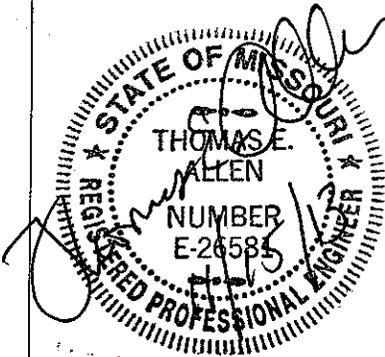


Belton Maintenance Facility
 County: Cass

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

(Job Special Provisions shall prevail over General Special Provisions whenever in conflict therewith.)

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	<p>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION 105 W. CAPITOL AVE. JEFFERSON CITY, MO 65102 Phone 1-888-275-6636</p>
	<p>CASS COUNTY, MO DATE PREPARED: 11/15/13</p>
<p>Date:</p>	<p>ADDENDUM DATE:</p>
<p>Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal:</p>	

JOB
SPECIAL PROVISIONS

A. WORK ZONE TRAFFIC MANAGEMENT PLAN JSP-02-06A

1.0 Description. Work zone traffic management shall be in accordance with applicable portions of Division 100 and Division 600 of the Standard Specifications, and specifically as follows.

2.0 Traffic Management Schedule.

2.1 Traffic management schedules shall be submitted to the engineer for review prior to the start of work and prior to any revisions to the traffic management schedule. The traffic management schedule shall include the proposed traffic control measures, hours traffic control will be in place, and work hours.

2.2 The contractor shall notify the engineer prior to lane closures or shifting traffic onto detours.

2.3 The engineer shall be notified as soon as practical of any postponement due to weather, material or other circumstances.

2.4 In order to ensure minimal traffic interference, the contractor shall schedule lane closures for the absolute minimum amount of time required to complete the work. Lanes shall not be closed until material is available for continuous construction and the contractor is prepared to diligently pursue the work until the closed lane is opened to traffic.

2.5 Traffic Congestion. The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone.

2.5.1 Traffic Delay. The contractor shall be responsible for maintaining the existing traffic flow through the job site during construction. If disruption of the traffic flow occurs and traffic is backed up in queues of 15 minute delays or longer, then the contractor shall review the construction operations which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from occurring again.

2.5.2 Traffic Safety.

2.5.2.1 Where traffic queues routinely extend to within 1000 feet (300 m) of the ROAD WORK AHEAD, or similar, sign on a divided highway or to within 500 feet (150 m) of the ROAD WORK AHEAD, or similar, sign on an undivided highway, the contractor shall extend the advance warning area, as approved by the engineer.

2.5.2.2 When a traffic queue extends to within 1000 feet (300 m) of the ROAD WORK AHEAD, or similar, sign on a divided highway or to within 500 feet (150 m) of the ROAD WORK AHEAD, or similar, sign on an undivided highway due to non-recurring

congestion, the contractor shall deploy a means of providing advance warning of the traffic congestion, as approved by the engineer. The warning location shall be no less than 1000 feet (300 m) and no more than 0.5 mile (0.8 km) in advance of the end of the traffic queue on divided highways and no less than 500 feet (150 m) and no more than 0.5 mile (0.8 km) in advance of the end of the traffic queue on undivided highways.

3.0 Work Hour Restrictions.

3.1 There are three major summer holiday periods: Memorial Day, Independence Day, and Labor Day. All lanes shall be scheduled to be open to traffic during these holiday periods, from 12:00 noon on the last working day preceding the holiday until 9:00 a.m. on the first working day subsequent to the holiday.

4.0 Detours and Lane Closures.

4.1 At least one lane of traffic in each direction shall be maintained at all times except for brief intervals of time required when the movement of the contractor's equipment will seriously hinder the safe movement of traffic. Periods during which the contractor will be allowed to halt traffic will be designated by the engineer.

5.0 Basis of Payment. No direct payment will be made to the contractor to recover the cost of equipment, labor, materials or time required to fulfill the above provisions, unless specified elsewhere in the contract document.

B. EMERGENCY PROVISIONS AND INCIDENT MANAGEMENT

1.0 The contractor shall have communication equipment on the construction site or immediate access to other communication systems to request assistance from the police or other emergency agencies for incident management. In case of traffic accidents or the need for police to direct or restore traffic flow through the job site, the contractor shall notify police or other emergency agencies immediately as needed. The area engineer's office shall also be notified when the contractor requests emergency assistance.

2.0 In addition to the 911 emergency telephone number for ambulance, fire or police services, the following agencies may also be notified for accident or emergency situation within the project limits.

Missouri Highway Patrol (816-622-0800)

City of Belton
(Fire: 816-331-7969
Police: 660-331-5522)

Cass County Sheriff
816-380-8320

2.1 This list is not all inclusive. Notification of the need for wrecker or tow truck services will remain the responsibility of the appropriate police agency.

2.2 The contractor shall notify enforcement and emergency agencies before the start of construction to request their cooperation and to provide coordination of services when emergencies arise during the construction at the project site. When the contractor completes this notification with enforcement and emergency agencies, a report shall be furnished to the engineer on the status of incident management.

3.0 No direct pay will be made to the contractor to recover the cost of the communication equipment, labor, materials or time required to fulfill the above provisions.

C. UTILITIES

1.0 For informational purposes only the following is a list of names, addresses, and telephone numbers of the known utility companies in the area of the construction work for this improvement:

<u>Utility Company</u>	<u>Known Required</u> <u>Adjustment</u>
Mr. Derrick Ward Right of Way Administrator Kansas City Power & Light Co. P.O. Box 418679 Kansas City, MO 64141 (816) 245-4022	No
Ms. Becca Orr Missouri Gas Energy 3025 SE Clover Dr. Lee's Summit, MO 64082 (816) 969-2230	No
Mr. David Sommerfeld BP Amoco Corporation 28100 Torch Parkway Warrenville, IL 60555 (630) 836-5000	No
Mr. Zach Matteo City of Belton City Hall Annex 520 Main Street Belton, MO 64012 816-331-4331	No
Mr. Steve Smith AT&T 215 N. Spring Street Independence, MO 64050-2822 (816) 325-6527	No

1.1 The existence and approximate location of utility facilities known to exist, as shown on the plans, are based upon the best information available to the Commission at this time. This information is provided by the Commission "as-is" and the Commission expressly disclaims any representation or warranty as to the completeness, accuracy, or suitability of the information for any use. Reliance upon this information is done at the risk and peril of the user, and the Commission shall not be liable for any damages that may arise from any error in the information. It is, therefore, the responsibility of the contractor to verify the above listing information indicating existence, location and status of any facility. Such verification includes direct contact with the listed utilities.

