FAIRFIELD COUNTY

CONSTRUCTION AND MATERIAL SPECIFICATIONS

Established By:

The Board of Commissioners
of Fairfield County, Ohio

For the Purpose of:

Informing and guiding all users, potential users, developers, engineers, contractors and others in the planning, design, construction, operation and use of the Water, Drainage and Sewer Facilities in Fairfield County. These specifications are established under the authority of Chapters 6103 and 6117 of the Ohio Revised Code.

Adopted by The Board of County Commissioners by Resolution 22-03.29 dated March 29, 2022.

Page Left Intentionally Blank

List of Tables

Page Left Intentionally Blank

Chapter I - General Provisions

101 - Scope:

These specifications will govern all construction performed for Water, and Sewer Systems within the Fairfield County Water and Sewer District and Greenfield Water and Sewer Subdistrict, including privately owned and/or operated systems, publicly owned and/or operated systems, and those that are or may be operated and maintained by Fairfield County.

102 - Plans and Specifications:

The location and nature of the work shall be shown on a set of construction drawings, which shall be submitted to and approved by the County. These specifications and the construction drawings prepared for the work are intended to be complete. Anything outlined in the specifications and not shown on the construction drawings or shown on the construction drawings and not called for in the specifications must be furnished by the Contractor as though appearing in both the construction drawings and specifications. If there is an apparent conflict or a conflict in fact between sections of these specifications or these specifications and the construction drawings as approved by the County, the most stringent information and interpretation shall prevail, subject to the discretion of the Sanitary Engineer. In accordance with ORC 6103.02 and 6117.01, construction drawings and specifications for water, drainage and sanitary sewer facilities to properties in the County outside of municipal corporations, including the plans of a municipal corporation, a water and sewer district, and a private corporation, must be submitted and approved by the County prior to beginning construction. The County shall disapprove of any plans for water, drainage and sanitary sewer facilities for a property to be served by another entity when the County has planned for or constructed services to the subject property in the County Sewer Districts, including areas recently annexed to a municipality.

103 - Reference Specifications and Drawings:

When American Water Works Association (AWWA), American Society of Testing Materials Specifications (ASTM), Ohio Department of Transportation Construction and Material Specifications (ODOT), Ohio Environmental Protection Agency (OEPA), Specifications and Standards, and other specifications and standard drawings are referred to; such a reference, unless otherwise noted, will refer to the latest effective edition. When such references are made, said specifications and drawings shall become a part of these specifications.

104 - Developer/Landowner to Meet Contractor Responsibilities:

When a developer/landowner wishes to develop land by installing or causing the installation of water and sewer systems, all or part of which is intended to be owned, operated, or maintained by the County, or other public or private owner, the developer/landowner shall be responsible to the County or

other public or private owner for all things listed in the specifications as contractor responsibilities.

105 - Definitions:

Whenever the words defined in this paragraph, or pronouns used in their stead, occur in these Specifications, they shall have the meaning herein given:

105.1 Abbreviations: Whenever the following abbreviations are used in these Specifications or on the Construction Drawings, they are to be construed as meaning the same as listed in Table 1.1.

Table 1.1 - Abbreviation Table

Organization	Abbreviation
American Association of State Highway and Transportation Officials	AASHTO
American Concrete Institute	ACI
American National Standards Institute	ANSI
American Society of Testing Materials	ASTM
American Public Water Association	APWA
American Water Works Association	AWWA
Code of Federal Register	CFR
Ohio Department of Commerce	ODOC
Construction and Material Specifications of the State of Ohio Department of Transportation	ODOT
Ohio Environmental Protection Agency	OEPA
Ohio Revised Code	ORC
United States Environmental Protection Agency	EPA
Water Environment Federation	WEF

105.2 Building: Any structure, or part of a structure, which may or may not be constructed for human habitation.

105.3 Building Drain: That part of the lowest horizontal piping of a building drainage system which receives the discharge from downspouts, footer drains or other storm sewers or drains and conveys such discharge to a point in a public or natural storm drainage system.

105.4 Building Sewer: That part of the lowest horizontal piping of a building sanitary system which receives the discharge from sanitary facilities, excluding building drainage facilities, and conveys such discharge to a centralized sanitary sewer system.

105.5 Connection or Tap: The installing of a service line to the County's collection system, distribution lines or mains. These connections are services provided. These are not interconnect connections. Interconnects are when services can be provided both ways of the connection.

105.6 Contractor: The individual, firm, or corporation entering into a Contract, or its authorized representatives legally empowered to act on its behalf.

105.7 Contract: The written agreement between the County or Owner and Contractor for the purpose of completing the Project.

105.8 Cost: The expenditures made by the County for labor, material, engineering, supervision, motor vehicles and tools, and any other expenditures incident thereto, to the extent that any or all of such expenditures are applicable in the particular situation involved. Also includes cost of land, land rights and all other property owned by the County that is used or useful in its operation of water, sanitary sewer, and storm water systems.

105.9 County: The Board of County Commissioners of Fairfield County and their authorized representatives legally empowered to act on their behalf.

105.10 County Commissioners: The Board of County Commissioners of Fairfield County and their authorized representatives legally empowered to act on their behalf.

105.11 County Engineer: The Fairfield County Engineer, or his designated agent.

105.12 County Sanitary Engineer: The Director of Utilities of Fairfield County or his designated agent.

105.13 County System: The portion of a system of water lines, sanitary sewers, treatment facilities, and associated equipment and materials which is owned by the County or within land, rights of way or easements owned or assigned to the County.

105.14 Customer: A person, firm or corporation who is the Owner of a premise currently served by the County system or is in need of utility service from the County system. When a customer requires service for more than one purpose, or for service to more than one premises, that customer may, at the discretion of the County, be deemed a separate customer with respect to each such service.

105.15 Debt Service: The fund used for the retirement of and interest on bonds and/or notes authorized and issued by the County to construct water or wastewater system facilities.

105.16 Development: The improvement of a tract or parcel of land.

105.17 Director: The Director of the Fairfield County Utilities Department or his authorized representative.

105.18 Easement: An acquired legal right for the specific use of land owned by others.

105.19 Engineer: An individual authorized to practice Engineering due to his/her registration in the State of Ohio.

105.20 Equipment: All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work

105.21 Extra Work: An item of work not provided for in the contract as awarded but found essential to the satisfactory completion of the contract within its intended scope.

105.22 Extra Work Contract: A contract concerning the performance of work or furnishing of materials involving extra work. Such extra work may be performed at agreed prices or on a force account basis as provided in ORC 5525.14.

105.23 Foundation Drains: Subsurface drains lain around the foundation of a building either within or outside of the building foundation, for the purpose of carrying ground or subsurface water to some point of discharge

105.24 Improvements: Any addition to the natural state of land which increases its value or utility, including buildings, street pavements, curbs and gutters, sidewalks, crosswalks, water mains, sanitary sewers, storm sewers, landscaping, street lighting, public utilities, paved parking areas, and other appropriate items.

A. *Site Improvements* refer to the improvements made to the land outside the exterior limits of a structure or structures.

B. *Public Improvements* refer to all improvements financed entirely or in part by public funds or which are dedicated to public use after completion thereof.

105.25 Infiltration: Water other than wastewater that enters a sanitary sewer system (including building sewer connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.

105.26 Inflow: Water other than wastewater that enters a sanitary sewer system from sources such as, but not limited to, roof leaders, cellar drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm waters, surface runoff, street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration.

105.27 Inspection Fee: The amount charged by the County to inspect and issue a permit for new users to verify proper construction procedures and materials.

105.28 Inspector: Duly authorized agent of the County Engineer and/or the Director of Utilities.

105.29 May: "May" is permissive.

105.30 Materials: Any materials or products specified for use in the construction of the project and its appurtenances.

105.31 Natural Outlet: Any outlet in a watercourse, pond, ditch, lake or other body of surface or ground water.

105.32 ODOT: Ohio Department of Transportation.

105.33 Owner: All individuals, partnerships, associations, and corporations holding the fee title to or life estate in, or an undivided interest in the fee or life estate, of any premises lots or tract of land.

105.34 Parcel: A specific part of a larger acreage of land.

105.35 Person: Any individual, firm, company, association, society, corporation or group.

105.36 Plans: The plans, profiles, typical cross sections, standard construction drawings, work drawings and supplemental drawings, approved by the County, or exact reproductions thereof, which show the location, character, dimensions and details of the work.

105.37 Plat: A plan of a tract or parcel of land made by a surveyor registered in the State of Ohio showing public dedications and easements, property lines, lot lines, and such other information as is required by law.

105.38 Premises: Any piece of real estate having one or more sanitary sewers which may be connected either individually or through a common sanitary sewer and directly or indirectly to the wastewater disposal system.

105.39 Replacement: Any expenditures for obtaining and installing equipment, accessories, or appurtenances which are necessary during the useful life of the treatment works to maintain the capacity and performance for which such works were designed and constructed. Also known as "equipment replacement costs."

105.40 Resolution: Resolution of the Board of County Commissioners of Fairfield County.

105.41 Right-of-Way: A general term denoting land, property or interest therein, usually in a strip acquired for or devoted to a roadway or utility easement.

105.42 Sanitary Sewer: A pipe or conduit which carries sanitary wastewater, limited industrial wastes and to which storm, surface and ground waters are not legally admitted.

105.43 Sanitary Sewer System: All of the facilities required for collecting, pumping, conveying, treating, and disposing of wastewater.

105.44 Service: Making available to the customer or potential customer, potable water and the

disposal of wastewater without regard to the extent to which the customer makes use of the available potable water or disposal of wastewater. The availability of potable water is called "water service". The availability of wastewater disposal is called "sanitary sewer service".

105.45 Service Area: All users connected with the treatment works including those in Fairfield County and outside of the County corporation limits.

105.46 Service Line: The line owned by the customer that extends from the County System over the customer's premises or lot. Normally, the water service line begins at the corporation stop at the main line (including service saddle) and the sanitary sewer service line begins at the sanitary sewer main line (wye connection).

105.47 Shall: Shall is mandatory, "may" is permissive.

105.48 Specifications: The latest edition of these Construction and Material Specifications in effect on the date the construction drawings are approved (signed) by the County, the specifications included with the construction drawings, and any other requirements referenced in the specifications or construction drawings.

105.49 Standard Methods: The laboratory procedures set forth in the most recent edition of Standard Methods for the Examination of Water and Wastewater, published jointly by the American Public Health Association, the American Water Works Association, and the Federation of Sewage and Industrial Wastes Association.

105.50 Storm Sewer: A sewer which transports ground, surface, storm and clear water and to which sanitary wastewater and industrial wastes may not be discharged.

105.51 Storm Sewer or Storm Drain: A pipe or conduit which carries storm and surface waters or drainage, from the point of origin to some point of disposal, but that excludes sanitary wastewater and industrial wastewater.

105.52 Storm Drainage System or Storm Water Drainage System: All facilities, structures, natural water courses, outlets, waterways or streams, swales or ditches, and sewers which carry storm water, groundwater, surface water, subsurface drainage water, and unpolluted cooling water.

105.53 Subcontractor: An individual, firm, or corporation having contracts awarded them by the Contractor or subcontractors, to do or perform any part of the work, who prior to such undertaking received the written consent of the Engineer.

105.54 Surveyor: A registered surveyor as defined by the "Registration Act of the State of Ohio".

105.55 System Components: All water or sanitary sewer lines, service lines, valves, manholes,

pipes, fittings, fixtures, vaults, pits, treatment equipment and machinery, buildings, booster stations, lift stations, storage tanks and towers, and appurtenances thereto which are a part of or connected to the water system or wastewater system.

105.56 Tract: A continuous expanse of land.

105.57 Watercourse: A channel in which a flow of water occurs, either continuously or intermittently.

105.58 Waterlines: A pipe or conduit used to distribute water to the customer's premises.

105.59 Water Treatment Facility or Plant: Any arrangement of devices and structures used for treating water to a potable condition.

105.60 Working Capital: A reasonable reserve of monies within the system operating fund to provide a margin of safety for fluctuations of cash flow in the fund.

105.61 The Work, The Project: All of the work to be executed and finished by the Contractor in accordance with these Specifications and Construction Drawings as approved by the County.

106 - Samples And Shop Drawings:

Material samples (if required), a list of suppliers, and such shop drawings, sketches, specifications and descriptions required to establish compliance with these specifications shall be submitted to the County or Engineer as appropriate and be approved prior to ordering, installing or using any equipment or material. Submission shall be made and approved prior to the preconstruction meeting for approval before construction.

107 - Quality of Material:

Wherever particular brand, makes of material, devices or equipment is shown or specified, such items shall be regarded as standard. Any other brand or make of material, device or equipment which, in the opinion of the County, is the equivalent to that specified, considering quality, workmanship, economy of operation, and suitability for the purpose intended will be accepted. Acceptance of such items shall not be construed to remove the Contractor's responsibility to provide a complete usable facility as specified herein and shown on the construction drawings.

108 - Project Control:

108.01 Authority of the Engineer: The Engineer or representative shall observe the progress and quality of the construction work and determine in general, if the results of the construction work are in general conformance with the contract documents. Based on onsite observations, the engineer shall endeavor to guard the County against apparent defects and deficiencies in the permanent work constructed by the contractor, but does not guarantee the

performance of the Contractor. The Engineer is not responsible for construction means, methods, techniques, sequences or procedures, time of performance, programs, or for any safety precautions in connection with the construction work. The Engineer is not responsible for the Contractor's failure to execute the work in accordance with these specifications or the construction drawings. In making the construction observations as described herein:

A. The Engineer shall receive and make recommendations to the County on all questions of fact which may arise including the quantity, quality or suitability of materials and equipment furnished, the work performance, and the rate of progress on the work.

B. The Engineer may correct any apparent or actual errors or omissions when such corrections are necessary for the proper fulfillment of the intention of the specifications and construction drawings.

C. Failure of Engineer to observe or recommend rejection of any defective, unauthorized or non-conforming work or material shall not in any way prevent later rejection when such defective, unauthorized or non-conforming work or materials are discovered, or obligate the County to final acceptance.

D. The Engineer may suspend work wholly or in part due to the failure of the Contractor to correct conditions unsafe for workers or the general public for failure to carry out provisions of the contract and to carry out orders.

E. The Engineer may suspend work for such periods as deemed necessary due to adverse weather conditions considered averse to the prosecution of the work or for any other condition or reason deemed to be in the public's best interest.

108.02 Control of Work and Material: All materials and work shall be in conformance with the lines, grades, cross sections, dimensions, and materials shown on the plans or specifications and are subject to review by the Engineer. The Engineer or his representatives shall be provided access to all parts of the work and shall be provided such information and assistance by the Contractor as is required to complete his review. The Engineer shall call the attention of the Contractor to any observed failure of the Work or materials to conform to the specifications or construction drawings. The Engineer shall then make a determination if the work shall be accepted and remain in place or be replaced to conform to the specifications or construction drawing. The Engineer will document his findings or acceptance by written correspondence to the County and/or Owner.

Should the Contractor fail to comply with these specifications, construction drawings or the

Engineer's recommendations, fail to provide certificates and/or proof of the suitability of materials, or fail to prosecute the work in a diligent and good workmanlike manner; the Engineer may recommend to the County that the Contractors operation be suspended on any or all portions of the Project until such unauthorized, non-reviewed or defective work, materials and equipment are corrected.

108.03 Testing of Materials: The taking of samples, testing of soils and concrete, and all other tests required by the specifications and construction drawings, or because of the lack of certificates or proof of suitability of any materials shall be performed at no expense to the County. All equipment and materials, which have passed the prescribed tests, may be incorporated in the Work, provided that said material and equipment meets all other requirements of the specifications and construction drawings. All material not conforming to the requirements of the specifications at the time they are used shall be considered unacceptable and shall be removed immediately from the site of the Work unless otherwise instructed by the Engineer.

108.04 Watertight Structures: All structures to be used for holding water shall be made watertight and shall be tested by filling with water before they will be accepted. Tests of concrete water bearing basins shall be made before backfill is placed, provided however, where special reasons make this impractical the Engineer may permit backfilling to proceed before the test is made. Permission to backfill shall not relieve the Contractor from any responsibility for water tightness of the structures and if upon making the test the need to remove backfill arises, it shall be done by and at the expense of the Contractor.

108.05 Plans and Work Drawings: The plans show details of structures, lines, grades, typical cross sections, and the location and design of structures. The Contractor shall keep a complete set of construction drawings, specifications, and shop drawings on the Project site at all times for the use of those legitimately interested. The plans shall be supplemented by working drawings when required to control the work adequately. Working drawings shall be furnished by the contractor.

108.06 Construction Layout Stakes: Stakes showing the lines and grades necessary for the completion of this Project will be provided by a licensed engineer or surveyor at the Owner's expense. Establishing horizontal and vertical controls for the applicable items of Work such as: streets, sewers, waterlines, force mains, structures, buildings, equipment and their appurtenances, and the final measuring are the basic items to be provided. Cut sheets, in a format acceptable to the County, shall be provided for all water and sewer line

installations. The County may require an as-built survey of the completed work showing final lines and grades and/or a certified statement from a licensed surveyor stating all construction work was completed in accordance with the specifications and construction drawings.

108.07 Authority and Duties of the Inspector:

A. Inspectors employed by the County or their designated agents will be authorized to inspect all work done and materials furnished. Such inspection extends to all or any part of the work and to the preparation, fabrication or manufacture of the materials to be used. The Inspector is not authorized to alter or waive the provisions of the contract. The Inspector is authorized to call the attention of the Contractor to any failure of the work or materials to conform to the specifications and construction drawings. The Inspector is authorized to reject materials which do not meet specification requirements or suspend the portion of the work involved until any question at issue can be referred to and decided by the Engineer. The Inspector is not authorized to issue instructions contrary to the construction drawings and specifications, or to act for the Contractor.

B. The contractor shall give at least seventy-two (72) hours' notice, excluding weekends and holidays, to the County Inspectors for any inspection to be conducted. The contractor shall furthermore ensure that no work shall be covered or obscured prior to inspection and acceptance by the County Inspectors.

C. The developer of a subdivision shall, prior to the start of construction, pay the amount set forth in the regulations to cover the cost of inspecting the improvements.

108.08 Removal of Unacceptable and Unauthorized Work: All work which does not conform to the requirements of the contract or these specifications will be considered unacceptable unless otherwise determined acceptable under 108.02. Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause found to exist prior to final acceptance of the work, shall be removed immediately and replaced in an acceptable manner.

109 - Guarantee and Maintenance Bond:

Prior to acceptance of any improvements within a phase of a subdivision, the developer shall furnish the County Commission a maintenance bond, certified check, or other acceptable guarantee that shall be held for a minimum of three (3) years after conditional acceptance is granted and no longer than five (5) years to ensure that the improvements are in satisfactory condition. The maintenance guarantee will only be released between years

3 and 5 once the applicable section or phase (of which the guarantee applies) has reached eighty (80) percent lot occupancy*. Occupancy will be defined as an issued Certificate of Occupancy (COO) by the township zoning inspector. In townships where a COO does not apply, a certificate of zoning compliance or similar form may be accepted. For non-residential subdivisions, the maintenance period will be no longer than 3 years. If within said period defects appear in the improvements which are determined by the County Inspectors to be the fault of the contractor or developer said defects shall be repaired to the satisfaction of the County Inspectors at the expense of the developer. In the event the developer fails to make required maintenance within a reasonable time of a request to do so, the above-mentioned guarantee shall be forfeit. Said guarantee shall be ten (10) percent of the total improvement cost of that phase. Subdivisions receiving conditional acceptance prior to January 1, 2020 will be subject to a five (5) year maintenance period.

If succeeding phases of an approved subdivision will be using an existing road in that subdivision for access and that is the only entrance to that phase, an additional maintenance bond, certified check, or other acceptable guarantee will be required to cover any damage to the public improvements in the preceding phase. The County Inspector shall determine the adequacy of an additional guarantee. This additional guarantee will not be required if the maintenance guarantee(s) for the applicable preceding phase(s) do(es) not expire prior to the acceptance of the public improvements for the additional phase(s) using the existing road in that subdivision.

The County Engineer shall make an evaluation of the existing road prior to the start of construction activities in the succeeding phases. An evaluation may be made at the completion of each succeeding phase to determine damage.

* In instances where 80% of the total lots results in a fraction should be rounded up. (Example: 44 lots x 80% = 35.2 lots. In this case the required number of lots occupied to receive final acceptance would be 36.)

110 - Service of Manufacturer's Representative:

When required by the construction drawings or specifications, the services of competent and experienced manufacturer's representatives shall be furnished to supervise the initial installation of material and equipment as well as to provide start-up and operational instructions to County personnel. Where the supervision by a manufacturer's representative is not called for, the Owner is not relieved of his responsibility to properly construct or install material and equipment in accordance with the terms of these specifications or to provide start-up and operational instructions.

111 - Notices:

Notice shall mean written notice. Written notice shall be deemed to have been duly served when delivered in person to the person, firm, officer, agent or corporation, or when delivered at the last known business address of such person, firm, officer, agent, or corporation, or when enclosed in a postage prepaid wrapper or envelope addressed to such person, firm, officer, agent, or corporation at the last known business address and sent by registered mail with return receipt requested.

112 - Sanitary Regulations:

Suitable sanitary conveniences for the use of all persons employed on the Project, properly screened from public observation, shall be provided and maintained by the Owner or Contractor, as appropriate. The Owner shall obey and enforce such other sanitary regulations and orders and shall take such precautions against infectious diseases as may be deemed necessary by the County.

113 - Access to Abutting Properties:

The Owner shall provide and maintain temporary access to all properties where such access is interrupted by the work or development operations.

