TECHNICAL SPECIFICATIONS

For

WASTEWATER TREATMENT FACILITIES

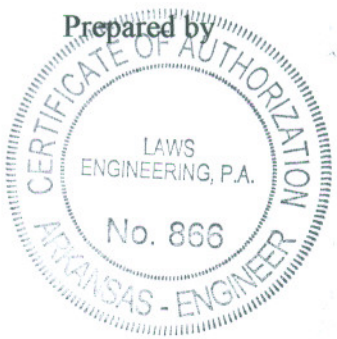
For

DEER CREEK DEVELOPMENT

Grant County, Arkansas

January 2006

Prepared by



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SECTION 01001

BASIC REQUIREMENTS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Summary of Work:

1. Description of Work.

B. Site Conditions:

1. Existing Utilities.

C. Contract Considerations:

1. Application for Payment.
2. Change Order Procedures.

D. Coordination and Meetings:

1. Cutting and Patching.
2. Conferences.

E. Submittals:

1. Submittal Procedures.
2. Construction Progress Schedule.
3. Shop Drawings.
4. Product Data.
5. Manufacturer's Instructions and Certifications.

F. Quality Control:

1. Quality Assurance.
2. References.
3. Manufacturer's Field Services.
4. Testing Laboratory Services.

G. Construction Facilities and Temporary Controls:

1. Temporary Electric Power and Lighting.

2. Temporary Water.
3. Sanitary Facilities.
4. Water for Testing.
5. Temporary Water Control.
6. Protection of Finished Work.
7. Progress Cleaning.
8. Removal of Utilities, Facilities, and Controls.

H. Material and Equipment:

1. Products.
2. Transportation, Handling, Storage, and Protection.
3. Substitutions.

I. Starting of System:

1. System Demonstration.

J. Contract Closeout:

1. Contract Closeout Procedures.
2. Final Cleaning.
3. Project Record Documents.
4. Operation and Maintenance Data.
5. Warranties.
6. Spare Parts and Maintenance Materials.

1.2 DESCRIPTION OF PROJECT

A. Wherever in these Documents the word "Engineer" appears, it shall be understood to mean Laws Engineering, P. A., acting either directly or indirectly as authorized agents of the Owner. In these Documents where the word "Owner" appears, it shall be understood to mean MWM Development, LLC.

B. Furnish and install a factory built above ground wastewater treatment plant.

1.3 EXISTING UTILITIES

A. Approximate locations of major utilities and structures are shown on the Drawings, there may be some discrepancies and omissions in the locations and size of utilities and structures shown.

B. Notify all utility offices that are affected by the construction operation at least 48 hours in advance.

1.4 APPLICATION FOR PAYMENT

A. Submit three copies of each application on EJCDC Form 1910-8E or other format approved by Engineer.
B. Contractor shall submit lien release for all previous progress payments for materials, labor, and equipment that has been billed to the Owner in the present pay request. Lien release shall be submitted to the Engineer with next Application for Payment. Application for Payment submitted without lien release from previous Application for Payment will not be approved for payment until Engineer has received lien release. Submit lien release on the following form found at the end of this Section.
C. Utilize Payment Schedule or Unit Prices for listing items in Application for Payment.
D. Pay Periods: Calendar Month.

1.5 CHANGE ORDER PROCEDURES

A. Submit on EJCDC Form 1910-8B.

1.6 CUTTING AND PATCHING

A. Employ a skilled and experienced installer to perform cutting and patching new Work; restore Work with new products.
B. Submit written request in advance of cutting or altering existing structures or utilities.
C. Fit work tight to adjacent elements and maintain integrity of existing work.

1.7 CONFERENCES

A. Engineer will schedule a preconstruction conference after Notice of Award for all affected parties.
B. Where required in individual specification Section, convene a pre-installation conference at project site prior to commencing Work of the Section.

1.8 SUBMITTAL PROCEDURES

A. Submittal form to identify Project, Contractor, subcontractor or supplier, and pertinent Contract Document reference.
B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction

Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

C. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

D. Revise and resubmit as required, identify all changes made since previous submittal.

1.9 SHOP DRAWINGS

A. Submit number of copies which the Contractor requires, plus four copies which will be retained by the Engineer.

B. Include as a minimum dimensions, size, location of connections to other work, weight of equipment, and supporting calculations.

1.10 PRODUCT DATA

A. Submit number of copies which the Contractor requires, plus four copies which will be retained by the Engineer.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this project.

1.11 MANUFACTURER'S INSTRUCTIONS AND CERTIFICATIONS

A. Submit as noted in individual specification Sections.

1.12 QUALITY ASSURANCE

A. Maintain quality control over suppliers, manufacturers, products, service, site conditions, and workmanship to produce work of specified quality.

B. Comply fully with manufacturer's instructions.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.13 REFERENCES

A. Conform to reference standard by date of issue current as of date of Contract.

B. Should specified reference standard conflict with Contract Documents, request clarification from Engineer before proceeding.

1.14 MANUFACTURER'S FIELD SERVICES

A. Representative shall submit written report to Engineer listing observations and recommendations.

1.15 TESTING LABORATORY SERVICES

A. Owner will select a testing laboratory to perform inspections, tests, and other services required by individual Specification Sections.
B. All costs for laboratory testing of earthwork and concrete shall be paid for by the Owner. The Contractor shall bear the costs for all tests required to be repeated.
C. Services will be performed in accordance with requirements of governing authorities and with specified standards.
D. Contractor shall cooperate with Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.

1. Notify Engineer/Testing Laboratory 48 hours prior to expected time for operations requiring testing services.
2. Make arrangements with Testing Laboratory and pay for additional samples and tests for Contractor's convenience.
3. Furnish and deliver samples/cylinders to lab for testing.

1.16 TEMPORARY ELECTRIC POWER AND LIGHTING

A. Provide and pay for power services required from source.
B. Provide power outlets for construction operations, branch wiring, distribution boxes, and flexible power cords as required.

1.17 TEMPORARY WATER

A. Provide water, as needed, for own use.
B. Provide an adequate supply of potable drinking water for use by employees and Engineer's employees.

1.18 SANITARY FACILITIES

A. Provide and maintain required sanitary facilities and enclosures.
B. Maintain clean and sanitary condition.

1.19 WATER FOR TESTING

A. The Owner shall provide the water for first time testing and shall determine the location where the Contractor can obtain the water. If test

fails, the Contractor shall be responsible to paying Owner cost for additional water for testing until the system being tested passes.

1.20 TEMPORARY WATER CONTROL

A. Maintain excavations and trenches free of water. Provide and operate pumping equipment of a capacity to control water flow.
B. Provide dewatering system and pumping to maintain excavations dry and free of water inflow on a 24 hour basis.
C. Provide piping to handle pumping outflow to discharge in a manner to avoid erosion or deposit of silt.

1.21 PROTECTION OF FINISHED WORK

A. Protect installed work and provide special protection where specified in individual specification Sections.

1.22 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Where work is performed in residential and commercial areas, cleanup sufficient to permit normal access and use by property owners shall be performed daily. Final cleanup shall be performed after each individual water or sewer extension has been installed. Failure to perform clean-up work as described above may result in retainage of an additional 10 percent of the cost of the work completed until the clean-up work has been completed or non-processing of additional pay requests.

1.23 REMOVAL OF UTILITES, FACILITIES, AND CONTROLS

A. Remove temporary erosion control construction, above grade or buried utilities, equipment, facilities, and materials, prior to Substantial Completion inspection.
B. Remove and repair damage caused by installation or use of temporary work.

