

DISCLAIMER OF RESPONSIBILITY  
I hereby certify that the documents intended to be authorized by my seal are limited to the work shown on these drawings. I am not responsible for any other drawings, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part or parts of the architectural or engineering project or survey.



JEFFREY R. SMITH, P.E.  
MO. P.E. # E-2001004672

PREPARED FOR:  
BETH HOLDINGS, LLC  
MR. DAVID BETH  
322 COUNTRY MEADOWS DRIVE  
ST. CHARLES, MISSOURI 63503  
TELEPHONE: 314-614-2207  
FAX: 314-553-5078  
E-mail: dbeth01@sbcbglobal.net

P & Z No.  
00-27.17.02 - 4/1/10  
City No.

Page No. 3

to eliminate settling. Any completed areas that show settlement shall be promptly re-backfilled with compacted clean earth or compacted 1" clean rock as required for the initial backfill. Refer to Detail A.

9. Pipe insulation  
Laying of the pipe shall commence immediately after the excavation is started, and the Contractor shall use every possible means to keep the completed pipe installation closely behind trenching. The Water District may stop the trenching if it appears that the trench is open too far in advance of the pipe laying operation. The Contractor may lay pipe in the best manner adapted to securing speed and good results. The Contractor shall have the necessary equipment and tools available for making the joints for the specific materials being used.  
All pipe spigot ends shall be visibly marked to fully "make-up" the joint. With excavation of field cut pipe, all "make-up" marks shall be placed on the pipe at the factory. Field cut pipe shall be marked for full joint depth prior to insertion.  
Cutting of pipe for closure pieces with installation of valves or fittings, or for any other reason, shall be done in a neat and workman-like manner without damage to the pipe or linings. The cutting operation shall leave a smooth cut end at right angles to the longitudinal axis of the pipe. The exterior surface of the cut end shall be beveled, and the interior surface shall be reamed or filed free of all rough edges and protrusions. All pipe cutting shall be done by saw or mechanical pipe cutters of an approved type.  
Upon completion of the cutting and trimming operation, the pipe end or ends shall be marked for "make-up" depth. Prior to insertion, the pipe shall be thoroughly cleaned of all foreign materials, including filing and cutting debris.

10. Valve Installation  
Prior to installation, all valves shall be checked for bolt tightness and operation. All foreign matter, dirt, and debris, shall be removed from inside the valve body. The valve gate and guide shall be cleaned free of grease and dirt. After thoroughly cleaning and checking the valve for proper operation, the valve gate shall be opened, and the valve shall be installed in place. All valves shall have pre-cast concrete block supports, the same as for fittings as shown on Detail C.  
Valve boxes shall be set plumb and earth or ground fill shall be tamped around the box to maintain the position and the lid or cover to correspond with finished grade based on the "height" indicated on the stakes for the valves.  
In general, valves shall be provided at intervals not greater than 500 feet. Additionally, at all tee intersections, a minimum of two (2) valves shall be provided, and at cross intersections, a minimum of three (3) valves shall be provided.  
11. Fire Hydrant Installation  
Fire hydrants shall be installed where shown on the plans and as shown on Detail B. Core shall be taken to set the hydrant plumb and the 4-1/2" pumper nozzle shall face the street. Core shall also be exercised to set the fire hydrant to meet the final finished grade as indicated by the "height" given on the stakes for the hydrant. After installation and backfill, the exposed barrel and top shall be given a finish coat of "Chrome yellow" paint. The operating nuts on the top of fire hydrant shall not be painted.  
In general, fire hydrants will not require thrust blocks when they are restrained by "Anchor Loks" or "Megalog" follower glands as shown on Detail B. However, if they are installed at a dead end of a street, a thrust block, some 6' x 6' x 6' shall be provided to restrain the fire hydrant and core shall be taken not to encase the drain hole in the fire hydrant.  
12. Installation of Tapping Sleeves and Valves  
The tapping sleeves shall be carefully installed on the existing pipes with tightening of bolts done carefully to avoid stresses on the existing water mains. If "Power Seal" tapping sleeves are used, particular care shall be used to follow the bolt tightening sequence as recommended by the manufacturer. The tapping valve shall then be attached to the tapping sleeve with support blocks provided as called for in these specifications. The pit for the tapping machine shall be adequate in size.  
Prior to the tap being made, with the tapping valve closed, the assembly shall be air tested to a pressure of 150 PSI, using the port provision on the tapping sleeve. After the tap is completed, the "coupon" removed shall be given to the District's representative for examination. When the tap is complete, concrete thrust blocking with the same dimensions as for a tee of the same size shall be poured behind the tapping sleeve. If the pit is to be temporarily backfilled, before pipe laying continues, a mechanical joint larger than 12" shall be installed on the tapping valve to prevent dirt or debris from entering the valve. The tapping valve shall have a valve box as specified herein for gate valves.