114 - Inclement Weather Conditions:

All work which will be adversely affected by climate conditions, such as rain, wind, frost or freezing shall be suspended unless permission is given by the County to proceed. Whenever work proceeds under such conditions, the Owner shall provide approved facilities for protecting all materials and finished work. This will include heating of materials if required for their proper installation.

115 - Utility Costs:

The Owner shall pay the costs of all utilities, such as water, sewer, gas and electric during construction and until acceptance of the Project by the County.

116 - Compliance with Laws:

The Owner shall include in all contracts for work on the Project provisions requiring the contractor or sub-contractor to:

116.01 Comply with all applicable laws, ordinances, rules, regulations, and orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss.

116.02 Erect and maintain, as required by existing conditions and progress of the Project, all necessary safeguards for safety and protection, including posting danger signs, and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

116.03 Guard all machinery and equipment.

116.04 Guard or eliminate all hazards in accordance with the safety provisions of applicable State and Federal laws, orders, findings, and regulations.

116.05 Exercise the utmost care and the supervision of properly qualified personnel when using or storing explosives, paints, or other hazardous materials or equipment.

117 - Protection of Finished Work:

The Contractor/Owner will be held responsible for any and all materials or work and will be required to make good, at his own cost, any injury or damage which said materials or work may sustain from any source or cause, before final acceptance thereof. This includes the Contractor/Owner's responsibility to mark utilities at the work site for the use of other utility companies or entities, to protect the contractor's materials or work.

118 - The Owner Not Released by Contractors or Subcontractors:

No subcontractors or contractors shall under any circumstances relieve the Owner of his liabilities and obligations to fulfill the requirements of these specifications.

119 - Field Office:

All contracts that are let and administered by the Owner or County when shown as a bid item in the bid schedule shall provide and maintain a field office of at least 150 square feet, located conveniently to the Work, in which a separate desk, chair, file cabinet, telephone, light and heat shall be provided for the exclusive use of the Engineer. The office may be part of the Contractor's office; however, the Engineer's office shall be separated by doors and partitions to provide a soundproof barrier between the two offices and the offices shall have separate entrances from the outside. On projects by private developers, an office may be provided but is not required.

120 - Safety and Health Provisions:

The Contractor is bound by all provisions of the Federal Occupational Safety and Health Act of 1970 (OSHA), and all other applicable federal, state, and local laws, regulations, findings, and orders relating to safety and health conditions on the Work site. Construction methods shall be consistent with the Occupational Safety and Health Administration (OSHA) and current Amended Construction Standards for Excavations.

121 – Substitutions

Whenever a material, article, or piece of equipment is identified on the Plans by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality, and function may be considered.

The Contractor may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the agreement by reference to brand name or catalogue number, and if, in the opinion of the Sanitary Engineer, such material, article, or piece of equipment is of equal substance and function to that specified, the Sanitary Engineer may approve its substitution and use by the Contractor.

122 Deeds and Easements

It is the responsibility of the Owner/Developer to acquire all necessary deeds and easements (both temporary and permanent) and present a copy of the recorded deed or easement to the Sanitary Engineer prior to the start of construction.

123 Sanitary Sewer Main Access Road

Sanitary Sewer Main Access Roads shall be required in circumstances where County maintenance vehicles will be unable to park close enough to a proposed or existing manhole (onsite or offsite) to provide proper maintenance. Generally, access roads may be comprised of ten (10) inches of ODOT Item 410, Type C constructed over geotextile fabric; however, varying soil or site conditions may necessitate a paved access road. All access roads shall have a minimum width of twelve (12) feet and shall include a turnaround area at their termination. In some circumstances, a permanent culvert may need to be installed to allow for such access. All permits required for the installation of any culverts are the responsibility of the Owner/Developer. The Owner/Developer shall also provide any sewer access easements necessary through the site to allow District to perform maintenance activities.

124 Pre-Construction Meeting

The following list must be provided to the Sanitary Engineer or Construction Coordinator prior to scheduling:

1) Ohio EPA approval.
2) All material submittals approved
3) Three (3) copies of plans two (2) days prior to the meeting and cut sheets (shop drawings) two (2)

days prior to starting work.

4) All development fees must be paid in full before scheduling.

5) Any and all permits and approved Stormwater Pollution Prevention Plan required to start construction.

6) Any and all offsite easements necessary to complete the work.

7) Construction bond and other financial surety.

Meetings will be scheduled with the Sanitary Engineer and/or Representative. A representative from the Owner/Developer, Design Engineer, and Contractor will be required to attend meetings unless directed by the Sanitary Engineer or Representative.

125 Final Acceptance/Project Closeout

Upon completion of construction and testing of improvements, owner shall request final inspection and approval from the County. The County conduct visual inspection and submit list of corrective items to owner for remedy (may include cleaning of sewers as required) upon completion of the inspections. The Fairfield County Board of Commissioners shall, upon certification in writing from the County Sanitary Engineer or Regional Planning Commission that all construction is complete according to the plans and specifications, by Resolution, accept the improvements and accept and assume operations and maintenance of the improvements.

The owner shall prior to final acceptance, furnish to the County as required:

1) "As built" drawings of the Improvements which plans shall become the property of the County. The drawings shall be two paper copies (one full size & one 11”x17”), and a Compact Diskette with the plans in .DWG format & .PDF format.
2) An Affidavit or waiver of lien from all contractors associated with the project that all material and labor costs have been paid. The owner shall indemnify and hold harmless the County from expenses or claims for labor or materials incident to the construction of the Improvements.
3) Documentation showing the required sanitary easements (plat).
4) Equipment, spare parts, operation & maintenance manuals, and additional warranties.

126-198 - Reserved

199 - Penalty:

Whoever violates any provision of these Regulations, Specifications or County directives pursuant to these Regulations shall be subject to the remedies allowed by law, be liable for fines and fees imposed in the Fairfield County Utilities Miscellaneous Charges, be liable for the cost of damages and the repairs incurred by the County, and be subject to having service discontinued and being disconnected from the water and/or sanitary sewer systems.

The Federal Clean Water Act and State Law enacting the Federal Clean Water Act contain criminal penalties, liabilities, and imprisonment provisions for violations of Federal and State environmental laws. Whoever violates any provisions of these Regulations that also violates Federal and/or State laws shall be subject to the criminal statutory provisions allowed by law.

199.01 Protection From Damage:

No unauthorized person shall maliciously, willfully, or negligently break, damage, destroy, uncover, deface, or tamper with any structure, appurtenance, or equipment, which is a part of the County waterworks, wastewater system, or drainage system. Any person violating this provision shall be subject to immediate arrest and upon conviction shall be fined not more than $500 for each offense, in addition to any repair and/or replacement costs resulting from such activity.

Notification of Accidental Release of Discharge: In case of any accidental release to the sewer or drainage system of an unacceptable discharge or of any substance or material considered by the County to be toxic or deleterious, as provided in this section, the user shall notify the County immediately and in no case later than one hour following such a discharge so that remedial action can be taken. Costs incurred to correct any damage resulting from such a discharge shall be charged to the user.

Failure to report such a discharge shall result in a charge of one thousand dollars ($1,000) in addition to the costs of correction and in addition to any penalties provided by other laws, rules or regulations. Each such discharge shall be considered separately and the cost and charges therefore shall be levied accordingly. A separate discharge shall be deemed made each day during or on which such discharge continues and charges therefore shall be levied accordingly. Such charges shall be collected by the County in the same manner as all other charges set by the County.

199.02 Penalties: Any person found to be violating, or in violating of any provisions of these Regulations, shall be served by the County with written notice stating the nature of the violation and providing five (5) days' notice or a reasonable time limit for the satisfactory correction

thereof. The offender shall, within the period of time stated in such notice, permanently cease all violations. Failure to correct the subject violations shall entitled the County to cut off the violator's service after providing five (5) days' notice or the reasonable time limit stated in such notice.

Any person who shall continue any violation of these Regulations beyond the time limit provided for in preceding sections may be guilty of a misdemeanor and upon conviction thereof shall be fined in an amount not exceeding $100 for each violation, each day in which any such offense shall be deemed a separate and distinct violation.

Whoever violates any provision of these regulations shall become liable to the County for any expense, loss or damage occasioned by the County by reason of such violation including any costs assessed by the Ohio EPA and/or the U.S. EPA as a result of the wastewater treatment plants inability to treat and effectively reduce the pollutant involved.

199.03 Federal Provisions: The Federal Clean Water Act contains the following criminal penalties, liabilities, and/or imprisonment.

A. Any person who *negligently*:

1. violates the terms or conditions of a discharge permit;
2. fails to maintain the required records, fails to conduct the required monitoring or maintain the required monitoring or sampling equipment;
3. submits false material statements, representations or certifications in any record or document that is required to be created or maintained under an applicable permit;
4. discharges without the required permit; or
5. falsifies or tampers with or renders inaccurate any monitoring device;

may be punished by a fine of up to $25,000 per day per violation or by imprisonment for up to 1 year, or by both.

B. Any person who *negligently* introduces into public sanitary sewer system wastewater which the person knows or reasonably should have known could cause property damage or cause the treatment works to violate its discharge permit may be punishable by a fine of up to $25,000 per day per violation or by imprisonment for up to 1 year, or by both.

C. Any person who *knowingly* engages in any of the above conduct may be punished by a fine of up to $50,000 per day per violation or by imprisonment for up to 3 years, or by both.

D. Any person who *knowingly* engages in the above conduct and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury may be subject to a fine of up to $250,000 or imprisonment for up to 15 years, or both. If an

organization engages in the aforementioned conduct, they may be subject to a fine of up to $1 million dollars. With respect to this particular provision, the term "serious bodily injury" includes an injury that would cause unconsciousness, extreme physical pain, or impairment of the function of a bodily member, organ or mental faculty.

E. Any person who *knowingly* makes a false material statement, representation or certification in any application, record or other document required to be developed or maintained, or who *knowingly* falsifies, tampers with or renders inaccurate any monitoring device or monitoring method required to be used under the Clean Water Act may be punished by a fine of up to $10,000 per day of violation or by imprisonment for up to 2 years, or by both.

Any person is defined to include any responsible corporate officer of a company or corporation.

199.04 State of Ohio Provisions: Under Ohio's environmental laws, criminal penalties, liabilities, and/or imprisonment are provided for the following activities:

A. Any person who *recklessly*:

1. discharges pollutants to the waters of the State of Ohio without a valid and unexpired permit;
2. violates the effluent limitations in an applicable permit;
3. violates national categorical effluent guidelines;
4. fails to maintain the required records, to make such records available for inspection, to allow entry to an authorized representative, or who hinders or thwarts such representatives during an inspection; or
5. violates any order or other term or condition of a permit;

may be fined up to $25,000 per day of violation or imprisoned for up to 1 year, or both.

B. Any person who *knowingly* submits false information or *knowingly* fails to submit information or records pertaining to a discharge as required under the permit may be fined up to $25,000 per day of violation.

END OF CHAPTER

201 - General:

All material furnished by the Contractor shall conform to the minimum requirements of the latest revision of the referenced Specifications in effect on the date of approval of the construction drawings by the County.

The manufacturer, producer, or supplier shall furnish a signed statement that the inspections of all the specified materials have been made and that the results comply with the requirements of these specifications, and the manufacturer shall supply certified copies of test results if required by the plans, specifications, or County. No material shall be used until approved by the County or Engineer.

202 - Samples:

The Contractor may be required to furnish samples of any or all materials proposed to be used which are subject to these specifications. Approval of any samples shall not be taken in itself to change or modify any specification requirement. Approval shall be only for the use of the material. After a material has been approved, no change in brand or make will be permitted without prior approval. Failure of any material to pass the specified tests may be sufficient cause for refusal to consider any further samples of the same brand of that material for use under these specifications. The County may take test samples from the various materials or equipment delivered to the site of the work by the Contractor whether previously approved for construction or not. Any material or equipment which fails to meet the requirements of these specifications shall be subject to removal and replacement by the Contractor with material or equipment meeting the requirements of these specifications.

203 - Aggregate:

Aggregate shall conform to the following items:

203.01 Aggregate for Concrete shall meet the requirements for Section 703.02 ODOT.

203.02 Fine Aggregate/Sand for mortar or grout shall meet the requirements of Section 703.03 ODOT.

203.03 Stone Aggregate shall conform in all respects to the specific kind designated under Item 703 ODOT.

204 - Brick and Masonry Units:

All units shall conform to the requirements of 704 ODOT.

205 - Cement and Concrete:

205.01 The Concrete shall conform to Item 499.02 and 499.03 ODOT.

205.02 Cement for mortar shall be as specified under the appropriate requirement for Item 701

ODOT.

205.03 Concrete incidentals shall conform to Item 705 ODOT.

205.04 Reinforcing steel shall be deformed bars conforming to Items 709.01, 709.03, or 709.05 ODOT. Bar mats and wire fabric shall conform to Items 709.09, 709.10, or 709.12 ODOT. The bar size number is specified on the construction drawings or on the standard drawings. The Contractor shall adhere to the methods of caring for, placing, bending, splicing, supporting, and protectively coating reinforcing steel as required by 509 ODOT.

206 - Fence:

All fabric, posts, wire fasteners and incidental fencing materials shall conform to Item 710 ODOT.

207 - Iron, Steel, Metals and Incidental Materials:

207.01 All iron casting, structural steel, miscellaneous metals and incidental materials shall meet the requirements of Item 711 ODOT.

207.02 Manhole steps shall be made of reinforced polypropylene plastic conforming to Section Item 711.31 ODOT. The steps shall be a minimum of 3/4 inch square bars with two (2) non-skid grooves. The steps shall be spaced as shown on the standard drawings cast or mortared with a non-shrinking grout, into the walls of precast risers and concave sections.

208 - Sanitary Sewer Pipe:

208.01 Concrete Pipe

A. All non-reinforced concrete pipe shall meet the requirements of Item 706.01 ODOT or ASTM C14.

B. Reinforced concrete pipe shall conform to the requirements of Item 706.02 or 706.03 ODOT or ASTM C76, C478, C655 or AWWA C300, C301, or C302.

D. Rubber gasket joints shall conform to ASTM C443.

208.02 Vitrified Clay Pipe

Clay pipe shall only be used where approved by the engineer. All vitrified clay pipe shall be extra strength pipe meeting the requirements of ASTM C700 or C4 with rubber joints meeting ASTM C425 and shall have the following minimum laying lengths:

	Minimum length
Pipe	5 feet
Wye and Tee Branches 4 inch through 12 inch 15 inch through 36 inch	 2 feet 3 feet

	Minimum length
Pipe	5 feet

208.03 Polyvinyl Chloride (PVC) Pipe:

A. Pipe:

1. For sizes up to and including 15 inches in diameter, PVC pipe shall conform to ASTM D3034, SDR 35 with joints meeting ASTM D3212 and gaskets meeting ASTM F477. For any section of sewer fifteen (15) or deeper, PVC pipe shall conform to ASTM D3034 SDR 26 with joints meeting to ASTM D3212 and gaskets meeting ASTM F477.

2. For sizes 18 inches in diameter and larger, PVC pipe shall conform to ASTM F679 (smooth wall) and ASTM F794 (Ultra Rib) SDR 26, with joints meeting ASTM D3212 and gaskets meeting ASTM F477.

3. Contech A-2026 PVC Pipe, with a minimum pipe stiffness of 115 psi, is an acceptable PVC pipe material for sizes up to and including 15 inches in diameter.

4. PVC Service Lines and risers shall be consistent with SDR 26 or SDR 35 used on the main line.

B. Fittings:

1. For sizes up to and including 15 inches in diameter, PVC pipe fittings shall conform to ASTM D3034 SDR 26 gasketed heavy wall sewer fittings meeting ASTM F1336.

2. For sizes 18 inches in diameter and larger, PVC pipe fittings shall conform to SDR 26 gasketed sewer fittings meeting ASTM F679, F1336, and F794.

208.04 Ductile Iron Pipe: All ductile iron pipe shall conform to AWWA C151 with joints conforming to AWWA C111 Class 53.

208.05 Drainage Pipe: For all underdrains, corrugated polyethylene tubing and fittings shall meet the requirements of AASHTO Specification M-252 or M-294 with gasket meeting ASTM F477. Also, high density polyethylene corrugated pipe with smooth interior for storm sewers and culverts shall meet the requirements of ODOT. Installation of said corrugated polyethylene pipe and fittings shall be in accordance with the latest recommended standards of the pipe manufacturer.

208.06 Adapters for connecting pipes of dissimilar material and size and adaptors for connecting broken or cut sewer pipe shall be Fernco 5000 supplied by Fernco, Inc, or as approved by

the County.

209 - Manholes, Vaults, Catch Basins, Inlets and Junction Chambers:

All materials used in the construction or fabrication of manholes, catch basins, inlets, junction chambers and other miscellaneous structures pertinent to waterline and sewer construction shall conform to ASTM C478. All manholes and junction chambers for sanitary sewers shall be precast in accordance with Section 706.13 ODOT unless otherwise approved by the County. All manhole, vault and chamber joints shall be sealed with Conseal CS-202 or equivalent. All manhole frames for sanitary sewers must be equipped with a manhole chimney seal equal to wrapid seal or Cretex Chimney Seal as approved by the engineer, meeting ASTM C923. Note for Cretex Chimney Seal – Bands used for compressing the sleeve and extensions shall be made of 16 gauge stainless steel conforming to ASTM A 240, Type 304, and shall have a minimum width of one and three quarters inch (1 ¾). Bands shall be self-locking slotted with integral tab, easily released for removal and reinstallation without damage to the band. The flexible portion for the seal shall remain free, allowing repeated vertical or horizontal movements of the frame due to frost heave, thermal expansion, or other ground movement. The flexible portion of the seal shall be made from high grade rubber compound conforming to ASTM C923, with a minimum 1500 psi tensile strength, maximum 19% compression set and hardness durometer of 48 +/- 5, and shall have a minimum thickness of three sixteenths inch (3/16). The seal shall have a minimum unexpanded height of wight inches (8”) and have two or more pleats capable of vertical expansion of not less than two inches (2”) when installed. Extensions used in conjunction with the sleeve to increase coverage shall be the same material designed to mechanically attach the seal. The contractor is responsible for all measurements and supplying all the necessary special tools.
The Sanitary Engineer may require an inside coating of cementitious or epoxy lining on manholes that contain a force main discharge connection or are downstream of a force main connected manhole. The cementitious or epoxy product shall be a coating system as required by the County. The bands shall be integrally formed with 16 gauge stainless steel conforming to ASTM A240, Type 304. Any screws, nuts or bolts for the mechanism shall be stainless steel and conform to ASTM F593 and F594, Type 304. All lids for manholes located in either the floodway or 100-year Flood Plain Zone shall have a watertight bolt down lid, Neenah R-1916-C.

210 - Sewer Pressure Pipe:

Sewer pressure lines or force mains shall meet the following specifications.

210.01 Pipe and pipe identification shall be as follows:

A. Ductile Iron Pipe shall be Class 53 and conform to AWWA C151 with a minimum working pressure of 350 psi with fittings conforming to AWWA C111.

B. Polyvinyl Chloride Pipe shall conform to ASTM D2241, SDR 21 (3" and below).

C. Polyvinyl Chloride Pipe meeting waterline specifications of AWWA C900, DR 14 or. Certa-lok C900 DR14 RJ or RJIB (Green)

D. High Density Polyethylene Pipe shall conform to AWWA C901 or C906 ASTM PE 4710 DR9.

E. Metallic detectable underground marking tape shall be installed 12 to 18 inches below finished grade above all sanitary force mains. Tape shall be green as specified by the APWA color code and shall be six (6) inches in width. The tape shall bear the words "CAUTION: BURIED FORCEMAIN LINE BELOW", permanently printed on the tape.

F. Marking wire shall be installed above all forcemains. The ends of the wire shall be anchored to a piece of #5 rebar within or curb box meeting Section 216.03 of the specifications, located every 500 feet along the sewer pipe. Bored lines shall have two marking wires attached the line. Wire shall be Copperhead 1030 HS with snake bite clips or equal.

G. High visibility marking posts equivalent to Sentry Posts by Repnet, Inc. are required every 1000 feet along force mains in rural, low-density areas or as required by the County Sanitary Engineer.

210.02 Fittings shall be ductile iron conforming to either AWWA C110 or AWWA C153 except for concrete pipe. Fittings shall have a standard asphaltic coating on the exterior.

211 - Tunnel Liners:

The tunnel liner shall be strong enough to withstand loadings imposed now and in the foreseeable future in accordance with the design requirements of the specifications or the public authority involved.

211.01 High Density Polyethylene Pipe shall conform to AWWA C901 or C906 ASTM PE 4710 DR17.

211.02 Steel pipe tunnel liner shall be fusion welded steel pipe, ASTM A139 Grade B galvanized

with a minimum of two ounces per square foot and conforming to ASTM A120.

211.03 Tunnel liner plates shall be furnished in black steel. The plates shall be formed from steel meeting the requirements of ASTM A139, Grade B. Individual liner plates shall be made of one piece of metal provided with flanges for both longitudinal and circumferential joints. The joints shall have sufficient bolt holes to fully develop the strength of the individual liner plate and so spaced in each liner plate that liner plates of the same curvature will be interchangeable and can be readily handled in the tunnel. Liner plates shall be of the design that, when bolted together, no opening shall exist large enough to permit inflow of granular material. The longitudinal bolts supplied with the tunnel liner plates shall be ASTM A307, 5/8 inch diameter by 1 ¼ inch long for 14 through 7 gauge structures, and shall be ASTM A449, 5/8 inch diameter by 1 ½ inch long for 5 through 3 gauge structures. For center corrugation assembly, a ¼ inch longer bolt shall be supplied. Liner plates will be accurately curved to suit the tunnel cross section, and when bolted together the finished casing pipe shall be full round. Grouting plugs shall consist of two (2) inch standard half pipe couplings welded or tapped into a hole in the liner plate and furnished with a cast iron plug for closure.

