevation of the lowest point in the pipeline corrected to the elevation of the test gauge. Obtain test pressure from the Owner/Engineer.

2. Slowly fill the section to be tested with water, expelling air from the pipeline at the high points install corporation stops at high points if necessary. After all air is expelled, close air vents and corporation stops and raise the pressure to the specified test pressure.

3. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.

4. After visible deficiencies are corrected, continue testing at the same test pressure for an additional two hours to determine the leakage rate. Maintain pressure within plus or minus 5.0 psi of test pressure. Leakage is defined as the quantity of water supplied to the pipeline necessary to maintain test pressure during the period of the test.

5. Compute the maximum allowable leakage by the following formula:

\[
L = \frac{SDP^{0.5}}{133,200}
\]

Where:

- \(L\) = Allowable Leakage, Gallons
- \(S\) = Length of Pipe Tested, Feet
- \(D\) = Nominal Diameter of Pipe, inches
- \(P\) = Average Test Pressure, psig

If the line under test contains sections of various diameters, the allowable leakage shall be the sum of the computed leakage for each size.

If the test of the pipe indicates leakage greater than that allowed, locate the source of the leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of the amount of leakage.

3.5 COST OF TESTING

A. The cost of field testing including, but not limited to, all necessary labor, equipment, calibration and materials shall be included in the cost of furnishing and installing the sewer pipeline. Testing is considered integral to the construction of the sewer pipeline, and no separate or additional payment will
be made for testing.
ARTICLE 10
SEWER PIPELINE TELEVISING

PART 1 GENERAL

1.1 SCOPE

A. CONTRACTOR shall provide all labor, materials, tools, equipment and incidentals as shown, specified, and required to perform digital television (TV) inspection of the sewer system installed as part of the Work. CONTRACTOR shall restore the Site to pre-inspection condition at completion of work.

B. The CONTRACTOR shall be responsible for traffic control at the work site.

1.2 DEFINITIONS

A. TV Inspection: Digital inspection conducted after to determine conditions of the pipe, and document location of service connections. TV Inspection also includes the pan and tilt inspection of manholes.

1.3 REQUIREMENTS

A. CONTRACTOR shall be aware that this Contract requires work in active sewers and shall follow all federal, state and local requirements for safety in confined spaces.

1.4 PERFORMANCE REQUIREMENTS

A. Inspection shall be done one sewer line section (i.e., manhole to manhole) at a time.

B. Quality of inspection recording shall be acceptable when viewed on a 24” monitor.

C. Inspection shall be performed by a NASSCO Pipeline Assessment Certification Program (PACP) certified operator and shall meet the coding and reporting standards and guidelines, as set by PACP. All report annotations, pipe conditions and pipe defects shall be identified properly using PACP codes as defined by PACP, and severity ratings shall be calculated according to PACP. The CONTRACTOR shall ensure that a PACP certified operator is on site at all times during the entire survey.

1.5 SUBMITTALS
The CONTRACTOR shall submit the following information at the completion of the Contract:

1. Submit 2 copies of Written Inspection Reports in a bound report with project name on binder spine.

2. Submit 2 copies of Electronic Inspection Reports on CD-ROMs, or 1 copy on a USB external hard drive with sufficient storage capacity.

3. Submit 1 copy of Digital Inspection Recordings on DVD and 1 copy on a USB external hard drive with sufficient storage capacity.

4. Copies of PACP certificate of inspectors completing the work.

1.6 REFERENCE STANDARDS

A. All Work must also conform to the latest edition of the following specifications (as required in advance by the Owner)

1. NASSCO PACP Standards
2. PennDOT Pub 408
3. PennDOT Pub 213
4. Rules and Regulations of Bethel Township
5. Rules and Regulations of the Bethel Township Municipal Authority

PART 2 PRODUCTS

2.1 TELEVISION EQUIPMENT

A. Closed Circuit TV Equipment: The Contractor shall use a color pan and tilt camera or a side wall scanning (panoramic) camera specifically designed and constructed for sewer inspection.

B. Pipe Inspection Camera: Produce a digital recording using a pan-and-tilt, radial viewing, pipe inspection camera that pans +/- 275 degrees and rotates 360 degrees. Side wall scanning inspection systems shall be capable of continuous 360 degree image capture of the wall of the pipeline being inspected. Use a camera with an accurate footage counter that displays on the TV monitor the exact distance of the camera from the centerline of the starting manhole. Use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised. Provide a lighting system that allows the features and condition of the pipe to be clearly seen. A reflector in front of the camera may be required to enhance lighting in large diameter pipe. The camera shall be operative in 100 percent humidity conditions. The camera, television, monitor and other components of the digital system shall be capable of producing a minimum 500-line resolution colored digital picture. Picture quality and definition shall be to the satisfaction of the Engineer.
C. If the image quality is not adequate and satisfactory to the Owner/Engineer, the Contractor shall be required to repeat the survey at the Contractor’s expense.

D. Recording: Record all images digitally.
   1. Image Capture - Capture color still shots of digital recordings for all defects encountered. Digitized picture images shall be stored and be exportable as JPEG formats.
   2. Digital Video Capture - Full time live digital and audio files shall be captured for each pipe segment and lateral inspected. The files shall be stored in industry standard MPEG format viewable from a DVD or external hard drive on an external personal computer that utilizes Microsoft Media Player, version 9.0 to view the recording. The MPEG video shall be ISO-MPEG Level 1 (MPEG-1) coding with a resolution of 352 pixels (x) by 240 pixels (y) and an encoded frame rate of 29.97 frames per second. System shall perform an automatic disk image/file naming structure to allow saved video/data sections to be "burned" to DVDR format. It shall have the capability of "burning" a minimum of 120 minutes of recording to the DVDR media. The digital recording shall be free of electrical interference and shall produce a clear and stable image. The audio recording shall be sufficiently free of background and electrical noise as to produce an oral report that is clear and discernable. The digital recordings and inspection data shall be cross-referenced to allow instant access to any point of interest within the digital recording.

E. Enhanced Television should be WinCan or approved equal. System shall link to GIS (Geographic Information Systems) Mapping.

PART 3 EXECUTION

3.1 PREPERATION
   A. Flush and clean pipeline to remove sludge, dirt, sand, stone, grease and other materials, as needed, to ensure clear view of interior conditions. Flushing and jetting is only required as needed and indicated, and should not be performed where the pipeline is adequately clean for the purpose of inspection.

   B. Intercept flushed debris at next downstream manhole using weir or screening device; remove and dispose of debris off site.

   C. Furnish and install temporary bypass pumping system around Work area, as required, for time required to complete TV inspection

3.1 TELEVISION INSPECTION
   A. Televise the sewer line to document the condition of the line. Notify OWNER 48 hours in advance of any TV inspection so that an OWNER’S representative may observe inspection operations. Provide a color recording of the inspection.
B. Inspections shall be from center of the starting manhole to the center of the ending manhole. Distances along the pipe should be measured from the center of the upstream manhole. Marking on cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Measurement meters shall be accurate to two-tenths of a foot over the entire length of the sewer line section being inspected. Prior to recording the location of defects and service connections, slack in the cable of the television inspection camera shall be taken up to ensure metering device is designating proper footage. Accuracy of the measurement meters shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device.

C. Center the camera in the middle of the pipe.

D. Move the camera through the line (in the downstream direction whenever possible) at a uniform rate not to exceed 20 feet per minute. If using a side wall scanning inspection system the inspection may be conducted at a higher speed provided that the image quality is adequate for post inspection coding, and as required by the OWNER/ENGINEER.