1.2 The contractor agrees that any effects of the presence of the utilities, their relocation, contractor's coordination of work with the utilities and any delay in utility relocation shall not be compensable as a suspension of work, extra work, a change in the work, as a differing site condition or otherwise including but, without limitation, delay, impact, incidental or consequential damages. The contractor's sole remedy for the effects of the presence of utilities, delay in their relocation or any other effects shall be an excusable delay as provided in Section 105.7.3. The contractor waives, for itself, its subcontractors and suppliers the compensability of the presence of utilities, delay in their relocation and any cost to the contractor, its subcontractors and suppliers in any claim or action arising out of or in relation to the work under the contract.

1.3 The contractor shall be solely responsible and liable for incidental and consequential damage to any utility facilities or interruption of the service caused by it or its subcontractors operation. The contractor shall hold and save harmless the Commission from damages to any utility facilities interruption of service by it or its subcontractor's operation.

2.0 It shall be noted by the contractor that MoDOT is a member of Missouri One Call (800 Dig Rite). Some work on this project may be in the vicinity of MoDOT utility facilities, which includes but is not limited to traffic signal cables, highway lighting circuits, ITS cables, cathodic protection cables, etc. Prior to beginning work, the contractor shall request locates from Missouri One Call. The contractor shall also complete the Notice of Intent to Perform Work form located at the Missouri Department of Transportation website:

<http://www.modot.mo.gov/asp/intentToWork.shtml>

The contractor shall submit the form over the web (preferred method) or by fax to the numbers on the printed form. The notice must be submitted a minimum of 2 and a maximum of 10 working days prior to excavation just as Missouri One Call requires.

D. PACKAGE DUPLEX GRINDER PUMP LIFT STATION

1.0 GENERAL DESCRIPTION: Furnish a complete factory-built and tested Grinder Pump Lift Station, consisting of duplex grinder pumps suitably mounted in a basin constructed of high density polyethylene (HDPE) or Fiberglass Reinforced Polyester Resin stations with capacities as described in the Contract Documents, NEMA 6P electrical quick disconnect (EQD), pump removal system, stainless steel discharge assembly/shut-off valve, check valve, each assembled in the basin, electrical alarm panel and all necessary internal wiring and controls. All components and materials shall be in accordance with section 2.0 of this Product Specification.

1.01 SCOPE OF WORK

- A. The contractor shall determine the grinder pump equipment needed at each service connection to assure proper operation of the grinder pump units at total dynamic head (TDH) conditions determined by the hydraulic analysis without extended runtimes exceeding the normal operating range of the pumps. The hydraulic analysis shall be based on the rational method of operation of the pumping units discharging into the same force main. Grinder pumps shall be centrifugal type pumps. Grinder pumps shall be specifically designed and intended for service in pressure sewer systems. All pumps supplied on the project for this service shall be of the same manufacturer.
- B. The Contractor will provide a complete hydraulic design for the pressure sewer collection system with bid proposal. The hydraulic design will confirm the size of the pressure sewer services and force mains designed. Pipe type, actual pipe I.D., C-factor and centrifugal hydraulic characteristics of each grinder pump shall be noted and documented for clarification.

1.02 QUALITY ASSURANCE

A. Applicable Standards:

- 1. Hydraulic Institute Standards
- 2. ANSI Standards
- 3. ASTM Standards

B. Acceptable Pump Manufacturers:

- 1. Environment/One Corporation
- 2. FLYGT
- 3. Engineer Pre-Approved Equal

All manufacturers shall meet technical specifications. The pre-fabricated lift station shown on the plans is based on the products manufactured by Environmental One Corporation, Nuskayuna, New York. Product numbers and references are given only as an indication of the quality of materials and workmanship to be used.

1.03 SUBMITTALS

After receipt of notice to proceed, the manufacturer shall furnish a minimum of four sets of shop drawings detailing the equipment to be furnished including dimensional data, materials of construction and data showing that it meets the performance specifications in Sec 1.05. The engineer shall promptly review this data, and return two copies as accepted, or with requested modifications.

Where a bidder intends to provide other than the listed equipment, the alternate material or equipment must be approved by the engineer. In order for the alternate equipment to be considered an "approved equal", prospective suppliers must furnish four copies of a submittal which includes:

- Full-size drawings of the proposed equipment with sufficient detail to allow assessment of the suitability of the equipment
- The impact of the alternate equipment on other equipment.
- Information showing that it meets the performance requirements in Sec 1.05

1.04 EXPERIENCE CLAUSE: The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of grinder pumps specifically designed for use in low pressure systems. Manufacturer must demonstrate to the satisfaction of the Engineer that the proposed pumping equipment will meet system flows and heads required. In addition, pre-submittal must also demonstrate to the satisfaction of the Engineer that the equipment being proposed meets or exceeds all performance and safety requirements, materials of construction and user benefits of the specified equipment. All bids utilizing manufacturers not pre-approved will be considered non-responsive.

1.05 PERFORMANCE REQUIREMENTS: At a minimum, the pumps shall be capable of delivering 42 GPM against a rated total dynamic head of 52 feet. The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head. The lift station system shall be able to meet all conditions as presented in the plans. The discharge force main must be able to maintain a minimum velocity of 2 feet/second not to exceed 8 feet/second.

1.06 WARRANTY: The grinder pump **MANUFACTURER** shall provide a part(s) and labor warranty on the complete station and accessories, including the panel, for a period of 24 months after notice of **OWNER'S** acceptance. Any manufacturing defects found during the warranty period will be reported to the **MANUFACTURER** by the **OWNER** and will be corrected by the **MANUFACTURER** at no cost to the **OWNER**.