STREET PAVEMENT CONSTRUCTION  
I. GENERAL  
1. The paving contractor shall perform a complete installation as shown on the plans, stated in these notes, and in accordance with the plans and notes as interpreted by the project engineer.  
2. Before street paving begins, the contractor shall employ a competent, licensed surveyor to establish the lines and grades of the street pavement being constructed.  
3. The contractor shall notify the City Engineer at least two days in advance of the start of construction. Contact the City of O'Fallon: 636-379-5561 or 636-379-5596.  
4. All paving to be in accordance with Saint Charles County standards and specifications except as modified by the City of O'Fallon ordinances.  
II. SPECIFICATIONS  
1. All materials used shall meet the following specifications:  
Rolled Stone Base: Rolled Stone Base used shall meet the requirements for Type III Aggregate as specified in Section 1007 of the "Missouri Standard Specifications for Highway Construction" (latest revision).  
P.C. Concrete: P.C. Concrete used shall meet the requirements for Pavement Concrete as specified in Section 501 of the "Missouri Standard Specifications for Highway Construction" (latest revision).  
2. All areas to receive paving shall first have the earth subgrade prepared in accordance with the requirements of Section 209 of the "Missouri Standard Specifications for Highway Construction" (latest revision).  
3. Areas within the City Street rights-of-way shall have P.C. Concrete pavement installed on the earth subgrade in accordance with the requirements of the City of O'Fallon Standard Specification's for Highway Construction.  
4. All paving work shall be performed in accordance with the City of O'Fallon specifications. The City Inspector shall witness tests as performed by the Geotechnical Engineer.

2. Fittings  
All fittings shall be ductile iron, Class 350, conforming to AWWA C-153. The fittings shall have mechanical joints conforming to AWWA C-153. All fittings shall be lined and seal coated in accordance with AWWA C-104. If restraints are being used in a ductile iron restraint system for pipe 16" and larger, slip joint fittings or cast iron, resilient wedge valves, or Super Lock joints may be used. Slip joint fittings with Field Lok gaskets will not be allowed.  
3. Valves  
Valves for 6", 8" and 12" pipe shall be gate valves. Valves for 16" pipe and larger shall be butterfly valves. All gate valves shall be ductile iron or cast iron, resilient wedge valves, with non rising stems, 2" operating nuts, mechanical joints and epoxy coated bodies and be manufactured in accordance with AWWA Standard C-153. Valves shall be designed to withstand a working pressure of 250 PSI on either side of the valve. The valves shall be American Flow Control Model AFC-2500, U.S. Pipe Metrosol 250, Tyler Class 250, Mueller A-2360 or approved equal.  
The valves shall open counterclockwise and have the maker's initials, pressure rating, and year in which manufactured cast on the body. Where valves are set at a depth that leaves the operating nut more than four (4) feet below the proposed grade, an extension stem shall be furnished to bring the operating nut to within two (2) feet of the proposed grade.  
Butterfly valves shall conform to AWWA C-504 for Class 150B butterfly valves. All butterfly valves shall have a working pressure of 200 PSI. All valve components shall conform to Underwriters Laboratories classification in accordance with ANSI/NSF 21.11.  
Butterfly valves shall have cast iron or ductile iron bodies, be designed for buried service, have mechanical joint ends and have side mounted 2" square operating nuts suitable for use in a standard valve box as stated herein for gate valves.  
Discs shall be offset to provide an uninterrupted 360 degree edge and shall be ductile iron per ASTM A48, Class 40C. The disc seating edge shall be solid 316 stainless steel. Sprayed mating seating surfaces are not acceptable. The disc shall be securely attached to the valve shaft utilizing a field removable/replaceable 316 stainless steel torque screw on sizes 6"-12" or a tangential pin locked in place with a set screw on sizes above 12".  
The valves shafts shall be type 304 stainless steel. Valve seats shall be self-compensating V-type packing with a minimum of four sealing rings. One piece matted shaft seals and O-ring shaft seals will not be allowed.  
The seats shall be of Buna-N for water and shall be milled in and vulcanized to the valve bodies. The seats shall contain integral shaft seals protecting the valve bearings and packing from any line debris. Seats vulcanized to cartridge inserts in the valve bodies and seats on the discs are not allowed. Valve shaft bearings shall be non-metallic and permanently lubricated.