211.04 Reinforced concrete pipe shall meet the requirements of Sections 706.02 or 706.03 ODOT.

211.05 Casing pipe shall be steel pipe meeting ASTM specifications, 35,000 psi yield strength and 60,000 psi tensile strength, or approved equivalent, to serve as a casing for water line or sewer and shall be installed within the limits and at the location shown on the construction drawings. The casing pipe shall be ASTM A139 Grade B galvanized with a minimum of two ounces per square foot and conforming to ASTM A120 and bituminous coated inside and out, and conform to ASTM A 123. Steel casing pipe shall have a minimum wall thickness as indicated on the Standard Construction Drawings, unless otherwise approved by the Engineer. Nylon casing spacers or casing spacers meeting Power Seal Type 304 Stainless Steel or Advanced Products Type SSI Stainless Steel shall be used in positioning the carrier pipe within the casing pipe.

212 - Underdrains:

Underdrains shall conform to the following specifications:

212.01 Perforated Concrete Pipe, Item 706.06 ODOT.

212.02 Concrete Drain Tile, Item 706.07 ODOT.

212.03 Vitrified Clay Pipe, Item 706.08 ODOT.

212.04 Clay Drain Tile, Item 706.09 ODOT.

212.06 Perforated Polyvinyl Chloride Pipe, ASTM D3034 SDR 35 or Item 707.47 ODOT.

212.07 Heavy Duty Corrugated Polyethylene Slotted Drain, ASTM F405.

213 - Waterline Pipe:

The water system materials shall meet the following specifications.

213.01 Pipe and pipe identification shall be as follows.

A. Ductile iron pipe shall be Class 53 designed in accordance with ANSI/AWWA C150 for a minimum 350 psi rated working pressure (or project requirements, whichever is greater) plus a 100 psi minimum surge allowance or a 2:1 factor of safety based on the sum of working pressure plus surge pressure.

Pipe shall have standard asphaltic coating on the exterior. Ductile iron pipe shall be manufactured in accordance with ANSI/AWWA C151. Each pipe shall be subject to a hydrostatic pressure test of at least 500 psi at the point of manufacture.

Pipe shall also have a cement mortar lining on the interior in accordance with ANSI/AWWA C104.

The class or nominal thickness, net weight without lining, and casting period shall be clearly marked on each length of pipe. Additionally, the manufacturer's mark, country where cast, year in which the pipe was produced, and the letters "DI", or "Ductile" shall be cast or stamped on the pipe.

B. PVC plastic pipe, ASTM D2241, SDR 17 (Class 250) for size 3 inches and below, AWWA C900, DR 14 for sizes 4 inch to 24 inch, minimum pressure rating of 305 psi for all sizes. High Density Polyethylene pipe meeting ASTM D2737 or D1248, DR9, is an acceptable pipe material for sizes 2 inches and below. Certa-lok C900 DR14 RJ or RJIB.

C. Metallic detectable underground marking tape shall be installed 12 to 18 inches below finished grade centered above all water lines. Tape shall be blue as specified by the APWA color code and shall be six (6) inches in width. The tape shall bear the words "CAUTION: BURIED WATER LINE BELOW", permanently printed on the tape.

D. Marking wire shall be installed above all water lines and service lines within the right of way or easement. The ends of the wire shall be anchored to a piece of #5 rebar within or curb box meeting Section 216.03 of the specifications, located every 500 feet. Bored lines shall have two marking wires attached the line. Wire shall be Copperhead 1030 HS with snake bite clips or equal.

E. High visibility marking posts equivalent to Sentry Posts by Repnet, Inc. are required every 1000 feet along waterlines in rural, low-density areas or as required by the County Sanitary Engineer.

213.02 Unless otherwise shown on the construction drawings, all pipe shall be furnished with push-on type joints, such as Tyton, Fastite or approved equivalent. Joints shall be in accordance with AWWA C111 and be furnished complete with all necessary accessories. Tapping saddles shall be per Section 216.04 of these specifications.

Fittings shall be ductile iron conforming to either AWWA C110 or AWWA C153.

Fittings shall have a standard asphaltic coating on the exterior.

Fittings shall also have a cement mortar lining on the interior in accordance with AWWA C104.

Unless shown otherwise on the construction drawings, fittings and accessories shall be furnished with mechanical in accordance with AWWA C111.

213.03 Where distribution systems are installed in areas of groundwater contamination by organic compounds:

A. Pipe and joint material which are not subject to permeation of the organic compounds shall be used.

B. Non-permeable material shall be used for all portions of the system including water main, service connections and hydrant leads.

213.04 Used Materials - Watermains which have been used previously for conveying potable water may not be reused under any condition.

213.05 Packing and jointing material used in the joints of pipe shall meet the standards of the AWWA. Pipe having mechanical joints or slip-on joints with rubber gaskets is preferred. Lead tip gaskets shall not be used. Repairs to lead joint pipe shall be made using alternative methods.

213.06 Fire hydrants shall either be American Flow Control, Model MK-73 or Mueller Super Centurion 250, Model A-421 in conformance with Standard Construction Drawing W-20.

213.07 All watermain repairs shall be made using Mueller or Dresser (Hymax) repair clamps, as approved by the County.

213.08 Tapping sleeves shall be of the stainless-steel type as equivalent to Mueller Model H-304, JCM 432 Stainless Steel or equivalent as approved by county

214 - Steel Casing Pipe:

Casing pipe shall be steel pipe meeting ASTM specifications, 35,000 psi yield strength and 60,000 psi tensile strength, or approved equivalent, to serve as a casing for water line or sewer and shall be installed within the limits and at the location shown on the construction drawings. The casing pipe shall be ASTM A139 Grade B galvanized with a minimum of two ounces per square foot and conforming to ASTM A120 and bituminous coated inside and out, and conform to ASTM A 123. Steel casing pipe shall have a minimum wall thickness as indicated on the Standard Construction Drawings, unless otherwise approved by the Engineer. Nylon casing spacers or casing spacers meeting Power Seal Type 304 Stainless Steel or Advanced Products Type SSI Stainless Steel shall be used in positioning the carrier pipe within the casing pipe.

215 - Valves:

215.01 Gate valves with a non-rising stem, left hand open (counter-clockwise) with double o-ring stem seals. Valves shall have end joints conforming to AWWA C111. Valves shall pass a seat test at a pressure of 250 psi without leakage. The valve shell shall pass a shell test with the valve in the open position at a pressure of 400 psi without leakage through metal, flanged joints or stem seals. The valve shall be resilient wedge type, AWWA C509, having a sealing mechanism that provides zero leakage at the water working pressure against line flow from either direction. No exposed metal seams, edges, screws, etc. shall be within the waterway in the closed position (all surfaces shall be rubber covered). The rubber covered gate shall not be wedges in a pocket nor slide across the seating surface to obtain tight closure. All internal and external ferrous surfaces, including the interior of the gate, bolt holes and flange faces, shall be coated, prior to assembly of the valve, with epoxy having a minimum thickness of 8 mils. There shall be an o-ring seal above the storm collar and an o-ring seal below the stem collar with the area between the o-rings filled with

lubricant. There shall be anti-friction washers at the stem collar.

215.02 Butterfly valves conforming to AWWA C504 for Class 150 B. Valve bodies shall be cast iron per ASTM A-126, Class B. Flanged valves shall be of the short body design with 125 pound flanged ends faced and drilled per ANSI B16.1 standard for cast iron flanges. Mechanical joints ends shall meet the requirements of ANSI/AWWA C110. Discs shall be offset to provide an uninterrupted 360-degree seating edge and shall be cast iron per ASTM A-48, Class 40 or ductile iron per ASTM A-536. The disc seating edge shall be 316 stainless steel. The disc shall be securely attached to the valve shaft using Type 304 stainless steel pins. The valve shaft shall be Type 304 stainless steel. The seat shall be acrylonitrile butadiene and shall be bonded or vulcanized in the valve body. The use of fillers to increase seat compression is not acceptable. Valve shaft seals for 3 inch to 24 inch valves shall be self-compensating V-type packing. Unless otherwise specified, exterior cast iron or steel surfaces of each valve shall be shop painted per the latest revision of AWWA C504. The interior of the body shall be lined with the same material as the seat. Each valve shall be factory tested per AWWA C504, with the actuator assembled to the valve.

Ten-position levers shall be installed where specified for 3 inch to 8 inch valves. Provision must be made for locking in any position using a standard padlock. Valves 3 inches to 24 inches shall have available handwheel actuators in complete conformance with AWWA C504 and AWWA C540. Housing will be of cast iron, in both weatherproof and buryable constructions, with optional chainwheel or 2 inch square nut inputs. All units shall have adjustable open and closed position stops. Pneumatic and hydraulic cylinder actuators, where specified, shall be double acting and stationary mounted, with all working parts totally protected within weatherproof enclosures per AWWA C540. Cylinder tubes shall be fiberglass reinforced epoxy resin having a 16 micro-inch or smoother internal finish. Piston seals shall be TFE with elastomeric backup. Cylinder actuators shall be installed where specified with pneumatic or electronic positioners and position transmitters, pilot valves, position indicating switches, and extended mounting provisions.

215.03 Valve Boxes shall be of the 5 ¼" shaft two piece screw type equivalent to Bingham &

Taylor Model 4905, Size 22. Valve Boxes within five (5) feet of traffic areas shall be the Heavy Duty Type, in accordance with Standard Drawing W-15. Valve Box shall be marked "WATER" for waterline valves and "SEWER" for sanitary force mains.

215.04 All fasteners shall be 304 stainless steel.

216 - Waterline Service Accessories:

216.01 Service lines for residences and businesses shall be:

A. High Density Polyethylene Pipe PE 4710 meeting ASTM D2737, SDR 9, Driscopipe 5100, ADS Polyflex or approved equivalent.

B. Waterline Pipe Material, per Section 213.01

C. Service lines shall be sleeved through foundation walls and under driveways with Schedule 40 PVC (2 times the diameter of the waterline) and be sealed watertight.

216.02 Corporation stop shall be equivalent to Mueller B-25008NFord FB1000 or approved equivalent.

216.03 Curb stop shall be equivalent to Mueller B-25209-38N or Ford B44 CTS Grip Joint with a Buffalo Type curb box equivalent to Bingham and Taylor No. 4901-B, Size 94 E, or approved equivalent.

216.04 Tapping saddles shall be equivalent to T3SS or approved equivalent.

216.05 All joints, fittings, valves, and appurtenances shall be furnished with all accessories.

216.06 A pressure reducing valve is recommended for all residences with pressure above 80 psi. The pressure reducing valve shall be Watts 25AUB with pressure gauge or equal.

216.07 Backflow Preventers shall be provided on all commercial establishments and any residence where an auxiliary water supply is available. All backflow preventers shall have an expansion tank by Watts DET 5 or equal. Backflow preventers shall be as follows:

A. Reduced pressure backflow preventers for all high hazard cross connections and continuous pressure applications where there is a high potential health hazard from contamination. All reduced pressure backflow preventers shall meet AWWA C511 and be from the latest approved list of the OEPA.

B. Fire Line Only - Double detector check valve backflow preventers for all low hazard (no chemicals) cross connections and continuous pressure applications where there is a low potential health hazard from contamination. All double detector valve backflow

preventers shall meet AWWA C510 and be from the latest approved list of the OEPA.

216.08 The meter yoke shall be equivalent to Mueller H-1412 or Ford CH SS-233 for 3/4" inch or Ford CH SS-444 for 1" Service or equivalent.

216.09 Quarter bend compression CTS X MIP (3/4” or 1”) Mueller H 15533. Full port threaded ball valve WATTS (3/4”) LFFBV-4.

217-298 – Reserved

299 - Penalty:

Whoever violates any provision of this Chapter or County directives pursuant to this chapter shall be subject to the remedies of **Section 199 - Penalty** of these Regulations.

END OF CHAPTER

Chapter III - General Construction Requirements 3.1

301 - Description:

This section describes the general work required for furnishing and installing underground conduits and the associated equipment, material and labor necessary to provide complete, usable sewers, waterlines and underdrains.

301.01 PVC pipe (Sect. 208.01) and polypropylene pipe (Sect. 208.03) shall be installed in accordance with ASTM D2321 “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications”.

302 - Trench Excavation:

Trenches shall be excavated to a width sufficient to allow for proper jointing and placing of the conduit. To a point twelve (12) inches above the top of the conduit, the trench walls shall be vertical and shall not exceed the dimensions shown on the construction drawings or the standard drawings. Other than noted in these specifications, the trench bottom shall be true and even to provide support for the full length of the pipe barrel, except that a slight depression may be provided to allow withdrawal of pipe sling or other lifting tackle without damaging the pipe. Excavated material shall be placed in a manner that will not obstruct the work nor endanger the workers or the public, or obstruct sidewalks, driveways, roadways, or other structures.

302.01 Unsuitable Material: The foundation for the conduit bed shall be firm for its full length. Where unsuitable material is encountered it shall be removed to the depth directed by the Sanitary Engineer and for a width on each side equal to the diameter or span of the conduit and replaced with granular material approved by the sanitary engineer. The Contractor shall be responsible for undercutting of unsuitable material to a point 24 inches below the original grade for all County constructed and financed projects. Additional excavation beyond 24 inches, provided it is not due to the fault or neglect of the Contractor, shall be measured by the Sanitary Engineer, or their designee, and paid for as a change in work on all County constructed and financed projects. The Contractor/Owner/Developer is responsible for all undercutting on all development projects.

302.02 Conduit in Embankment: When a conduit is to be placed within an embankment or the top of the conduit is to be above the existing ground, the embankment shall be constructed to a point at least twelve (12) inches above the top of the conduit, in accordance with the

requirements of Item 203 ODOT, before trenching for the conduit. The trench shall then be excavated as described above.

302.03 Excess Excavation: Unless stated otherwise in the construction drawings, the constructor shall dispose of all excess excavation in suitable locations at the Contractor's expense.

302.04 Blasting Procedures: When it is necessary to resort to blasting with explosives, the Contractor shall use the highest degree of care and adequate protective measures so as not to endanger life, completed portions of the Project, and all other property both public and private. Before conducting any blasting operations, the Contractor shall furnish the Engineer in writing, a schedule of intended blasting operations and written notification of any changes in such schedule. The responsibility of the Contractor with respect to the use of explosives in blasting includes compliance with all laws, rules and regulations of federal, state, local agencies, and the insurer governing the storage, use, manufacturing, sale, handling, transportation, and other dispositions of explosives. The Contractor's operations shall be conducted with every precaution by trained, reliable personnel under satisfactory, experienced supervision. No blast shall be fired until all persons in the vicinity have had notice and reached positions out of danger. The Contractor shall be responsible for any and all damages resulting from the use of explosives. All firing shall be done by electric means only, and the Contractor shall make suitable provisions to prevent the scattering of broken rock, earth, stones, or other material during blasting operations.

A. All blasting operations shall be covered by public liability and property damage insurance, with copies of such insurance certificates furnished to the County.

B. Except in the case of continuous tunnel operations, all blasting shall be limited to specified daylight hours.

302.05 Pavement Removal: Removal of pavement and road surfaces shall be part of the trench excavation. The amount removed shall depend on the width of trench required for installation of the pipe and the dimensions of the area into which valves, hydrants, manholes, or other structures will be installed. The dimensions of pavement removed shall not exceed the dimensions of the opening required for installation of pipe, valves, hydrants, manholes or other structures by more than four (4) feet in any direction, unless otherwise stipulated in the specifications. Methods such as sawing or drilling shall be used to ensure the removal of pavement along straight lines. All appropriate permits of local jurisdiction

shall be secured by the Contractor prior to any pavement removal

303 - Removal of Water:

The Contractor shall, at all times during construction, provide proper and satisfactory means and devices for the removal of all water entering the excavations and shall remove all such water as fast as it may collect in such manner that will not interfere with the prosecution of the work or the proper placing of masonry or other work. Discharges from the trench dewatering system shall be directed away from the trench in order not to affect the trench stability and shall be filtered through appropriate siltation devices meeting state or local codes prior to entering drainage ways or streams. The Contractor shall not dispose of ground and/or surface water into newly constructed or existing waterlines or sanitary sewers. The Contractor shall place a temporary watertight plug on the existing sanitary sewer line at the point of connection. The plugs shall not be removed until the new sanitary sewer line has been tested and approved by the County. The Contractor shall, at the end of each day, place a watertight plug or cap at the end of the last joint to prevent water and/or materials from entering into the system. The plug or cap shall not be removed until the excavation is dewatered.

The Contractor shall submit a dewatering plan to the County prior to construction. The Contractor is responsible for all local, state, and federal withdrawal permits, reporting, and maintenance associated with the removal and discharge of said water. The Contractor will be required to clean all conduits that were utilized to convey and promote removal of water to the satisfaction of the County.

304 - Bedding:

All conduits shall be laid on granular soil or bedding as described in these specifications and shown on the standard drawings. Bell-holes for the bells shall be provided at each joint but shall be no larger than necessary to allow joint assembly and to ensure that the pipe barrel will lie flat on the trench bottom. The dimensions of bell-hole depressions for push-on-type joints only need to be large enough to ensure that the pipe is not resting on the bells and is supported by the full length of pipe barrel. The bedding classifications are described in Table 3.1 - Bedding Classifications.

Table 3.1 - Bedding Classifications.

Class	Description
A	Class “C” concrete cradle, plain or reinforced, as specified on the Construction Drawings, meeting the following minimum requirements. The concrete cradle shall extend from the bottom of the trench, which shall be no less than

	six (6) inches below the bottom of the conduit, to a point a minimum of one quarter of the outside conduit diameter above the bottom of the conduit. The concrete cradle shall extend to the full width of the trench which shall be a minimum of four (4) inches horizontally beyond the outside diameter on each side of the conduit or have a minimum overall width centered on the conduit of one and one quarter times its outside diameter, whichever is greater.
B	Granular material shall conform to Item 703.01 ODOT No. 57, 6, 67, 68, 7, 78 or 8 aggregate extending from a point six (6) inches below the bottom of the conduit to the top of the conduit for rigid pipe or to a point 12 inches above the top of the conduit for flexible pipe.
C	Natural soil free from stones larger than two inches across the greatest dimension, topsoil, vegetation, peat, or frozen soil material, compacted to 95% of its maximum dry weight shall be placed around the bottom half of the pipe.

304.01 Unless the type of bedding is specified on the construction drawings or in the specifications as either Class A or C Bedding, or unless otherwise ordered by the Engineer, it shall be understood to mean that Class B Bedding shall be used.

304.02 When the trench is excavated below the proposed trench grade, the excess depth shall be filled with Class A or B Bedding material or other material as approved by the County Sanitary Engineer. When Class C Bedding is permitted, Class B Bedding shall be used in the areas of undercuts.

305 - Backfill/Trench Dams:

All trenches and excavations shall be backfilled as specified herein as soon after the sewers, waterline or other structures are completed and the particular type of construction and the circumstances will permit.

305.01 The type of backfill shall be as specified in Table 3.2:

Table 3.2 - Description of Backfill Types

Type	Description
A	Compacted granular backfill ODOT Item 304 or 410.
B	Granular material as specified in ODOT Item 304, ODOT No. 57, 6, 67, 68 ,7, 78, or 8 aggregate.
C	Natural earth free from stones larger than two (2) inches in the greatest dimension, topsoil, vegetation, or frozen soil material.

305.02 Unless the type of backfill is specified herein or on the construction drawings as either Type A Backfill or Type B Backfill, or unless otherwise ordered by the Engineer, it shall be understood to mean that Type C Backfill may be used.

305.03 Unless specified on the construction drawings or approved by the County, backfill under and/or within five (5) feet of existing or proposed roadways, paved shoulders or curbs, and existing paved parking areas and drives shall be Type A backfill.

305.04 When concrete cradle, encasement or backing are used, the trench or excavation shall not be backfilled for at least 24 hours after placing the concrete, except that the conduit may be covered to a depth not to exceed 12 inches in order to afford protection. The method employed in depositing the backfill shall be as such to prevent damage to the concrete cradle, pipe or other structures. Maximum lift shall not exceed 12 inches.

305.05 All backfilling operations and placement of the backfill material shall be conducted so as to protect the conduit, its appurtenances and structures from damages. Equipment which will cause the trench loads to exceed the pipe strength, shall be kept at least five feet away from the trench.

305.06 When Type A backfill is called for, the material shall be placed and compacted using water if free drainage is provided or with mechanical tampers so as to obtain 98 percent of its maximum, laboratory dry weight. Approval of water prior to its use shall be obtained from the Engineer. When Type B backfill is called for, the backfill shall be carefully selected backfill, carefully placed and compacted to 96 percent of its maximum laboratory dry weight as determined in accordance with Item 203 ODOT. When Type C backfill is permitted, the backfill shall be carefully placed and compacted to 95 percent of its maximum laboratory dry weight as determined in accordance with Item 203 ODOT. Compaction tests shall be provided by the Contractor as requested by the Engineer to verify backfill compaction complies with the above requirements. The Contractor shall bear all costs for this work.

305.07 All trench backfill shall be in layers not to exceed twelve (12) inches in depth and shall be thoroughly compacted to the satisfaction of the Engineer and the County.

305.08 Regardless of the backfill method used, the Contractor shall be responsible to correct any settlement or deterioration of the backfill and restore the area to the satisfaction of the Engineer and the County.