1.24 PRODUCTS

A. Products: New material, machinery, components, equipment, and systems forming Work, but does not include machinery or equipment used for preparation, fabrication, or erection of Work.
B. Use interchangeable components of the same manufacture for similar components.

1.25 TRANSPORTATION, HANDLING, STORAGE, AND PROTECTION

A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.

1.26 SUBSTITUTIONS

A. Possible substitutions shall be submitted no later than 10 days prior to bid date for Engineer to review and consider requests from Contractor for substitutions. Subsequently, substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

1.27 SYSTEMS DEMONSTATION

A. Prior to final inspection demonstrate operation of each system to Engineer and Owner.

B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

1.28 CONTRACT CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and Work is complete in accordance with Contract Documents and ready for Engineers inspection.

B. Submit final Application for Payment identifying total adjusted Contract Price, previous payments, and amount remaining due.

1.29 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean interior and exterior surfaces exposed to view.

C. Clean debris, waste and surplus supplies, rubbish, and construction facilities from site.

1.30 PROJECT RECORD DOCUMENTS

A. Maintain on site in the Office, one set of Contract Documents, Shop Drawings, and Product Submittals to be utilized for record documents.

B. Record actual revisions to the Work concurrent with construction progress.

C. Specification, Record Documents, and Shop Drawings: Legibly mark each item to record actual construction or product installed.
D. Submit documents to Engineer with final Application for Payment.

1.31 OPERATION AND MAINTENANCE DATA

A. Submit 2 sets prior to final inspection, bound in 8-1/2 x 11 inch text pages with durable plastic covers.
B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE MANUAL", and title of project.
C. Internally subdivide the binder contents with permanent page dividers, logically organized, with tabs clearly printed under reinforced laminated plastic tabs.
D. Contents:

1. Directory listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
2. Operation and maintenance instructions, arranged by system.
3. Certificates.
4. Shop Drawings.
5. Product Data.
6. Warranties.

1.32 WARRANTIES

A. Provide duplicate notarized copies.
B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
C. Submit prior to final Application for Payment.

1.33 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
B. Deliver to project site and place in locations as directed; obtain receipt prior to final payment.

PART 2. PRODUCTS

Not Used.

PART3. EXECUTION

Not Used.

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1. GENERAL

1.1 SUMMARY

A. Remove interfering or objectionable material from the treatment plant site.
B. Preserve vegetation and existing objects designated to remain from injury or defacement.
C. Entire plant site shall be cleared and grubbed.

1.2 DEFINITIONS

A. Clearing:

1. Cutting, removing, and disposing of trees, snags, stumps, shrubs, brush, limbs, and other vegetation growth.
2. Removing evidence of their presence from the surface, inclusive of sticks and branches greater than 2 inches in diameter or thickness.
3. Removing and disposing of trash piles, rubbish, and fencing.

B. Grubbing:

1. Removing and disposing of wood or root matter below the ground surface remaining after clearing.
2. Includes stumps, trunks, roots, or root systems greater than 2 inches in diameter or thickness to a depth of 18 inches below the ground surface.

1.3 RELATED SECTIONS

A. Section 11360 – Above Ground Factory-Built Sewage Treatment Plant (SBR).

PART 2. MATERIALS

2.1 GENERAL

A. Provide materials, suitable and in adequate quantity, required to accomplish Work of this Section.

PART 3. EXECUTION

3.1 PREPARATION

A. Review with Engineer's representative the location, limits, and methods to be used prior to commencing Work under this Section.

3.2 CUTTING TIMBER

A. Exercise care when clearing near the clearing limits to avoid damage to existing trees, vegetation, structures, or utilities, which are outside of the clearing limits.
B. Trees shall be leveled into the area to be cleared.
C. Flush cut stumps not designated for grubbing by cutting to within 2 inches of the ground surface.
D. Timber is the property of the Contractor.
E. Dispose of stumps, limbs, brush, snags, non-marketable timber, and other vegetative growth off-site.

3.3 PRESERVATION OF TREES, SHRUBS, AND OTHER VEGETATION

A. Protect trees, shrubbery, and other vegetation from damage that is not designated for removal.
B. Cut and remove tree branches only where, in the opinion of the Engineer, that cutting is necessary to effect construction operation.
C. Remove branches other than those required to effect the Work to provide a balanced appearance of any tree, as approved prior to removal.
D. Treat scars resulting from the removal of branches with an approved tree sealant.

3.4 CLEARING AND GRUBBING LIMITS

A. Clear and grub areas within the limits of construction.
B. Clear and grub in stages as the construction area is increased to avoid unnecessary clearing and grubbing.

3.5 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

A. Haul the material from the Work site and dispose of in accordance with state, federal, and local laws. Off-site disposal shall be at the Contractor's sole expense.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1. GENERAL

1.1 SUMMARY

A. Perform earthwork.
B. Meet requirements for excavation safety, or to facilitate construction due to wet conditions.
C. Perform excavation regardless of type, nature, or condition of materials encountered.
D. Contractor shall make his own estimate of the type and extent of the various materials to be excavated in order to accomplish the work.
E. There will be no extra compensation for dewatering.

1.2 RELATED SECTIONS

A. Section 01001 – Basic Requirements.
B. Section 02100 – Site Preparation.
C. Section 02225 – Trench Excavation, Backfill, and Compacting.

1.3 REFERENCES

A. Arkansas State Highway and Transportation Department, Standard Specifications for Highway Construction, 1996.

1. AHTD Section 303 – Aggregate Base Course.

B. American Society for Testing and Materials, 1916 Race St. Philadelphia, PA 19103.

1. ASTM D698 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49-kg) Rammer and 12-in. (304.8-mm) Drop.
2. ASTM D1556 – Test Method for Density of Soil Place by the Sand-Cone Method.
3. ASTM D1557 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 lb. (4.54-kg) Rammer and 18-in. (457-mm) Drop.
4. ASTM D2216 – Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.

5. ASTM D2922 – Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 – Test Method for Moisture Content of Soil and Soil-Aggregate in Place of Nuclear Methods (Shallow Depth).

C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P = Excavations.
D. Arkansas Statute 291 of 1993.

1.4 DEFINITIONS

A. Relative Compaction:

1. The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by the Standard Proctor Test, ASTM D698, or as determined by the Modified Procter Test, ASTM D1557, as applicable.
2. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Engineer.

B. Optimum Moisture Content:

1. Moisture content of the material for which the maximum dry density is obtained as determined by ASTM D698 or D1557.
2. Field moisture contents shall be determined on the basis of the fraction passing the ¾-inch sieve.

C. Completed Course: A course or layer that is ready for the next layer or the next phase of construction.

1.5 SUMBITTALS

A. Submit in accordance with Section 01001.
B. Provide the following:

1. Samples of imported material.
2. Samples of onsite material to be used as fill.
3. Certification that imported materials conform to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory.
4. Proctor curves on fill material as prepared by approved laboratory.

1.6 PROJECT CONDITIONS

A. Beginning work of this Section means acceptance of existing conditions.

PART 2. PRODUCTS

2.1 FILL

A. Free from roots, organic matter, trash, and debris with maximum particle size of 1-1/2 inches.
B. It is intended that structural backfill material be obtained from on site to the maximum extent possible.

2.2 IMPORTED GRANULAR FILL

A. Provide granular fill beneath structures as noted on Drawings.
B. Imported granular fill to consist of a natural or artificial mixture of gravel and soil mortar, uniformly well graded from coarse to fine.
C. Conform to the AHTD Section 303 classifications for Class 7 as designated on the Drawings.

2.3 TOPSOIL

A. Selected topsoil at the site, properly stored and protected, free from roots, sticks, hard clay, and stones which will not pass through a 2-inch square opening.
B. Provide imported topsoil of equal quality if required to accomplish the work.