4. Valve Boxes  
All buried valves shall be provided with a Buffalo type valve box, Tyler 562-S or 564-S, or approved equal. The top of the valve boxes shall be designed to accommodate a valve box adjusting tool as provided in the tops of the above referenced Tyler valve boxes. The valve boxes shall be flush with the finished grade or pavement surface. All valve boxes shall be designed with a hole drilled 3" from the top to accommodate the water main locator wires.  
5. Bedding Material  
Bedding material for all PVC pipe and where required for ductile iron pipe shall be crushed limestone and screenings, 3/4" minus.  
6. Tapping Sleeves and Valves  
All tapping sleeves for 12" and smaller pipe shall be stainless steel with stainless steel flanges. The tapping sleeves shall be Power Seal No. 349D-S or 349D-SM, ASTM A432, or approved equal, with class 125 ANSI B-16.1 flanges on the outlets. For 12" ductile iron pipes, Smith Blair 662 or other approved 4 bolt models may be used. For pipes larger than 12", the tapping sleeves shall be ductile iron, split mechanical joint type.  
Tapping valves shall be designed for leak tight attachment to the tapping sleeve and tapping machine, shall have mechanical joint x flanged joint ends and shall otherwise conform to Section 7-4 Gate Valves of these specifications. All tapping valves shall have a valve box conforming to 7-5 Valve Boxes of these specifications.

7. Fire Hydrants  
Fire hydrants shall have a 5-1/4" valve opening, one 4-1/2" steamer nozzle and two 2-1/2" hose nozzles and a 6" mechanical joint shoe. The fire hydrants shall be Mueller Figure 4-423, American Darling, or approved equal, 12" diameter, Kennedy KB1D, delivered to the site coated with a black bituminous coating for the portions to be underground and a primer and yellow finish coat for the portions to be exposed. The types of paint and coating shall be as recommended by the fire hydrant manufacturer. All hydrants shall receive a final paint coat in the field. Exposed barrels and tops shall be chrome yellow. All hydrant cap threads shall be field-lubricated with an approved, food-grade grease. The hydrants shall have a minimum "bury" of four (4) feet unless the depth of the main requires a deeper "bury". Refer to Detail B of these specifications.  
8. Trench Excavation and Backfilling  
Trenches for water mains shall have a minimum width of the pipe O.D. plus 12 inches, and a maximum width of the pipe O.D. plus 24 inches. The finished cover over water mains shall be at least 48 inches above a maximum of 6'-0". Where additional depth is necessary to clear other utilities or obstructions, the District may grant permission to allow such additional depth.  
For PVC pipe, the trench depth shall be excavated 6" deeper than the proposed bottom of the pipe to allow for a 6" granular bedding of compacted 3/4" stone or rock (See Detail A). The PVC pipe shall also have the compacted granular material placed to a level 6" above the top of the pipe with core taken to fill all void spaces beneath the pipe.  
For PVC or ductile iron pipe, if the trench bottom contains frozen material, excessive moisture, debris or other deleterious material, the trench shall be excavated 6" or more deeper than the proposed pipe bottom and backfill to the desired grade with compacted 3/4" minus bedding material. For all pipe, bell holes in the trench bottom shall be provided to allow full contact of the pipe with the trench bottom.