305.09 Concrete structures such as manholes, pump stations, etc. built in place shall not be backfilled until permitted by the Engineer.

305.10 Trench Dams shall consist of predominately clay soil or a mixture of predominately clay soil and bentonite. Trench dams are to be constructed on all sanitary sewer gravity main lines at intervals not to exceed 800 feet and shall be located approximately 25 feet upstream of manholes, lift stations and other structures. Trench dams shall also be located the same distance downstream of storm ditch crossings or underground water sources, or as directed by the Engineer or County. Trench dams shall not be installed at wyes, risers, utility crossings, pavement crossings, or granular backfill areas. The minimum length of an individual trench dam shall be six (6) feet. The width shall extend fully from the excavated trench wall to the opposite excavated trench wall. The height of trench dams shall extend from the excavated trench bottom to within 2 feet of the existing ground surface.

Trench bottoms within the proposed trench dam area may be excavated by machine to the proposed pipe spring line. The area shall then be carefully excavated by hand or similar means so as to accommodate and properly support the pipe without the use of bedding aggregate and properly support the pipe with a predominately clay material.

The area above the installed pipe shall be backfilled with clay and/or bentonite materials. The placement and compaction of the backfill shall be in accordance with Item 203 ODOT. The method of installation shall also conform to the pipe manufacturer's published recommendations.

Deviations from any of the above listed requirements shall not be allowed without a written request from the Contractor and consequent written approval by the County. The cost for this work shall be included in the price bid for other various related items.

Trench dams shall also be provided on all sanitary sewer service connections at the time of construction of the service connection

305.11 Sanitary Sewer Connection Trench Dams. The contractor shall place a cut off trench dam of native clay or impervious soil across and along the trench upstream from the main line

sewer connection to retard and resist the movement of groundwater through the trench granular bedding or backfill material. The trench dams shall be carefully compacted and shall be 6 feet in thickness as measured along the service center line and shall be constructed against the undisturbed trench sides from the subgrade or bottom of the stone foundation, whichever is lower, to the limit of 36 inches over the top of the pipe, no more than 10 feet from the main line sanitary sewer. See Fairfield County Standard Drawing Sa.S-7 for 6 inch Sanitary Sewer Service detail.

306 - Concrete Backing:

Wherever called for or shown on the construction drawings, the Contractor shall provide and place Class "C" concrete backing from the bottom of the trench to the spring line of the conduit. The distance between the bottom of the trench and the conduit shall be the same as required for bedding. The width of the Class "C" concrete backing shall be the excavated width of the trench.

307 - Concrete Encasement:

Wherever called for or shown on the plans or ordered by the Engineer, the Contractor shall provide and place Class "C" concrete encasement as shown on the Standard Construction Drawings.

If encasement is required, concrete shall completely surround the pipe and shall have a minimum thickness of one sixth of the inside diameter of the pipe or six (6) inches, whichever is greater. Class "C" Concrete shall be used with an ultimate compressive strength shall not be less than 4000 psi at 28 days.

308 - Jurisdictional Water, Wetland Crossings and Erosion and Sediment Control:

Sewers crossing jurisdictional streams and other open channels shall be designed to cross the streams as close to perpendicular as possible. The number of crossings shall be minimized to the extent possible.

Watercourse protection shall be installed over the top of the backfilled trench for all stream crossings.

Any conditions required by the USACE, Ohio EPA, or other agencies having jurisdiction over the jurisdictional waters and/or wetlands shall be adhered to.

If a project crosses a jurisdictional water body or if the equipment necessary to install the project must cross a jurisdictional water body or if other features on the site are subject to erosion from the proposed construction activities, then sediment controls shall be shown on the Plans.

a) Temporary or permanent erosion and sediment controls must be installed prior to disturbance.

b) All runoff, whether onsite or offsite, shall be contained by erosion control measures.

c) All stock piles shall be protected from sediment generation. If stockpiles are placed on a future site of a development, the general locations shall be shown on the Plans to ensure there is not a conflict with any sanitary manholes.

All sediment basin calculations shall account for disturbed areas for the sanitary sewer in addition to the disturbed areas for the site grading.

The Sanitary Engineer may require additional erosion and sediment controls at any time that, in his or her opinion, the controls installed on the site are not adequately protecting the surrounding areas from erosion.

River Crossings and Flowing Streams

Description: The Contractor shall furnish all labor, materials, and equipment necessary to install the river crossings as shown on the plans as described herein.

General: It is the intent of the plans and specifications to install river crossings in such a manner as to protect the sewer from erosion and to restore, as much as practicable, the riverbanks and bottom to their original condition.

Sewer Protection: The sewer will be protected from erosion either by concrete encasement around the pipe or by a concrete slab level with the top of the rock above the pipe.

River Bank Restoration: The river banks will be restored by back filling the sewer pipe trench with mechanically compacted earth to the original surface. The river banks will be graded, fertilized and seeded, or protected from erosion immediately following the completion of the crossing. Riprap shall be utilized for bank protection on outside curves in streams and rivers, where directed by the Sanitary Engineer.

River Bottom Restoration: The river bottom trench above the concrete will be backfilled with excavated bottom material.

Construction Procedure: If the river/stream requires a permit to cross, the Contractor shall use the procedure outlined in the approved permit. If a permit is not required, one of the following methods will be used:

Option #1: Boring or tunneling.

Option #2: The Contractor shall construct an earth embankment from the riverbank to a point beyond the centerline of the river. The slopes of the earth embankment shall be protected from erosion by covering them with 6 mil polyethylene sheeting. The sheeting shall extend from the river bottoms to an elevation of 2 feet above the water level. The sewer pipe shall then be installed in a trench excavated through the embankment. The embankment and material and any excess trench excavation shall be removed to an offsite disposal area. The same procedure shall be used to install the remainder of the river crossing.

Option #3: The Contractor shall construct a cofferdam of sandbags or inflatable bags, from the riverbank to a point beyond the centerline of the river. The sewer pipe shall then be installed in a trench within the cofferdam. Any excess trench excavation shall be removed to an offsite disposal area. The cofferdam shall then be removed. The same procedure shall be used to install the remainder of the river crossing.

The crown of all sewers crossing the streams shall be sufficient depth below the natural bottom of the stream bed. The minimum cover over the crown of the pipe shall meet one of the following requirements:

308.01 One (1) foot if the sewer is located in rock or the sewer is constructed in accordance with any method as prescribed in Section 307.

308.02 Four (4) feet if the sewer is located in materials other than rock.

The crossing shall be free from change in grade and the sewer should be designed to cross the stream as nearly perpendicular to the stream flow as possible.

309 - Tunneling and Jacking:

This work shall include the furnishing of all labor, equipment and material necessary to install tunnels, boring and jacking as shown on the plans. Work includes all clearing and grubbing; removal and restoration of fences, sidewalks, pavements and other property; excavation; grouting and pumping sand or other granular material inside and outside the tunnel or bore as described herein; providing all liner plates, steel pipe or conduit, grout, sand or granular material; providing and removing all dewatering and pumping systems; all shoring, cribbing and sheathing; testing; and other work associated and required to provide a complete usable tunnel.

309.01 Other Requirements and Permits: All work within the right-of-way of private companies and public agencies shall conform to the requirements and regulations of the respective companies or agencies. The Contractor will obtain permits for any railroad, local, state or federal highway crossing and coordinate scheduling the construction of crossing with railroads and highway departments and shall pay any charges established therefore for work accomplished by those companies or agencies. Special construction requirements defined by railroads or highway departments shall be adhered to by the Contractor. A copy of the permit or approval from the respective companies or agencies shall be furnished to the County prior to starting work in the right-of-way.

309.02 Tunneling: The Tunnel liners shall conform to Section 211. In excavating the tunnel, care shall be exercised to trim the surface of the excavated section to a true line and grade with the excavation conforming to the outside of the tunnel plates as nearly as possible. In the installation of tunnel or shaft liners, the length of unsupported tunnel or shaft shall be no greater than one and one half times the laying length of a liner plate or pipe. Liners shall be placed promptly as excavation permits. Upon the completion of any ring of liner plates, bolts shall be retightened in the two rings previously completed. Should the top half of the tunnel excavation be supported by cutting shield, excavation shall not advance beyond this support. The vertical face of the excavation shall be supported as necessary, to prevent sloughing and interruptions to the tunneling operations.

309.03 Borings: Installation of steel conduit by the boring method shall be done using an auger type boring machine or a machine of such a design as to meet the individual requirements of the railroad, or the local, state or federal highway system being crossed. The Contractor shall provide an approach pit, completely sheeted and of sufficient size to operate the

boring equipment and receive the lengths of conduit. The operation of the boring equipment shall be subject to continuous checking by the Contractor to insure proper alignment of the encasement pipe.

309.04 Jacking: The Contractor shall provide an approach pit for the jacking operation, excavated so that the jacking face is a minimum of three (3) feet above the conduit. This open face will be shored securely to prevent displacement of the embankment. The pit shall include a backstop of sufficient size to take the thrust of the jack. Care shall be exercised in placing the guide rails to ensure that the conduit will be accurately constructed to line and grade. The entire approach pit shall be sheeted. Hydraulic or mechanical jacks may be used in this operation. The number of jacks and the capacity of the jacks shall be adequate to complete the operation. A jacking head shall be used to transfer the pressure from the jacks and the jacking frame to the pipe. If an auger is used, the pipe shall be jacked simultaneously with the angering. The construction work shall be checked by the Contractor at frequent intervals to insure proper line and grade of the installation.

309.05 Grouting: Any space existing outside the tunnel liner shall be grouted at low pressure through grout holes provided in a sufficient quantity in the liner. These holes shall be installed in suitable locations so that grouting can be done effectively. The pressure grouting shall preferably begin at the lowest middle hole of each grout section, the grout holes above being open, and proceed upward progressively and simultaneously on both sides of the tunnel. Grouting shall be done as near the end of the line as practicable and, if deemed necessary, grout stops shall be placed behind the sections at or near the end of the erected lining to permit grouting to or near the end.

310 Directional Boring

Sanitary sewer mains, and/or force mains may be installed under pavement or ground surfaces through directional drilling practices in lieu of open-cut excavation. The limits of the directional boring shall be as shown on the construction drawings. Substitution of open-cut excavation for directional boring shall be approved by the County prior to performance.

310.01 Materials: The pipe shall be HDPE (AWWA C-906) PE 3408 resin as specified in ASTM D 3550 or Certa-Lok C900 DR14 (RJ or RJIB) for sanitary sewer mains and/or force mains. The HDPE pipe shall be ductile iron pipe size and have a minimum rating of SDR 9

unless the manufacturer's recommendations require a thicker wall. The internal diameter of the HDPE main shall be equal to or greater than that of the open-cut excavation material in which connection or transition is made. The sanitary sewer main and force main shall have a green identification band.

310.02 Fittings: Fused on fittings only. The fittings used to transition between the open-cut excavation material and the directional boring material shall be as recommended by the manufacturer or as a minimum as follows: HDPE (AWWA C-906) shall be restrained a minimum of three (3) joints on both sides of the bore when installed by directional drill method.

310.03 Qualifications: The directional drilling contractor shall have actively engaged in the installation of pipe using guided boring for a minimum of three (3) years, with at least three (3) projects in similar ground conditions and with similar size and length. The field supervisory personnel employed by the directional drilling contractor shall have at least five (5) years' experience in the performance of work. Written proof of qualifications should be submitted and approved by the Sanitary Engineer prior to construction.

310.04 Tracer Wire: Wire shall be Copperhead 1030 HS with snake bite clips or equal. Two (2) insulated wires shall be installed with the pipe for locating purposes. At each end of a bored section, wire shall be clamped with a brass connector to a piece of ½" rebar. Wire shall be pulled back through the bored hole with the pipe and tested for continuity. The top of the rebar shall be installed flush with the ground at each end of the bore. Tracer wire shall be brought to the ground surface every 500 feet as indicated in Section 210.

310.05 Testing: The finished main shall be tested in accordance with Sections 408 and/or 409 of these specifications. Mains not holding the specified pressure for the test duration shall be removed from the hole, repaired, or replaced and installed and tested again.

310.06 Pilot Hole: The Contractor shall follow the pipeline alignment as shown on the drawings. If adjustments are required, the Contractor shall notify the Sanitary Engineer for approval prior to making the adjustments. In the event of difficulties at any time during boring

operations requiring the complete withdrawal from the tunnel, the Contractor shall be allowed to withdraw and abandon the tunnel and begin a second attempt at a location approved by the Sanitary Engineer.

310.07 Installation: After the pilot hole is completed, the Contractor shall enlarge the hole, if needed, by pre-reaming, and install a swivel to the reamer and commence pullback operations. Reaming diameter shall not exceed 1½ times the diameter of the product pipe being installed. The product pipe being pulled into the tunnel shall be protected and supported so that it moves freely and is not damaged by debris on the ground during installation. Pullback forces shall not exceed the allowable pulling forces for the pipe material. The Contractor shall supply documentation from the pipe manufacturer verifying allowable pulling force. The thickness of the pipe shall be increased, at no additional costs, if pullback forces are anticipated to exceed the allowable pulling force on the specified pipe.

310.08 Drilling Fluid: Drilling fluid shall be a mixture of water and bentonite clay or other District approved mixture. The fluid shall be inert. Disposal of excess drilling fluid and spoils will be the responsibility of the Contractor who shall comply with all relevant regulations and permit agreements. Excess drilling fluid and spoils shall be disposed at an approved location. The Contractor is responsible for transporting all excess drilling fluid and spoils to the disposal site and paying any disposal costs. Excess drilling fluid and spoils shall be transported in a manner that prevents accidental spillage onto roadways. Excess drilling fluid and spoils shall not be discharged into sanitary or storm systems, ditches or waterways. Drilling fluid returns (caused by fracturing of formations) at locations other than the entry and exit points shall be minimized. The Contractor shall immediately clean up any drilling fluid that surfaces through fracturing.

310.09 Acceptable Deflection and Grade: Force mains shall have no deflection which exceeds the manufacturer’s recommendation for the approved and installed material. Sanitary sewer lines shall be within 0.1 foot of desired grade at either end and have a “Belly” of no more than 0.1 foot. This shall be measured by filling the pipe with water, letting it drain, and televising the line. Installations that do not meet these acceptable tolerances will be considered

insufficient and re-installation will be required.

310.10 As-Builts: An as-built survey of the plan and profile for the installed main shall be submitted at 25 foot intervals. These elevations at the prescribed intervals shall be taken during installation of the pilot hole.

310.11 Service Lateral Directional Boring: Laterals installed under existing pavements may be directionally bored as approved by the Sanitary Engineer. Pipe must be DR14, CERTLOK or Modified PVC Yelomine®, pipe meeting the requirements of ASTM D-2241 with a minimum cell classification of 12454 as per ASTM D 1784.

311 - Miscellaneous Work:

All items of work called for on the construction drawings, or in these specifications for which no specific method of payment is provided shall be performed by the Contractor and the cost of same shall be included in the price bid for the various related items.

312 - Field Tile:

All field tile and storm sewer broken during excavation shall be replaced to original condition or connected either to a curb subdrain or the storm sewer system as directed by the Engineer and in accordance with Standard Construction Drawings.

313- Temporary Pavement Replacement:

Temporary pavement replacement shall be provided for permanent pavement damaged or removed by the Contractor in the performance of the work to the limits shown on the construction drawings or ordered by the Engineer. As soon as the trench has been backfilled, temporary pavement shall be installed. The Engineer may require that all materials and equipment incidental to providing the temporary pavement be on the job site prior to removing the existing pavement. The temporary pavement shall consist of two (2) inches of compacted bituminous material Item 405 ODOT, placed upon a minimum of 6 inches of compacted Item 304 ODOT aggregate base. Temporary pavement shall be maintained by the Contractor until permanent pavement is installed.

314- Permanent Pavement Replacement:

The pavement shall be replaced by first removing the temporary pavement down to the clean granular material and removing the existing pavement for at least 12 inches beyond the trench limits on each side. The pavement to be removed shall be neatly sawed, not more than 72 hours prior to the

placing of permanent pavement materials. The permanent pavement materials and workmanship shall be at least equivalent to the existing permanent pavement, as approved by the Engineer. After removal of the temporary pavement and sawing of the existing pavement edges and prior to the placing of the permanent pavement, Tack Coat Item 407 ODOT shall be applied to the exposed existing pavement edges, Prime Coat, Item 408 ODOT shall be applied to the base material, and Seal Coat Item 409 ODOT shall be applied to the surface of the final asphalt coat at the saw cut.

315 - Traffic Control:

The Contractor shall submit a plan and schedule for detouring traffic ten (10) days prior to the closing of any road. Any temporary closing of a road does not relieve the Contractor of the responsibility to provide access to the property by emergency vehicles and the owners.

Where it is anticipated that work will close a road, the Contractor shall inform the agency in control of the right-of-way, the Sheriff's Department, the County Sanitary Engineer, the local Fire Department, the County Engineer and the Project Engineer as to the extent, nature, time of the closing and post signs along the road to be closed. The Contractor shall post a notice in a local newspaper, three days prior to the closing, stating the extent, nature and time of closing. Adequate lights, signs, flaggers and barricades shall be used as required in Item 614 ODOT to safeguard the traveling public at all times. No road shall be closed until the schedule is approved by the Engineer and the agency in control of the right-of-way. No existing traffic flow shall be altered until the Contractor submits in writing a request for approval of the alteration of traffic. The request shall be directed to the County and the agency in control of the right-of-way. Approval shall be considered only when received in writing.

316 - Safety of Construction:

Contractors shall comply with the latest Occupational Safety and Health Act requirements.

317 - Clean Up and Restoration of Surfaces:

All surfaces including grass or lawn, pavement, sidewalk, curbing, and other surfaces disturbed or destroyed during and as a result of the construction, shall be replaced by the Contractor as specified herein.

317.01 Top Soil Placement And Grading:

A. General: All topsoil will be removed during the earthwork operation and stored for later use in location(s) indicated on the drawings.

B. The topsoil will be hauled from the stockpiles and placed on the complete cuts or fills in accordance with the plans. The final grading will then be carried out to the

elevations as shown on the plans.

C. Topsoil: Topsoil shall not contain more than 40 percent clay in that portion passing a No. 10 sieve and shall contain not less than 5 percent nor more than 20 percent organic matter as determined by loss on ignition of samples oven dried at 212 degrees Fahrenheit (°F) to a constant weight.

D. Fertilizer: Fertilizer shall contain the specified percentages of total nitrogen, available phosphoric acid, and water soluble potash. The weight, name of plant nutrients, and guaranteed percentages shall be marked on the sealed fertilizer containers.

1. 12-12-12: This fertilizer shall be used with Seed Mixes 1, 2, and 3.

2. 5-10-10: This fertilizer shall be used with Seed Mix 4 (Crownvetch).

E. Inoculant: Seed Mix 4 (Crownvetch) shall be treated with inoculant culture of nitrogen fixing bacteria not more than 1 year old.

317.02 Restoration: Unless otherwise provided, the Contractor shall perform restoration of surfaces as the work progresses and will be directed to cease excavation and the laying of conduit until such restoration is accomplished. When surface soil is replaced, any settlement below the original ground surface occurring within the guarantee period shall be refilled with surface soil equivalent to the original material.

317.03 Seeding: The work shall be performed as required and in accordance with the following the specifications, except as modified herein:

E. Seed Mix: All areas to be seeded shall be seeded with Seed Mix 1, unless otherwise noted.

	Minimum Germination	**Maximum Purity**
1. Seed Mix 1		
40 percent Kentucky Bluegrass (Poa pratensis)	75%	85%
40 percent Creeping Red Fescue (Festuca rubra)	85%	98%

20percent Annual Ryegrass (Lolium multiflorum)	85%	95%
2. Seed Mix 2		
20 percent Kentucky Bluegrass (Poa pratensis)	75%	85%
80 percent Creeping Red Fescue (Festuca rubra)	85%	95%
3. Seed Mix 3		
90 percent Perennial Ryegrass (Lolium perenne)	85%	95%
10 percent Alsike Clover (Trifolium hybridum)	85%*	95%
4. Seed Mix 4 (Crownvetch)		
30 percent Crownvetch (Coronilla varia)	70%	99%
30 percent Kentucky 31 Fescue (Festuca arundinacea var. Ky. 31))	85%	95%
30 percent (Pennlawn) Red Fescue (Festuca ruba)	85%	98%
10 percent Annual Ryegrass (Lolium multiflorum)	85%	95%

*Germination includes a total of quick germination plus hard seeds.

B. Preparation of Seed Bed:

1. Topsoil: Topsoil that is available as part of the excavated material shall be removed, stockpiled, and used to backfill the areas to be seeded. All grass, weeds, roots, sticks, stones and other debris are to be removed and the seed bed carefully finished by hand raking.
2. Non-Topsoil: If there is a deficiency of topsoil as part of the excavated materials, the Contractor shall provide topsoil from another source at no cost to the owner.
3. Seed Mix 1: When Seed Mix 1 is required, the seedbed shall be 4 inches of topsoil.
4. Seed Mix 2: When Seed Mix 2 is required, the seedbed shall be a minimum of 2 inches of topsoil.

C. Mulch:

1. Straw: Straw mulch shall be baled wheat or oat straw free of weed seed, sticks, or other foreign material.
2. Wood Cellulose Fiber: Wood cellulose fiber mulch shall be dyed green and shall not inhibit the growth or germination of the seed.

D. Asphalt Emulsion: Emulsion shall conform to American Association of State Highway and Transportation Officials (AASHTO) M140 or AASHTO M208.

