

A G E N D A
WORK SESSION
City of Moberly
November 04, 2019
6:00 PM

Requests, Ordinances, and Miscellaneous

1. Standard Specifications for Water and Sanitary Sewer systems, and construction details.
2. Receipt of additional bid for 2020 Police Package SUV for the Police Department.
3. Application for Board of Adjustment.
4. Discussion of a Text amendment to City Code section 22-229 regarding the Historic Preservation Commission Design Guidelines
5. A resolution authorizing the City Manager to enter into agreements with First State Community Bank for the lease purchase financing of water meters and automated meter reading equipment, billing and accounting software, and energy efficient equipment for the Water Treatment and Waste Water Treatment plants.

City of Moberly City Council Agenda Summary

Agenda Number: _____
 Department: Public Utilities
 Date: November 4, 2019

WS #1.

Agenda Item: Standard Specifications for Water and Sanitary Sewer systems, and construction details.

Summary: The current Water System Standard Specifications and Construction details for the water system were put into place in November of 2012. The current Standard Specifications for Sanitary Gravity Sewer System was put into place on August 19th, 2005. Updating the Standard Specifications and Construction details for the water and sanitary sewer system, as well as getting them approved with Missouri Department of Natural Resources will eliminate the process of getting permits through Missouri Department of Natural Resources. Additionally, this will speed up the pan review process when required.

Recommended

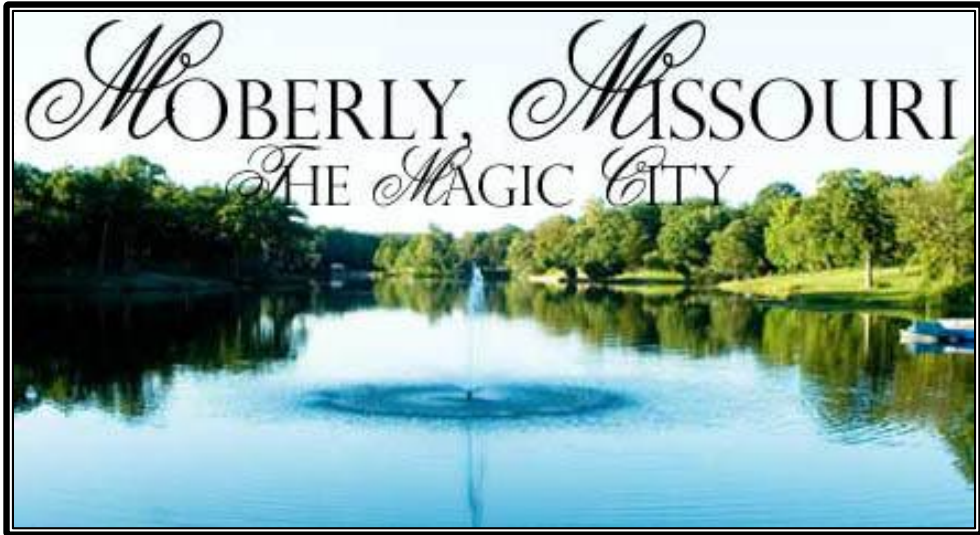
Action: Direct staff to bring forward to regular session on November 18th, 2019.

Fund Name: N/A

Account Number: N/A

Available Budget \$: N/A

ATTACHMENTS:		Roll Call	Aye	Nay
<input type="checkbox"/> Memo	<input type="checkbox"/> Council Minutes	Mayor		
<input type="checkbox"/> Staff Report	<input type="checkbox"/> Proposed Ordinance	M___ S___ Jeffrey	___	___
<input type="checkbox"/> Correspondence	<input checked="" type="checkbox"/> Proposed Resolution	Council Member		
<input type="checkbox"/> Bid Tabulation	<input type="checkbox"/> Attorney's Report	M___ S___ Brubaker	___	___
<input type="checkbox"/> P/C Recommendation	<input type="checkbox"/> Petition	M___ S___ Kimmons	___	___
<input type="checkbox"/> P/C Minutes	<input type="checkbox"/> Contract	M___ S___ Davis	___	___
<input type="checkbox"/> Application	<input type="checkbox"/> Budget Amendment	M___ S___ Kyser	___	___
<input type="checkbox"/> Citizen	<input type="checkbox"/> Legal Notice		Passed	Failed
<input type="checkbox"/> Consultant Report	<input type="checkbox"/> Other _____			



CITY OF MOBERLY, MISSOURI

**STANDARD SPECIFICATIONS
FOR SANITARY SEWER SYSTEMS**

(ADOPTED _____)



PSBA

Poepping, Stone, Bach & Associates, Inc.

Engineers, Architects, Surveyors, GIS

**CITY OF MOBERLY, MISSOURI
STANDARD SPECIFICATIONS FOR SANITARY SEWER SYSTEMS**

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SECTION 01000 APPROVAL AND ACCEPTANCE

PART 1 – GENERAL

1.01 SUMMARY

- A. These specifications are for the construction, replacement, extension, and alteration of sewer systems intended to be maintained under authority of the City of Moberly, Missouri.
- B. The intent of these specifications and details is to specify the type and quality of sanitary sewer system materials, installation, inspection, testing, and final acceptance by the City for all improvements, replacements, and extensions to be included as a part of the City's sanitary sewer system.
- C. All design, permitting, materials, and work shall be in accordance with applicable sections of:
 - 1. City of Moberly Standard Specifications for Sanitary Sewer Systems
 - 2. City of Moberly, Missouri – Code of Ordinances, Chapter 42-Utilities
 - 3. Missouri Department of Natural Resources - Minimum Design Standards.
 - 4. Missouri Standard Specification for Highway Construction, current edition
 - 5. Approved, Project-Specific Special Provisions, Specifications, and Plans
- D. The work shall consist of obtaining all required permits, approvals, and legal easements before beginning work. Work includes furnishing all labor, materials, and equipment for the complete installation of sewer line extension and/or alterations, and appurtenances, in conformance with approved construction documents.
- E. Proposed modifications, alterations, or changes to City of Moberly, Missouri Standard Specifications and Details must be submitted to the City for approval prior to implementing changes.

1.02 DEFINITIONS

- A. City: City of Moberly, Missouri.
- B. Wastewater Department: City Wastewater Department.
- C. Enforcement Officer: City Director of Public Utilities or designated representative.
- D. Engineer: Licensed Professional Engineer in responsible charge for the project and licensed to perform services in the State of Missouri.
- E. Developer: Entity requesting sewer service construction, modifications, extensions, and/or alteration to the city sewer system. The Developer could be a public or private entity, such as the City or private Developer.
- F. Contractor: Entity contracted by Developer to perform work on water main and services. The Contractor is responsible for constructing approved plans.

- G. Owner: Entity who is responsible for long term performance, maintenance, and operation of sanitary sewer systems. The City will typically become the Owner upon final approval and acceptance by City. The Developer will be responsible for the project until final approval and acceptance.
- H. Standard Specifications: City of Moberly, Missouri Standard Specifications for Sanitary Sewer Systems.

1.03 DESIGN - GENERAL

- A. All sewer system extensions or alterations shall be designed, signed, and sealed by an Engineer.
- B. Sanitary Sewer Systems shall be designed to meet City of Moberly, Missouri Specifications and minimum design requirements in accordance with Rules of Missouri Department of Natural Resources, Division 20 – Clean Water Commission, Chapter 8 – Design Guides (MoDNR Design Guides). Gravity Sewer Design shall be in accordance with Title 10 CSR 20-8.120. Sewage pumping station and force main design shall be in accordance with Title 10 CSR 20-8.130.
- C. Design considerations shall include, but are not limited to:
 - 1. Design capacity and flow; flow velocity, flow depth, and solids deposition;
 - 2. Future extensions, service connections and system expansion;
 - 3. Depth of bury; flowline gradient;
 - 4. Topography; subsurface soil, rock, and groundwater conditions; flood plains
 - 5. Construction means and methods; construction and maintenance accessibility;
 - 6. Excavation support systems; Dewatering and water control;
 - 7. Pipe anchorage for steep gradients or installations below groundwater;
 - 8. Excavation depths; external loading; differential ground and pipe movement;
 - 9. Road, highway, and street crossings; pavement repair;
 - 10. Pipe alignment and gradient; location; public and private easements; competing uses;
 - 11. Manhole sizes and locations; flow channel configurations, water tightness; inverted siphons; relationship to waterbodies; aerial crossings; water supply protection;
 - 12. Relative location of utilities, structures; roads, and stream crossings.
- D. Sanitary sewers shall be polyvinyl chloride (PVC), unless otherwise specified in the Standard Specifications. Clay tile sewer mains and taps shall be replaced with SDR26 PVC, or greater.
- E. Service lateral connections shall be at least 6 inches with a minimum gradient of 0.60%.
- F. The minimum diameter pipe for sanitary sewer mains shall be 8-inch. Size shall not decrease with increasing length downstream in direction of flow.
- G. Pavement Structure Crossings: In accordance with authority having jurisdiction with a design vehicle loading no less than AASHTO HS-20.

H. Sanitary Sewer Alignment:

1. Linear pipe with no gradient or angular changes between structures.
2. Consistent and regular gradient changes at structures.
3. Pipe parallel to existing road/street centerlines.
4. Pipe perpendicular to existing road/street centerlines at crossings.
5. Manholes at all gradient and angular changes.
6. Angular changes in direction of flow less than 90 degrees at manholes.
7. Hydraulic grade line below the inside diameter crown of the pipe.
8. Concrete anchorage cradle or collar if gradient is 20% or greater. Conditional approval is required for gradients exceeding 50 %.

I. Sanitary Sewer Location:

1. To serve all property conveniently.
2. In unimproved or unpaved areas when possible.
3. In public streets, roads, alleys, rights-of-way, or City sewer easements.
4. To avoid crossing private property.
5. To avoid interference between house, foul water, sanitary sewer, and storm sewer connections.
6. At a sufficient distance from existing/proposed structures, foundations, and underground utilities to limit encroachment and potential instabilities during construction.
7. To avoid karst features, water bodies, and storm water overflow; no sanitary lateral cleanouts or sewer vents shall be placed within an overflow path of stormwater.

J. Sanitary Sewer Manholes:

1. Provide access to sewers for inspection, maintenance, and repair. New manholes shall not have steps.
2. Provide junction structures for connecting lines and alignment changes.
3. Distance between manholes shall not exceed 400 feet for pipe sizes less than 15 inches
4. Distance between manholes shall not exceed 500 feet for pipe sizes greater than 15 inches. Conditional approval may be given for increased spacing on a project specific basis
5. Minimum inside diameter for manholes is 48 inches.
6. Manholes with sewer pipe diameters greater than 36 inches are considered special structures and shall be designed by an engineer licensed in Missouri and approved by the City.

- 7. Manholes shall be installed on each side of a stream, creek, or water body crossing and installed at least 10 feet laterally behind top of bank.
- 8. Manholes within FEMA mapped 100-year flood limits, within storm water overflow paths, or other areas subject to flooding shall be water-tight and include a lock-type water-tight manhole cover.

K. Sanitary Sewer Design Flow:

- 1. Hydraulic calculations shall be included in submittal packages to be reviewed by the City.
- 2. Sewer flows shall be based on the design peak hourly flow in accordance with MoDNR Design Guides 10 CSR 20-8-110 and shall be designed to prevent sanitary sewer overflows. If actual flow data is available, it may be used in lieu of the design average daily wastewater flow. In no case shall the ratio of peak hourly flow to design average flow be less than 4.
- 3. Population factors shall be determined from the most recent United States Census Tracts. In lieu of census data, 3.7 persons per household may be used for residential applications.
- 4. Project-specific flow design for non-residential, unconventional, or other applications may be considered in lieu 10 CSR 20-8-110, Table 1, on a project-specific basis and subject to review and approval by the City and MoDNR.

L. Sanitary Sewer Gradient:

- 1. The following minimum pipe and flowline gradients shall be used. These values assume a minimum velocity of 2.0 feet per second, flowing full, and are based on a Manning “n”: value of 0.013.

Nominal Pipe Size (inches)	Percent Slope
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.08
27	0.067
30	0.058
36	0.046

- 2. Field verification of as-built pipe gradient is required. Submittal of revised hydraulic calculations for lines with as-built gradients less than the approved design gradient by more than 0.1% is required. Removal and replacement of sewer lines and structures will be required if sufficient hydraulic capacity and cleansing velocity of the system is not met.

M. Sanitary Sewer Minimum Depth and Cover:

1. 9 feet below finish grade to flowline for new sewers with reasonable expectation of future expansion or extension. The City will review this requirement on a project-specific basis. In some cases, upstream topography may indicate shallower burial is more economical.
2. 3 feet to top of pipe for sewer mains.
3. 2.5 feet to top of pipe for service lateral connections. Service laterals shall be at least 2.5 feet below low-floor or basement-floor elevations. This elevation shall determine recommended depth of new sewer mains.
4. At stream and channel crossings, streambanks shall be protected with a grouted rock blanket in accordance with MoDNR Design Guides 10 CSR 20-8.120 (8) "Sewers in Relation to Streams".
5. Deviations from Best Practices will be reviewed by the City on a project-specific basis.

N. Sanitary Sewer Manhole and Sewer Line Connections:

1. All connections to manholes are subject to City review and approval. Connections to existing structures may require rehabilitation or reconstruction. Rehabilitation or reconstruction shall be included in the scope of a proposed project, where appropriate.
2. Service connections shall be made to sewer lines with a factory tee, Inserta Tee or approved equal. All service connections shall be made to sewer lines. Service connections to manholes will be reviewed by the City on a project-specific basis.
3. Drop type manhole connections shall be provided for a sewer line entering a manhole 24 inches or more above the invert.
 - a. Drop Pipe size shall be 12 inches or less.
 - b. Outside drops shall be fully encased in concrete.
 - c. Inside drops connections are allowed if manhole inside diameter is at least 48 inches and the incoming sewer gradient is less than 1%. Only one inside drop is allowed in a manhole.
 - d. Drop connections shall not be made through manhole joints or the transition conical section.
 - e. Manhole inverts shall be shaped to provide proper flow through the manhole
4. Force main connections to manholes shall be made within 12 inches of the manhole flowline and the invert shall be shaped to allow proper flow through the structure.
5. Pipes entering and exiting manholes at the flowline should project through the center of the structure and the manhole invert shall be shaped to ensure proper flow through the structure.
6. The number of lines entering a manhole, either new or existing, shall be kept to a minimum.

7. All replaced or repaired sewer mains shall be re-connected with a Shear Guard type fitting, or approved equal, to mitigate effects of differential pipe movement at joint and connections to dissimilar pipe materials.

O. Adjusting Manholes to Grade

1. If a proposed project requires manhole adjustment to grade, the proposed grade and method of adjustment shall be included in the project plans and is subject to City approval.

1.04 DESIGN - SEPARATION REQUIREMENTS

A. Public health is paramount. To protect the public health, the following separation requirements shall be met for water lines near sanitary and storm sewer lines. These requirements apply to both conventional trench-type construction methods and trenchless construction methods including but not limited to directional drilling and utility jacking and boring. These requirements shall be considered minimum requirements. Additional requirements may be required as conditions of required permits.

B. The following factors should be design considerations for separation requirements:

1. Materials and type of joints for water and non-potable fluid pipes.
2. Soil conditions.
3. Service and branch connections into the water main and non-potable fluid.
4. Compensating variations in the horizontal and vertical separations.
5. Space for repair and alterations of water and non-potable fluid pipes.
6. Routing water mains around manholes.

C. Horizontal Separation Requirements

1. See Standard Details.
2. Water lines shall be located at least ten (10) feet horizontally from any existing or proposed line carrying non-potable fluids such as, but not limited to, drains, storm sewers, sanitary sewers, combined sewers, sewer service connections, inlets, manholes, and process waste or product lines. The distance shall be measured edge to edge.
3. Water mains may be located closer than ten (10) feet when:
 - a. Local conditions prevent lateral separation.
 - b. The water main invert is at least 18 inches above the crown of non-potable fluid lines.
 - c. The water main is either in a separate trench or in an adjacent trench on an undisturbed earth shelf located on one side of the non-potable fluid line.
4. If separation requirements listed above cannot be met, the water line shall be placed in casing suitable for potable water in accordance with City Standard Specifications or the non-potable fluid line shall be re-constructed using pipe suitable for potable water use in accordance with Section 01001 – Standard Specification for Water Mains.

D. Vertical Separation Requirements

1. See Standard Details. The minimum vertical separation from water lines and non-potable fluid lines shall be 18 inches.
 - a. If the 18-inch vertical separation cannot be met for water lines above non-potable fluid lines, the water line shall be placed in casing suitable for potable water in accordance with City Standard Specifications and Details. Casing pipe shall be placed no closer than 4 inches above non-potable fluid pipe.
 - b. For water lines placed 18 inches or more below a non-potable fluid line, the water line shall be placed in casing suitable for potable water in accordance with City Standard Specifications and Details. Adequate support shall be provided to prevent damage to utilities located above the water line.
 - c. Where required, protective casing shall extend a minimum of 10 feet from non-potable fluid line measured perpendicular to the non-potable fluid line. Casing shall be sealed at each end according to City Standard Specifications.

1.05 PRE – CONSTRUCTION SUBMITTALS

- A. **Preliminary Submittal:** Project-specific special provisions, specifications, and plans shall be submitted to the City for review and approval of any public sewer main alteration or extension. The submittal shall be prepared by an Engineer. Submittal shall include but may not be limited to:
1. A completed MoDNR Application for Construction Permit – Sewer Extension, Form MO 780-1632.
 2. Proposed alignment, grade and locations of new structures and connections to existing sewer systems.
 3. Materials list and manufacturer data sheets, catalog data, and illustrations for all proposed materials to be used for the project. Material test certificates and affidavits of compliance with applicable standards.
 4. A work plan describing construction means, methods, sequencing, and scheduling.
 5. Plan showing all existing utilities and identifying potential conflicts with proposed work. If utility relocation is required, the Developer and their Engineer, in conjunction with respective utility owners, shall provide a proposed utility relocation plan for approval. The relocation of existing utilities shall be incorporated into the overall construction project as well as appropriate demolition plan of abandoned utility facilities.
 6. Other submittals detailed in other sections of City Standard Specifications
- B. **Preliminary Submittal Review(s):** Project-specific special provisions, specifications, and plans shall be submitted to the City of Moberly for review and approval of any public sewer main alteration or extension. The submittal shall be prepared by a professional licensed to practice in the State of Missouri. Submittal shall include:
1. At discretion of City, multiple iterations of the preliminary submittal review will be performed until all design and pertinent modifications are complete.

C. Final Submittal:

1. Final submittal to the City shall include Engineer's official seal, current date stamp, and signature on project-specific special provisions, specifications, and plans. Three (3) hard copies and one (1) electronic copy in .pdf format.
2. Submit approved MoDNR Application for Construction Permit – Sewer Extension, Form MO 780-1632. No work may begin until a copy of the approved permit has been provided to City.
3. Submit legally recorded copies of required utility easements, if any. No work may begin within proposed easements without having legally recorded permanent easements.
4. Submit approved Missouri Department of Transportation Highways and Transportation Commission, Permit to Work on Right of Way, if applicable.

1.06 INSPECTION

- A. In general, all work shall be inspected by the Enforcement Officer. Inspection for acceptance of materials will be conducted as soon as practical after materials arrive on the job site. Inspections will be performed as work progresses.
- B. The Enforcement Officer shall always have access for observation and inspection during the work. Access will be coordinated with the Contractor. The Contractor shall furnish all reasonable aid and assistance required by the Enforcement Officer for the proper inspection and examination of work and materials. The Enforcement Officer shall be notified at least two (2) working days in advance of all testing for inspection and observation. Notifications are required in accordance with other Standard Specifications.
- C. The Enforcement Officer reserves the right to reject materials and work not in compliance or accordance with approved plans and specifications.
- D. The Enforcement Officer reserves the right to suspend work.
- E. Under no circumstance shall service connections be made to existing mains without approval. All service connections will be coordinated by Contractor and conducted in the presence of Enforcement Officer.

1.07 POST – CONSTRUCTION FINAL SUBMITTAL

- A. Upon successful completion of construction and obtaining required testing results meeting or exceeding performance requirements, the Developer shall submit:
 1. Copies of all test reports, including failed tests.
 2. Submit two (2) copies of as-built drawings to City showing all changes, deviations, or modifications to original plans. As-built drawings shall include reference swing tie measurements from identifiable landmarks to all service connections. Each service connection shall have at least two (2) reference swing tie measurements.
 3. As-built drawings shall be completed by Engineer, dated and clearly marked with the name and company of the person illustrating the changes.

1.08 ACCEPTANCE

- A. After Final Submittal and City Approval, the City will conditionally accept the work.
- B. The Owner and Contractor shall warranty all work and materials for a period of one year. The Owner and Contractor will be responsible for repairing and replacing failures or damages resulting from poor workmanship and defective materials.
- C. The Enforcement Officer will inspect the work periodically during the warranty period, document conditions, and notify Developer of repairs required, if any.
- D. Final acceptance will be given when the warranty period ends, and all work and site conditions are to the satisfaction of the City.

END OF SECTION 01000

SECTION 01001 SEWER LINES AND MANHOLES

PART 1 – GENERAL

1.01 SUMMARY

- A. The design and construction of sewer main replacements, extensions, and alterations shall be in conformance with the City of Moberly Standard Specifications and Missouri Department of Natural Resources Minimum Design Standards for Sewer Systems.
- B. The work shall consist of furnishing all labor, materials, and equipment for complete installation of sewer main replacements, extensions, alterations, and appurtenances, in conformance with the lines and grades shown on the plans, as established by the Engineer, or otherwise specified.
- C. The Contractor shall employ skilled, qualified workers and supervision to perform work following generally accepted industry practices. The City reserves the right to suspend work if, in the opinion of the Enforcement Officer, this requirement is not being met.

1.02 DEFINITIONS

- A. City: City of Moberly, Missouri
- B. Sewer Department: City Sewer Department
- C. Enforcement Officer: City Director of Public Utilities or designated representative
- D. Engineer: Licensed Professional Engineer in responsible charge for the project licensed to perform services in the State of Missouri.
- E. Developer: Entity requesting sewer service construction, modifications, extensions, or alterations to the City sewer system. The Developer could be a public or private entity, such as the City of Moberly or a private Developer.
- F. Contractor: Entity contracted by Developer to perform work on sewer main and services. The Contractor is responsible for constructing approved plans.
- G. Owner: Entity who is responsible for long term performance, maintenance, and operation of new sewer mains. The City will typically become the Owner upon final approval and acceptance by City. The Developer will be responsible for the project until final approval and acceptance.

1.03 RELATED WORK

- A. Section 01000 – Approval and Acceptance
- B. Section 01002 - Earthwork
- C. Section 01003 - Directional Drilling
- D. Section 01004 - Utility Jacking and Boring
- E. Section 01005 - Pavement Repair

1.04 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least five (5) business days prior to commencing work.

1.05 SUBMITTALS

- A. See Section 1000 – Approval and Acceptance
- B. Material product data
- C. Work Plan detailing means, methods, equipment, sequencing, schedule, and testing for.
- D. Testing Reports and documentation of repairs

1.06 JOB CONDITIONS

- A. Interrupting Utility Service:
 - 1. Utility services to the City and existing customers shall not be interrupted unless approved by the Enforcement Officer and existing utility provider.
 - 2. If approval for an interruption of service is obtained, the Contractor shall provide an eight-hour notification to the Enforcement Officer and all affected occupants. The City Fire Department shall be notified at least 24-hours in advance.
 - 3. The Contractor shall provide standby service, if required. Outages shall not exceed 6 hours and will be coordinated with the Enforcement Officer.
 - 4. The Water Department is responsible for operation of in-service water valves, including closure as needed. Closure by other entities will not be permitted.
 - 5. The Contractor shall be responsible for preventing contamination of existing lines.
- B. New sewer mains must be fully tested and approved before installing service line connections.
- C. Whenever pipe laying is not actively in progress, open ends of all installed pipe and fittings shall be sealed water tight.

1.07 MATERIAL DELIVERY, STORAGE, AND HANDLING

- A. Means and methods for material shipping, loading, transporting, unloading, storing, and placing shall prevent damage. Damaged and/or defective materials shall not be installed. The City reserves the right to reject all damaged or defective materials.
- B. All materials shall be packaged, labeled, or otherwise marked with adequate, identifiable information to determine suitability for intended project application.
- C. Materials shall be stored at a mutually agreed upon location. Materials shall not be stored directly on the ground or in direct sunlight. They shall be stored in a manner to ensure they are kept clean, dry, and free of foreign debris.
- D. Materials shall be protected in a manner to prevent entrance of contamination or foreign debris.

1.08 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Gravity Sewer Systems
 - 1. **Sewer main** will be measured and paid by the lineal foot of pipe along pipe centerline, including all labor, equipment, and materials required for installation. Unless otherwise identified as a bid item, unit cost shall include: excavation, backfill, fittings, joints, tracer wire, warning tape, erosion control, dewatering, pavement repair, seeding, and cleanup.
 - 2. **Manholes** will be counted as a single unit and be paid on a per-each basis, including all labor, equipment, and materials required for installation. Costs for pipe insertion, grouting, sealing; invert forming, frames and lids shall be included in the unit costs.
 - 3. **Service Lines and Connections** will be paid for on a per each basis, including all labor, equipment, and materials required for installation. Unit cost will include connections at sewer main, connections to service lines (new and existing), and cleanout installation where specified.
 - 4. **Separation Casing Pipe** will be measured and paid by the lineal foot along casing centerline. Unit cost shall include insulating spacers and end seals. Casing required for trenchless construction methods will be paid for separately.
 - 5. Estimated quantities for bid items could change. If quantities increase, additional materials and associated work will be paid for at contract unit cost. Purchasing additional materials and performing additional work shall not be done without prior written approval from the Enforcement Officer.
 - 6. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
 - 7. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - PRODUCTS

2.01 POLYVINYL CHLORIDE PIPE (PVC) AND FITTINGS

- A. Unless otherwise specified or shown on the plans, the following type of pipe shall be used for gravity sewers:
 - 1. PVC pipe less than 18 inches shall meet requirements of ASTM D3034, with minimum SDR26. PVC pipe 18 inches and greater shall be in accordance with ASTM F679.
 - 2. All pipe shall have a minimum stiffness of 46 psi.
 - 3. Pipe shall be bell and spigot type. Wall thickness in pipe bell shall not be less than pipe barrel.
 - 4. Pipe shall have reference marks on male end indicating proper seating into bell.
- B. Fittings shall be of the same material and strength as sewer pipe. Fittings shall be compatible with pipe manufacturer.

C. Joints and Gaskets:

1. Finish joints shall be in accordance with ASTM D3212
2. Gaskets shall be in accordance with ASTM F477
3. Wall thickness in pipe bell shall not be less than pipe barrel. Pipe shall have reference marks on male end indicating proper seating into bell.
4. Buried joints shall be push-on type unless restrained or mechanical joints are required, specified, or as shown on the drawings.

D. Adapters and Couplings:

1. All sewer main replaced or repaired shall be re-connected. Connection of dissimilar material or different size materials shall be made with an approved, flexible, pre-formed elastomeric material conforming to ASTM - D3212, mechanical or compression seal type and also be equipped with a Shear Guard type fitting or approved equal. Stainless steel bands shall be used.

2.02 MANHOLES

A. Pre-cast concrete manholes: In accordance with ASTM C478 with provisions for gasketed joints between barrel and conical sections. Special design is required for manholes with incoming pipe diameter greater than 36 inches.

B. Size:

1. Base Section: 6-inch minimum floor thickness with 5-inch minimum thickness for wall and base riser.
2. Riser Sections: 5-inch minimum thickness and 48-inch inside diameter with lengths to provide depth/elevations indicated.
3. Top Section: Concentric cone type; top of cone shall match grade ring size.

C. Drop Type Manhole: Same as above. See standard details.

1. Drop pipe shall be PVC pipe with solvent welded elbow at bottom. Pipe shall be installed below flow line of incoming pipe.
2. Inside Drop: Pipe gradient for inside drops shall be less than 1%. Drop pipe shall be same size as incoming line. Use prefabricated or field-fit drop bowl. Solvent weld 90 degree elbow at bottom to match flowline. Drop pipe shall be attached to the inside face of manhole with at least three "Flared-Leg Bracket" type D021 or approved equal, with 3-inch x 3/8-inch stainless steel bolt. Bracket shall be fastened to concrete with stainless steel anchor, wedge-type or grouted. A 3/4-inch stainless steel band shall be wrapped around the pipe and attached to the bracket. At least two bracket/band assemblies shall be used with a maximum spacing of 3 feet.
3. Outside drops shall be either pre-cast with the manhole or fully encased in concrete. Maximum pipe size for outside drops is 12 inches.

- D. Gaskets:
1. In accordance with ASTM C923, rubber or mastic sealant. Ram-Nek, E-Z Stik, or approved equal.
- E. Grade Rings:
1. Pre-cast concrete, Cretex Pro Ring, or approved equal and compatible with 24-inch manhole frames and covers. Maximum thickness for grade rings and frame shall be 18 inches.
- F. Concrete Manhole Collar:
1. Where specified and shown on the drawings install concrete manhole collars for manholes installed within existing pavement structures in accordance with standard details.
- G. Steps:
1. No steps shall be installed in manholes, unless otherwise specified or shown on the drawings.
- H. Pipe Connections:
1. In accordance with ASTM C923, resilient, of size required for each pipe connecting to manhole. Pipe connections shall be A-Loc, Z-Loc, or approved equal.
- I. Frames and Covers:
1. In accordance with either ASTM A48 - Standard Specification for Gray Iron Castings or ASTM A536 Standard Specification for Ductile Castings manufactured by Neenah Foundry Company or approved equal with machined bearing surface and self-sealing gasket.
 2. Frames shall be secured to the manhole with at least four connections. Connections may be wedge anchor or grout type with at least 1/2-inch x 4-inch bolts.
 3. 22-inch minimum inside diameter
 4. 7-inch to 9-inch riser with 4-inch minimum flange width
 5. 24-inch diameter cover, checkered or knobbed surface finish with "SANITARY SEWER" cast into cover
 6. The frame shall be compatible with chimney seal installations.
 7. Watertight manhole frames and covers shall be provided where indicated on the plans, manufactured by Neenah Foundry Company or approved equal and installed according to manufacturer recommendations. Covers shall have concealed pickholes.
- J. Chimney Seals:
1. Where indicated on the plans, an external or internal chimney seal shall be installed between the manhole frame and masonry chimney in accordance with manufacturer's recommendations and specifications. Seals shall be Cretex or approved equal.

K. External Joint Sealing Bands:

1. External joint seals shall be installed on each manhole section joint. Seals shall be CretexWrap or approved equal meeting requirements of ASTM C877, Type II, and installed according to manufacturer's recommendations and specifications.

L. Protective Coatings:

1. Surfaces shall be clean, dry, and contaminant free. Remove surface protrusions and fill air pockets, lifting lug holes, and other surface imperfections with hydraulic cement grout or other approved filler compatible with coating application. Supply written confirmation of material compatibility with selected coating.
2. All exterior manhole surfaces shall have a waterproof protective coating either factory or field applied.
 - a. 1 or 2 coat asphalt waterproofing conforming to ASTM D449, Type C, 15-mil thickness unless otherwise specified or shown on the drawings.
3. Provide protective interior surface coatings where specified or indicated on the plans. Protective coating shall be applied according to manufacturer's recommendations and specifications.
 - a. SewerGard polymer lining, or approved equal
 - b. Tnemec Series 66 Epoxoline barrier coat and Tnemec Series 46H-413 finish coat, or approved equal
 - c. The material shall be an impermeable, high strength, corrosion-resistant, fiber-filled or aggregate-filled epoxy material specifically designed to protect concrete surfaces of municipal wastewater treatment structures and collection systems.
 - d. The material shall prohibit water infiltration and shall have proven resistance to corrosive chemicals, including sulfuric acid as well as other chemicals typically found in sanitary sewers.
 - e. The material shall be suitable for application over damp or dry concrete surfaces without the use of a primer.
 - f. The material shall have a non-sagging consistency to permit application on vertical and overhead surfaces.

2.03 CONCRETE

- A. Cast-in-place according to ACI 318, ACI 350R
- B. Cement: ASTM C150, Type I or II
- C. Fine Aggregate: ASTM C33 Sand
- D. Coarse Aggregate: ASTM C33, Crushed Grave, 1-inch maximum particle size
- E. Water: Potable
- F. Reinforcement: ASTM A185, steel, welded wire fabric, plain

- G. Reinforcement: ASTM A615, Grade 60, deformed steel
- H. Water Cement Ratio: 0.45 maximum
- I. Unconfined Compression Strength: 4,000 psi minimum
- J. Air Entrainment: 3% to 6%

2.04 GROUT

- A. ASTM C1107 Standard Specification for Packaged Dry, Hydraulic Cement Grout (Non-shrink)
- B. Quikrete commercial grade non-shrink precision grout or approved equal.

2.05 SEPARATION CASING PIPE

- A. This section applies when casing is required around water mains to comply with sanitary and storm sewer separation requirements. Casing materials, including joints, shall be suitable for potable water. Casing size shall be large enough to allow unrestricted installation of product pipe, including casing spacers, pipe fittings, and joints.
- B. Casing materials may be PVC, Steel, or High-Density Polyethylene (HDPE)
 - 1. PVC casing shall be in accordance with this section.
 - 2. Steel casing shall conform to AWWA C200 and AWWA M11, joined by fully welding in accordance with AWWA C206. Casing shall have a minimum wall thickness of 0.25-inch for casing up to 24 inches.
 - 3. HDPE casing shall be in accordance with Section 01003 – Directional Drilling.
- C. Projection type, non-metallic insulating spacers shall be used to support sewer main inside casing. Insulating spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.
- D. Synthetic rubber end seals shall be installed on each end of the casing pipe. End seals shall be Advanced Model Products – Model AC pull-on or approved equal fastened tightly with stainless steel bands.
- E. See Standard Details.

2.06 TRACER WIRE

- A. Tracer wire shall be green HDPE insulated single strand #12 AWG continuous copper clad steel tracer wire. Tracer wire shall be manufactured by Copperhead Industries LLC or approved equal.

2.07 WARNING TAPE

- A. Warning tape shall be "green" non-metallic, 3-inches wide and at least 5 mil thick. Warning tape shall have "Caution Buried Sewer Line" or similar warning printed on the tape. Tape shall be buried at least 2 feet above top of pipe.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Notify utility providers at least 3 business days prior to performing work adjacent to existing utilities. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.
- B. Coordinate Utility interruptions with service provider. For city-owned utilities, a written approval and two day notification is required before interrupting service.
- C. Document existing conditions including distress to existing features within project limits and footprint of construction. Document conditions at adjoining properties.
- D. When connecting to existing sewer lines, verify invert elevation of existing sewer prior to constructing new sewer.
- E. Establish survey control and verify governing dimensions and elevations. Locate existing structures and piping scheduled for abandonment and/or decommissioning.
- F. Prior to laying pipe, prepare trench subgrade and bedding in accordance with Section 01002 – Earthwork.
- G. Trench excavations shall be protected in accordance with applicable Federal, State, and local regulations, Laws, and rules in accordance with OSHA 29 CFR part 1926. Trench and excavation stability shall be the responsibility of the Contractor.
- H. If surface or ground contamination is suspected or encountered, notify the City immediately. The Developer and Contractor, in communication with the City, shall assess conditions and develop a plan for continued work including but not limited to: removal and disposal of contamination, specifying different sewer line materials and/or sewer line realignment.
- I. All pipe, fittings, and joints shall be clean, and free of foreign debris.
- J. Exclude entrance of foreign material if work is suspended or stopped.
 - 1. Close ends of pipe with snug-fitting closures such as end caps.
 - 2. Do not let water fill the trench. Include provisions to prevent flotation if water control measures are inadequate.
 - 3. Remove water, sand, mud, and other undesirable material from trench before removal of end cap.

3.02 WATER CONTROL

- A. Develop and implement an approved stormwater pollution prevention plan including erosion control measures. Prevent surface water and subsurface or ground water from entering excavations.
- B. If required, dewater to lower groundwater elevation a sufficient depth below pipe and structures to allow specified subgrade preparation, pipe laying, backfilling, and testing.

1. If dewatering is required, the contractor shall submit a project-specific dewatering plan prepared by an Engineer with at least 10 years' experience designing dewatering systems. Develop and implement site specific studies as needed to assist with the design.
- C. Water from surface runoff, downspouts, and subsurface drains shall be managed and controlled by the Contractor through an approved site drainage system. Equipment and materials required to remove water from excavations shall be on-site and available for uses throughout construction.
- D. Water disposal shall be the responsibility of the Contractor and completed in accordance with applicable federal, state, and local regulations.

3.03 INSTALLATION

A. Pipe Laying

1. In accordance with ASTM D2321 – Standard Practice for Underground Installation of thermoplastic pipe sewers and other gravity flow applications.
2. Perform only when weather and trench conditions are suitable. Do not lay in water.
3. Remove trash, debris, vegetation, snow, ice, water or other unsatisfactory materials from excavations.
4. All materials shall be carefully lowered into the trench using means and methods to prevent damage and entrance of foreign debris. Rolling or dropping materials will not be permitted. End hooks will not be permitted.
5. Commence laying at the downstream end of line and install pipe with spigot ends in the direction of flow. Bells shall be in the direction of the laying operations.
6. Open ends of sewer lines shall be adequately sealed to prevent intrusion of foreign debris during all work stoppages.
7. Clean piping and structures; remove all foreign debris. Maintain drag or swab line and pull past each joint as it is completed.
8. Install concrete cradles, encasement, and anchors in accordance with approved plans. Provide temporary support as required to position or anchor the pipe. Concrete shall be worked beneath pipe to eliminate all voids. Place concrete evenly on both sides of pipe.

B. Manhole Installation:

1. In accordance with ASTM C891 – Standard Practice for Installation of Underground Concrete Utility Structures.
2. Install manholes at locations and orientation and of type as shown on the plans and Standard Details.
3. Seal joints between manhole sections, conical sections, grade rings and frames. Provide water tight manhole covers where specified or shown on the plans.
4. Install and seal pipe connections as specified.
5. Place concrete inverts and benches. Inverts shall be shaped to the incoming and outgoing pipes and smoothly shaped from pipe to pipe to the top of invert at springline. Form smooth, curved channels. Slope benches from manhole wall down to channel at 1 in/ft.

6. Set top of frames and covers at specified elevations. In general, flush with surface in pavement structures and 1 inch above finished surface in all other area, unless otherwise specified.
7. Fill all voids, holes, and defects with hydraulic cement non-shrink grout. If interior protective coatings are specified, ensure compatibility of filler and coating materials.
8. If field applied, apply waterproof protective coating to exterior surfaces. If factory installed, repair damaged coatings.
9. Apply interior protective coating where specified and shown on the plans.
10. Install external joint sealing bands according to manufacturer's recommendations and specifications.
11. Where indicated, install chimney seals as specified and shown on the plans.

C. Service Connections

1. See Standard Details
2. Provide wye or tee type fitting on sewer main at service connections as shown on Standard Details. Inserta Tee type fittings require City approval.
3. No connections shall have bends greater than 45 degrees.
4. Where indicated, install service line cleanouts according to Standard Details.
5. Re-connect services in accordance with these specifications.
6. If existing service lines will be disconnected and abandoned, the service line shall be plugged with a water-tight seal.
7. Document connection locations relative to manhole locations. Document offset location to existing service line and clean out location. Provide documentation to City.

D. Joining

1. Join pipe in accordance with manufacturer's recommendations
 - a. Clean and lubricate all joint and gasketed surfaces.
 - b. Employ means and methods to prevent damage during jointing.
 - c. Inspect joint openings and deflection for compliance with specifications.
2. Install gaskets, seals, sleeves, couplings, and other fittings according to manufacturer recommendations.
3. Pipe expansion and contraction due to changes in temperature shall be monitored during construction. Previously joined pipe shall be inspected to ensure joints have not separated due to expansion and contraction.