Backfill for all pipes under roadways or parking lots shall consist of 1" clean crushed limestone carefully placed to avoid future settlement from 6" above the top of the pipe to the finished grade. In other areas, the backfill may be excavated earth, free of large stones or frozen material, vegetation or debris. Backfilling of all pipe shall be well compacted by means of jelling or other approved methods to eliminate settling. Any completed areas that show settlement shall be promptly re-backfilled with compacted clean earth or compacted 1" clean rock as required for the initial backfill. Refer to Detail A.

3. The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe. Any section of pipe found to be defective before or after laying shall be replaced with sound pipe of the same size "clean" or minus stone from springline of pipe 6" above the top of pipe.  
4. All trench backfills under paved areas shall be of Backfill Aggregate material. Trench backfills under paved areas may be earthen backfill. All trench backfills shall be water jetted.  
5. All sanitary sewer manholes shall be waterproofed on the exterior in accordance with Missouri Department of Natural Resources Specification 10-CR-8120 (7)(E).  
6. All sanitary sewer construction shall be performed in accordance with the Docket Creek Sanitary District specifications. The contractor shall assist the D.C.S.D. personnel in the inspection and testing of the sanitary sewers.  
7. Provide clean-out on all laterals over 100 L.F. and at all major angle points on all laterals.

STORM SEWER CONSTRUCTION  
I. GENERAL  
1. No area shall be cleared without authorization from the project engineer.  
2. All grading work performed shall be within a 0.2 foot tolerance of the grades shown on the grading plan.  
3. A Geotechnical Engineer shall be employed by the owner and be on site during grading operations.  
4. The grading contractor shall perform a complete grading and compaction operation as shown on the plans, stated in these notes, or reasonably implied therefrom, all in accordance with the plans and notes as interpreted by the Geotechnical Engineer.  
5. Before the grading begins, the contractor shall employ a competent, licensed surveyor to establish all lines and grades.  
6. The contractor shall notify the Geotechnical Engineer at least two days in advance of the start of the grading operation.  
7. The developer shall supply City construction inspectors with soil reports prior to or during site soil testing.  
8. No slope shall be steeper than 3 (horizontal) to 1 (vertical).  
9. All erosion control systems shall be inspected and necessary corrections made within 24 hours of a rainstorm resulting in one-half inch of rain or more.  
II. SPECIFICATIONS  
1. Site preparation includes the clearing of all stumps, trees, bushes, shrubs, and weeds; the grubbing and removal of roots and other surface obstructions from the site; and the demolition and removal of any man-made structures. The unsuitable material shall be burned (after securing permits) and/or properly disposed of on site. Topsoil and grass in the fill areas shall be thoroughly disced prior to the placement of any fill. The Geotechnical Engineer shall approve the discing operation.  
2. Compaction equipment shall consist of tamping rollers, pneumatic-tired rollers, or high speed impact type drum rollers acceptable to the Geotechnical Engineer. The roller shall be designed so as to avoid the creation of a layered fill without proper blending of successive fill layers.  
3. Observation and Testing: The Geotechnical Engineer shall observe and test the placement of the fill to verify that specifications are met. A series of fill density test will be determined of each lift of fill. Interim reports showing fill quality will be made to the owner at regular intervals.  
4. The Geotechnical Engineer shall notify the contractor of rejection of a lift of fill or portion thereof. The contractor shall rework the rejected portion of fill and obtain notification from the Geotechnical Engineer of its acceptance prior to the placement of additional fill.  
5. Placing and Compaction of Fill: All areas to receive fill shall be scarified to a depth of not less than 6 inches and then compacted to at least 90 percent of the maximum dry density as determined from the Modified Proctor Test (ASTM-D-1557). Natural slopes steeper than 1 vertical to 5 horizontal to receive fill will have horizontal benches, with minimum widths of 12 feet and maximum height of 5 feet, cut into before the placement of any fill. The fill shall be loosely placed in horizontal layers not exceeding 8 inches in thickness and compacted in accordance with the specifications given below. The Contractor shall be responsible for determining the acceptability of the soils placed. Any unacceptable soils placed shall be removed at the contractor's expense.  
6. The sequence of operation in the fill areas will be fill, compact, verify acceptable soil density, and repetition of the sequence.  
7. The surface of the fill shall be finished so that it will not impound water. If at the end of a day's work, it would appear that there may be rain prior to the next working day, the surface shall be finished smooth. If the surface has been finished smooth for any reason, it shall be scarified before proceeding with the placement of succeeding lifts. Fill should not be placed on frozen ground, nor shall filling operations continue when the temperature is such as to permit the layer under placement to freeze.  
8. All fills shall be compacted to 90% of maximum density as determined by the "Modified AASHTO T-180 Compaction Test" (ASTM D-1557).  
9. All fill placed under proposed storm and sanitary sewer, proposed roads, and/or paved areas shall be compacted to 95% of maximum density as determined by the Modified AASHTO T-180 Compaction Test or 100% of maximum density as determined by the Standard Proctor Test AASHTO T-99. All fill placed in proposed roads shall be compacted from the bottom of the fill up. All tests shall be verified by a soils engineer concurrent with grading and backfilling operations. The moisture content of the soil in the fill areas is to correspond to the compactive effort as defined by the Standard or Modified Proctor Test. Optimum moisture content shall be determined using the same test that was used for compaction. Soil compaction curves shall be submitted to the City of O'Fallon prior to placement of fill. Proof rolling may be required to verify soil stability at the discretion of the City of O'Fallon.