E. Dry Seeding: When a seed mix is sown dry, the materials shall be applied as follows:

1. Fertilizing: Fertilizer shall be applied uniformly to all areas to be seeded at the rate of 10 pounds per 1,000 square feet in topsoil or 20 pounds per 1,000 square feet in no topsoil. The fertilizer shall be disked, harrowed or raked into the seedbed to a depth of 2 inches. The Contractor shall provide a smooth seedbed prior to seeding.
2. Seeding: The seed shall be mixed thoroughly and sown uniformly over the prepared areas. After sowing, the area shall be raked, dragged, or otherwise treated to cover the seed with soil to a depth of 1/4 inch.
    a. Seed Mixes 1, 2, and 3: These seed mixes shall be sown at a rate of 616/100 pounds per 1,000 square feet.
    b. Seed Mix 4 (Crownvetch): This seed mix shall be sown at a rate of 2 pounds per 1,000 square feet. Prior to sowing, it shall be inoculated in accordance with manufacturer's directions. This seed mix shall not be sown during the months of September or October.

3. Water: The Contractor shall water the seeded areas at the completion of the sowing and weekly thereafter unless a natural rainfall of 1/2 inch has occurred within the same time span.
4. Mulching: Straw mulching material shall be placed evenly over all seeded areas within 48 hours of seeding at a rate of 2 tons per acre between March 15 and October 15 and at a rate of 3 tons per acre between October 16 and March 14. Straw mulching material shall be secured with asphalt emulsion applied at a rate of 60 gallons per ton of mulch or by other approved methods. Mulching which is displaced shall be replaced and the area reseeded; other work damaged as a result of mulch displacement shall be repaired.

F. Hydraulic Seeding: When seed is applied hydraulically, a combined slurry of fertilizer, inoculant when required, seed, and wood cellulose fiber mulch shall be applied in one operation. The inoculant for Seed Mix 4 (Crownvetch) shall be increased to five times the manufacturer's recommended rate for dry seeding. Wood cellulose fiber shall be mixed at a rate of 1,500 pounds per acre. Fertilizer and seed shall be mixed at the rate specified for dry seeding.

G. Sodding: All areas requiring sod will be done in accordance with Item 660 ODOT.

H. Planting Trees and Shrubs shall be done in accordance with Item 661 ODOT

I. General: Seeded areas shall be maintained by the Contractor. Settled and eroded areas shall be filled, graded, and reseeded as requested by the Engineer or County at any time during the guarantee period. Seeding will not be accepted unless it is alive and healthy.

317.04 Pavement: All pavement damaged or removed during construction shall be replaced per the Standard Construction Drawings and requirements of these Specifications.

317.05 Sidewalks: All sidewalks damaged or removed during construction shall be replaced per the Standard Construction Drawings the width of existing sidewalk.

317.06 Curbs: All curbs damaged or removed during construction shall be replaced per the Standard Drawings or the same as existing as directed by the Engineer.

317.07 Other Surface: Any surface damaged or removed during construction shall be replaced in kind.

318 - Curb Markings:

The Fairfield County Utilities Department requires that the letter "V" for water main valve, "W" for water service line and "S" for sanitary sewer service line be embedded in concrete curbs where provided. For standard curbs, the letter is to be located in the center on the top, flat portion of the curb; for rolled curbs, the top of the

letter is to be located on the face of the curb within one and one-half (1 ½") inches of the crest. The letter is to be at least two (2) inches wide, three (3) inches high and one quarter (¼") inch deep. The letter "V" is to be located on the curb immediately adjacent to all water main valves. The letters "W" and "S" are to be located directly over the house service lines.

319 Connection to Existing Sewers

Contractor shall install mechanical plugs in the upstream and downstream inverts of the connection manhole with plug restraint. Plugs shall be inspected routinely by the Contractor to ensure that stormwater from the construction site is not entering the public sewer system. Plugs shall also be inspected after each rain event.

320 - 398 Reserved

399 - Penalty:

Whoever violates any provision of this Chapter or County directives pursuant to this Chapter shall be subject to the remedies of **Section 199 - Penalty** of these Regulations.

END OF CHAPTER

401 - Description:

This section describes the work required to install sanitary sewers including the pipe, manholes and structures. The work includes all clearing and grubbing; removal and restoration of fences, sidewalks, pavements, and other property; trenching; bedding and backfill; constructing, providing and removing all dewatering and pumping systems; all shoring, cribbing and sheeting; testing; and any other work associated with installing complete, usable conduits, including tees, wyes, manholes, and structures. The requirements stated in this chapter supplement and are in addition to those stated in Chapters I, II and III, whether or not a section of either chapter is specifically referenced herein.

402 - Materials:

The sanitary sewers shall be of the size and kind shown on the plans and shall be constructed of the materials described in **Chapter II - Construction Materials**, including the following:

Cement and Concrete	Section 205.00
Manholes - Precast	Section 209.00
Pipe-Gravity Sewer	Section 208.03
Pipe-Pressure Sewer	Section 210.00

403 - Trench Excavation:

The trench shall be excavated in accordance with Section 302 of these Specifications.

404 - Bedding:

The bedding shall be placed in accordance with Section 304 of these Specifications. Unless otherwise shown on the construction drawings, Class B Bedding shall be used.

405 - Laying Conduit:

Except where otherwise directed by the Engineer, for special conditions, the conduit shall be laid starting at the lowest point with the bell or groove end laid upgrade. The bottom segment of the conduit shall be in contact with the shaped bedding throughout its full length. All conduit shall be laid with ends abutting and true to line and grade. Line and grade for sanitary sewer conduit shall be established by the Contractor using laser beam or other approved method. Any method used shall provide a means to periodically check the accuracy of the method being used.

Conduit shall be laid at grades that are greater than or equal to the minimum grades established by *Recommended Standards for Wastewater Facilities*, current edition, unless approved by the Sanitary

Engineer.

405.01 Joining Conduit The method of joining conduit sections shall be such that the ends are fully entered and sealed. The inner surfaces shall be reasonably flush and even with all possible care being used when joining the conduit to insure that the conduit ends are clean. Gaskets shall be installed in accordance with the manufacturer's recommendations. All connections with existing structures shall be made watertight, using an approved flexible watertight joint. Grout shall not be used to make the structure watertight. Structures not made watertight using flexible watertight joints shall be reexcavated, replaced or repaired as necessary to make watertight. All exposed surfaces smooth and flush with the adjacent walls.

405.02 The end of the sanitary house connection service, installed for future use, shall be plugged with an approved watertight plug so as to prevent any ground water infiltration. At the end of the service shall be set a Y-pole made of hardwood timber not less than four (4) inch by four (4) inch with the timber being one unit, in good condition, straight, sound and free from large or loose knots. The Y-pole shall extend from the plug to a point at least three (3) feet above the ground. After the Engineer has located the Y-poles and recorded those on the construction drawings, the Contractor may cut off the Y-poles to a point slightly below the existing ground surface, provided however, a steel or cast iron cap of at least three (3) inch diameter is securely affixed to the end of the Y-pole or a steal rebar is installed on the wye pole.

405.03 On pressure sewer pipes, concrete blocking and supports shall be provided at all tees, bends, valves and at any other location shown on the construction drawings or directed by the Engineer or County. These concrete structures shall be Class C concrete per Section 205 and shall be built to the lines, grades and dimensions shown on the Standard Construction Drawings.

405.04 During any construction where the outside temperature is below 40 degrees Fahrenheit, all rubber gaskets and lubricants shall be kept in an area heated to at least 40 degrees Fahrenheit until needed. No gasket or lubricant shall be out of the heated area more than 5 minutes before being placed in the bell or on the spigot of the pipe. The Contractor shall lubricate all joints according to the manufacturer's recommendations.

Inclement Weather Conditions: All work which will be adversely affected by climatic conditions such as rain, wind, frost or temperature shall be suspended at the discretion of

the County. Whenever work proceeds under such conditions, the Contractor shall provide approved facilities for protecting all the materials and the finished work. This shall include heating of materials if required for proper installation. No materials shall be installed during climatic conditions that do not meet said manufacturer's recommendation.

405.05 The Contractor shall furnish and install, prior to testing, all fittings, air release valves, wyes, and service taps in the number and sizes shown on the construction drawings, or at locations required by the County. All appurtenances are to be furnished and installed by the Contractor.

405.06 The Contractor, in connection with the laying of the sewer line, shall furnish and install all valves as shown on the construction drawings or as directed by the Engineer. Valves will be provided with mechanical joint ends, unless otherwise shown or approved by the Engineer. The Contractor shall furnish and install any special casting necessary to make the valve installation as shown on the construction drawings.

405.07 The Contractor shall furnish and install all closure pieces, special bends and fittings necessary for construction of the pipe along the route shown by the construction drawings.

406 - Backfilling:

All trenches and excavations shall be backfilled in accordance with Section 305 of these specifications.

407 - Manholes and Special Structures:

407.01 General Construction Methods: The construction for the item specified shall conform to the construction drawings and be placed at the locations and elevations shown or ordered except that the height of any unit shall be changed to meet finished grade.

Adequate precautions shall be taken to prevent concrete or mortar from freezing. Brick, concrete block, etc., having a temperature of 40 degrees Fahrenheit or less shall not be set with mortar until heated for a period sufficient to insure a temperature of 50 degrees Fahrenheit to 80 degrees Fahrenheit throughout the entire mass of the material.

Cast Iron frames, taps, and covers shall be of the type and set as called for on the construction drawings or standard drawings. Special care shall be exercised to prevent the entrance of earth or debris into the pipe lines connecting with the manhole or special lines

connecting with the manhole or special structure. All such earth or debris resulting from the construction operations shall be removed.

407.02 Manholes: Manholes shall be precast, meeting ASTM C478. The joints between section shall conform to ASTM C443. The precast bottoms and sections shall be provided with lifting lugs and reinforced for handling. Manhole section shall be assembled with Conseal at all section joints or an external EPDM Sealing system per Sealing Systems, Inc. or approved equal, in addition to the sealed O-ring joint. They shall be set so as to have a uniform bearing on at least four (4) inches of granular material as shown on ODOT Table No. 703-1, No. 67 aggregate. The invert channel shall be the true shape of the lower half of the sewer conduit. The sewer shall be connected to the manhole using a flexible watertight joint of approved manufacture using a rubber sleeve with stainless steel banding or a rubber gasket that seals through compression or expansion, conforming to ASTM C925. All connections on the exterior of the manhole may be further sealed with an approved grout or EPDM sealing system. Grout on the interior of the manhole is not permitted. The manhole and/or pipe shall be excavated if necessary to make watertight.

A. Testing: Each manhole shall be tested after assembly and backfilled in accordance with the following procedure:

1. All lift holes shall be plugged with an approved non-shrink grout.
2. All pipes entering the manhole shall be plugged and the plugs securely braced to prevent their being drawn into the manhole.
3. The vacuum testing shall be completed after casting has been set.
4. A vacuum to ten (10) inches of mercury shall be drawn and the vacuum pump shut off. With all valves closed, the time shall be measured for the vacuum to drop to nine (9) inches of mercury. The manhole shall pass if the time is greater than sixty (60) seconds for a four (4) foot diameter manhole, seventy-five (75) seconds for a five (5) foot manhole, and ninety (90) seconds for a six (6) foot diameter manhole.
5. If the manhole fails the initial test, necessary repairs shall be made to the exterior of the manhole by excavation and placement of an external EPDM sealing system per Sealing System, Inc. requirements or approved equal while the vacuum is still being drawn. Any damaged or defective manhole sections, boots, or rings shall be replaced as necessary to obtain a satisfactory test. Repairs and retesting shall

proceed until a satisfactory test is obtained. The use of grout is not permitted to seal manholes.

B. Manhole Rings and Covers: All manhole castings and covers shall be of the machined type without vent holes and the pick hole shall not penetrate completely through the ring. The manhole castings shall be sealed to the concrete cone section with an elastomeric material approved by the engineer with a minimum of four (4) overlapping concentric rings. Care shall be taken to assure that no gaps in the elastomeric material develops during the installation process.

C. Alternative Manhole Casting: The frame shall consist of a minimum 5000 psi concrete with a fitted bolt down rubber surface piece with a cast iron lid. The unit shall be factory equipped with reinforced lifting holes that do not require repair or covering when installed. The rubber surface piece shall be manufactured from recycled scrap tires and molded to 23" minimum opening for manhole size. It shall have a density of ± 70pcf, a Modulus of Elasticity of ± 525 psi 100% elongation @20°C and ± 110 psi @ 65° C - 155% elongation. Hardness shall be ±75, Durometer Shore A, and shall meet ASTM D746 standard for low temperature brittleness to -47 °C.

407.03 Structures: Concrete structures poured in place shall be constructed in accordance with Item 604, ODOT.

407.04 Excavation: The excavation shall be of such dimensions in all cases as will give ample room for construction, including the removal of any obstruction which is necessary to provide room.

407.05 Backfill: The backfilling shall follow the completion of the work as closely as the type of construction will permit. The backfill material for all precast manholes and all concrete structures shall be Type A (ODOT Item 304 or 410) material from the invert to within 12 inches of final grade.

407.06 Manhole Frame Sealing: The purpose of sanitary manhole frame seals is to prevent water inflow/infiltration into the sanitary manholes through the frame to manhole joint. The manhole frame joint above the cone shall be sealed with a flexible rubber seal from the frame to the cone on all manholes.

A. The flexible portion for the seal shall remain free, allowing repeated vertical or horizontal movements of the frame due to frost heave, thermal expansion or other

ground movement, and be made from the high grade rubber compound conforming to ASTM C923, with a minimum 1500 psi tensile strength, maximum 19% compression set and hardness durometer of 48±5 and shall have a minimum thickness of three sixteenths ($^3/_{16}$) inch. The seal shall have a minimum unexpanded height of eight (8) inches and have two or more pleats capable of vertical expansion of not less than two (2) inches when installed. Extension used in conjunction with the sleeve to increase coverage shall be the same material designed to mechanically attach to the seal.

Bands used for compressing the sleeve and extensions shall be made of 16 gauge stainless steel conforming to ASTM A 240, Type 304 and shall have minimum width of one and three quarters ($1\ ^3/_4$) inch. Bands shall be self locking slotted with integral tab, easily released for removal and reinstalled without damage to the band.

Seal shall be manufactured by Cretex Specialty Products or shall meet the requirements contained in NASSCO specifications for a manufactured frame seal or pre-approved equal to wrapped seal.

B. Execution: The area where the seal is to be attached must be free of any dirt, grease, rust, or any loose mortar. With the seal in appropriate position, stainless steel bands are expanded into grooves of the seal to mechanically attach the seal to both the frame and manhole structure. After bands are fully expanded, the tab must engage the slots to hold the seal in place. Contractor is responsible for all measurements and supplying necessary special tools.

408 - Sanitary Force Mains and Valves:

Force mains shall be constructed and tested in accordance with the provisions of **Chapter VI - Waterlines**. The need for chlorination is excluded for sanitary force mains, however force mains shall be flushed cleaned prior to being placed in service. All sanitary force mains shall be constructed with at least five (5) feet of cover to the top of the pipe from the existing or proposed ground or finished grade. Valves larger than two (2) inches shall conform to Section 215. Valves two (2) inches and smaller shall conform to Section 216.02 and 216.03.

408.01 Extension Stems: If the top of the operating nut is more than thirty-six (36) inches below the finished grade, an extension stem shall be provided to place the operating nut between twenty-four (24) inches and thirty-six (36) inches of the finished grade. Cost of extension items shall be included in the unit price for the various valve types and sizes.

408.02 Valve Boxes: Unless otherwise noted on the construction drawings or directed by the Engineer, all valves larger than two (2) inches shall be provided with Standard Valve Boxes. Covers for the boxes shall be marked "SEWER". All boxes shall be provided with the necessary extensions to bring the top of the box to the finished grade. All valve boxes shall be installed such that they are centered vertically over the operating nut and such that the box provides maximum cover of the operating housing. Boxes that are to be installed in areas subject within five (5) of vehicular travel shall be the Traffic Type Valve Boxes. All valve boxes shall be as shown on the Standard Construction Drawings.

408.03 Valve Supports: Concrete piers or supports shall be provided under all valves per Section 405.03.

408.04 Operation: All valves which affect the flow of wastewater through active lines are to be operated only by the County Utilities Department personnel.

409 - Sanitary Sewer Testing:

The Contractor shall furnish all labor, equipment, and materials which are required to test sections of sanitary sewer pipe for tightness. Either the infiltration test, the exfiltration test or air test shall be performed and all tests shall be conducted under the supervision of the Inspector and Engineer. All tests shall be performed no sooner than thirty days after the sewer is backfilled to final grade. The tests for leakage shall include all portions of the sanitary sewer system including service lines that are installed by the Contractor. The sewer shall be tested in sections, each section extending between two consecutive manholes or from the end of the sewer to the nearest manhole. The allowable leakage shall not exceed 100 gallons per day per mile of pipe per inch of pipe diameter tested, or computed equivalent for shorter periods of time. No test shall be for less than 60 minutes. Air testing shall meet the requirements detailed in Section 409.03.

409.01 Infiltration Test: If the infiltration test is selected, each section of pipe to be tested shall be covered with not less than two (2) feet of ground water above the top of the pipe at the highest point in the section being tested. The incoming sewer or sewers in the upper end of the test section shall be securely sealed. The quantity of ground water infiltration into the test section shall be measured and shall not exceed the allowable leakage.

409.02 Exfiltration Test: If the exfiltration test is selected, the inlet end of the upstream and downstream manhole shall be closed with a watertight plug. The sewer along with the upstream manhole shall then be filled with water until the elevation of the water in the

upstream manhole is two (2) feet higher than the inside crown of the conduit in the section being tested or two (2) feet above the existing ground water in the trench, whichever is the higher elevation. The length of the section to be tested shall be filled and maintained full of water for a period of approximately 24 hours prior to the start of the test. If the water level in the upper manhole has dropped during this 24 hour period, the level shall be raised to the test elevation mark and the test made. The exfiltration amount will be determined by measuring the volume of water required to keep the water level in the upstream manhole at the test elevation mark.

409.03 Air Test: The low pressure air test is a test which can be used either for line acceptance or leak location in accordance with ASTM F1417 testing methods as amended herein.

A. Summary of Method: The section of the sewer line to be tested is plugged. Low-pressure air is introduced into the plugged line. The line passes the test if the rate of air loss, as measured by pressure drop, does not exceed a specified amount in a specified time. Pressure drop may be determined by using Table 4-1 - Minimum Specified Time Required.

B. Preparation of the Sewer line: Flush and clean the sewer line prior to testing, serving to wet the pipe surface as well as clean out any debris. A wetted interior pipe surface will produce more consistent results. Plug all pipe outlets to resist the test pressure. Give special attention to stoppers and laterals.

C. Safety: This low-pressure air test may be dangerous to personnel if, through lack understanding or carelessness, a line is over pressurized or plugs/caps are installed or restrained improperly. It is extremely important that the various plugs be properly installed to prevent the sudden expulsion of a poorly installed or partially inflated plug. Observe the following minimum safety precautions.

1. No one shall be allowed in the manholes during testing.
2. Install and restrain all caps and plugs securely.
3. When lines are tested, it is mandatory that all the caps and plugs be braced as an added safety factor.
4. Do not over pressurize the lines. Do not exceed 9.0 psi.

5. A regulator or relief valve set no higher than 9 psi shall be included on all pressurized equipment.

D. Procedures:

1. Isolate the section of sewer line to be tested by inflatable stopper or other suitable test plugs.
2. Plug or cap the ends of all branches, laterals, tees, wyes, and stubs to be included in the test to prevent air leakage. All plugs and caps shall be securely braced to prevent blow-out. One of the plugs or caps should have an inlet tap, or other provision for connecting a hose to a portable air control source.
3. Connect the air hose to the inlet tap and portable air control source. The air equipment shall consist of necessary valves and pressure gages to control an oil-free air source and the rate at which air flows into the test section to enable monitoring of the air pressure within the test section.
4. Add air slowly to the test section until the pressure inside the pipe reaches 4.0 psig.
5. After the pressure of 4.0 psig is obtained, regulate the air supply so that the pressure is maintained between 3.5 and 4.0 psig for at least 2 minutes depending on air/ground temperature conditions. The air temperature should stabilize in equilibrium with the temperature of the pipe walls. The pressure will normally drop slightly until equilibrium is obtained; however a minimum of 3.5 psig is required.
6. Determine the rate of air loss by the time-pressure drop method.
7. *Time-Pressure Drop Method* - Air is slowly introduced into the section of pipe to be tested, until the air pressure is raised to approximately 5.0 psi and the test pipe section is stabilized. Disconnect the air supply and decrease the pressure to that shown in Table 4.1 - Minimum Specified Time Required for a 0.5 psig Pressure Drop before starting the test. Determine the time required for the pressure to drop 0.5 psig, and compare this interval to the required time to decide if the rate of air loss is within the allowable. Minimum holding times required by pipe diameter are shown in Table 4.1. If the pressure has dropped not more than 0.5 psi (7 kPa) gage during the test period, the line is presumed to have passed. The

test may be discontinued when the prescribed test time has been completed even though the 0.5 psi drop has not occurred.