E. Cutting Pipe

1. Cut neatly without damage to pipe. Surfaces shall be perpendicular to pipe centerline.

2. Remove burrs and sharp edges and smooth the pipe end by grinding.
- F. Casing Pipe
1. Where required, install casing to satisfy separation requirements.
 2. When typical trench-type construction techniques are used, subgrade preparation, bedding, initial backfill, and final backfill shall be in accordance with Standard Specification Section 01002 – Earthwork
 3. When trenchless construction techniques are used, installation shall be in accordance with Standard Specifications Section 01003 – Directional Drilling and Section 01004 – Utility Jacking and Boring
- G. Furnish and install plugs where necessary to properly complete required testing.
- H. Tracer Wire
1. Attach continuous tracer wire to top of sewer line or force main, either taped, banded, or strapped at 5 feet to 7 feet intervals. Install according to manufacturer's recommendations.
 2. Tracer wire shall be looped to the surface at all Manholes and service line cleanouts, and locations specified or as shown on the plans.
 3. All sewer service lines shall have a tracer wire from the sewer main tap to the cleanout at Right-Of-Way.
 4. Prior to acceptance, Contractor shall perform conductivity testing for all tracer wire. Full continuity must be established prior to final acceptance.
- I. Warning Tape:
1. Install continuous warning tape at least 2 feet directly above all sewer lines.
- J. Backfilling and Pavement Repair:
1. Backfill and finish surface in accordance with Standard Specification Section 01002 – Earthwork, and Standard Specification Section 01005 – Pavement Structure Repair.
- K. Connections to Existing Manholes:
1. Where specified and shown on the drawings, connect new sewer main to existing manholes. Provide inside or outside drop type in accordance with drawings and specifications.
 2. Cut holes in manhole wall to permit pipe insertion, alignment and gradient establishment and a minimum 2-inch annular space between pipe and wall across full circumference. Remove all debris prior to bedding pipe and placing grout. For smaller pipe (four (4) inch to six (6) inch), the manhole shall be core drilled and a link seal installed. This work is subject to approval of the City of Moberly
 3. Coat surface of hole with grout prior to setting pipe. Place grout bedding prior to inserting pipe. Place pipe in grout bedding and allow to set.

4. After setting, completely fill annular space with grout and provide smooth surface flush with manhole wall.
5. Construct new inverts between new and existing flowlines in accordance with manhole installation section of this specification.
6. The Enforcement Officer shall observe all connections to existing manholes. If, in the opinion of the City, manhole repair and replacement is required, subsequent mitigation work will be the responsibility of the Contractor.

3.04 QUALITY CONTROL

A. General

1. All work shall be inspected and approved by the Enforcement Officer prior to backfilling. Contractor shall notify the Enforcement Officer and arrange for inspection and observation of all testing prior to commencing.
2. Contractor shall obtain approval from Enforcement Officer prior to making any connections to existing manholes. The Enforcement Officer or representative must be present during any connection activities.
3. The Contractor shall furnish all equipment, labor and other materials and services necessary to perform pressure testing, deflection testing, and pipe gradient verification.
4. All pipe being tested shall have backfill placed in accordance with specifications, except in pavement structure areas. Placement of pavement structure base and surface courses shall be completed after all pressure, leak, deflection, and distortion testing requirements are met. Prior to backfill, verify pipe is to grade and alignment along entire length. Care should be taken during backfill to avoid moving the pipe.
5. Manhole water tightness testing shall be performed prior to backfilling.
6. Submit results of each test to Enforcement Officer.
7. Test failures require repair of failed portions of system until satisfactory test results are achieved.

B. Deflection/Distortion Testing

1. Deflection/Distortion testing shall be performed on all pipe at least 30 days after backfilling.
2. A go/no-go mandrel shall be used. The diameter of the mandrel shall be at least 95% (i.e. 5% Deflection Mandrel) of the pipe base inside diameter determined in accordance with ASTM D3034 or ASTM F679. Base inside diameter is established by subtracting a statistically derived tolerance package from the PVC sewer pipe in accordance with ASTM standard the pipe was manufactured.
3. The device shall be manually pulled through the pipe section being tested. Where possible, begin testing at downstream end of pipe. Mechanical pulling devices are not allowed.
4. Failure to advance the mandrel through the pipe constitutes a failed test.

C. Low Pressure Air Test for Pipe Sections

1. Perform test in accordance with ASTM F1417 - Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air. During joining, ASTM F3058 – Standard Practice for Preliminary Field Testing of Thermoplastic Pipe Joints for Gravity Flow (Non-Pressure) Sewer Lines may be used to test individual joints. Final testing for acceptance will be in accordance with ASTM F1417 methods.
2. Seal ends of pipe and openings air and watertight.
3. Minimum test pressure shall be 5 psig above average groundwater pressure, if any, at pipe springline.
4. Pressurize pipe and allow pressure to stabilize at least 4 minutes. Adjust pressure to 5 psig and begin recording time. Measure the amount of elapsed time it takes for the pressure to drop 1 psi. in minutes and seconds.
5. Reference Table 1 in ASTM F1417 Minimum Time for a 1 psig Pressure Drop for Size and Length of Pipe for $Q = 0.0015 \text{ ft}^3/\text{min}/\text{ft}^2$ of Internal Surface. Measured time greater than those listed in the table for a particular pipe size and length constitute a passing test.

D. Manhole Water Tightness

1. Vacuum testing and acceptance shall be in accordance with ASTM C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill. These testing requirements do not apply to existing manholes, unless otherwise specified or shown on project drawings.
2. Seal manhole. Apply 10 in/Hg vacuum. This creates a pressure differential of approximately 5 psi from outside to inside when test is conducted under normal atmospheric pressure conditions. Maintain vacuum for at least 5 minutes.
 - a. De-water as necessary to remove additional hydrostatic pressure. Vacuum testing a manhole system subject to hydrostatic pressure may induce a pressure differential in excess of design limits of critical flexible connectors.
3. Begin recording time. Measure the amount of elapsed time it takes for the pressure to drop 1 in/HG in minutes and seconds.
4. Reference Table 1 in ASTM C1244 for minimum elapsed time for a drop in vacuum of 1 in/Hg. Measured time greater than those listed in the table for a particular manhole size and depth constitute a passing test.

END OF SECTION 01001

SECTION 01002 EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for earthwork, trenching, backfilling and compacting. The work shall consist of all labor, materials, and equipment required to install sewer main and appurtenances in accordance with contract documents, drawings, and specifications.
- B. The Contractor shall employ skilled, qualified workers and supervision to perform work following generally accepted industry practices. The City reserves the right to suspend work if, in the opinion of the Enforcement Officer, this requirement is not being met.

1.02 DEFINITIONS

- A. City: City of Moberly, Missouri
- B. Sewer Department: City Sewer Department
- C. Enforcement Officer: City Director of Public Utilities or designated representative.
- D. Engineer: Licensed Professional Engineer in responsible charge for the project licensed to perform services in the State of Missouri.
- E. Developer: Entity requesting sewer service construction, modifications, extensions, or alterations to the City sewer system. The Developer could be a public or private entity, such as the City of Moberly or a private Developer.
- F. Contractor: Entity contracted by Developer to perform work on sewer main and services. The Contractor is responsible for constructing approved plans.
- G. Owner: Entity who is responsible for long term performance, maintenance, and operation of new sewer mains. The City will typically become the Owner upon final approval and acceptance by City. The Developer will be responsible for the project until final approval and acceptance.
- H. ASTM: American Society for Testing and Materials

1.03 RELATED WORK

- A. Section 01000 – Approval and Acceptance
- B. Section 01005 - Pavement Repair
- C. Section 01006 - Seeding

1.04 REFERENCE STANDARDS

- A. ASTM D698 - Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 lb. Rammer and 12-inch Drop.
- B. ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (shallow depth).

- C. Missouri Standard Specification for Highway Construction.

1.05 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least five (5) business days prior to commencing work.

1.06 SUBMITTALS

- A. See Section 1000 – Approval and Acceptance.
- B. Work Plan detailing means, methods, equipment, sequencing, and schedule for Earthwork.
- C. Traffic control plan and required permits from jurisdictions having authority.

1.07 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Trenching, backfilling, and compacting shall be included in the Contract unit cost of sewer main pipe.
- C. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - PRODUCTS

- 2.01** Materials shall be in accordance with Contract Documents, plans, specifications, and approved submittals.

2.02 BEDDING AND INITIAL BACKFILL

- A. Granular bedding containing no clods, muck, sod, frozen material, roots or other deleterious material with a plasticity index not greater than 6 and meeting the following gradation requirements.

Sieve Size	Percent Passing
1.5 inch	100
#4	20-60
#200	0-6

2.03 FINAL BACKFILL

- A. **Excavation Spoils:** suitable silt, sand, gravel, lean clay or combinations thereof containing no clods, muck, organics, frozen material, or other deleterious material from excavations. Maximum particle size shall be 3 inches.
 - 1. If sufficient quantity of suitable materials is not available from excavation spoils, the Contractor shall identify and import suitable materials for backfill. Contractor shall dispose of all unsuitable material.

- B. **Select Granular Backfill**, Section 1010, Missouri Standard Specification for Highway Construction. Material shall meet the following gradation:

Sieve Size	Percent Passing
3 inches	100
#40	20-60
#200	0-6

2.04 AGGREGATE BASE AND SURFACE

- A. **Aggregate Base:** Type 5, Section 1007, Missouri Standard for Highway Construction.
- B. **Aggregate Surface:** Grade A or B, Section 1006, Missouri Standards for Highway Construction.

2.05 CONTROLLED LOW-STRENGTH MATERIAL (FLOWABLE FILL)

- A. Controlled Low-Strength Material: Self-compacting, flowable concrete material produced from the following:
 - 1. Portland Cement: ASTM C150/C150M, Type I or Type II.
 - 2. Fly Ash: ASTM C618, Class C or F.
 - 3. Normal-Weight Aggregate: ASTM C33/C33M, 3/4-inch nominal maximum aggregate size.
 - 4. Water: ASTM C94/C94M.
 - 5. Air-Entraining Admixture: ASTM C260/C260M.
- B. Produce conventional-weight, controlled low-strength material with 100-psi compressive strength when tested according to ASTM C495/C495M and placed in the field with a slump between 9 and 11 inches tested in accordance with ASTM C143..

PART 3 - EXECUTION

3.01 GENERAL

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.
- B. Establish line and grade to maintain minimum burial and separation requirements in coordination with Enforcement Officer and Engineer. Notify Enforcement Officer and Engineer if conflicts with existing utilities or structures exist.
- C. Trench excavations shall be protected in accordance with applicable Federal, State, and local regulations, Laws, and rules in accordance with OSHA 29 CFR part 1926. Trench and excavation stability shall be the responsibility of the Contractor.
- D. Implement and maintain traffic control plan

3.02 WATER CONTROL

- A. Develop and implement stormwater pollution prevention plan including erosion control measures. Prevent surface water and subsurface or ground water from entering excavations. Dewater to remove all water a sufficient depth below pipe and structures to allow specified subgrade preparation, pipe laying, and backfilling. The plan shall address water disposal if dewatering is required.

- B. Water from surface runoff, downspouts, and subsurface drains shall be managed and controlled by the Contractor through an approved site drainage system. Equipment and materials required to remove water from excavations shall be on-site and available for uses throughout construction.
- C. Water disposal shall be the responsibility of the Contractor and completed in accordance with applicable federal, state, and local regulations.

3.03 PREPARATION

- A. Clear and grub areas of excavation.
- B. Backfilling and compaction shall not occur until the following conditions are satisfied:
 - 1. Subgrade proof-compacting, required inspection, testing and acceptance by Enforcement Officer.
 - 2. Soft, rutting, pumping, frozen or otherwise unsuitable soils in base of excavations shall be removed at direction of Enforcement Officer. Notify Enforcement Officer once subgrade elevations are reached. Excavate unsuitable soils within directed limits and replace with suitable materials approved by Enforcement Officer. Suitable materials could include but are not limited to bedding, initial backfill, and final backfill.
 - 3. All trash, debris, vegetation, snow, ice, water or other unsatisfactory materials shall be removed from excavations.

3.04 EXCAVATION

- A. Excavate trenches to approved subgrade elevations. Unless otherwise specified, the minimum trench width shall be at least one (1) foot greater than the outside diameter of the pipe.
- B. If rock is encountered, it shall be excavated at least 12 inches wider than the outside diameter of the pipe and at least 6 inches deeper than planned subgrade elevation. Alternatively, pipe alignment and grade could be adjusted to avoid rock excavation if separation, burial, and joint restraint requirements are satisfied. If additional excavation is required, bedding material shall be used as backfill.
 - 1. For City projects, notify Enforcement Officer and Engineer immediately if rock is encountered within excavation limits, and earthwork progress significantly slows or stops. Excavation in rock shall not progress unless approved by Enforcement Officer. The Enforcement Officer will provide guidance and specifications for rock excavation and backfilling on a case by case basis.
 - 2. For City projects, unless identified as a bid item, additional cost for rock excavation will be paid for as additional work in accordance with Contract Documents regarding changes.
 - 3. For City projects, unless identified as a bid item or otherwise addressed on a project specific basis, if surface or ground contamination is suspected or encountered, notify the City immediately. The Contractor, in communication with the City, shall assess conditions and develop a plan for continued work including but not limited to: removal and disposal of contamination, specifying different sewer line materials, and sewer line realignment. Additional work, will be paid for as additional work in accordance with Contract Documents.
- C. Stockpile materials acceptable for use as backfill and topsoil. Stockpile locations relative to excavations shall be incorporated into Contractor's responsibility for excavation stability. Place,

grade, and shape stockpiles to promote positive drainage with adequate erosion control. Dispose unsuitable materials.

3.05 BACKFILLING

- A. Proof-compact subgrade prior to placing bedding or laying pipe. Proof-compacting shall be performed in the presence of Enforcement Officer; approval is required before placing bedding to receive pipe.
- B. Shape and compact bedding to provide uniform bearing of the pipe. Excavate bell holes to allow for unobstructed assembly of the joint. Make bell hole as small as practical. After the joint has been made, carefully fill bell hole with bedding material and compact.
- C. After pipe laying, joining and aligning, place and compact bedding and initial backfill as shown on the plans. Ensure material is worked under the haunch of the pipe to provide adequate side support. Take precautions to prevent movement of the pipe during placement and compaction of haunching material.
- D. Place and compact initial backfill to provide cover over the pipe. Use methods to prevent pipe damage or displacement.
- E. In unpaved areas, place final backfill using methods to prevent pipe damage or displacement. Place final backfill in 6-inch loose lifts and compact. Leave material neatly mounded over the trench. Maintain trench and fill settled areas as they occur. Finish grade to eliminate uneven areas. Seed areas where required.
- F. In paved areas, place and compact base and surface repairs in accordance with details and project specification Section 01005 - Pavement Repair. Place final backfill using methods to prevent pipe damage or displacement.
- G. Jetting or water-settling backfill is prohibited, unless permitted by Enforcement Officer and Engineer.

3.06 COMPACTION

- A. Compact materials in accordance with ASTM D698 and ASTM 6938 and according to the following table:

Material	Minimum Compaction	Maximum Loose Lift Thickness
Bedding and Initial Backfill	90%	4 inches
Suitable Excavation Spoils	90%	6 inches
Select Granular Backfill	95%	6 inches
Aggregate Base	95%	6 inches
Aggregate Surface	95%	6 inches
Bituminous Surface	98%	3 inches

- B. Moisture condition (wetting or drying) fill as needed to achieve optimum moisture contents and required compaction.
- C. Use compaction equipment capable of achieving required densities and avoid damage to pipe, adjacent utilities, and adjacent structures. Self-propelled, "heavy" roller or pad type vibratory rollers shall not be operated within 2 feet from top of pipe.

3.07 QUALITY CONTROL

- A. Compaction quality control shall be provided by Contractor and will be incidental to Contract Unit costs. Quality control technicians and testing organizations shall be trained and certified to perform required testing in accordance with ASTM standards and specifications.
- B. Quality control density testing frequency shall be in accordance with the following table:

Material	Testing Frequency per lift
Bedding and Initial Backfill	One test every 300 linear feet of trench
Suitable Excavation Spoils	One test every 300 linear feet of trench
Select Granular Backfill	One test at each pavement structure crossing
Aggregate Base	One test at each pavement structure crossing
Aggregate Surface	One test at each pavement structure crossing
Bituminous Surface	One test at each pavement structure crossing

- C. Areas where testing indicates insufficient compaction shall be re-compacted, re-conditioned, re-worked, and/or moisture conditioned until requirements are met and to satisfaction of Owner and Engineer.
- D. Controlled low strength material shall be tested in the field for slump and samples collected for comprehensive strength testing. Slump and comprehensive testing shall be in accordance with ASTM C143 and ASTM C495, respectively. Testing frequency shall be 1 set of tests per 100 cubic yards of material used. Slump shall be between 9 and 11 inches. Minimum compressive strength is 100 psi.

3.08 MAINTENANCE

- A. The Contractor will demobilize equipment and restore the work site to the original condition. All excavations will be backfilled, and surfaces restored according to specifications and project drawings.
- B. Remove all leftover materials, including unsuitable excavation spoils, trash, debris, and other construction waste in accordance with applicable federal and state laws and regulations.
- C. Protect newly graded areas from traffic (except pavement crossings) and erosion. Keep free of trash and debris See Section 01005- Pavement Repair for pavement area maintenance.
- D. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances during warranty period and to satisfaction of Enforcement Officer.
- E. Where differential movement is measurable or observable along excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add appropriate backfill material, compact, and replace surface treatment according to project specifications and plans. Restore appearance, quality, and condition of surface or finish to match adjacent work to satisfaction of Enforcement Officer.

END OF SECTION 01002

SECTION 01003 DIRECTIONAL DRILLING

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for directional drilling installation methods for High Density Polyethylene (HDPE) pipe casing or steel pipe casing beneath traveled ways or at locations shown on the drawings. The Contractor shall provide all labor, materials, and equipment required to install casing in accordance with these specifications.

1.02 SUBMITTALS

- A. Submit work plans, shop drawings, and product data for approval. Submittals shall include:
1. Detailed work plan and sequencing including procedures and schedule;
 2. Proposed line and grade of casing pipe to maintain minimum burial depth, minimum separation requirements from existing utilities, and radius of curvature;
 3. Proposed equipment including but not limited to: drilling rig, rotary torque capacity, thrust/pullback pressures, tensile load limit calculations, drill bits, mud system including pump and motor size, down-hole tools, guidance system with stated accuracy, and safety systems;
 4. Pit locations;
 5. Design, means, methods and materials for pit excavation support;
 6. Pit dimensions showing relative location to traveled ways;
 7. Dewatering methods;
 8. Spoil removal methods;
 9. Drilling fluids including water source;
 10. Methods for monitoring drill fluid volumes and losses;
 11. Product data;
 12. Casing pipe material and size;
 13. Casing pipe segment joining methods and procedures;
 14. Product pipe spacers and casing pipe end seal materials;
 15. Erosion control and stormwater pollution prevention plan;
 16. Adverse conditions plan:
 - a. Plan shall address means and methods of work, especially HDPE fusion welding, in adverse conditions such as freezing temperatures, precipitation, and wind and mitigation measures to eliminate resulting effect on pipe fusion and installation;
 17. Remediation plan:
 - a. Identify means and methods to remove obstructions at the boring face;
 - b. Identify remedial measures for mitigating damage to existing facilities, and impacts to traveled ways, including ground subsidence and heaving;
 - c. Identify remedial measures for excessive drill fluid loss;
 18. Experience:
 - a. Submit a list of at least five (5) successfully completed directional drilling projects using HDPE pipe sizes of at least 18 inches and lengths greater than 150 feet within the last five (5) years. Include project owner contact information references substantiating Contractor's experience; and,
 19. As-Built Drawings showing horizontal and vertical alignment of completed casing installation. This submittal shall also include pullback pressure logs, volume of drilling fluid, and fluid losses, if any.

1.03 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least two (2) business days prior to commencing work. All work shall be performed in the presence of the Enforcement Officer.

1.04 BASIS OF PAYMENT

- A. Directional drilling shall be paid for by the lineal footage of casing installed along casing centerline. The unit price shall include:
 - 1. Excavation, use, and backfilling of all pits;
 - 2. Removal and disposal of spoils and drilling fluid;
 - 3. Traffic control;
 - 4. Verifying location and depth of all utilities within impacted area;
 - 5. Casing pipe installation; and,
 - 6. All labor, equipment, and materials required to complete the work.
- B. The unit cost shall be for casing pipe and shall not include product pipe and installation.
- C. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
- D. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 – PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE PIPE CASING

- A. Materials shall be in accordance with Contract Documents, plans, specifications, and approved submittals.
- B. All HDPE shall be manufactured from PE 4710 resin listed as TR-4 by the Plastic Pipe Institute (PPI). The resin shall meet ASTM D3350 with a minimum 445474C cell classification. The manufacturer shall certify the specified cell classification.
- C. HDPE casing shall conform to ASTM F 714, ANSI and AWWA C906, and have an NSF-61 listing.
- D. All pipe, fittings, and fusion equipment shall be provided by one supplier. Fusion equipment must be in satisfactory working order. All fusion equipment operators shall be qualified to perform heat fusing procedures.

2.02 STEEL PIPE CASING

- A. Materials shall be in accordance with approved submittals.

- B. Steel casing pipe shall meet or exceed ASTM A-139, Grade B with a minimum wall thickness of 0.25 inches and minimum yield strength of 35,000 psi. Steel casing shall be joined by fully welding around the entire circumference of the pipe. Welding shall conform to AWWA Standard C206.

2.03 CASING END SEALS

- A. Synthetic rubber end seals shall be installed on each end of the casing pipe. End seals shall be Advanced Model Products – Model AC Pull-on or approved equal and fastened tightly with stainless steel bands.

2.04 INSULATING SPACERS

- A. Projection type, non-metallic spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.

2.05 DIRECTIONAL DRILLING EQUIPMENT

- A. Directional drilling equipment shall consist of a hydraulically-powered directional drilling rig of sufficient capacity to perform the bore and pullback the casing pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the crossing, a drilling fluid recycling system to remove solids from the drilling fluid, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle drilling fluid volume, and qualified personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.
- B. The directional drilling rig shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while recirculating pressurized drilling fluid mixture to a guidable drill head. The rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations. The rig shall be electrically grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm that automatically sounds when an electrical current is detected.
- C. Drilling fluid shall be composed of clean water and appropriate bentonite clay additives in accordance with approved submittals. Water shall be from source approved by Enforcement Officer and be contaminant free. Drilling fluids shall be thoroughly mixed and free of clumps or clods.

PART 3 - EXECUTION

3.01 GENERAL

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.
- B. Construction means, methods, and materials shall be in accordance with approved submittals.
- C. Entry and exit pit excavations shall be constructed in accordance with approved submittals. Excavations should be protected in accordance with applicable Federal, State, and Local regulations, laws, and rules. Excavation protection shall not be less than the standards and regulations established by OSHA 29 CFR Part 1926. Trench safety and stability shall be the responsibility of the Contractor, including placement of excavation spoils and control of water intrusion.

3.02 HANDLING OF MATERIAL

- A. Handle pipes, conduits, casing, and ancillary items in such a manner as not to damage the material. Pipe rollers or other approved means shall be used during pullback operations to avoid damage to casing pipe and product pipe.
- B. Damage to material shall be repaired to the satisfaction of the Enforcement Officer and, if required, replaced.
- C. The Enforcement Officer maintains the authority to reject materials damaged or otherwise unsuitable for project use.

3.03 DRILLING FLUID

- A. Disposal of drilling fluid and spoils will be the responsibility of the Contractor and shall be done in compliance with all Federal, State, and local regulations.
- B. All drilling fluids and loose cuttings shall be contained in access pits or holding tanks for recycling and disposal. Drilling fluid returns into or on other areas shall be cleaned up and disposed of immediately. The Contractor shall notify the Enforcement Officer immediately if drilling fluid returns occur or are spilled in areas other than approved holding structures.
- C. The Contractor shall provide adequate means and equipment for removing drilling fluid and spoils from access pits to mitigate potential overflows and provide for final disposal. Disposal equipment shall be present during all directional drilling operations.

3.04 DIRECTIONAL DRILLING

- A. Perform directional drilling operations in accordance with approved submittals. The Contractor shall provide all material, equipment, and facilities required to perform directional drilling.
- B. The drill path shall be accurately staked with alignment and entry/exit pits.
- C. Pipe, conduit, and casing installation under traveled ways shall progress on a continuous basis without stoppage, except for adding sections, until the leading edge has reached the receiving pit. Engineering approval is required for variations from this specification.
- D. Stop operations if ground movement is detected and implement the remediation plan in accordance with approved submittals. Immediately report movement to the Enforcement Officer. Repair any damages to traveled ways, including displacement (up or down) resulting from construction operations. Corrective actions shall be approved by the responsible authority. Mitigating repairs and associated costs will be the responsibility of the Contractor.

3.05 PILOT HOLE BORING

- A. The entry angle, pilot hole, and boring process shall maintain a curvature that does not exceed allowable bending radius of casing or product pipe and in accordance with approved submittals.
- B. The pilot hole shall be drilled along the Contractor submitted, and approved line, grade, and radius of curvature. No curves will be accepted with a radius more than approved curvature.
- C. Drilling fluid pressures shall be monitored at all times during operations. Pressures shall be controlled to avoid hydraulic fracturing of subsurface materials and prevent structure and ground surface heaving.

- D. Drilling fluid and cutting return shall be monitored at all times during operations. The volume of drilling fluids and spoil return anticipated shall be estimated based on subsurface conditions encountered. Excessive drilling fluid loss or excess spoil return shall be reported immediately to the Enforcement Officer. The Enforcement Officer will, in consultation with the Contractor, determine if corrective actions are required.
- E. Contractor shall provide adequate containment, drilling fluid and spoil removal equipment and other means required to contain all fluid and spoils and/or remove it from site. No additional compensation will be allowed for containment or cleanup resulting from spillage, hydraulic fracturing, or other means leading to release of drilling fluids.
- F. Alignment Adjustments and Restarts
 - 1. The Contractor shall follow the approved alignment within specifications. If adjustments or restarts are required, the Contractor shall notify the Enforcement Officer for approval prior to adjusting.

3.06 CASING PIPE INSTALLATION

- A. After the pilot hole is completed and approved, the enlarging phase of installation shall begin. The borehole diameter shall be increased to accommodate the pullback operations for the specified casing pipe size. The type of reamer shall be determined by subsurface soil conditions encountered during pilot hole drilling. The reamer type shall be selected by the Contractor and must be equipped with a swivel.
- B. The maximum hole diameter shall be 1.25 times the casing pipe outside diameter. The Contractor may elect to perform multiple reaming passes. Multiple reaming passes will be completed at Contractor's expense.
- C. Borehole stability shall be the responsibility of the Contractor. Open boreholes shall be stabilized using appropriate means to prevent collapse while still maintaining ability to perform work.
- D. Once pullback operations have commenced, operations must continue without interruption until pipe is completely pulled into borehole. During pullback operations, Contractor will not apply more than the maximum safe pipe pull pressure at any time. If casing pipe becomes stuck, Contractor will cease pulling operations and allow any potential "suction lock" to subside and resume pulling operations. If pipe remains stuck, Contractor will notify Engineer. Engineer and Contractor will review available options and proceed accordingly.
- E. Drilling fluid pressures shall be monitored at all times during operations. Pressures shall be controlled to avoid hydraulic fracturing of subsurface materials and avoid structure and ground surface heaving. Contractor shall provide adequate containment, drilling fluid and spoil removal equipment and other means required to contain all fluid and spoils and/or remove it from site. No additional compensation will be allowed for containment or cleanup resulting from spillage, hydraulic fracturing, or other means leading to release of drilling fluids.
- F. Drilling fluid and cutting return shall be monitored at all times during operations. The volume of drilling fluids and spoil return anticipated shall be estimated based on subsurface conditions encountered. Excessive drilling fluid loss or excess spoil return shall be reported immediately to the Enforcement Officer. The Enforcement Officer will, in consultation with the Contractor, determine if corrective actions are required.
- G. The casing pipe shall be protected and supported during pullback operations using rollers or other approved means to minimize damage.

3.07 OBSTRUCTIONS

- A. The Enforcement Officer must be notified immediately if any obstruction is encountered that stops progress of operations. The Contactor shall review the situation with the Enforcement Officer and determine the feasibility of continuing drilling operations, switching to alternative methods, and/or modifying alignment/location of the jack and bore.
- B. If continuing is deemed unfeasible or impractical, the obstructed pilot hole or casing shall be abandoned in place and filled completely with grout or other approved materials.
- C. For City projects, substantiated cost of abandoned work resulting from unforeseen obstructions encountered will be paid for as additional work in accordance with Contract documents.

3.08 ALIGNMENT

- A. The Contractor shall provide an accurate means to monitor horizontal and vertical positions of the casing during construction operations. The Enforcement Officer shall always have access to this information during the directional drilling process. If a magnetic guidance system is used, the Contractor shall identify any surface geo-magnetic anomalies and take appropriate corrective measures to ensure accurate spatial tracking of the drill stem.
- B. The casing shall be installed within a tolerance of 6 inches from approved, line and grade over 100 feet. The tolerance will be adjusted proportionally for shorter or longer casing lengths; however, the maximum deviation for casing lengths longer than 150 feet shall be no more than 1 foot.
- C. The alignment of casing shall be established to allow unrestricted insertion of the product pipe, including spacers, pipe bells, and restrained joints. If product pipe cannot be installed, the casing shall be abandoned and filled with grout or other approved materials. The Contractor shall establish another casing at a location approved by Enforcement Officer.

3.09 PRODUCT PIPE INSTALLATION

- A. The product pipe shall be the size and type as specified or shown on the plans.
- B. The end of product pipe shall be protected from damage during installation into the casing.
- C. Product pipe shall have restrained joints within the casing.
- D. The product pipe shall be supported in the casing pipe using projection-type non-metallic casing spacers.
 - 1. The minimum number of spacer projections around the product pipe circumference shall equal the pipe diameter (i.e. a nominal 10-inch pipe shall have minimum of 10 projections). Refer to manufacturer's product data for spacer type and size.
 - 2. Casing spacers shall fasten tightly onto the product pipe to prevent movement during installation.
 - 3. The insulator spacing shall be installed to support the weight of the product pipe and contents. Spacers shall be placed a maximum of 2 feet from each side of a joint and evenly spaced along the product pipe at intervals not to exceed manufacturer's recommendations or 6 feet, whichever is less.
 - 4. Double spacers shall be installed one foot from each end of the casing.
 - 5. Projection type spacers shall be RACI, Advance Products & Systems, or approved equal.

3.10 SITE RESTORATION

- A. The Contractor will demobilize equipment and restore the work site to the original condition. All excavations will be backfilled according to specifications and project drawings. Surface restoration shall be completed in accordance with Section 01005 – Pavement Repair and Section 01006 - Seeding.
- B. Remove all excess spoils and dispose of in accordance with all federal, state, and local regulations.

END OF SECTION 01003

SECTION 01004 UTILITY JACKING AND BORING

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for jack and bore installation of steel casing. The Contractor shall provide all labor, materials, and equipment required to install casing in accordance with these specifications. This work shall consist of pushing/jacking a steel casing pipe with a boring auger rotating within the pipe to remove spoils as casing is advanced.

1.02 SUBMITTALS

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Submit work plans, shop drawings, and product data for Engineer approval. Submittals shall include:
1. Work plan and sequencing;
 2. Proposed line and grade of casing pipe to maintain minimum burial depth and separation requirements from existing utilities;
 3. Equipment and site configuration;
 4. Jacking and receiving pit locations;
 5. Design, means, methods and materials for pit excavation support;
 6. Pit dimensions showing relative location to traveled ways;
 7. Dewatering methods;
 8. Differential movement monitoring methods;
 9. Excavation face loss prevention methods;
 10. Spoil removal methods;
 11. Drilling fluids;
 12. Product data;
 13. Casing pipe material and size;
 14. Casing pipe segment joining methods and procedures;
 15. Product pipe spacers and casing pipe end seal materials;
 16. Erosion control and stormwater pollution prevention plan;
 17. Remediation plan:
 - a. Identify means and methods to remove obstructions at the boring face;
 - b. Identify remedial measures for mitigating damage to existing facilities, and impacts to traveled ways, including ground subsidence and heaving;
 18. Experience:
 - a. Submit a list of at least five (5) successfully completed jack and bore projects greater than 50 feet within the last five (5) years including project owner contact information references substantiating jack and bore installer's experience; and,
 19. As-Built Drawings showing horizontal and vertical alignment of completed jack and bore.

1.03 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least two (2) business days prior to commencing work. All work shall be performed in the presence of the Enforcement Officer.

1.04 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Jack and Bore shall be paid for by the lineal footage of casing measured along casing centerline. The unit price shall include:
 - 1. Excavation, use, and backfilling of all pits;
 - 2. Removal and disposal of spoils and drilling fluid;
 - 3. Traffic control;
 - 4. Verifying location and depth of all utilities within impacted area;
 - 5. Casing pipe installation; and,
 - 6. All labor, equipment, and materials required to complete the work.
- C. The unit cost shall not include sewer pipe and installation.
- D. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
- E. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall be in accordance with Contract Documents, plans, specifications, and approved submittals.
- B. Steel casing pipe shall meet or exceed ASTM A-139, Grade B with a minimum wall thickness of 0.25 inches and minimum yield strength of 35,000 psi. Steel casing shall be joined by fully welding around the entire circumference of the pipe. Welding shall conform to AWS requirements for the specific applications.
- C. Synthetic rubber end seals shall be installed on each end of the casing pipe. End seals shall be Advanced Model Products – Model AC Pull-on or approved equal fastened tightly with stainless steel bands.
- D. Projection type spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.

PART 3 - EXECUTION

3.01 GENERAL

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.
- B. Construction means, methods, and materials shall be in accordance with approved submittals.

- C. Excavations shall be constructed in accordance with approved submittals. Excavations should be protected in accordance with applicable Federal, State, and local regulations. Excavations must meet or exceed regulations established by OSHA 29 CFR Part 1926. Trench safety and stability shall be the responsibility of the Contractor.
- D. Disposal of excess spoils removed from the casing pipe shall be the responsibility of the Contractor and shall be done in compliance with all Federal, State, and local regulations.

3.02 HANDLING OF MATERIAL

- A. Handle pipes, conduits, casing, and ancillary items in such a manner as not to damage the material.
- B. Damage to material shall be repaired to the satisfaction of the Engineer or replaced at Contractor's expense.
- C. The Enforcement Officer maintains the authority to reject materials damaged or otherwise unsuitable for project use.

3.03 JACK AND BORE

- A. Perform jack and bore operations in accordance with approved submittals and the following requirements:
 - 1. Unsupported excavation (open-hole) ahead of the casing will not be permitted. Mechanical arrangements or other devices shall be provided at the leading end of the carrier to prevent drilling ahead of the casing.
 - 2. The use of water or slurry under pressure (jetting) or puddling shall not be permitted to facilitate boring, pushing, or jacking operations. Non-pressurized water or slurry is acceptable for use as a lubricant behind the cutter head.
 - 3. Pipe, conduit, and casing installation shall progress on a continuous basis without stoppage, except for adding sections, until the leading edge has reached the receiving pit. Engineering approval is required for variations from this specification.
- B. Employ methods to prevent loss of the excavation face in accordance with approved submittals.
- C. Stop operations if ground displacement is detected and implement the remediation plan in accordance with approved submittals. Repair any damages to traveled ways, including displacement (up or down) resulting from construction operations. Corrective actions shall be approved by the Engineer. Mitigating repairs and associated costs will be the responsibility of the Contractor.

3.04 OBSTRUCTIONS

- A. The Enforcement Officer must be notified immediately if any obstruction is encountered that stops progress of operations. The Contractor shall review the situation with the Enforcement Officer and determine the feasibility of continuing operations, switching to alternative methods, and/or modifying alignment/location of the jack and bore.
- B. If continuing is deemed unfeasible or impractical, the obstructed pilot hole or casing shall be abandoned in place and filled completely with grout or other approved materials.
- C. For City projects, substantiated cost of abandoned work resulting from unforeseen obstructions encountered will be paid for as additional work in accordance with Contract documents

3.05 ALIGNMENT

- A. The Contractor shall provide an accurate means to monitor horizontal and vertical positions of the casing during construction operations. The Enforcement Officer shall always have access to this information during the jack and bore process. If a magnetic guidance system is used, the Contractor shall identify any surface geo-magnetic anomalies and take appropriate corrective measures to ensure accurate spatial tracking of casing.
- B. Extreme care shall be exercised by the Contractor to maintain line and grade during jacking operations and casing installation. Modifications to means and methods may be required to maintain correct gradient and alignment or correct deviations when deemed necessary by the Enforcement Officer.
- C. The casing shall be installed within a tolerance that allows unrestricted sewer pipe installation at design gradient and alignment.
- D. The alignment of casing shall be established to allow unrestricted insertion of the sewer pipe, including spacers, pipe bells, and restrained joints.

3.06 SEWER PIPE INSTALLATION

- A. The sewer pipe shall be the size and type as specified or shown on the plans.
- B. The end of sewer pipe shall be protected from damage during installation into the casing.
- C. Sewer pipe shall have restrained joints within the casing.
- D. The carrier pipe shall be supported in the casing pipe using projection-type non-metallic casing spacers.
 - 1. The minimum number of spacer projections around the sewer pipe circumference shall equal the pipe diameter (i.e. a nominal 10-inch pipe shall have minimum of 10 projections). Refer to the manufacturer's product data for spacer type and size.
 - 2. Casing spacers shall fasten tightly onto the sewer pipe to prevent movement during installation.
 - 3. The insulator spacing shall be installed to support the weight of the sewer pipe and contents. Spacers shall be placed a maximum of 2 feet from each side of a joint and evenly spaced along the sewer pipe at intervals not to exceed manufacturer's recommendations or 6 feet, whichever is less.
 - 4. Double spacers shall be installed one foot from each end of the casing.
 - 5. Projection type spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.
- E. Adjust pipe grade as needed by changing the thickness of spacers to compensate for gradient or alignment variations of the casing.

3.07 SITE RESTORATION

- A. The Contractor will demobilize equipment and restore the work site to the original condition. All excavations will be backfilled according to specifications and project drawings.

- B. Surface restoration shall be completed in accordance with contract requirements, Section 01005 – Pavement Repair, and Section 01006 – Seeding.
- C. All excess spoils and materials shall be removed and disposed of in accordance with applicable federal, state, and local regulations.

END OF SECTION 01004

SECTION 01005 PAVEMENT STRUCTURE REPAIR

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for repairing and restoring aggregate, concrete, and asphalt concrete pavement structures in areas where trenches cross these features. The Contractor shall provide all labor, materials, and equipment required to perform work in accordance with these specifications.

1.02 RELATED WORK

- A. Section 01002 – Earthwork
- B. Section 01003 – Directional Drilling
- C. Section 01004 – Utility Jacking and Boring

1.03 REFERENCE STANDARDS

- A. ASTM D698 - Moisture-Density Relations of Soils and Soil Aggregate Mixture, using 5.5 lb Rammer and 12 in Drop.
- B. Missouri State Highway and Transportation Commission: Missouri Standard Specifications for Highway Construction, current edition, including Section 613 Pavement Repair

1.04 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Pavement Structure Repair shall be paid for by the lineal foot at Contract unit cost for surfaces listed on bid form and plan quantities table. Culvert, mailbox, or other surface features required to be removed as a result of construction shall be included in Contract unit cost.
- C. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
- D. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - MATERIALS

2.01 AGGREGATE BASE AND SURFACE COURSE MATERIALS

- A. Aggregate Base: Type 5, Section 1007, Missouri Standard Specifications for Highway Construction.
- B. Aggregate Surface: Grade A or B, Section 1006, Missouri Standard Specifications for Highway Construction.

2.02 BITUMINOUS SURFACE COURSE AND PATCHING MATERIALS

- A. Prime Coat: Liquid Asphalt RC-MC Grade 30, Section 1015, Missouri Standard Specifications for Highway Construction.
- B. Base Mix: MoDOT Base, Section 401, Missouri Standard Specifications for Highway Construction.
- C. Tack Coat: SS-1 or SS-1H, Section 1015 Missouri Standard Specifications for Highway Construction.
- D. Surface Mix: Type BP-1, Section 401, Missouri Standard Specifications for Highway Construction.

2.03 PORTLAND CEMENT CONCRETE

- A. Portland Cement: Type I or Type II
- B. Concrete Mix: Portland Cement Concrete Base and Pavement, class B-1, non-air entrained with material conforming to Section 502 and 1000, Missouri Standard Specifications for Highway Construction with a slump between 3 and 6 inches.
- C. Water: potable
- D. Reinforcement: #4 rebar placed 12 inches on center each way. Concrete shall be dowelled into existing with drilled and epoxy set #4 rebar dowels placed 18 inches on center, 24 inches long.

PART 3 - EXECUTION

3.01 REPAIR

- A. All trenches in traveled ways shall be repaired with either Bituminous Surface Course and Patching Materials or Concrete Material according to standard details.
- B. All trenches in concrete sidewalk, driveways and roadways shall be repaired/replaced with concrete material according to standard details.
- C. All trenches in aggregate surfaced pavement structures shall be replaced with Aggregate Base and Surface Course according to standard details.
- D. Pavement replaced shall adhere to the following procedures:
 - 1. Place granular backfill to provide temporary surface over trenches across traveled ways. Open to traffic for at least one week. Repair all potholes and level surface daily, adding additional material as needed. Base under the pavement shall be 8 inches thick.
 - 2. After pavement has been open to traffic for one week, saw cut and remove existing pavement on both sides of trench, remove sufficient base course material, level, compact, and construct pavement patch per the project details.