E. Stop at every joint for three seconds and using a pan and tilt, view when appropriate, and stopping elsewhere when necessary to ensure proper documentation of the sewer's condition. Pan and tilt to observe and document areas of apparent deteriorated pipe surface.

F. Stop at every lateral connection. Center the camera so that the lighting and the pan and tilt view can be used to inspect as far into the lateral connection as possible. Record all defects found in the service connection. Observe top, bottom and sides of lateral connections. Where lateral flow is observed, observe flows from service connections for approximately two minutes to ascertain if the flow is sanitary or extraneous flow. The digital recording may be paused during observation. Record results of the flow observed on digital recording and inspection logs.

G. Use manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions to move the camera through the sewer line.

H. TV inspection recordings shall be continuous for each pipe segment.

I. CONTRACTOR is responsible for adjusting light levels, cleaning fouled or fogged lens, and allowing vapor to dissipate from camera lights in order to produce acceptable recordings.

J. CONTRACTOR is required to immediately notify the OWNER/ENGINEER should any structural defect or blockage be encountered that risks imminent collapse of the sewer pipeline or overflow of wastewater from the pipeline.

3.3 FLOW CONTROL
A. Adequately control the flow in the section being televised. Plugging or bypassing of the flows may be used to accomplish this. Recordings made where the depth of wastewater flow shown below is exceeded will be rejected:

<table>
<thead>
<tr>
<th>Pipe Diameter (Inches)</th>
<th>Depth of Flow (Percent of Pipe Diameter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-10</td>
<td>10</td>
</tr>
<tr>
<td>12-24</td>
<td>15</td>
</tr>
<tr>
<td>Over 24</td>
<td>20</td>
</tr>
</tbody>
</table>

B. Whenever flows in a sewer line are blocked, plugged, pumped, or bypassed, sufficient precautions must be taken to protect the sewer lines from damage that might be inflicted by excess sewer surcharging. Further, precautions must be taken to ensure that sewer flow control operations do not cause flooding or damage to public or private property being served by the sewers involved. No overflows are permitted. CONTRACTOR is responsible for all damages.

C. CONTRACTOR is responsible for all damages to CONTRACTOR-owned and operated equipment, and privately owned facilities caused by malfunction plugs, pumps or other CONTRACTOR-owned or operated equipment. In the event of a failure or malfunction of CONTRACTOR equipment, CONTRACTOR is responsible for all work necessary to restore facilities to pre-contract condition including but not limited to excavation and restoration of sewer lines and roadways required to retrieve malfunctioning cameras, plugs and hoses.

D. It is anticipated that portions of the sanitary sewer are bowed or bellied and as a result the camera will be submerged. Wherever the camera encounters a submerged condition, or where the wastewater flow depth exceeds the maximum allowable, reduce the flow depth to an acceptable level by performing the survey TV inspection during minimum flow hours, or by pulling a camera with swab, high-velocity jet nozzle or other acceptable dewatering device. Recordings made while floating the camera are not acceptable.

E. If it is determined that a sewer segment requires by-pass pumping, by-pass pumping will be performed in accordance with the unit price provided by the CONTRACTOR on the Bid Form.

3.4 PASSAGE OF TV CAMERA.

A. If during TV inspection of a pipe segment, the camera is unable to pass an obstruction even though flow is unobstructed, televise the pipe segment from the opposite direction in order to obtain a complete recording of the line. CONTRACTOR shall also measure the distance between the manholes (centerline to centerline) with a tape or wheel to accurately determine the total length of the manhole segment.

3.5 INSPECTION DELIVERABLES
A. Written Inspection Logs: Provide printed location records to clearly identify the location of each defect, or lateral connection, in relation to adjacent manholes, using a standard stationing system, zeroed on the upstream manhole. Record all information requested using proper NASSCO PACP defect codes. The reports shall include at least the minimum amount of information required by PACP, including required PACP header information. Color still shot images of all defects encountered shall be included with each pipe segment.

B. Electronic Inspection Logs: Provide a Microsoft Excel 2400 compatible electronic file for each pipe segment. All defects and observations coded shall be logged in the file using the following PACP code fields: Distance, Group/Description, Modifier/Severity, Continuous Defect, SWL Value, Inches Value, Percent, Joint, At/From Location, and To Location. Each observation/defect code entry shall have the accompanying PACP Header Fields 7, 8, 20, 21, 23, 25, 26, 27, 28, 29, 33, 34, 36, 36a, 38, and 39.

C. Digital Inspection Recordings
1. Provide digital inspection recordings. Inspection recordings must be viewable on a standard 17" computer monitor.
2. Recording shall be of a quality sufficient to evaluate the condition of the sewer, the sewer service connections, and verify cleaning. If the quality is not sufficient, CONTRACTOR shall re-televise the sewer segment and provide a new recording and report at no additional compensation. Camera distortions, inadequate lighting, dirty lens, or blurred/hazy picture will be cause for rejection.
3. Only pipe segments from the same project shall be included on a given DVD. Multiple projects may be included, on a given hard drive, but the files must be organized in individual project folders. TV Inspection recordings shall not be edited. Each pipe segment must be its own electronic file. Electronic recording file must allow snap scrolling to allow easy and quick access of the entire recording.
4. Each DVD/hard drive must have a file index whose name contains the pipe segment reference number.
5. CONTRACTOR shall maintain a master copy of all recordings and Inspection Reports submitted for two years after delivery of inspections reports and recordings.
6. Label each DVD/hard drive with the following information:
   a. File Number
   b. CONTRACTOR's Name
   c. Project Name
   d. Contract Number
   e. Inspection Type: Post Cleaning, Repair
END OF SECTION
ARTICLE 11
PLUGGING AND BYPASS PUMPING OF FLOW

PART 1  GENERAL

1.1    DESCRIPTION

A.  The work of this section includes, but is not limited to:

1.  Plugging and Blocking of Flow
2.  Bypass Pumping of Sanitary Sewer Flows

B.  Related Work Specified Elsewhere:

1.  Traffic Regulations

1.2    SCOPE

A.  The CONTRACTOR is required to furnish all materials, labor, equipment, power, fuel, maintenance, etc. to implement a temporary pumping system for the purpose of diverting sewage flow around existing sanitary sewer and/or equipment undergoing modifications as required to maintain flow through the sanitary sewer.

B.  The design, installation and operation of the temporary pumping system shall be the CONTRACTOR’S responsibility. The CONTRACTOR shall employ the services of a vendor who can demonstrate to the Authority that he specializes in the design and operation of temporary bypass pumping systems.

C.  The bypass system shall be capable of pumping the flow rate required to effectively bypass the wastewater flow encountered without the use of the standby pump.

D.  It is required under this section that the CONTRACTOR provide all necessary means to safely convey the normal flows past the work area. It will not be permitted to stop or impede the sewage flow under any circumstances.

E.  The Bypass System shall include a minimum of two (2) pumps, one operating pump and one installed, ready for operation, stand-by pump.

F.  The Bypass System shall include a level control system to control the by-pass system. By-pass pumping will occur within the limits of the elevations as shown on the Drawings.
1.3 QUALIFICATIONS

A. Vendor Experience

1. The temporary by-pass pumping vendor shall have not less than five (5) successful years of experience in the design and operation of by-pass pumping systems of the type specified at five (5) different sanitary sewers.

2. The OWNER or Authority may require evidence, in the form of operating records, from these sanitary sewer systems to substantiate any claims concerning the ability of the system to perform as required.

3. The by-pass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

4. Temporary by-pass pumping vendor shall be Godwin Pumps of America, Inc., Rain for Rent or approved equal.

1.4 SUBMITTALS

A. The CONTRACTOR shall prepare with the vendor a specific detailed description of the proposed pumping system and submit it along with the vendor's references.