WATER MAIN CONSTRUCTION  
I. GENERAL  
1. The water main contractor shall perform a complete installation as shown on the plans, stated in these notes, or reasonably implied therefrom, all in accordance with the plans and notes as interpreted by the project engineer.  
2. Before water main construction begins, the owner shall employ a competent, licensed surveyor to establish the lines of the mains being constructed.  
3. The contractor shall notify the following at least two days in advance of the start of construction: St. Charles County Public Water Supply District No. 2: 636-561-3737 ext. 131; City of O'Fallon: 636-379-5561 or 636-379-5596.  
4. Materials for use at any location in the water distribution system shall meet the requirements as set forth in the specifications below. When references are made to standards such as AWWA, ANSI, ASTM, etc. it shall be understood that such references are to the latest edition of such standards. When requested by the District, Contractors shall furnish affidavits from their suppliers certifying that materials conform to stated standards before being incorporated into the work.  
Where materials are specified by brand name and model, followed by the words "or approved equal", the information concerning an "approved equal" product must be submitted to the District and a written statement of approval by the District must be issued by the District before such material may be used. In all cases, approval of such alternate products shall be at the sole discretion of the District.  
Failure to comply with these specifications shall result in rejection of the work by the District.  
II. SPECIFICATIONS  
1. Pipe  
All pipe for water mains shall be 6" (inch) in diameter or larger and shall be PVC or ductile iron. In general, pipes 6", 8", and 12" shall be PVC and pipes larger than 12" shall be ductile iron. For certain projects, 12" pipe may be required to be ductile iron. No 10", 14" or 18" pipe will be allowed except as required to connect to existing facilities.  
PVC pipe shall be class 200, with a standard dimension ratio (SDR) of 21 or as otherwise directed by the District. Pipe use under High Density Polyethylene (HDPE) pipe meeting the performance requirements of ASTM D-3212.  
Bedding Aggregate: Bedding Aggregate shall conform to the following:  
For Pipes 27 inch in diameter and smaller:  
% by Weight Passing  
Sieve Maximum Minimum  
1 inch 100 100  
3/4 inch 100 90  
1/2 inch 60 35  
# 100 10 0  
For Pipes 30 inch in diameter and larger:  
% by Weight Passing  
Sieve Maximum Minimum  
1-1/2 inch 100 100  
1 inch 70 60  
3/4 inch 50 35  
1/2 inch 35 25  
100 10 0  
Backfill Aggregate: Backfill Aggregate shall be crushed limestone and screenings and be 3/4 inch minus.  
Rip-Rap: Rip-Rap shall conform to the following:  
% by Weight Passing  
Sieve Maximum Minimum  
12 inch 90 70  
6 inch 50 35  
1/2 inch 5 0  
Grout: All grout used for grouted rip-rap shall be high slump ready-mix concrete.  
2. Pipe and appurtenances shall be new and unused. The type of pipe to be installed shall be as shown on the drawings. Pipe and appurtenances shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Particular care shall be taken to prevent damage to any pipe coating.  
3. The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe. Any section of pipe found to be defective before or after laying shall be replaced with sound pipe, or repaired in a satisfactory manner.  
4. Pipe shall be laid to line and grade as shown on the plans and as staked in the field. When connections are to be made to any existing manhole, pipe, or other improvement, the actual elevation or position of which cannot be determined without excavation, the contractor shall excavate for and expose the existing improvement before laying the connection pipe conduit. When existing underground improvements may reasonably be expected to conflict with the line or grade established for the new sewer line, the contractor shall excavate as necessary to expose and locate such potentially conflicting underground improvements prior to laying the new pipe. Any adjustment in line or grade which may be necessary to accomplish the intent of the plans shall be made.  
5. Pipe shall be laid upon a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade.  
6. All trench backfills under paved areas shall be compacted to 90% of the maximum density as determined by the "Modified AASHTO T-180 Compaction Test", or to 95% of maximum density as determined by the Standard Proctor Test AASHTO T-99. All fill placed in proposed roads shall be compacted from the bottom of the fill up. All tests shall be verified by a Soils Engineer concurrent with grading and backfilling operations. The moisture content of the soil in fill areas is to correspond to the compactive effort as defined by the Standard or Modified Proctor Test. Optimum moisture content shall be determined using the same test that was used for compaction. Soil compaction curves shall be submitted to the City of O'Fallon prior to placement of fill. Proof rolling may be required to verify soil stability at the discretion of the City of O'Fallon.