Table 4.1 - Minimum Specified Time Required for a 0.5 psig Pressure Drop

Pipe Diameter in.	Minimum Time min:s	Test Pressure psi	Specification Time for Length (L) Shown, min:s			
			100 ft	200 ft	300 ft	400 ft
6	5:00	5.0	5:00	5:00	5:00	5:00
8	5:00	4.5	5:00	5:00	5:00	5:04
10	5:00	4.0	5:00	5:00	5:56	7:54
12	5:40	3.5	5:40	5:42	8:33	11:24
15	7:05	3.5	7:05	8:54	13:21	17:48
18	8:30	3.5	8:30	12:49	19:14	25:38
21	9:55	3.5	9:55	17:27	26:11	34:54
24	11:20	3.5	11:24	22:48	34:11	45:35
27	12:45	3.5	14:25	28:51	43:16	57:42
30	14:10	3.5	17:48	35:37	53:25	71:13
33	15:35	3.5	21:33	43:56	64:38	86:10
36	17:00	3.5	25:39	51:17	76:55	102:34

409.04 Deflection Test: When PVC pipe is used, a deflection test shall be made by pulling through the sewer a rigid ball or mandril having a diameter equal to ninety five percent of the inside diameter of the pipe. The accuracy of the ball or mandril shall be determined by the Inspector. The mandril shall have an odd number of runners, with seven (7) as the minimum number. This test shall be run no sooner than thirty days after the sewer is backfilled. Any pipe that fails the Deflection Test shall be replaced at no cost to the County.

409.05 Videotaping: All sanitary sewers shall be videotaped after deflection testing and prior to acceptance of the sewers by the County. The videotape shall remain the

property of the County. The videotape shall clearly identify the location of the camera within the sewer, date and time of videotape, and be of sufficient quality to determine the condition of the sewers.

410 - Wye Poles:

The Contractor shall furnish and place, as directed, approved wye poles made of one piece, 4" x 4" lumber at all wye locations, ends of extended services, or at the end of each riser where risers are required. The wye poles shall extent above the ground at least three feet. In lieu of extending the wye pole above grade, the Contractor may anchor a section of rebar, eighteen (18) inches in length, to the wye pole below ground for detection. The rebar shall be installed vertically in such a manner so as to provide six (6) inches of cover over the top (surveyor required).

411 - Risers:

Risers shall be placed on all wyes where the depth of flow line is greater than 12 feet. Tops of risers are to be 10 feet below ground, plus or minus one foot, or as otherwise shown on the construction drawings.

412 - Service Connections and Lines:

412.01 Service or house connections shall not be connected to the lateral or main line sewers until full approval of said lateral or main line sewer has been received.

412.02 The sewer service line shall be constructed of a size not less than six (6) inches internal diameter, laid with a minimum fall of one-fourth inch per linear foot, and shall be PVC or ductile iron pipe with watertight joints, as specified in Section 208 of these specifications, and using proper bends (11 1/4°, 22½° or 45° only) for all changes in alignment or grade. Only adapters approved by the County shall be used to change from one pipe material to another in any sewer line. A watertight test tee shall be installed on the service connection near the connection point to the mainline sewer or lateral for use during the air pressure test. The interior of each length of pipe shall be perfectly clean and free from offsets, fins, and projections before the next length is connected thereto. The County may, by special permission in each case, authorize the building sewer to be constructed with a fall as little as one-eight inch per linear foot if it is determined that such procedure is absolutely necessary. The County will require that the water tightness of the sewer service line be demonstrated by the testing procedures established in Section 409.

412.03 Old or existing service connections may not be used in connection with new buildings or

alterations to existing buildings on a property for any reason. A new sanitary service connection from the foundation of a new building or altered building to the main line is required in accordance with the specifications herein. For existing buildings being connected to a new sewer, an outside cleanout shall be installed on the service connection within 2 feet of the building foundation.

412.04 All excavation for sewer service lines shall be open cut from the surface as specified in accordance with Section 302. The sides of the trench shall be vertical, using such sheeting and bracing as may be necessary. The bottom of the excavation shall be shaped to fit the lower half of the sewer pipe so that the pipe will have uniform bearing. Pipe shall have a bed of granular material extending from a point six (6) inches below the bottom of the pipe to the outside top of the pipe as shown on the Standard Drawing. Adequate bell holes shall be excavated at each joint. In the event the trench is excavated below the required grade of the pipe, the excess space shall be filled with the stone specified in Section 404.01 for Class B bedding. The width of the trench at the top of pipe shall not exceed two feet plus the outside diameter of the pipe nor shall the width be less than one foot plus the outside diameter of the pipe. When unstable, soft or spongy conditions are encountered at the trench bottom, such material shall be removed and replaced with clean, crushed stone sufficient to stabilize the trench bottom to support the pipe to a true line and grade. Water, gas, telephone, electric, or cable lines shall not be laid in the same trench as the building sewer.

412.05 The building sewer shall be backfilled to an elevation at least twelve inches over the top of the pipe by tamping in finely graded soil or granular material in six inch layers. Soil containing stones larger than two inches in the greatest dimension shall not be used. The balance of the backfill shall be made in accordance with the requirements of Type C backfill, Section 406, when in non-paved areas. A Cut-Off Trench Dam shall be installed as described and shown on Standard Construction Drawing Sa.S.-7 on all service lines. The trench dams shall be carefully compacted and shall be 6 feet in thickness, as measured along the service center line and shall be constructed against the undisturbed trench sides from the subgrade or bottom of the stone foundation, whichever is lower, to a limit of 36 inches over the top of the pipe.

412.06 Connection to existing wye-branches shall be made carefully to avoid damage to the bell of

the branch or to the lateral sewer. Such damage as may occur shall be repaired as directed by the County Inspector. Connections to a lateral or public sewer at a point where no wye-branch has been provided, shall be made using a watertight connection, Inserta Tee or approved equal by the County, and be encased in concrete in accordance with Standard Drawings.

412.07 The permit holder shall repair or restore any drains or service lines damaged or disturbed during the construction of the sewer service line.

412.08 Sanitary house service connections which are to be installed from an existing main line lateral sewer shall be connected to the existing sewer or appurtenance with the same material fitting or with a watertight flexible adapter approved by the County. The connection shall produce as tight a joint between the existing and proposed work as that specified for the sanitary house service connection pipe joint. Bedding shall be in accordance with Section 304 of these specifications.

412.09 Surface water which collects in basement or foundation excavations shall not be discharged at any time into the sewer service line. If the sewer service line is completed before the plumbing is connected thereto, it shall be tightly closed at all times with a glued plumber's plug or other watertight plug in order to prevent surface or ground water from entering the sanitary sewer system. A HubSett Test must be installed in accordance with the requirements of HubSett manufacturing, Inc. or pre-approved equal, to prevent storm-water from entering the sewer line prior, to connection to our system. Only after the basement floor is poured, the house is under roof and the sump pump is in place and operational with permanent power, can the HubSett be pulled free in the presence of a County representative. Failure to comply with these requirements will result in appropriate penalties and/or loss of the tap deposit.

412.10 All excavations for building sewer installation shall be adequately guarded with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways, and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the County.

412.11 Sewer service connections for new developments shall be installed at the center of lots and such service connections shall run as straight as possible, without unnecessary bends, directly to the building. In no case shall service connections run onto other lots or

parallel to the right-of-way to connect to the main sewer.

413 - Storm Water Connections:

No downspouts, surface inlets, foundation drains or any other source of ground or surface water shall be connected either directly or indirectly to or discharged into any part of the sanitary sewer system.

414-498 - Reserved

499 - Penalty:

Whoever violates any provision of this Chapter or County directive pursuant to this Chapter shall be subject to the remedies of **Section 199 - Penalty** of these Regulations.

END OF CHAPTER

Chapter V - SUBMERSIBLE PUMP STATIONS

501 General

This specification provides a guideline for a developer designed and constructed pump station. The Sanitary Engineer reserves the right to make additions to these requirements based on site conditions and the upstream pump station tributary area. The developer shall comply with the requirements of the Ohio EPA and "Recommended Standards for Wastewater Facilities" (10 States Standards) during the design of this pump station. The developer should also refer to County Standard Drawing Sa.S-36, Pump Station Details, Sheets 1 through 11 which also apply to this pump station.

Pump Stations with pumps less than 30 horsepower (Hp) and less than 500 gallons per minute (GPM) shall be designed with submersible pumps in accordance with the standard drawings for pump stations. Pumps in excess of 30 Hp shall be designed in accordance with the requirements of the Sanitary Engineer. All work and equipment must be approved by the Sanitary Engineer prior to performing the proposed work.

502 Design

The design engineer shall be responsible for submitting the following information to the Sanitary Engineer for review:

502.01 A site and grading plan showing erosion and sediment control.

502.02 A pump station plan and cross sections, including the wet well and utility building.

502.03 An odor control equipment plan.

502.04 An electrical site plan.

502.05 Electrical one line and control block diagrams.

502.06 Power and control panel plans.

502.07 The results of geotechnical investigations (soil borings and laboratory testing of soil samples) at the wet well location.

502.08 Buoyancy calculations. The contractor shall be responsible for anti-floatation methods needed during construction until backfill is properly placed.

502.09 Pump sizing calculations showing head loss, force main sizing including force main velocities, system curve for design flow and ultimate peak flow, system curve versus pump curves for design flow and ultimate peak flow.

502.10 Product data for all proposed equipment. Data shall include physical dimensions, features, components, ratings, and performance.

502.11 Shop drawings detailing dimensions, components, location, identification of field connections, arrangement of components and operational characteristics.

503 Site Layout

The site layout of the pump station will be in general accordance with the pump station Standard Drawings. However, site-specific layouts will be required for review and approval by the Sanitary Engineer. Pump station structures and electrical and mechanical equipment shall be protected from physical damage by the 100-year flood and should remain fully operational and accessible during the 25-year flood. At least 1 (one) foot of freeboard above the 100-year flood elevation will be provided at all pump station building entrances and hatches. The following items provide the minimum requirements based on a generic site layout.

504 Driveway

504.01 Driveways will be designed so that vehicles are not required to back onto public or private streets or roadways. Driveways shall be designed to allow service truck with equipment (i.e. portable generator) sufficient room to completely pull off the street/roadway while opening the site gate to gain entrance. 504.02 The driveway shall be sloped to facilitate drainage away from the pump station. 504.03 Concrete sidewalk shall be provided from the access drive to the entry of the pump station building and odor control chemical tank as shown on the standard pump station drawings. 504.04 The disturbed areas between the concrete sidewalks and around the pump station building shall be graded to drain away from the building and landscaped as directed by the Sanitary Engineer. Four inch-perforated drainage tiles shall be provided in areas that are not free draining as an outlet away from the pump station.

505 Pump General Requirements

505.01 Pumps shall be FLYGT “N” series submersible pumps or approved equal.

505.02 Provide Flygt Experion energy saving premium efficient motors.

505.03 Pump speed shall not exceed 1750 revolutions per minute.

505.04 Pump suction and discharge openings shall be at least 4-inch diameter.

505.05 Provide a Type 316 stainless-steel chain.

505.06 Provide a quick-disconnect sealing flange and discharge elbow with integral baseplate. The mating surface shall be a machined metal-to-metal design providing a watertight contact.

506 Pump Detailed Specifications

506.01 Pumps shall be of the centrifugal, non-clog, solids handling, submersible, wastewater type. Pumps shall be non-overloading throughout the entire range of operation without employing the service factor, which shall be not less than 1.15. The pump curve shall be submitted to the Sanitary Engineer for approval and shall state pumping head, capacity, pump efficiency, solids handling capacity, and reflect motor service factor.

506.02 The pump volute type casing shall have a 125 lb flange that is faced. Contractor shall provide appropriate increaser to transition from the pump discharge flange to the discharge piping as shown on the Drawings. The pump discharge shall conform to ANSI standards and be manufactured of heavy-duty gray cast iron, ASTM A-48, Class 35. The casing shall be of sufficient strength and thickness to withstand all stresses imposed by the intended service at full operating load. The pumps shall be mated to a 90° cast iron inlet elbow with mounting pedestal. The mounting base shall be provided by the manufacturer and shall be suitable for withstanding the pump weight and forces generated via the pump. The inlet elbow intake shall be situated in parallel with the pump discharge outlet.

506.03 The casing shall be accurately machined and bored for register fits with the suction and casing covers. All exposed nuts or bolts shall be ANSI type stainless steel construction.

506.04 Impellers shall be hard iron, ASTM A-532 Alloy IIIA (25% chrome) or as recommended by the manufacturer for the specific application. Impellers shall have a maximum of single vane, have a non-clog design and have pump-out vanes to prevent materials from collecting in the mechanical seal area. Impellers shall be dynamically balanced. Impellers shall be slip fit to a tapered shaft and key driven or with a bolt, washer and key.

506.05 Motors shall be of the Premium Efficiency type, with rated efficiencies at full load.

The premium efficiency motor rotor shall have end rings and rotor bars constructed of cast aluminum. Motors shall have stator, rotor, and bearings mounted in a sealed submersible housing. The stator windings shall be inverter duty rated with Class H insulation, 180°C rated (356°F) a minimum 1.15 service factor. Motors shall be air filled NEMA B design. Intrinsically safe winding thermal sensors shall provide further protection. Stator shall be securely held in place yet easily removable in the field.

506.06 Pumps shall be equipped with low resistance, bi-metal heat sensors mounted directly on the stator windings and sized to open at 155°C and automatically reset at 30-35°C differential. The sensors shall be connected in series with the motor starter coil so that the starter is equipped with 3 leg overload heaters and protects all normal overloads.

506.07 Bearings shall include an upper radial bearing and a lower thrust bearing. Bearings shall be heavy-duty single row ball bearings that are permanently lubricated. The upper radial and lower thrust bearings shall have a minimum B-10 life of 50,000 hours at the best efficiency point.

506.08 The shaft shall be machined from series 300- or 400-stainless steel and be of a large diameter with minimum overhang.

506.09 An intrinsically safe leakage sensor shall be provided to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will send an alarm both local and/or remote. USE OF VOLTAGE SENSITIVE SOLID STATE SENSORS AND TRIP TEMPERATURE ABOVE 125°C (260°F) SHALL NOT BE ALLOWED. The pump and motor shall be designed to operate partially or completely submerged in the liquid being pumped.

506.10 Electrical power cords shall be Flygt SUBCAB water resistant 600V, 60°C, UL and CSA approved and applied dependent on amp draw for size. A serviceproven, manufacturer-guaranteed method, acceptable to the Engineer, shall protect pumps from leakage at the cord entry point. Cord lengths shall be as required and as shown on the Drawings.

506.11 Pumps shall be painted after assembly with a single standard coat of zinc chromate base enamel. Finish paint shall be the manufacturer's standard for the application.

506.12 The pump volute shall be supported by the inlet elbow base. 506.13 Testing shall include the following: a) Visually inspect pump to assure that it is in accordance with the specification, as to voltage, phase, and hertz.

507 Mechanical Seals

507.01 Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, corrosion and abrasion resistant tungsten-carbide ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, corrosion and abrasion resistant tungsten-carbide seal ring.

507.02 Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing. The position of both mechanical seals shall depend on the shaft. Mounting of the lower mechanical seal on the impeller hub will not be acceptable. For special applications, other seal face materials shall be available.

507.03 The following seal types shall not be considered acceptable or equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. No system requiring a pressure differential to offset pressure and to effect sealing shall be used.

507.04 Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate dry without damage while pumping under load.

507.05 Where a seal cavity is present in the seal chamber, the area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

507.06 Seal lubricant shall be FDA approved, nontoxic.

508 Wet Well

508.01 The Wet Well shall be constructed of poured-in-place reinforced concrete or precast concrete sections in the diameter required on the individual plans but in no case less than ten (10) feet. Precast concrete shall be per ASTM C478. Watertight rubber gaskets shall be per ASTM C443.
508.02 Only circular wet wells will be permitted.
508.03 The floor shall have a 1:1 slope to the hopper bottom.
508.04 FLYGT Safe Hatch (with stainless steel lockable hasps) aluminum access door shall be used on any opening on the wet well as deemed applicable by the Sanitary Engineer.
508.05 A minimum four (4) inch diameter vent with down-turned elbows and a stainlesssteel or plastic mesh insect screen, emergency pump out connection, and temporary level control ports shall be provided as shown on the pump station standard drawings.
508.06 The wet well will be sized to provide enough storage to have no more than 10 pump starts per hour under peak design conditions.
508.07 Provide a FLYGT Multitrode Level Monitoring System or equivalent. Provide one backup high level alarm and pump start float. Install level sensors such that they are not affected by the influent sewer or pump suction.
508.08 Use of non-conductive grating is required by the Electric Code.

509 Sewage Grinder

509.01 An electric powered, immersible motor, sewage grinder sized for the peak influent sewer flow as manufactured. Submit sizing information and shop drawings to the Sanitary Engineer for review.
509.02 The installation of the grinder shall include a stainless-steel frame and retrieval system mounted on the interior wall of the wet well at the invert of the influent line. This shall include a lifting bracket.
509.03 All controls and the power supply will be installed complete as part of the grinder installation.
509.04 Grinder electric supply will be mounted as provided by JWC Environmental inside the pump station building.
509.05 Electrical conduit lines shall be provided from the supply/power unit to the grinder. Any conduits that are underground shall be enclosed.
509.06 Electrical cables that are not placed in conduit shall be fully supported and braced on 1- foot centers.

510 Valves

510.01 All eccentric plug valves shall be McWane (Clow) Eccentric Plug valves, F-5412 or approved equal.

510.02 Flanged, horizontal swing check valves shall be Mueller A-2602 or approved equal. Valves shall be equipped with outside stem lever and weight. Valves shall meet or exceed the requirements of AWWA Standard C508.

510.03 Flanged, grooved, or mechanical joint pipe, fittings, couplings, and valves are acceptable.

510.04 Grooved fittings and couplings and valves may be utilized in lieu of welded, threaded, or flanged joints as shown on the Drawings. Gasket selection and intended use shall be verified as suitable for the intended service as published in the manufacturer's latest literature. Installation shall be in accordance with the coupling manufacturer's latest published instructions.

510.05 Grooved joint couplings shall consist of two or more ductile iron housings to ASTM A536, FlushSeal pressure responsive gasket to ASTM D2000, and zincelectroplated steel bolts and nuts to ASTM A449. Basis of Design: Victaulic Style 31.

511 Piping

511.01 All PVC piping and appurtenances shall be Schedule 80, unless otherwise noted.

511.02 All ductile iron piping as shown on the plans shall be Thickness Class 53.

511.03 All underground piping shall be installed below the building footer.

511.04 All above ground piping shall be painted with Tnemec paint per manufactures specifications or equal product.

511.05 All underground piping outside of the building and wet well shall be joined using mechanical joint sleeves with "MEGALUG".

511.06 All piping, valves, and appurtenances inside the wet well and building shall be flanged.

512 Junction Box

512.01 A NEMA 4X stainless steel electrical junction box shall be placed adjacent to the wet well for disconnecting the pump and grinder, as shown on the standard pump station drawings.

512.02 Specific location of junction box is subject to approval by the Sanitary Engineer. 512.03 The bottom of the junction box will be no less than 3.5 feet from the final grade and be at a top height of no more than 5.5 feet from final grade.

512.04 Duplex junction boxes shall have dimensions of no less than 24" x 24" x 8".

512.05 Triplex junction box sizing shall be submitted to the Sanitary Engineer for approval prior to construction.

512.06 Separate conduits for pump electrical leads, level control sensors, and floats shall be required. One spare ¾" conduit shall be supplied with a pull string for future use.

512.07 Gas seals and sealing wyes shall be provided for all conduit coming from the wet well to the junction box. Explosion proof sealer compound and packing/wadding made by Appleton shall be used.

512.08 Junction box shall have lockable quick release latching mechanisms.

512.09 Provide appropriate terminal as required by/for power and control wiring.

513 Fasteners

513.01 All nuts, bolts, hasps, washers, anchors, and other miscellaneous metals shall be Type 316 stainless steel. 513.02 Aluminum in contact with concrete shall be covered in bitumastic material.

514 Building

514.01 The 2-room structure will house all the electronic/electrical components for the control of the pumps, monitoring system, and sewage grinder on one side, and all piping, valves, appurtenances, etc. on the other side.

514.02 Developers desiring a pump station to match architectural styles of the development shall submit pump station building plans to the Sanitary Engineer for approval.

514.03 The building shall be a minimum of 8'W x 18'L x 10'H, insulated with R-19 insulation rating for the sidewalls and attic areas.

514.04 The building exterior finish shall either be composed of split face block or shall match local architecture (as directed by the Sanitary Engineer). Masonry work shall conform to the latest edition of the "National Concrete Masonry Association". All block shall be treated with

Hydrozo Enviroseal® Double 7, by Hydrozo Coatings Company per the manufacturer's specifications.

514.05 Hollow load-bearing concrete masonry units shall meet the requirements of ASTM C90.

514.06 Mortar shall be Type S in accordance with ASTM C-270 and have a minimum compressive strength of 1,800 psi in 28 days. Grout shall have a minimum compressive strength of 2,500 psi in 28 days.

514.07 Ceilings shall be 5/8-inch plywood, PS1 rated, exterior exposure, grade C-C plywood sheathing. Panels shall be secured with 8c nails, at 6 inches on center along boundaries, continuous at panel joints, and at all other edges, and at 12 inches on center in the field. Ceiling shall be painted white with Tnemec per manufacture specifications.

514.08 The building shall meet the most recent local building codes.

514.09 Provide complete 5 kW heater system with blower, automatic reset linear thermal cut-out, temperature element, and thermostat control accessible at floor level. Complete installation shall include mounting brackets and steel disconnect switch per manufacturer's specifications. Provide washdown heater manufactured.

514.10 Ventilation will be provided for the attic area and the main room of the building. Attic ventilation shall be by convection and whereas building ventilation shall be by providing two closable (weather-tight) shuttered louvers with screens.

514.11 A thermostatically controlled fan and louver system shall be provided for both fresh air inlets for the building.

514.12 A 9-inch floor drain shall be installed in the valve area to direct water into the wet well. Floor drain shall be Zurn Z550 with a stainless-steel grate installed flush with the finish floor elevation. A P-trap/check valve shall be installed in the drain line to prevent gases from entering the building. The P-trap/check valve shall be accessible for repair/replacement. Provide a 2" Duckbill check valve inside wet well on the end of the drain line.