B. The submittal shall include a written description of the plan and shall address the quantity, capacity, and location of all pumping equipment. All pumping equipment submitted shall include the manufacturer's performance curves. The size, type and routing of all suction and discharge pipes and the means of connecting the system shall also be included.

C. The vendor shall submit at least five (5) references of projects of a similar size and complexity as this project performed by his firm within the last five (5) years.

1.5 BYPASS SYSTEM

A. Temporary Flow By-pass System

1. The temporary flow by-pass system shall consist of the necessary pumps required to pump the flow of wastewater encountered and one (1) standby pump with a capacity equal to that of the largest operating pump. The bypass system shall be capable of pumping low flow rates without damage to the system.

2. The pump control system shall be configured so that the standby pump will operate along with the primary pump in the event that the flow exceeds the capacity of the primary pump operating alone.

3. Temporary bypass piping shall be laid as required to perform the bypass.
4. Installation of the temporary pipes shall not disturb normal access through the site.

1.6 SPECIAL PRECAUTIONS

A. The CONTRACTOR is notified that maintaining flow through the collection system is critical and must be maintained at all times. If any spills of wastewater occur due to the failure of the CONTRACTOR to maintain the temporary pumping when needed, the CONTRACTOR shall be responsible for any fines levied on the OWNER by the PADEP or any other agency or any damage claims from customers served by the sewage collection system.

PART 2 PRODUCTS

2.1 PUMPS

A. The pumps and drives shall be rated for continuous duty and shall be capable of pumping the specified flow range without surging, cavitation, or vibration. The pump shall not overload the driver at any point on the pump operating curve. The pump shall be suitable for use with raw unscreened sewage and trash. The pump shall be a self-contained unit, designed for temporary use.

B. All pumps used shall be fully automatic self-priming units that automatically and continuously prime the pump. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of sanitary sewer flows.

C. Pumps shall be engine driven on skid bases or trailers with centralized lifting bracket and integral fuel tank. The pump shall be direct coupled to an electric start diesel engine.

D. Pump shall have a cast iron casting, suction cover, separation tank, open impeller front wear plate and non-return valve. Pump shaft shall be alloy steel.

E. Pump seals shall be of the mechanical type, and shall be located in an oil bath. All metal parts shall be stainless steel.

F. Pumps shall be provided with check valves on discharges of each pump.

G. CONTRACTOR shall provide the necessary start/stop controls for each pump.

H. Pump engine exhaust system shall be equipped with a residential silencer.

2.2 PIPING

A. Suction hose shall be heavy duty, flexible PVC hose with synthetic braiding reinforcement and quick-disconnect fittings. Suction hose shall have a minimum rating of 28" Hg vacuum and 70 psi pressure.
B. Discharge hose shall be either rigid pipe or heavy duty, nitrile rubber layflat hose with quick-disconnect fittings. Discharge hose shall have a minimum pressure rating of 300 psi.

C. Provide suction screens and all fittings, adapters, tools, and appurtenances required for a complete operating system.

2.3 TEMPORARY PLUGS

A. Plugs shall be inflatable plugs constructed of specially treated industrial fabric and reinforced neoprene. Plugs shall be equipped with steel pull rings and aluminum end clamps.

B. All plugs shall be firmly attached to a stationary object at ground level by a steel cable in order to prevent loss of plug in the pipeline.

PART 3 EXECUTION

3.1 SAFETY REQUIREMENTS

A. Maintain and be responsible for the safety of the operations at all times. Warnings: The wastewater may be in the stage of active decomposition and producing hazardous gases such as carbon dioxide, carbon monoxide, methane, hydrogen sulfide or other deleterious gases.

B. Perform work in such manner to prevent damage to the OWNER’S equipment and property, and insure the safety of all personnel at the sanitary sewer site. The CONTRACTOR shall also be responsible for the safety of his personnel.

C. Safety precautions include the detection of explosive gas mixtures, the use of non-sparking tools if deemed necessary, furnishing forced air to non-ventilated spaces and using personnel safety lines and harnesses.

3.2 PLUGGING AND BLOCKING OF FLOW

A. The Contractor shall be required, as a minimum, to block off all flow to effectively perform the required pipeline or manhole maintenance and shall use the following method:

1. A sewer line plug (or plugs) shall be inserted into the line(s) at the manhole upstream from the section to be inspected. The plug(s) shall be so designed that all or any portion of the sewage flows can be released during the required maintenance procedure.

2. After the work is complete, flows shall be restored to normal level.

3. Any damage to public or private property resulting from the plugging
or blocking of sewer lines by the Contractor shall be the sole responsibility of the Contractor.

3.3 BYPASS PUMPING OF FLOWS

A. TEMPORARY INSTALLATION

1. Equipment specified in this section shall be installed in strict accordance with the manufacturer’s instructions and recommendations. Installation shall include furnishing oil, fuel, grease, lubricants, tools, and spare parts that may be required to maintain the operation of the pump throughout the construction period, as recommended by the manufacturer. The CONTRACTOR shall be solely responsible for maintaining the temporary pumps and appurtenances. At the end of the construction period, the CONTRACTOR shall remove the pumps and appurtenances.

2. The pumps are to be installed where specified. They shall be installed for temporary use only and shall be removed by the CONTRACTOR prior to completion of the contract. The CONTRACTOR shall be responsible for proper operation of the complete pumping system, which includes pump, driver, controls and appropriate pipe connections, during the construction period.

3. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

4. The CONTRACTOR shall insure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pumps are operating.

5. The temporary pumping system shall be placed in service a minimum of 24 hours before any work may begin. It shall remain operable at least 72 hours after the work is completed and its removal is approved by the OWNER in writing.

6. Once written permission is issued, the CONTRACTOR shall remove all components of the temporary pumping system. The CONTRACTOR shall perform all restoration work to the satisfaction of the OWNER.

7. Pump supplier must be capable of replacing pump system within a 2-hour response time in the event of equipment failure.
ARTICLE 12
CONCRETE FOR UTILITY CONSTRUCTION

PART 1 GENERAL

1.1 DESCRIPTION
A. The Work of this Section includes, but is not limited to:
   1. Cast-in-place cement concrete construction
   2. Reaction and support blocking
   3. Cradles and encasement
B. Related Work Specified Elsewhere
   1. Trenching, Backfilling & Compaction: Article 2.

1.2 QUALITY ASSURANCE
A. Reference Standards
   1. Pennsylvania Department of Transportation: Publication 408 Specifications, as amended
   2. American Society for Testing and Materials (ASTM): C3 1Making and Curing Concrete Test Specimens In the Field
      C3 9 Test for Compressive Strength of Cylindrical Concrete Specimens
      C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
      C172 Sampling Fresh Concrete

1.3 SUBMITTALS
A. Certificates
   1. Submit certification from the concrete producer attesting that the cement concrete conforms to Section 704, Publication 408
Specifications for the class of concrete being used.

2. Submit certified results of compressive strength tests performed by an independent testing laboratory.

B. Shop Drawings

1. Submit detailed shop drawings of reinforcing steel.

PART 2 PRODUCTS

2.1 CEMENT CONCRETE

A. Ready-mixed, conforming to Section 704, Publication 408 Specifications.

1. Requirements for State approved batch plants, design computations and plant inspection shall not apply. The acceptability of concrete will be based on conformance with the Cement Concrete Criteria specified below and the results of the specified tests.

B. Cement Concrete Criteria

1. Class A
   a. 28-day compressive strength: 3300 psi
   b. Slump: 1 to 3 inches

2. Class C
   a. 28-day compressive strength: 2000 psi
   b. Slump: 2 to 6 inches

3. High Early Strength
   a. 3-day compressive strength: 3000 psi
   b. Slump: 1 to 3 inches

4. Cement Factor and Maximum Water-Cement Ratio conforming to Table A, Section 704.1(b), PennDOT Publication 408 Specifications.