2.4 COMPACTION EQUIPMENT

A. Provide compaction equipment of suitable type and adequate to obtain the densities specified.
B. Operate compaction equipment in strict accordance with the manufacturer's instructions and recommendations.
C. Hand-operated equipment shall be capable of achieving the specified densities.

2.5 MOISTURE CONTROL EQUIPMENT

A. Provide equipment for applying water of a type and quality adequate for the work; it shall not leak; and be equipped with a distributor bar or other approved device to assure uniform application.

B. Provide equipment for mixing and drying out material consisting of blades, discs, or other approved equipment.

2.6 WATER REMOVAL EQUIPMENT

A. Provide and operate equipment adequate to keep excavation and trenches free of water.

2.7 IMPORTED MATERIAL ACCEPTANCE

A. Import only if insufficient material is available on-site.
B. Locate and arrange use of a site near the construction area for obtaining borrow material.
C. Additional tests required at the borrow area:

1. Standard Proctor.
2. Remolded permeability
3. Atterberg limits.

D. Upon completion of removal of borrow material, grade the site to drain, place topsoil on disturbed areas, and establish grass as outlined in Section 02900.
E. Costs shall be the responsibility of the Contractor.

2.8 SELECTED MATERIAL ACCEPTANCE

A. Provide samples for testing representative of the actual material to be installed in the work. Take samples from each 2,000 cubic yards of material stockpiled. Depending on the uniformity of the material, Engineer may request more frequent samples.
B. Forward test results to the Engineer at least 10 days before the material is required for use. If tests indicate that the material does not meet Specification requirements, the material shall not be installed in the work.
C. Material, which is placed in the work but does not conform to the Specification requirements shall be removed and replaced at the Contractor's sole expense.

PART 3. EXECUTION

3.1 CLEARING AND GRUBBING

A. Complete clearing and grubbing work as specified in Section 02100 prior to beginning work in this Section.

3.2 STRIPPING TOPSOIL

A. Remove existing grass and overburden before excavating topsoil.
B. Prior to beginning excavation or fill, strip the topsoil to a depth of at least 6 inches or to a depth sufficient to remove organic material and stockpile for future use.
C. In general, remove topsoil where structures are to be built, trenches dug, and roads, parking lots, walks, and similar improvements constructed within the area presently covered with topsoil.
D. Store topsoil clear of the construction area.
E. Take reasonable care to prevent the topsoil from becoming mixed with subsoil or eroding.

3.3 STRUCTURAL EXCAVATION

A. Contractor shall be solely responsible for trench and excavation safety systems in accordance with ACT 291 of 1993 and OSHA requirements.
B. Identify required lines, levels, and grades.
C. Identify known underground utilities. Contractor will be responsible for locating utilities.
D. The method of excavation is optional; however, no equipment shall be operated in a manner that will endanger existing structures and their integrity.
E. Use excavation support system such as sheet piling wherever necessary.
F. Allow for forms, working space, granular base, and finish topsoil where shown on Drawings or required.
G. Do not carry excavation for footings and slab deeper than the elevation shown on Drawings after allowing for base material.
H. If undercutting occurs below the planned dirt grade, the same fill material as specified for backfill shall be placed and compacted to 95 Percent Standard Proctor Density as defined in this Section up to the planned dirt grade in 8 inch lifts. Do not attempt to over compact excessively wet soil. Allow to dry first by scarifying and aerating before remolding.

3.4 DEWATERING EXCAVATION

A. Remove water during periods when concrete is being deposited, pipe is being laid, and placing of backfill unless water settling is required, and at other times as required for efficient and safe execution of the work.
B. Accomplish removal of groundwater in a manner that will preserve the strength of the foundation soils, will not cause instability of the excavation slopes, and will not result in damage to existing structures.
C. Where necessary to these purposes, lower the water level in advance of excavation, utilizing wells, well points, or similar methods.

D. Maintain the water level in the gravel stratum as measured in piezometers, a minimum of 3 feet below the prevailing excavation level or as needed to prevent bottom heave of the excavation.
E. Open pumping, sumps, and ditches: If these result in boils, loss of fines, softening of the ground or instability of slopes, areas shall not be accepted.
F. Install wells and well points with suitable screens and filters so that continuous pumping of fines does not occur.
G. Operate well points continuously to prevent boils and loss of consolidation.
H. Arrange discharge to facilitate collection of samples by Engineer.
I. Avoid settlement or damage to adjacent property.
J. Dispose of water in a manner that will not damage adjacent property, as approved.

3.5 GRANULAR FILL MATERIAL UNDER FACILITIES

A. Place fill granular material as specified in Article 2.2 within the influence area beneath slabs, walks, structures, roads, and parking areas, and as shown on the Drawings.
B. Do not exceed loose lifts of 6 inches.
C. Compact each lift to not less than 95 percent Modified Proctor Density.
D. Place and compact a 6-inch layer of granular fill to at least 95 percent Modified Proctor density immediately beneath spread footings, slabs on grade, or other concrete structures.
E. Moisten material as required to aid compaction (± 2 percent optimum moisture).
F. Place material in horizontal lifts and in a manner to avoid segregation.
G. Correct and repair subsequent damage to slabs, piping, concrete structures, facilities, or other structures caused by settlement of fill material.

3.6 BACKFILL AND STRUCTURES

A. Remove form materials and trash from excavation before placing backfill.
B. Do not operate earth-moving equipment within 5 feet of walls of concrete structures for the purpose of depositing or compacting backfill material.
C. Compact backfill adjacent to concrete walls with hand-operated tampers or similar equipment that will not damage the structure.
D. Backfill water-holding basins only after satisfactory leakage tests have been conducted.
E. Place earth fill in areas not designated to be structural fill or granular fill.
F. Deposit material in maximum 6-inch loose lifts, and compact each lift to not less than 95 Percent Standard Proctor.

3.7 FILL NOT BENEATH STRUCTURES OR FACILITIES

A. Place earth fill to the lines and grades shown.
B. Place fill material in maximum 6-inch loose lifts and compact each lift to not less than 95 Percent Standard Proctor.
C. Make proper allowance for topsoil where required.

3.8 MOISTURE CONTROL

A. During compacting operations, maintain optimum practicable moisture content required for compaction purposes in each lift of fill.
B. Maintain moisture content uniform throughout the lift.
C. Add water to the material at the site of excavation. Supplement, if required, by sprinkling the fill.
D. At the time of compaction, maintain the water content of the material at optimum moisture content, plus or minus 2 percentage points, except as otherwise specified for embankments.
E. Do not attempt to compact fill material that contains excessive moisture.
F. Aerate material by blading, discing, harrowing, or other methods, to hasten the drying process.

3.9 FIELD DENSITY TESTS

A. Test Methods: ASTM D2922, D1556, D2216, and D3017.
B. Cooperate with testing work by leveling small test areas designated by the Engineer.
C. Backfill test areas.
D. Field density test shall be performed for every 3,000 cubic yards of fill material placed.
E. Engineer may order testing of lift of fill at any time, location, or elevation.

3.10 SITE GRADING

A. Perform earthwork to lines and grades as shown on Drawings with proper allowance for topsoil where specified or shown on Drawings.
B. Shape, trim, and finish slopes to conform with the lines, grades, and cross sections shown.
C. Slopes shall be free of loose exposed roots and stones exceeding 3-inch diameter.
D. Round tops of banks to circular curbs, in general, not less than a 6-foot radius.
E. Neatly and smoothly trim rounded surfaces; over-excavating and backfilling to the proper grade are not acceptable.