1.07 WARRANTY PERFORMANCE CERTIFICATION: As a bid certification requirement, each bidder shall provide with their bid schedule a Warranty Performance Certification statement executed by the most senior executive officer of the grinder pump **MANUFACTURER**, which certifies a minimum of a 24-month warranty. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the **MANUFACTURER** will bear **all** costs to correct any original equipment deficiency for the effective period of the warranty. All preventive maintenance type requirements shall be included in this form as exclusions. These requirements include, but are not limited to, unjamming of grinder mechanism, periodic motor maintenance, and periodic cleaning of liquid level controls. Should the **CONTRACTOR** (supplier) elect to submit a performance bond in lieu of the experience clause outlined above, this Warranty Performance Certification shall also be used as a criterion to evaluate the **CONTRACTOR'S** (supplier's) performance over the warranty period. A Warranty Performance Certification form is included with the bid schedule and must be

completed and submitted as part of the bid package. Bids with incomplete forms or missing forms will be considered nonresponsive.

PART 2 PRODUCTS

2.0 GENERAL CONSTRUCTION

2.01 GRINDER PUMP

Each grinder pump shall be a heavy duty pump used as a grinder. The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. The material shall be suited for domestic waste water service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, good aging properties, and outstanding wear resistance.

The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one piece stainless steel motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall provide maximum corrosion and abrasion resistance. There shall be no need for personnel to enter the wet-well. No portion of the pump shall bear directly on the sump floor.

This assembly shall be dynamically balanced and operate without objectionable noise over the entire range of recommended operating pressures. The grinder shall be constructed so as to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:

- 1 The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
- 2 The inlet shroud shall have a diameter no less than 5 inches.
- 3 The maximum flow rate through the cutting mechanism must not exceed 4.0 feet per second.
- 4 The impeller mechanism must rotate at a nominal speed no greater than 1800 rpm.

The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects", such as paper, wood, plastic, glass, rubber and the like, to finely divided

particles which will pass freely through the passages of the pump and the discharge piping.

2.03 Electrical Motor

The motor shall be a minimum of 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application.

2.04 Mechanical Seal

The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

2.05 Tank and Integral Accessway

The tank shall be made of concrete or high density polyethylene or fiberglass Reinforced Polyester Resin stations, with a grade selected to provide the necessary environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. Corrugations of outside wall are to be of a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be a minimum 0.25 inch thick. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. Tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150% of the maximum external soil and hydrostatic pressure.

The tank shall be furnished with one EPDM grommet fitting to accept a 4.50" OD DWV or Schedule 40 or Schedule 80 pipe. The tank capacities shall be as described in the contract documents.

The Drywell accessway shall be an integral extension of the wetwell assembly and shall include a lockable cover assembly providing low profile mounting and watertight capability. The cover shall be capable of withstanding a load rating of 300 lbs per square foot. The accessway design and construction shall enable field adjustment of the station height in increments of 3" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

The station shall have all necessary penetrations molded in and factory sealed. If a field penetration is necessary, it shall be approved in advance by the manufacturer and the engineer.

All discharge piping shall be constructed of 304 Series Stainless Steel and terminate outside the access way bulkhead with a stainless steel, 2 inch female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 235 psi WOG. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

The access way shall include a single NEMA 6p electrical quick disconnect (EQD) for all power and control functions, factory installed with access way penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with sufficient length of useable Electrical Supply Cable (ESC) outside the station, to connect to the alarm panel. The ESC shall be installed in the basin by the manufacturer. Field assembly of the ESC into the basin is not acceptable because of potential workmanship issues. The EQD shall require no tools for connecting, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. A junction box shall not be permitted in the accessway due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required. The access way shall also include a vent to prevent sewage gas from accumulating in the tank.

2.06 Core Unit

The Grinder Pump Station shall have cartridge type easily removable core assembly containing pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls and electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is not acceptable because of potential workmanship issues and increased installation time. The watertight integrity of each core unit, shall be established by 100% factory test at a minimum of 5 PSIG.

2.07 Valves

- a) Check Valve. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless steel discharge piping. The check valve shall provide a full-port passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Working parts shall be made of a 300 series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A non-metallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at very low back pressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall

be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

2.08 Controls

The package lift station shall be furnished with an automatic pump control system housed in a NEMA 4X *stainless steel* enclosure. The control system shall include the following primary features:

- Main disconnect
- Motor starter/protector for each pump
- Start/run capacitor(s)
- Top mounted flashing alarm light
- Audible alarm with silence switch
- Pump run indicator
- Microprocessor based pump controller, including automatic alternation, pump run LED's, float activation LED's, alarm code blinker, pump fail LED and control power LED. To provide float loss indication and to maintain control even with the loss of up to three floats.
- Hand-Off-Automatic selector switch for each pump
- 24VAC float circuit
- Pump seal failure alarm indication
- Motor thermal overload circuit
- Aux. Contact for high-level alarm
- Terminals for all field connections
- U.L. 508 Listing
- Elapsed Time Meter for each pump
- Lightning Suppressor
- Dead Front with interior swing door (w/main fused disconnect)
- The panel shall include a receptacle for connection of a portable auxiliary power generator.

2.09 Corrosion Protection

All materials exposed to wastewater shall have inherent corrosion protection i.e., cast iron, fiberglass, stainless steel, PVC. Any exterior steel surfaces are to be suitably protected against corrosion. Galvanized steel is prohibited. Connections between dissimilar metals shall be insulated to prevent galvanic corrosion.

2.10 Serviceability

The grinder pump core, including level sensor assembly, shall have two lifting hooks complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature will be

provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

2.11 Safety

The grinder pump shall be free from electrical and fire hazards as required and suitable for use in the context and environment being proposed. As evidence of compliance with this requirement, the completely assembled and wired grinder pump in its tank shall be listed by Underwriters Laboratories, Inc.

2.12 Manuals

The equipment shall be furnished to the Owner with three copies of detailed wiring diagrams, operation and maintenance manual, and detailed installation instructions for each type of unit.

PART 3 EXECUTION

3.0 FACTORY TEST: Each grinder pump shall be submerged and operated for 5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit's dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.

The **ENGINEER** reserves the right to inspect such testing procedures with representatives of the **OWNER**, at the **GRINDER PUMP MANUFACTURER'S** facility.