514.13 Polyeurethane caulking shall be applied around the entire perimeter of the finish floor and ceiling, and along all ceiling panel joints. Caulking material shall be SIKA IA or approved equal. Contractor shall submit caulk samples to the Sanitary Engineer for approval.

514.14 Interior walls shall be painted with Tnemec Paint per manufactures specifications

514.15 Doors shall be Steelcraft LW18, 18-gauge, galvannealed, prime coated, with Steelcraft F16, 16-gauge, galvannealed, welded frames. Furnish and install LCN 4040XP Series closers. Provide locks with Sargent LA keyways.

514.16 Roofing material shall be Certainteed Landmark™ TL shingles, Max Def Moire Black in color, with all associated accessories, or shall match local architecture, as directed by the Sanitary Engineer.

514.17 Provide below slab water vapor retarder meeting the requirements of ASTM E96 for underslab.

514.18 Grounding and bonding:

a). Codes and Standards: Perform all work to furnish and install grounding in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein:

I. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and National Electrical Code (NEC) as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment. Use of conduit system for ground conductor shall not be allowed.

II. Underwriters' Laboratories, Inc. (UL) Compliance: Comply with applicable requirements of UL Standards Nos. 467, "Grounding and Bonding Equipment", and 869 "Reference Standard for Service Equipment", pertaining to grounding and bonding of systems, circuits and equipment. In addition, comply with UL Standard 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors". Provide grounding and bonding products which are UL listed and labeled for their intended usage.

III. Institute of Electrical and Electronic Engineers (IEEE) Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141 and 142 pertaining to grounding and bonding of systems, circuits and equipment.

b). Ground Rods: Locate a minimum of one rod length from each other and at least the same distance from any other grounding electrode. Interconnect all ground rods with bare conductors buried at least 24 inches below grade. Connect bare cable ground conductors to ground rods by means of exothermic welds. Make these connections without damaging the copper coating or exposing the steel. Drive rods until tops are 2 feet-6 inches below finished floor or final grade except as noted otherwise.

514.19 Building shall be equipped with lightning protection consisting of at least one (1) gently-tapered aluminum air terminal. The completed installation shall meet the “Installation

Requirements for Lightning Protection Systems, UL96A" of the Underwriter's Laboratories, current edition. Air terminal(s) shall be a maximum of 24 inches from the roof edge. Spacing between terminals, if more than one is installed, shall not exceed 20 feet. The complete system shall include aluminum or copper clad lightning conductors and the conductors shall maintain a horizontal or downward path. All bends in the conductor(s) shall have a radius bend of 8 inches or greater, and shall have an angle bend of 90O or greater. Grounding rod(s) shall be constructed of copper, copper clad, or steel and be installed per the manufacturer's specifications.

515 Odor Control

515.01 An odor control chemical system shall be designed and provided by Evoqua, or approved equal. The system shall be installed per the approved drawings and Standard Construction Drawing Sa.S-36.

515.02 The odor control chemical shall meet the following specifications:

a) Material shall be free of any objectionable odor-producing compounds.

b) Concentration: minimum of 3.5 lbs. of nitrate oxygen per gallon – wt/wt.

c) Appearance: clear solution free from particulate matter.

d) Stability: temperature range -4 degrees F to 120 degrees F.

e). pH: The material shall not be less than 4.0 S.U. nor greater than 10.0 S.U.

f) Certificate of Analysis: A certificate of Analysis detailing the composition of the specific nitrate solution shall accompany each delivery.

g) Samples: t the County's request, a minimum 1,000 mL sample shall be provided with each delivery. The material required under this specification shall be used to remove hydrogen sulfide, thereby preventing odor and corrosion within wastewater collection and treatment systems. The material shall utilize and enhance naturally occurring biochemical treatment processes to accomplish hydrogen sulfide removal. The material shall be a liquid-phase product. It shall be delivered, stored, and fed into the wastewater via standard liquid-phase chemical handling procedures.

515.03 The odor control system shall contain the following components:

a) One (1) storage tank – 2, 000-gallon minimum capacity

b) A spill/storage tank failure containment system constructed of 3000 psi minimum,

cast-in-place or precast concrete.

c) The drainage from containment system shall be directed to wet well

d) A NEMA 4X Stainless Steel Control Panel

e) All piping, valves, fittings, gauges, and electronics necessary for complete operation.

f) A 1,000 ml in-line graduated cylinder for pump calibration

g) A stainless steel pipe support stand.

h) 2" PVC fill lines with ball valves and quick connect couplings. i) All miscellaneous piping, fittings, filters, etc. needed to complete the system.

515.04 Odor control chemical tank shall include two (2) variable frequency drive, Gorman-Rupp Bellows chemical feed pumps with adjustable feed rate.

515.05 Odor control chemical tank shall include a leveling device connected to the station's SCADA system that monitors tank level.

515.06 The contractor shall furnish the concrete pad and containment with all in-slab piping and conduit. All electrical connections and wiring shall be done by the contractor.

515.07 The contractor shall furnish and install all necessary slab openings, sleeves, and sealant.

515.08 The contractor shall furnish and install all hangers, supports, and blocking for piping.

515.09 All hardware required for installation shall be stainless steel, furnished and installed by the contractor.

515.10 Floor drain in odor control chemical tank containment area shall be Zurn Z550 with ball type back water valve and drum trap Zurn Z-1099, or approved equal with 6-inch outlet and 9-inch strainer. Floor grate shall be installed flush with finish floor.

516 Pressure Gauges

A liquid filled pressure gauge shall be provided on the force main at the location shown on Standard Construction Drawing Sa.S-36. The pressure gauge shall be liquid filled and have a range that covers the operating range of the system. The pressure gauge type and manufacturer shall be submitted for approval by the Sanitary Engineer. The common force main discharge line shall have a pressure gauge capable of outputting a 4-20 mA signal to be monitored by the Multi-Smart SCADA System. This gauge shall be a Rosemount pressure transmitter gauge.

517 Magnetic Flowmeter

Magnetic flowmeters shall be provided on the force main at the location shown on Standard Construction Drawing Sa.S-36. Flowmeters shall be pulsed direct current induction meters with the following specifications:

a) System accuracy, 2.0 percent of rate from 0 to 10 percent of range, 0.4 percent of rate from 10 to 100 percent of range.

b) System repeatability, 0.5 percent of rate in 10 to 100 percent flow range.

c) Drift, complete zero stability.

d) Ambient temperature range of -20 to 150 degrees Fahrenheit.

e) Minimum fluid conductivity limit of 5 microsiemens per centimeter or higher.

f) Process fluid temperature of 190 degrees F maximum.

g) Range adjust, continuously adjustable from 1 to 31 feet per second (fps).

h) Signal output, 4-20 milliamperes direct current (mAdc) isolated into 0-800 ohms, isolated. Filed selectable active or passive scaled pulse output, relay output assigned to various functions.

i) Power requirements, 120 V alternating current (Vac) + 10 percent, 60 Hz, 30 W maximum. Provide magnetic flowmeter manufactured by Siemens, Model 5100W with integral 5000 transmitter.

518 Air Release

An air release as manufactured by Vent-O-Mat, Model 050RGX1021 shall be provided at the location shown on the Standard Drawings.

519 Electrical

519.01 Provide components that comply with NFPA 70 and that are listed and labelled by UL where applicable.

519.02 A 110-volt GFCI duplex outlet and lighting for the work area shall also be included.

519.03 Tamlite® W2LED Series exterior lights with photocell and switch inside the building shall be installed to provide light to the wet well area. Two LED lights capable of producing

sufficient light as approved by the Engineer shall be provided overlooking the wet well and the access drive. Lighting placement shall be in accordance with the standard drawings.

519.04 All electrical components within the Motor Control Center shall be manufactured by Allen Bradley.

519.05 Lighting Panel: Provide a 3 phase-4 wire 208Y/120-volt lighting panel. Provide in NEMA 1 enclosure with 150-Ampere main circuit breaker and branch circuit breakers as shown on drawings. Panel shall be sized to allow up to 12 single pole branch circuit breakers. Provide ground fault interrupt circuits as required by NEC. All components shall be manufactured by Square D Inc.

519.06 Service Entrance Disconnect Switch: Provide 600 Volt, 200 Ampere, 4-wire, heavy duty fused disconnect switch rated for service entrance use. Switch shall be load break and HP rated for the application. The enclosure shall be NEMA 1 rated with a pad-lockable handle. Provide with Class J fuse rated sized at 150 amperes.

519.07 Transfer Switch: Provide 600 Volt, 200 Ampere, 3 pole.

519.08 Power Panel: Provide 3-phase 4-wire power panel with 150-ampere main circuit breaker rated for 480Y/277 Volts. Provide in NEMA 1 enclosure with branch circuit breakers as shown on drawing. Panel shall be sized to allow up to 6-3 pole branch circuit breakers. Provide ground fault interrupt circuits as required by NEC.

519.09 Distribution Transformer: Provide 3-phase, 30 KVA, NEMA 1 dry type transformer with 480-volt primary and 208Y/120-volt secondary. Provide mounting bracket to keep transformer off floor.

519.10 Site Lighting: Provide lighting contactor with Hand/Off/Auto selector switch control in building to control lighting mounted on outside of building as shown on standard drawing.

519.11 Provide photocell mounted on building and connect to auto circuit to control outside lighting.

519.12 Building Lighting: Provide ceiling mounted luminaires in Control Room and Valve Room as shown on standard drawings. Luminaires shall be LED and shall have at least 1200 initial delivered lumens, a luminous efficacy of at least 71 lumens/W, a color temperature of 4000K, at least 80 CRI, an estimated life of at least 50,000 hours, and shall include a minimum 1-year warranty on the entire luminaire including the driver.

519.13 Building Exhaust Fan: Provide fan with integral control as shown on Standard Drawings. Fan shall be controlled by the lighted switch outside of the building.

519.14 Wiring and Schematics

a) Wire all power and devices to the Control Panels as detailed on the approved drawings.

b) Clearly identify and mark all conduits entering/leaving the Control Panels as of their destination.

c) Keep field wiring neat and bundled inside the Control Panels. All field wiring shall be contained in wire way provided within the Control Panels.

d) Keep conduit filings from entering panels when installing conduit.

e) Provide 3/4" plywood mounting board on wall of electrical room where panels are mounted.

f) Provide panel schematics and panel layout drawings for each control panel supplied. Items on the schematic shall be labeled to match the labels used on the panel layout and bill of material.

g) Provide wiring inside panels that is neatly bundled with wire ties and/or run inside plastic wire troughs. Terminate all device wiring on terminal blocks with no more than two (2) wires per screw. Provide 20% additional spare terminal blocks in each panel.

h) Provide terminals for incoming power and neutral connections.

i) Provide one wired terminal for every two field devices powered from the same wire. Provide one wired terminal for every two field devices sharing a common neutral.

j) Provide separate terminals for DC voltage / analog signal wiring.

k) Provide spare terminals for signal cable shield terminations.

l) Provide isolated space inside panel for intrinsically safe wiring as required by NEC and manufacture's recommendations.

m) Label all terminals and wires with individual and unique wire numbers. Provide industrial type wire markers, such as Brady "Wrap Around" type wire labels.

n) Provide labels with numbers that are printed, NOT “hand written", on each wire label. Provide Nameplates with individual designations for all control relays, breakers, fuses, and all other miscellaneous equipment mounted inside panels.

o) Provide sufficient wiring so that all doors may be fully opened for panel access without having to disconnect any wiring, terminal blocks, etc. Design interior of panels so that all devices, wiring, terminal blocks, etc. are easily accessible for maintenance and

testing.

p) Provide UL listed type MTW wire with 600 V insulation, minimum size AWG #18 copper for DC voltage / analog signal panel wiring, unless otherwise noted on the Standard Drawings. Keep all DC voltage / analog signal wiring separate from 120 VAC wiring.

q) Provide UL listed type MTW wire with 600 V insulation, minimum size AWG #16 copper for 120 VAC panel wiring.

r) Color code all 120 VAC panel wiring in the to identify it separately from analog signal and communications wiring, and keep 120 VAC wiring in separate wiring troughs from all other wiring. Panels are arranged such that all wiring from the terminal blocks to the field is separated from that wiring within the panel. Maintain this segregation.

s) Contractor shall utilize sweeps only (no elbows) for conduit directional changes.

t) Connect all service line wires to main line wires using Duratrace™ Part #3WB01 (blue), Copperhead® LSC12-Blue, or Pro-Trace® #73901 weatherproof underground wire connectors.

519.15 Control Panels

a) Provide a new Pump Control Panel, Sewage Grinder Control Panel and SCADA panel constructed of new and un-deteriorated parts and components. Panels are to be installed in the building.

b) Provide panels that are factory wired and tested prior to shipment so that field installation will consist only of setting panels in place and making final field connections.

c) Provide and install all switches, pilot lights, and other panel devices as specified herein or as noted on the approved drawings.

d) Provide all plug-in control relays in Control Panels as noted on the approved drawings.

e) Provide original and three spare fuses for each type and size fuse in the panel.

f) Mount sub-panel as indicated on the approved drawings.

g) Pump monitoring equipment shall be manufactured by Multitrode, Inc

h) Provide a NEMA 4X enclosure that is UL, CSA, and IEC approved and sized as required. Provide enclosure complete with full size sub panel. Pump supplier shall provide enclosure. Provide enclosure that is fabricated from 14-gauge stainless steel

with the following features:

I. Continuously welded and ground smooth seams.

II. Oil-resistant continuously gasketed doors.

III. 3-point latching mechanism operated by an oil-tight key locking handle.

IV. Heavy gauge continuous hinges.

V. Removable print pocket mounted on door.

VI. Collar studs for mounting sub panel.

VII. Ground stud welded on door.

VIII. Finish to be white epoxy polyester coated inside and ASNI 61 high solids re-coatable gray finish outside.

IX. Sub panel to be full size of enclosure and constructed of 10 to 12-gauge steel with white epoxy polyester coated finish.

519.16 Circuit Breaker:

a) Provide molded case circuit breakers with inverse time and instantaneous tripping characteristics size per NEC requirements.

b) All circuit breakers shall have ground fault protection where indicated or as required by NEC.

c) Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make/quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be non-welding silver alloy, and arc extinction shall be accomplished by means of arc chutes.

d) A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.

519.17 Circuit Breaker Handle: Provide Allen Bradley Non-Rotary Circuit Breaker Operating Mechanism. Breakers shall be accessible (through the door type) without opening the main door.

519.18 Smart Motor Controller: Provide Allen Bradley Bulletin 150 Smart Motor Controller - SMC Dialog Plus. Provide SMC Dialog Plus units that are properly sized for the load they are controlling.

a) Control Power Transformer: Provide a control power transformer that is size properly supply 120VAC control power for the Pump Control Panel and its associated equipment.

Provide a transformer that is 480 VAC single phase primary, 120 VAC single phase secondary.

b) Current Transformer: Current transformers shall be provided to monitor 3 phases of each pump. Current transformers shall have the capability to allow the Multi-Smart/SCADA System to monitor pump drain. Current Transformers shall be manufactured by Allen Bradley.

519.19 Pump Selector Switch: Provide Allen Bradley Model 800T (NEMA 4/13) 3 positions-maintained contact non-illuminated selector switches with contacts rated for 125 VAC operations. Provide switches complete with contacts as required and legend plates engraved as shown on the contract drawings.

519.20 Back up float system in operation pilot light: Provide Red Allen Bradley Model 800T pilot lights rated for 125 VAC. Provide complete unit with engraved legend plates as shown on the contract drawings.

519.21 Control Relays: Provide 120 VAC control relays with DPDT contracts rated for 5 amps (minimum) at 120 VAC. Provide relays as required, complete with mounting sockets.

519.22 Pump Control Panel Interior Light: Provide Hoffman low profile 120 VAC fluorescent light, or approved equal. Provide light complete with integrally mounted manual switch and properly sized bulb.

519.23 Backup Float System: A one-float back-up level control system shall be included to act as an emergency back-up level control system if the main system or level probe should fail. The backup system will operate when the pump selector switches are in Auto Mode. Indication shall be provided on the control panel when the backup float system is in operation and a signal shall be sent to the telemetry system. The back-up level control system will include one encapsulated mercury float switch, Flygt ENM 10, suitable for suspending directly into wet will and an analog Allen Bradley Timer. Furnish the float with required length of 16/2 SJO cord. Float shall be "UL" approved and suitable for operating intrinsically safe relays. Provide flat, stainless steel mounting brackets for suspending float with cord grips included. When the backup float is reached, the first pump will turn on and the second pump will turn on 10 seconds later. Both pumps will run for an adjustable time period then shut off.

519.24 Control Panel Operations: All control panel components shall be integrated to form a complete and functioning system.

a) Interconnection schematics shall be submitted with shop drawings that detail how

each component is wired and grounded.

b) All programmable settings shall be submitted with shop drawings that detail how the system will function.

519.25 Level Sensing:

a) A Multi-Stage Level Sensing Device designed to detect liquid level at specified intervals in tanks or sumps and interface with an electronic controller for pump control and liquid level display. The level sensing equipment shall be Multitrode 3 M level sensing probe with 1 foot increments.

b) Probe Cable: The flexible cable used for the level sensing probe shall be comprised of PVC/PVC multi-conductor construction with a common oversheath that is water and oil resistant. The multi-conductor cable shall be identified with numbering and text along the entire length of the outer sheath at required intervals. Individual conductors of the multi-conductor cable shall be numbered for easy identification, as well as connection to the pump controls.

c) Cables: Cables shall be secured to the top of probe bodies by synthetic rubber compression fittings for strain relief. Flexible cables shall be rated to physically support the combined weight of the level sensing probe and any suspended cable connected to the probe.

d) Mounting and Installation: Mounting connections shall be stainless steel. The mounting assembly for probes shall include a device available to maintenance personnel to clean the level sensing probe at desired maintenance intervals.

519.26 SCADA: The SCADA system shall be Multitrode Outpost Control and Monitoring software connected to the County's wireless network with an MDS iNET 900 MHz spread spectrum radio. District staff shall conduct a radio/telemetry study to determine antenna type and installation height. Contractor shall furnish and install all equipment necessary for the SCADA system, including radio, antennas, etc.

Multi-Smart/SCADA shall monitor the following additional I/Os:

a) Power failure

b) Sewage Grinder unit running

c) Sewage grinder failure

d) Odor control chemical alarm

519.27 A High Tide high level backup SCADA alarm shall be included.

a) Model No. is HTT-900

b) Communication: cellular

c) Input Power: 100-240V / 50-60Hz

d) 12 Discrete inputs

e) Enclosure: 8in x 10 in, Nema 4X FRP or Dinrail kit

f) Operating Temperature: -25C to 70C

g) Built-in power fail monitor and battery backup.

h) Backup Battery: 12V 1-2 days

i) High level backup alarm.

519.28 Backup Generator:

a). General: Provide all labor, tools, equipment, and materials necessary for a complete and functional engine-generator system in accordance with the plans and as specified herein for the engine-generator set, batteries, battery charger, to include automatic transfer switch, exhaust system, weatherproof housing, sub-base fuel tank.

b). Codes: Perform all work in compliance with all applicable federal, state, and local codes and regulatory requirements, the National Electrical Code (NEC), National Fire Protection Association (NFPA), Underwriters' Laboratories, Inc. (UL), American National Standards Institute (ANSI), National Electrical Manufacturers Association (NEMA), Institute of Electrical and Electronic Engineers (IEEE).

c). Submittals: Product data, shop drawing, wiring diagrams. Show all components and features specified. Show all connections to feeders, load, and accessory equipment. Differentiate between factory installed and field installed wiring and components.

I. Quality Control Submittals

a. Submit warranty documents.

b. Submit manufacturer's current installation recommendations.

c. Submit factory test report prior to shipment.

d. Submit certified copies of the field test report.

e. Submit Operation and Maintenance Manuals

II. Include instructions on storage, installation, start up, operation and maintenance.

III. Submit a complete parts list and a recommended spare parts list.

d). Generator Details

I. Manufacturer: Kohler or Cummins.

II. Sizes, Ratings, and Quantities

a. Output power: to be sized according to pump and voltage requirements.

b. Output voltage: 480Y/277 volt, 3-phase, 4-wire, 60 Hertz at rated speed.

c. Maximum voltage dip: 20 percent root mean square (RMS) voltage dip as measured during the fourth complete cycle following the application of the load.

d. Steady state frequency regulation: ±0.5 percent.

e. Maximum frequency dip. 10 percent.

f. Altitude rating: 850 feet above sea level.

g. Temperature: 105 deg F maximum and -20 deg F minimum.

h. Rated for continuous standby operation.

i. Single step load pickup: Meet NFPA 110 requirements.

e). Engine and Accessories

I. Manufacturer: John Deere.

II. Liquid cooled.

III. Four stroke cycle.

IV. Full compression, diesel for use with No. 2 diesel fuel or natural gas where available.

V. Replaceable cylinder liners.

VI. Valves shall not require adjustment while in service.

f). Base

I. Mount the engine-generator set on a structural steel base.

II. Base shall maintain proper alignment between components during shipment, installation, and operation.

III. Vibration Isolators

a. Provide vibration isolators to prevent transmission of vibrations from the generator to the foundation and surrounding structures.

b. Isolators shall provide a minimum of 90 percent isolation.

g). Remote Annunciator

I. Battery powered.

II. Meeting Level 1 requirements of NFPA 110.

III. Provide the following alarms and controls:

a. Audible alarm and silence button.

b. Lamp test button.

c. Over-crank alarm light.

d. Low coolant temperature alarm light.

e. High coolant temperature pre-alarm light.

f. High coolant temperature shutdown light.

g. Low oil pressure pre-alarm light.

h. Low oil pressure shutdown light.

i. Over-speed light.

j. Low fuel light.

k. Control switch not in auto light.

h). Batteries

I. Lead-acid.

II. Ampere-hour rating equal to or greater than the manufacturer's recommendations.

III. Capacity for a minimum of three cranking cycles in the ambient temperatures specified.

IV. Unit mounted rack for battery mounting.

V. Battery cables of adequate size to prevent voltage drop problems during cranking cycle.

VI. Engine block heater.

VII. Provide a battery charger.

i). Sub-base Mounted Fuel Tank

I. Leak Detection

a. Provide an inter-tank leak detector with alarm contact

b. Provide control panel for local and remote annunciation of leak.