4. The contractor shall notify the City of O'Fallon and Duckett Creek Sanitary District at least two days in advance of the start of construction. Contact the City of O'Fallon, at telephone (636) 379-5561 or (636) 379-5596 and Duckett Creek Sanitary District, at telephone (636) 441-1244.  
5. All sanitary sewer building connections shall be designed so that the minimum vertical distance from the low point of the basement to the flowline of a sanitary sewer at the corresponding building connection shall not be less than the diameter of the pipe plus the vertical distance of 2-1/2 feet.  
6. All sanitary sewer manholes shall be waterproofed on the exterior in accordance with Missouri Department of Natural Resources specification 10-CR-8120(7)(E).  
7. All PVC sanitary sewer pipe shall conform to the requirements of ASTM D-3034 Standard Specification for PSM Polyvinyl Chloride Sewer Pipe, SDR-35 or equal, with "clean" 1/2 inch to 1 inch granular stone bedding uniformly graded. This bedding shall extend from 4 inches below the pipe to springline of pipe. Immediate backfill over pipe shall consist of same size "clean" or minus stone from springline of pipe 6" above the top of pipe.  
8. All trench backfills under paved areas shall be of Backfill Aggregate material. Trench backfills under paved areas may be earthen backfill. All trench backfills shall be water jetted.  
9. All sanitary sewer manholes shall be waterproofed on the exterior in accordance with Missouri Department of Natural Resources Specification 10-CR-8120 (7)(E).  
10. Provide clean-out on all laterals over 100 L.F. and at all major angle points on all laterals.