3.01 DELIVERY: All grinder pump units will be delivered to the job site 100 percent completely assembled, including testing, ready for installation.

3.02 INSTALLATION

The **CONTRACTOR** shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.

Installation shall be accomplished so that 1" to 4" of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

A 6" inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.

The **CONTRACTOR** shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with sufficient length of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a **FACTORY INSTALLED** EQD half to connect to the mating EQD half on the core.

3.03 BACKFILL REQUIREMENTS: Recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern, Class 1B is a better choice when the native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone offers an added benefit in that it doesn't need to be compacted.

Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density. If the native soil condition consists of clean compactible soil, with less than 12 percent fines, free of rocks, roots and organic material, it may be an acceptable backfill. Soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 85 percent and 90 percent. Heavy, non-compactible clays and silts are *not* suitable backfill for this or any underground structure such as inlet or discharge lines.

Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augured holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped more than 4 feet from the discharge to the bottom of the hole to avoid separation of the constituent materials.

Backfill of clean native earth, free of rocks, roots, and foreign objects shall be thoroughly compacted in lifts not exceeding 12" to a final Proctor Density of not less than 85 percent. Improper backfilling may result in damaged accessways. The grinder pump station shall be installed at a minimum depth of 42" from grade to the top of the discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.

3.04 START-UP AND FIELD TESTING: The **MANUFACTURER** shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the **OWNER'S** personnel in the operation and maintenance of the equipment before the stations are accepted by the **OWNER**.

All equipment and materials necessary to perform testing shall be the responsibility of the **INSTALLING CONTRACTOR**. This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin

(filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.

Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:

1. Make certain the discharge shut-off valve in the station is fully open.
2. Turn ON the alarm power circuit and verify the alarm is functioning properly.
3. Turn ON the pump power circuit. Initiate the pump operation to verify automatic "on/off" controls are operative. The pump should immediately turn ON.
4. Consult the Manufacturer's Service Manual for detailed start-up procedures.

Upon completion of the start-up and testing, the **MANUFACTURER** shall submit to the **ENGINEER** the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected

4.0 Basis of Payment: Payment will be made to the contractor for 1 each-Duplex Grinder Pump Lift Station. This will included all materials, labor testing and time necessary to install and make operable the Grinder Pump.

E. GRADING, EARTHWORK, TRENCHING & DIRECTIONAL BORING

PART 1 GENERAL

1.1 SUMMARY

This section applies to open cut and trenchless sewer installation, as indicated on the Drawings. The Contractor shall perform all excavation, embankment, trenching, backfilling, cushioning, surface dressing, dewatering, shoring, and disposal of waste as required for site grading, structures, piping and appurtenances as shown on the Drawings.

The Contractor shall perform investigations, before bidding, as he considers necessary to satisfy himself as to the materials to be encountered. He shall then submit his bid to include the removal of any and all material.

1.2 REFERENCES

A. The following publications form a part of these specifications to the extent indicated by references thereto. Only the most recent revisions of these publications shall be used.

1. ASTM D-698 Moisture-Density Relations Of Soils, Using 5.5 Pound (2.5 kg) Rammer And 12-Inch (304.8 mm) Drop
2. ASTM D-1140 Test Method for Amount of Material in Soils Finer Than the No. 200 (75µm) Sieve.
3. ASTM D-2922 Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

4. ASTM D-3017 Standard Test Methods for Water Content of Soil and Rock by Nuclear Methods.

1.3 DEFINITIONS

- A. Earth excavation: Earth excavation is defined as the removal of all material whose removal is not defined as rock excavation.
- B. Pipe embedment: Pipe embedment is defined as soil or stone aggregate material placed under, around, and in some cases over the pipe. The material type and extent of embedment is specified in the respective pipe section.
- C. Trench backfill: Trench backfill is defined as soil or stone aggregate material placed in a pipe or utility trench, above the pipe embedment and up to the existing ground surface, finished grade, or the bottom of pavement.
- D. Structure backfill: Structure backfill is defined as soil or stone aggregate material placed around or above subsurface structures, such as manholes, vaults, foundations, and wetwells, to replace excavated material below existing grade.

1.4 MAINTENANCE OF WORK: The Contractor shall be responsible for the satisfactory compaction and maintenance of all completed excavation, embankment, and backfill. If, prior to the expiration of the General Warranty period stipulated in the Supplemental General Conditions, any grades or subgrades are found to have settled or eroded, they shall be reworked immediately by the Contractor and restored to the specified grades, and the surface restored.

PART 2 PRODUCTS

2.1 GENERAL

- A. Materials shall conform to the respective references listed above and other requirements specified herein.
- B. Topsoil, and material required for structural backfill and trench backfill in excess of suitable material excavated from trenching and structural excavation shall be furnished by the Contractor at no additional cost to the Owner.

2.2 PIPE EMBEDMENT MATERIAL

Granular Embedment Material: Embedment material shall be a ¾" crushed stone with at least 95% of the material passing the ¾" square sieve and no more than 5% passing a # 4 sieve.

2.3 COMPACTED CRUSHED STONE:

Crushed stone shall be as specified for pipe embedment material.

2.4 FILL MATERIALS

- A. Bulk Fill Material: Bulk fill material for earthfills and embankments shall be a soil material which is free from: rocks or stones larger than 6 inches in greatest dimension, brush, stumps, logs, roots, debris, top soil, and organic or harmful materials. The portion of fill material passing the No. 40 sieve shall have a liquid limit not exceeding 40 and a plastic limit not exceeding 25, when tested in accordance with ASTM D-4318. To the extent possible, site excavated material may be used. Bulk fill material shall be imported if suitable soil material is not available on site.