F. Finish site grading shall be reviewed by the Engineer.

3.11 DISPOSAL OF EXCESS EXCAVATION

A. Dispose of excess excavated materials, not required or suitable for use as backfill or fill, outside of the area of work.
B. Compact excess material as specified for fill, dress the completed disposal area to slopes no greater than 4:1 (horizontal:vertical), and slope to drain.

3.12 SETTLEMENT

A. Settlement in backfill, fill, or in structures built over the backfill or fill, that may occur within the 1-year guarantee period in the General Conditions shall be considered to be caused by improper compaction methods.
B. Restore structures damaged by settlement to original condition.

END OF SECTION

SECTION 02225

TRENCH EXCAVATION, BACKFILL, AND COMPACTING

PART 1 GENERAL

1.1 SUMMARY

A. Work of this Section also includes:

1. Replacing topsoil that contains regenerative material.
2. Disposal of trees, stumps, brush, roots, limbs, and other waste materials from clearing operations.
3. Imported topsoil.
4. Crush rock backfill required by over-excavation.
5. Imported pipe zone material.
6. Trench settlement repair, including replacing roadway surfacing, sidewalk, or other structures.
7. Replacing damaged culverts.

B. Trench excavation is classified as common excavation and includes removal of material of whatever types encountered to depths shown or as directed by Engineer.

C. Pipe zone includes full width of excavated trench from 4 inches below bottom of pipe to a point 6 inches above top outside surface of pipe barrel.

D. Conform to federal, state, and local codes governing safe loading of trenches with excavated material.

E. The right is reserved to modify the use, location, and quantities of the various types of backfill during construction as Engineer considers to be in the best interest of Owner.

F. There shall be no additional payment for rock excavation.

1.2 RELATED SECTIONS

A. Section 02200 – Earthwork.

B. Section 02632 – Polyvinyl Chloride (PVC) Pipe – Sewer.

1.3 REFERENCES

A. Arkansas Highway and Transportation Department, P.O. Box 2262, Little Rock, Arkansas 72203

1. AHTD 303 – Aggregate Base Course.

B. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

1. ASTM D448 – Classifications for Standard Sizes of Aggregate and Bridge Construction.
2. ASTM D698 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, using 5.5-lb. (2.49-kg.) Rammer and 12-inch (304.8-mm) Drop.
3. ASTM D1557 – Test Methods for Moisture –Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-lb. (4.54-kg.) Rammer and 18-inch (457-mm) Drop.
4. ASTM D2922 – Test Methods for Density of Soils and Soil-Aggregates in Place by Nuclear Method.

C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P = Excavations.

D. The Contractor shall be solely responsible for trench and excavation safety systems in accordance with Act 291 of 1993.

PART 2. PRODUCTS

2.1 FOUNDATION STABILIZATION

A. Crushed gravel or crushed rock, free from dirt, clay balls, or organic material, well graded from coarse to fine, containing sufficient finer material for proper compactions, and meeting ASTM D448 Size No. 67 (Concrete Aggregate).

2.2 PIPE ZONE MATERIAL

A. Select native material shall consist of fine loose earth or sand free from clods or rocks larger than ¾ inches in dimension and of proper moisture content for maximum consolidation.

B. Crushed granular material (angular rock) with maximum size of ¾".

C. Rounded rock with maximum size of 1 ½".

2.3 COMMON FILL MATERIALS

A. Material shall not contain pieces larger than 3 inches, and shall be free of roots, debris, or organic matter.

2.4 BEDDING MATERIAL

A. Pea gravel, sand, or other locally available bedding material, as approved.

2.5 TRENCH BACKFILL

A. Granular Backfill:

1. Natural or artificial mixture of gravel and soil mortar uniformly well graded from coarse to fine.
2. AHTD Section 303 Class 3, Class 4, or Class 7 as specified in this Section.

2.6 PVC GRAVITY PIPE TRENCH

A. Refer to Drawings for trench details.

2.7 COMPACTION EQUIPMENT

A. Suitable type and adequate to obtain the amount of compaction specified.
B. Operate in strict accordance with manufacturer's instructions and recommendations and maintain conditions so that it delivers manufacturer's rated compactive effort.

2.8 IMPORTED TOPSOIL

A. Suitable sandy loam from an approved source.
B. Possess friability and a high degree of fertility.
C. Free of clods, roots, gravel, and other inert material.
D. Free of quackgrass, horsetail, and other noxious vegetation and seed.

PART 3. EXECUTION

3.1 PREPARATION

A. Where clearing or partial clearing of right-of-way is necessary, complete prior to start of trenching.
B. Cut trees and brush as near to surface of ground as practicable, remove stumps, and pile for disposal.
C. Do not permit excavated materials to cover brush or trees prior to disposal.

3.2 DISPOSAL OF CLEARED MATERIAL

A. Dispose of cleared materials in a manner that meets or exceeds requirements of state, county, and local regulations regarding health, safety, and public welfare.
B. Dispose of nonflammable and flammable material off the construction site in an approved location.
C. Do not leave material on the Project site, shove onto abutting private properties, or bury in embankments or trenches.

3.3 REMOVAL OF OBSTRUCTIONS

A. Remove obstructions within trench area or adjacent to trench area, such as tree roots, stumps, abandoned piling, logs, and debris.
B. Engineer may, if requested, make changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the easement or right-of-way without adversely affecting the intended function of the facility.
C. Dispose of obstructions in accordance with this Section.

3.4 REMOVAL AND REPLACEMENT OF TOPSOIL

A. Where trenches cross lawns, garden areas, pasturelands, cultivated fields, or other areas on which reasonable topsoil conditions exist, remove topsoil for a depth of 6 inches for full width of trench to be excavated.
B. Use equipment capable of removing a uniform depth of material, such as a scraper or motor grader; a backhoe shall not be considered suitable.
C. Stockpile removed topsoil at regular intervals, and do not mix with other excavated material.
D. Locate stockpiles so that material of one ownership is not transported and stockpiled on property of another ownership.
E. Minimum Finished Depth of Topsoil over Trenches: 5 inches.
F. Imported topsoil may be substituted for stockpiling and replacing topsoil.
G. Maintain finished grade of topsoil level with area adjacent to trench until final acceptance by Engineer.
H. Repair damage to adjacent topsoil caused by work operations.

1. Remove rock, gravel, clay, and other foreign materials from the surface.
2. Regrade.
3. Add topsoil as required.

3.5 TRENCH WIDTH

A. Minimum width of unsheeted trenches where pipe is to be laid shall be 18 inches greater than the outside diameter of the pipe or as approved.
B. Maximum width at top of trench shall not be limited, except where excess width of excavation would cause damage to adjacent structures or property or cause undue stresses on the pipe.
C. Confine trench widths to dedicated rights-of-way or construction easements, unless special written agreements have been made with affected property owners.

3.6 EXCAVATION

A. Material excavated is defined as unclassified excavation regardless of the material encountered.
B. Excavate trench to lines and grades shown or as established by Engineer with proper allowance for pipe thickness and for pipe base or special bedding when required.
C. If trench is excavated below required grade, correct with foundation stabilization material.
D. Place material over full width of trench in compacted layers not exceeding 6 inches deep to established grade with allowance for pipe base or special bedding.

3.7 PREPARATION OF TRENCH – LINE AND GRADE

A. Do not deviate more than ½ inch from line or ½ inch from grade. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness.
B. Grade the bottom of the trench by hand to the line and grade where the pipe is to be laid, with proper allowance for pipe thickness and for pipe base when specified or indicated.
C. Remove hard spots that would prevent a uniform thickness of bedding.
D. Check the grade with a straightedge and correct irregularities found.
E. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

3.8 SHORING, SHEETING, AND BRACING OF TRENCHES

A. Sheet and brace trench when necessary to prevent caving during excavation in unstable material or to protect adjacent structures, property, workers, and the public.
B. Increase trench widths accordingly by the thickness of the sheeting.