3.02 COMPACTION

- A. In accordance with Section 01002 Earthwork.

3.03 MAINTENANCE

- A. Maintain surface repairs until final acceptance. Replace and repair areas where excessive displacement, rutting, raveling, or other unacceptable damages occur as a result of construction.
- B. Repaired areas will be accepted at end of maintenance period and all pavement repairs are performing well without further damages.

END SECTION 01005

SECTION 01006 SEEDING

PART 1 – GENERAL

1.01 RELATED WORK

- A. Section 01002 - Earthwork
- B. Section 01003 – Directional Drilling
- C. Section 01004 – Utility Jacking and Boring

1.02 REFERENCE STANDARDS

- A. Missouri Standard Specification for Highway Construction, current edition.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.04 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Seeding cost shall be included in Contract unit cost for sewer pipe.

PART 2 - MATERIALS

2.01 SEED

- A. Seed shall meet the following minimum percentages for purity and germination, and maximum percentage for weed seed. Vendor certification for each lot number of numbers with testing statement. Seed that has not been tested and certified within the last 1 year will be rejected

Type	Purity	Germination	Weed
Kentucky Blue Grass	85	80	<1.0
Perennial Rye	98	85	<1.0
Red Fescue	97	85	<1.0

2.02 FERTILIZER

- A. Standard commercial fertilizer supplied separately or in mixtures and furnished in water tight containers. Each container shall be marked with weight and manufacturer's guaranteed analysis showing ingredient percentages.
- B. Furnish a mixture of chemical ingredients providing total nitrogen, phosphoric acid, and potassium required based on soil analysis or as otherwise specified. Chemical ingredient tolerances shall be within 2 percent.

2.03 MULCH

- A. Fresh wheat, rye, or oat straw, air dried. Non-toxic to vegetation and to the germination of seed, free from noxious seeds and weed seeds.

2.04 APPLICATION RATES

- A. **Fertilizer:** provide total nitrogen, phosphoric acid, and potassium required based on soil analysis or as otherwise specified.

- B. **Seed**

- 1. Kentucky Blue Grass: 1.10 lbs/1,000 sq. ft.
 - 2. Perennial Rye: 0.60 lbs/1,000 sq. ft.
 - 3. Redtop: Red Fescue: 0.40 lbs/1,000 sq. ft.

PART 3 - EXECUTION

3.02 PREPARATION

- A. When soil is in a tillable condition, cultivate to a depth of 4 inches, reducing soil particles to a size not larger than 2 inches. Moisture condition surface to receive seed.
- B. Assure seed bed is level, smooth, and free of weeds, clods, stones, roots, and sticks. Moisture condition as needed.
- C. Apply fertilizer and mix into the top 2 inches of soil. Apply within 48 hours prior to seeding.

3.03 SEEDING AND MULCHING

- A. Uniformly sow seeds in two operations at right angles to each other. Within 12 hours after seeding roll areas at right angles to runoff with a lawn type roller. Do not over compact.
- B. Within 24 hours of seeding apply mulch at 2 1/2 tons per acre. Stabilize vegetative mulch by embedding in soil to prevent mulch loss by wind or water erosion.

3.04 MAINTENANCE

- A. Maintain surfaces until final acceptance and supply additional topsoil, seed, and fertilizer where necessary, including areas affected by erosion.
- B. Replant damaged grass areas showing root growth failure, deterioration, bare or thin spots, and eroded areas.
- C. Seeded areas will be accepted at end of maintenance period when seeded areas are properly established and otherwise acceptable.

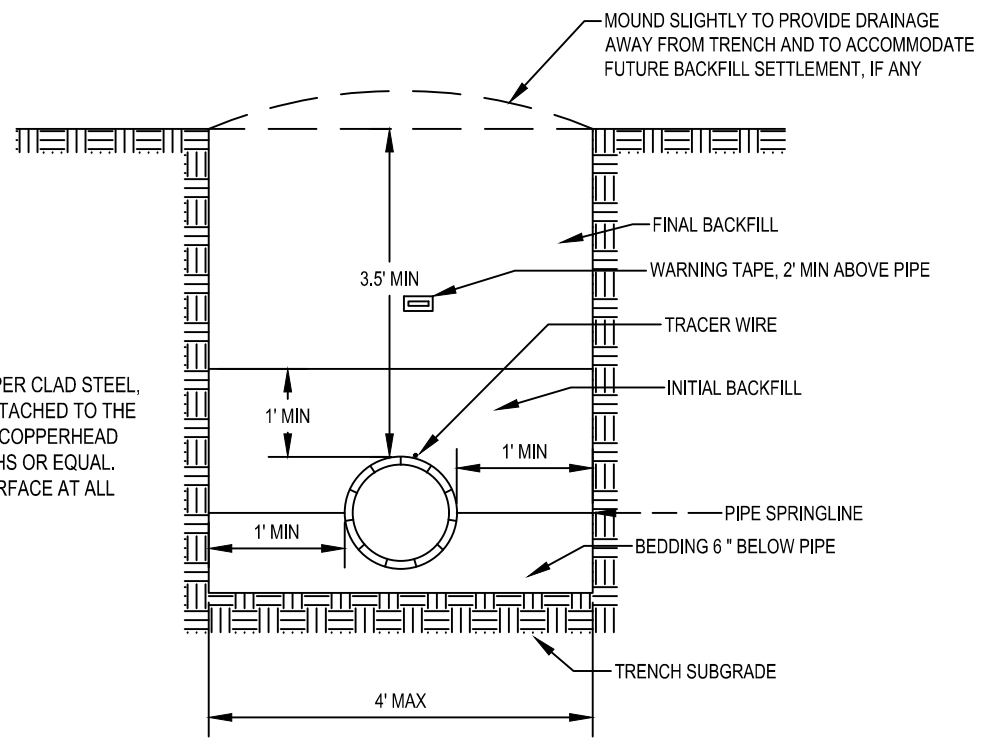
END OF SECTION 01006

**CITY OF MOBERLY, MISSOURI
STANDARD SPECIFICATIONS FOR SANITARY SEWER SYSTEMS**

SECTION 2 – STANDARD DETAILS FOR SANITARY SEWER SYSTEMS

- 02001 Typical Sewer Trench Installations
- 02002 Typical Sanitary Sewer Manhole
- 02003 Typical Service Connection and Cleanout
- 02004 Typical Sewer Main in Casing
- 02005 Typical Water/Sewer Main Separation Requirements

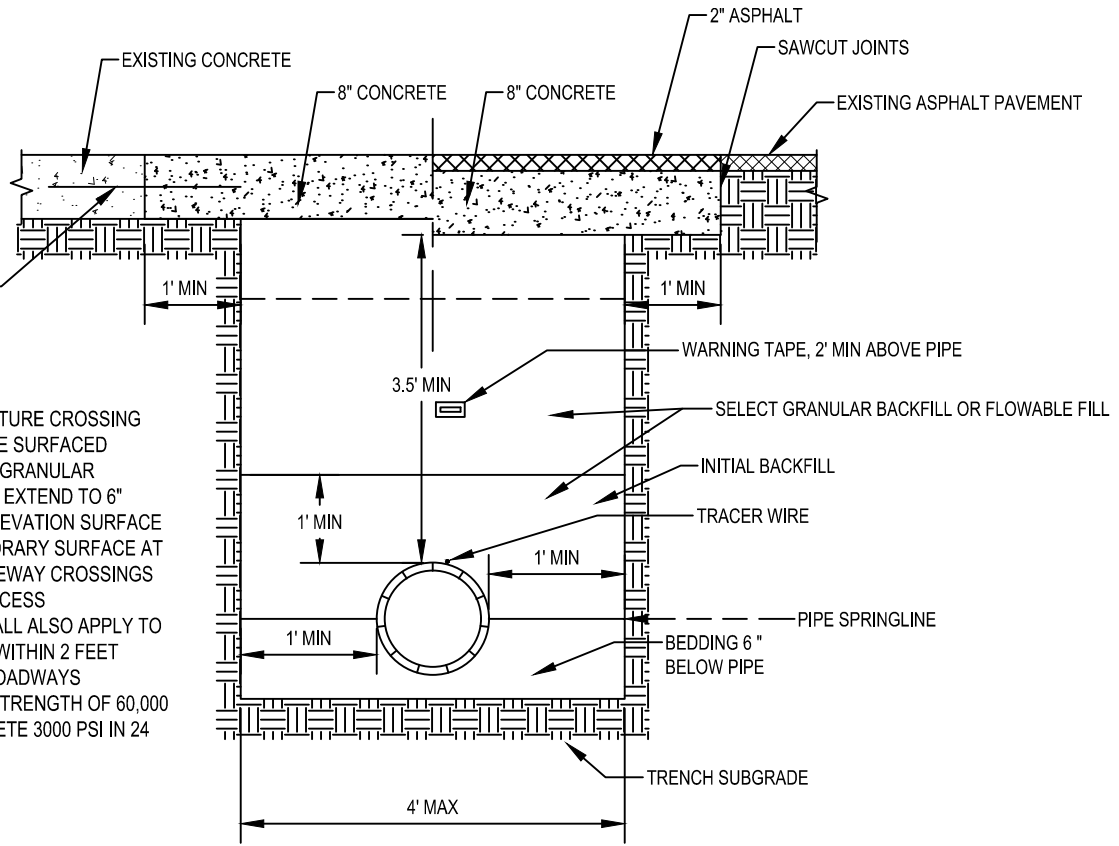
TRACER WIRE SHALL BE COPPER CLAD STEEL, CCS, (12 GAUGE AWG) AND ATTACHED TO THE SEWER MAIN. WIRE SHALL BE COPPERHEAD INDUSTRIES LLC PART # 1230 HS OR EQUAL. WIRE SHALL LOOP TO THE SURFACE AT ALL MANHOLES AND CLEANOUTS.



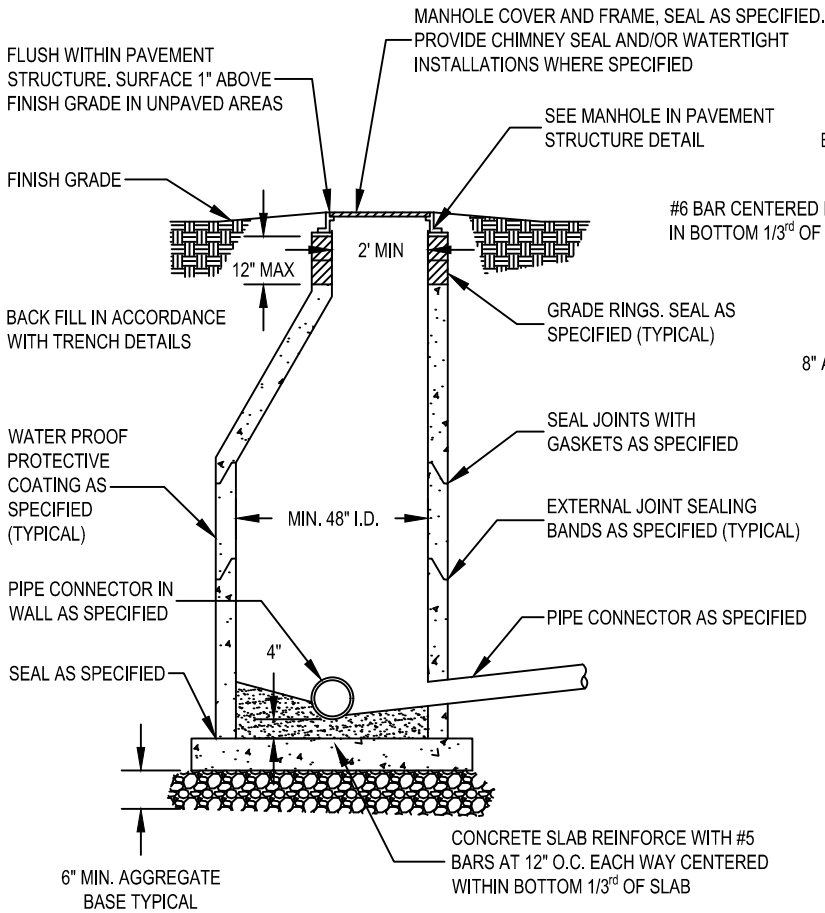
TYPICAL TRENCH INSTALLATION DETAIL - UN-PAVED AREAS

#4 REBARS - 24" LONG
GROUTED INTO EXISTING
PAVEMENT 8" @ 18" O.C.

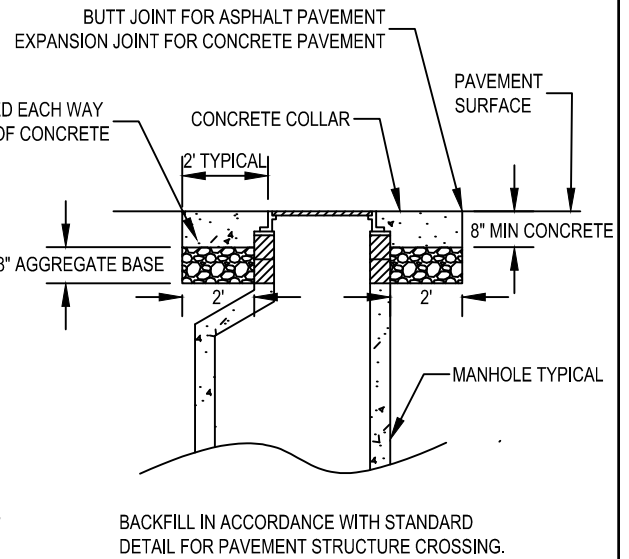
- NOTES: PAVEMENT STRUCTURE CROSSING
1. FOR AGGREGATE SURFACED AREAS, SELECT GRANULAR BACKFILL SHALL EXTEND TO 6" BELOW FINAL ELEVATION SURFACE
 2. PROVIDE TEMPORARY SURFACE AT ROAD AND DRIVEWAY CROSSINGS TO MAINTAIN ACCESS
 3. THIS DETAIL SHALL ALSO APPLY TO ALL TRENCHES WITHIN 2 FEET PARALLELING ROADWAYS
 4. REBARS YIELD STRENGTH OF 60,000 PSI AND CONCRETE 3000 PSI IN 24 HOURS.



TYPICAL TRENCH INSTALLATION DETAIL - PAVEMENT STRUCTURE CROSSINGS

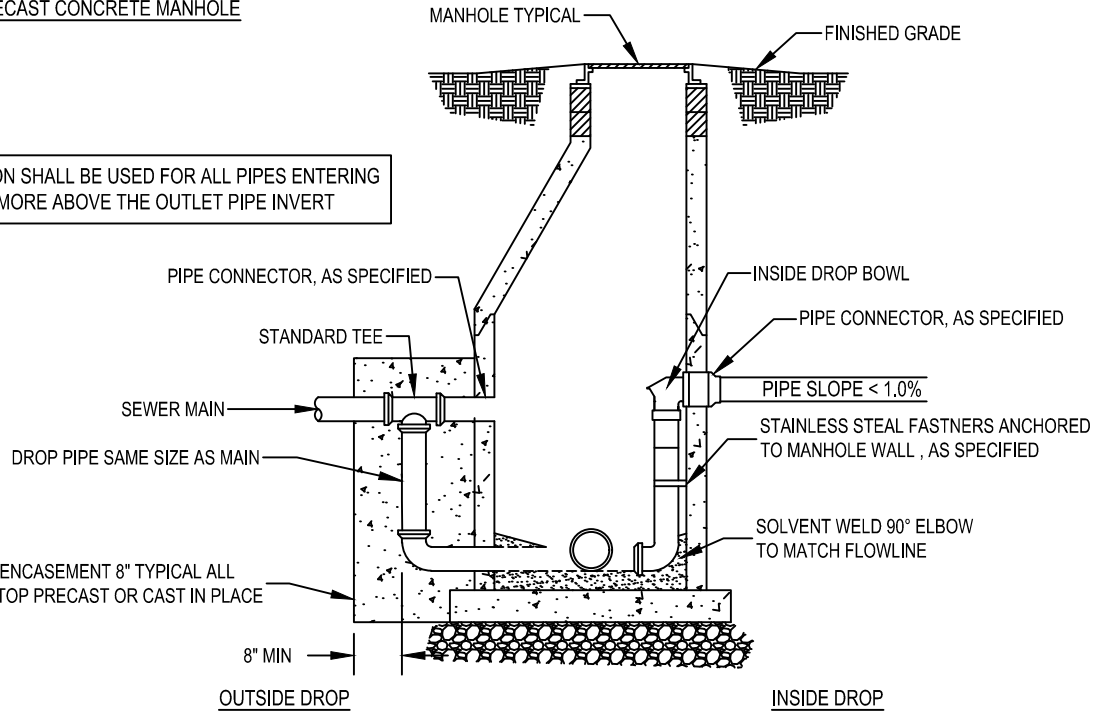


TYPICAL PRECAST CONCRETE MANHOLE



DETAIL: MANHOLE COLLAR IN PAVEMENT

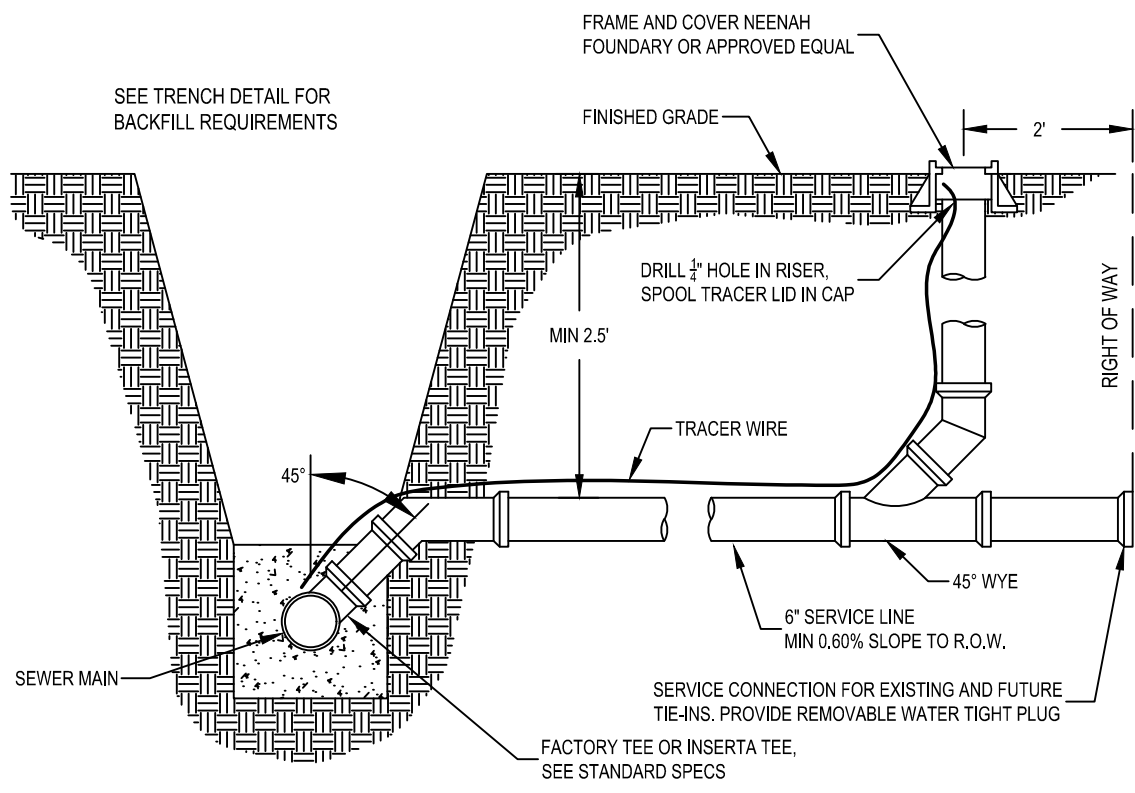
DROP CONNECTION SHALL BE USED FOR ALL PIPES ENTERING MANHOLE 24" OR MORE ABOVE THE OUTLET PIPE INVERT



DETAIL: DROP MANHOLE CONNECTION

STANDARD DETAIL 02002
TYPICAL SANITARY SEWER MANHOLE
CITY OF MOBERLY - SANITARY SEWER SYSTEMS

10-09-2019



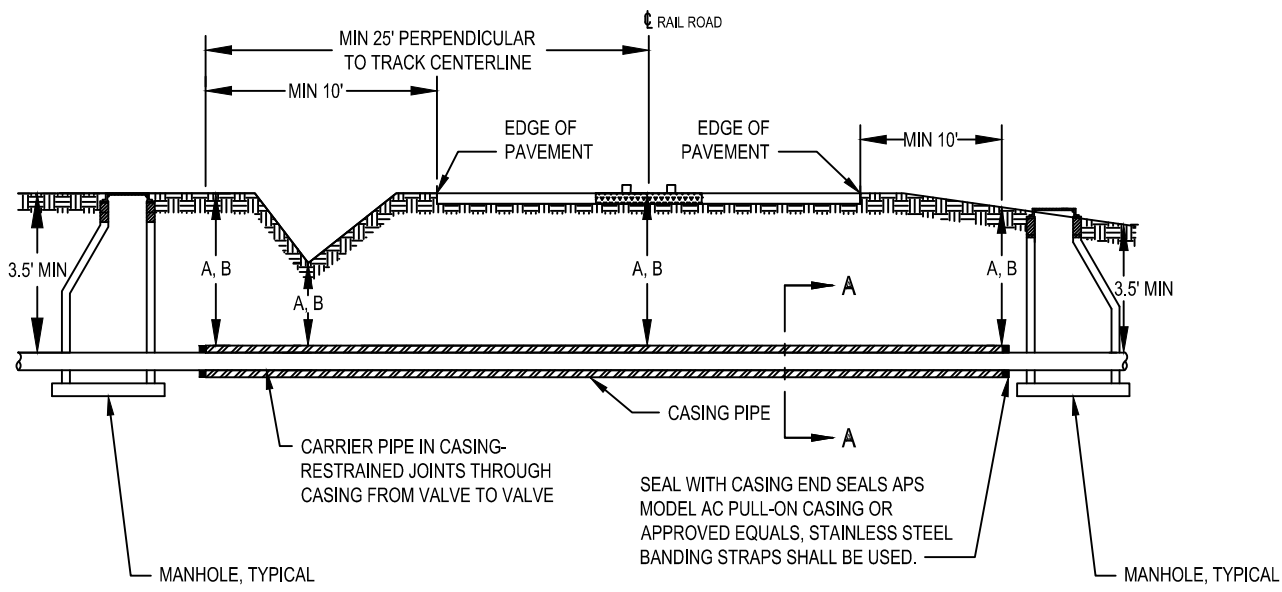
NOTES:

1. CONTRACTOR TO RECORD SERVICE LOCATION RELATIVE TO MANHOLES FOR ALL SERVICE CONNECTIONS AND PROVIDE TO THE CITY PRIOR TO PROJECT COMPLETION.
2. MINIMUM SERVICE LINE SHALL BE 6", UNLESS OTHERWISE APPROVED.
3. SERVICE WYE TO BE INSTALLED, SUBJECT TO ALL TEST REQUIREMENTS.
4. SERVICE WYE AND SERVICE LINE TO BE THE SAME MATERIAL AS SEWER MAIN, UNLESS OTHERWISE APPROVED.
5. PROVIDE TRACER WIRE AND WARNING TAPE FROM WYE TO CLEANOUT.
6. MARK TIE-IN LOCATION AT GROUND SURFACE WITH SURVEY LATHE OR STEEL POST.

STANDARD DETAIL 02003
 TYPICAL SERVICE CONNECTION AND CLEANOUT
 CITY OF MOBERLY - SANITARY SEWER SYSTEMS

10-09-2019

PSBA POEPPING, STONE, BACH & ASSOCIATES, INC.
 ARCHITECTS ENGINEERS PLANNERS SURVEYORS
 100 S 54TH ST., P.O. BOX 709 • QUINCY, IL 62306 • PHONE 217/223-4605
 3523 MAIN ST., P.O. BOX 817 • KEOKUK, IA 52632 • PHONE 319/524-8730
 U.S. FEDERAL BUILDING STE 248
 801 BROADWAY P.O. BOX 190 • HANNIBAL, MO 63401 • PHONE 573/406-0541
 www.psba.com email: psba@psba.com

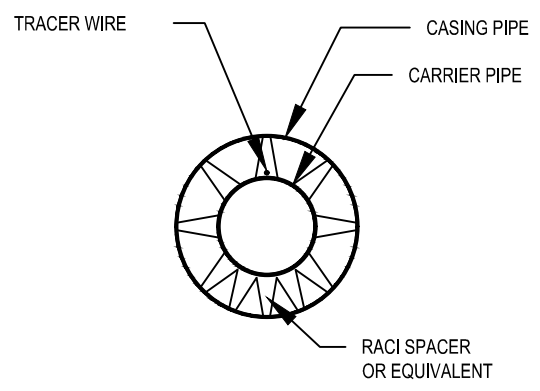


NOTES:

1. CONTRACTOR MEANS AND METHODS FOR TRENCHLESS CONSTRUCTION METHOD MUST BE APPROVED.
2. IF DIRECTIONAL DRILLING METHOD IS USED, THE MINIMUM EMBEDMENT DEPTH TO TOP OF FINISHED CASING SHALL BE 8 FEET.
3. SEE STANDARD SPECIFICATIONS FOR ALLOWABLE CASING PIPE MATERIALS.
4. CONTRACTOR SHALL OBTAIN NECESSARY PERMITS AND APPROVALS FROM APPROPRIATE REGULATORY AUTHORITY. ALL WORK SHALL MEET ALL REQUIREMENTS OF RESPONSIBLE REGULATORY AUTHORITY
5. CASING SPACERS SHALL BE RACI OR APPROVED EQUAL WITH STAINLESS STEEL BOLTS AND NUTS. CASING SPACERS SHALL BE INSTALLED AT INTERVALS NOT TO EXCEED MANUFACTURER'S SPECIFICATIONS OR 6' WHICHEVER IS LESS. DOUBLE SPACERS SHALL BE INSTALLED 1' FROM EACH END OF THE CASING. ONE CASING SPACER MUST BE WITHIN 2' OF EACH SIDE OF A PIPE JOINT. SPACERS SHALL HAVE A MINIMUM HEIGHT THAT EXCEEDS THE PIPE BELL HEIGHT AND RESTRAINED JOINT HEIGHT.
6. ALL JOINTS BETWEEN GATE VALVES SHALL BE RESTRAINED JOINTS.

NOTES:

- A. MINIMUM COVER OVER CASING FOR ROADWAY CROSSINGS SHALL BE 4 FEET WITHIN LIMITS SHOWN
- B. MINIMUM COVER OVER CASING FOR RAILWAY CROSSING SHALL BE 6 FEET WITHIN LIMITS SHOWN
- C. COVER DEPTH GREATER THAN MINIMUMS MAY BE REQUIRED AS A CONDITION OF AUTHORITY HAVING JURISDICTION FOR ROAD OR RAILROAD



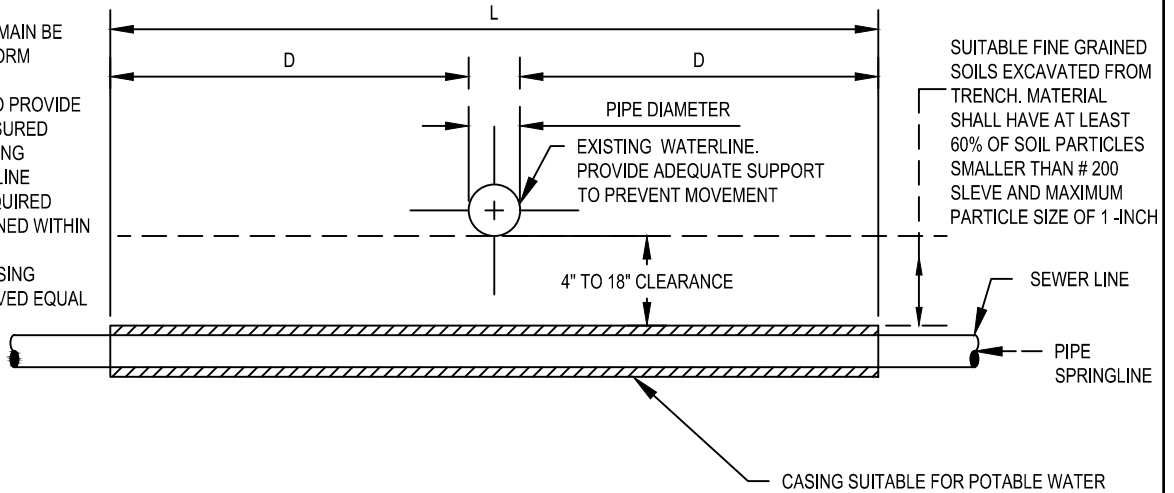
SECTION A

STANDARD DETAIL 02004
 TYPICAL SEWER MAIN IN CASING
 CITY OF MOBERLY - SANITARY SEWER SYSTEMS

10-09-2019

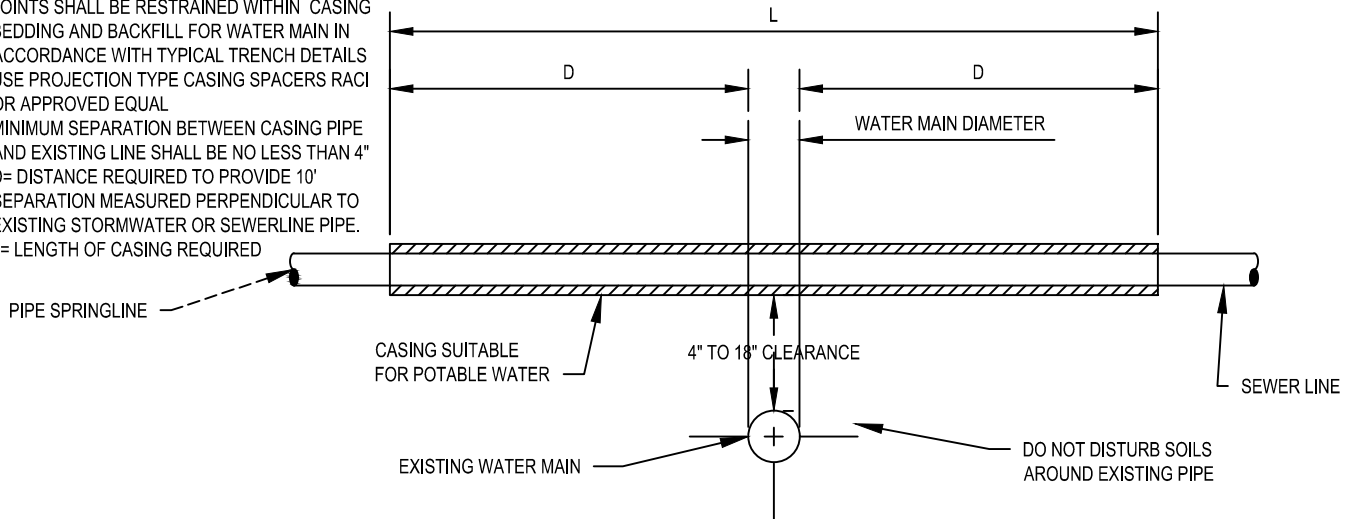
PSBA POEPPING, STONE, BACH & ASSOCIATES, INC.
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 100 S 54TH ST, P.O. BOX 709 • QUINCY, IL 62306 • PHONE 217/223-4605
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 www.psba.com email: psba@psba.com

1. BACKFILL FROM 1' ABOVE PIPE UP TO SURFACE IN ACCORDANCE WITH TYPICAL TRENCH DETAILS
2. IN NO CASE SHALL WATER MAIN BE LESS THAN 1.5' BELOW STORM WATER OR SEWER LINE
3. D= DISTANCE REQUIRED TO PROVIDE 10 FEET SEPARATION MEASURED PERPENDICULAR TO EXISTING STORMWATER OR SEWER LINE
4. L= LENGTH OF CASING REQUIRED
5. JOINTS SHALL BE RESTRAINED WITHIN CASING
6. USE PROJECTION TYPE CASING SPACERS, RACI OR APPROVED EQUAL



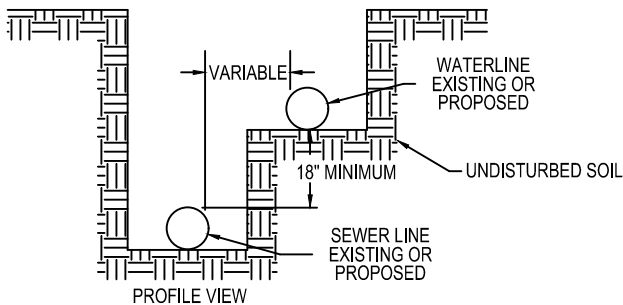
PROPOSED SEWER LINE BELOW EXISTING WATER MAIN WITH LESS THAN 18" VERTICAL CLEARANCE

1. JOINTS SHALL BE RESTRAINED WITHIN CASING
2. BEDDING AND BACKFILL FOR WATER MAIN IN ACCORDANCE WITH TYPICAL TRENCH DETAILS
3. USE PROJECTION TYPE CASING SPACERS RACI OR APPROVED EQUAL
4. MINIMUM SEPARATION BETWEEN CASING PIPE AND EXISTING LINE SHALL BE NO LESS THAN 4"
5. D= DISTANCE REQUIRED TO PROVIDE 10' SEPARATION MEASURED PERPENDICULAR TO EXISTING STORMWATER OR SEWERLINE PIPE.
6. L= LENGTH OF CASING REQUIRED

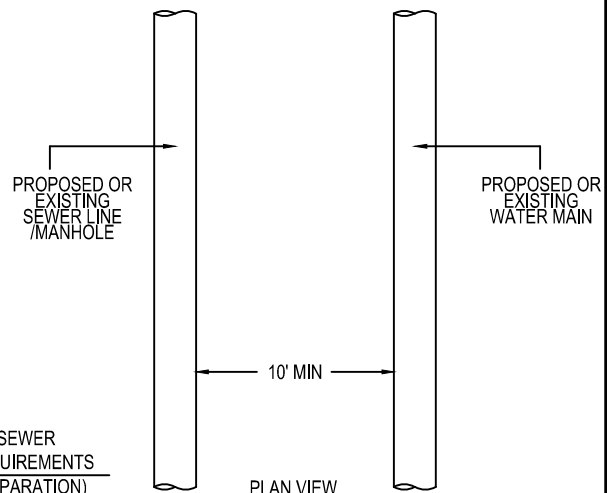


PROPOSED SEWER LINE ABOVE EXISTING WATER MAIN WITH LESS THAN 18" VERTICAL SEPARATION

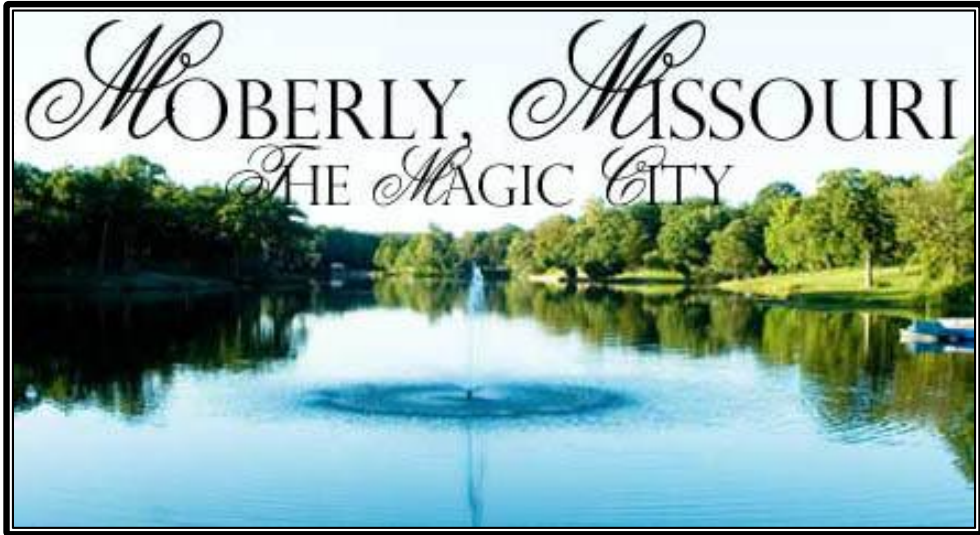
PROPOSED SEWER (OR WATER) IS LOCATED 10 FEET OR LESS FROM EXISTING WATER (OR SEWER).



WATER AND SEWER SEPARATION REQUIREMENTS (VERTICAL SEPARATION)



WATER AND SEWER SEPARATION REQUIREMENTS (HORIZONTAL SEPARATION)



CITY OF MOBERLY, MISSOURI
STANDARD SPECIFICATIONS
FOR WATER MAIN CONSTRUCTION

(ADOPTED _____)



CITY OF MOBERLY, MISSOURI
STANDARD SPECIFICATIONS FOR WATER MAIN CONSTRUCTION

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SECTION 01000 APPROVAL AND ACCEPTANCE

PART 1 – GENERAL

1.01 SUMMARY

- A. These specifications are for the construction, replacement, extension, and alteration of water mains and water services under authority of the City of Moberly, Missouri.
- B. The intent of these specifications and details is to specify the type and quality of all water main and service materials, installation, inspection, testing, and final acceptance by the City for all improvements, replacements, and extensions intended to be included as a part of the City's water distribution system.
- C. All design, permitting, materials, and work shall be in accordance with applicable sections of:
 - 1. City of Moberly Standard Specifications for Water Main Construction
 - 2. City of Moberly, Missouri – Code of Ordinances, Chapter 42-Utilities
 - 3. Missouri Department of Natural Resources Minimum Design Standards for Community Water Systems.
 - 4. Missouri Standard Specification for Highway Construction, current edition
 - 5. Approved, Project-Specific Special Provisions, Specifications, and Plans
- D. The work shall consist of obtaining all required permits, approvals, and legal easements before beginning work. Work also includes furnishing all labor, materials, and equipment for the complete installation of water main extension and/or alterations, and appurtenances, in conformance with the approved lines and grades.
- E. Modifications, alterations, or changes to City of Moberly, Missouri Standard Specifications and Details during the course of work must be submitted to the City for approval prior to performing work.

1.02 DEFINITIONS

- A. City: City of Moberly, Missouri
- B. Water Department: City Water Department
- C. Enforcement Officer: City Director of Public Utilities or designated representative
- D. Engineer: Licensed Professional Engineer in responsible charge for the project and licensed to perform services in the State of Missouri
- E. Developer: Entity requesting water service construction, modifications, extensions, and/or alteration to the city water system. The Developer could be a public or private entity, such as the City or private Developer.
- F. Contractor: Entity contracted by Developer to perform work on water main and services. The Contractor is responsible for constructing approved plans

- G. Owner: Entity who is responsible for long term performance, maintenance, and operation of new water mains. The City will typically become the Owner upon final approval and acceptance by City. The Developer will be responsible for the project until final approval and acceptance.
- H. Standard Specifications: City of Moberly, Missouri Specifications for Water Main Construction

1.03 DESIGN - GENERAL

- A. All water main extensions or alterations shall be designed, signed, and sealed by an Engineer.
- B. Water pressure in distribution systems below 20 pounds per square inch (psi) violate Missouri Safe Drinking Water Regulation 10 CSR 60-4.080 (9). The Missouri Department of Natural Resources considers pressures below 20 psi to be an imminent hazard to public health.
- C. All water mains and systems shall be sized in accordance with a hydraulic analysis based on flow demands and pressure requirements. Distribution systems shall be designed to maintain at least 35 psi normal working pressure at ground level at all points in the distribution system under all conditions of design flow.
- D. Systems designed for fire protection shall provide a minimum flow of 250 GPM for a duration of two hours. Water mains that are not designed to provide fire protection shall not have fire hydrants connected to them.
- E. All water lines shall be buried a minimum 3.5 feet below grade, unless otherwise approved.
- F. Water main dead ends shall be avoided, if possible. If unavoidable, dead ends shall have a fire hydrant, flushing hydrant, or other approved assembly for flushing purposes.
 - 1. Flush assemblies shall have a gate valve and box the same size as the water main. Flush assembly details (other than fire hydrant) shall be included in the project specific plans.
- G. Restrained joints, where specified, shall have thrust reinforcement using properly designed concrete thrust blocks or manufactured mechanical and harness restraints. All thrust restraint shall be designed based on the working pressure of the pipe and bearing pressure of the soil. Manufactured restraint is City preferred method for restraint. Concrete thrust blocking may be used in conjunction with manufactured restraint.
- H. Generally, valves shall be located at intersections with other water mains, on both sides of railway, waterway, and bridge crossings.