- B. Random Backfill Material: Random backfill material for pipe and utility trenches shall be job-excavated soil material which is free from organic material, debris, and rocks or lumps larger than 6 inches in their greatest dimension.
- C. Select Fill Material: Select backfill material shall be a sorted, job excavated or imported soil material as specified for bulk fill material, except no rocks, stones, or lumps larger than one inch in largest dimension shall be present.
- D. Granular Backfill Material: Granular backfill material shall be a graded gravel or crushed stone of the following gradation:

Sieve Size (square opening)	Percent Passing (by weight)
1 inch	100
3/4 inch	85 - 100
3/8 inch	50 - 80
No. 4	35 - 60
No. 40	15 -25
No. 200	4 - 8

- 1. Granular backfill material shall be free from clay lumps or organic matter. The fraction passing the No. 4 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 PREPARATION:

- A. The Contractor shall verify that required lines, levels, contours and datum are as shown in the plans.
- B. Grading, excavation and backfilling shall be made to the lines, grades and cross sections indicated in the plans.
- C. The Contractor shall maintain the site and conduct earthwork operations to ensure that the property is well drained at all times. The Contractor shall protect adjacent and downstream properties from damage or pollution caused by erosion. The Contractor is responsible for erosion control measures and methods and shall conduct earthwork operations to ensure the protection of all downstream and adjacent properties. The Contractor shall implement any additional erosion control measures to prevent damage.
- D. Existing Utilities:
 - 1. The Contractor shall verify the location and depth of all utilities a minimum of 24 hours prior to construction. The Contractor may utilize the toll free number for the "Missouri One Call System, Inc. " 1-(800) DIG-RITE. This number is applicable anywhere within the state of Missouri. Prior to commencement of work the Contractor shall notify all those companies which have facilities in the vicinity of the construction.
 - 2. Coordinate removal or relocation of existing utilities with their Owner.
 - 3. Locate and identify utilities that remain and protect them from damage. The Contractor shall make every reasonable effort to protect all existing utilities from damage. If any utility is damaged through the carelessness or negligent actions of the Contractor, the utility shall be repaired by its owner at the Contractor's expense.
 - 4. Abandoned pipes which the Drawings indicate shall be capped or filled do not need to be removed. All other abandoned pipe conduit within the limits of grading shall be removed by the Contractor

- E. Existing fences: Fences within the construction grading area shall be removed and reconstructed to equal or better quality than that of the fence removed. It shall be the sole responsibility of the Contractor to maintain all gates, fences, cattle guards and the like encountered during construction, as required to prevent the straying of pets and livestock.

3.2 CLASSIFICATION OF MATERIALS: No classification of excavated materials, regardless of type or condition, will be made for purposes of payment. All excavation shall be unclassified. Excavation and trenching work shall include the handling and removal of all materials, regardless of its nature, excavated or removed from the site in performance of the Work. No separate payment will be made for rock.

3.3 SITE CLEARING:

- A. All stumps, roots, buried logs, foundations, drainage structures, or other miscellaneous debris occurring within the limits of the excavation and site grading shall be removed as part of the grubbing operations and disposed of in accordance with the stipulations of Section E. Stumps and roots in excavated or fill areas where depth of fill does not exceed 3 feet shall be removed to a depth of 18 inches below subgrade. In fill areas where more than 3 feet of fill is required, roots and stumps shall be cut off at the face of the excavation.
- B. Clearing and stripping: All vegetation and other unsuitable material, or other miscellaneous debris occurring within the limits of the excavation and site grading shall be removed as part of the clearing operations and disposed of by, and at the expense of, the Contractor. Likewise, six inches of topsoil shall be stripped from the disturbed construction areas and stockpiled for later use in final grading.
- C. Tree Removal: It is the intent of these specifications to minimize tree removal.
 - 1. No trees except for those designated for removal on the drawings are to be damaged or removed without the express approval of the Owner.
 - 2. All trees, brush, etc., shall be disposed of by the Contractor as specified herein.
 - 3. Trees shall be removed in such a manner that will prevent damage to trees left standing, to existing structures, utilities, paved roadways, curbs and walkways, and with due regard to the safety of employees and others.
 - 4. Surfaces of trees that are cut or scarred by the Contractor's operations shall be painted with an approved asphaltum base paint prepared especially for tree surgery.

3.4 EARTHFILLS AND EMBANKMENTS

- A. Material and Compaction Requirements:
 - 1. Fill areas which are below an envelope defined as being within 5 horizontal feet of a structure or concrete slab shall be filled with select backfill material, as specified herein, unless otherwise indicated on the Drawings. The select backfill material shall be placed in lifts not exceeding 8 inches loose thickness, and shall be compacted to a minimum 95 percent of maximum density as determined by ASTM D-698. Backfill shall be placed and compacted at a moisture content within plus 2 or minus 2 percent of optimum.

2. Fill areas which are outside the envelope described above shall be filled with bulk fill material, as specified herein, unless otherwise indicated on the Drawings. The bulk backfill material shall be placed in lifts not exceeding 8 inches loose thickness, and shall be compacted to a minimum 90 percent of maximum density as determined by ASTM D-698. Backfill shall be placed and compacted at a moisture content within plus 3 or minus 3 percent of optimum.

For areas which will be surfaced with gravel, the top two feet of bulk fill shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D-698. Backfill shall be placed and compacted at a moisture content within plus 2 or minus 2 percent of optimum.

- B. All unstable or unsuitable material shall be removed from the existing surface to receive fill material prior to commencing embankment work.
- C. Before placing any fill the existing surface shall be scarified, moisture conditioned as required and the top 6 inches compacted to 90 percent of the maximum density for that material in accordance with ASTM D-698.
- D. When embankments, regardless of height, are placed against hillsides or existing embankments having a slope steeper than 1 vertical to 4 horizontal, the existing slope shall be benched or stepped in approximately 24 inch rises. The material shall be bladed out and the bottom area cut to form benches and the embankment material being placed shall be compacted to the specified density. Formation and compaction of benches shall not be measured and paid for directly but will be considered incidental work.
- E. Where embankments of two feet or less are placed over existing pavement, the existing pavement shall be removed and the cleared surface compacted to the specified density. Where embankments greater than two feet are placed over existing pavement, the pavement shall be broken into pieces with a maximum dimension of 24 inches and the pieces left in place.
- F. Do not place fill or backfill material over porous, wet, frozen or spongy surfaces. Embankment construction shall not be performed when fill material is frozen or contains frost or snow.
- G. Placement: Place earth embankments in successive horizontal lifts uniformly distributed over the full width of the fill area. Each lift shall not exceed the specified thickness and shall be compacted to the specified density prior to placing any additional lifts. As compaction of each layer progresses, continuous blading and dozing will be required to level the surface and insure uniform compaction.
- H. No rocks or stones shall be placed in the upper 18 inches of any fill or embankment. Rocks or stones within the size limit may be incorporated in the remainder of fills and embankments, provided they are distributed so they do not interfere with proper compaction, as determined by the Engineer.