C. Maintain sheeting in place until pipe has been placed and backfilled at pipe zone.
D. Remove shoring and sheeting as backfilling is done in a manner that will not damage pipe or permit voids in backfill.
E. Conform to safety requirements of federal, state, or local public agency having jurisdiction for sheeting, shoring, and bracing of trenches; the most stringent of these requirements shall apply.

3.9 LOCATION OF EXCAVATED MATERIALS

A. Place excavated material only within construction easement, right-of-way, or approved working area.
B. Do not obstruct private or public traveled roadways or streets.

3.10 REMOVAL OF WATER

A. Provide and maintain ample means and devices to promptly remove and dispose of water entering trench during time trench is being prepared for pipe laying, during laying of pipe, and until backfill at pipe zone is completed.

1. These provisions apply during the noon hour as well as overnight.
2. Provide necessary means and devices, as approved, to positively prevent under water from entering the construction area of another contractor.

B. Dispose of water in a manner to prevent damage to adjacent property.
C. Drainage of trench water through the pipeline under construction is prohibited.

3.11 FOUNDATION STABILIZATION

A. When existing material in bottom of trench is unsuitable for supporting pipe, excavate unsuitable material.
B. Backfill trench to subgrade of pipe base with foundation stabilization material specified.
C. Place foundation stabilization material over the full width of trench and compact in layers not exceeding 6 inches deep to required grade by making passes with a vibratory compactor (or equivalent).
D. Material shall be considered unsuitable when it contains more than 5 percent organic material by volumetric sampling or when it will not support a reading of 1.5 on a hand penetrometer.

3.12 ROCK IN PIPE TRENCH

A. Where rock is encountered in bottom of trench, support pipe on bedding material.
B. Minimum Bedding Thickness: 4 inches or one eight of the outside diameter of pipe, minimum.
C. Extent bedding up pipe sides on sixth of outside diameter of the pipe, minimum.
D. Backfill over pipe according to pipe zone type.

3.13 PIPE ZONE BACKFILL

A. Depth of the pipe zone above pipe barrel varies with pipe material.
B. Particular attention shall be given to area of pipe zone from flow line to centerline of pipe to ensure firm support is obtained to prevent lateral movement of pipe during final backfilling of pipe zone.
C. Backfill area of pipe zone from bottom of pipe to horizontal centerline of pipe by hand-placing material around pipe in 4-inch layers.
D. Achieve continuous support beneath pipe haunches by "walking in" and slicing with shovel.
E. Backfill area of pipe zone from horizontal centerline to top of pipe zone with pipe zone material as shown in trench details on Drawings.

3.14 TRENCH BACKFILL ABOVE PIPE ZONE

A. When backfill is placed mechanically, push backfill material onto slope of backfill previously placed and allow to slide down into trench.
B. Do not push backfill into trench in a way to permit free fall of material until at least 2 feet of cover is provided over top of pipe.
C. Under no circumstances allow sharp, heavy pieces of material to drop directly onto pipe or tamped material around pipe.
D. Do not use backfill material of consolidated masses larger than ½ cubic foot.

3.15 EXCESS EXCAVATED MATERIAL

A. Dispose of excess excavated material off project site in an approved area.

3.16 DRAINAGE CULVERTS

A. Replace drainage culverts that are removed on near right angles to pipe centerline.
B. If pipe cannot be reused or is damaged during removal, dispose of it and provide new pipe.

C. Protect culverts from damage or restore to equivalent condition.,
D. Replace culverts to existing lines and grades.
E. Do not replace culverts until proposed pipeline is installed and backfill of trench has been completed to subgrade of culvert.

3.17 PIPE COVER

A. Place select material from excavation over pipe to provide minimum coverage, as shown on Drawings or as directed by Engineer.

3.18 DRAINAGE DITCH RESTORATION

A. Undercrossings of minor drainage ditches not covered in another Specification Section shall be backfilled so that upper 1 foot of material in ditch between ditch banks is clay.
B. Compact material for full ditch width by 6 passes of vibratory compactor (or equivalent).
C. Where indicated on Drawings, provide concrete arch, or rip rap on ditch banks.

3.19 SETTLE MENT

A. Correct settlement noted in backfill, fill, or in structures built over backfill or fill within warranty period.

3.20 IMPORTED TOPSOIL

A. Should regenerative material be present in soil, remove both surface and root that appears within 1 year following acceptance of Project in an manner satisfactory to Owner.

END OF SECTION

SECTION 02620

CEMENT-LINED DUCTILE IRON PIPE AND FITTINGS

PART 1. GENERAL

1.1 SUMMARY

A. Provide cement-lined ductile iron pipe and gray cast iron or ductile iron fittings specified.

B. Pipe and fittings shall be manufactured in the United States. Foreign made products shall be unacceptable.

1.2 RELATED SECTIONS

A. Section 02225 – Trench Excavation, Backfilling, and Compacting.

1.3 REFERENCES

A. American National Standards Institute, 1430 Broadway, New York, New York 10018.

1. ANSI A21.11 – Standard for Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
2. ANSI A21.14 – Ductile Iron Fittings 3 in. through 24 in., for Gas.
3. ANSI A21.15 – Standard for Flanged Ductile Iron Pipe with Threaded Flanges.
4. ANSI A21.4 – Standard for Cement-Mortar Lining for Ductile Iron Pipe and Fittings.
5. ANSI A21.50 – Standard for Polyethylene Encasement for Ductile Iron Pipe.
6. ANSI B16.1 – Standard for Cast Iron Pipe Flanges and Flanged Fittings.
7. ANSI B16.21 – Nonmetallic Flat Gaskets for Pipe Flanges.

B. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

1. ASTM A307 – Specifications for Carbon Steel Externally Threaded Standard Fasteners.
2. ASTM A563 – Specifications for Carbon and Alloy Steel Nuts.
3. ASTM D1248 – Specification for Polyethylene Plastic Molding and Extrusion Materials.

C. American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235.

1. AWWA C110 – Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids.
2. AWWA C111 – Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
3. AWWA C115 – Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.
4. AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service, Sizes 4 in. through 144 in.

PART 2. PRODUCTS

2.1 PIPE

A. Buried Pipe: Class 350 and comply with applicable requirements of ANSI A21.50. Flanged pipe shall meet ANSI/AWWA C115/A21.15.
B. Pipe shall be jointed with push-on mechanical, flanged, restrained, or flexible joints meeting applicable requirements of ANSI A21.11-72 and ANSI 21.15-75.
C. Ductile iron pipe shall receive standard thickness cement lining and bituminous seal coat in conformance with ANSI 2.14-74.
D. Ductile iron pipe shall be coated on the exterior with either coal tar or asphalt base material approximately 1 mil thick.
E. Flexible Joint (Ball and Socket) Pipe: Class 58.

2.2 FITTINGS

A. Gray or ductile iron, 350 psi pressure class, cement-lined and seal-coated. Where taps are shown on fittings, tapping bosses shall be provided.

1. Flanged Joint: ANSI/AWWA C110 and ANSI B16.1, faced and drilled 125-pound ANSI standard.
2. Mechanical Joint: ANSI/AWWA C110 and ANSI/AWWA C111.
3. Flexible Joint: American Flex-Lox pipe or equal.

B. Cement Linings: In accordance with ANSI A21.4.
C. Fittings shall receive an exterior coating of 1 mil thick bituminous material in accordance with ANSI A21.4.
D. Fittings shall have distinctly cast on them the manufacturer's identification, pressure rating, nominal diameter of openings, and the number of degrees or fraction of the circle on bends.