1.04 DESIGN - SEPARATION REQUIREMENTS

- A. Public health is paramount. To protect the public health, the following separation requirements shall be met for water lines near sanitary and storm sewer lines. These requirements apply to both conventional trench-type construction methods and trenchless construction methods including but not limited to directional drilling and utility jacking and boring. These requirements shall be considered minimum requirements. Additional requirements may be required as conditions of required permits.
- B. The following factors should be design considerations for separation requirements:
 - 1. Materials and type of joints for water and non-potable fluid pipes.
 - 2. Soil conditions.

3. Service and branch connections into the water main and non-potable fluid.
4. Compensating variations in the horizontal and vertical separations.
5. Space for repair and alterations of water and non-potable fluid pipes.
6. Routing water mains around manholes.

C. Horizontal Separation Requirements

1. See Standard Details.
2. Water lines shall be located at least ten (10) feet horizontally from any existing or proposed line carrying non-potable fluids such as, but not limited to, drains, storm sewers, sanitary sewers, combined sewers, sewer service connections, inlets, manholes, and process waste or product lines. The distance shall be measured edge to edge.
3. Water mains may be located closer than ten (10) feet when:
 - a. Local conditions prevent lateral separation.
 - b. The water main invert is at least 18 inches above the crown of non-potable fluid lines.
 - c. The water main is either in a separate trench or in an adjacent trench on an undisturbed earth shelf located on one side of the non-potable fluid line.
4. If separation requirements listed above cannot be met, the water line shall be placed in casing suitable for potable water in accordance with City Standard Specifications or the non-potable fluid line shall be re-constructed using pipe suitable for potable water use in accordance with Section 01001 – Standard Specification for Water Lines.

D. Vertical Separation Requirements

1. See Standard Details. The vertical separation from water lines and non-potable fluid lines shall be 18 inches.
 - a. If the 18-inch vertical separation cannot be met for water lines above non-potable fluid lines, the water line shall be placed in casing suitable for potable water in accordance with City Standard Specifications and Details. Casing pipe shall be placed no closer than 4 inches above non-potable fluid pipe.
 - b. For water lines placed 18 inches or more below a non-potable fluid line, the water line shall be placed in casing suitable for potable water in accordance with City Standard Specifications and Details. Adequate support shall be provided to prevent damage to utilities located above the water line.
 - c. Where required, protective casing shall extend a minimum of 10 feet from non-potable fluid line measured perpendicular to the non-potable fluid line. Casing shall be sealed at each end according to City Standard Specifications and Details.

1.05 PRE – CONSTRUCTION SUBMITTALS

- A. **Preliminary Submittal:** Project-specific special provisions, specifications, and plans shall be submitted to the City of Moberly for review and approval of any public water main alteration or extension. The submittal shall be prepared by an Engineer. Submittal shall include:
1. Design parameters based on flow demands and pressure requirements.
 2. Proposed alignment and grade, details of connections to existing water systems, construction locations, location of valves, hydrants and other facilities, and proposed location of water services.
 3. Materials list and manufacturer data sheets, catalog data, and illustrations for all proposed materials to be used for the project. Material test certificates and affidavits of compliance with applicable standards.
 4. A work plan describing construction means, methods, sequencing, and scheduling.
 5. Plan showing all existing utilities and identifying potential conflicts with proposed work. If utility relocation is required, the Developer and their Engineer, in conjunction with respective utility owners, shall provide a proposed utility relocation plan for approval. The relocation of existing utilities shall be incorporated into the overall construction project as well as appropriate demolition plan of abandoned utility facilities, as required.
 6. If perception of or potential exists for contamination due to cross-connections or backflow, the design must include mitigation measures for control and prevention.
 7. Other submittals detailed in other sections of City Standard Specifications
- B. **Preliminary Submittal Review(s):** Project-specific special provisions, specifications, and plans shall be submitted to the City of Moberly for review and approval of any public water main alteration or extension. The submittal shall be prepared by an engineer licensed to practice in the State of Missouri. Submittal shall include:
1. At discretion of City, multiple iterations of the preliminary submittal review will be until all design and pertinent modifications are complete.
- C. **Final Submittal:**
1. Final submittal to the City shall include Engineer's official seal, current date stamp, and signature on project-specific special provisions, specifications, and plans. Three (3) hard copies and one (1) electronic copy in .pdf format.
 2. Submit approved Missouri Department of Natural Resources, Water Protection Program, Construction Permit including all stipulations. No work may begin until a copy of the approved permit has been provided to City.
 3. Submit legally recorded copies of required utility easements, if any. No work may begin within proposed easements without having legally recorded permanent easements.
 4. Submit approved Missouri Department of Transportation Highways and Transportation Commission, Permit to Work on Right of Way, if applicable.

1.06 INSPECTION

- A. In general, all work shall be inspected by the Enforcement Officer. Inspection for acceptance of materials will be conducted as soon as practical after materials arrive on the job site. Inspections will be performed as work progresses.
- B. The Enforcement Officer shall always have access for observation and inspection during the work. Access will be coordinated with the Contractor. The Contractor shall furnish all reasonable aid and assistance required by the Enforcement Officer for the proper inspection and examination of work and materials.
- C. The Enforcement Officer reserves the right to reject materials and work not in compliance or accordance with approved plans and specifications.
- D. The Enforcement Officer reserves the right to suspend work.
- E. The Enforcement Officer shall be notified a minimum of two (2) working days for inspection and observation of all testing. Notifications are also required in accordance with other Standard Specifications.
- F. Under no circumstance shall taps or connections be made to existing mains without approval. All taps will be coordinated by Contractor and conducted in the presence of Enforcement Officer.

1.07 POST – CONSTRUCTION FINAL SUBMITTAL

- A. Upon successful completion of construction and obtaining required testing results meeting or exceeding performance requirements, the Developer shall submit:
 - 1. Copies of all test reports, including failed tests.
 - 2. Submit two (2) copies of as-built drawings to City showing all changes, deviations, or modifications to original plans. As-built drawings shall include reference swing tie measurements from identifiable landmarks to all valves. Each valve shall have at least two (2) reference swing tie measurements.
 - 3. As-built drawings shall be completed by Engineer, dated and clearly marked with the name and company of the person illustrating the changes.

1.08 ACCEPTANCE

- A. After Final Submittal and City Approval, the City will conditionally accept the work.
- B. The Owner and Contractor shall warranty all work and materials for a period of one year. The Owner and Contractor will be responsible for repairing and replacing failures or damages resulting from poor workmanship and defective materials.
- C. The Enforcement Officer will inspect the work periodically during the warranty period, document conditions, and notify Developer of repairs required, if any.
- D. Final acceptance will be given when the warranty period ends, and all work and site conditions are to the satisfaction of the City.

END OF SECTION 01000

SECTION 01001 WATER LINES

PART 1 – GENERAL

1.01 SUMMARY

- A. The design and construction of water main replacements, extensions, and alterations shall be in conformance with the City of Moberly Standard Specifications and Missouri Department of Natural Resources Minimum Design Standards for Missouri Community Water Systems.
- B. The work shall consist of furnishing all labor, materials, and equipment for complete installation of water main replacements, extensions, alterations, and appurtenances, in conformance with the lines and grades shown on the plans, as established by the Engineer, or otherwise specified.
- C. The Contractor shall employ skilled, qualified workers and supervision to perform work following generally accepted industry practices. The City reserves the right to suspend work if, in the opinion of the Enforcement Officer, this requirement is not being met.
- D. If surface or ground contamination is suspected or encountered, notify the City immediately. The Developer and Contractor, in communication with the City, shall assess conditions and develop a plan for continued work including but not limited to: removal and disposal of contamination, specifying different water line materials and/or water line realignment.

1.02 DEFINITIONS

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- C. Enforcement Officer: City Director of Public Utilities or designated representative
- D. Engineer: Licensed Professional Engineer in responsible charge for the project licensed to perform services in the State of Missouri.
- E. Developer: Entity requesting water service construction, modifications, extensions, or alterations to the city water system. The Developer could be a public or private entity, such as the City of Moberly or a private Developer.
- F. Contractor: Entity contracted by Developer to perform work on water main and services. The Contractor is responsible for constructing approved plans.
- G. Owner: Entity who is responsible for long term performance, maintenance, and operation of new water mains. The City will typically become the Owner upon final approval and acceptance by City. The Developer will be responsible for the project until final approval and acceptance.
- H. AWWA: American Water Works Association
- I. ASTM: American Society for Testing and Materials
- J. ANSI: American National Standards Institute
- K. MSS: Manufacturers Standardization Society of the Valve and Fitting Industry

1.03 RELATED WORK

- A. Section 01000 – Approval and Acceptance
- B. Section 01002 - Earthwork
- C. Section 01003 - Directional Drilling
- D. Section 01004 - Utility Jacking and Boring
- E. Section 01005 - Pavement Repair

1.04 REFERENCES

- A. American Water Works Association (AWWA)
 - C104 – Cement Mortar Lining for Ductile Iron Pipe and Fittings
 - C105 – Polyethylene Encasement for Ductile Iron Pipe Systems
 - C110 – Ductile Iron and Gray Iron Fittings
 - C111 – Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 - C115 – Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
 - C150 – Thickness Design of Ductile Iron Pipe
 - C151 – Ductile Iron Pipe, Centrifugally Cast
 - C153 – Ductile Iron Compact Fittings
 - C200 – Steel Water Pipe, 6 in. and larger
 - C207 – Steel Pipe Flanges for Water Works Service, sizes 4 in. through 144 in.
 - C600 – Installation of Ductile Iron Mains and their Appurtenances
 - C651 – Disinfecting Water Mains
 - C800 – Underground Service Line Valves and Fittings
 - C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 60 in.
 - M11 – Steel Pipe, A guide for Design and Installation
 - M23 – PVC Pipe Design and Installation
- B. American Society for Testing and Materials (ASTM)
 - B88 – Seamless Copper Water Tube
 - D1248 – Polyethylene Plastics Extrusion Materials for Wire and Cable
 - D1784 – Rigid PVC Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds
 - D3139 – Standard Specification: Plastic Pressure Pipe Joints Using Flexible Elastomeric seals
 - F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- C. American National Standards Institute (ANSI)
 - B16.22 – Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
- D. Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)
 - SP-60 – Connecting Flange Joint Between Tapping Sleeves and Tapping Valves

1.05 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least five (5) business days prior to commencing work.

1.06 SUBMITTALS

- A. See Section 1000 – Approval and Acceptance
- B. Work Plan detailing means, methods, equipment, sequencing, and schedule for pressure and leakage testing, disinfection and chlorination, and flushing.

1.07 JOB CONDITIONS

- A. Interrupting Utility Service:
 - 1. Utility Service to existing City customers shall not be interrupted unless approved by the Enforcement Officer and the existing utility provider.
 - 2. If approval for an interruption of service is obtained, the Contractor shall provide an eight-hour notification to the Enforcement Officer and all affected occupants. The City Fire Department shall be notified at least 24-hours in advance.
 - 3. The Contractor shall provide standby service, if required. Outages shall not exceed 6 hours and will be coordinated with the Enforcement Officer.
 - 4. The Water Department is responsible for operation of in-service valves, including closure as needed. Closure by other entities will not be permitted.
 - 5. The Contractor shall be responsible for preventing contamination of existing lines.
- B. New water mains must be fully tested, disinfected, and approved before installing service line connections.
- C. Whenever pipe laying is not actively in progress, open ends of all installed pipe and fittings shall be sealed water tight.

1.08 MATERIAL DELIVERY, STORAGE, AND HANDLING

- A. Means and methods for material shipping, loading, transporting, unloading, storing, and placing shall prevent damage. Damaged and/or defective materials shall not be installed. The City reserves the right to reject all damaged or defective materials.
- B. All materials shall be packaged, labeled, or otherwise marked with adequate, identifiable information to determine suitability for intended project application.
- C. Materials shall be stored at a mutually agreed upon location. Materials shall not be stored directly on the ground. They shall be stored in a manner to ensure they are kept clean, dry, and free of foreign debris.
- D. Materials shall be protected in a manner to prevent entrance of contamination or foreign debris.

1.09 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.

B. Water Mains:

1. **Water main** will be measured and paid by the lineal foot of pipe along pipe centerline, including all labor, equipment, and materials required for installation. Unless otherwise identified as a bid item, unit cost shall include: excavation, backfill, fittings, joints, thrust blocks, tracer wire, erosion control, pavement repair, seeding, and cleanup.
2. **Valve and Valve Box** will be counted as a single unit and be paid on a per-each basis, including all labor, equipment, and materials required for installation. See Standard Details.
3. **Meter Setting and Meter Box** will be counted as a single unit and be paid on a per-each basis, including all labor, equipment, and materials required for installation. See Standard Details.
4. **Service Lines and Connections** will be paid for on a per each basis, including all labor, equipment, and materials required for installation. Unit cost will include connections at water main and connections on City side of meter setting. Unit cost shall include all taps, saddles, sleeves, corporation stops, curb stops, etc... See Standard Details.
5. **Fire Hydrants** will be paid for on a per each basis including, all labor, equipment, and materials required for installation. Valves and valve boxes will be paid for separately. Pipe and joints required from main to hydrant shall be included in unit cost.
6. **Casing Pipe** will be measured and paid by the lineal foot along casing centerline. Unit cost shall include insulating spacers and end seals. Product pipe will be paid for separately. Casing required for trenchless construction methods will be paid for separately.
7. Estimated quantities for bid items could change. If quantities increase, additional materials and associated work will be paid for at contract unit cost. Purchasing additional materials and performing additional work shall not be done without prior written approval from the Enforcement Officer.
8. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
9. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All materials shall conform to the latest AWWA, ASTM, ANSI, and MSS standards and specifications, and, where applicable, shall be certified by National Sanitation Foundation (NSF) or underwriters' laboratories (UL) for drinking water use.
- B. All materials shall be suitable for use in potable drinking water systems.
- C. All buried iron pipe and fittings shall be coated with manufacturer's standard exterior enamel coating.
- D. Water mains shall be six (6) inches or greater.

2.02 DUCTILE IRON PIPE (DIP) AND FITTINGS

A. DIP Pipe:

1. Conform to AWWA C115, C150, and C151 unless otherwise specified.
2. Acceptable Manufacturers: American Cast Iron Pipe Company, U.S. Pipe Supply, EBBA Iron Sales, Inc., or approved equal.
3. Ductile iron pipe shall be used in commercial and industrial areas and may be used in residential areas.

B. DIP Joints:

1. Conform to AWWA C111 and C115, mechanical joints with ductile iron glands.
2. Conform to AWWA C110 and AWWA C115 push-on joints with neoprene gaskets.
3. Buried joints shall be push-on type unless restrained or mechanical joints are required, specified, or as shown on the drawings.
4. Restrained mechanical joints shall be EBBA Iron Megalug Series 1100 or approved equal. Bell harness joint restraint shall be EBBA Megalug Series 1700 or approved equal. Restrained joints will be required at all fittings, including bends, tees, crosses, fire hydrants, caps, plugs, and all pipe specified for joint restraint.

C. DIP Fittings:

1. Conform to AWWA C110 or C153, ductile iron with a pressure rating of 250 psi for flanged joint and pressure rating of 350 psi for mechanical joints.

D. DIP Lining:

1. Conform to AWWA C104, cement mortar for all DIP pipe and fittings.

2.03 POLYVINYL CHLORIDE PIPE (PVC) AND FITTINGS

A. PVC Pipe:

1. PVC pressure pipe shall conform to AWWA C900, Class DR 14 for pipe 12 inches or less and AWWA C905, class DR 14 for pipe greater than 12. PVC pipe and fittings shall be compatible and interchangeable with ductile iron pipe.
2. Acceptable Manufacturers: Certainteed Corporation, J-M Manufacturing Company, Inc., Diamond Plastics, Clow Corp, or approved equal.
3. PVC pipe materials shall be uniformly blended with un-plasticized PVC. Materials and finished product shall not be hazardous to humans. Materials shall not impact or alter taste, odor, or chemical composition of potable water.
4. PVC pipe shall have National Sanitation Foundation (NSF) seal and be made of virgin components in accordance with ASTM D1784 Class 12454-A or Class 12454-B. Manufacturer shall provide certifications of conformance with these requirements.

B. Joints:

1. ASTM D3139 with ASTM F477 Gaskets. Wall thickness in pipe bell shall not be less than pipe barrel. Pipe shall have reference marks on male end indicating proper seating into bell.
2. Buried joints shall be push-on type unless restrained or mechanical joints are required, specified, or as shown on the drawings.
3. Mechanical joint restraint shall be EBBA Iron Megalug Series 2000PV or approved equal. Bell harness joint restraint shall be EBBA Series 1900 or approved equal.

C. Fittings:

1. C900 and C905 PVC pipe shall use ductile iron pipe fittings. Fittings shall have a minimum pressure rating equal to or greater than the pipe.

2.04 GATE VALVES

A. Gate Valves shall conform to AWWA C509 with minimum design working pressure of 200 psi.

1. Gate valves shall be iron body, bronze trim, super seal or resilient seated, non-rising stem, opening counter clockwise, mechanical joint flanges with stainless steel hardware, and double O-ring stuffing seals.
2. Valves shall have a 2-inch operating nut for below ground applications and a hand-wheel for above ground applications.
3. Acceptable Manufacturers: Mueller, American, U.S. Pipe Valve and Hydrant, or approved equal.

2.05 VALVE BOXES

A. Three-section cast iron screw-type shaft adjustment, minimum 5-inch inside diameter with lid marked "water". See Standard Details.

B. Valve boxes must be compatible with valves.

2.06 TAPPING VALVES

A. Tapping valves shall meet requirements for gate valves except tapping valve shall be equipped with a raised lip constructed in accordance with MSS SP-60 for valve centering on the tapping saddle.

B. Acceptable Manufacturers: Mueller, American, U.S. Pipe Valve and Hydrant, or approved equal.

2.07 TAPPING SLEEVES

A. Tapping sleeves shall be stainless steel including all hardware. The seal shall be fully circumferential and gridded. Outlet flange dimensions and drilling shall comply with ANSI B16.1, class 150 and indexed according to MSS SP-60 to accept tapping valve.

B. Acceptable Manufacturers: American Darling 5 ¼ inch B-84-B, or approved equal.

2.08 FIRE HYDRANTS

- A. Hydrants shall be dry barrel type with lubricating reservoir, 3 way, opening counter clockwise, and minimum 250 psi working pressure.
- B. Hydrants shall have two (2) standard 2 ½ inch male hose connections and one (1) standard 4 ½ inch male pumper connection.
- C. Acceptable Products: American Darling B-84-B, 5 ¼ inch or approved equal.

2.09 CASING PIPE

- A. This section applies when casing is required around water mains to comply with sanitary and storm sewer separation requirements. Casing materials, including joints, shall be suitable for potable water. Casing size shall be large enough to allow unrestricted installation of product pipe, including casing spacers, pipe fittings, and joints.
- B. Casing materials may be PVC, Steel, or High-Density Polyethylene (HDPE)
 - 1. PVC casing shall be in accordance with this section.
 - 2. Steel casing shall conform to AWWA C200 and AWWA M11, joined by fully welding in accordance with AWWA C206. Casing shall have a minimum wall thickness of 0.25-inch for casing up to 24 inches.
 - 3. HDPE casing shall be in accordance with Section 01003 – Directional Drilling.
- C. Projection type, non-metallic insulating spacers shall be used to support water main inside casing. Insulating spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.
- D. Synthetic rubber end seals shall be installed on each end of the casing pipe. End seals shall be Advanced Model Products – Model AC Pull-on or approved equal fastened tightly with stainless steel bands.
- E. See Standard Details.

2.10 SERVICE FITTINGS

- A. Corporation Stops for copper water services shall be Mueller Company Number H15020, H15008 or Ford Company number F1000-3, or approved equal.
- B. Corporation stops for plastic services shall be Mueller Company number H15008, Haze Manufacturing Company number 5200-DF, Ford Company number F1000-4, or approved equal.
- C. Corporation stops on PVC pipe shall be made with a saddle.
- D. Copper shall be used under pavement structures or polyethylene tubing in casing pipe.

2.11 SERVICE TUBING

- A. Copper Tube and Fittings
 - 1. Copper service tubing 3/4-inch through 1-inch shall conform to ASTM B88 - Type K annealed and soft tempered for buried installations.

2. Fittings shall be wrought copper in accordance with ANSI 816.22, flared or compression type.
3. All copper lines installed in granular soils shall be encased in schedule 40 pvc pipe with solvent welded or compression type joints.
4. All service lines with sizes between ¾-inch and 1-inch shall be copper (or poly line with tracer wire) between the water main and meter.

B. Plastic Tube and Fittings

1. Plastic service tubing shall be ¾" minimum inner diameter and shall be plastic, 250 CTS, copper size.
2. Fittings shall be flared or compression type with stainless steel stiffeners.

2.12 METERS

- A. Meters supplied by the City. See standard details for meter setting configurations and materials.

2.13 POLYETHYLENE ENCASEMENT

- A. In general, the City does not require polyethylene encasement of ductile iron water mains and fittings. When project specific specifications require, use eight (8) mil (minimum) polyethylene in accordance with AWWA C105.

2.14 THRUST BLOCKS

- A. Provide concrete thrust blocks where specified or shown on the plans. Concrete for thrust blocks may be from a City-approved locally available source with a minimum compressive strength of 3,000 psi.
- B. See standard details

2.15 TRACER WIRE

- A. Tracer wire shall be "blue" HDPE insulated single strand #12 AWG continuous copper clad steel tracer wire. Tracer wire shall be manufactured by Copperhead Industries LLC or approved equal.

2.16 WARNING TAPE

- A. Warning tape shall be "blue" non-metallic, 3-inches wide and at least 5 mil thick. Warning tape shall have "Caution Buried Water Line" or similar warning printed on the tape. Tape shall be buried at least 2 feet above top of pipe.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.

- B. Establish line and grade to maintain minimum burial and separation requirements in coordination with Enforcement Officer and Engineer. The minimum burial depth for water mains shall be 3.5 feet, unless otherwise approved by Enforcement Officer. Notify Enforcement Officer and Engineer if conflicts with existing utilities or structures exist.
- C. Prior to laying pipe, prepare trench subgrade and initial backfill in accordance with Section 01002 – Earthwork.
- D. Trench excavations shall be protected in accordance with applicable Federal, State, and local regulations, Laws, and rules in accordance with OSHA 29 CFR part 1926. Trench and excavation stability shall be the responsibility of the Contractor.
- E. All pipe, fittings, and joints shall be clean, and free of foreign debris. Pipe valves and fittings at existing line connections shall be swabbed with a 4 percent chlorine solution prior to connection.
- F. Exclude entrance of foreign material if work is suspended or stopped.
 - 1. Close ends of pipe with snug-fitting closures such as end caps.
 - 2. Do not let water fill the trench. Include provisions to prevent flotation if water control measures are inadequate.
 - 3. Remove water, sand, mud, and other undesirable material from trench before removal of end cap.

3.02 INSTALLATION

- A. Pipe Laying
 - 1. Perform only when weather and trench conditions are suitable. Do not lay in water.
 - 2. Remove trash, debris, vegetation, snow, ice, water or other unsatisfactory materials from excavations.
 - 3. All materials shall be carefully lowered into the trench using means and methods to prevent damage and entrance of foreign debris. Rolling or dropping materials will not be permitted. End hooks will not be permitted.
 - 4. Commence laying at the downstream end of line and install pipe with spigot ends in the direction of flow. Bells shall be in the direction of the laying operations.
 - 5. Open ends of water lines shall be adequately sealed to prevent intrusion of foreign debris during all work stoppages with a duration of 30 minutes or more.
- B. Jointing
 - 1. Join pipe in accordance with manufacturer's recommendations and AWWA specifications. Backfill in accordance with Section 01002 – Earthwork.
 - a. Clean and lubricate all joint and gasketed surfaces.
 - b. Employ means and methods to prevent damage during jointing.
 - c. Inspect joint openings and deflection for compliance with specifications.

2. All joint deflections shall be within manufacturers recommendations.
 - a. Ductile iron pipe joint deflection shall conform to AWWA C600.
 - b. PVC pipe may be deflected a maximum of 1.5 degrees per 20 feet.
 3. Pipe expansion and contraction due to changes in temperature shall be monitored during construction. Previously joined pipe shall be inspected to ensure joints have not separated due to expansion and contraction.
- C. Restrained Joints
1. Restrained joints shall be provided at all fittings, including bends, tees, crosses, fire hydrants, caps, plugs, and all pipe specified for joint restraint.
 2. Restraint may be provided by properly designed thrust blocking, mechanical restraint, and bell harness restraint.
 3. See Standard Details.
- D. Cutting Pipe
1. Cut in neat manner without damage to pipe, even surfaces perpendicular to pipe centerline.
 2. Ductile iron and steel pipe to be cut with carbide or diamond tip blade saw or other approved methods.
 3. Remove burrs and sharp edges and smooth the pipe end by grinding.
 4. Repair lining where required and as approved.
- E. Closure Pieces
1. Connect two segments of pipeline or a pipeline segment and structure with short sections of pipe, fabricated for the purpose.
 2. Location of joints, types of joints, pipe materials and strength classifications shall comply with specifications.
 3. Sleeve couplings may be used:
 - a. Gaskets shall be at least 3 inches from pipe ends.
 - b. Spacer ring shall be identical to pipe end with clear space in closure less than ¼-inch.
- F. Valves and Valve Boxes
1. Valves and valve boxes shall be set plumb
 2. Valve box base section shall be centered over operating nut
 3. Valve box upper section shall be set flush with finish grade

G. Polyethylene Encasement

1. When project specific specifications require use of polyethylene encasement, all valves and fittings shall be fully wrapped with polyethylene encasement in accordance with AWWA C105.

H. Casing Pipe

1. When typical trench-type construction techniques are used, subgrade preparation, bedding, initial backfill, and final backfill shall be in accordance with Standard Specification Section 01002 – Earthwork
2. When trenchless construction methods are used, installation shall be in accordance with Standard Specifications Section 01003 – Directional Drilling and Section 01004 – Utility Jacking and Boring

- I. Remove plugs from existing pipe to complete connections to existing pipe. Removed plugs shall become the property of the City.

J. Furnish and install test plugs where necessary to properly complete required testing.

1. Test plugs shall be as manufactured by pipe supplier.
2. Plugs shall be push-on, flanged, mechanical joint or restrained as required for ductile iron pipe and shall be watertight against heads equal to the specified test pressure. See Standard Details.
3. Secure plugs in place to facilitate removal when required to connect pipe.
4. Restrain plugs to fittings where indicated.

K. Tracer Wire

1. Attach continuous tracer wire to top of water line, either taped, banded, or strapped at 5 feet to 7 feet intervals. Install according to manufacturer's recommendations.
2. Tracer wire shall be looped to the surface at all valve/valve boxes, fire hydrants, blow-air release chambers, and locations specified or as shown on the plans.
3. Prior to acceptance, Contractor shall perform conductivity testing for all tracer wire. Full continuity must be established prior to final acceptance.

L. Warning Tape

1. Install continuous "blue" warning tape at least 2 feet above all water lines.

3.03 WATER MAIN PRESSURE TESTING

A. General

1. All work shall be inspected and approved by the Enforcement Officer prior to backfilling. Contractor shall notify the Enforcement Officer and arrange for inspection and observation of all testing prior to commencing.

2. Contractor shall obtain approval from Enforcement Officer prior to making any connections to existing water lines. The Enforcement Officer or representative must be present during any connection activities. The Contractor shall coordinate connections with the Water Department.
3. The Contractor shall furnish all pumps, piping, labor and other materials and services necessary to bring the piping up to the specified test pressure. Pipe in the sections to be tested shall be sufficiently backfilled or center loaded, with thrust blocks installed.

B. Hydrostatic Pressure Test

1. After the pipe has been laid and partially backfilled, test connections shall be made, and the pipe filled with water. After all air removal, water shall be pumped in to bring the pipe to the specified pressure.
2. Unless otherwise specified, testing pressure shall be:
 - a. 1.5 times the normal operating pressure (for the lowest point on the pipe line).
 - b. At least 150 pounds per square inch (psi).
 - c. Less than the rated pipe working pressure shall be used for testing for a period of one hour.
3. Pressure test period shall be at least one hour at testing pressure.
4. Any cracked or defective system components observed during this test shall be repaired or removed and replaced to satisfaction of City.

C. Leakage Test

1. After successful pressure test, leakage testing shall be performed.
2. Leakage test shall be maintained for a period of at least 3 hours. The maximum operating pressure of the pipe shall be used as leakage test pressure. Pressure shall be based on the elevation of the lowest point in the section being tested, corrected to test gauge elevation. Applicable provisions of AWWA C600 and C605 shall apply.
3. Allowable leakage in gallons per hour shall not be greater than the leakage defined by the following formula:

$$L = \frac{S * D * \sqrt{P}}{148,000}$$

L = Leakage allowance make-up water) - gallons per hour (gph)

S = length of pipe tested - feet

D = nominal diameter of the pipe - inches

P = average test pressure during hydrostatic test - pound per square inch (gauge)

4. All visible leaks shall be repaired regardless of leakage allowance.
5. All exposed pipe, fittings, valves, hydrants and joints shall be inspected and all evidence of moisture appearing on the surface of the ground during the test shall be investigated by the Contractor. Should the leakage test results exceed allowable leakage, the test

pressure shall be maintained for an additional period as directed by the City to facilitate location of leaks.

6. All pipe, fittings, valves, pipe joints, hydrants, and other materials which are found to be defective shall be removed and replaced with new, approved materials.
7. Pressure and leakage testing shall be repeated after repairing leaks and other defective work until results conform to specified requirements and approved by the City.

3.04 WATER MAIN DISINFECTION

- A. The Contractor shall furnish all pumps, piping, taps, labor and other materials and services necessary to perform work.
- B. One sampling tap shall be provided at the end of each line and a minimum of one tap per 1500 feet of pipe or as directed by the Enforcement Officer.
 1. Sampling tap shall be as shown in AWWA C651, Figure 1. Use of hose or fire hydrant for sample collection is not permitted.
 2. All disinfection, chlorination and flushing of the main will be done by the Contractor and in accordance with methods outlined in AWWA standard C651 – Disinfecting Water Mains.
 - a. Before being placed into service, all new mains and repaired portions of, or extensions to, existing mains shall be chlorinated so that the initial chlorine residual is greater than 50 mg/L and chlorine residual greater than 25 mg/L after 24 hours in the pipe.
 3. Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe such that residual chlorine is less than 1 mg/L throughout the system or concentration directed by Enforcement Officer.
 4. Following disinfection and flushing, the Contractor will collect bacteriological samples. Water from the new main shall remain isolated from other waters of the City system and shall not be made available for consumption until bacteriological testing verifies acceptable water quality.
 - a. Bacteriological testing and sampling procedures will be in accordance with AWWA C651.
 - b. Testing shall verify water samples are free of coliform bacteria contamination and is equal to or better than water quality in the distribution system.
 - c. Water quality shall meet all drinking water standards of the Missouri Department of Natural Resources.

END OF SECTION 01001

SECTION 01002 EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for earthwork, trenching, backfilling and compacting. The work shall consist of all labor, materials, and equipment required to install water main and appurtenances in accordance with contract documents, drawings, and specifications.
- B. The Contractor shall employ skilled, qualified workers and supervision to perform work following generally accepted industry practices. The City reserves the right to suspend work if, in the opinion of the Enforcement Officer, this requirement is not being met.
- C. If surface or ground contamination is suspected or encountered, notify the City immediately. The Developer and Contractor, in communication with the City, shall assess conditions and develop a plan for continued work including but not limited to: removal and disposal of contamination, specifying different sewer line materials, and line realignment.

1.02 DEFINITIONS

- A. City: City of Moberly, Missouri
- B. Water Department: City Water Department
- C. Enforcement Officer: City Director of Public Utilities or designated representative.
- D. Engineer: Licensed Professional Engineer in responsible charge for the project licensed to perform services in the State of Missouri.
- E. Developer: Entity requesting water service construction, modifications, extensions, or alterations to the City water system. The Developer could be a public or private entity, such as the City of Moberly or a private Developer.
- F. Contractor: Entity contracted by Developer to perform work on water main and services. The Contractor is responsible for constructing approved plans.
- G. Owner: Entity who is responsible for long term performance, maintenance, and operation of new water mains. The City will typically become the Owner upon final approval and acceptance by City. The Developer will be responsible for the project until final approval and acceptance.
- H. AWWA: American Water Works Association
- I. ASTM: American Society for Testing and Materials
- J. ANSI: American National Standards Institute
- K. MSS: Manufacturers Standardization Society of the Valve and Fitting Industry

1.03 RELATED WORK

- A. Section 01000 – Approval and Acceptance

- B. Section 01005 - Pavement Repair
- C. Section 01006 - Seeding

1.04 REFERENCE STANDARDS

- A. ASTM D698 - Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 lb. Rammer and 12-inch Drop.
- B. ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (shallow depth).
- C. Missouri Standard Specification for Highway Construction.

1.05 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least five (5) business days prior to commencing work.

1.06 SUBMITTALS

- A. See Section 1000 – Approval and Acceptance.
- B. Work Plan detailing means, methods, equipment, sequencing, and schedule for Earthwork.
- C. Traffic control plan and required permits from jurisdictions having authority.

1.07 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Trenching, backfilling, and compacting shall be included in the Contract unit cost of water main pipe.
- C. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - PRODUCTS

- 2.01** Materials shall be in accordance with Contract Documents, plans, specifications, and approved submittals.

2.02 BEDDING AND INITIAL BACKFILL

- A. Granular bedding containing no clods, muck, sod, frozen material, roots or other deleterious material with a plasticity index not greater than 6 and meeting the following gradation requirements.

Sieve Size	Percent Passing
1.5 inch	100
#4	20-60
#200	0-6

2.03 FINAL BACKFILL

- A. **Excavation Spoils:** suitable silt, sand, gravel, lean clay or combinations thereof containing no clods, muck, organics, frozen material, or other deleterious material from excavations. Maximum particle size shall be 3 inches.
 - 1. If enough quantity of suitable materials is not available from excavation spoils, the Contractor shall identify and import suitable materials for backfill. Contractor shall dispose of all unsuitable material.
- B. **Select Granular Backfill,** Section 1010, Missouri Standard Specification for Highway Construction. Material shall meet the following gradation:

Sieve Size	Percent Passing
3 inches	100
#40	20-60
#200	0-6

2.04 AGGREGATE BASE AND SURFACE

- A. **Aggregate Base:** Type 5, Section 1007, Missouri Standard for Highway Construction.
- B. **Aggregate Surface:** Grade A or B, Section 1006, Missouri Standards for Highway Construction.

2.05 CONTROLLED LOW-STRENGTH MATERIAL (FLOWABLE FILL)

- A. Controlled Low-Strength Material: Self-compacting, flowable concrete material produced from the following:
 - 1. Portland Cement: ASTM C150/C150M, Type I or Type II.
 - 2. Fly Ash: ASTM C618, Class C or F.
 - 3. Normal-Weight Aggregate: ASTM C33/C33M, 3/4-inch nominal maximum aggregate size.
 - 4. Water: ASTM C94/C94M.
 - 5. Air-Entraining Admixture: ASTM C260/C260M.
- B. Produce conventional-weight, controlled low-strength material with 100-psi compressive strength when tested according to ASTM C495/C495M and placed in the field with a slump between 9 and 11 inches tested in accordance with ASTM C143.

PART 3 - EXECUTION

3.01 GENERAL

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.
- B. Establish line and grade to maintain minimum burial and separation requirements in coordination with Enforcement Officer and Engineer. Notify Enforcement Officer and Engineer if conflicts with

existing utilities or structures exist.

- C. Trench excavations shall be protected in accordance with applicable Federal, State, and local regulations, Laws, and rules in accordance with OSHA 29 CFR part 1926. Trench and excavation stability shall be the responsibility of the Contractor.
- D. Implement and maintain traffic control plan

3.02 WATER CONTROL

- A. Develop and implement stormwater pollution prevention plan including erosion control measures. Prevent surface water and subsurface or ground water from entering excavations. The plan shall address water disposal if dewatering is required
- B. Water from surface runoff, downspouts, and subsurface drains shall be managed and controlled by the Contractor through an approved site drainage system. Equipment and materials required to remove water from excavations shall be on-site and available for uses throughout construction.
- C. Water disposal shall be the responsibility of the Contractor and completed in accordance with applicable federal, state, and local regulations.

3.03 PREPARATION

- A. Clear and grub areas of excavation.
- B. Backfilling and compaction shall not occur until the following conditions are satisfied:
 - 1. Subgrade proof-compacting, required inspection, testing and acceptance by Enforcement Officer.
 - 2. Soft, rutting, pumping, frozen or otherwise unsuitable soils in base of excavations shall be removed at direction of Enforcement Officer. Notify Enforcement Officer once subgrade elevations are reached. Excavate unsuitable soils within directed limits and replace with suitable materials approved by Enforcement Officer. Suitable materials could include but are not limited to bedding, initial backfill, and final backfill.
 - 3. All trash, debris, vegetation, snow, ice, water or other unsatisfactory materials shall be removed from excavations.

3.04 EXCAVATION

- A. Excavate trenches to approved subgrade elevations. Unless otherwise specified, the minimum trench width shall be at least one (1) foot greater than the outside diameter of the pipe.
- B. If rock is encountered, it shall be excavated at least 12 inches wider than the outside diameter of the pipe and at least 6 inches deeper than planned subgrade elevation. Alternatively, pipe alignment and grade could be adjusted to avoid rock excavation if separation, burial, and joint restraint requirements are satisfied. If additional excavation is required, bedding material shall be used as backfill.
 - 1. For City projects, notify Enforcement Officer and Engineer immediately if rock is encountered within excavation limits, and earthwork progress significantly slows or stops. Excavation in rock shall not progress unless approved by Enforcement Officer. The Enforcement Officer will provide guidance and specifications for rock excavation and backfilling on a case by case basis.

- 2. For City projects, unless identified as a bid item, additional cost for rock excavation will be paid for as additional work in accordance with Contract Documents regarding changes in work.
- C. Stockpile materials acceptable for use as backfill and topsoil. Stockpile locations relative to excavations shall be incorporated into Contractor's responsibility for excavation stability. Place, grade, and shape stockpiles to promote positive drainage with adequate erosion control. Dispose unsuitable materials.

3.05 BACKFILLING

- A. Proof-compact subgrade prior to placing bedding or laying pipe. Proof-compacting shall be performed in the presence of Enforcement Officer; approval is required before placing bedding to receive pipe.
- B. Shape and compact bedding to provide uniform bearing of the pipe. Excavate bell holes to allow for unobstructed assembly of the joint. Make bell hole as small as practical. After the joint has been made, carefully fill bell hole with bedding material and compact.
- C. After pipe laying, joining and aligning, place and compact bedding and initial backfill as shown on the plans. Ensure material is worked under the haunch of the pipe to provide adequate side support. Take precautions to prevent movement of the pipe during placement and compaction of haunching material.
- D. Place and compact initial backfill to provide cover over the pipe. Use methods to prevent pipe damage or displacement.
- E. In unpaved areas, place final backfill using methods to prevent pipe damage or displacement. Place final backfill in 6-inch loose lifts and compact. Leave material neatly mounded over the trench. Maintain trench and fill settled areas as they occur. Finish grade to eliminate uneven areas. Seed areas where required.
- F. In paved areas, place and compact base and surface repairs in accordance with details and project specification Section 01005 - Pavement Repair. Place final backfill using methods to prevent pipe damage or displacement.
- G. Jetting or water-settling backfill is prohibited, unless permitted by Enforcement Officer and Engineer.

3.06 COMPACTION

- A. Compact materials in accordance with ASTM D698 and ASTM 6938 and according to the following table:

Material	Minimum Compaction	Maximum Loose Lift Thickness
Bedding and Initial Backfill	90%	4 inches
Suitable Excavation Spoils	90%	6 inches
Select Granular Backfill	95%	6 inches
Aggregate Base	95%	6 inches
Aggregate Surface	95%	6 inches
Bituminous Surface	98%	3 inches

- B. Moisture condition (wetting or drying) fill as needed to achieve optimum moisture contents and required compaction.
- C. Use compaction equipment capable of achieving required densities and avoid damage to pipe, adjacent utilities, and adjacent structures. Self-propelled, "heavy" roller or pad type vibratory rollers shall not be operated within 2 feet from top of pipe.