3.5 EXCAVATION

A. General:

1. Where necessary, satisfactory sheeting and bracing shall be used to hold the sides of the excavation at all points where damage might result from slides.
 - a) All sheeting and bracing shall be removed as the backfill is placed, unless otherwise directed in writing by the Owner or shown on the

drawings. All voids left or caused by the withdrawal of sheeting shall be filled immediately with suitable material and compacted.

2. Excavation below structure or trench subgrade:
 - a) Over excavation due to Contractor's oversight shall be backfilled with granular embedment material placed in 8-inch loose lifts and compacted to 90 percent of the maximum density for that material in accordance with ASTM D-698, at no additional cost to the Owner.
 - b) When unstable or unsuitable material is encountered in the subgrade, such material shall be removed, backfilled with granular pipe embedment material and compacted to the density equal to or greater than required for subsequent backfill material. Such excavation and backfill shall be done at no additional cost to Owner.
 - c) When the subgrade bottom is soft and in the opinion of the Engineer cannot support the foundation, a further depth and/or width shall be excavated and refilled to the desired pipe or foundation grade with granular embedment material as required by the Engineer to assure a firm foundation. Such excavation and backfill shall be done at no additional cost to Owner.
 - d) Where granular embedment material is not available, and in locations directed by the Engineer, granular backfill material shall be used to stabilize or raise the subgrade.
3. No blasting of any kind for rock excavation or for other purposes will be permitted unless permission is given in writing from the Owner.
4. Dewatering: Each excavation shall be kept dry by Contractor during subgrade or pipe embedment preparation, and continually thereafter until the structure or pipe is completely installed, to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.
 - a) All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level at least 12 inches below the bottom of the excavation.
 - b) Trenches shall be drained so that workmen do not have to work in mud or water. The discharge of pumps used for draining the trenches shall be led to natural drainage courses or drains.

B. Structure Excavation:

1. Excavation for structures shall be performed to the limits indicated on the Drawings and/or described in Section D.
2. All suitable material removed by excavation shall be used as far as practicable for backfill and embankment as required to complete the work. The Contractor shall sort all excavated material and stockpile suitable material as necessary. Stockpile excavated material, to be used as fill and backfill, in area designated on site and remove excess and unsuitable material, not being reused, from site.
3. Compacted crushed stone shall be placed beneath concrete slabs and in other locations indicated on the Drawings. Crushed stone shall be placed in 6" loose lifts and compacted to 90% of maximum dry density as determined by ASTM D-698, at a moisture content within plus or minus 3 percent of optimum.

C. Trenching:

1. All pipeline excavation shall be open cut unless shown otherwise on the plans. The Contractor shall not open more trench in advance of the pipe

laying than is necessary. The length of open trenches shall be limited depending on the nature of the soil and safety considerations. All open trenches shall be adequately protected from collapse.

2. Trenches shall be excavated within the limits of public right-of-way or easements in conformance with the requirements herein. Trenches shall be excavated to the width and depth necessary to install sewer pipe to the lines, grades and elevations shown on the drawings.
3. In those areas designated to be landscaped, seeded or sodded, the top soil shall be excavated, stockpiled and replaced as specified herein.
4. The Contractor shall not open more trench in advance of pipe laying than is necessary to expedite the work. The length from one manhole to the next, or 300 feet, whichever is the shorter, shall be the maximum allowable length of open trench ahead of pipe laying.
5. Trenches shall be excavated to a width which will provide adequate working space and pipe clearances for proper pipe installation, jointing, and embedment. However, the limiting trench widths, below an elevation 12 inches above the top of the installed pipe, shall be as follows:

Pipe Size (inches)	Minimum Trench Width in Earth (inches)*	Maximum Trench Width in Earth (inches)	Minimum Trench Width in Rock (inches)*
<4	20	26	20
4-6	24	30	24
8	26	32	24
10	30	34	24
12	32	36	26

*Note: Minimum trench width given is for gravity sewer construction.

6. Unauthorized trench widths: Where, for any reason, the width of the lower portion of the trench as excavated at any point exceeds the maximum permitted in the foregoing table, either pipe of adequate strength, special pipe embedment, or arch concrete encasement, as required by loading conditions and as determined by the Engineer, shall be furnished and installed by and at the expense of the Contractor. Excessively large trench widths in roads shall not be compensated for extra pavement restoration outside prescribed trench widths.
7. Trench bottom in earth: The trench in earth shall have a flat bottom the full width of the trench and shall be excavated to the grade to which the embedment is to be laid. The surface shall be graded to provide a uniform bearing and continuous support. No part of the bell shall be in contact with the trench bottom.
8. The Contractor shall sort and stockpile excavated material so that suitable material is available for backfill. Excavated material shall be deposited on the side of the trenches and beyond the reach of slides. Excavated material not suitable for backfill shall be promptly removed from the site.

9. Where necessary to reduce earth load on trench banks to prevent sliding and caving, banks may be cut back on slopes, but sloping trench walls shall not extend lower than 1 foot above the top of the pipe.
10. Trench Shields: Where trench shields are used by the Contractor, no part of the shield shall exceed lower than 6 inches above the top of the pipe, nor shall the maximum allowable trench width be exceeded.
11. Topsoil displaced due to trenching shall be carefully stockpiled and placed back on top of the trench when backfilling.