2.3 FLANGES

A. ANSI A21.15/AWWA C115, threaded, 250 psi working pressure, ANSI 125-pound drilling.

2.4 BOLTS

A. For Class 125 FF flanges use carbon steel, ASTM A307, Grade A hex head bolts and ASTM A563, Grade A hex head nuts.
B. For Class 250 RF flanges use carbon steel, ASTM A307, Grade B hex head bolts and ASTM A563, Grade A heavy hex head nuts.
C. For mechanical joint use manufacturer's standard.

2.5 GASKETS

A. Gaskets for mechanical joints shall be rubber, conforming to ANSI A21.11, AWWA C111.
B. Gaskets for flanged joints shall be 1/8-inch thick, cloth-inserted rubber conforming to applicable parts of ANSI B16.21 and AWWA C207.
C. Gasket Material: Free from corrosive alkali or acid ingredients and suitable for use in potable waterlines.
D. Gaskets shall be full-face type for 125-pound FF flanges.

2.6 LUBRICANT

A. Lubricant for push-on or mechanical joint end piping shall be manufacturer's standard.

PART 3. EXECUTION

3.1 HANDLING PIPE

A. Do not damage the cement lining when handling pipe.

3.2 RELATION TO SEWER LINE

A. Laying water main, follow Health Department requirements. Maintain 10-foot horizontal separation and 18-inch vertical separation in crossing.

3.3 CUTTING PIPE

A. Cut pipe with milling type cutter, rolling pipe cutter, or abrasive saw cutter. Do not flame cut.

3.4 DRESSING CUT ENDS

A. Dress cut ends of pipe in accordance with the type of joint to be made.
B. Dress cut ends of mechanical joint pipe to remove sharp edges or projections, which may damage the rubber gasket.
C. Dress cut ends of pipe for flexible couplings and flanged coupling adapters as recommended by the coupling or adapter manufacturer.

3.5 MECHANICAL JOINT

A. Join pipe with mechanical joints in accordance with the manufacturer's recommendations. Provide special tools and devices, special jacks, chokers, and similar items required for proper installation. Pipe manufacturer shall provide lubricant for the pipe gaskets, no substitutes shall be permitted.

3.6 FABRICATION OF FLANGED PIPE AND FITTINGS

A. Flanged pipe and fittings shall be fabricated in the shop, not in the field, and delivered to the job site with flanges in place and properly faced.
B. Threaded flanges shall be individually fitted and machine tightened on the threaded pipe by the manufacturer.
C. Flanges shall be faced after fabrication in accordance with ANSI A21.15/AWWA C115.

3.7 JOINTING FLANGED PIPE

A. Prior to connecting flanged pipe, the faces of the flanges shall be thoroughly cleaned of oil, grease, and foreign material.
B. The rubber gaskets shall be checked for proper fit and thoroughly cleaned.
C. Care shall be taken to assure proper seating of the flanged gasket.
D. Bolts shall be tightened so that the pressure on the gasket is uniform.
E. Torque-limiting wrenches shall be used to ensure uniform bearing insofar.
F. If joints leak when the hydrostatic test is applied, the gaskets shall be removed and reset and bolts retightened.

3.8 TESTING

A. Lines shall be hydrostatically or pneumatically tested. Test procedures shall be as specified in Section 02661.

END OF SECTION

SECTION 02630

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

A. Provide polyvinyl chloride (PVC) pipe and fittings.

1.2 RELATED SECTIONS

A. Section 02225 - Trench Excavation, Backfill, and Compacting.

1.3 REFERENCES

A. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

1. ASTM D1784 – Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
2. ASTM D2241 – Specifications for Poly (Vinyl Chloride (PVC) Pressure – Rated Pipe (SDR Series).
3. ASTM D3139 – Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
4. ASTM F477 – Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

B. American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235.

1. AWWA C110/A21.10 – American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. For Water and Other Liquids.

PART 2. PRODUCTS

2.1 PIPE

A. PVC pressure pipe, Class 200, SDR-21 in compliance with ASTM D1784 and manufactured from virgin PVC compound with a cell classification of 12454-B with gasket joints and integral bell for buried water piping.

B. PVCO pressure pipe, Class 200 in compliance with ASTM F1483 and manufactured from virgin PVC compound with a cell classification of 12454-B with gasket joints and integral bell for buried water piping.

C. Pipe and fittings shall be manufactured in the United States. Foreign made products shall be unacceptable.

D. Pipe shall be permanently marked at 5-foot intervals with the following information:

1. Nominal Size.
2. Material code designation.
3. Manufacturer's name or trademark and production record code.
4. ASTM or AWWA certification.
5. SDR designation.

E. Warranty:

1. Manufacturer of the pipe shall warrant product for a period of not less than one (1) year.
2. Forward copies of warranty to the Owner.
3. Replace defective materials at no extra cost to the Owner.

2.2 JOINTS

A. Buried Pipe: Gasketed slop joint.

B. Comply with ASTM D3139.

2.3 FITTINGS

A. Fittings 4 Inches and Larger: Gray or ductile iron, 250-psi pressure class, cement-lined and seal-coated. Where taps are shown on fittings, tapping bosses shall be provided.

1. Flanges Joint – ANSI/AWWA C153 and ANSI B16.1, faced and drilled 125-pound ANSI standard.
2. Mechanical Joint: ANSI/AWWA C153 and ANSI/AWWA C111.
3. Flexible Joint: American Flex-Lox pipe or equal.

B. Cement Linings: In accordance with ANSI A21.4.

C. Fittings shall receive an exterior coating of 1 mil thick bituminous material in accordance with ANSI A21.4.

D. Fittings shall have distinctly cast on them the manufacturer's identification, pressure rating, nominal diameter of openings, and the number of degrees or fraction of the circle on bends.

E. Fittings Smaller than 4 Inches: PVC.

2.4 GASKETS

A. As recommended by pipe manufacturer to conform to pipe.

B. Comply with ASTM F477.

2.5 MARKING TAPE

A. Install on pressure systems.
B. Terra Tape "Extra Stretch".
C. Or equal.

PART 3. EXECUTION

3.1 GENERAL

A. Rigid PVC pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations.
B. Offset shall be as recommended by the manufacturer for the maximum temperature variation between time of installation and final use.

3.2 TRACE WIRE

A. Furnish and install a 14-gage insulated copper trace wire with PVC pressure pipe.
B. Run wire continuous from valve box to valve box, meter box, air release vault, cleanout, or other access points.
C. Bring wire up inside boxes and vaults in an accessible method.
D. Bring wire around or tape wire to each pipe section.
E. Pipe testing shall include following trace wire.
F. Wire breaks shall be repaired at no additional expense to the Owner.

3.3 MARKING TAPE

A. On pressure installations of non-metallic pipe, metallic marking tape, Terra Tape Extra Stretch or equal shall be installed 12 inches, minimum above the top of pipe or service line.
B. The tape shall be in addition to the trace wire specified.

3.4 THRUST BLOCKS

A. Install 2,500-psi concrete thrust blocks at bends, wyes, or other thrust points on pressure piping.
B. Block to bear against undisturbed soil and shall be of size and with bearing area as shown on Drawings.

3.5 TESTING

A. Pressure lines shall be hydrostatically tested at the pressures listed in Section 02661.
B. Use pipe-locating equipment to test continuity of trace wire.
C. Engineer shall observe and document trace wire test.