3.07 QUALITY CONTROL

- A. Compaction quality control shall be provided by Contractor and will be incidental to Contract Unit costs. Quality control technicians and testing organizations shall be trained and certified to perform required testing in accordance with ASTM standards and specifications.
- B. Quality control density testing frequency shall be in accordance with the following table:

Material	Testing Frequency per lift
Bedding and Initial Backfill	One test every 300 linear feet of trench
Suitable Excavation Spoils	One test every 300 linear feet of trench
Select Granular Backfill	One test at each pavement structure crossing
Aggregate Base	One test at each pavement structure crossing
Aggregate Surface	One test at each pavement structure crossing
Bituminous Surface	One test at each pavement structure crossing

- C. Areas where testing indicates insufficient compaction shall be re-compacted, re-conditioned, re-worked until requirements are met to satisfaction of Owner and Engineer.
- D. Controlled low strength material shall be tested in the field for slump and samples collected for comprehensive strength testing. Slump and comprehensive testing shall be in accordance with ASTM C143 and ASTM C495, respectively. Testing frequency shall be 1 set of tests per 100 cubic yards of material used. Slump shall be between 9 and 11 inches. Minimum compressive strength is 100 psi.

3.08 MAINTENANCE

- A. The Contractor will demobilize equipment and restore the work site to the original condition. Backfill excavations and restore surfaces according to specifications and project drawings.
- B. Remove all leftover materials, including unsuitable excavation spoils, trash, debris, and other construction waste in accordance with applicable federal and state laws and regulations.
- C. Protect newly graded areas from traffic (except pavement crossings) and erosion. Keep free of trash and debris See Section 01005- Pavement Repair for pavement area maintenance.
- D. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances during warranty period and to satisfaction of Enforcement Officer.
- E. Where differential movement is measurable or observable along excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add appropriate backfill material, compact, and replace surface treatment according to project specifications and plans. Restore appearance, quality, and condition of surface or finish to match adjacent work to satisfaction of Enforcement Officer.

END OF SECTION 01002

SECTION 01003 DIRECTIONAL DRILLING

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for directional drilling installation methods for High Density Polyethylene (HDPE) pipe casing or steel pipe casing beneath traveled ways or at locations shown on the drawings. The Contractor shall provide all labor, materials, and equipment required to install casing in accordance with these specifications.

1.02 SUBMITTALS

- A. Submit work plans, shop drawings, and product data for approval. Submittals shall include:
1. Detailed work plan and sequencing including procedures and schedule;
 2. Proposed line and grade of casing pipe to maintain minimum burial depth, minimum separation requirements from existing utilities, and radius of curvature;
 3. Proposed equipment including but not limited to: drilling rig, rotary torque capacity, thrust/pullback pressures, tensile load limit calculations, drill bits, mud system including pump and motor size, down-hole tools, guidance system with stated accuracy, and safety systems;
 4. Pit locations;
 5. Design, means, methods and materials for pit excavation support;
 6. Pit dimensions showing relative location to traveled ways;
 7. Dewatering methods;
 8. Spoil removal methods;
 9. Drilling fluids including water source;
 10. Methods for monitoring drill fluid volumes and losses;
 11. Product data;
 12. Casing pipe material and size;
 13. Casing pipe segment joining methods and procedures;
 14. Product pipe spacers and casing pipe end seal materials;
 15. Erosion control and stormwater pollution prevention plan;
 16. Adverse conditions plan:
 - a. Plan shall address means and methods of work, especially HDPE fusion welding, in adverse conditions such as freezing temperatures, precipitation, and wind and mitigation measures to eliminate resulting effect on pipe fusion and installation;
 17. Remediation plan:
 - a. Identify means and methods to remove obstructions at the boring face;
 - b. Identify remedial measures for mitigating damage to existing facilities, and impacts to traveled ways, including ground subsidence and heaving;
 - c. Identify remedial measures for excessive drill fluid loss;
 18. Experience:
 - a. Submit a list of at least five (5) successfully completed directional drilling projects using HDPE pipe sizes of at least 18 inches and lengths greater than 150 feet within the last five (5) years. Include project owner contact information references substantiating Contractor's experience; and,
 19. As-Built Drawings showing horizontal and vertical alignment of completed casing installation. This submittal shall also include pullback pressure logs, volume of drilling fluid, and fluid losses, if any.

1.03 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least two (2) business days prior to commencing work. All work shall be performed in the presence of the Enforcement Officer.

1.04 BASIS OF PAYMENT

- A. Directional drilling shall be paid for by the lineal footage of casing installed along casing centerline. The unit price shall include:
 - 1. Excavation, use, and backfilling of all pits;
 - 2. Removal and disposal of spoils and drilling fluid;
 - 3. Traffic control;
 - 4. Verifying location and depth of all utilities within impacted area;
 - 5. Casing pipe installation; and,
 - 6. All labor, equipment, and materials required to complete the work.
- B. The unit cost shall be for casing pipe and shall not include product pipe and installation.
- C. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
- D. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 – PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE PIPE CASING

- A. Materials shall be in accordance with Contract Documents, plans, specifications, and approved submittals.
- B. All HDPE shall be manufactured from PE 4710 resin listed as TR-4 by the Plastic Pipe Institute (PPI). The resin shall meet ASTM D3350 with a minimum 445474C cell classification. The manufacturer shall certify the specified cell classification.
- C. HDPE casing shall conform to ASTM F 714, ANSI and AWWA C906, and have an NSF-61 listing.
- D. All pipe, fittings, and fusion equipment shall be provided by one supplier. Fusion equipment must be in satisfactory working order. All fusion equipment operators shall be qualified to perform heat fusing procedures.

2.02 STEEL PIPE CASING

- A. Materials shall be in accordance with approved submittals.

- B. Steel casing pipe shall meet or exceed ASTM A-139, Grade B with a minimum wall thickness of 0.25 inches and minimum yield strength of 35,000 psi. Steel casing shall be joined by fully welding around the entire circumference of the pipe. Welding shall conform to AWWA Standard C206.

2.03 CASING END SEALS

- A. Synthetic rubber end seals shall be installed on each end of the casing pipe. End seals shall be Advanced Model Products – Model AC Pull-on or approved equal and fastened tightly with stainless steel bands.

2.04 INSULATING SPACERS

- A. Projection type, non-metallic spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.

2.05 DIRECTIONAL DRILLING EQUIPMENT

- A. Directional drilling equipment shall consist of a hydraulically-powered directional drilling rig of sufficient capacity to perform the bore and pullback the casing pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the crossing, a drilling fluid recycling system to remove solids from the drilling fluid, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle drilling fluid volume, and qualified personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.
- B. The directional drilling rig shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while recirculating pressurized drilling fluid mixture to a guidable drill head. The rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations. The rig shall be electrically grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm that automatically sounds when an electrical current is detected.
- C. Drilling fluid shall be composed of clean water and appropriate bentonite clay additives in accordance with approved submittals. Water shall be from source approved by Enforcement Officer and be contaminant free. Drilling fluids shall be thoroughly mixed and free of clumps or clods.

PART 3 - EXECUTION

3.01 GENERAL

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.
- B. Construction means, methods, and materials shall be in accordance with approved submittals.
- C. Entry and exit pit excavations shall be constructed in accordance with approved submittals. Excavations should be protected in accordance with applicable Federal, State, and Local regulations, laws, and rules. Excavation protection shall not be less than the standards and regulations established by OSHA 29 CFR Part 1926. Trench safety and stability shall be the responsibility of the Contractor, including placement of excavation spoils and control of water intrusion.

3.02 HANDLING OF MATERIAL

- A. Handle pipes, conduits, casing, and ancillary items in such a manner as not to damage the material. Pipe rollers or other approved means shall be used during pullback operations to avoid damage to casing pipe and product pipe.
- B. Damage to material shall be repaired to the satisfaction of the Enforcement Officer and, if required, replaced.
- C. The Enforcement Officer maintains the authority to reject materials damaged or otherwise unsuitable for project use.

3.03 DRILLING FLUID

- A. Disposal of drilling fluid and spoils will be the responsibility of the Contractor and shall be done in compliance with all Federal, State, and local regulations.
- B. All drilling fluids and loose cuttings shall be contained in access pits or holding tanks for recycling and disposal. Drilling fluid returns into or on other areas shall be cleaned up and disposed of immediately. The Contractor shall notify the Enforcement Officer immediately if drilling fluid returns occur or are spilled in areas other than approved holding structures.
- C. The Contractor shall provide adequate means and equipment for removing drilling fluid and spoils from access pits to mitigate potential overflows and provide for final disposal. Disposal equipment shall be present during all directional drilling operations.

3.04 DIRECTIONAL DRILLING

- A. Perform directional drilling operations in accordance with approved submittals. The Contractor shall provide all material, equipment, and facilities required to perform directional drilling.
- B. The drill path shall be accurately staked with alignment and entry/exit pits.
- C. Pipe, conduit, and casing installation under traveled ways shall progress on a continuous basis without stoppage, except for adding sections, until the leading edge has reached the receiving pit. Engineering approval is required for variations from this specification.
- D. Stop operations if ground movement is detected and implement the remediation plan in accordance with approved submittals. Immediately report movement to the Enforcement Officer. Repair any damages to traveled ways, including displacement (up or down) resulting from construction operations. Corrective actions shall be approved by the responsible authority. Mitigating repairs and associated costs will be the responsibility of the Contractor.

3.05 PILOT HOLE BORING

- A. The entry angle, pilot hole, and boring process shall maintain a curvature that does not exceed allowable bending radius of casing or product pipe and in accordance with approved submittals.
- B. The pilot hole shall be drilled along the Contractor submitted, and approved line, grade, and radius of curvature. No curves will be accepted with a radius more than approved curvature.
- C. Drilling fluid pressures shall be monitored at all times during operations. Pressures shall be controlled to avoid hydraulic fracturing of subsurface materials and prevent structure and ground surface heaving.

- D. Drilling fluid and cutting return shall be monitored at all times during operations. The volume of drilling fluids and spoil return anticipated shall be estimated based on subsurface conditions encountered. Excessive drilling fluid loss or excess spoil return shall be reported immediately to the Enforcement Officer. The Enforcement Officer will, in consultation with the Contractor, determine if corrective actions are required.
- E. Contractor shall provide adequate containment, drilling fluid and spoil removal equipment and other means required to contain all fluid and spoils and/or remove it from site. No additional compensation will be allowed for containment or cleanup resulting from spillage, hydraulic fracturing, or other means leading to release of drilling fluids.
- F. Alignment Adjustments and Restarts
 - 1. The Contractor shall follow the approved alignment within specifications. If adjustments or restarts are required, the Contractor shall notify the Enforcement Officer for approval prior to adjusting.

3.06 CASING PIPE INSTALLATION

- A. After the pilot hole is completed and approved, the enlarging phase of installation shall begin. The borehole diameter shall be increased to accommodate the pullback operations for the specified casing pipe size. The type of reamer shall be determined by subsurface soil conditions encountered during pilot hole drilling. The reamer type shall be selected by the Contractor and must be equipped with a swivel.
- B. The maximum hole diameter shall be 1.25 times the casing pipe outside diameter. The Contractor may elect to perform multiple reaming passes. Multiple reaming passes will be completed at Contractor's expense.
- C. Borehole stability shall be the responsibility of the Contractor. Open boreholes shall be stabilized using appropriate means to prevent collapse while still maintaining ability to perform work.
- D. Once pullback operations have commenced, operations must continue without interruption until pipe is completely pulled into borehole. During pullback operations, Contractor will not apply more than the maximum safe pipe pull pressure at any time. If casing pipe becomes stuck, Contractor will cease pulling operations and allow any potential "suction lock" to subside and resume pulling operations. If pipe remains stuck, Contractor will notify Engineer. Engineer and Contractor will review available options and proceed accordingly.
- E. Drilling fluid pressures shall be monitored at all times during operations. Pressures shall be controlled to avoid hydraulic fracturing of subsurface materials and avoid structure and ground surface heaving. Contractor shall provide adequate containment, drilling fluid and spoil removal equipment and other means required to contain all fluid and spoils and/or remove it from site. No additional compensation will be allowed for containment or cleanup resulting from spillage, hydraulic fracturing, or other means leading to release of drilling fluids.
- F. Drilling fluid and cutting return shall be monitored at all times during operations. The volume of drilling fluids and spoil return anticipated shall be estimated based on subsurface conditions encountered. Excessive drilling fluid loss or excess spoil return shall be reported immediately to the Enforcement Officer. The Enforcement Officer will, in consultation with the Contractor, determine if corrective actions are required.
- G. The casing pipe shall be protected and supported during pullback operations using rollers or other approved means to minimize damage.

3.07 OBSTRUCTIONS

- A. The Enforcement Officer must be notified immediately if any obstruction is encountered that stops progress of operations. The Contactor shall review the situation with the Enforcement Officer and determine the feasibility of continuing drilling operations, switching to alternative methods, and/or modifying alignment/location of the jack and bore.
- B. If continuing is deemed unfeasible or impractical, the obstructed pilot hole or casing shall be abandoned in place and filled completely with grout or other approved materials.
- C. For City projects, substantiated cost of abandoned work resulting from unforeseen obstructions encountered will be paid for as additional work in accordance with Contract documents.

3.08 ALIGNMENT

- A. The Contractor shall provide an accurate means to monitor horizontal and vertical positions of the casing during construction operations. The Enforcement Officer shall always have access to this information during the directional drilling process. If a magnetic guidance system is used, the Contractor shall identify any surface geo-magnetic anomalies and take appropriate corrective measures to ensure accurate spatial tracking of the drill stem.
- B. The casing shall be installed within a tolerance of 6 inches from approved, line and grade over 100 feet. The tolerance will be adjusted proportionally for shorter or longer casing lengths; however, the maximum deviation for casing lengths longer than 150 feet shall be no more than 1 foot.
- C. The alignment of casing shall be established to allow unrestricted insertion of the product pipe, including spacers, pipe bells, and restrained joints. If product pipe cannot be installed, the casing shall be abandoned and filled with grout or other approved materials. The Contractor shall establish another casing at a location approved by Enforcement Officer.

3.09 PRODUCT PIPE INSTALLATION

- A. The product pipe shall be the size and type as specified or shown on the plans.
- B. The end of product pipe shall be protected from damage during installation into the casing.
- C. Product pipe shall have restrained joints within the casing.
- D. The product pipe shall be supported in the casing pipe using projection-type non-metallic casing spacers.
 - 1. The minimum number of spacer projections around the product pipe circumference shall equal the pipe diameter (i.e. a nominal 10-inch pipe shall have minimum of 10 projections). Refer to manufacturer's product data for spacer type and size.
 - 2. Casing spacers shall fasten tightly onto the product pipe to prevent movement during installation.
 - 3. The insulator spacing shall be installed to support the weight of the product pipe and contents. Spacers shall be placed a maximum of 2 feet from each side of a joint and evenly spaced along the product pipe at intervals not to exceed manufacturer's recommendations or 6 feet, whichever is less.
 - 4. Double spacers shall be installed one foot from each end of the casing.
 - 5. Projection type spacers shall be RACI, Advance Products & Systems, or approved equal.

3.10 SITE RESTORATION

- A. The Contractor will demobilize equipment and restore the work site to the original condition. All excavations will be backfilled according to specifications and project drawings. Surface restoration shall be completed in accordance with Section 01005 – Pavement Repair and Section 01006 - Seeding.
- B. Remove all excess spoils and dispose of in accordance with all federal, state, and local regulations.

END OF SECTION 01003

SECTION 01004 UTILITY JACKING AND BORING

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for jack and bore installation of steel casing beneath traveled ways. The Contractor shall provide all labor, materials, and equipment required to install casing in accordance with these specifications. This work shall consist of pushing/jacking a steel casing pipe with a boring auger rotating within the pipe to remove spoils as casing is advanced.

1.02 SUBMITTALS

- A. Submit work plans, shop drawings, and product data for Engineer approval. Submittals shall include:
1. Work plan and sequencing;
 2. Proposed line and grade of casing pipe to maintain minimum burial depth and separation requirements from existing utilities;
 3. Equipment and site configuration;
 4. Jacking and receiving pit locations;
 5. Design, means, methods and materials for pit excavation support;
 6. Pit dimensions showing relative location to traveled ways;
 7. Dewatering methods;
 8. Differential movement monitoring methods;
 9. Excavation face loss prevention methods;
 10. Spoil removal methods;
 11. Drilling fluids;
 12. Product data;
 13. Casing pipe material and size;
 14. Casing pipe segment joining methods and procedures;
 15. Product pipe spacers and casing pipe end seal materials;
 16. Erosion control and stormwater pollution prevention plan;
 17. Remediation plan:
 - a. Identify means and methods to remove obstructions at the boring face;
 - b. Identify remedial measures for mitigating damage to existing facilities, and impacts to traveled ways, including ground subsidence and heaving;
 18. Experience:
 - a. Submit a list of at least five (5) successfully completed jack and bore projects greater than 50 feet within the last five (5) years including project owner contact information references substantiating jack and bore installer's experience; and,
 19. As-Built Drawings showing horizontal and vertical alignment of completed jack and bore.

1.03 NOTIFICATION

- A. The Contractor shall notify the Enforcement Officer at least two (2) business days prior to commencing work. All work shall be performed in the presence of the Enforcement Officer.

1.04 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.

- B. Jack and Bore shall be paid for by the lineal footage of casing measured along casing centerline. The unit price shall include:
 - 1. Excavation, use, and backfilling of all pits;
 - 2. Removal and disposal of spoils and drilling fluid;
 - 3. Traffic control;
 - 4. Verifying location and depth of all utilities within impacted area;
 - 5. Casing pipe installation; and,
 - 6. All labor, equipment, and materials required to complete the work.
- C. The unit cost shall not include product pipe and installation.
- D. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
- E. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall be in accordance with Contract Documents, plans, specifications, and approved submittals.
- B. Steel casing pipe shall meet or exceed ASTM A-139, Grade B with a minimum wall thickness of 0.25 inches and minimum yield strength of 35,000 psi. Steel casing shall be joined by fully welding around the entire circumference of the pipe. Welding shall conform to AWWA Standard C206.
- C. Synthetic rubber end seals shall be installed on each end of the casing pipe. End seals shall be Advanced Model Products – Model AC Pull-on or approved equal fastened tightly with stainless steel bands.
- D. Projection type spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.

PART 3 - EXECUTION

3.01 GENERAL

- A. Verify the actual locations (horizontal and vertical) of all utilities prior to beginning work. Protect all utilities from damage during construction. Damage to existing utilities shall be repaired to the satisfaction of the utility provider at Contractor's expense.
- B. Construction means, methods, and materials shall be in accordance with approved submittals.
- C. Excavations shall be constructed in accordance with approved submittals. Excavations should be protected in accordance with applicable Federal, State, and local regulations. Excavations must meet or exceed regulations established by OSHA 29 CFR Part 1926. Trench safety and stability shall be the responsibility of the Contractor.

- D. Disposal of excess spoils removed from the casing pipe shall be the responsibility of the Contractor and shall be done in compliance with all Federal, State, and local regulations.

3.02 HANDLING OF MATERIAL

- A. Handle pipes, conduits, casing, and ancillary items in such a manner as not to damage the material.
- B. Damage to material shall be repaired to the satisfaction of the Engineer or replaced at Contractor's expense.
- C. The Enforcement Officer maintains the authority to reject materials damaged or otherwise unsuitable for project use.

3.03 JACK AND BORE

- A. Perform jack and bore operations in accordance with approved submittals and the following requirements:
 - 1. Unsupported excavation (open-hole) ahead of the casing will not be permitted. Mechanical arrangements or other devices shall be provided at the leading end of the carrier to prevent drilling ahead of the casing.
 - 2. The use of water or slurry under pressure (jetting) or puddling shall not be permitted to facilitate boring, pushing, or jacking operations. Non-pressurized water or slurry is acceptable for use as a lubricant behind the cutter head.
 - 3. Pipe, conduit, and casing installation under traveled ways shall progress on a continuous basis without stoppage, except for adding sections, until the leading edge has reached the receiving pit. Engineering approval is required for variations from this specification.
- B. Employ methods to prevent loss of the excavation face in accordance with approved submittals.
- C. Stop operations if ground displacement is detected and implement the remediation plan in accordance with approved submittals. Repair any damages to traveled ways, including displacement (up or down) resulting from construction operations. Corrective actions shall be approved by the Engineer. Mitigating repairs and associated costs will be the responsibility of the Contractor.

3.04 OBSTRUCTIONS

- A. The Enforcement Officer must be notified immediately if any obstruction is encountered that stops progress of operations. The Contractor shall review the situation with the Enforcement Officer and determine the feasibility of continuing operations, switching to alternative methods, and/or modifying alignment/location of the jack and bore.
- B. If continuing is deemed unfeasible or impractical, the obstructed pilot hole or casing shall be abandoned in place and filled completely with grout or other approved materials.
- C. For City projects, substantiated cost of abandoned work resulting from unforeseen obstructions encountered will be paid for as additional work in accordance with Contract documents.

3.05 ALIGNMENT

- A. The Contractor shall provide an accurate means to monitor horizontal and vertical positions of the casing during construction operations. The Enforcement Officer shall always have access to this information during the jack and bore process. If a magnetic guidance system is used, the Contractor shall identify any surface geo-magnetic anomalies and take appropriate corrective measures to ensure accurate spatial tracking of casing.
- B. The casing shall be installed within a tolerance of 1 foot of approved line and grade over 100 feet. The tolerance may be adjusted proportionally for shorter or longer casing lengths; however, the maximum deviation for casing lengths longer than 150 feet shall be no more than 1.5 feet.
- C. The alignment of casing shall be established to allow unrestricted insertion of the product pipe, including spacers, pipe bells, and restrained joints. If product pipe cannot be installed, the casing shall be abandoned and filled with grout or other approved materials. The Contractor shall establish another casing at a location approved by Enforcement Officer.

3.06 PRODUCT PIPE INSTALLATION

- A. The product pipe shall be the size and type as specified or shown on the plans.
- B. The end of product pipe shall be protected from damage during installation into the casing.
- C. Product pipe shall have restrained joints within the casing.
- D. The product pipe shall be supported in the casing pipe using projection-type non-metallic casing spacers.
 - 1. The minimum number of spacer projections around the product pipe circumference shall equal the pipe diameter (i.e. a nominal 10-inch pipe shall have minimum of 10 projections). Refer to the manufacturer's product data for spacer type and size.
 - 2. Casing spacers shall fasten tightly onto the product pipe to prevent movement during installation.
 - 3. The insulator spacing shall be installed to support the weight of the product pipe and contents. Spacers shall be placed a maximum of 2 feet from each side of a joint and evenly spaced along the product pipe at intervals not to exceed manufacturer's recommendations or 6 feet, whichever is less.
 - 4. Double spacers shall be installed one foot from each end of the casing.
 - 5. Projection type spacers shall be RACI, Advance Products & Systems, or approved equal. Refer to manufacturer's product data for spacer type and size.

3.07 SITE RESTORATION

- A. The Contractor will demobilize equipment and restore the work site to the original condition. All excavations will be backfilled according to specifications and project drawings. Surface restoration shall be completed in accordance with contract requirements, Section 01005 – Pavement Repair, and Section 01006 – Seeding.

END OF SECTION 01004

SECTION 01005 PAVEMENT STRUCTURE REPAIR

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes specifications for repairing and restoring aggregate, concrete, and asphalt concrete pavement structures in areas where trenches cross these features. The Contractor shall provide all labor, materials, and equipment required to perform work in accordance with these specifications.

1.02 RELATED WORK

- A. Section 01002 – Earthwork
- B. Section 01003 – Directional Drilling
- C. Section 01004 – Utility Jacking and Boring

1.03 REFERENCE STANDARDS

- A. ASTM D698 - Moisture-Density Relations of Soils and Soil Aggregate Mixture, using 5.5 lb. Rammer and 12 in Drop.
- B. Missouri State Highway and Transportation Commission: Missouri Standard Specifications for Highway Construction, current edition, including Section 613 Pavement Repair

1.04 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Pavement Structure Repair shall be paid for by the lineal foot at Contract unit cost for surfaces listed on bid form and plan quantities table. Culvert, mailbox, or other surface features required to be removed as a result of construction shall be included in Contract unit cost.
- C. Cost associated with all work and materials not specifically identified as a bid item shall be considered as incidental to other pay items.
- D. Additional, extra, and/or changes in work must be approved by Enforcement Officer. Payment will be on basis of Contract documents regarding changes in work.

PART 2 - MATERIALS

2.01 AGGREGATE BASE AND SURFACE COURSE MATERIALS

- A. Aggregate Base: Type 5, Section 1007, Missouri Standard Specifications for Highway Construction.
- B. Aggregate Surface: Grade A or B, Section 1006, Missouri Standard Specifications for Highway Construction.

2.02 BITUMINOUS SURFACE COURSE AND PATCHING MATERIALS

- A. Prime Coat: Liquid Asphalt RC-MC Grade 30, Section 1015, Missouri Standard Specifications for Highway Construction.
- B. Base Mix: MoDOT Base, Section 401, Missouri Standard Specifications for Highway Construction.
- C. Tack Coat: SS-1 or SS-1H, Section 1015 Missouri Standard Specifications for Highway Construction.
- D. Surface Mix: Type BP-1, Section 401, Missouri Standard Specifications for Highway Construction.

2.03 PORTLAND CEMENT CONCRETE

- A. Portland Cement: Type I or Type II
- B. Concrete Mix: Portland Cement Concrete Base and Pavement, class B-1, non-air entrained with material conforming to Section 502 and 1000, Missouri Standard Specifications for Highway Construction with a slump between 3 and 6 inches.
- C. Water: potable
- D. Reinforcement: #4 rebar placed 12 inches on center each way. Concrete shall be dowelled into existing with drilled and epoxy set #4 rebar dowels placed 18 inches on center.

PART 3 - EXECUTION

3.01 REPAIR

- A. All trenches in traveled ways shall be repaired with either Bituminous Surface Course and Patching Materials or Concrete Material according to standard details.
- B. All trenches in concrete sidewalk, driveways and roadways shall be repaired/replaced with concrete material according to standard details.
- C. All trenches in aggregate surfaced pavement structures shall be replaced with Aggregate Base and Surface Course according to standard details.
- D. Pavement replaced shall adhere to the following procedures:
 - 1. Place granular backfill to provide temporary surface over trenches across traveled ways. Open to traffic for at least one week. Repair all potholes and level surface daily, adding additional material as needed. Base under the pavement shall be 8 inches thick.
 - 2. After pavement has been open to traffic for one week, saw cut and remove existing pavement on both sides of trench, remove enough base course material, level, compact, and construct pavement patch per the project details.

3.02 COMPACTION

- A. In accordance with Section 01002 Earthwork.

3.03 MAINTENANCE

- A. Maintain surface repairs until final acceptance. Replace and repair areas where excessive displacement, rutting, raveling, or other unacceptable damages occur as a result of construction.
- B. Repaired areas will be accepted at end of maintenance period and all pavement repairs are performing well without further damages.

END SECTION 01005

SECTION 01006 SEEDING

PART 1 – GENERAL

1.01 RELATED WORK

- A. Section 01002 - Earthwork
- B. Section 01003 – Directional Drilling
- C. Section 01004 – Utility Jacking and Boring

1.02 REFERENCE STANDARDS

- A. Missouri Standard Specification for Highway Construction, current edition.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.04 BASIS OF PAYMENT

- A. This section applies to projects where the City of Moberly is the responsible Developer/Owner.
- B. Seeding cost shall be included in Contract unit cost for product pipe.

PART 2 - MATERIALS

2.01 SEED

- A. Seed shall meet the following minimum percentages for purity and germination, and maximum percentage for weed seed. Vendor certification for each lot number of numbers with testing statement. Seed that has not been tested and certified within the last 1 year will be rejected

Type	Purity	Germination	Weed
Kentucky Blue Grass	85	80	<1.0
Perennial Rye	98	85	<1.0
Red Fescue	97	85	<1.0

2.02 FERTILIZER

- A. Standard commercial fertilizer supplied separately or in mixtures and furnished in water tight containers. Each container shall be marked with weight and manufacturer's guaranteed analysis showing ingredient percentages.
- B. Furnish a mixture of chemical ingredients providing total nitrogen, phosphoric acid, and potassium required based on soil analysis or as otherwise specified. Chemical ingredient tolerances shall be within 2 percent.

2.03 MULCH

- A. Fresh wheat, rye, or oat straw, air dried. Non-toxic to vegetation and to the germination of seed, free from noxious seeds and weed seeds.

2.04 APPLICATION RATES

- A. **Fertilizer:** provide total nitrogen, phosphoric acid, and potassium required based on soil analysis or as otherwise specified.

- B. **Seed**

- 1. Kentucky Blue Grass: 1.10 lbs/1,000 sq. ft.
- 2. Perennial Rye: 0.60 lbs/1,000 sq. ft.
- 3. Redtop: Red Fescue: 0.40 lbs/1,000 sq. ft.

PART 3 - EXECUTION

3.02 PREPARATION

- A. When soil is in a tillable condition, cultivate to a depth of 4 inches, reducing soil particles to a size not larger than 2 inches. Moisture condition surface to receive seed.
- B. Assure seed bed is level, smooth, and free of weeds, clods, stones, roots, and sticks. Moisture condition as needed.
- C. Apply fertilizer and mix into the top 2 inches of soil. Apply within 48 hours prior to seeding.

3.03 SEEDING AND MULCHING

- A. Uniformly sow seeds in two operations at right angles to each other. Within 12 hours after seeding roll areas at right angles to runoff with a lawn type roller. Do not over compact.
- B. Within 24 hours of seeding apply mulch at 2 1/2 tons per acre. Stabilize vegetative mulch by embedding in soil to prevent mulch loss by wind or water erosion.

3.04 MAINTENANCE

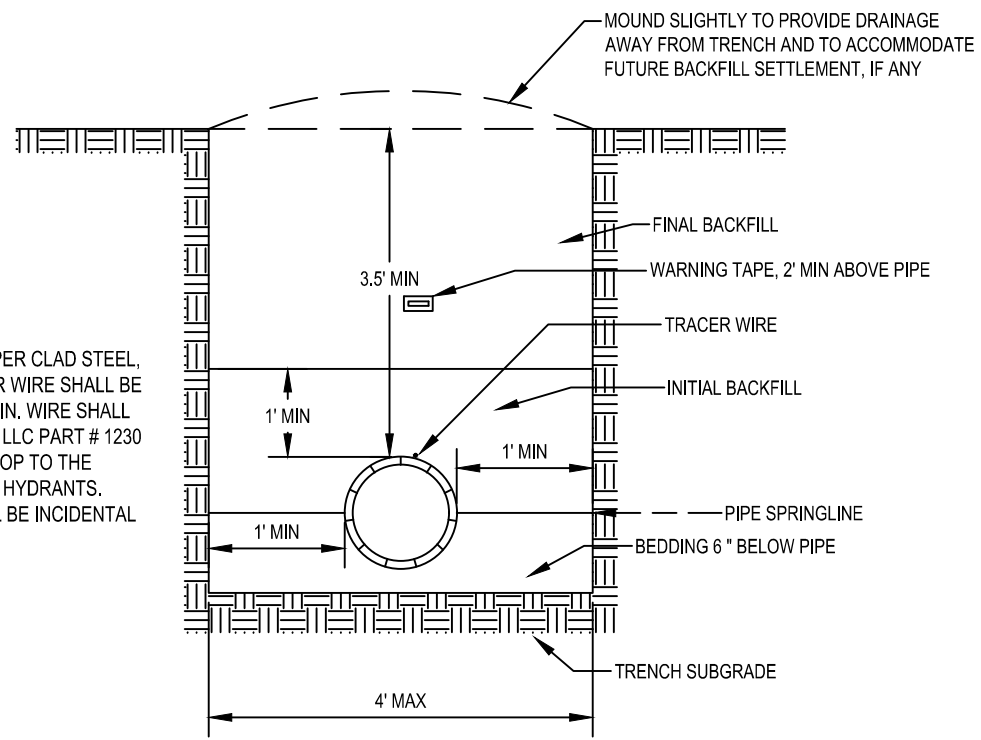
- A. Maintain surfaces until final acceptance and supply additional topsoil, seed, and fertilizer where necessary, including areas affected by erosion.
- B. Replant damaged grass areas showing root growth failure, deterioration, bare or thin spots, and eroded areas.
- C. Seeded areas will be accepted at end of maintenance period when seeded areas are properly established and otherwise acceptable.

END OF SECTION 01006

**CITY OF MOBERLY, MISSOURI
STANDARD SPECIFICATIONS FOR WATER MAIN CONSTRUCTION**

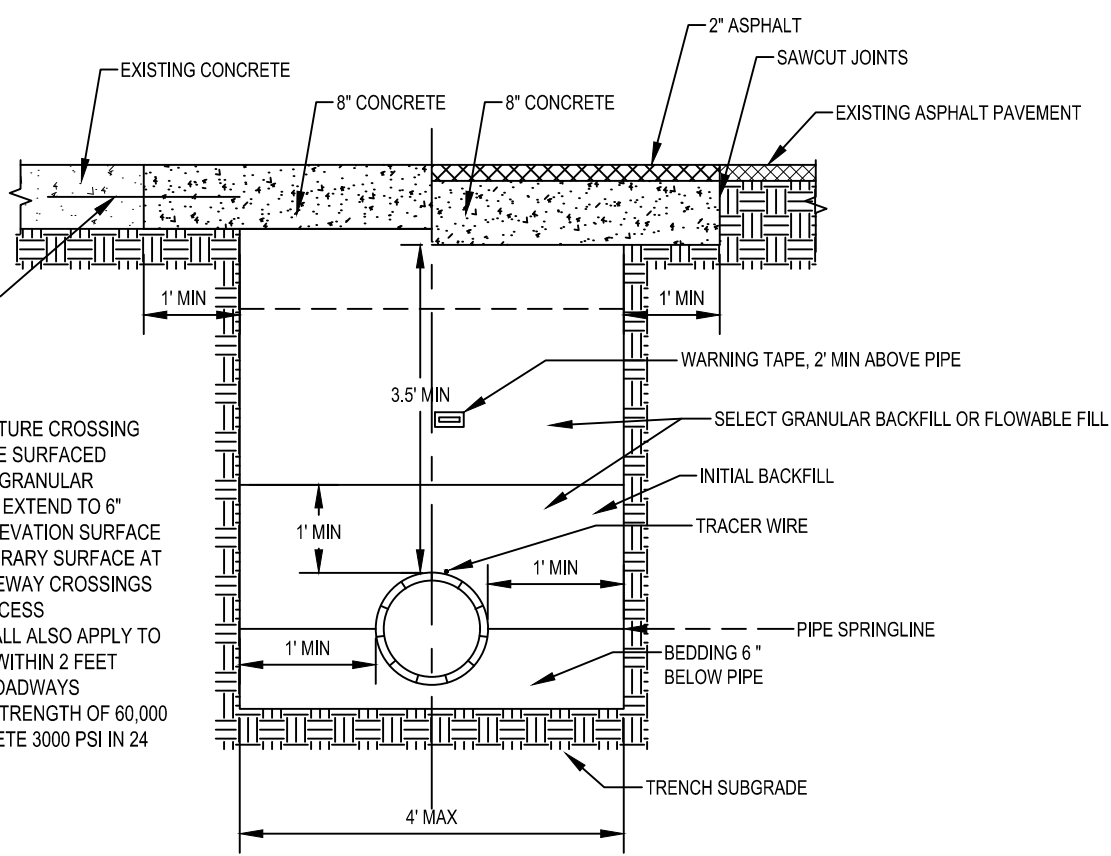
SECTION 2 – STANDARD DETAILS FOR WATER MAIN CONSTRUCTION

- 02001 Typical Water Main in Trench Installation
- 02002 Typical Fire Hydrant, Valve, and Valve Box
- 02003 Typical Hydrant and Valve Locations
- 02004 Typical Thrust Block Installations
- 02005 Typical Restrained Joint Installation
- 02006 Typical Water Main Creek Crossing
- 02007 Typical Water Main in Casing Installations
- 02008 Typical Service Connection and Meter Setting
- 02009 Typical Water Main Separation Requirements



TRACER WIRE SHALL BE COPPER CLAD STEEL, CCS, (12 GAUGE AWG) TRACER WIRE SHALL BE ATTACHED TO THE WATER MAIN. WIRE SHALL BE COPPERHEAD INDUSTRIES LLC PART # 1230 HS OR EQUAL, WIRE SHALL LOOP TO THE SURFACE AT ALL VALVES AND HYDRANTS. COST OF TRACER WIRE SHALL BE INCIDENTAL TO UNIT COST OF PIPE.

WATER MAIN IN TRENCH TYPICAL INSTALLATION DETAIL- SEEDED SOIL SURFACE



#4 REBARS - 24" LONG
GROUTED INTO EXISTING
PAVEMENT 8" @ 18" O.C.

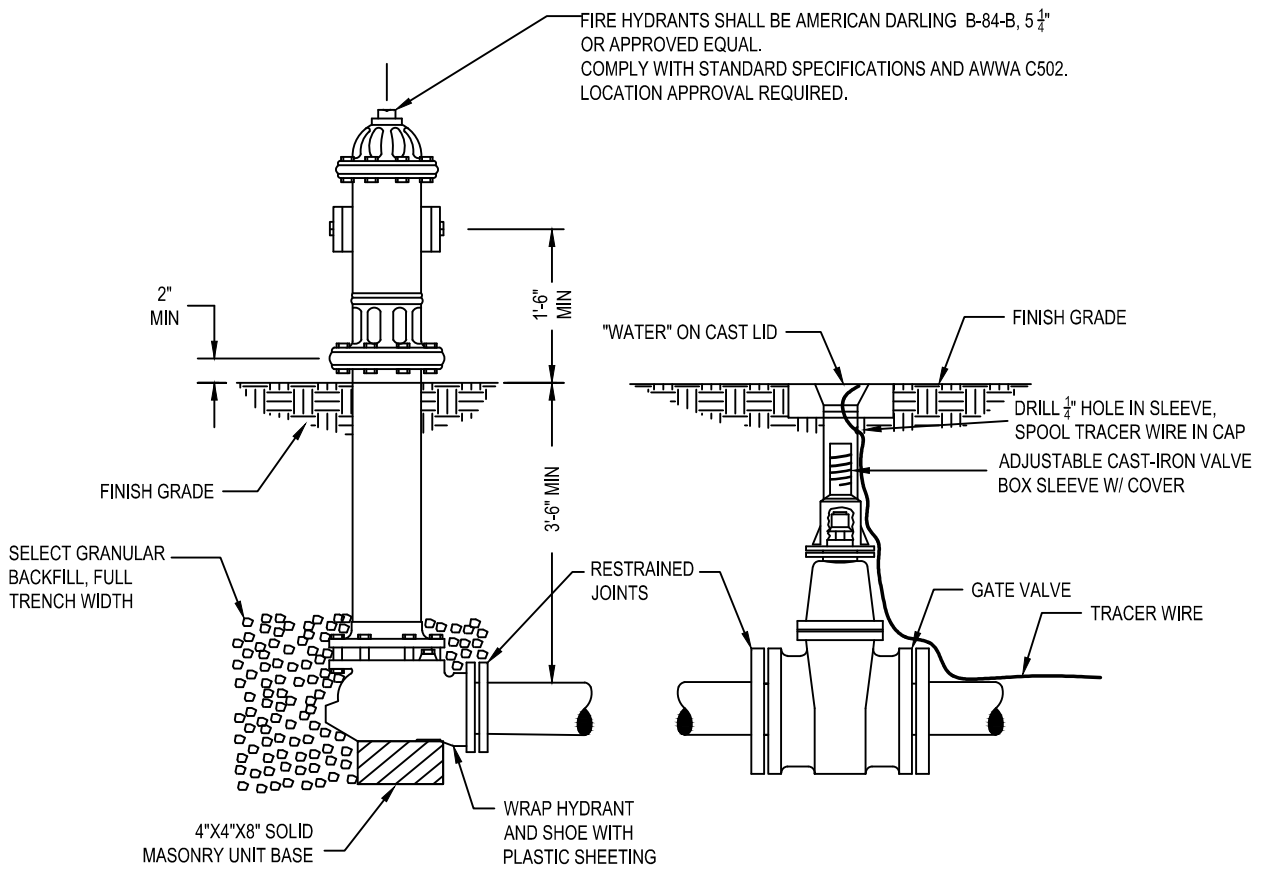
- NOTES: PAVEMENT STRUCTURE CROSSING
1. FOR AGGREGATE SURFACED AREAS, SELECT GRANULAR BACKFILL SHALL EXTEND TO 6" BELOW FINAL ELEVATION SURFACE
 2. PROVIDE TEMPORARY SURFACE AT ROAD AND DRIVEWAY CROSSINGS TO MAINTAIN ACCESS
 3. THIS DETAIL SHALL ALSO APPLY TO ALL TRENCHES WITHIN 2 FEET PARALLELING ROADWAYS
 4. REBARS YIELD STRENGTH OF 60,000 PSI AND CONCRETE 3000 PSI IN 24 HOURS.