REINFORCED CONCRETE PIPE  
I. GENERAL  
1. No area shall be cleared without authorization from the project engineer.  
2. The storm sewer contractor shall perform a complete installation as shown on the plans, and notes as interpreted by the project engineer, stated in these notes, or reasonably implied.  
3. Before sewer construction begins, the contractor shall employ a competent, licensed surveyor to establish the lines and grades of the storm sewers being constructed. The contractor shall pick up the cut sheets at the office of the surveyor.  
4. The contractor shall notify the City of O'Fallon at least two days in advance of the start of construction. Contact the City of O'Fallon, at telephone 636-379-5561 or 636-379-5596.  
II. SPECIFICATIONS  
1. All materials used shall meet the following specifications:  
Concrete Pipe: Concrete pipe shall be precast and shall conform to the requirements of the Specifications for Concrete Sewer Pipe, ASTM C14. The interior surface of the pipe shall be a true cylindrical surface free from undulations or corrugations. Cement shall meet all requirements of the Specifications for Portland Cement, ASTM C150, Type II.  
Reinforced Concrete Pipe: Reinforced Concrete Pipe shall be precast and shall conform to the requirements of the Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, ASTM C507. Strength class or classes shall be as noted on the Project Plans. The interior surfaces of the pipe shall be a smooth true cylindrical surface free from undulations or corrugations. Lifting holes when provided, shall be cast in the wall of the pipe to receive a pre-cast truncated conical concrete plug of such sizes as will allow 1/8 inch cementing material on the side of the joining surfaces of the plug and will fill at least 50% of the lifting hole depth. Cement shall meet all the requirements of the Specifications for Portland Cement, ASTM C150, Type II. Cut pipe for curved alignments shall be of uniform cut and length along the same curve and otherwise meet the same requirements as for straight pipe.  
High Density Polyethylene Pipe: High Density Polyethylene shall be allowed following Metropolitan Saint Louis Sewer District (MSD) requirements which include meeting AASHTO M-294 Type S, or ASTM F-2306.  
Storm Manholes: Storm Manholes shall be precast reinforced concrete manholes conforming to the standard specifications for precast reinforced concrete manhole sections, ASTM C478 and the approved Standards of sewer construction for the Duckett Creek Sanitary District. The Portland cement used shall be Type II. Manhole cones shall be concentric and base sections shall have the base riser section integral with the floor. Manhole steps shall be cast into the full depth of the wall section. Connections for inlet and outlet pipes shall be of an approved patented compression type connection. The inside diameter for riser sections shall be 42 inches for 48 inch pipes and be 48 inches for pipe sizes larger and for inside drop manholes. No brick structures allowed.  
Manhole Frames and Covers: Gray Iron Castings conforming to the requirements of the specifications for Gray Iron Castings, ASTM A48. All castings shall be clean and free of scale, oxidation, or inclusions. They shall be fabricated to Class 30B cast iron. Bearing surfaces between manhole frames and covers shall be such that the cover shall seat in any position onto the frame without rocking.  
Joints: Type D joints shall be used with PVC pipes and shall be elastomeric gasket joints providing a water tight seal. They shall conform to the requirements of the "Specifications for Joints for Drain and Sewer Plastic Pipes and Fittings Using Flexible Elastomeric Seals", ASTM C-3212.  
Bedding Aggregate: Bedding Aggregate shall conform to the following, and have a maximum percentage of "fines" as follows:  
Sieve % by Weight Passing  
Maximum Minimum  
1 inch 100 100  
3/4 inch 100 90  
1/2 inch 60 35  
# 100 10 0  
Backfill Aggregate: Backfill Aggregate shall be crushed limestone and screenings and be 3/4 inch minus.  
Pipe and appurtenances shall be new and unused. The type of pipe to be installed shall be as shown on the drawings. Pipe and appurtenances shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken to prevent damage to any pipe coating.  
3. The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe. Any section of pipe found to be defective before or after laying shall be replaced with sound pipe, or repaired in a satisfactory manner.  
4. Pipe shall be laid to line and grade as shown on the plans and as staked in the field. When connections are to be made to any existing manhole, pipe, or other improvement, the actual elevation or position of which cannot be determined without excavation, the contractor shall excavate for and expose the existing improvement before laying the connection pipe conduit. When existing underground improvements may reasonably be expected to conflict with the line or grade established for the new sewer line, the contractor shall excavate as necessary to expose and locate such potentially conflicting underground improvements prior to laying the new pipe. Any adjustment in line or grade which may be necessary to accomplish the intent of the plans shall be made.  
5. Pipe shall be laid upon a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade.