2.2 REINFORCEMENT STEEL

A. Reinforcement Bars

1. New billet-steel conforming to Section 709.1, Publication 408 Specifications.
2. Deformed, Grade 40

B. Steel Wire Fabric
   1. Conforming to Section 709.3, Publication 408 Specifications

2.3 GROUNTS
   A. General
      1. All grouting as indicated or noted on the Drawings, in other sections of the specification or obviously required to perform the work shall be non-shrink grout.
      2. Grout in general shall be non-metallic type unless specifically noted on the Drawings or in other sections of the specifications to be a metallic type.
      3. Grouting shall be in strict compliance with the directions contained in the manufacturer's current catalog or instructions provided with the product.
      4. The grout manufacturer shall make available at no cost, upon 72 hours notification, the services of a qualified full-time field representative to aid in assuring proper use of the product under job conditions.

   B. Non-metallic Type
      1. Non-metallic grout shall be Masterflow 713 Grout (pre-mixed) as manufactured by Master Builders.

   C. Epoxy based Type
      1. Epoxy Based Grouts shall be a 2 component, moisture insensitive epoxy adhesive, such as Sikadur 32 Hi-Mob by Sika Corporation.

PART 3 EXECUTION

3.1 CONSTRUCTION
   A. Comply with Section 1001, Publication 408 Specifications for construction requirements including formwork, curing, protection and finishing of cement concrete.
   B. Excavate and shape trench bottoms and sides to accommodate thrust block forms, encasement, manhole bases, inlets and vaults.
C. Support pipe, valves and fittings at the required elevation with brick or concrete block. Do not use earth, rock, wood, or organic material as supports.

D. Construct manhole bases, reaction and support blocking, cradles, encasements and miscellaneous mass concrete of Class A concrete.

E. Provide spacers, chairs, bolsters, ties and other devices for properly placing, spacing, supporting and fastening reinforcement in place.

F. Place concrete utilizing all possible care to prevent displacement of pipe or fittings. Return displaced pipe or fittings to line and grade immediately.

G. Insure tie rods, nuts, bolts and flanges are free and clear of concrete.

H. Do not backfill structures until concrete has achieved its initial set, forms are removed, and concrete work is inspected by the Owner/Engineer.

I. Perform backfilling and compaction as specified in Article 2.

3.2 FIELD TESTS OF CONCRETE DURING CONSTRUCTION

A. Test each 50 cubic yards or fraction thereof of each class of concrete for compressive strength. Retain an independent testing laboratory to test cylinders.

1. Sample concrete in accordance with ASTM C172

2. Prepare and cure two test cylinders in accordance with ASTM C31.

3. Test cylinders in accordance with ASTM C39

B. If test cylinders fail to meet strength requirements, the Owner/Engineer may require additional core tests in accordance with ASTM C42 at the expense of the Contractor.
ARTICLE I

DESIGN CRITERIA FOR WASTewater PUMPING STATIONS

SECTION 1.01 General

In situations where gravity flow to an existing Bethel Township Municipal Authority (Authority) sanitary sewer collection line is not feasible, the Authority will consider the installation of a wastewater pumping station and a force main.

The purpose of this document is to establish minimum technical and design standards for developers and engineers for the design and acceptance of wastewater pumping stations within the service area of the Authority. The standards are intended to ensure uniformity and quality of
construction for wastewater pumping stations throughout the service area of the Authority. Any deviation from the standards contained herein shall be subject to the approval of the Authority Engineer. Plans and specifications shall be prepared and certified by a professional engineer registered in the Commonwealth of Pennsylvania.

Certain equipment manufacturers have been noted herein for the purposes of establishing standards for the level of quality for materials and workmanship, reliability, ease of maintenance, and minimization of spare parts inventory; however, manufacturers of equal quality will be considered. The pumping station and all appurtenant equipment and materials shall be new and unused.

SECTION 1.02 Design

a. All work shall be in accordance with the requirements of the Bethel Township Municipal Authority, Pennsylvania Department of Environmental Protection (PA-DEP) including but not limited to the PA-DEP Domestic Wastewater Facilities Manual, Bethel Township (Township) Subdivision and Land Development Ordinance, Bethel Township Zoning Ordinance and Bethel Township Stormwater Management Ordinance, most recent revisions.

B. Site or subdivision plans which propose a wastewater pumping station shall show in summary form the number of lots or units served, the off-site drainage area and zoning, the average daily flow, peak daily flow, and the rated capacity of pumps at a specified total dynamic head. Complete system curves and a force main profile shall be provided.

C. Prepare plans on 24" x 36" sheets, appropriate scale. Three sets are to be submitted initially. The plans shall be signed and sealed by a professional engineer licensed by the Commonwealth of Pennsylvania.

D. All stations shall have a minimum of two (2) pumps of equal capacity, and shall be capable of handling flows in excess of the expected peak flow. Where three or more pumps are required, they shall be of such capacity that with any one unit out of service, the remaining units will have capacity to handle peak sewage flows. Future flow conditions will be included in the flow determination, and the wet well, piping, electrical equipment, etc. shall be sized to accommodate the future flow.

E. For ratio of peak hourly flow/design average flow see the latest edition of the "Recommended Standards for Wastewater Facilities", Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers.

F. A manhole, separate from the wet well, shall be provided within 20 feet (but outside of the station fence) of the wet well. Where multiple sewers converge at a pumping station, they shall be brought together at the manhole and only one influent line shall enter the wet well.
G. Sewer air release valves shall be provided at all high points where gas pockets may accumulate. Combination air/vacuum valves shall be located where the force main is subject to draining and filling. Technical Standards and Standard Details for the Air Valves and Air Valve Vaults are found in the Authority's documents, most recent revisions.

SECTION 1.03 Site Requirements

A. The site work shall be generally level graded to remove runoff from site in a non-erosive manner. Drainage swales shall be provided to direct drainage away from the site.

B. The pumping station site shall be protected by a chain link fence 8 ft. in height. One 3-foot walk-through gate and one 20-foot opening cantilevered sliding gate shall be provided. All fencing materials shall be vinyl coated galvanized steel, green or black in color. The fence shall be installed in true and correct alignment, with all posts plumb. Line posts shall be spaced at a maximum interval of 10 feet.

C. Provide space for future expansion, especially if population growth or development in the drainage area may increase substantially.

D. All pump stations shall include an asphalt driveway/access road and turn around inside the fenced area. The minimum width of access roads shall be 12 feet. The paved area within the fence must be large enough and be designed to allow the turn-around of an AASHTO standard single unit utility vehicle with a wheelbase of 20 feet and width of 8 feet 6 inches. All grounds outside the fenced area are to be landscaped and seeded for grass. Slopes requiring mowing shall not exceed 10 percent.

E. Wastewater pumping stations, structures, electrical equipment, etc. shall be protected from physical damage by sitting no less than 2 feet above the predicted 100-year floodwater elevation. Stations shall remain fully operational and accessible during the 100-year flood. The predicted 100-year flood elevation shall be shown on all site plans. The final station elevation shall be indicated on the record drawings.

F. Provide sufficient area, in the best judgment of the Authority Engineer, between wastewater pumping stations, structures, electrical equipment, etc. and perimeter fencing for adequate access.