TYPICAL TRENCH INSTALLATION DETAIL-PAVEMENT STRUCTURE CROSSINGS

STANDARD DETAIL 02001
TYPICAL WATER MAIN IN TRENCH INSTALLATIONS
CITY OF MOBERLY - WATER MAIN CONSTRUCTION


10-08-2019

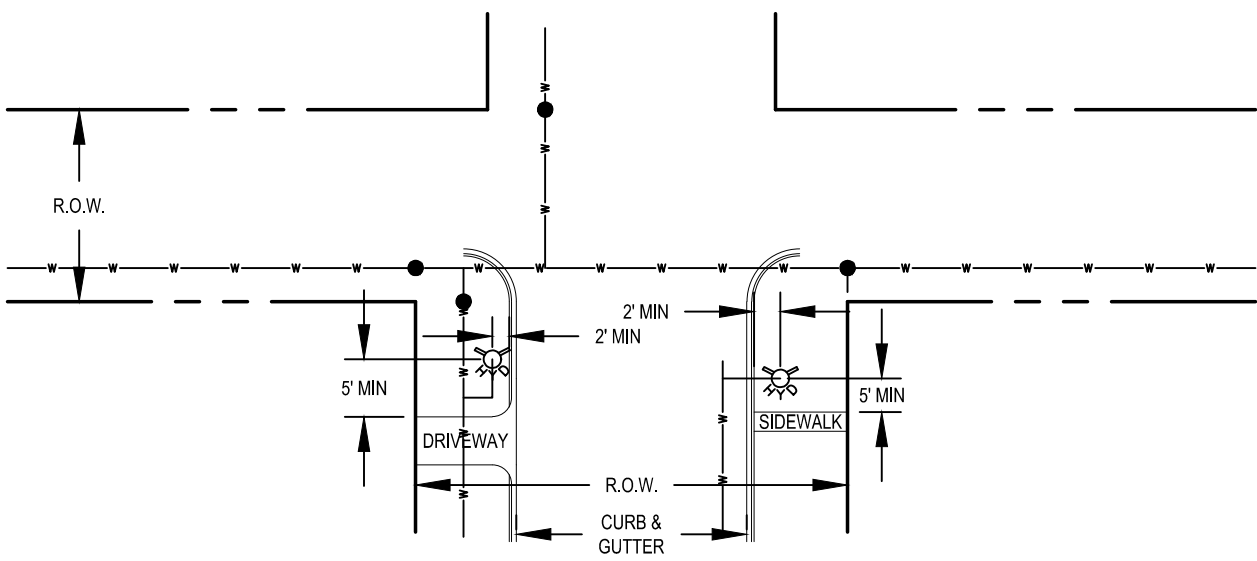
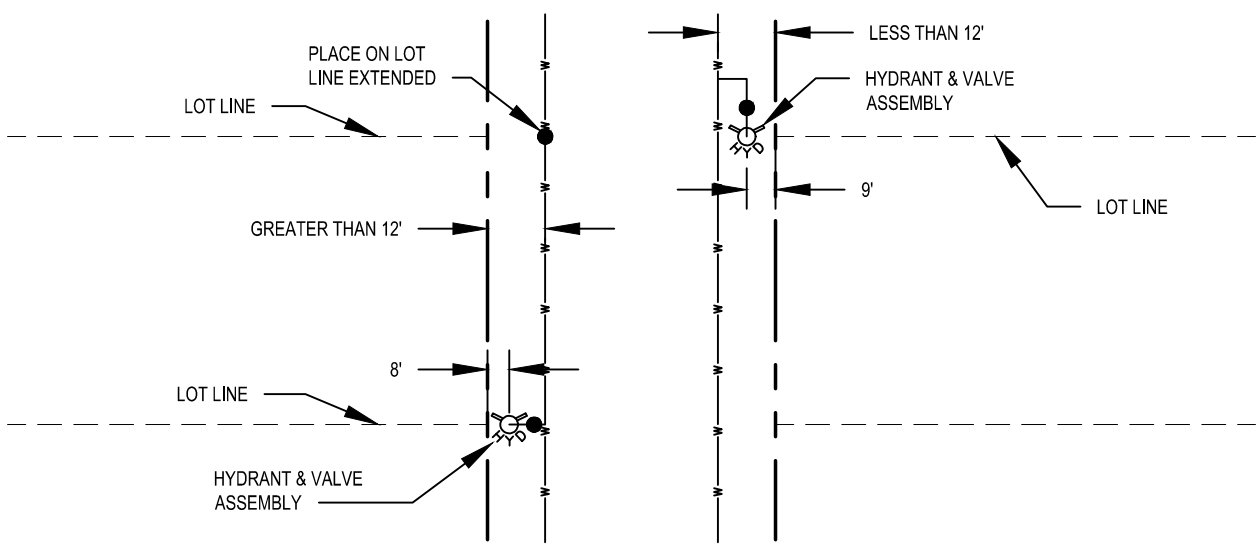
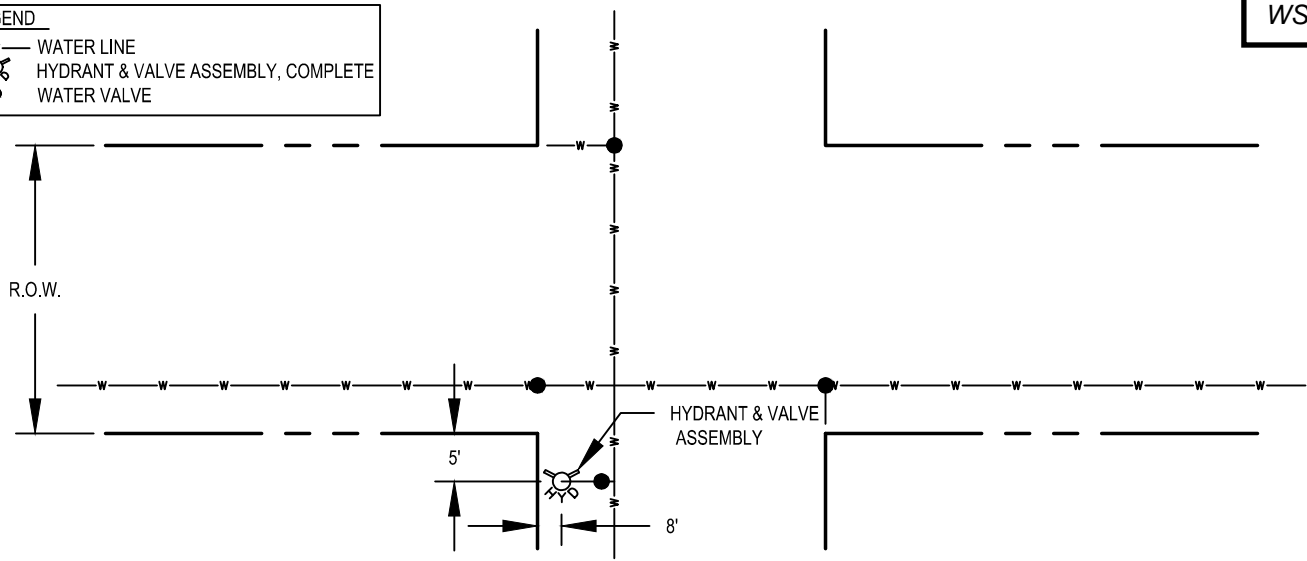
PSBA POEPPING, STONE, BACH & ASSOCIATES, INC.
ARCHITECTS ENGINEERS PLANNERS SURVEYORS
100 S 54TH ST, P.O. BOX 709 • QUINCY, IL 62306 • PHONE 217/223-4605
3523 MAIN ST. P.O. BOX 817 • KEOKUK, IA 52632 • PHONE 319/524-8730
U.S. FEDERAL BUILDING STE 248
801 BROADWAY P.O. BOX 190 • HANNIBAL, MO 63401 • PHONE 573/406-0541
www.psba.com email: psba@psba.com



FIRE HYDRANT ASSEMBLY, COMPLETE
NO SCALE

VALVE & VALVE BOX DETAIL
NO SCALE

LEGEND
 — W — WATER LINE
 HYDRANT & VALVE ASSEMBLY, COMPLETE
 ● WATER VALVE



STANDARD DETAIL 02003
 TYPICAL FIRE HYDRANT AND VALVE LOCATIONS
 CITY OF MOBERLY - WATER MAIN CONSTRUCTION

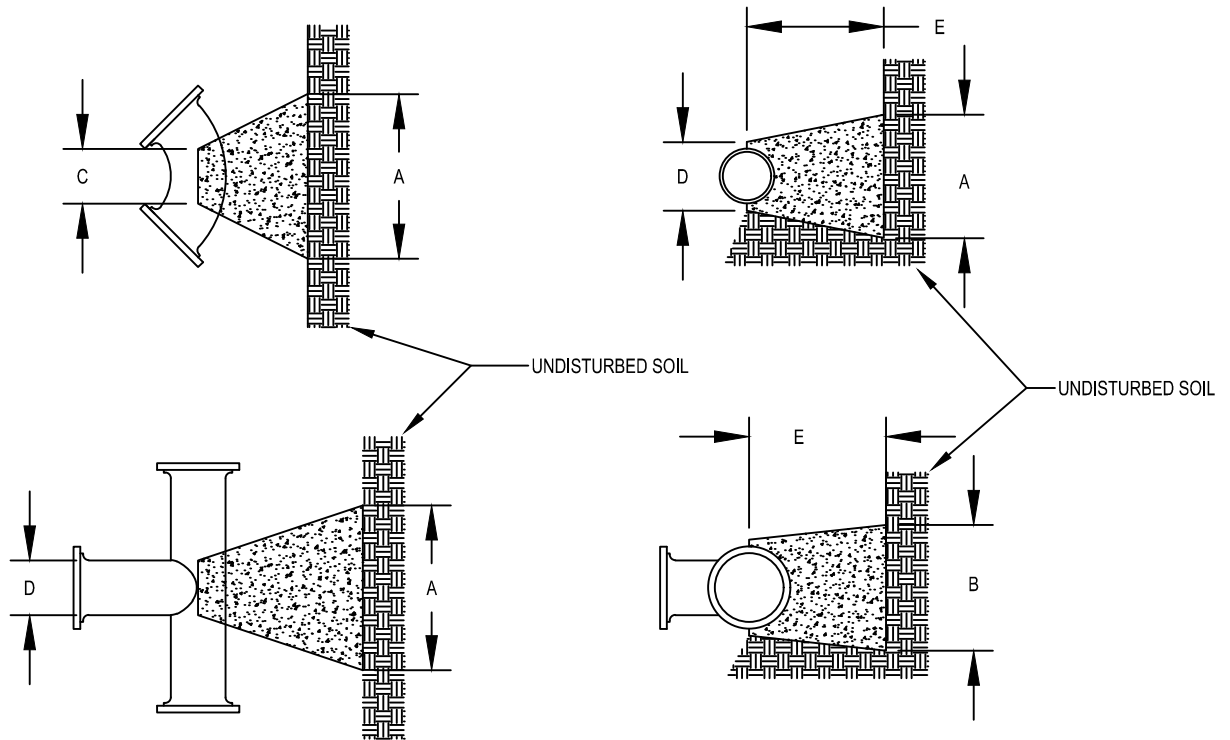
10-08-2019

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 www.psba.com email: psba@psba.com

PIPE SIZE	FITTING	DISTANCE IN INCHES				
		A	B	C	D	E
6"	11.25 & 22.5°	12	12	8	10	12
	45°	27	12	8	10	12
	90°	33	18	8	10	12
	TEE/PLUG	24	18	8	10	12
8"	11.25 & 22.5°	18	15	8	10	12
	45°	33	15	8	10	18
	90°	42	24	8	10	18
	TEE/PLUG	30	24	12	10	18
10" & 12"	11.25 & 22.5°	27	24	12	12	18
	45°	51	24	12	12	24
	90°	63	36	12	12	30
	TEE/PLUG	45	36	12	12	24
14" & 16"	11.25 & 22.5°	33	33	12	16	18
	45°	69	33	12	16	30
	90°	84	48	12	16	36
	TEE/PLUG	60	48	12	15	30

NOTES: MANUFACTURED RESTRAINT IS THE CITY PREFERRED METHOD OF RESTRAINT. SEE STANDARD SPECIFICATIONS.
 CONCRETE THRUST BLOCKING MAY BE USED IN CONJUNCTION WITH MANUFACTURED RESTRAINTS.

1. THRUST BLOCKS ARE BASED ON A WORKING PRESSURE OF 200 P.S.I. & 2000 P.S.F. ALLOWABLE SOIL BEARING PRESSURE.
2. USE DIMENSIONS FOR NEXT LARGER SIZE FOR PIPE SIZES NOT SHOWN .
3. USE 3/8" PLYWOOD SEPARATOR BETWEEN BLOCKS AND PLUGS FOR EASE OF FUTURE REMOVAL.

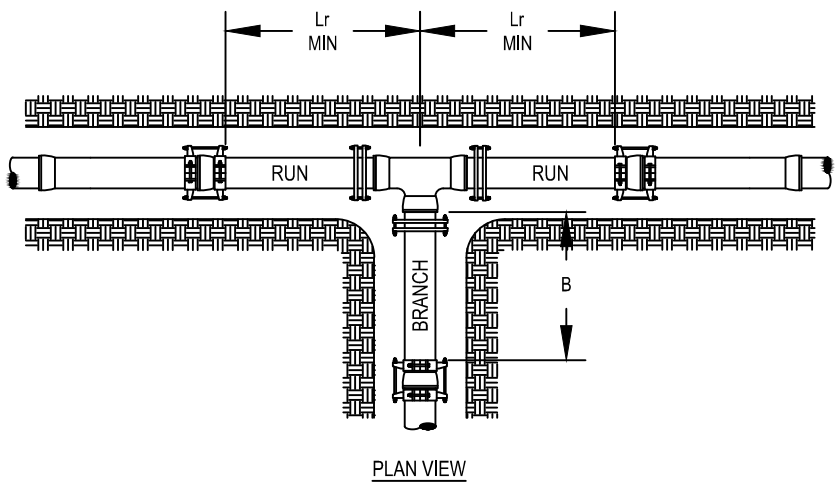
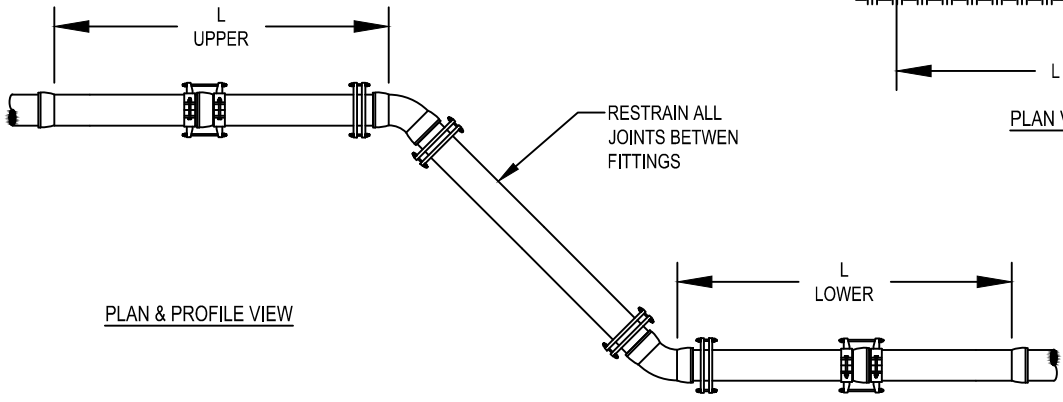
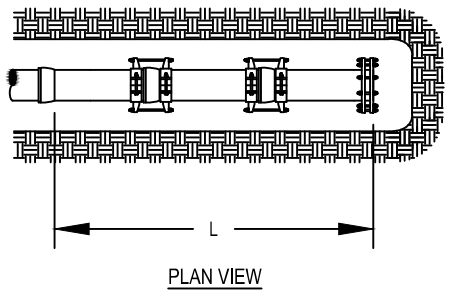
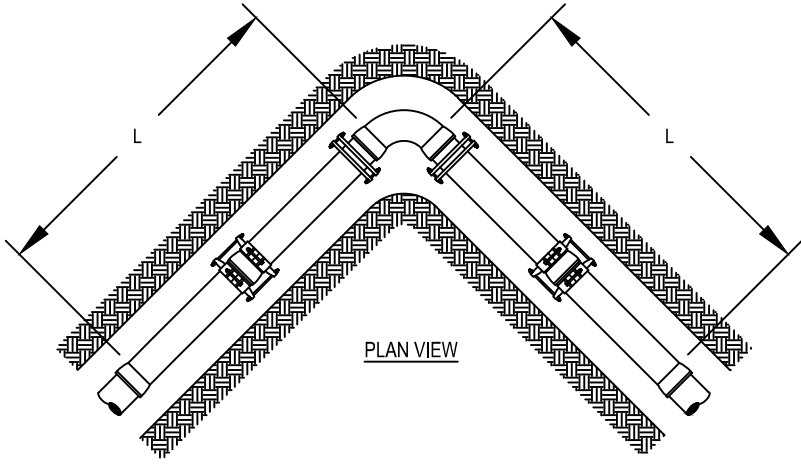


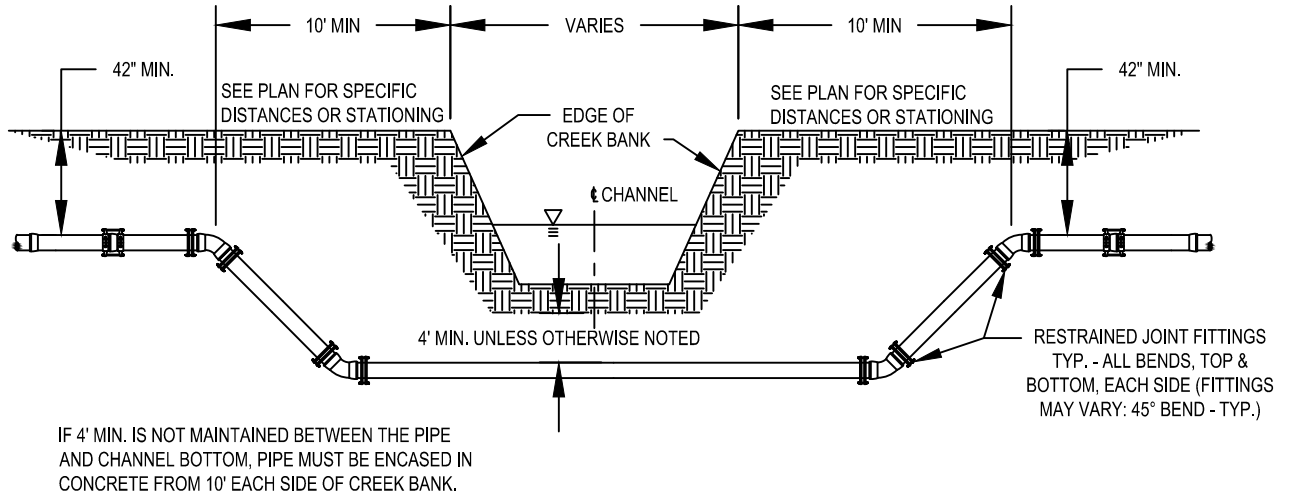
CONCRETE THRUST BLOCK DETAIL
 NOT TO SCALE
 DETAIL E

STANDARD DETAIL 02004
 TYPICAL THRUST BLOCK INSTALLATION
 CITY OF MOBERLY - WATER MAIN CONSTRUCTION

10-08-19

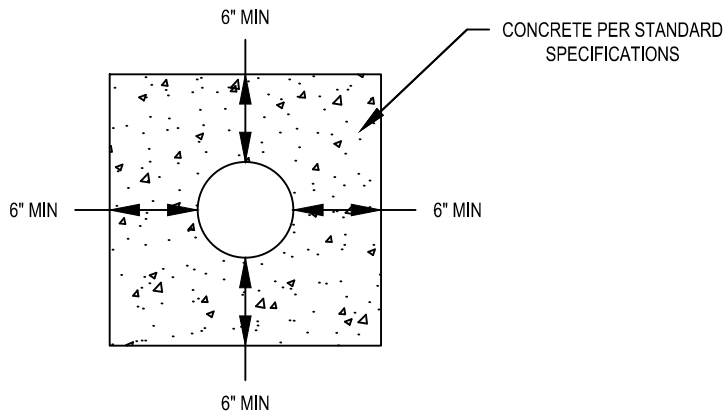
- NOTES:**
1. ALL JOINTS WITHIN LENGTH "L" OF FITTING MUST BE RESTRAINED
 2. LENGTHS L, L_r, AND B TO BE SPECIFIED BY ENGINEER



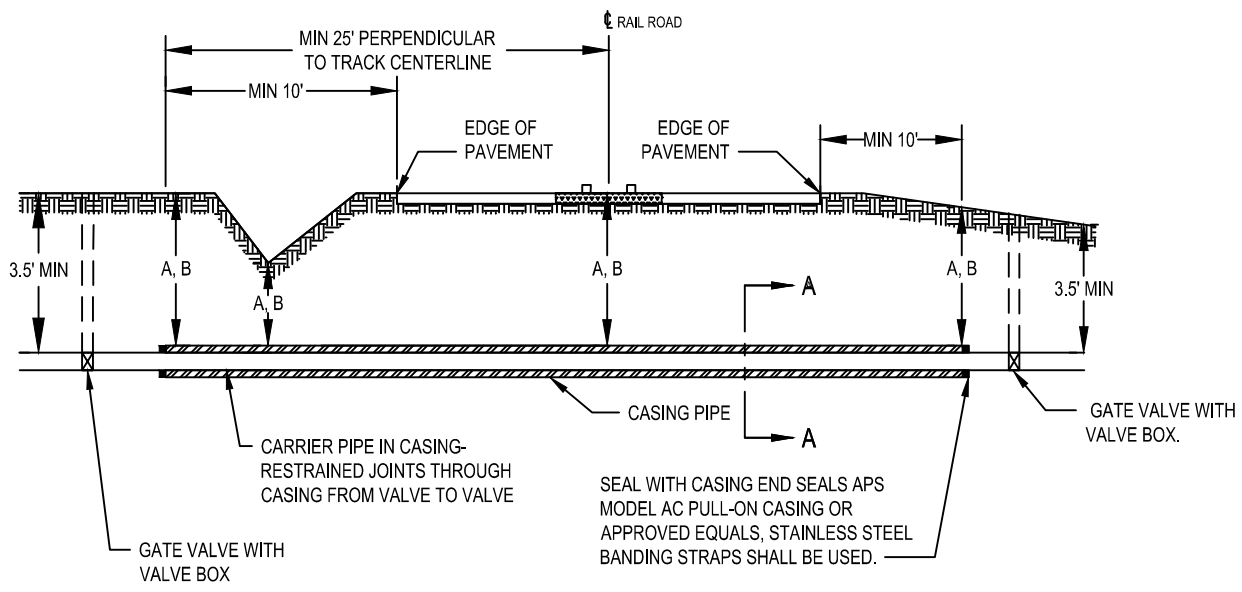


NOTE: STREAM BANKS SHALL BE PROTECTED AT ALL STREAM AND CHANNEL CROSSINGS. SEE PROJECT SPECIFIC REQUIREMENTS.

CHANNEL CROSSING DETAIL
NOT TO SCALE



CONCRETE ENCASEMENT DETAIL
NOT TO SCALE

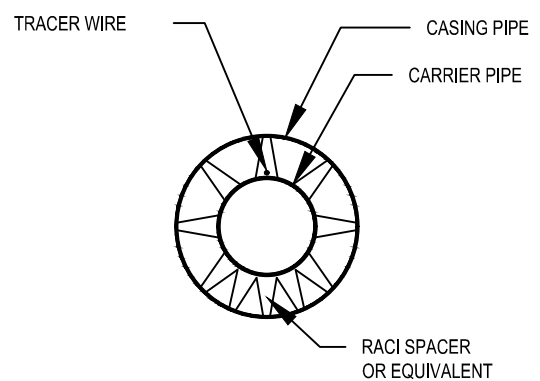


NOTES:

1. CONTRACTOR MEANS AND METHODS FOR TRENCHLESS CONSTRUCTION METHOD MUST BE APPROVED.
2. IF DIRECTIONAL DRILLING METHOD IS USED, THE MINIMUM EMBEDMENT DEPTH TO TOP OF FINISHED CASING SHALL BE 8 FEET.
3. SEE STANDARD SPECIFICATIONS FOR ALLOWABLE CASING PIPE MATERIALS.
4. CONTRACTOR SHALL OBTAIN NECESSARY PERMITS AND APPROVALS FROM APPROPRIATE REGULATORY AUTHORITY. ALL WORK SHALL MEET ALL REQUIREMENTS OF RESPONSIBLE REGULATORY AUTHORITY
5. CASING SPACERS SHALL BE RACI OR APPROVED EQUAL WITH STAINLESS STEEL BOLTS AND NUTS. CASING SPACERS SHALL BE INSTALLED AT INTERVALS NOT TO EXCEED MANUFACTURER'S SPECIFICATIONS OR 6' WHICHEVER IS LESS. DOUBLE SPACERS SHALL BE INSTALLED 1' FROM EACH END OF THE CASING. ONE CASING SPACER MUST BE WITHIN 2' OF EACH SIDE OF A PIPE JOINT. SPACERS SHALL HAVE A MINIMUM HEIGHT THAT EXCEEDS THE PIPE BELL HEIGHT AND RESTRAINED JOINT HEIGHT.
6. ALL JOINTS BETWEEN GATE VALVES SHALL BE RESTRAINED JOINTS.

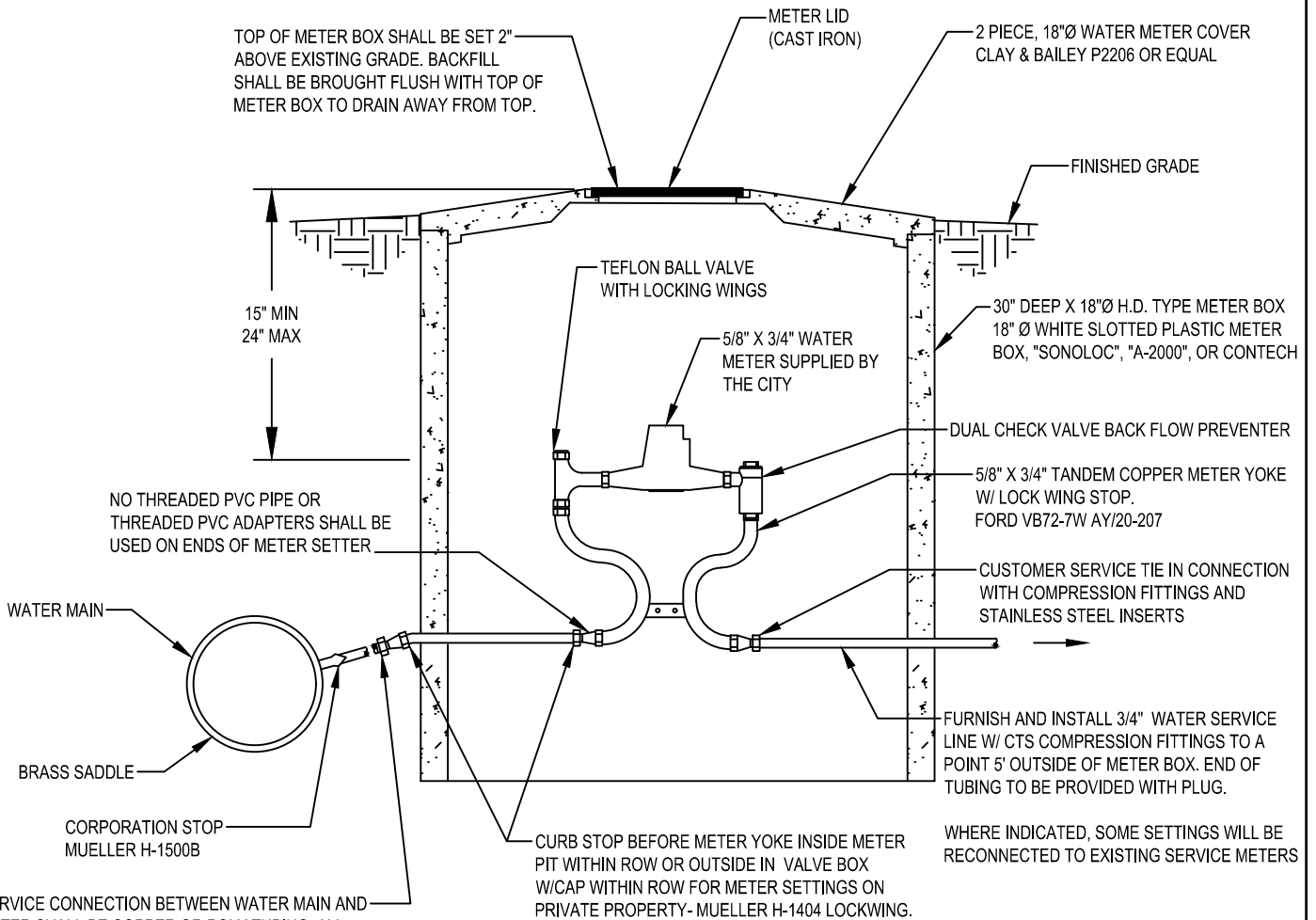
NOTES:

- A. MINIMUM COVER OVER CASING FOR ROADWAY CROSSINGS SHALL BE 4 FEET WITHIN LIMITS SHOWN
- B. MINIMUM COVER OVER CASING FOR RAILWAY CROSSING SHALL BE 6 FEET WITHIN LIMITS SHOWN
- C. COVER DEPTH GREATER THAN MINIMUMS MAY BE REQUIRED AS A CONDITION OF AUTHORITY HAVING JURISDICTION FOR ROAD OR RAILROAD



SECTION A

NOTES: ALL SERVICE LINES GREATER THAN 10' IN LENGTH REQUIRES TRACER WIRE.
WARNING TAPE SHALL BE PLACED OVER ALL SERVICE LINES CONSTRUCTED.



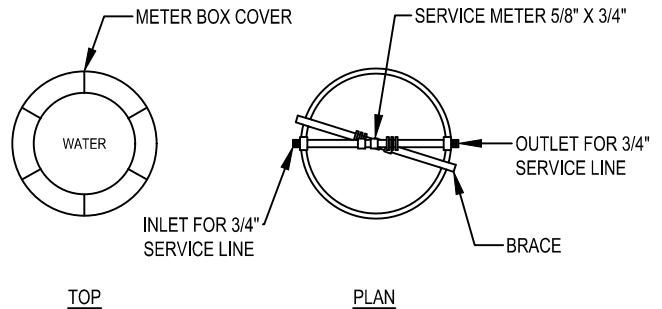
SERVICE CONNECTION BETWEEN WATER MAIN AND METER SHALL BE COPPER OR POLY TUBING. ALL COPPER LINES INSTALLED IN GRANULAR MATERIAL SHALL BE CASED. ALL POLY SERVICE LINES BETWEEN WATER MAIN AND METER SHALL BE CASED WITH TRACER WIRE. SADDLE CORPORATION STOPS SHALL HAVE STAINLESS STEEL STRAPS OR BE ALL BRASS

ON 1 1/2" OR LARGER SETTINGS A CURB STOP IS REQUIRED ON BOTH SIDES OF METER.

TYPICAL 5/8" X 3/4" METER SETTING AND SERVICE CONNECTION
NOT TO SCALE

IN SOME INSTANCES, METER SETTINGS, GREATER THAN 3/4" X 5/8" MAY BE SPECIFIED. 1" SETTINGS SHALL UTILIZE THE SAME CONFIGURATION SHOWN FOR 3/4" X 5/8" SETTINGS. 1 1/2" AND 2" METER SETTINGS SHALL BE INSTALLED IN 30" DIA. X 36" PVC METER WELLS W/APPROPRIATE SETTER OR TUBE RISERS INCORPORATING ANGLE VALVE (W/PADLOCK WINGS) ON THE INLET.

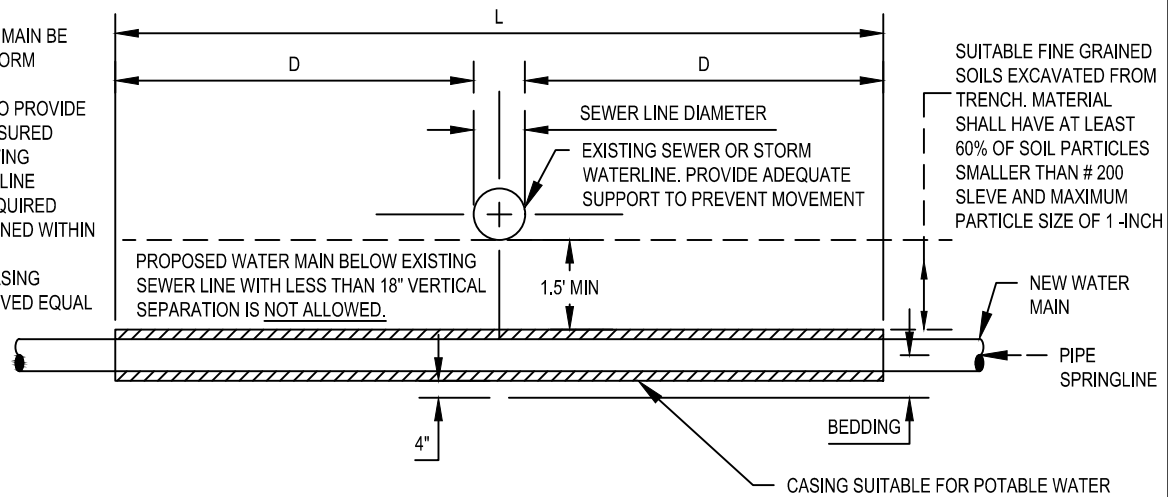
ADDITIONAL BRACING SHALL BE PROVIDED AS REQUIRED FOR METER SUPPORT. CAST IRON METER COVER AND LID SHALL BE INSTALLED FOR THE SPECIFIC METER WELL DIAMETER. CUSTOMER SERVICE LINE SIZED TO MATCH THE SPECIFIC METER REQUIREMENTS SHALL BE INSTALLED TO A POINT 1'-0" OUTSIDE OF THE METER WELL. ALL METERS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR EXCEPT WHERE OTHERWISE NOTED ON THE PLANS.



STANDARD DETAIL 02008
TYPICAL SERVICE CONNECTION AND METER SETTING
CITY OF MOBERLY - WATER MAIN CONSTRUCTION

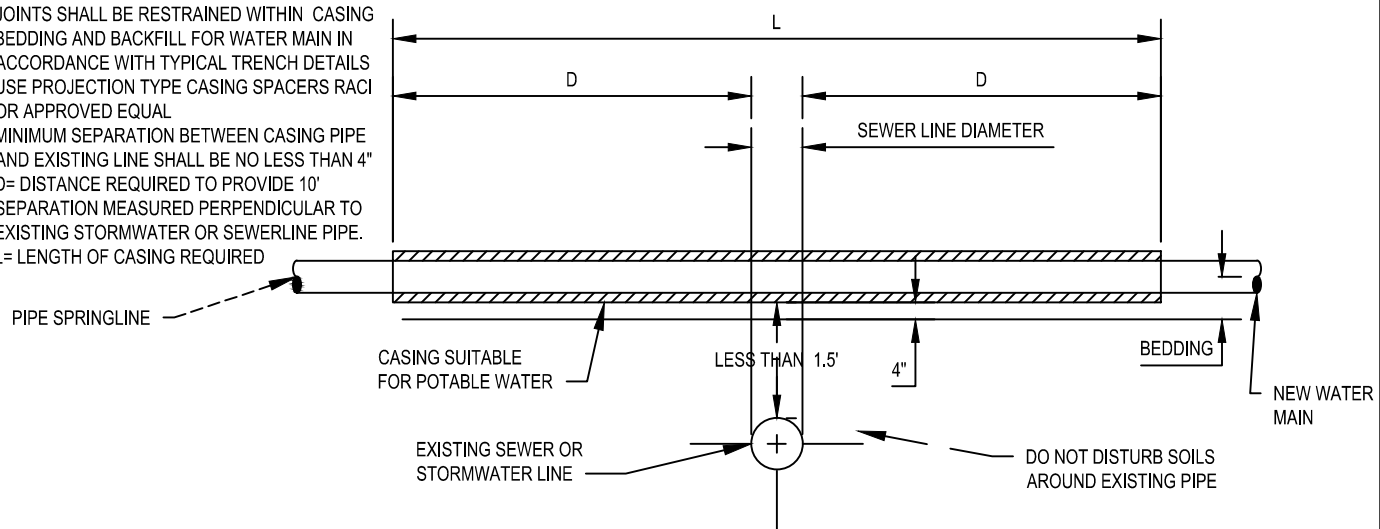
10-08-2019

1. BACKFILL FROM 1' ABOVE PIPE UP TO SURFACE IN ACCORDANCE WITH TYPICAL TRENCH DETAILS
2. IN NO CASE SHALL WATER MAIN BE LESS THAN 1.5' BELOW STORM WATER OR SEWER LINE
3. D= DISTANCE REQUIRED TO PROVIDE 10 FEET SEPARATION MEASURED PERPENDICULAR TO EXISTING STORMWATER OR SEWER LINE
4. L= LENGTH OF CASING REQUIRED
5. JOINTS SHALL BE RESTRAINED WITHIN CASING
6. USE PROJECTION TYPE CASING SPACERS, RACI OR APPROVED EQUAL



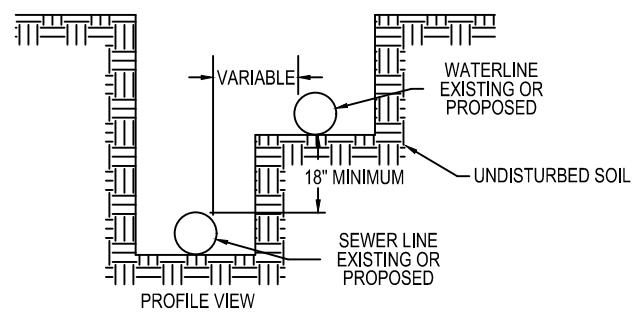
PROPOSED WATER MAIN BELOW EXISTING STORMWATER OR SEWERLINE

1. JOINTS SHALL BE RESTRAINED WITHIN CASING
2. BEDDING AND BACKFILL FOR WATER MAIN IN ACCORDANCE WITH TYPICAL TRENCH DETAILS
3. USE PROJECTION TYPE CASING SPACERS RACI OR APPROVED EQUAL
4. MINIMUM SEPARATION BETWEEN CASING PIPE AND EXISTING LINE SHALL BE NO LESS THAN 4"
5. D= DISTANCE REQUIRED TO PROVIDE 10' SEPARATION MEASURED PERPENDICULAR TO EXISTING STORMWATER OR SEWERLINE PIPE.
6. L= LENGTH OF CASING REQUIRED

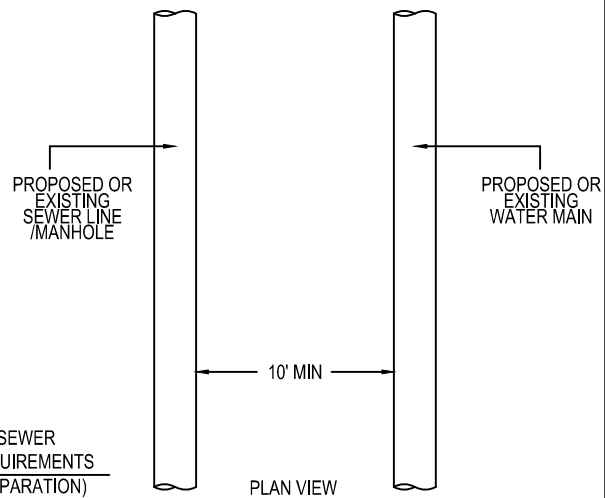


PROPOSED WATER MAIN ABOVE EXISTING STORMWATER OR SEWERLINE WITH LESS THAN 18" VERTICAL SEPARATION

PROPOSED SEWER (OR WATER) IS LOCATED 10 FEET OR LESS FROM EXISTING WATER (OR SEWER).



WATER AND SEWER SEPARATION REQUIREMENTS (VERTICAL SEPARATION)



WATER AND SEWER SEPARATION REQUIREMENTS (HORIZONTAL SEPARATION)

STANDARD DETAIL 02009
 TYPICAL WATER MAIN SEPARATION REQUIREMENTS
 CITY OF MOBERLY - WATER MAIN CONSTRUCTION

City of Moberly City Council Agenda Summary

Agenda Number: _____
 Department: Police
 Date: November 4, 2019

WS #2.