II. Provide fuel level gauge with adjustable low level alarm contacts.

j). Weatherproof Housing

I. General: Completely enclosed weatherproof/sound attenuated housing to protect the generator from adverse weather conditions and reduced the sound. The sound enclosed housing shall provide average of 75 dB sound level at 23 feet and shall meet state and local regulations to restrict the level sound near the residential area.

II. Constructed of reinforced sheet steel, primed and painted.

III. Lockable, removable side panels.

IV. Lockable door over the generator control panel.

V. Generator silencer mounted inside housing.

k). Disconnect Switch – Provide circuit breaker at the generator.

END OF CHAPTER

Chapter VI - Waterlines

601 - Description:

This section describes the work required to install waterlines including the pipe, valves, fittings and appurtenances. Work includes all clearing and grubbing; removing and restoration of fences, sidewalks, pavement, mailboxes, and other property; trenching; bedding and backfill; constructing, providing and removing all dewatering and pumping systems; all shoring, cribbing and sheeting; testing; and any other work associated with installing complete usable waterlines, including taps, fire hydrants, air releases and structures. The requirements stated in this chapter supplement and are in addition to those stated in Chapters I, II, and III, whether or not a section is specifically referenced herein.

602 - Materials:

The waterline and associated materials and equipment shall be as shown on the construction drawings and specified in Chapter II of these Specifications.

603 - Trench Excavation:

The trench shall be excavated in accordance with Section 302 of these specifications.

604 - Bedding:

The bedding shall be placed in accordance with Section 304 of these specifications. Class B bedding shall be used except when a higher class of bedding is required. Class C bedding shall not be used unless written authorization is received from the County Sanitary Engineer.

605 - Laying Conduit:

The general location of waterlines and fittings shall be as shown on the Construction Drawings. If during construction, unforseen conditions arise, the horizontal location of the waterline may be changed as directed by the County. If it is necessary to change the grade of the waterline, it shall be lowered unless specific approval to raise the waterline is given by the County. Unless otherwise shown or approved, the waterline is to be installed with a minimum of four (4) feet of cover to the top of the waterline from the existing or proposed ground or finished grade.

605.01 Concrete blocking, supports and buttresses shall be provided at all tees, bends, valves, plugs, hydrants and any other location shown on the construction drawings or directed by the County. These concrete structures shall be built to the lines, grades and dimensions shown on the Standard Drawings of Class C concrete as per Section 205.

605.02 During any construction where the outside temperature is below 40° F, all rubber gaskets and lubricants shall be kept in a heated area at least 40° F until needed. No gasket or lubricant shall be out of the heated area more than 5 minutes before being placed in the bell or on the

spigot of the pipe. The Contractor shall lubricate all joints according to the manufacturer's recommendations.

605.03 The Contractor shall furnish and install, prior to testing all fittings, blow offs, pressure reducing valves, air release valves, and water service taps in the number and sizes shown on the construction drawings, or at locations selected by the County. The connection outlets shall be designed for attaching valves and other appurtenances as shown on the Construction Drawings, which appurtenances are to be furnished and installed by the Contractor.

605.04 The Contractor in connection with the laying of waterline shall furnish and install all valves as shown or as directed by the County. Such valves shall be provided with mechanical joint ends, restrained as appropriate, unless otherwise shown or approved by the County, and the Contractor shall furnish and install any special casting necessary to complete the valve installation as shown on the Construction Drawings. Set screw type joints are not acceptable when used on PVC pipe.

605.05 The Contractor shall furnish and install all plugs, bends and fittings necessary for the construction of the pipe along the route as shown by the Construction Drawings.

605.06 The Contractor shall place six (6) inch wide metallic detection tape over the centerline of the water mains at a vertical distance of no less than twelve (12) inches and no more than eighteen (18) inches below the finished surface grade. Tape shall be blue as specified by the APWA color code and shall bear the words "CAUTION ...WATER LINE", permanently on the tape.

606 - Backfill:

All trenches and excavations shall be backfilled in accordance with Section 305 of these specifications.

607 - Hydrostatic Tests:

A hydrostatic test, as required in Section 7.3 of AWWA Specification C605 for PVC Pipe or Section 5.2 of AWWA Specification C600 for Ductile Iron Pipe, as applicable, shall be applied to the whole or individual valved off sections of the waterlines, service connections and fire hydrant leads either before or after the trench is backfilled. The pressure during the test shall be maintained at 150 psi in any section being tested. The duration of each pressure test shall be at least two hours. The Contractor shall furnish all gauges and materials, make all taps required and furnish a pump, piping, and other equipment and all necessary assistance for conducting the tests. Before applying the specified pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made by the

contractor at points of highest elevation, or as required. Taps shall be of the sizes as shown on the construction drawings or as directed by the County.

No pipe installation will be accepted until or unless any leakage (evaluated on a pressure basis of 150 psi) is less than 1.99 U.S. Gallons per hour per 100 joints of pipe of 12-inch nominal diameter and correspondingly varied for other sizes of pipe as provided in AWWA C600 and AWWA C605 Specifications.

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within five (5) psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Any testing performed against existing valves shall be at the Contractor's risk and in strict compliance with the requirements of the Engineer. If unable to achieve the required test, the Contractor shall disconnect from the existing valve, plug and re-test until satisfactory results are obtained. Any damage caused to existing facilities shall be repaired at the Contractor's expense.

608 - Disinfection of Potable Water Facilities

The completed potable water facilities shall be disinfected by the Contractor in accordance with AWWA C651 (water mains, valves and fire hydrants); C652 (storage facilities); C653 (water plants); and C654 (wells). All labor, material, and equipment required for disinfection and testing will be furnished and paid for by the Contractor, including disinfection taps and blow-off taps. Taps shall include tapping valves, sufficient tubing or pipe extending outside the trench and an operable valve above ground. Blow-offs shall be installed where shown on the Construction Drawings or as directed by the County. The time and section of line to be chlorinated shall be approved by the Engineer. Special attention is directed to applicable sections of AWWA C651, particularly for flushing, chlorinating, and bacteriological testing of valves, mains, and fire hydrants. All disinfection and blow off taps and the corp will be removed and a TPS- Quick Cam Repair Clamp installed.

609 - Valves:

Valves larger than two inches shall conform to Section 215. Valves two inches and smaller shall conform to Section 216.01 and 216.02.

609.01 Extension Stems: If the top of the operating nut is more than 36 inches below the finished grade, an extension stem shall be provided to place the operating wrench nut between 24 inches and 36 inches of the finished grade. Cost of extension items shall be included in the unit price for the various valve types and sizes.

609.02 Valve Boxes: Unless otherwise noted on the Construction Drawings or directed by the Engineer, all valves larger than two inches shall be provided with Standard Heavy Duty, Valve Boxes of the Buffalo type by Bingham and Taylor Model 4905 Size 22 or equal. Covers for the boxes shall be marked "WATER". All boxes shall be provided with the necessary extensions to bring the top of the box to finished grade.

All valve boxes shall be installed such that they are centered vertically over the valve operating nut and such that the box provides maximum cover of the operating housing. Boxes that are to be installed in areas subject to vehicular travel shall be the Traffic Type Valve Boxes. All boxes shall be as shown on the Standard Construction Drawings. Valve boxes that do not allow ready access to valve operating nuts shall be removed and replaced to comply with this specification.

609.03 Valve Supports: Concrete piers or supports of the size shown on the plans or Standard Drawings shall be provided under all valves.

609.04 Operation: All valves which affect the flow of water in waterlines or service lines are to be operated by the County Utilities Department personnel only.

609.05 Under no circumstances should valves be used to connect misaligned pipes during installation.

609.06 Plugs and caps: All dead ends on new mains shall be closed with a plug and valve that are suitably restrained to prevent blowing off under test pressure. If a blowoff valve precedes the plug, it too shall be restrained against blowing off. Such restraints shall be installed for support from the proceeding section of pipe to prevent blowing off of the plug and valve under waterline pressure in an open trench condition. In lieu of restraints, two full sections of pipe with a plug can be laid after the valve to allow for excavations and extension without the valve blowing off. All dead ends shall be equipped with suitable blowoff venting devices or flushing hydrants, as approved by the County.

610 - Tapping Waterlines, Water Services:

The Tapping sleeve shall conform to Section 213.08 and 216.04, and the valves shall conform to Section 215 of these Specifications except that the inlet joints of the valve shall be designed for the sleeve provided, and be designed to permit free passage of the tapping machine cutters.

610.01 Installation of Taps Larger Than 2": After the sleeves and valves are installed but before any cut is made or any concrete supports or backers installed, the sleeves and valves shall be

tested under 150 pounds per square inch air or water pressure, for a minimum of fifteen (15) minutes, to check for leaks. Whenever the valves and sleeves show no leaks, the Contractor shall make the cut through the wall of the pipe to be tapped under pressure, and pour the concrete supports and thrust backers specified, shown or required. All tapping valves shall be provided with the "Standard Heavy Duty Boxes" as provided under Section 609.02 unless otherwise specified.

610.02 Installation of 2" or Smaller Taps: Water service taps 2 inch and smaller may be installed by jacking or boring under existing pavement. The jacking procedure used shall be such as not to bend or kink the service pipe, nor strain the pipe joints. The pipe from the waterline connection to the control valve shall be installed to the grade and elevations shown on the Construction Drawings, but in no case shall less than 3' - 6" of cover be provided. Bends in taps are to be minimized and must be approved prior to installation.

Curb boxes shall be located at least 2.0 feet from the edge of the proposed sidewalk between the side walk and the proposed building or 1.0 foot inside the proposed Right-of-Way line. In new developments, taps shall be made and the service line laid within the Right-of-Way or under the street, roadway or paved areas after paved areas are rough graded and prior to the installation of the proposed pavement. If laid by open cut methods, the trench shall be backfilled in accordance with Section 305. All water service taps shall be pressure tested from the waterline connection to the control valve and all leaks shall be repaired.

On new residences, water service lines shall enter the home at the front corner opposite the garage. The service lines must be sleeved through the basement or foundation wall under driveways or sidewalks, by Schedule 40 PVC pipe sized two times the water service line size, with the sleeve extending outside the wall three (3) feet. Seal the water line in the sleeve.

610.03 The control valve may, with County approval, be the tapping valve for water services larger than 2 inches which do not cross under existing or proposed pavement.

610.04 Water service lines and waterlines larger than 2 inches shall be tested, in accordance with Section 607 of these Specifications, between the tap and the last valve or the meter inlet and valve. Water service lines 2 inch and smaller shall be tested at normal water pressure from the curb box to the angle stop inside the structure by visible inspection of a County

representative, unless they are installed with the waterline in which case they shall be tested per Section 607 of these Specifications. All service lines or water lines shall be flushed and chlorinated per Section 608 of these Specifications.

610.05 No service line shall be less than 3/4 inch internal diameter. If necessary to provide adequate supply and pressure, larger size lines may be required by the County.

610.06 All water service lines shall be laid at least three feet six inches (3'-6") below the ground or pavement surface with no couplings. No water service line shall be laid in the same trench with a sewer, sewer service line, or gas line. A horizontal separation of at least ten (10) feet shall be maintained from any sanitary sewer, storm sewer or service line. All water services to be constructed in or across existing paved roads shall be done by boring and jacking the line under the surface. The cutting of existing paved surfaces for this purpose will not be permitted except by special permission of the County, Township, or authority having jurisdiction. Refer to Standard Construction Drawing W-30.

610.07 No service lines are permitted entry into or through any crawl spaces service and house side shut-offs must be installed within 12" on either side of the meter yoke. No meter bypasses are permitted.

610.08 The following criteria must be met in order to use directional drilling for service line installations. These requirements do not waive any other installation criteria in the County regulations.

A. Waterline material must be HPDE SDR 9. The installation shall be seamless with no fittings or connections other than at the angle stop and curb box.

B. Directional bores shall not exceed 100' in length unless specifically approved by the County.

C. At the time of inspection by the County, the directional bore contractor shall provide documentation of the depth of the line along the entire length of the bore. The waterline shall be a minimum of 48" below grade at all times.

D. The contractor shall provide a pressure test on the line for a minimum of 10 minutes at 150 psi with no allowable pressure loss.

610.09 Water Service connections for new developments shall be installed along the side lot line and the line shall run as straight as possible to the building. In no case shall the water service line run onto another lot or property, or parallel to the right-of-way.

610.10 The meter and MIU will be provided by the County. The builder shall install the wire within the building from the meter to the MIU on the outside of the building. MIUs shall be installed on the outside of the building in a location selected by the County.

611 - Unapproved Materials:

In the event unapproved materials are discovered to have been incorporated in the project, they shall be removed and replaced with approved materials prior to performing any additional work. The work will not be accepted until the unapproved materials are replaced and an inspection of the new waterline is conducted and accepted.

612 - Unloading:

All pipe, fittings, valves, hydrants, and accessories shall be loaded and unloaded by lifting with lift hoists or skidding in order to avoid shock or damage. Under no circumstances shall such material be dropped. Pipe handled on skidways shall not be rolled or skidded against other pipe.

Unless otherwise specified, the contractor shall be responsible for all unloading and loading of materials at the jobsite. To avoid damage, all pipe and appurtenances shall be loaded and unloaded with care and in accordance with the manufacturer's recommendations.

Unloading shall be done by lifting with a fork truck, a crane, or other suitable lifting device. Pipe shall never be rolled off the truck or railcar. When pipe is being unloaded one at a time, or in single layers, the restraining bands or straps shall be removed only from the layer being unloaded. Steel bands shall be cut with a long-handled bolt cutter or similar tool. Do not cut the bands with an ax, chisel, or other tool likely to cause product damage or personal injury. Personnel not directly involved in the unloading operation shall stand clear of the load. Inspect, repair, and replace lifting devices on a timely basis.

613 - Storage:

If stored, materials shall be kept safe from damage. The interior of all pipe, fittings, and other appurtenances shall be kept free from dirt, or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

Gaskets shall be stored in accordance with Section 605.02, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

Mechanical joint bolts shall be handled and stored in a dry location in a manner that will ensure proper use with respect to types and sizes.

Prolonged exposure to sunlight will eventually deteriorate polyvinyl chloride pipe and polyethylene film. Therefore, such exposure prior to backfilling the pipe should be kept to a minimum.

614 - Pipe Installation:

Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench by means of a backhoe, crane, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water mains be dropped or dumped into the trench.

614.01 Examination of Material: All pipe, fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for final disposal.

614.02 Pipe Ends: All lumps, blisters, and excess coating shall be removed from the sock and plain ends of each pipe. The outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.

614.03 Pipe Cleanliness: Before lowering the pipe into position in the trench, all dirt, and foreign matter that cannot be removed by normal flushing shall be cleaned by mechanical means. The County shall determine when such mechanical cleaning is required. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing, or other materials shall be placed in the pipe at any time.

614.04 Pipe Placement: As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to final line and grade. The pipe shall be secured in place with approved bedding material.

614.05 Pipe Plugs: At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means as specified. The plug shall be fitted with a means for venting. The plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation if the trench fills with water.

615 - Joint Assembly:

615.01 Ductile Iron Pipe joints assembly shall conform to AWWA C500.

615.02 Polyvinyl Chloride Pipe joints shall conform to AWWA C605.

616 - Hydrants:

All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb, with 4 ½" pumper nozzle facing the curb. The full weight of the hydrant shall not be carried by the pipe.

Hydrants shall be installed away from the curb line at a sufficient distance to avoid damage from or to vehicles in accordance with the Standard Construction Drawings. Hydrants shall be "Traffic Model" and be installed so that the breakaway flange is not less than 2 inches, nor more than 6 inches above final established grade.

Each hydrant shall be connected to the main with a 6 in. or larger diameter branch controlled by an independent valve, minimum of 4 ¼" in size. The valve shall be restrained to allow shutoff when the hydrant is to be removed. The hydrant and valve shall be set on Class C concrete as detailed in the Standard Construction Drawings.

The contractor shall provide a course-aggregate drain pocket or drain pit for dry-barrel hydrants. The installation recommendations of AWWA Manual M17, Installation, Field Testing, and Maintenance of Fire Hydrants shall be followed.

Fire hydrants shall be American Flow Control Model MK-73 or Mueller Super Centurion 250 Model A-421, as shown on Standard Drawing W-20, and be installed as per Standard Drawings W-21, W-22, W-23 and W-24. Fire hydrants and lids of watch valve boxes shall be thoroughly cleaned and prepped, be primed with one coat Tnemec Uni-bond DF Series Gray and be painted with two coats Tnemec Enduratone Series 1028 Chilean Red for the top coats. Hydrants shall be of the same manufacturer as consistent within a subdivision or service area

All hydrants shall be lubricated with FDA approved food grade lubricant. Chains shall not be provided on hydrants.

617-698 - Reserved

699 - Penalty:

Whoever violates any provision of this Chapter or County directive pursuant to this Chapter shall be subject to the remedies of **Section 199 - Penalty** of these Regulations.

END OF CHAPTER

Page Left Intentionally Blank

EXHIBIT A

DAILY CONSTRUCTION INSPECTION REPORT

FAIRFIELD COUNTY UTILITIES

6670 Lockville Road
Carroll, OH 43112

614.322.5200 740.652.7120
fax 614.322.5203 740.652.7129

DAILY CONSTRUCTION INSPECTION REPORT

Prime Contractor: _____ Day/Date: _____ Report No.: _____

Subcontractor(s): _____ Project: _____

Copies: _____ Project/Section No.: _____

Temp (time am/pm): _____ Weather (time am/pm): _____

Work Force (Total): _____ Worker Classifications: _____

Equipment Operating: _____

Hours Worked (Contractor): _____ am/pm to _____ am/pm = _____ Hours

Materials Delivered: _____

Equipment Delivered: _____

General Site Conditions (time am/pm): _____

Problems/Delays: _____

Clarifications/Information: _____

Site Visitation: _____

Accident/Safety Observations: _____

Observations Performed: _____

Testing Performed: _____

Hours Worked (Field Rep.): _____ am/pm to _____ am/pm = _____ Reg Hours & _____ OT Hours

Field Representative: _____ Mileage: _____ Miles

Inspection Supervisor: _____ Date: _____

Follow-Up Action Required: _____ Sewer ☐

Water ☐

EXHIBIT B

PRESSURE PIPE
TEST DATA SHEET

FAIRFIELD COUNTY UTILITIES

6670 Lockville Road
Carroll, OH 43112

614.322.5200 740.652.7120
fax 614.322.5203 740.652.7129

PRESSURE PIPE TEST DATA SHEET

Prime Contractor: _____ Date: _____

Subcontractor: _____ Project: _____

System Tested: _____ Weather Conditions: _____

Plan Location: _____ Site Conditions: _____

Length Tested: _____ _____

Type: _____ Diameter: _____

Type of Joints: _____ Classification: _____

Valves (in test length)

Size	Number	Type	Open	Closed
			☐	☐
			☐	☐
			☐	☐
			☐	☐

Test Data

Type of Test: _____

Working Pressure (psi): _____ Specified Test Pressure (psi): _____

Maximum Rated Pressure (psi): Pipe: _____ Valves: _____

Actual Test Pressure (psi): Start: _____ Finish: _____

Start Time: _____ Finish Time: _____ Duration: _____

Comments & Problem Areas: _____

_____

Test Results: (circle) Acceptable Not Acceptable

Corrective Action Required: _____

Subcontractor's Representative (Name/Company): _____

EXHIBIT C

SANITARY SEWER
TEST DATA SHEET

FAIRFIELD COUNTY UTILITIES

6670 Lockville Road
Carroll, OH 43112

614.322.5200 740.652.7120
fax 614.322.5203 740.652.7129

SANITARY SEWER TEST DATA SHEET

Prime Contractor _____ Date: _____

Subcontractor: _____ Project: _____

System Tested: _____ Weather Conditions: _____

Plan Location: _____ Site Conditions: _____

Length Tested: _____ _____

Date of Installation: _____ ☐ 30 Day Requirement Met

Piping

Type: _____ Diameter: _____

Type of Joints: _____ Classification: _____

Test Data

Type of Test: _____

Allowable Leakage: _____ Specified Test Pressure (psi): _____

Pipe Under Testing					Field Test Operational Data					
Up-Stream MH #	Down-Stream MH #	Dia D. (in)	Length L (ft)	Speci-fication Time	Pressure Initially Raised to (psig)	Time Allowed for Pressure to Stabilize (min)	Start Test Pressure (psig)	Stop Test Pressure (psig)	Elapsed Time (min:sec)	Pass or Fail (P or F)

Comments & Problem Areas: _____

_____

_____

Test Results: (circle) Acceptable Not Acceptable

Acceptable Corrective Action Required: _____

Subcontractor's Representative (Name/Company): _____

Prime Contractor's Representative (Name/Company): _____

County's Representative (Name/Company): _____