G. The pumping station building, wet well and influent manhole shall be located on Authority owned land and all other pumping station appurtenances shall be located within dedicated easements. The site shall be of sufficient size to accommodate the pumping facilities and to permit the turn-around of service vehicles. The minimum size shall be as determined by the Township Zoning and Sub-division Ordinance. Depending upon the locality, topography, and pumping station type, a larger area, as determined by the Authority may be required.
SECTION 1.04  Access for Maintenance Vehicles

A. Adequate access to the site is required for maintenance personnel, equipment and vehicles.

b. Adequate parking spaces for maintenance equipment and visitors should be provided.

c. Access to the station shall be via a dedicated asphalt or concrete paved road of single lane width. In some cases, curbs and gutters may be required by the Authority Engineer. Access road grade shall not be excessively steep. The road and parking configuration should be adequate for vehicle turnaround.

SECTION 1.05  Pumping Station Building

A. In general, the building type and architecture should match existing Authority pumping station(s) and complement adjacent buildings and properties. It shall also meet all applicable building codes. Pump station building design calculations, drawings, and materials of construction shall be submitted to the Authority Engineer for approval at the time of application.

B. The building shall have a minimum 8 foot clear ceiling height, with adequate space around the equipment to allow for service and repair of the equipment. The size may be altered at the discretion of the Authority Engineer to provide adequate clearance for equipment operation and maintenance. The building shall have a minimum of one 6'-0" x 6'-8" aluminum insulated double door with key lock and stainless steel hardware. The building shall have no windows.

C. Key locksets to the Authority's existing master-key system. Deliver four (4) master keys to the Authority.

D. A minimum of 4 feet of unobstructed floor space shall be provided in all directions around the pumping equipment or as otherwise accepted by the Authority Engineer.

E. A battery powered 12-volt DC emergency lighting system shall provide 50 watts of illumination for 11-1/2 hours in the event of a power shortage.

F. A thermostatically controlled supply fan with screen and weatherproof shutters shall be installed in the wall approximately opposite the air exhaust louver. The fan shall be capable of changing the air in the building a minimum of twelve times per hour. The supply fan and exhaust louver shall be corrosion resistant. The supply fan shall be provided with a wall-mounted switch located on the inside of the building near the entrance door.

G. Include a fresh air intake vent assembly consisting of (4) individual thermally actuated louvers, two (2) mounting frames, and exterior screens. Louvers shall be properly sized and positioned to provide adequate airflow to remove excess heat generated by the engine. Gravity or electrically operated louvers will not be
accepted.

H. Include an exhaust vent assembly consisting of (4) individual thermally actuated louvers, two (2) mounting frames, and exterior screens. Louvers shall be properly sized and positioned to provide adequate airflow to remove excess heat generated by the engine. Gravity or electrically operated louvers will not be accepted.

I. No manholes or wet well entrances shall be located inside the pumping station building.

J. Water service shall be provided by one 3/4-inch hose bib and sink located inside the building. An instantaneous water heater shall be included for the sink.

K. Provide a floor drain with a bolted solid cover within 6 feet of each pump drain connection. Floor drain shall drain back into the wet well. The bolted solid cover on the floor drain shall provide a positive seal to prevent wet well vapors from entering the pump building and shall be removable for use when servicing the pumps.

L. Sufficient electric heat shall be provided so as to prevent freezing inside the building at –10°F ambient temperature.

M. One outside entry light shall be provided near the entrance door. Provide adequate illumination for all areas in the station and the control panel, a minimum of 2 watts illumination per square foot shall be provided. This lighting shall be supplied by the required number fluorescent type lighting fixtures, each having two (2) 40-watt fluorescent tubes and separate ballasts. A light switch shall be located adjacent to each door opening. Lighting circuit shall be protected by a thermal magnetic circuit breaker.

N. A minimum of two 110-volt receptacles shall be provided with ground fault protection and waterproof covers.

SECTION 1.06 Wet Well and Sewage Grinder

A. Except for the intrinsically safe high water alarm float switch, no electrical equipment, junction boxes, or instrumentation shall be installed in the wet well.

B. Wet well structures shall be cast in place reinforced concrete or precast concrete construction. If precast units are utilized, they shall conform to the requirements of ASTM C478, with watertight joints per ASTM C443.

C. Wet wells shall be designed in accordance with PA DEP Standards. It shall be sized to avoid heat buildup in the pump motor due to frequent starts and to avoid septic conditions due to excessive detention time. The effective capacity of the wet well shall generally provide a holding period not to exceed 10 minutes for the maximum monthly average flow. Where tributary flow distance is short, a holding period, not to exceed 30 minutes for the maximum monthly average flow should be considered.

D. Wet well interior concrete surfaces shall be coated with a protective coating system as
directed by the Authority Engineer.

E. All penetrations through the slab between the pump enclosure and the wet well shall be sealed to prevent sewer gas leakage into the pump enclosure.

F. An access hatch shall be provided for access to the wet well sized to provide appropriate clearance for pump removal and maintenance, and the appropriate loading rating for the site conditions. Access hatches shall include automatic hold open arm.

G. The bottom of the wet well shall include a concrete fillet sloped 1:1 toward the pump suction inlet to minimize solids settling. Slope shall begin below pumps off elevation.

H. All support brackets and hardware in the wet well shall be stainless steel.

H. The wet well shall have a screened vent to allow the escape of gases. Vent shall be constructed using a minimum of a 6-inch flanged ductile iron pipe with a 180-degree turndown.

I. An aluminum ladder or manhole rungs of corrosion resistant materials shall be provided to provide access to the bottom of the wet well.

J. The Authority may require the installation of a comminutor in the wet well of the proposed pumping station. A Muffin Monster sewage grinder as manufactured by JWC Environmental shall be required for the influent pipe coming into the pump station wet wells. The sewage grinder shall be designed for 10-yr anticipated flows and sized for peak flow. The sewage grinder shall be mounted on stainless steel slide rails and removable without entering the wet well. The slide rails shall be anchored with stainless steel nuts and bolts. Provide aluminum winch stand for removal of sewage grinder.

K. Wet wells should be designed to provide acceptable pump intake conditions, sufficient volume to prevent excessive pump cycling, and sufficient depth for pump control, while minimizing solids deposition. The wet well shall be designed for the ultimate build-out of the sewershed draining to the pump station. The minimum volume between pump on and off levels should be calculated using the following general formula:

SECTION 1.07 Wet Well Aeration System

A. In order to prevent grease and grit buildup in the wet well and to reduce odors, the applicant may be required to provide a wet well aeration system including blower, control panel and piping installed in the wet well, depending on the required size of the proposed pumping station.
B. The blower shall be capable of producing a minimum of 30 CFM at 36" of water column. The blower shall be capable of operating at 3,450 rpm with a minimum 1.0 HP, TEFC motor. Include pressure/vacuum gauge, inlet filter with replaceable filter elements, discharge check valve, elastomer vibration isolators, pressure relief valve and discharge muffler pre-assembled with galvanized piping on an aluminum base plate. Blower shall turn off when a sewage pump is operating. Whenever possible or at the discretion of the Authority Engineer, the wet well aeration system shall be installed inside the pump building. If the wet well aeration system must be installed outside of the pump building, all components, except the control panel, shall be installed in a fiberglass enclosure mounted on a 6-inch high concrete pad.

C. Include a control panel with NEMA 1 wall mounted panel, circuit breaker, repeat cycle interval timer, panel mounted HOA selector switch, and interlock auxiliary contacts. In the "Auto" mode, the blower shall operate when a sewage pump is not operating and is called to run by the timer.

SECTION 1.08     Pumps & Motors

A. The pumps shall be located above grade inside the pump station building. Suction lift pumps shall be manufactured by Gorman Rupp or an approved equal. All valves, discharge piping and controls shall be furnished by Gorman-Rupp. Pumps shall be self-priming, Super T-Series or Ultra-V Series with flanged suction and discharge connections. Pumps shall have a large cover plate opening to allow for unclogging and removal of the impeller. Each pump shall be equipped with a high pump temperature thermostat and sight glasses for monitoring oil level in the bearing cavity and the seal cavity.