Agenda Item: Receipt of additional bid for 2020 Police Package SUV for the Police Department.

Summary:

A request for bids for two patrol cars and one SUV for the police department were requested from Moberly Motors, Joe Machens Ford, Thomas Motors and Bob McCosh Chevrolet. Only Moberly Motors submitted bids. The bid tabulation is attached. Required upgrades to the Durango; vinyl rear seats, rubber interior flooring, center console and noise suppression increase the price to 31,573. If the interior emergency lights do not transfer, and the console for the Durgano does not accept our current two radio and light controls, the price will increase approximately another 3,400 dollars to 34,973. Based on these prices, the Police Department requests the bid for the 2020 Ford Police Interceptor Explorer AWD 4-door for \$32,898 and equipment group 67U and 67V, ultimate wiring package and the Police Wire Harness Kit (Front and Rear) for 701 dollars for a total cost of \$33,599. Adding the wiring package and harness kit greatly helps the installation of the radio, lights, computers and in-car camera. State bid price for the Explorer is 33,482.

Recommended

Action: Direct staff to bring to council for approval

Fund Name: Police Department CIP

Account Number: 100-007-5502

Available Budget \$:
101,128.00

ATTACHMENTS:	Roll Call	Aye	Nay
<input type="checkbox"/> Memo			
<input checked="" type="checkbox"/> Staff Report	Mayor		
<input type="checkbox"/> Correspondence	M__ S__ Jeffrey	___	___
<input type="checkbox"/> Bid Tabulation			
<input type="checkbox"/> P/C Recommendation	Council Member		
<input type="checkbox"/> P/C Minutes	M__ S__ Brubaker	___	___
<input type="checkbox"/> Application	M__ S__ Kimmons	___	___
<input type="checkbox"/> Citizen	M__ S__ Davis	___	___
<input type="checkbox"/> Consultant Report	M__ S__ Kyser	___	___
<input type="checkbox"/> Council Minutes			
<input type="checkbox"/> Proposed Ordinance			
<input type="checkbox"/> Proposed Resolution			
<input type="checkbox"/> Attorney's Report			
<input type="checkbox"/> Petition			
<input type="checkbox"/> Contract			
<input type="checkbox"/> Budget Amendment			
<input type="checkbox"/> Legal Notice			
<input type="checkbox"/> Other _____			
		Passed	Failed

CITY OF MOBERLY
"BID OPENING"

Date: 10-11-2019 10:00 AM

2020 Dodge Durango AWD ^{Police} PKG	\$ 28,821
5.7L V8	
2020 Dodge Durango AWD - ^{Police} PKG	\$ 31,397
w/ V8 - 4 door	
2020 Dodge Charger w/ ^{Police} PKG	\$ 22,067.
for (2) ↑	\$ 45,334
+ AYW option	\$ +1,024 extra ea
+ AYE option	\$ +1,780 extra ea
w/ V8 - 4 door	
2020 Dodge Charger w/ ^{Police} PKG	\$ 25,165
for (2) ↑	\$ 50,330
+ AYW option	\$ +1,024 extra ea
+ AYE option	\$ +1,780 extra ea
	\$
	\$
	\$

moberly motors

Driven by tradition.

City of Moberly
101 West Reed
Moberly, Mo 65270

October 16, 2019

Moberly Motor Company would like to submit the following bid specifications and pricing for your consideration.

2020 Ford Police Interceptor Explorer AWD 4 door

K8A - Police Interceptor Series	All Wheel Drive
3.3L V6 engine	10 speed Automatic transmission
HD Cooling	Transmission Oil Cooler
Engine Oil Cooler	Column Shifter
Electronic Power Steering	Police Calibrated ABS Brakes
Tilt Steering Wheel	4-Wheel Disc w/HD Calipers
Power Locks & Windows	220 Amp DC Convertor – vs Alternator
Air Conditioner - Dual	800 CCA / 80Amp Battery
Engine Hour Meter	Class III Receiver Hitch – 5,000lb
Certified Speedometer	Frt Bucket Seating – Police Grade Cloth
HD Frt & Rear Suspension	6-Way Power / w/foam for utility belt
Tinted & Privacy Glass	2nd Row Police Grade Vinyl 35/30/35
Intermittent Wipers	3rd Row - Delete
Automatic Headlights	Flooring HD Thermoplastic
Power Remote Exterior Mirrors	AM FM Radio / Clock
(4) P255/60R18 A/S tires	18" X 8.0" Steel Wheels
Red/White Task Light – Frt	3rd Row Overhead Map Light
Full Size Spare Tire	Rear Window Defroster
Speed - Cruise Control	Air Bag Safety Restraint Systems
Rear Backup Camera	Rear Window Wiper Washer
4 Keyless-Entry transmitters	Hands Free Communications / Bluetooth
Sterling Gray Exterior Color	Power Pigtail Harness
4 Keyless-Entry transmitters	2-Way Radio Pre-Wire



1520 North Morley, P.O. Box 249, Moberly, MO 65270

T (660) 263.6000 | T (800) 798.6006 | F (660) 263.1871

110

moberlymotors.com | www.moberlymotors.com

41H – Engine Block Heater
65L – Full 18” Wheel Covers

60R – Noise Suppression Pkg +
51R – 6” Dr Side Spotlight

Amount for (1) 2020 Ford Police Interceptor Explorer AWD - \$ 32,898
Amount due at delivery

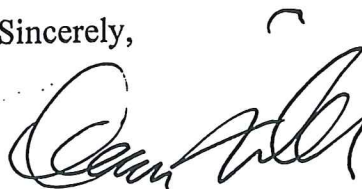
Other Options you may consider:

99W – 3.3L DI “HYBRID” Engine
99C – 3.0L EcoBoost Engine
Police Lighting / Wiring Packages

\$3,116 extra
\$3,812 extra
Please see attachment

Thank You for the opportunity to give you pricing on the above unit. Please let me know how you would like me to proceed from this point. Warranty is 3 year / 36,000 mile plus Power train 5 year / 100,000 miles. Build date will be as soon as possible by the manufacture.

Sincerely,



Dean Miller
Moberly Motor Co.

City of Moberly City Council Agenda Summary

Agenda Number: _____
 Department: Comm. Dev. WS #3.
 Date: November 4, 2019

Agenda Item: Application for Board of Adjustment.

Summary: In December 2019 one (1) term expires for the Board of Adjustment. This is for Kevin Hall. Contact has been made with this individual and he wishes to remain on the committee. We have advertised for applicants and received one (1) from Kevin Hall. Application is attached.

Recommended Action: Direct staff to bring forward to the November 18, 2019 regular City Council meeting for final approval.

Fund Name: N/A

Account Number: N/A

Available Budget \$: N/A

ATTACHMENTS:	Roll Call	Aye	Nay
<input type="checkbox"/> Memo			
<input type="checkbox"/> Staff Report			
<input checked="" type="checkbox"/> Correspondence			
<input type="checkbox"/> Bid Tabulation			
<input type="checkbox"/> P/C Recommendation			
<input type="checkbox"/> P/C Minutes			
<input type="checkbox"/> Application			
<input type="checkbox"/> Citizen			
<input type="checkbox"/> Consultant Report			
<input type="checkbox"/> Council Minutes			
<input type="checkbox"/> Proposed Ordinance			
<input type="checkbox"/> Proposed Resolution			
<input type="checkbox"/> Attorney's Report			
<input type="checkbox"/> Petition			
<input type="checkbox"/> Contract			
<input type="checkbox"/> Budget Amendment			
<input type="checkbox"/> Legal Notice			
<input type="checkbox"/> Other _____			
	Mayor		
	M___ S___ Jeffrey	___	___
	Council Member		
	M___ S___ Brubaker	___	___
	M___ S___ Kimmons	___	___
	M___ S___ Davis	___	___
	M___ S___ Kyser	___	___
		Passed	Failed



Board/Commission Application Form

Individuals serving on boards or commissions play an important role in advising the City Council on matters of interest to our community and its future. For the most part, Board and Commission members must be residents of City of Moberly. When a vacancy occurs, an announcement of that vacancy will be posted. The City Council will review all applications. The appointment will be made at a formal City Council meeting. Appointees serve as unpaid volunteers.

This application is a public document and as such it or the information it contains may be reproduced and distributed. This application will remain active for two years and you will automatically be considered for any vacancy occurring during that time.

Name of Board or Commission: Board of Adjustment Date: 10/30/2019
Your Name: Kevin Hall Street Address: 413 W. Reed
Phone number(s): (evening) 660-414-5605 (day) Same
Email: jkevin2428@outlook.com

Do you live within the corporate limits of City of Moberly? Yes / No
How long have you been a resident of City of Moberly? 43 years
Occupation: Self employed Employer: me myself and I

Optional Questions (use back of application if necessary)

What experience and/or skills do you have that might especially qualify you to serve on this board or commission?

Real estate appraiser for 30+ years Served on Board of Adjustment for 5+ years

What particular contributions do you feel you can make to this board or commission?

Experience for Business and Real estate for 43 years

I will attend meetings in accordance with the adopted policies of City of Moberly, Missouri. If at any time my business or professional interests conflict with the interests of the Commission, I will not participate in such deliberations. References may be secured from the following individuals:

- 1. David Patton Phone: 660-833-3758
2. Cole Davis Phone: 660-651-3317
3. Jennifer Lawrence Phone: 660-263-7284

Signature of Applicant

City of Moberly City Council Agenda Summary

Agenda Number: _____ WS #4.
 Department: Community Development
 Date: November 4, 2019

Agenda Item: Text amendment to City Code section 22-229.

Summary: The Historic Preservation Commission reviewed and approved recommendation to amend the City Code Section 22-229 at the September 2019 Meeting. The amendment is written to give authority from the Historic Preservation Commission to an administrative panel (the architect on the HPC board and Community Development Director or designee) to review and determine approval of changes to the exterior elements of a building located in the Historic District. Administrative review is granted for items that follow the already adopted historic design guidelines. Any items that do not follow the historic design guidelines will go before the HPC Board for a Certificate of Appropriateness.

The Historic Preservation Commission recommends approval of the text amendment. The City of Moberly Staff recommends approval of the text amendment.

Recommended Action: Bring forward to the November 18, 2019 regular City Council meeting for final approval.

Fund Name: N/A

Account Number: N/A

Available Budget \$: N/A

ATTACHMENTS:		Roll Call	Aye	Nay
<input type="checkbox"/> Memo	<input type="checkbox"/> Council Minutes	Mayor		
<input checked="" type="checkbox"/> Staff Report	<input type="checkbox"/> Proposed Ordinance	M__ S__ Jeffrey	___	___
<input type="checkbox"/> Correspondence	<input type="checkbox"/> Proposed Resolution	Council Member		
<input type="checkbox"/> Bid Tabulation	<input type="checkbox"/> Attorney's Report	M__ S__ Brubaker	___	___
<input type="checkbox"/> P/C Recommendation	<input type="checkbox"/> Petition	M__ S__ Kimmons	___	___
<input type="checkbox"/> P/C Minutes	<input type="checkbox"/> Contract	M__ S__ Davis	___	___
<input type="checkbox"/> Application	<input type="checkbox"/> Budget Amendment	M__ S__ Kyser	___	___
<input type="checkbox"/> Citizen	<input type="checkbox"/> Legal Notice			
<input type="checkbox"/> Consultant Report	<input type="checkbox"/> Other _____		Passed	Failed

Insert the following into Section 22-229

(c) Applications for certificate of appropriateness shall be reviewed by the Director of Community Development or his/her designee for completeness and qualification for administrative review by the Historic Preservation Commission Architect and the Director of Community Development or his/her designee.

(d) Administrative review of Certificates of Appropriateness is available to those projects that qualify by meeting the approved criteria of the HPC Commission in the Historic Design Guidelines Addendum. Items reviewed administratively that are not approved can be taken to the next Historic Preservation Meeting for review.

Historic Design Guidelines Addendum.

The following items may be reviewed through Administrative review for compliance with the Historic Design Guidelines. The intention is to create an acceptable list of items that can be readily reviewed and approved that meet the Historic Design Guidelines and improve the efficiency of the process for the applicants.

Items allowed for administrative review:

- 1) Painting or repainting of any non-masonry component of the building façade that is selected in the spectrum of the approved color palette in the Historic Design Guidelines. Repainting of any already painted surface will be allowed so long as it has been reviewed and determined that the masonry surface below would not be able to be preserved.
- 2) Projecting signs not larger than 42" in a single dimension that presents the name of the business or logo only. Excessive text will require review by the Historic Preservation Commission.
- 3) Raised letters or logos that are individually attached to the building façade.
- 4) ADA Compliance ramps that meet the standard of concrete construction and with black metal railing. Exception, Reed Street entries shall be recessed into the building to accommodate handicap entry when possible.
- 5) Windows selected from an approved historic list of windows and match the style of windows historically used in the building.
- 6) Utility installations in which the infrastructure and handholds are located below grade.
- 7) Review of exterior improvements that are not located on a street frontage.

City of Moberly City Council Agenda Summary

Agenda Number: _____
 Department: Finance
 Date: November 4, 2019

WS #5.

Agenda Item: A resolution authorizing the City Manager to enter into agreements with First State Community Bank for the lease purchase financing of water meters and automated meter reading equipment, billing and accounting software, and energy efficient equipment for the Water Treatment and Waste Water Treatment plants.

Summary: Recently the City entered into an agreement with Energy Service Professionals for several projects, with an estimated price tag of \$4.6 million. Bids for lease purchase financing of these projects were sought and First State Community Bank (FSCB) was selected. Gilmore and Bell was contracted to develop the relevant documents for this transaction, which are attached here. In addition, FSCB is requesting that the Missouri First program be utilized for \$1 million of these funds. This program provides lower interest funds to financial institutions for utilization as part or in whole of the funds required for the financing package. It has no impact on the City’s transaction with FSCB and will allow them a slight break on their interest cost. The document for this program is also included here for your review. This program was also utilized with FSCB to finance the purchase of the sewer service truck last year.

Recommended

Action: Direct staff to bring to the November 18th Council meeting for final approval.

Fund Name: N/A

Account Number: N/A

Available Budget
\$: N/A

ATTACHMENTS:	Roll Call	Aye	Nay
<input type="checkbox"/> Memo			
<input type="checkbox"/> Staff Report			
<input type="checkbox"/> Correspondence			
<input type="checkbox"/> Bid Tabulation			
<input type="checkbox"/> P/C Recommendation			
<input type="checkbox"/> P/C Minutes			
<input type="checkbox"/> Application			
<input type="checkbox"/> Citizen			
<input type="checkbox"/> Consultant Report			
<input type="checkbox"/> Council Minutes			
<input type="checkbox"/> Proposed Ordinance			
<input checked="" type="checkbox"/> Proposed Resolution			
<input type="checkbox"/> Attorney's Report			
<input type="checkbox"/> Petition			
<input type="checkbox"/> Contract			
<input type="checkbox"/> Budget Amendment			
<input type="checkbox"/> Legal Notice			
<input type="checkbox"/> Other _____			
	Mayor		
	M___ S___ Jeffrey	___	___
	Council Member		
	M___ S___ Brubaker	___	___
	M___ S___ Kimmons	___	___
	M___ S___ Davis	___	___
	M___ S___ Kyser	___	___
		Passed	Failed

ACCOUNT CONTROL AGREEMENT

This Account Control Agreement (the “Agreement”), dated as of November __, 2019, and entered into among **FIRST STATE COMMUNITY BANK**, a state bank organized and existing under the laws of the State of Missouri (together with its successors and assigns, “Lessor”), **CITY OF MOBERLY, MISSOURI**, a third class city and political subdivision existing under the laws of Missouri (“Lessee”), and **FIRST STATE COMMUNITY BANK**, a state bank organized and existing under the laws of the State of Missouri, as deposit bank (together with its successors and assigns, “Deposit Bank”).

Account Name: City of Moberly, Missouri, Project Account for Equipment Lease Purchase Agreement dated November __, 2019

Account Number: _____ (ABA Routing No. 081918425)

Amount of Initial Deposit: \$100,000

TERMS AND CONDITIONS

Section 1. This Agreement relates to and is hereby made a part of the Equipment Lease Purchase Agreement dated as of November __, 2019 (the “Lease”), between Lessor and Lessee. Except as otherwise defined herein, all terms defined in the Lease will have the same meaning for the purposes of this Agreement as in the Lease.

Section 2. Deposit Bank has agreed to establish and maintain the project account as set forth on **Exhibit A** hereto (the “Project Account”) for Lessee.

Section 3. As collateral security for the obligations and liabilities of Lessee under the Lease, Lessee has and hereby does grant to Lessor, a present and continuing security interest in the following, or proceeds thereof: (a) the Project Account and (b) all contract rights, claims and privileges in respect of the Project Account, and all proceeds of the foregoing, and Deposit Bank acknowledges that this Agreement constitutes notice of Lessor’s security interest in such collateral and does hereby consent thereto.

Section 4. To give Lessor control over the Project Account, as control is defined in the Uniform Commercial Code, Deposit Bank hereby agrees to comply with any and all instructions from time to time originated by Lessor directing disposition of funds in the Project Account, without further consent by Lessee (the “Instructions”). Lessor agrees that it will not give any Instructions unless there is a default under the Lease. Deposit Bank further agrees that it will institute procedures to prevent Lessee from making withdrawals from the Project Account, without approval of Lessor, in the event Instructions are given. The parties hereto agree that (i) the Instructions may include, without limitation, the giving of stop payment orders and may further include instructions to transfer funds to or for Lessor’s benefit and (ii) Deposit Bank shall have no duty to inquire or determine whether Lessor is entitled, under the Lease, to give any Instructions. Prior to Deposit Bank’s receipt of any Instructions, Deposit Bank shall be entitled to honor Lessee’s instructions and directions with respect to any transfer or withdrawal of funds from the Project Account, subject to the restrictions of **Section 6**. Lessee hereby agrees that Deposit Bank shall be entitled to rely on any Instructions, as set forth herein, even if (i) the Instructions are contrary to any instructions or demands that Lessee may deliver to Deposit Bank and/or (ii) a result of such Instructions is the dishonoring by Deposit Bank of items which may be presented for payment.

Section 5. In accordance with the Lease, Lessor will deposit in the Project Account not to exceed the Maximum Amount specified on **Exhibit A** attached hereto. Moneys held by Deposit Bank hereunder will be held in an account in accordance with the Arbitrage Instructions attached as **Exhibit D**, and fully insured or collateralized as required by deposits of public funds. All interest and gain earned on deposits in the account will be deposited in the Project Account.

Section 6. Moneys in the Project Account will be used to pay or reimburse Lessee for the Costs of the Project listed in the Lease. Such payment will be made from the Project Account upon presentation to Deposit Bank of one or more properly executed Payment Request and Acceptance Certificates, a form of which is attached as **Exhibit B**, together with all required attachments referenced in **Exhibit B**, and approved for payment in writing by Lessor. Lessee understands and agrees that Lessor will not approve any disbursements to pay Costs of the Project other than closing costs, until Lessee files with Lessor the items listed on **Exhibit A**. In making any disbursement pursuant to this **Section 6**, Deposit Bank may conclusively rely as to the completeness and accuracy of all statements in such Payment Request and Acceptance Certificate, and Deposit Bank will not be required to make any inquiry, inspection or investigation in connection therewith. The submission of each Payment Request and Acceptance Certificate will constitute unto Deposit Bank and Lessor an irrevocable determination by Lessee that all conditions precedent to the payment of the amounts set forth therein have been completed.

Section 7. The Project Account will terminate upon the occurrence of the earlier of (a) the presentation to Lessor of a Completion Certificate, a form of which is attached hereto as **Exhibit C**, which must be accompanied by a certificate of insurance evidencing compliance with **Section 7.1** of the Lease or (b) written notification by the Lessor that an Event of Default has occurred or that Lessee has terminated the Lease pursuant to **Section 3.3** of the Lease. The Completion Certificate may state that it is given without prejudice to any rights of Lessee that then exist or may subsequently come into being against third parties. Upon termination as described in (a), any amount remaining in the Project Account shall be paid to Lessor and applied in the manner described in the Lease. Upon termination as described in (b), any amount remaining in the Project Account shall immediately be paid to Lessor.

Section 8. Deposit Bank may at any time resign by giving at least 30 days' written notice to Lessee and Lessor, but such resignation will not take effect until the appointment of a successor Deposit Bank. The substitution of another Deposit Bank or trust company to act as Deposit Bank under this Agreement may occur by written agreement of Lessor and Lessee. In addition, Deposit Bank may be removed at any time, with or without cause, by an instrument in writing executed by Lessor and Lessee. In the event of any resignation or removal of Deposit Bank, a successor Deposit Bank will be appointed by an instrument in writing executed by Lessor and Lessee. Such successor Deposit Bank will indicate its acceptance of such appointment by an instrument in writing delivered to Lessor, Lessee and the predecessor Deposit Bank. Thereupon such successor Deposit Bank will, without any further act or deed, be fully vested with all the powers, rights, duties and obligations of Deposit Bank under this Agreement and the predecessor Deposit Bank will deliver all moneys and securities held by it under this Agreement to such successor Deposit Bank whereupon the duties and obligations of the predecessor Deposit Bank will cease and terminate. If a successor Deposit Bank has not been so appointed within 90 days of such resignation or removal, Deposit Bank may petition a court of competent jurisdiction to have a successor Deposit Bank appointed.

Section 9. Any corporation or association into which Deposit Bank may be merged or converted or with or into which it may be consolidated, or to which it may sell or transfer its depository banking business and assets as a whole or substantially as a whole, or any corporation or association resulting from any merger, conversion, sale, consolidation or transfer to which it is a party, will be and become successor Deposit Bank hereunder and will be vested with all the powers, rights, obligations, duties,

remedies, immunities and privileges hereunder as was its predecessor, without the execution or filing of any instrument or any further act on the part of any of the parties hereto.

Section 10. Deposit Bank incurs no responsibility to make any disbursements pursuant to this Agreement except from funds held in the Project Account. Deposit Bank makes no representations or warranties as to the title to any property or equipment listed in the Lease or as to the performance of any obligations of Lessor or Lessee.

Section 11. Deposit Bank may act in reliance upon any writing or instrument or signature which it, in good faith, believes to be genuine, may assume the validity and accuracy of any statement or assertion contained in such a writing or instrument, and may assume that any person purporting to give any writing, notice, advice or instructions in connection with the provisions hereof has been duly authorized to do so. Deposit Bank will not be liable in any manner for the sufficiency or correctness as to form, manner, execution or validity of this Agreement (other than its own execution thereof) or any instrument deposited with it, nor as to the identity, authority or right of any person executing the same; and its duties hereunder will be limited to those specifically provided herein.

Section 12. Unless Deposit Bank is guilty of negligence or willful misconduct with regard to its duties hereunder, Lessee, to the extent permitted by law, and Lessor jointly and severally hereby agree to indemnify Deposit Bank and hold it harmless from any and all claims, liabilities, losses, actions, suits or proceedings at law or in equity, or any other expense, fees or charges of any character or nature, which it may incur or with which it may be threatened by reason of its acting as Deposit Bank under this Agreement; and in connection therewith, to indemnify Deposit Bank against any and all expenses, including reasonable attorneys' fees and the cost of defending any action, suit or proceeding or resisting any claim.

Section 13. As long as this Agreement remains in effect, transactions involving the Project Account shall be subject, except to the extent inconsistent herewith, to the provisions of such deposit account agreements, disclosures and fee schedules, as are in effect from time to time with respect to the Project Account.

Notwithstanding the preceding paragraph, Deposit Bank will be entitled to reimbursement from Lessee of reasonable out-of-pocket, legal or extraordinary expenses incurred in carrying out the duties, terms or provisions of this Agreement. Claims for such reimbursement may be made to Lessee and in no event will such reimbursement be made from funds held by Deposit Bank pursuant to this Agreement. Deposit Bank agrees that it will not assert any lien whatsoever on any of the money on deposit in the Project Account for the payment of fees and expenses for services rendered by Deposit Bank under this Agreement or otherwise.

Section 14. If Lessee, Lessor or Deposit Bank are in disagreement about the interpretation of the Lease or this Agreement, or about the rights and obligations, or the propriety of any action contemplated by Deposit Bank hereunder, Deposit Bank may, but will not be required to, file an appropriate civil action to resolve the disagreement. Deposit Bank will be indemnified by Lessor and Lessee, to the extent permitted by law, for all costs, including reasonable attorneys' fees and expenses, in connection with such civil action, and will be fully protected in suspending all or part of its activities under this Agreement until a final judgment in such action is received.

Section 15. Deposit Bank may consult with counsel of its own choice and will have full and complete authorization and protection for any action or non-action taken by Deposit Bank in accordance with the opinion of such counsel. Deposit Bank will otherwise not be liable for any mistakes of facts or

errors of judgment, or for any acts or omissions of any kind unless caused by its negligence or willful misconduct.

Section 16. This Agreement will be governed by and construed in accordance with the laws of the State of Missouri.

Section 17. If any provision of this Agreement is held invalid or unenforceable by any court of competent jurisdiction, such holding will not invalidate or render unenforceable any other provision hereof.

Section 18. This Agreement may not be amended except by a written instrument executed by Lessor, Lessee and Deposit Bank.

Section 19. This Agreement may be executed in several counterparts, each of which so executed will be an original.

Section 20. The parties agree that the transaction described herein may be conducted and related documents may be sent, received or stored by electronic means. Copies, telecopies, facsimiles, electronic files and other reproductions of original executed documents shall be deemed to be authentic and valid counterparts of such original documents for all purposes, including the filing of any claim, action or suit in the appropriate court of law.

[Remainder of Page Intentionally Left Blank.]

IN WITNESS WHEREOF, Lessor, Lessee and Deposit Bank have caused this Agreement to be executed by their duly authorized representatives.

FIRST STATE COMMUNITY BANK, AS LESSOR

By: _____
Name:
Title:

CITY OF MOBERLY, MISSOURI

By: _____
Name:
Title:

FIRST STATE COMMUNITY BANK, AS DEPOSIT BANK

By: _____
Name:
Title:

EXHIBIT A
Other Provisions (Project Account)

Name of Account: "City of Moberly, Missouri Project Account"

Deposit to Project Account not to Exceed: \$4,675,000, with initial deposit to be \$100,000.

Items required prior to disbursements from Project Account (other than for closing costs) pursuant to Section 6, unless waived by Lessor:

(A) Proof of the insurance and performance and labor and material payment bonds required by **Section 7.1** of the Lease.

(B) Lien waivers for all services or materials furnished by subcontractors or suppliers related to the amounts requested to be disbursed.

* * *

EXHIBIT B

FORM OF PAYMENT REQUEST AND ACCEPTANCE CERTIFICATE

To: First State Community Bank, as Deposit Bank
201 E. Columbia
Farmington, Missouri 63640

Re: City of Moberly, Missouri Project Account Established by the Account Control Agreement, dated as of November __, 2019 (the “Agreement”) among First State Community Bank, as lessor (“Lessor”), City of Moberly, Missouri, as lessee (“Lessee”) and First State Community Bank, as deposit bank (the “Deposit Bank”)

Ladies and Gentlemen:

Pursuant to **Section 6** of the above-referenced Account Control Agreement, Lessee hereby requests payment in accordance with this request and said **Section 6** and hereby states and certifies as follows:

- (a) All terms in this request are used with the meanings used in the Agreement.
- (b) The names of the persons, firms or corporations to whom the payments requested hereby are due, the amounts to be paid and the general classification and description of the Costs for which each obligation requested to be paid hereby was incurred are as set forth on Attachment I hereto.
- (c) The amounts requested either have been paid by Lessee, or are justly due to contractors, subcontractors, materialmen, engineers, architects or other persons (whose names and addresses are stated on Attachment I hereto) who have performed necessary and appropriate work or furnished necessary and appropriate materials, equipment or furnishings in the acquisition, construction and installation of the Project.
- (d) No part thereof has been or is being made the basis for the withdrawal of any moneys in any previous or pending request under the Agreement.
- (e) Each of Lessee’s representations contained in the Lease is true, correct and not misleading as though made as of the date hereof.
- (f) No event exists that constitutes, or with the giving of notice of the passage of time or both would constitute, an Event of Default under the Lease.
- (g) All such materials, equipment or furnishings have been, or will be, delivered to, and are, or will be, part of the Project.
- (h) The amount remaining to be paid from the Project Fund will, after payment of the amounts requested, be sufficient to pay the Costs of the Project in accordance with the Project Documents and an estimate of the cost of the work not under contract, if any.

(i) This certificate contains no request for payment on account of any retained percentage which Lessee is on the date hereof entitled to retain.

(j) There has not been filed with or served upon Lessee any notice of any lien, right to a lien or attachment upon or claim affecting the right of any person, firm or corporation to receive payment of the amounts requested which has not been released or will not be released simultaneously with the payment of such obligation.

(k) Lien waivers for all services or materials furnished by subcontractors or suppliers related to the amounts requested are *attached hereto*.

If this box is checked, (i) Lessee represents that all amounts requested to be paid are closing costs, and (ii) Lessee is not required to make, and does not make, the representations set forth above in paragraphs (e) through (k).

CITY OF MOBERLY, MISSOURI

By: _____
Name: _____
Title: Authorized Representative

APPROVED FOR PAYMENT:

FIRST STATE COMMUNITY BANK,
Lessor

By: _____
Name: _____
Title: Authorized Representative

ATTACHMENT I
TO WRITTEN REQUEST FOR DISBURSEMENT
FROM PROJECT FUND
SCHEDULE OF PAYMENTS REQUESTED

Payee and Address	Amount	Description

EXHIBIT C

FORM OF COMPLETION CERTIFICATE

First State Community Bank
201 E. Columbia
Farmington, Missouri 63640
Attention: Government Lending

Re: Equipment Lease Purchase Agreement dated as of November __, 2019 (the "Lease"),
between First State Community Bank and City of Moberly, Missouri

Ladies and Gentlemen:

Pursuant to **Section 7** of the Account Control Agreement dated as of November __, 2019 (the "Agreement"), among First State Community Bank, as lessor, City of Moberly, Missouri, as lessee, and First State Community Bank, as Deposit Bank, the undersigned hereby certifies (a) all terms in this certificate are used with the meanings used in said Agreement, (b) the Project was completed on _____, 2020, (c) all other facilities necessary in connection with the Project have been acquired, constructed, equipped and installed, (d) the Project and such other facilities have been acquired, constructed, equipped and installed in accordance with the Project Documents and in conformance with all applicable zoning, planning, building, environmental and other similar governmental regulations, and (e) all Costs of the Project have been paid. As required by **Section 7** of the Agreement, attached to this certificate are certificates of insurance evidencing compliance with **Section 7.1** of the Lease. This certificate is given without prejudice to any rights of Lessee that exist or may subsequently come into being against third parties.

Pursuant to the Agreement, Lessee hereby states and certifies that (a) each of Lessee's representations contained in the Lease is true, correct and not misleading as though made as of the date hereof, and (b) no event exists that constitutes, or with the giving of notice of the passage of time or both would constitute, an Event of Default.

Date: _____, 2020.

CITY OF MOBERLY, MISSOURI

By: _____
Name: _____
Title: Authorized Representative

ACKNOWLEDGED:

FIRST STATE COMMUNITY BANK,

By: _____
Name: _____
Title: Authorized Representative

EXHIBIT D**ARBITRAGE INSTRUCTIONS**

These Arbitrage Instructions provide procedures for complying with § 148 of the Internal Revenue Code of 1986, as amended (the “Code”), in order to preserve the exclusion from federal gross income of the interest components of Rental Payments paid by the Lessee under the Lease.

Section 1. Temporary Periods/Yield Restriction. The proceeds of the Lease deposited in the Project Account and investment earnings thereon may be invested without yield restriction for three years after the Commencement Date of the Lease. If any unspent proceeds remain in the Project Account after three years, such amounts may continue to be invested without yield restriction so long as the Lessee computes and pays to the IRS all yield reduction payments in accordance with Treas. Reg § 1.148-5(c). These payments are required whether or not the Lease is exempt from the arbitrage rebate requirements of Code § 148.

Section 2. Investments Must Be Acquired For Amounts Not Exceeding Fair Market Value. No investment may be acquired with amounts deposited in the Project Account for an amount (including transaction costs) in excess of the fair market value of such investment, or sold or otherwise disposed of for an amount (including transaction costs) less than the fair market value of the investment. The fair market value of any investment is the price a willing buyer would pay to a willing seller to acquire the investment in a bona fide, arm’s-length transaction. Fair market value will be determined in accordance with Internal Revenue Code Regulations § 1.148-5. If an investment is purchased or sold in an arm’s-length transaction on an established securities market (within the meaning of Internal Revenue Code § 1273), the purchase or sale price constitutes the fair market value. The purchase price of a certificate of deposit (a “CD”) is treated as its fair market value on the purchase date if (a) the CD has a fixed interest rate, a fixed payment schedule, and a substantial penalty for early withdrawal, (b) the Yield on the CD is not less than the Yield on reasonably comparable direct obligations of the United States, and (c) the Yield is not less than the highest Yield published or posted by the CD issuer to be currently available on reasonably comparable CDs offered to the public. For investments not previously described, the fair market value may be established through a competitive bidding process, in which (1) at least three bids on the investment are received from persons with no financial interest in the Lease (*e.g.*, as underwriters or brokers); and (2) the Yield on the investment must be equal to or greater than the Yield offered under the highest bid. *Amounts in the Project Account shall not be invested in an investment with specifically negotiated withdrawal or reinvestment provisions and a specifically negotiated interest rate (sometimes referred to as a guaranteed investment contract or a forward supply agreement).*

Section 3. Opinion of Special Tax Counsel. The requirements of these Arbitrage Instructions may be modified or amended in whole or in part upon receipt of the advice of Gilmore & Bell, P.C. or other nationally recognized bond counsel acceptable to Lessor, to the effect that such modifications and amendments will not adversely affect the exclusion from federal gross income of the Rental Payments.

EQUIPMENT LEASE PURCHASE AGREEMENT

dated as of November __, 2019,

between

**FIRST STATE COMMUNITY BANK,
as Lessor**

and

**CITY OF MOBERLY, MISSOURI,
as Lessee**

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EQUIPMENT LEASE PURCHASE AGREEMENT

LESSOR: FIRST STATE COMMUNITY BANK, a Missouri state-chartered bank

LESSEE: CITY OF MOBERLY, MISSOURI, a third class city and political subdivision of the State of Missouri

DATE: NOVEMBER __, 2019

THIS EQUIPMENT LEASE PURCHASE AGREEMENT, dated as of the date set forth above (the “Agreement”), by and between the Lessor named above (together with its successors and assigns, “Lessor”), and the Lessee named above (together with its successors, “Lessee”),

RECITALS:

1. Lessor proposes to lease the Equipment, as hereinafter described, to Lessee, and Lessee desires to lease the Equipment from Lessor subject to the terms and conditions of and for the purposes set forth in this Agreement.

2. Lessor will provide funds in an amount not to exceed the Maximum Authorized Amount listed on **Exhibit B**, to pay the costs of Project, as further described on **Exhibit B**, and Lessee will repay such funds on subject to the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the premises and the mutual covenants and agreements herein set forth, Lessor and Lessee do hereby covenant and agree as follows:

ARTICLE I

DEFINITIONS AND RULES OF CONSTRUCTION

Section 1.1. Definitions of Words and Terms. In addition to words and terms defined herein, the following words and terms as used in this Agreement shall have the following meanings, unless some other meaning is plainly intended:

“**Account Control Agreement**” means the Account Control Agreement, dated as of the date hereof, among Lessor, Lessee and Deposit Bank.

“**Additional Rent**” means those payments required to be made by Lessee by **Section 4.2**.

“**Agreement**” means this Equipment Lease Purchase Agreement and any other schedule, exhibit or agreement made a part hereof by the parties hereto, together with any amendments to this Agreement.

“**Code**” means Internal Revenue Code of 1986, as amended.

“**Commencement Date**” is the date when the term of this Agreement and Lessee’s obligation to pay rent commences, which date will be the date on which the Initial Principal Advance is deposited in the Project Account to pay the Costs of the Project.

“**Completion Date**” means the date of completion of the Project as that date shall be certified as provided in **Section 5.4** hereof.

“**Cost**” or “**Costs**” means all reasonable or necessary expenses incidental to the acquisition, construction, installation, repair, alteration, improvement and extension of the Equipment, including the expenses of studies, surveys, land title and title policies, architectural and engineering services, recording fees, bank fees, legal and other special services and all other necessary and incidental expenses.

“**Counsel**” means an attorney duly admitted to practice law before the highest court of any state and, without limitation, may include legal counsel for either Lessee or Lessor.

“**Deposit Bank**” means First State Community Bank, the deposit bank under the Account Control Agreement, or any successor deposit bank under the Account Control Agreement.

“**Engineer**” means an individual engineer or firm of engineers selected by the Lessee who or which is not a full-time employee of the Lessee and is approved in writing by Lessor.

“**Event of Default**” or “**Default**” means any Event of Default as defined in **Section 12.1**.

“**Equipment**” means the personal property described on **Schedule 1**.

“**Final Disbursement Date**” means the earlier of (i) the Completion Date, or (ii) the first anniversary of the Commencement Date, which date will be the latest date on which a draw request for an advance of principal may be paid.

“**Fiscal Year**” means the fiscal year of Lessee for financial and budgetary purposes as set forth on **Exhibit B** hereto.

“**Impositions**” means those Impositions defined as such in **Article VI**.

“**Initial Principal Advance**” means the initial deposit of \$100,000 made to the Project Account.

“**Interest Portion**” means the Interest Portion of a Rental Payment identified as such in **Exhibit A**.

“**Issuance Year**” is the calendar year in which the Commencement Date occurs.

“**Lease Term**” means the Original Term and any Renewal Terms.

“**Maximum Authorized Amount**” means the maximum authorized amount specified on **Exhibit B**, to be paid by Lessor under this Agreement and to be applied to pay Costs of the Project.

“**Maximum Lease Term**” means the Original Term and all Renewal Terms through the final Rental Payment Date listed on **Exhibit B**.

“**Net Proceeds**” when used with respect to any insurance proceeds or any condemnation award or amounts received from the sale of property under the threat of condemnation, means the amount remaining after deducting all expenses (including attorneys’ fees and any expenses of Lessee and Lessor) incurred in the collection of such proceeds or award from the gross proceeds thereof.

“**Original Term**” means the initial term of this Agreement beginning as of the Commencement Date and ending on the last day of Lessee’s current Fiscal Year.

“**Principal Portion**” means the Principal Portion of a Rental Payment identified as such in **Exhibit A** hereto.

“**Project**” means the acquisition, construction, installation, equipping and improving of the Equipment.

“**Project Account**” means the project account, established under the Account Control Agreement.

“**Project Documents**” means this Agreement, the Account Control Agreement, any bids received and accepted by the Lessee relating to the Equipment, and any other agreements, contracts, documents or certificates related to the foregoing or the Project.

“**Renewal Terms**” means the renewal terms of this Agreement during which the Lease Term is extended in accordance with **Section 3.2** hereof, each having a duration of one year and a term coextensive with Lessee’s Fiscal Year except as otherwise provided in said **Section 3.2**.

“**Rental Payment Dates**” means the dates during the Lease Term on which Rental Payments are due as set forth on **Exhibit A**.

“**Rental Payments**” means those payments required to be made by Lessee by **Section 4.1** hereof, as set forth in **Exhibit A**.

“**State**” means the State of Missouri.

“**Vendor**” means the manufacturer of the Equipment as well as the agents or dealers of the manufacturer from whom Lessor purchased or is purchasing the Equipment.

Section 1.2. Rules of Construction. Words of the masculine gender shall be deemed and construed to include correlative words of the feminine and neuter genders. Unless the context shall otherwise indicate, the words importing the singular number shall include the plural and vice versa, and words importing person shall include firms, associations and corporations, including public bodies, as well as natural persons.

The words “herein,” “hereby,” “hereunder,” “hereof,” “hereto,” “hereinbefore,” “hereinafter” and other equivalent words refer to this Agreement and not solely to the particular article, section, paragraph or subparagraph hereof in which such word is used.

Reference herein to a particular article, a particular section, a particular exhibit or a particular schedule shall be construed to be a reference to the specified article, section, exhibit or schedule hereof or hereto unless the context or use clearly indicates another or different meaning or intent.

Whenever an item or items are listed after the word “including,” such listing is not intended to be a listing that excludes items not listed.

Section 1.3. Section and Article Headings. The Section and Article headings herein are for convenience only and in no way define, limit or describe the scope or intent of any of the provisions hereof.