3.6 DIRECTIONALLY DRILLED CROSSINGS

- A. Directionally drilled crossings shall be performed in accordance with industry practice, and shall include all labor, equipment and consumables necessary to accomplish the following:
 1. Clearing, grading, and general site/access preparation necessary for construction operations;
 2. Transportation of all equipment, labor, consumables, and Contractor supplied materials to and from the jobsite;
 3. Erection of horizontal drilling equipment at the drill site;
 4. Reaming the pilot holes to a diameter suitable for installation of the prefabricated pull sections;
 5. Installation of the prefabricated pull sections along the reamed holes;
 6. Fabrication of the pull sections; and
 7. Clean-up and restoration of all work areas.
- B. Horizontal directional drilling type machines shall be used when a minimum bend radius is specified on the project. Contractor shall not bore a radius smaller than specified on the project drawings. Wash boring is not permitted.
- C. Sodium Bentonite and/or gel type drilling muds are permitted for cuttings removal, borehole stabilization and carrier pipe lubrication on pullback.
 1. No fluid shall be approved or used that does not comply with permit requirements and environmental regulations.
 2. Disposal of drilling fluids shall be the responsibility of the Contractor and shall be conducted in compliance with all relative environmental regulations, right-of-way and workspace agreements, and permit requirements.
 3. Mud pits shall be suitably lined and bermed to prevent leakage to the surrounding area. All barrels, tanks, connections, valves, lines, etc. shall be maintained in good condition so that leaks do not occur. Should a leak occur, any spillage shall be cleaned up immediately and the cause of the leak remedied.
 4. The drilling Contractor shall be responsible for mud containment/disposal.
 5. The Contractor is responsible for securing permits and transporting all excess fluids to an approved disposal site.
- D. Pulling:
 1. Before inserting a plastic pipe through a bored hole, ensure that the size of the bore is of sufficient diameter to prevent stress during insertion.
 2. The pull section shall be supported during pull back so that it moves freely.
 3. A swivel shall be used to connect the pipeline pull section to the reaming assembly to minimize torsional stress on the pipeline pull section.
 4. A leader or fuse link approximately four feet long of the next smaller size PE pipe shall be added to the pulling hitch.

5. The pull section shall be installed in 1 continuous length with no tie in welds, if possible. If this is not possible, tie-in welds shall be minimized.
 6. The leading end of the inserted pipe shall be closed to prevent entrance of dirt and water.
 7. After insertion, the leading end shall be examined in the exit bell hole to see if there are any scratches or gouges which would indicate contact with sharp objects.
 8. If the pipe is damaged or distorted, remove the pipe and pull a plug through the bore to clean the hole. Repeat this process as many times as necessary until the leader passes through the bore undamaged.
 9. The maximum allowable pulling force on the pipeline pull section shall not exceed 5,500 pounds.
 10. The Contractor shall at all times provide and maintain instrumentation which will accurately locate the pilot hole and measure drilling fluid flow discharge rate and pressure. The Owner shall have access to these instruments and their readings at all times.
 11. Polyethylene has elastic properties, and if the pulling load on the pipe does not exceed the Safe Pull Strength, the pipe will relax back to its original pre-pull length. After the pull is complete, a relaxation period of several hours is necessary before final tie-in. The pipe shall be pulled slightly past the tie-in point to accommodate pipe contraction and facilitate final tie-in.
- E. Tracer Wire: In an uncased insertion of plastic pipe through a bored hole, a 12-gage copper tracer wire shall be attached to the leading pipe and inserted along with the pipe. Care shall be used to try and minimize the twisting of the wire around the pipe.

3.7 PIPE EMBEDMENT

- A. Embedment Classes: Embedment classes shall be as follows, and as detailed on the Drawings. All lifts are given in loose thickness. All compaction percentages refer to maximum dry density as determined by ASTM D-698. Select backfill material shall be compacted within 2% of optimum moisture content.
1. Class B Embedment:
 - a) Class B-1 embedment shall provide an encasement of granular embedment material, extending below the pipe to above the top of pipe. Granular embedment material shall be placed in 6-inch lifts and compacted to a minimum of 90%.
 - b) Class B-2 embedment shall provide a cradle of granular embedment material which shall be placed in 6-inch lifts and compacted to a minimum of 90%. Select backfill material shall then extend above the top of the pipe, placed in 8-inch lifts and compacted to 85%.
 2. Class C Embedment: Materials and compaction requirements shall be as for Class B-2.
 3. Class D Embedment: Shall allow the pipe to rest on a flat or restored trench bottom. Pipe embedment shall be select backfill material extending from the bottom of the pipe to above the top of pipe, placed in 12-inch lifts and compacted to 85%.
- B. Pipe Embedment Class Schedule: Unless otherwise noted on the Drawings, pipe embedment classes shall be provided according to the following schedule:

Pipe Material	Depth over pipe (feet)	Embedment class
SDR-35 PVC	6"	B-1
SDR-PR PVC	6"	D
C-900 PVC	6"	D
DIP (ductile iron)	6"	B-2
Other types not listed here	6"	B-1

C. Placement of Embedment:

1. Place embedment material at the trench bottom with proper allowance for bell joints. Level materials in continuous layers not exceeding 6 inches in compacted depth. Shovel slicing of embedment shall be performed along the sides of the pipe as embedment is placed, to consolidate the bedding and haunching below the pipe.
2. Consolidate granular embedment by rodding, spading and compacting as necessary to provide uniform pipe support and meet the compaction requirement.

3.8 BACKFILLING:

A. General:

1. All trenches and excavations around structures shall be backfilled to finish grade according to the drawings. Backfill with material as specified herein.
2. Large compaction equipment, including self-propelled compaction equipment, bulldozers, loaders, and boom-mounted vibratory plates, shall not be used within 3 feet above the top of pipe, or within 3 feet of new or existing structures.
3. If backfilling operations do not meet the specifications, the material shall be removed, replaced and recompactd at the Contractor's expense.
4. Backfill shall not be placed when material is frozen, contains frost, snow, waste material, trees, organic matter and rubbish or when the surface to receive backfill is snow covered or frozen.
5. No backfill shall be placed over or around any structure until the concrete or mortar has attained a minimum compressive strength of 2000 psi and can support the loads imposed by backfilling and traffic.

B. Trench backfill: Backfill for all pipeline trench excavation shall be placed by the end of each working day around all pipe laid that day, leaving only the working end of the pipe uncovered. Any trenches excavated in advance of pipe laying shall also be backfilled at the end of each working day.

1. For trenches beneath proposed structures, or in areas which have or will have a paved or chip-and-seal surface, or where indicated on the drawings to use granular backfill material:
 - a. Granular backfill material shall be placed on the compacted pipe embedment, in layers not to exceed 9 inches loose thickness and compacted.
 - b. Granular backfill material shall be compacted by vibratory means. Each lift of granular backfill material shall be compacted to a minimum

95 percent of maximum density as determined by ASTM D-698. Backfill shall be placed and compacted at a moisture content within plus 2 or minus 2 percent of optimum. Extreme care shall be used in compaction operations to prevent compacting equipment from contacting the pipe.