B. Adjustment of the pump impeller face clearance (distance between impeller and wear plate) shall be maintained by external shimless coverplate adjustment, utilizing collar and adjusting screw design for incremental adjustment of clearances by hand. Requirement of realignment of belts, couplings, etc., shall not be acceptable. Coverplate shall be capable of being removed without disturbing clearance settings. Additional clearance adjustment shall be accomplished by moving the entire rotating assembly towards the wear plate by removal of stainless steel shims from the rotating assembly side of the pump.

C. The shaft bearings shall be isolated from the seal cavity with an air gap to provide positive protection of the bearings in the event of a seal leak and to provide for external monitoring of the seal integrity.

D. All pumps shall be non-clog design capable of passing a minimum 2-1/2-inch sphere for 3-inch pumps and a minimum 3-inch sphere for larger pumps through all openings within the pump.
E. Each pump shall be equipped with a glycerin-filled compound gauge to monitor suction pressures, and a glycerin-filled pressure gauge to monitor discharge pressures. Gauges shall be a minimum of 4 inches in diameter, and shall be graduated in feet water column. Gauges shall be mounted on a resilient panel and frame assembly which shall be firmly secured to pumps or piping. Gauge installations shall be complete with all hoses and fittings, and shall include a shutoff valve installed in each gauge inlet at the point of connection to suction and discharge pipes. Gauge kit shall be supplied with stainless steel fittings.

F. The pump drain kit shall consist of a 10' length of plastic hose with a quick connect female Kamlock fitting on one end of hose and two sets of fittings for pump drains. Each set of fittings for pump drain includes a pipe nipple, bushing, bronze ball valve and quick connect male Kamlock fitting. Pump drain kit shall be supplied with stainless steel fittings.

G. Each pump shall be equipped with a self-cleaning wear plate fastened securely to the pump cover. The wear plate shall be constructed with a minimum of six (6) semi-circular machined channels and a tapered face designed to provide self-cleaning action and ensure that debris is cleared away from and does not collect between the impeller and the wear plate.

H. Each pump shall be given a certified performance test to substantiate operation at the specified capacity and TDH. The tests shall be conducted at the pump manufacturer's facility and certified by the pump manufacturer. All test data, to include pump serial numbers, shall be submitted to the Authority Engineer for approval prior to shipment of the equipment. Complete system head curve calculations shall be submitted to the Authority Engineer for approval with initial shop drawings plotting Q vs. TDH against proposed pump curves.

I. Provide the following spare parts:
   a. One complete rotating assembly
   b. Two spare pump mechanical seals (complete), and with it all gaskets, seals, sleeves, and "o"-rings required to be replaced during replacement of the seals
   c. Two sets of rotating assembly adjustment shims
   d. Two quarts of seal lubricant
   e. Two cover plate "o"-rings
   f. Two rotating assembly "o"-rings
   g. Two suction flap valve assemblies
   h. Two air release valve diaphragms
   i. One air pump for liquid level controls

J. Each pump shall be driven by a 1750 rpm, TEFC motor with v-belt drive power transmission. Motors shall not be overloaded at the design condition or at any head in the pump operating range. Each motor shall be NEMA rated with cast iron frame and copper windings.
A. Each pump shall be equipped with a full flow type check valve, each capable of passing a 3" spherical solid, with flanged ends and be fitted with an external lever and spring. The valve seat shall be constructed of stainless steel and shall be replaceable. The valve body shall incorporate a clean-out port for removal of internal valve components.

B. A discharge plug valve must allow either or both pumps to be isolated from the force main. The plug valve shall be non-lubricated, tapered type. Valve shall be operated with a single lever actuator providing lift, turn, and reseat action. The lever shall have a locking device to hold the plug in the desired position.

C. Each pump shall be equipped with one Gorman-Rupp pressure actuated diaphragm-type automatic air release valve, designed to permit the escape of air to the atmosphere during initial priming or unattended repriming cycles. Upon completion of the priming or repriming cycle, the valve shall close to prevent recirculation. Valves shall provide visible indication of valve closure, and shall operate solely on discharge pressure. Level/float actuated air release valves shall not be acceptable. All valve parts exposed to sewage shall be constructed of cast iron, stainless steel, or similar corrosion resistant materials. Diaphragms shall be fabric-reinforced neoprene. A cleanout port, 3 inches or larger in diameter, shall be provided for ease of inspection, cleanout, and service. Each air release valve shall be supplied with stainless steel pipe fittings. Each air release valve shall be provided with an isolation ball valve.

D. All piping within the pumping station including the wet well shall be centrifugally cast, flanged, ductile iron, complying with ANSI/AWWA A21.5I/C115 and class 53 thickness, minimum 4-inch diameter.

E. Contractor must insure all pipes connected to the pump station are supported to prevent piping loads from being transmitted to pumps or station piping. Pump station discharge force main piping shall be anchored with thrust blocks by the contractor where shown on the contract drawings.

F. Pump station suction piping shall be installed in such a manner as to eliminate high points where air may collect.

G. The pump station header piping shall include the necessary valves and fittings to permit emergency access to the pump station force main after isolation of the pumps. The bypass connection shall be accessible from outside the pump station enclosure on the wet well side of the station and shall terminate with a male OPW type quick connect fitting.

SECTION 1.10 Pump Control Panel

A. Pump controls shall be manufactured by Gorman-Rupp, or compatible equal, to insure that the pumping equipment is properly coordinated and to insure complete compatibility with the pumps.
B. The pump control panel shall be manufactured by a UL panel builder and the assembly shall bear a serialized UL label for "Enclosed Industrial Control Panels". All wiring, workmanship, and schematic wiring diagrams shall be in compliance with the National Electric Code (NEC).

C. Enclosures shall be constructed in conformance with National Electrical Manufacturers' Association (NEMA) standards for Type I electrical enclosures. Enclosure shall be fabricated of steel.

D. A properly sized heavy-duty air circuit breaker shall be furnished for each pump motor. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanisms shall be located on the exterior of the control compartment door, with interlocks which permit the door to be opened only when circuit breakers are in the "off" position.

E. An open frame, across-the-line, NEMA rated magnetic motor starter shall be furnished for each pump motor. All motor starters shall be equipped to provide undervoltage release and overload protection on all three phases. For motors 25 horsepower and larger, provide Allen-Bradley reduced voltage solid state (RVSS) starters.

F. Circuit breakers shall have through the door operating mechanisms to prevent the door from opening when the breakers are in the "on" position. Motor starters, relays and selector switches shall be NEMA rated.

G. The control panel shall be equipped with circuitry to override the level control system and shut down the pump motor(s) when required to protect the pump from damage caused by excessive temperature. A thermostat shall be mounted on each pump to detect its temperature. If the pump temperature should rise to a level which could cause pump damage, the thermostat shall cause the pump motor to shut down. A pilot light shall indicate that the pump motor has been stopped because of a high temperature condition. The pump shall remain locked out until the pump has cooled and the circuit has been manually reset. Automatic reset of such a circuit shall not be acceptable.

H. AC powered level control system shall be a Gorman-Rupp electronic pressure switch air bubbler wet well level controller with digital readout of wet well level. The pump controller shall be equipped with high wet well level alarm capability. Level control shall utilize two (2) industrial rated air pumps. Conventional level floats and submersible level transmitters will also be acceptable, and may be required in certain applications by the Authority.