Section 1.4. Execution of Counterparts. This Agreement may be executed simultaneously in two or more counterparts, each of which shall be deemed to be an original, and all of which together shall constitute but one and the same instrument.

Section 1.5. Construction and Enforcement. This Agreement shall be construed and enforced in accordance with the laws of the State. Wherever in this Agreement it is provided that either party shall or will make any payment or perform or refrain from performing any act or obligation, each such provision shall, even though not so expressed, be construed as an express covenant to make such payment or to perform, or not to perform, as the case may be, such act or obligation.

Section 1.6. Severability. In the event any provision hereof shall be determined to be invalid or unenforceable, the validity and effect of the other provisions hereof shall not be affected thereby.

Section 1.7. Complete Agreement. This written agreement is a final expression of the agreement between the parties hereto and such agreement may not be contradicted by evidence of any prior oral agreement or of a contemporaneous oral agreement between the parties hereto. No unwritten oral agreement between the parties exists.

Section 1.8. Accounting Terms. Accounting terms used herein and not otherwise specifically defined shall have the meaning ascribed to such terms by accounting principles generally accepted in the United States as from time to time in effect.

ARTICLE II

REPRESENTATIONS AND COVENANTS

Section 2.1. Representations and Covenants by Lessee. Lessee represents, warrants and covenants as follows:

(a) Lessee is a third class city and political subdivision organized and existing under the constitution and laws of the State with full power and authority to enter into each of the Project Documents and the transactions contemplated hereby and to perform all of its obligations hereunder. Lessee has a substantial amount of one or more of the following sovereign powers: (a) the power to tax, (b) the power of eminent domain, and (c) police power.

(b) The lease of the Equipment by Lessor to Lessee, as provided in this Agreement, is necessary, desirable and in the public interest, and Lessee hereby declares its current need for the Equipment.

(c) The Equipment, when purchased and installed, in accordance with the Project Documents, will be in compliance with all applicable laws and regulations and Lessee's requirements, and will be suitable for the use by Lessee as set forth on **Exhibit B** hereto.

(d) Lessee and the Engineer have estimated, and Lessee reasonably believes, that the total Costs of the Project, in accordance with the Project Documents, will not exceed the Maximum Authorized Amount, together with other funds Lessee has available to pay such Costs.

(e) Lessee has duly authorized the execution and delivery of each of the Project Documents by proper action by its governing body at a meeting duly called, regularly convened and attended throughout by the requisite majority of the members thereof or by other appropriate official approval, and all requirements have been met and procedures have occurred in order to ensure the validity and enforceability of each of the Project Documents.

(f) Neither the execution and delivery of any Project Document, nor the fulfillment of or compliance with the terms and conditions thereof, nor the consummation of the transactions contemplated thereby, conflicts with or results in a breach of the terms, conditions or provisions of any restriction or any agreement or instrument to which Lessee is a party or by which Lessee is bound.

(g) There is no proceeding pending or, to Lessee's knowledge, threatened in any court or before any governmental authority or arbitration board or tribunal challenging the validity of the authorization or the power or authority of Lessee to enter into any Project Document or the validity or enforceability of any Project Document or which, if adversely determined, would adversely affect the transactions contemplated by any Project Document or the interest of Lessor or its assigns under any Project Document.

(h) Lessee has not made, done, executed or suffered, and warrants that it will not make, do, execute or suffer, any act or thing whereby Lessee's interests in the Equipment shall be or may be impaired, changed or encumbered in any manner whatsoever, except as contemplated by this Agreement.

(i) No event or condition that constitutes, or with the giving of notice or the lapse of time or both would constitute, an Event of Default exists at the date hereof.

(j) Lessee has, in accordance with the requirements of law, fully budgeted and appropriated sufficient funds for the current Fiscal Year to make the Rental Payments scheduled to come due during the Original Term, and to meet its other obligations for the Original Term, and such funds have not been expended for other purposes.

(k) Lessee will do or cause to be done all things necessary to preserve and keep in full force and effect its existence as a body corporate and politic.

(l) Lessee has complied, or will comply, with such public bidding requirements as may be applicable to any of the Project Documents and the acquisition of the Equipment.

(m) During the Lease Term, the Equipment will be used by Lessee only for the purpose of performing essential governmental or proprietary functions of Lessee consistent with the permissible scope of Lessee's authority.

ARTICLE III

GRANTING PROVISIONS; TERM

Section 3.1. Granting of Leasehold. Lessor, by these presents, hereby rents, leases and lets the Equipment unto Lessee, and Lessee hereby rents, leases and hires the Equipment from Lessor for the Rental Payments and subject to the terms and conditions hereinafter set forth.

Section 3.2. Lease Term. The Original Term shall commence as of the date of delivery of this Agreement and shall terminate on the last day of Lessee’s current Fiscal Year. The Lease Term may be continued, at the option of Lessee, at the end of the Original Term or any Renewal Term for additional one year Renewal Terms; provided that the final Renewal Term shall not extend beyond the final Rental Payment Date set forth on **Exhibit B** hereto. Lessee shall be deemed to have exercised its option to continue this Agreement for the next Renewal Term unless Lessee shall have terminated this Agreement pursuant to **Section 3.3** or **10.1**. The terms and conditions during any Renewal Term shall be the same as the terms and conditions during the Original Term, except that the Rental Payments shall be as provided in **Section 4.1** and in **Exhibit A** hereto.

Lessee currently intends, subject to the provisions of **Section 3.3**, to continue this Agreement through the Maximum Lease Term and to pay the Rental Payments due during the Original Term and each Renewal Term hereunder. Lessee reasonably believes that legally available funds in an amount sufficient to pay all Rental Payments during the Original Term and each of the Renewal Terms through the Maximum Lease Term can be obtained. The responsible financial officer of Lessee shall do all things lawfully within their power to obtain and maintain funds from which the Rental Payments may be made, including making provision for such Rental Payments to the extent necessary in each proposed annual budget submitted for approval in accordance with applicable procedures of Lessee and to exhaust all available reviews and appeals in the event such portion of the budget is not approved. Notwithstanding the foregoing, the decision to budget and appropriate funds or to extend this Agreement for any Renewal Term is to be made in accordance with Lessee’s normal procedures for such decisions, and the then current governing body of Lessee will have the final responsibility for that decision.

Section 3.3. Nonappropriation. Lessee is obligated only to pay such Rental Payments under this Agreement as may lawfully be made from funds budgeted and appropriated for that purpose during Lessee’s then current Fiscal Year. Should Lessee fail to budget, appropriate or otherwise make available funds sufficient to pay Rental Payments following the then current Original Term or Renewal Term, this Agreement shall be deemed terminated at the end of the then current Original Term or Renewal Term. Lessee agrees to deliver notice to Lessor of such termination at least 30 days prior to the end of the then current Original Term or Renewal Term, but failure to give such notice shall not extend the term beyond such Original Term or Renewal Term. If this Agreement is terminated in accordance with this Section, Lessee agrees to transfer possession of the Equipment to Lessor.

ARTICLE IV

PROVISIONS FOR PAYMENT OF RENTAL PAYMENTS

Section 4.1. Rental Payments; Prepayments.

(a) Subject to **Section 3.3**, Lessee shall pay Rental Payments to Lessor on each Rental Payment Date, in an amount equal to the amount calculated as described on **Exhibit A** hereto. Rental Payments shall be made exclusively from legally available funds, in lawful money of the United States of America. A portion

of each Rental Payment is paid as, and represents payment of, interest, as set forth in **Exhibit A** hereto. All Rental Payments shall be applied first to the Interest Portion accrued to the date of such payment and then to the principal portion. The Interest Portions of Rental Payments shall be calculated on the Principal Portion outstanding from time to time, using the interest rate and accrual basis set forth on **Exhibit B**.

(b) On the Commencement Date, Lessor will advance, for deposit in the Project Account established under the Account Control Agreement, an amount equal to the Initial Principal Advance. Subsequently, Lessor will advance to the Project Account installments of principal aggregating not more than the Maximum Authorized Amount, upon receipt of a signed draw request in substantially the form set forth on **Exhibit B** attached to the Account Control Agreement, to pay Costs of the Project, provided that no draw requests may be made after the Final Disbursement Date.

(c) As early as practicable after the earlier of (i) the date that Lessor has advanced the Maximum Authorized Amount, or (ii) the Final Disbursement Date, Lessor will calculate the Rental Payments due on each Rental Payment Date with respect to the Equipment, in the manner described in **Exhibit A**, taking into account the amount of proceeds drawn by Lessee from time to time from the Commencement Date to and including the Final Disbursement Date. Lessor will provide Lessee with a completed **Exhibit A** to be attached to this Agreement, calculated using the interest rates and accrual basis set forth on **Exhibit B**.

(d) Lessee will pay Lessor a charge on any Rental Payment not paid for three business days following the Rental Payment Date such Rental Payment is due at the rate of 10% per annum or the maximum amount permitted by law, whichever is less, from such date. Such late charge shall be payable by Lessee upon demand by Lessor and shall be deemed Additional Rent hereunder. Lessee acknowledges and agrees that the late charge (i) does not constitute interest, (ii) is an estimate of the costs Lessor will incur as a result of the late payment and (iii) is reasonable in amount. A portion of each Rental Payment is paid as, and represents payment of, interest, as set forth on **Exhibit A**.

(e) The Principal Portion of Rental Payments may be prepaid in part by Lessee on each anniversary of the Commencement Date, upon giving written notice to Lessor at least 30 days before the date of prepayment. Amounts received will be applied first to the Interest Portion of Rental Payments due hereunder, and then to reduce the Principal Portion of Rental Payments, applied in inverse order of payments due. Rental Payments may be prepaid in whole only pursuant to **Article X**.

Section 4.2. Additional Rent. Lessee will pay, subject to the provisions of **Section 3.3**, as Additional Rent (i) all amounts required under **Section 4.5** and all other payments of whatever nature which Lessee has agreed to pay or assume under this Agreement; and (ii) all expenses, including attorneys' fees, incurred in connection with the enforcement of any rights under this Agreement by Lessor. Amounts required to be paid under this Section will be paid directly to the person or entity owed.

Section 4.3. Rental Payments and Additional Rent Constitute Current Expense. The obligation of Lessee to pay the Rental Payments and the Additional Rent and other amounts payable hereunder is subject to the provisions of **Section 3.3**, constitutes a current expense of Lessee and does not constitute a general obligation or indebtedness of Lessee for which Lessee is obligated to levy or pledge any form of taxation or for which Lessee has levied or pledged any form of taxation; such obligation shall not be construed to be a debt of Lessee in contravention of any applicable constitutional or statutory limitation or requirement, but in each Fiscal Year shall be payable solely from the amounts budgeted or appropriated therefor out of the income and revenue provided for such Fiscal Year, any proceeds of the Equipment and the Net Proceeds of any insurance or condemnation awards.

Section 4.4. Rental Payments and Additional Rent Payable Without Abatement or Set-Off; Lessee’s Obligations. Subject to the provisions of **Section 3.3**, Lessee covenants and agrees that all payments of Rental Payments and Additional Rent shall be made by Lessee on or before the date the same become due, and Lessee shall perform all of its other obligations, covenants and agreements hereunder (including the obligation to pay Rental Payments and Additional Rent) without notice or demand and without abatement, deduction, setoff, counterclaim, recoupment or defense or any right of termination or cancellation arising from any circumstance whatsoever, whether now existing or hereafter arising, and irrespective of whether the acquisition or installation of the Equipment has been started or completed.

Nothing in this Agreement shall be construed as a waiver by Lessee of any rights or claims Lessee may have against Lessor under this Agreement or otherwise, but any recovery upon such rights and claims shall be from Lessor separately, it being the intent of this Agreement that Lessee shall be unconditionally and absolutely obligated to perform fully all of its obligations, agreements and covenants under this Agreement, including its obligation to pay Rental Payments and Additional Rent. Lessee may, however, at its own cost and expense and in its own name or in the name of Lessor, prosecute or defend any action or proceeding or take any other action involving third persons which Lessee deems reasonably necessary in order to secure or protect its right of possession, occupancy and use hereunder, and in such event Lessor hereby agrees to cooperate fully with Lessee and to take all action necessary to effect the substitution of Lessee for Lessor in any such action or proceeding if Lessee shall so request.

Section 4.5. Advances by Lessor to Insure the Equipment. In the event Lessee fails to either maintain the insurance required by this Agreement or keep the Equipment in good repair, Lessor may, but shall be under no obligation to, purchase the required insurance and pay the cost of the premiums therefor and maintain and repair the Equipment and pay the cost thereof. All amounts so advanced by Lessor shall constitute Additional Rent for the then current Original Term or Renewal Term and Lessee covenants and agrees to pay such amounts so advanced by Lessor with interest thereon from the date advanced by Lessor until paid at the rate of 10% per annum or the maximum amount permitted by law, whichever is less. In accordance with Section 427.120 of the Revised Statutes of Missouri, unless Lessee provides evidence of the insurance coverage required by this Agreement, Lessor may purchase insurance at Lessee’s expense to protect Lessor’s interests hereunder. This insurance may, but need not, protect Lessee’s interests. The coverage that Lessor may purchase may not pay any claim that Lessee may make or any claim that may be made against Lessee in connection with the Equipment. Lessee may later cancel any insurance purchased by Lessor, but only after providing evidence that Lessee has obtained insurance as required by this Agreement. If Lessor purchases insurance for the Equipment, Lessee will be responsible for the costs of that insurance, including the insurance premium, interest and other reasonable charges directly related to the placement of the insurance, until the effective date of the cancellation or expiration of the insurance. The costs of the insurance will be added as Additional Rent. The costs of the insurance may be more than the cost of insurance Lessee may be able to obtain on its own.

ARTICLE V

EQUIPMENT

Section 5.1. Delivery and Acceptance of the Equipment. Lessee will order the Equipment, cause the Equipment to be delivered and pay any and all delivery costs in connection therewith. When the Equipment has been delivered, Lessee will accept the Equipment (after review and verification that the Equipment matches what was ordered, which will be conducted in a timely manner) and evidence said acceptance by executing and delivering to Lessor an acceptance certificate in form and substance acceptable

to Lessor. Lessee will not sell, transfer or otherwise move the Equipment without Lessor's consent, which consent will not be unreasonably withheld.

Section 5.2. Enjoyment of Equipment. Lessor hereby covenants with Lessee that Lessor shall not interfere with Lessee's quiet use and enjoyment of the Equipment during the Lease Term, and Lessee will peaceably and quietly have and hold and enjoy the Equipment during the Lease Term, without suit, trouble or hindrance from Lessor, except as otherwise expressly set forth in this Agreement.

Section 5.3. Right of Inspection. Lessor will have the right at all reasonable times to inspect the Equipment.

Section 5.4. Use of the Equipment. Lessee will not install, use, operate or maintain the Equipment improperly, carelessly, in violation of any applicable law or in a manner contrary to that contemplated by this Agreement. Lessee will obtain all permits and licenses, if any, necessary for the installation and operation of the Equipment. In addition, Lessee agrees to comply in all material respects (including, without limitation, with respect to the use, maintenance and operation of each item of the Equipment) with all applicable laws, regulations and rulings of any legislative, executive, administrative or judicial body; provided, however, that Lessee may contest in good faith the validity or application of any such law, regulation or ruling in any reasonable manner that does not, in the opinion of Lessor, adversely affect the interest of Lessor in and to the Equipment or its interest or rights under this Agreement.

Section 5.5. Maintenance of Equipment. Lessee agrees that it will, at Lessee's own cost and expense, maintain, preserve and keep the Equipment in good repair, working order and condition. Lessor will have no responsibility to maintain, or repair or to make improvements or additions to the Equipment. If requested to do so by Lessor, Lessee will enter into a maintenance contract for the Equipment with Vendor.

ARTICLE VI

TITLE TO EQUIPMENT; SECURITY INTEREST

Section 6.1. Title to the Equipment. During the Lease Term, title to the Equipment and any and all additions, repairs, replacements or modifications will vest in Lessee, subject to the rights of Lessor under this Agreement; provided that title will thereafter immediately and without any action by Lessee vest in Lessor, and Lessee will immediately surrender possession of the Equipment to Lessor upon (a) any termination of this Agreement other than termination pursuant to **Section 10.1** or (b) the occurrence and continuation of an Event of Default. It is the intent of the parties hereto that any transfer of title to Lessor pursuant to this Section will occur automatically without the necessity of any bill of sale, certificate of title or other instrument of conveyance. Lessee will, nevertheless, execute and deliver any such instruments as Lessor may request to evidence such transfer. Lessee, irrevocably designates, makes, constitutes and appoints Lessor and its assignee as Lessee's true and lawful attorney (and agent in-fact) with power, at such time of termination or times thereafter as Lessor in its sole and absolute discretion may determine, in Lessee's or Lessor's or such assignee's name, to endorse the name of Lessee upon any bill of sale, document, instrument, invoice, freight bill, bill of lading or similar document relating to the Equipment in order to vest title in Lessor and transfer possession to Lessor.

Section 6.2. Security Interest. To secure the payment of all of Lessee's obligations under this Agreement and to the extent permitted by law, Lessor retains a security interest constituting a first lien on the Equipment and on all additions, attachments and accessions thereto and substitutions therefor and proceeds

therefrom. Lessee agrees to execute such additional documents in form satisfactory to Lessor, that Lessor deems necessary or appropriate to establish and maintain its security interest. Lessee agrees that financing statements may be filed with respect to the security interest granted herein.

Section 6.3. Personal Property. Lessor and Lessee agree that the Equipment is and will remain personal property. The Equipment will not be deemed to be affixed to or a part of the real estate on which it may be situated, notwithstanding that the Equipment or any part thereof may be or hereafter become in any manner physically affixed or attached to such real estate or any building thereon. Upon the request of Lessor, Lessee will, at Lessee's expense, furnish a waiver of any interest in the Equipment from any party having an interest in any such real estate or building.

ARTICLE VII

INSURANCE; INDEMNITY; LIENS

Section 7.1. Insurance Required. Lessee shall, during the Lease Term, cause the Equipment to be kept continuously insured against such risks customarily insured against for items such as the Equipment and shall pay (except as otherwise provided herein), as the same become due, all premiums in respect thereof, such insurance to include the following policies of insurance:

- (a) Insurance insuring the Equipment against loss or damage by fire, lightning and all other risks covered by the extended coverage insurance endorsement then in use in the State in an amount not less than an amount equal to the full insurable value thereof (subject to reasonable loss deductible clauses) issued by such insurance company or companies authorized to do business in the State as may be selected by Lessee. The full insurable value of the Equipment may be determined from time to time at the request of Lessee or Lessor (but not less frequently than every five years) by an engineer, contractor, appraiser, appraisal company or one of the insurers, to be selected, with notice to Lessor, and paid by Lessee. The policy or policies of such insurance shall name Lessee and Lessor as insureds and loss payees. All proceeds from such policies of insurance shall be applied as provided in **Article XI**.
- (b) Comprehensive general accident and public liability insurance (including coverage for all losses whatsoever arising from the ownership, maintenance, operation or use of any automobile, truck or other motor vehicle), under which Lessee and Lessor are named as insureds, in an equal to the limits of liability set by Section 537.610 of the Revised Statutes of Missouri, as amended;
- (c) Performance and labor and material payment bonds required with respect to the contracts for the acquisition, construction, equipping and installation of the Equipment and in the full amount of such contracts, made by the contractors thereunder as the principals and a surety company or companies qualified to do business in the State as surety which shall be approved in writing by Lessor, which bonds shall be in such form as is acceptable to Lessor and shall name Lessee and Lessor as obligees; and
- (d) Workers' compensation and unemployment coverages to the extent, if any, required by the laws of the State.

Not less than 20 days prior to the expiration dates of the expiring policies, originals or copies of the policies required by this Section or certificates evidencing such insurance shall be delivered by Lessee to Lessor. All policies of such insurance, and all renewals thereof, shall contain a provision that such insurance may not be cancelled by the issuer thereof without at least ten days written notice to Lessee and Lessor.

Nothing in this Agreement shall be construed as preventing Lessee from satisfying the insurance requirements herein set forth by using blanket policies of insurance provided each and all of the requirements and specifications of this Agreement respecting insurance are complied with.

Section 7.2. Enforcement of Contract and Surety Bonds. In the event of material default of any contractor or subcontractor under any contract made in connection with the acquisition and installation of the Equipment, or in the event of a material breach of warranty with respect to any materials, workmanship or performance, Lessee will promptly proceed, either separately or in conjunction with others, to pursue diligently the appropriate remedies of Lessee against the contractor or subcontractor in default and against each surety on a bond securing the performance of such contract. Any amounts recovered by way of damages, refunds, adjustments or otherwise in connection with the foregoing, after deduction of expenses incurred in such recovery and after reimbursement to Lessee of any amounts theretofore paid by Lessee and not previously reimbursed to Lessee for correction or remedying of the default which gave rise to the proceedings against the contractor, subcontractor or surety, shall be held by Lessee in a separate account and not commingled with other funds of Lessee if received before the Completion Date, and, if received after the Completion Date, shall be appropriated solely for the purpose of paying Rental Payments under this Agreement.

Section 7.3. Release and Indemnification. To the extent permitted by law and without waiving any rights of sovereign immunity, Lessee will indemnify, protect and hold harmless Lessor from and against any and all liability, obligations, losses, claims and damages whatsoever, regardless of cause thereof, and expenses in connection therewith (including, without limitation, counsel fees and expenses and any federal income tax and interest and penalties connected therewith imposed on interest received) arising out of or as the result of (a) the entering into this Agreement, (b) the ownership of any item of the Equipment, (c) the ordering, acquisition, use, operation, condition, purchase, delivery, rejection, storage or return of any item of the Equipment, or (d) any accident in connection with the operation, use, condition, possession, storage or return of any item of the Equipment resulting in damage to property or injury or death to any person. The indemnification arising under this paragraph will continue in full force and effect notwithstanding the full payment of all obligations under this Agreement or the termination of the Lease Term for any reason.

Section 7.4. Liens, Taxes, Other Governmental Charges and Utility Charges. Lessee will keep the Equipment free and clear of all liens, charges and encumbrances, except those created under this Agreement. The parties to this Agreement contemplate that the Equipment will be used for a governmental or proprietary purpose of Lessee and, therefore, that the Equipment will be exempt from all property taxes. If the use, possession or acquisition of the Equipment is found to be subject to taxation in any form, Lessee will pay all taxes and governmental charges lawfully assessed or levied against or with respect to the Equipment. Lessee will pay all utility and other charges incurred in the use and maintenance of the Equipment. Lessee will pay such taxes and charges as the same become due; provided that, with respect to any such taxes and charges that may lawfully be paid in installments over a period of years, Lessee will be obligated to pay only such installments that accrue during the Lease Term.

ARTICLE VIII

ASSIGNMENT AND SUBLEASING

Section 8.1. Assignment by Lessor. Lessor’s interest in, to and under this Agreement and the Equipment may be assigned and reassigned in whole or in part to one or more assignees by Lessor without the necessity of obtaining the consent of Lessee; provided that any assignment will not be effective until Lessee has received written notice, signed by the assignor, of the name, address and tax identification number of the assignee. Lessee will retain all such notices as a register of all assignees and will make all payments to the assignee or assignees designated in such register. Lessee agrees to execute all documents, including notices of assignment and chattel mortgages or financing statements that may be reasonably requested by Lessor or any assignee to protect its interest in the Equipment and in this Agreement and agrees to the filing of financing statements with respect to the Equipment and this Agreement. Lessee will not have the right to and will not assert against any assignee any claim, counterclaim or other right Lessee may have against Lessor.

Section 8.2. Assignment and Subleasing by Lessee. None of Lessee’s right, title and interest in, to and under this Agreement and in the Equipment may be assigned or encumbered by Lessee for any reason, except that Lessee may sublease all or part of the Equipment if Lessee obtains the prior written consent of Lessor and the advice of Special Tax Counsel that such subleasing will not adversely affect the exclusion of the Interest Portion of the Rental Payments from gross income for federal income tax purposes. Any such sublease of all or part of the Equipment will be subject to this Agreement and the rights of Lessor in, to and under this Agreement and the Equipment.

ARTICLE IX

WARRANTIES

Section 9.1. Disclaimer of Warranties. LESSOR MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, AS TO THE VALUE, DESIGN, CONDITION, MERCHANTABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE EQUIPMENT OR AGAINST INFRINGEMENT, OR ANY OTHER WARRANTY OR REPRESENTATION WITH RESPECT THERETO. IN NO EVENT SHALL LESSOR BE LIABLE FOR ANY ACTUAL, INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGE IN CONNECTION WITH OR ARISING OUT OF THIS AGREEMENT OR THE EXISTENCE, FURNISHING, FUNCTIONING OR LESSEE’S USE OR MAINTENANCE OF ANY EQUIPMENT OR SERVICES PROVIDED FOR IN THIS AGREEMENT.

Section 9.2. Vendor’s Warranties. Lessee may have rights under the contract evidencing the purchase of the Equipment; Lessee is advised to contact the Vendor for a description of any such rights. Lessor hereby assigns to Lessee during the Lease Term all warranties running from Vendor to Lessor. Lessor hereby irrevocably appoints Lessee its agent and attorney-in-fact during the Lease Term, so long as Lessee will not be in default hereunder, to assert from time to time whatever claims and rights (including without limitation warranties) related to the Equipment that Lessor may have against the Vendor. Lessee’s sole remedy for the breach of any such warranty, indemnification or representation will be against the Vendor, and not against Lessor. Any such matter will not have any effect whatsoever on the rights and obligations of Lessor with respect to this Agreement, including the right to receive full and timely payments hereunder. Lessee expressly acknowledges that Lessor makes, and has made, no representation or warranties whatsoever as to the existence or availability of such warranties by the Vendor.

ARTICLE X

LESSEE'S OPTION TO PURCHASE THE EQUIPMENT

Section 10.1. Lessee's Option to Purchase the Equipment. Lessee shall have the option to purchase Lessor's interest in the Equipment, upon giving written notice to Lessor at least 30 days before the date of purchase, on any date, upon payment in full to Lessor all Rental Payments and all other amounts then due hereunder, plus the then remaining Principal Portion of Rental Payments through the Maximum Lease Term.

Section 10.2. Determination of Fair Purchase Price. Lessee and Lessor hereby agree and determine that the Rental Payments hereunder during the Original Term and each Renewal Term represent the fair value of the use of the Equipment and that the amount required to exercise Lessee's option to purchase the Equipment pursuant to **Section 10.01** represents, as of the end of the Original Term or any Renewal Term, the fair purchase price of the Equipment. Lessee hereby determines that the Rental Payments do not exceed a reasonable amount so as to place Lessee under a practical economic compulsion to renew this Agreement or to exercise its option to purchase the Equipment hereunder. In making such determinations, Lessee and Lessor have given consideration to (a) the costs of the Equipment, (b) the uses and purposes for which the Equipment will be employed by Lessee, (c) the benefit to Lessee by reason of the acquisition and installation of the Equipment and the use of the Equipment pursuant to the terms and provisions of this Agreement, and (d) Lessee's option to purchase the Equipment. Lessee hereby determines and declares that the acquisition and installation of the Equipment and the leasing of the Equipment pursuant to this Agreement will result in equipment of comparable quality and meeting the same requirements and standards as would be necessary if the acquisition and installation of the Equipment were performed by Lessee other than pursuant to this Agreement. Lessee hereby determines and declares that the Maximum Lease Term does not exceed the useful life of the Equipment.

ARTICLE XI

DAMAGE, DESTRUCTION AND CONDEMNATION; USE OF NET PROCEEDS

Section 11.1. Damage, Destruction and Condemnation. If (a) the Equipment or any portion thereof is destroyed, in whole or in part, or is damaged by fire or other casualty, or (b) title to, or the temporary use of, the Equipment or any part thereof or the interest of Lessee or Lessor in the Equipment or any part thereof will be taken under the exercise of the power of eminent domain by any governmental body or by any person, firm or corporation acting under governmental authority (other than by the Lessee or any entity controlled by or otherwise affiliated with Lessee), Lessee and Lessor will cause the Net Proceeds of any insurance claim or condemnation award to be applied to the prompt replacement, repair, restoration, modification or improvement of the Equipment, unless Lessee has exercised its option to purchase the Equipment pursuant to **Section 10.1**. Any balance of the Net Proceeds remaining after such work has been completed will be paid to Lessee.

Section 11.2. Insufficiency of Net Proceeds. If the Net Proceeds are insufficient to pay in full the cost of any repair, restoration, modification or improvement referred to in **Section 11.1**, Lessee will either (a) complete such replacement, repair, restoration, modification or improvement and pay any costs thereof in excess of the amount of the Net Proceeds, or (b) purchase Lessor's interest in the Equipment pursuant to **Section 10.1**. The amount of the Net Proceeds, if any, remaining after completing such repair, restoration, modification or improvement or after purchasing the Equipment will be retained by Lessee. If Lessee will

make any payments pursuant to this Section, Lessee will not be entitled to any reimbursement therefor from Lessor nor will Lessee be entitled to any diminution of the amounts payable under **Article IV**.

Section 11.3. Cooperation of Lessor. Lessor shall cooperate fully with Lessee, at the expense of Lessee, in filing any proof of loss with respect to any insurance policy covering the events described in **Section 11.1** and in the prosecution or defense of any prospective or pending condemnation proceeding with respect to the Equipment or any part thereof and will, to the extent it may lawfully do so, permit Lessee to litigate in any proceeding resulting therefrom in the name of and on behalf of Lessor. In no event will Lessor voluntarily settle, or consent to the settlement of, any proceedings arising out of any insurance claim or any prospective or pending condemnation proceeding with respect to the Equipment or any part thereof without the written consent of Lessee.

Section 11.4. Risk of Loss. Lessee assumes, from and including the Commencement Date, all risk of loss of or damage to the Equipment from any cause whatsoever. No such loss of or damage to the Equipment nor defect therein nor unfitness or obsolescence thereof will relieve Lessee of the obligation to make Rental Payments or to perform any other obligation under this Agreement.

ARTICLE XII

DEFAULT PROVISIONS

Section 12.1. Events of Default Defined. The following shall be “Events of Default” under this Agreement and the term “Events of Default” shall mean, whenever it is used in this Agreement, any one or more of the following events:

- (a) Subject to the provisions of **Section 3.3**, failure by Lessee to pay any Rental Payment or other payment required to be paid hereunder at the time specified herein;
- (b) Subject to the provisions of **Section 3.3**, failure by Lessee to observe and perform any covenant, condition or agreement on its part to be observed or performed, other than as referred to in **Section 12.1(a)**, for a period of 30 days after written notice, specifying such failure and requesting that it be remedied, is given to Lessee by Lessor, unless Lessor will agree in writing to an extension of such time prior to its expiration; provided, however, if the failure stated in the notice cannot be corrected within the applicable period, Lessor will not unreasonably withhold its consent to an extension of such time if corrective action is instituted by Lessee within the applicable period and diligently pursued until the default is corrected;
- (c) Any statement, representation or warranty made by Lessee in or pursuant to this Agreement or its execution, delivery or performance will prove to have been false, incorrect, misleading or breached in any material respect on the date when made;
- (d) Subject to the provisions of **Section 3.05**, any provision of this Agreement will at any time for any reason cease to be valid and binding on Lessee, or will be declared to be null and void, or the validity or enforceability thereof will be contested by Lessee or any governmental agency or authority if the loss of such provision would materially adversely affect the rights or security of Lessor, or Lessee will deny that it has any further liability or obligation under this Agreement;
- (e) Lessee will (i) apply for or consent to the appointment of a receiver, trustee, custodian or liquidator of Lessee, or of all or a substantial part of the assets of Lessee, (ii) be unable,

fail or admit in writing its inability generally to pay its debts as they become due, (iii) make a general assignment for the benefit of creditors, (iv) have an order for relief entered against it under applicable federal bankruptcy law, or (v) file a voluntary petition in bankruptcy or a petition or an answer seeking reorganization or an arrangement with creditors or taking advantage of any insolvency law or any answer admitting the material allegations of a petition filed against Lessee in any bankruptcy, reorganization or insolvency proceeding; or

(f) An order, judgment or decree will be entered by any court of competent jurisdiction, approving a petition or appointing a receiver, trustee, custodian or liquidator of Lessee or of all or a substantial part of the assets of Lessee, in each case without its application, approval or consent, and such order, judgment or decree will continue unstayed and in effect for any period of 30 consecutive days.

Section 12.2. Remedies. Whenever any Event of Default shall have happened and be continuing, Lessor shall have the right, at its option and without any further demand or notice, to take any one or more of the following remedial steps:

(a) By written notice to Lessee, Lessor may declare all Rental Payments and other amounts payable by Lessee hereunder to the end of the then current Original Term or Renewal Term to be due;

(b) With or without terminating this Agreement, Lessor may enter the premises where the Equipment is located and retake possession of the Equipment or require Lessee at Lessee's expense to promptly return any or all of the Equipment to the possession of Lessor at a place specified by Lessor, and sell or lease the Equipment or, for the account of Lessee, sublease the Equipment, holding Lessee liable for the difference between (i) the Rental Payments and other amounts payable by Lessee hereunder to the end of the then current Original Term or Renewal Term, and (ii) the net proceeds of any such sale, lease or sublease (after deducting all expenses of Lessor in exercising its remedies under this Agreement, including without limitation, all expenses of taking possession, storing, reconditioning and selling or leasing the Equipment and all brokerage, auctioneers' and attorneys' fees); and

(c) Lessor may take whatever other action at law or in equity may appear necessary or desirable to enforce its rights as the owner of the Equipment.

Section 12.3. No Remedy Exclusive. No remedy herein conferred upon or reserved to Lessor is intended to be exclusive and every such remedy shall be cumulative and shall be in addition to every other remedy given under this Agreement or now or hereafter existing at law or in equity. No delay or omission to exercise any right or power accruing upon any default shall impair any such right or power or shall be construed to be a waiver thereof, but any such right and power may be exercised from time to time and as often as may be deemed expedient. In order to entitle Lessor or Lessee to exercise any remedy reserved to it in this Article it shall not be necessary to give any notice, other than such notice as may be required in this Article or by law.

Section 12.4. No Additional Waiver Implied by One Waiver. In the event any agreement contained in this Agreement shall be breached by either party and thereafter waived by the other party, such waiver shall be limited to the particular breach so waived and shall not be deemed to waive any other breach hereunder.

ARTICLE XIII

MISCELLANEOUS

Section 13.1. Maintenance of Tax-Exemption. Lessee shall not take any action or fail to take any action which action or failure would cause the interest components of Rental Payments under this Agreement to be includable in gross income for federal income tax purposes. Lessee will comply with all applicable provisions of the Code, including Sections 103 and 148 thereof, and the regulations of the Treasury Department thereunder from time to time proposed or in effect in order to maintain the exclusion from gross income for purposes of federal income taxation of the interest components of Rental Payments under this Agreement. Without limiting the generality of the foregoing, Lessee hereby ratifies, confirms and incorporates herein, as though set forth in full at this place, the representations, covenants and warranties contained in the Federal Tax Certificate relating to this Agreement and delivered to Lessor concurrently with this Agreement.

Section 13.2. Notices. It shall be sufficient service of any notice, request, complaint, demand or other paper required by this Agreement to be given or filed with Lessor or Lessee if the same shall be duly mailed by registered or certified mail with postage prepaid addressed as set forth in **Exhibit B** hereto. Lessor and Lessee may, by notice given hereunder, designate any further or different addresses to which subsequent notices, certificates or other communications shall be sent.

Section 13.3. Net Lease. It is the understanding and agreement of the parties hereto that, subject to **Sections 3.3** and **4.3**, this is a clear “net” lease obligation and that Lessee shall bear all expenses and make all payments consistent with the principle of the “net” Lease. Lessee hereby assumes and agrees to perform all duties and obligations relating to the Equipment, as well as the use, operation, and maintenance thereof, even though such duties and obligations may otherwise be construed to be those of Lessor.

Section 13.4. No Pecuniary Liability. No provision, covenant or agreement contained in this Agreement or any obligation herein imposed upon Lessor, or the breach thereof, shall constitute or give rise to or impose upon Lessor a pecuniary liability.

Section 13.5. Amendments, Changes and Modifications. This Agreement may be amended, changed or modified in any manner by written agreement of Lessor and Lessee. Any waiver of any provision of this Agreement or any right or remedy hereunder must be affirmatively and expressly made in writing and shall not be implied from inaction, course of dealing or otherwise.

Section 13.6. Financial Statements. Each year during the term of this Agreement, Lessee hereby agrees to deliver to Lessor a copy of: (i) annual audited financial statements within six months of the end of the Fiscal Year; and (ii) any other financial information Lessor requests from time to time, within a reasonable period of time after such request.

Section 13.7. Binding Effect. This Agreement shall inure to the benefit of and shall be binding upon Lessor and Lessee and their respective successors and assigns.

Section 13.8. Execution; Electronic Transactions. This Agreement may be executed in any number of counterparts, each of which will be deemed to be an original but all together will constitute but one and the same Lease. It is also agreed that separate counterparts of this Agreement may be executed by Lessor and Lessee all with the same force and effect as though the same counterpart had been executed by both Lessor and Lessee. Copies, telecopies, facsimiles, electronic files and other reproductions of original executed

documents will be deemed to be authentic and valid counterparts of such original documents for all purposes, including the filing of any claim, action or suit in the appropriate court of law. The parties agree that the transaction described herein may be conducted and related documents may be sent, received or stored by electronic means.

[Remainder of page intentionally left blank.]

IN WITNESS WHEREOF, the parties hereto have executed these presents the day and year first above written.

FIRST STATE COMMUNITY BANK, as lessor

By: _____
Name:
Title:

CITY OF MOBERLY, MISSOURI
as lessee

By: _____
Name:
Title:

[SEAL]

ATTEST:

By: _____
Name:
Title: City Clerk

EXHIBIT A TO LEASE PURCHASE AGREEMENT

RENTAL PAYMENT SCHEDULE

Rental Payments will be made quarterly on the first day of each February, May, August and November, beginning February 1, 2020 through the Maximum Lease Term. The Rental Payment through November 1, 2020 will be equal to the interest accrued at the Interest Rate set forth on **Exhibit B**, on the aggregate principal advanced and outstanding through the Final Disbursement Date with interest to begin to accrue from the date the principal has been advanced.

As soon as practical after the earlier of (a) the Completion Date or (b) the Final Disbursement Date, Lessor will provide an updated Rental Payment Schedule, with the Rental Payments being based upon the aggregate principal advanced, amortized for level payments at the Interest Rate set forth on **Exhibit B**, over the Maximum Lease Term.

Notwithstanding anything in the Lease to the contrary, the Lessee agrees that, upon a Determination of Taxability, Rental Payments shall be adjusted to reflect that the interest rate used to calculate Interest Portions of Rental Payments will be increased by 100 basis points retroactive to the date that, according to the Determination of Taxability, the Interest Portions of Rental Payments are no longer excludable from gross income for federal income tax purposes. The Lessee agrees to promptly acknowledge an amended Payment Schedule. *“Determination of Taxability”* means (a) a determination by the commissioner or any district director of the Internal Revenue Service, or (b) a determination by any court of competent jurisdiction, that the Interest Portions of the Rental Payments are includible in gross income for federal income tax purposes of the Lessor; provided, however, that no such Determination of Taxability shall be deemed to have occurred if the Lessee has been afforded the opportunity to contest such determination, has elected to contest such determination in good faith and is proceeding with all reasonable dispatch to prosecute such contest until the earlier of (i) a final determination from which no appeal may be taken with respect to such determination or (ii) abandonment of such appeal by the Lessee.

The Lessee has the option to purchase the Equipment subject to the provisions of **Section 10.1**.

The Lessee hereby acknowledges the Rental Payments and other terms set forth above.

CITY OF MOBERLY, MISSOURI, as Lessee

By: _____
Name:
Title:

EXHIBIT B TO LEASE PURCHASE AGREEMENT

OTHER PROVISIONS

Fiscal Year: Lessee’s Fiscal Year currently begins on July 1 of each year.

Initial Principal Advance on the Commencement Date: \$100,000.00.

Maximum Authorized Amount: \$4,675,000.00.

Interest Rate: The interest rate shall be 2.945% per annum. The interest rate will be based on a 30/360 accrual basis.

Final Rental Payment Date: November 1, 2028.

Addresses: The following addresses shall be used as described in **Section 14.2**, unless changed as described therein:

- (a) If to Lessor: **FIRST STATE COMMUNITY BANK**
201 E. Columbia
Farmington, Missouri 63640
Attention: Governmental Lending

- (b) If to Lessee: **CITY OF MOBERLY, MISSOURI**
101 West Reed Street
Moberly, Missouri 65270
Attention: City Manager

SCHEDULE 1 TO LEASE PURCHASE AGREEMENT

DESCRIPTION OF THE EQUIPMENT

* * *