END OF SECTION

SECTION 02632

POLYVINYL CHLORIDE (PVC) PIPE – SEWER

PART 1. GENERAL

1.1 SUMMARY

A. Provide polyvinyl chloride (PVC) pipe and fittings for sewer lines.

1.2 RELATED SECTIONS

A. Section 02225 – Trench Excavation, Backfill, and Compacting.
B. Section 02730 – Sewage Collection System.

1.3 REFERENCES

A. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

1. ASTM D1784 – Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
2. ASTM F477 – Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

PART 2. PRODUCTS

2.1 PIPE

A. PVC gravity sewer pipe, SDR-26 in compliance with ASTM D1784 and manufactured from virgin PVC compound with a cell classification of 12454-B with gasket joints and integral bell.
B. Pipe shall be manufactured in the United States. Foreign made products shall be unacceptable.
C. Pipe shall be permanently marked at 5-foot intervals with the following information:

1. Nominal Size.
2. Material code designation.
3. Manufacturer's name or trademark and production record code.
4. ASTM or AWWA certification.
5. SDR designation.

D. Warranty:

1. Manufacturer of the pipe shall warrant product for a period of not less than one (1) year.
2. Forward copies of warranty to the Owner.
3. Replace defective materials at no extra cost to the Owner.

2.2 JOINTS

A. Buried Pipe: Gasketed slip joint.
B. Comply with ASTM D3139.

2.3 GASKETS

A. As recommended by pipe manufacturer to conform to pipe.
B. Comply with ASTM F477.

PART 3. EXECUTION

3.1 GENERAL

A. Rigid PVC pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations.
B. Offset shall be as recommended by the manufacturer for the maximum temperature variation between time of installation and final use.

3.2 TESTING

A. Gravity sewer line shall be tested in accordance with Section 02730.
B. Engineer shall observe tests.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1. GENERAL

1.1 SCOPE

A. Provide all labor and materials for all forming and removal of forms for poured-in-place concrete.

1.2 GENERAL

A. Provide forms in new or in undamaged condition. Conform to shape, lines, and dimensions of all members as shown on the Drawings. Brace and tie together to maintain position and shape and insure the safety of the workmen and passers-by.

B. Forms shall be of sufficient strength and rigidity and properly supported so that they will not deflect under the weight and pressure of wet concrete. Forms shall be sufficiently tight to prevent the leakage of mortar. Locate form ties level and plumb in horizontal rows and vertical tiers.

C. Construct forms for beams and lintels so that sides may be removed without disturbing the bottom of the form or its supports and without damage to the concrete.

D. Provide for a 3/4" chamfer of all external corners of exposed concrete slabs, beams and columns, unless shown otherwise on the Drawings.

E. Form release agent shall be colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.

1.3 WOODEN FORMS FOR EXPOSED CONCRETE SURFACES

A. The contact surface of all forms for exposed concrete surfaces shall be 3/4" plywood. This plywood shall be new with all edges and corners true, square and free of defects capable of impairing the finish surface of the corners. Arrange the plywood sheets in an orderly manner with neatly and tightly butted joints securely fastened on solid bearing.

1.4 REMOVAL OF FORMS

A. Formwork for walls, sides of beams and other parts not supporting the weight of the concrete may be removed as soon as the concrete has

hardened sufficiently to resist damage form removal operations.

B. Formwork for beam soffits, slabs, and other parts that support the weight of the concrete shall remain in place until the concrete has reached its specified 28-day strength.

PART 2. MATERIALS

A. Not Used.

PART 3. EXECUTION

A. Not Used.

END OF SECTION

SECTION 11308

GRINDER PUMP STATION

PART 1. GENERAL

1.1 SUMMARY

A. Section provides for installation of duplex grinder pump stations.
B. Section Includes: Pumps, motors, fiberglass basin, pump and motor castings, liftout rail, power cords, waterproof junction box, control panel, inlet hub, level controls, and discharge piping.
C. Grinder Pumps shall be from single manufacturer.

1.2 RELATED SECTIONS

A. Section 02225 – Trench Excavation, Backfill, and Compacting.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. Hydromatic

2.2 MANUFACTURED UNITS

A. Submersible Grinder Pump:

1. Pumped Fluid: Raw sewage.
2. Cutter/Grinder Mechanism: Hardened and ground stainless steel capable of macerating solids to a fine slurry.
3. Cutting Impeller.
4. Cutter Ring: Reversible to yield new cutting edge.
5. Capable of pumping 51.5 gpm against a total dynamic head of 43 feet.

B. Motors:

1. Sealed, submersible type, 2 hp, 208 volts, 60 Hz with 1.15 service factor, 3-phase.
2. Either air filled or oil filled.
3. High temperature cut-off switch embedded in motor windings.

4. Pump Seal Chamber: Equip with moisture sensing seal failure probe which will cause a warning light to glow in the control panel in the event of seal leakage.

C. Fiberglass Basin:

1. Watertight.
2. Stainless steel fasteners for bolting on the cover.
3. Fiberglass or epoxy coated steel cover.
4. Dimensions as shown on the Drawings.
5. Anti-flotation ring around circumference at bottom of basin.

D. Pump and Motor Castings:

1. High tensile cast iron.
2. Manufacturers standard epoxy coating inside and outside including interior of volute.

E. Liftout Rail:

1. Pump to be installed and removed by simple upward force on stainless steel cable without requiring personnel to enter basin.
2. Stainless steel guide rail.
3. Two-piece brass sliding disconnect device with "O"-ring seal.

F. Power Cords.

1. Motor Power and Control Cards: Type SO, sized for horsepower as per NEC.
2. No splices between pump and junction box.
3. Cords:

    a. Potted into motor and cap with epoxy compound, or grommet.
    b. Able to withstand a pull of 150 pounds without loosening.

G. Control Panels Provided by Pump Supplier:

1. NEMA 3R enclosure with hasp for lock. Locks shall be keyed alike and shall be interchangeable.
2. Flashing red high level alarm light, NEMA 4 rated.
3. 208-volt, 3-phase.
4. Control circuit and alarm circuit shall be 24 volts.
5. Provide for each pump:

a. Circuit breaker.
b. NEMA magnetic starter with quick trip ambient compensated overload.
c. H-O-A switch.
d. Yellow run light.
e. Red seal fail light.
f. Connection terminal strip.

6. Alternator for alternation of pumps.
7. Control circuit breaker.

a. Alarm test push button.
b. Alarm silence push button.

8. Override circuit to start second pump if water level in basin continues to rise or first pump fails to start.
9. Schematic Wiring Diagram: Paste to inside cover of box.
10. Terminals: Clearly label with proper designation.
11. Elapsed time meter.
12. Lightning arrestor.
13. Duplex 115-volt GFI receptacle.
14. Pedestal mounted with cord grip seal connector; provide gas-tight seal between basin and pedestal, if shown on Drawings.
15. 24-volt control circuit transformer.

H. Inlet Hub (Fiberglass Basins):

1. Rubber grommet or cast iron bottom hub to accommodate PVC inlet pipe(s) shown on Drawings.
2. Install on tank side wall with stainless steel fasteners.

I. Level Controls:

1. Mercury tube seated in polyurethane float and weighted to hold position in wet well.
2. Connecting Cord: SJO type.
3. Attach mounting bracket to basin wall to support controls.
4. Connect control cords to junction box with cord grip seal connectors, if junction box is shown on Drawings.
5. Four switches required at each station:

a. Lead on.
b. Lag on.

c. Both off.
d. High level alarm.

J. Discharge Piping:

1. Schedule 40 galvanized.
2. Coat metal discharge piping as follows:

a. 1 coat polyamide anti-corrosive epoxy primer (2.5 MDFT).
b. 2 coats coal tar epoxy (8 MDFT per coat).