I. A separate DC level control system shall start and stop the pump/engine in response to changes in wet well level. The electronic pressure switch used in the DC level control system shall be identical to and interchangeable with the electronic pressure switch in the AC level control system.
J. Control voltage shall be provided by a transformer mounted inside the pump control panel.

K. The pump control panel shall also include elapsed time meters for each pump, indicating lights, switches, lag pump start time delay, three phase voltage monitor, secondary surge arrestor, GFCI utility receptacle and alarm contacts.

L. Pumps and pump control panel shall be constructed and tested as a unit at the pump manufacturer's facility prior to shipment.

M. For larger pumping stations and/or stations that are anticipated to receive large peak flows, the Authority may require the use of variable speed motor controllers for each pump. For these applications, float controls can be utilized as a backup control system, but the primary system will need to be capable of constantly monitoring the water level in the wet well (i.e. ultrasonic transducer, etc.). These controls will be reviewed by the Authority on a case by case basis.

SECTION 1.11 Flow Meters

A. A flow metering device which is capable of continuously recording pumped flows and displaying instantaneous flow rate and totalized flow shall be provided. Meter shall be Endress Hauser or approved equal, magnetic flow meter. The meter shall have flanged connections, be appropriately enclosed for the location, with 4-20 mA output signal and be sized the same diameter as the discharge piping. At least one of the pipe flanges joining the flow meter must be a dismantling joint. Meter shall be installed per the manufacturer’s recommendations. Meter shall be factory calibrated and include a copy of the report in the O&M manual.

B. Flow converter/transmitter shall be furnished with the meter. It shall have an isolated 4-20 mA output and NEMA 4X enclosure.

C. A microprocessor based paperless recorder and totalizer. Recorder shall integrate and display the totalized flow and be of the non-reset type and shall not reset on loss of power.

SECTION 1.12 Electrical

A. Electrical design shall conform to the National Electrical Code (NEC), National Electrical Safety Code (ANSI), and all federal, state and local codes. Particular attention shall be given to classifying the various enclosed spaces to ensure adequate ventilation, and using explosion proof and intrinsically-safe electrical equipment where necessary.

B. Electrical service shall be 3-phase, 480, 240, or 208 volt. Phase conversion equipment to convert single-phase power to three-phase power shall not be acceptable.
C. Design shall include all arrangements with utility company to provide 3-phase power to facility. Design shall be in accordance with all utility company requirements.

D. The main electrical panel shall be service entrance rated with a main circuit breaker and circuit breakers to feed building loads.

E. A surge protection device shall be provided on the main service panelboard.

F. A separate intrinsically-safe float switch shall be installed in the wet well to serve as an independent high water alarm.

SECTION 1.13 Telephone Dialer

A. The pump station shall include an automatic telephone dialer. The dialer shall be an Engineer approved device and shall operate with 115 VAC, 60 Hz, single-phase power. Enclosure shall be NEMA 4X.

B. The dialer shall be configured, programmed, setup, and capable of being monitored using the internet.

C. The dialer shall be capable of monitoring up to seven (7) alarm contacts. The device shall be capable of calling, paging or emailing to alarm condition to a pre-programmed contact list.

D. The dialer shall monitor the following conditions:

1. High water alarm (From level controller)
2. High pump temperature, Pumps 1 & 2
3. Phase failure
4. Engine fault
5. Station enclosure low temperature
6. Independent high water float switch
7. Pump run time, Pumps 1 & 2

E. The dialer shall be equipped with a key switch to disable false alarms during maintenance operations and report to the website that the unit is out of service.

F. The dialer shall contain its own tapered type battery charging power supply and battery backup with a 36-hour minimum operation time.

G. The dialer shall be protected by a circuit breaker and single-phase lightning arrestor.

SECTION 1.14 Standby Engine

A. Standby engine to drive one pump during failure of utility power and during scheduled exercise periods. Standby engine shall be of sufficient size to operate the pumping station, water cooled type, and shall have continuous duty power rating suitable for the horsepower requirements of the pump. The engine and pump shall be
equipped to provide automatic start up and operation of pumping equipment. Provisions shall be made for manual start-up.

B. Engine shall be cooled by an integral forced water cooling system capable of maintaining safe engine operating temperature under expected operating loads, and subject to the expected maximum ambient temperatures in the pump station enclosure.

C. Engine shall be powered by natural gas if available. If not available, engine should be powered by LP gas. If LP gas is used, provide calculations on storage tank sizing. The LP gas tank and fuel supply piping shall be sized to adequately furnish the engine with LP gas when the temperature reaches 10 degrees F and the tank is 60% full. LP gas pipe size shall be per engine supplier's recommendations. The LP gas tank shall be Owned by the Authority.

D. Provide separate DC powered electronic pressure switch liquid level controls to operate standby engine/pump during failure of utility power and when the water level in the wet well reaches the pump on elevation.

E. The Engine shall be located on a concrete pad and in a sound attenuated, drip proof, weather protective enclosure.

F. The exhaust from the engine shall be vented to the outside via flexible stainless steel piping with a drip leg. Sound attenuating residential mufflers may be required by the Authority depending on pumping station location.

G. Provide thermally actuated intake and exhaust assemblies consisting of louvers, actuator assembly, mounting frame, and external screen. Air intake vents shall progressively open at 75 degrees F and progressively close at 60 degrees F as a result of thermal expansion or contraction of wax-like material contained in an enclosed plunger actuator.

H. All equipment shall be wired for automatic restart capability after restoration of power.

SECTION 1.15 Submersible Pump Stations

Submersible pump stations shall meet the applicable requirements in the previous Sections except as modified in this Section

A. Submersible pumps and motors shall be designed specifically for raw wastewater use, including totally submerged operation during a portion of each pumping cycle and shall meet the requirements of the National Electrical Code for such units. An effective method to detect shaft seal failure or potential seal failure shall be provided.

B. Submersible pumps shall be readily removable and replaceable without personnel entering or dewatering the wet well, or disconnecting any piping in the wet well. Guide rails, brackets, lifting chains, and other appurtenances shall be stainless steel
C. Electrical supply, control, and alarm circuits shall be designed to provide strain relief and to allow disconnection from outside the wet well. Terminals and connectors shall be protected from corrosion by location outside the wet well or through use of watertight seals.

D. The motor control center shall be located outside the wet well, be readily accessible, and be protected by a conduit seal or other appropriate measures meeting the requirements of the National Electrical Code, to prevent the atmosphere of the wet well from gaining access to the control center. The seal shall be so located that the motor may be removed and electrically disconnected without disturbing the seal. When such equipment is exposed to weather, it shall meet the requirements of weatherproof equipment NEMA 4X.

E. Pump motor power cords shall be designed for flexibility and serviceability under conditions of extra hard usage and shall meet the requirements of the National Electrical Code standards for flexible cords in wastewater pump stations. Ground fault interruption protection shall be used to de-energize the circuit in the event of any failure in the electrical integrity of the cable. Power cord terminal fittings shall be corrosion-resistant and constructed in a manner to prevent the entry of moisture into the cable, shall be provided with strain relief appurtenances, and shall be designed to facilitate field connecting.

F. Applicable discharge valves and appurtenances not integral to the submersible pump assembly, as discussed in Section 1.09 of these specifications shall be located in a separate precast concrete vault. The precast concrete vault shall meet the same materials standards discussed in Section 1.06 for precast structures. Provisions shall be made for the valve vault to be dewatered through a drain line with trap. Access shall be provided with an access hatch as manufactured by Halliday or equal, or manhole frame and casting as manufactured by EJ, Inc. with appropriate duty rating for the site conditions.