2. For trenches in graveled areas, or other vehicle traveled ways which are neither paved nor surfaced with chip-and-seal material:
 - a. Select fill material shall be placed on the compacted pipe embedment, in layers not to exceed 9 inches in loose thickness and compacted.
 - b. Select fill material shall be compacted to a minimum of 90 percent of maximum density as determined by ASTM D-698. Backfill shall be placed and compacted at a moisture content within plus 3 or minus 3 percent of optimum. Random backfill may be compacted by vibratory plates, tracks or wheels of graders, tractors, high loaders or similar equipment, subject to the restrictions above. Extreme care shall be used in compaction operations to prevent compacting equipment from contacting the pipe.
3. For trenches in other areas, including grassed areas and parkways which are not in vehicle traveled ways:
 - a. Random backfill material shall be placed on the compacted pipe embedment, in layers not to exceed 9 inches in loose thickness and compacted.
 - b. Random backfill material shall be compacted to a minimum of 85 percent of maximum density as determined by ASTM D-698. Backfill shall be placed and compacted at a moisture content within plus 3 or minus 3 percent of optimum. Random backfill may be compacted by vibratory plates, tracks or wheels of graders, tractors, high loaders or similar equipment, subject to the restrictions above. Extreme care shall be used in compaction operations to prevent compacting equipment from contacting the pipe.

C. Structure Backfill:

1. All structures shall be backfilled to the lines and grades shown on the drawings. In no instance shall backfill be dumped, bull-dozed or otherwise deposited in bulk upon the structure. Backfill shall be kept at approximately the same elevation on all sides of the structure as backfilling proceeds.
2. Structure backfill for structures within paved or graveled areas shall be granular backfill material, compacted in place to 95% of maximum density as determined by ASTM D-698, at a moisture content within plus 2 or minus 2 percent of optimum. Granular backfill shall be placed in lifts not to exceed 8 inches in loose thickness, and compacted by careful pneumatic or vibratory tamping.
3. Structure backfill for structures in other areas shall be select fill material, placed in lifts not to exceed 9 inches in loose thickness, and compacted in place to 90% of maximum density as determined by ASTM D-698, at a moisture content within plus 3 or minus 3 percent of optimum.

3.9 TRACER WIRE AND WARNING TAPE:

- A. Tracer wire and warning tape shall be placed in the trench for all plastic sewage force mains. Tracer wire shall be # 12 THHN copper, insulated wire. Refer to the trench details on the Drawings.

3.10 SURFACE RESTORATION

- A. All areas disturbed by construction operations shall be restored by paving, gravel surfacing, seeding, or sodding as indicated on the Drawings and specified.

3.11 DISPOSAL OF MATERIALS

- A. All unused excess excavated material, together with all debris, removed pipe, stones, stumps, roots, and other unsuitable materials shall be removed from the site and disposed of by the Contractor, at the expense of the Contractor.
- B. Material to be disposed of, including excess material, shall be promptly removed from the site by Contractor. If Contractor desires to set aside excess excavated material free from contamination by sewage or other hazardous substances, he shall do so only in an area approved by the Owner.

END OF SECTION

F. Site Erosion and Siltation Control

1.01 SITE EROSION AND SILTATION CONTROL

Appropriate erosion and siltation controls shall be used and maintained in effective operating condition during the project. The contractor shall complete and submit to the City of Belton the "Permit Letter to Grade and Install Sediment and Erosion Controls (1 acre or less)

All exposed soil and disturbed areas shall be stabilized at the earliest practicable date.

Erosion control shall be in accordance with Section 800 of the Standard Specifications, and Missouri Standard Plans for Highway Construction Standard Drawing 806.10.

Payment will be considered as covered by and made under the various items in the project.

G. SEED AND MULCH

1.0 Description. All disturbed areas will be seeded and mulched as directed by the engineer.

2.0 Seed. In accordance with Section 805 of the Standard Specifications, the following mixture shall be applied at the rate specified for this project.

<u>Seeding Mixture</u>	<u>Lbs Pure Live Seed/Acre</u>
Turf Type Fescue	80 lb/acre
Annual ryegrass	10 lb/acre
Perennial ryegrass	5 lb/acre
White Clover	5 lb/acre

3.0 Mulch. In accordance with Section 802 of the Standard Specifications, mulch overspray shall be applied for this project.

4.0 Basis of Payment. No direct payment will be made to the contractor to recover the cost of equipment, labor, materials or time required to fulfill the above provisions, unless specified elsewhere in the contract document.

H. Commission Furnished Materials and Labor

1.01 COMMISSION FURNISHED MATERIAL AND LABOR

The Commission will furnish the following:

1. The gravel and/or asphalt millings, labor and equipment to install them once the sewer lines are backfilled.
2. The wire, pull boxes, switches, breakers, conduit and other items needed to establish the electrical connections to the pump grinder. This will also include an electrician and an assistant to make the connections.

I. Closing Septic Tank

1.01 CLOSING SEPTIC TANK

Description. This work shall consist of plugging and disposing of septic tanks shown on the plans or as directed by the engineer.

Conformance Requirements. The contractor shall notify the engineer at least 24 hours in advance of the contractor's intent to plug and dispose of the septic tank. Septic tanks shall be abandoned by pumping the septic tank, collapsing the top of the tank, plugging incoming and outgoing laterals, and breaking the bottom to permit drainage. The tank trench shall be backfilled with coarse gravel or rock, agricultural lime, or sand to a depth of 2 feet below the existing ground surface. The top 2 feet shall be backfilled with soil from the parcel and compacted in 6-inch lifts to the approximate density of the adjacent soil. In the event there is insufficient material in the immediate vicinity, the contractor shall provide material meeting the approval of the engineer, at the contractor's expense. All material pumped from septic tanks shall be properly disposed of at a permitted sewage treatment facility or other location approved by the engineer.

Basis of Payment. The accepted quantity of septic tanks, plugged and disposed of, will be paid for at the contract unit price per each. Payment will be considered full compensation for disposal of tank contents, permits, labor, equipment and material to complete the described work.