PART 3. EXECUTION

3.1 INSTALLATION

A. Equipment of this Section shall be installed according to manufacturer's instructions and in accordance with the Drawings.
B. Manufacturer's representative shall be present during installation and startup.

END OF SECTION

SECTION 11360

ABOVE GROUND FACTORY-BUILT SEWAGE TREATMENT PLANT (SBR)

PART 1. GENERAL

1.1 SUMMARY

A. Provide and install a complete factory-built Sequencing Batch Reactor (SBR) type sewage treatment plant with all needed equipment for efficient operation of the plant on a concrete pad.

B. The treatment plant shall be designed to meet the discharge effluent requirements for the treatment plant's NPDES permit limits at the design capacity and influent quality listed in Paragraph 2.2 of this Section.

1.2 RELATED SECTIONS

A. Section 01001 – Basic Requirements.

1.3 SYSTEM DESCRIPTION

A. Service Conditions:

1. Liquid treated: Raw sewage from apartment complex.

B. Equipment Provided:

1. Welded steel rectangular tank structure divided into four major sections: pretreatment/sludge storage (trash trap tank), flow equalization (anoxic tank), biological treatment (SBR tank) and chlorine contact chamber.
2. Principle items of equipment include:

   a. Feed pumps/jet aspirators
   b. Stainless steel supports
   c. Decant equipment and valving
   d. Overflow weir/scum skimmer
   e. Waste sludge mechanism
   f. Control panel
   g. Level controls

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. Fluidyne Corporation, Cedar Falls, Iowa.
B. Or approved equal.

2.2 TREATMENT PLANT

A. Design Capacity: 50,000 gallons per day.
B. 5-day BOD: 250 mg/l, maximum.
C. Total Suspended Solids: 250 mg/l
D. Ammonia Nitrate: 40 mg/l
E. 4 inch inlet, 6 inch outlet

2.3 MATERIALS

A. Structural grade steel plate.
B. Minimum thickness: ¼ inch.
C. Remove weld splatter and surface roughness by grinding.
D. Coat all inside and outside surfaces with a self-priming heavy duty, solvent type protective coating formulated for abrasion and corrosion resistance, 10 mils minimum thickness.
E. Reinforced to withstand normal pressures from the interior hydrostatic load.

2.4 FEED PUMPS/JET ASPIRATORS

A. Provide two (2) SBR feed pumps/jet aspirators each designed to provide 100% of the oxygen requirement at design flow.
B. Each unit shall be designed to transfer the required oxygen per hour using atmospheric air provided to the diffuser be an air supply pipe.
C. The pump body shall be cast iron, submersible sewage type design having a corrosion resistant coating.
D. Integral motor shall be 15 horsepower, 230 volt, 3 phase.
E. Diffuser shall consist of a precision formed, fiberglass, tubular nozzle connected to the pump discharge piping with FRP flanges using stainless steel bolts.
F. Provide stainless steel guide rails for removal of the jet pumps.

2.5 AIR SUPPLY

A. Furnish FRP air supply pipe to provide air to the diffuser.
B. Provide sufficient length to provide a minimum of 8" freeboard above the water surface.
C. Provide slotted end cap to help prevent debris from entering air pipe.

2.6 DECANT EQUIPMENT AND VALVING

A. Stationary, solids excluding type.
B. Constructed of 304 stainless steel.
C. Air operated.
D. 4 inch automated butterfly control valve for control of effluent discharge.
E. ¾ inch electric operated decant vent valve provided for decanter air release.

2.7 OVERFLOW WEIR/SCUM SKIMMER

A. Provide steel overflow weir to allow flow from the SBR compartment back to the influent equalization tank during the interact cycle.
B. The weir shall provide scum skimming of the SBR compartment and provide flow diffusion during periods of high flow..
C. Provide same surface preparation and coating for weir as the steel tank.

2.8 WASTE SLUDGE SKIMMER

A. Provide waste sludge mechanism that includes all piping, valving and supports.

2.9 CONTROL PANEL

A. Provide control panel in a NEMA enclosure suitable for mounting outdoors.
B. Cycle drives and sequences for the treatment unit shall be controlled by an industrial grade programmable controller.
C. PLC's shall be housed in the control panel supplied by the treatment plant manufacturer for unit responsibility.

D. Switches and lights shall be supplied to operate all electric valves, mode selection and cycle indication in both manual and automatic modes.
E. All lights and switches shall be industrial grade, oil tight Square D, or equal.
F. The control system shall provide automatic sequencing of the SBR's tanks.
G. The PLC shall contain a central processing unit, a CMOS RAM memory power supply, inputs and outputs.
H. The PLC shall have the following diagnostic indicators: PC Run, Communication, CPU Fault, Forced I/O and battery low..
I. The PLC shall have a minimum 16K word user memory contained within CMOS RAM with capacitor and battery backup capable of 3 year memory backup.
J. The PLC shall be equipped with removable EEPROM non-volatile memory backup.
K. Processor shall be an Allen Bradley SLC5/03, or equal.
L. Each PLC unit shall be provided with a Data Table Access Module (DTAM) mounted on the front of the control panel that will allow the operator to monitor or modify the timer-counter set points by means of a key switch. The unit shall have a two-line backlit display. The keyboard shall be a 9-place pressure sensitive keyboard.

2.10 LEVEL CONTROLS

A. Tank level controls shall be of a non-invasive type suitable for the intended purpose for use in raw sewage.
B. Each detector shall be independently adjustable and provide a distant signal at the selected level.
C. Level sensors shall be of the weighted suspended float type suitable for use in sewage.
D. Provide a separate float or level sensor for proper operation of the SBR and equalization tank.
E. Provide 304 stainless steel mounting brackets if floats are installed.

2.11 CHLORINE CONTACT TANK

A. Provide chlorine contact tank with a minimum capacity of 1200 gallons.
B. Construct as integral part of treatment plant.
C. Provide sufficient flow baffles to assure proper mixing prior to discharge.

2.12 TABLET CHLORINATOR

A. Provide Sanuril , or equal, tablet chlorinator rated for the design flow.
B. Provide one year's supply of Sanuril 115 tablets, or equal.

2.13 WEIR BOX

A. Provide 90 degree V-notch weir in a rectangular steel chamber designed for installation by bolting to the plant outlet.
B. Provide ¼" aluminum weir plate, baffle plate and facilities for inlet and outlet pipe connections.
C. Provide staff gage that shows both inches of flow over the weir and the corresponding flow rate in gallons per minute

2.14 GRATING

A. Provide grating panels to cover all plant openings.
B. Manufactured from galvanized carbon steel sheets.
C. Designed for safe uniform carrying capacity of 100 pounds per square foot, minimum.

PART 3. EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's recommendations, and as approved.
B. Bolts shall be accurately placed with templates.
C. Coat bolt thread projections with lubricant to facilitate future nut removal.
D. Strain from attached piping shall be eliminated.
E. Care during storage, installation, and lubrication shall be in strict accordance with manufacturer's recommendations.
F. Perform touch-up painting of areas damaged during shipment and installation.

3.2 SUPPLIERS/MANUFACTURERS' SERVICES

A. Provide for and receive services of a factory trained engineer with at least three years of factory experience in jet aeration equipment for the following:

1. Supervise installation of unit and certify that treatment plant has been installed in accordance with manufacturer's recommendations. Certification shall be in writing and shall be received and acknowledged by Engineer prior to placing treatment facility into operation.
2. Place unit into operation (startup).
3. Train Owner's personnel in operation and maintenance of units.
4. Provide a minimum of 32 hours on the job site in a minimum of one trip.

B. Provide a complete Operation and Maintenance Manual for the treatment facility .

END OF SECTION