G. Provisions shall be made in the valve chamber to allow for the installation of the magnetic flow meter(s) on the pump discharge line(s). The meter shall be installed on a straight and horizontal section of the discharge piping such that there is no valves or fittings within the distance as recommended by the meter manufacturer. Separate meter chambers on the discharge side of the valve vault, and meeting the same specifications are acceptable.

H. The elevation of the top of the wet well and valve vault shall be a minimum of 2 feet above the 100 year flood elevation.

SECTION 1.16 Force Main

A. Refer to Article 7 for allowable force main pipe materials.

B. Depth of cover shall be a minimum of 4' - 0".

C. A by-pass connection with a quick connect coupling and shut-off plug valve shall be installed inside the pump station building on the discharge header to allow for bypass pumping into the force main.

D. Force mains shall be sized such that velocities are not less than 2.0 fps nor greater than 4.5 fps.
E. Refer to Article 7 for allowable force main pipe diameters.

F. Automatic air release valves shall be located at all high points of force mains where gas pockets may accumulate. Sewer air release valves shall be an Authority approved model with 316 stainless steel body, float, cover and hardware. Combination air/vacuum valves shall be installed at high points where the force main is subject to filling and draining cycles. Combination sewer air/vacuum valves shall be an Authority approved model with 316 stainless steel body, float, cover and hardware. Each valve shall be equipped with a flushing connection including 316 stainless steel ball valve. A force main isolation valve shall be installed between the automatic air release valve and the force main for the purpose of isolating the air release valve from the force main for service. The force main isolation valve shall be a full port ball valve equal to the inlet size of the automatic air release valve. Automatic air release valves shall be installed in valve vaults or manholes of sufficient size, in the judgment of the Authority Engineer, to provide adequate working area for maintenance, removal and re-installation of the valves.

G. The engineering drawings for all force mains shall include a profile drawing for the entire length of the main. Sewer air valves and/or air and vacuum valves shall be installed at all high points on the force main.

H. All force main pipe and fittings shall be adequately blocked against thrust reaction.
SECTION 1.17 Installation

A. All installations shall be performed such that components are plumb and true and aligned in such a manner that the station is fully operable and functional and no additional maintenance or restorative action is required. All electrical installations shall be performed by a licensed Electrical Contractor and shall result in a fully functioning station meeting the full intent of these specifications and the drawings.

SECTION 1.18 Start-Up

A. Start-up and equipment check operations shall be performed by an authorized service technician from the original equipment manufacturer.

B. The Authority Engineer shall be notified forty-eight (48) hours prior to start-up and an Authority representative shall be present during the period of start-up.

C. A copy of the technician's start up report showing all field data control, set points and equipment condition shall be furnished to the Authority Engineer.

D. Sufficient water for start-up and equipment check shall be the responsibility of the developer.

E. The manufacturer shall furnish the services of a qualified, factory-trained operations and maintenance serviceman to instruct and train Owner's personnel in the proper care, operation and maintenance of the equipment.

SECTION 1.19 Pump Manufacturer's Equipment Re-certification

A. The manufacturer's factory-trained service technician shall return to the site six (6) month's after initial startup of the equipment to perform a final re-certification of the equipment.

SECTION 1.20 Submittals

A. At the time of application, submit the following to the Authority Engineer:

1. All calculations and assumptions for the system head curve, total dynamic head, flow quantification, wet well volume, pump duty cycle at average and peak daily flow, force main line velocity, net positive suction head, and other design calculations.

2. Site plan showing subject pumping station and proposed force main relative to area under development and the existing sewer system.

3. Building design calculations, drawings, and materials of construction for the pumping station and force main.
4. All pump performance curves.

5. Copy of the agreement with the power company including the following: service voltage, 3-phase power, available short circuit current or kVA at service location, applicable rate schedule, meter location requirement and service disconnect location requirements.

B. Prior to fabrication of the pumping equipment, four (4) copies of each of the following shall be submitted to the Authority Engineer for approval:

1. Equipment shop drawings
2. Pump performance data
3. Engine performance data
4. Control panel wiring schematics
5. Any other material required to determine equipment compliance with these Specifications.

C. Prior to acceptance of the pumping station, the following shall be submitted to the Authority Engineer:

1. Three copies of the manufacturer's O/M manuals for all mechanical and electrical equipment.
2. Recommended spare parts list from the equipment manufacturer.
3. One copy of written report by manufacturer's technical representative verifying that the equipment is installed and lubricated and is in accurate alignment. Report shall also verify that the equipment has operated fully loaded and that it operates satisfactorily.

SECTION 1.21 Protection of Equipment

A. The pumping station should be placed into service soon after delivery of the equipment. If operation is delayed, the equipment including controls shall be stored indoors free from excessive dust in a low humidity, heated environment.

SECTION 1.22 Clean Up

A. The Contractor shall clean up as the work progresses and shall maintain his construction areas in a clean condition up until acceptance by the Authority, without regard to who
caused the need for clean up.
B. Prior to acceptance, inspect interior and exterior of pump station for dirt, splashed material or damage. Clean or repair accordingly. Remove from the job site all tools, surplus materials, scrap and debris.

ARTICLE II

TYPICAL SITE PLAN REQUIREMENTS

SECTION 2.01 General

A. The Authority has adopted the following requirements for submission of all plans:

1. Drawings scales for plan over profiles: horizontal scale of one inch equals fifty feet and a vertical scale of one inch equals 5 feet.

2. Drawing sheet size: 24"x36"

3. Each sheet shall show the appropriately oriented plan view at the top and its corresponding profile below the plan view.

4. All utility plans indicating proposed lot locations shall indicate lot numbers, street addresses, and adjoining property owner's name, if known.

5. All utility plans shall display the North arrow (preferably pointing up).

6. All utility plans and profiles shall indicate existing and proposed sanitary sewer locations, including all manholes, as well as all proposed and existing gas mains, water mains, storm sewers, electric conduits, and any other underground utility.

7. All utility profiles shall numerically indicate slopes, pipe sizes, manhole rim and pipe invert elevations, distances between manholes, manhole numbers, and piping materials proposed along the utility line.

8. All utility plan views shall indicate direction of flow using flow arrows and manhole numbers. Manhole numbers shall be assigned by the Authority Engineer. The developer's engineer shall assign manhole numbers, starting with number 1 and numbering consecutively.

9. All utility plans shall indicate existing and new right-of-way.

10. All utility plans shall indicate lands to be dedicated to the Authority.
11. All plans shall be sealed and signed by a professional engineer who is registered in the Commonwealth of Pennsylvania, the plans shall be dated, and include all revision dates.

12. All plans shall include an overall utility plan sheet containing the following information:
   a. Lot numbers
   b. North arrow
   c. Sanitary sewer utility
   d. Manhole numbers
   e. Sanitary sewer flow arrows
   f. Pipe sizes and materials
   g. Storm sewer pipes and structures
   h. Fire hydrants
   i. Gas mains
   j. Electric lines
   k. Telephone lines
   l. Cable tv lines
   m. Existing and new utility right-of-way

13. The overall utility plan will not be subject to the previously stated horizontal scale.

14. The overall utility plan shall be independent of the Erosion and Sedimentation Control Plan.

15. Detail sheets shall be provided for the proposed sewer facilities. Details shall be sufficient for construction of the facilities.

B. The developer shall record plans for the project. These plans shall be submitted in hard copy (one set of mylars and two sets of prints), and in electronic format (disk) which can be read directly by BTMA computers. The following formats are:

   1. AutoCAD - release 2016

C. All plans must be on Pennsylvania state plane. The vertical elevations shall be based on the NAVD 1988 vertical datum.

SECTION 2.02 Reference

Refer to typical site plan example sheets example sheets (2) as shown on the following pages (full size & digital copies can be furnished upon request).