GENERAL NOTES PERTAINING TO ALL CONSTRUCTION OPERATIONS  
1. Underground utilities shown on these plans have been plotted from available records and information, and their locations shall be considered approximate only. The verification of the actual location of all underground utilities, either shown or not shown on these plans, shall be the responsibility of the contractor(s) and the verification of the actual location shall be performed prior to beginning work.  
2. Easements and right-of-ways will be provided for streets, sanitary sewers, storm sewers, water mains and private utilities on the subdivision plot (record plat). See the subdivision plot (record plat) for location and size of easements and rights-of-way.  
3. All construction shall be performed in accordance with the specifications, ordinances, rules, regulations, guidelines and/or policies of the local governing jurisdictional authority.  
GRADING NOTES  
I. GENERAL  
1. No area shall be cleared without authorization from the project engineer.  
2. All grading work performed shall be within a 0.2 foot tolerance of the grades shown on the grading plan.  
3. A Geotechnical Engineer shall be employed by the owner and be on site during grading operations.  
4. The grading contractor shall perform a complete grading and compaction operation as shown on the plans, stated in these notes, or reasonably implied therefrom, all in accordance with the plans and notes as interpreted by the Geotechnical Engineer.  
5. Before the grading begins, the contractor shall employ a competent, licensed surveyor to establish all lines and grades.  
6. The contractor shall notify the Geotechnical Engineer at least two days in advance of the start of the grading operation.  
7. The developer shall supply City construction inspectors with soil reports prior to or during site soil testing.  
8. No slope shall be steeper than 3 (horizontal) to 1 (vertical).  
9. All erosion control systems shall be inspected and necessary corrections made within 24 hours of a rainstorm resulting in one-half inch of rain or more.  
II. SPECIFICATIONS  
1. Site preparation includes the clearing of all stumps, trees, bushes, shrubs, and weeds; the grubbing and removal of roots and other surface obstructions from the site; and the demolition and removal of any man-made structures. The unsuitable material shall be burned (after securing permits) and/or properly disposed of on site. Topsoil and grass in the fill areas shall be thoroughly disced prior to the placement of any fill. The Geotechnical Engineer shall approve the discing operation.  
2. Compaction equipment shall consist of tamping rollers, pneumatic-tired rollers, or high speed impact type drum rollers acceptable to the Geotechnical Engineer. The roller shall be designed so as to avoid the creation of a layered fill without proper blending of successive fill layers.  
3. Observation and Testing: The Geotechnical Engineer shall observe and test the placement of the fill to verify that specifications are met. A series of fill density test will be determined of each lift of fill. Interim reports showing fill quality will be made to the owner at regular intervals.  
4. The Geotechnical Engineer shall notify the contractor of rejection of a lift of fill or portion thereof. The contractor shall rework the rejected portion of fill and obtain notification from the Geotechnical Engineer of its acceptance prior to the placement of additional fill.  
5. Placing and Compaction of Fill: All areas to receive fill shall be scarified to a depth of not less than 6 inches and then compacted to at least 90 percent of the maximum dry density as determined from the Modified Proctor Test (ASTM-D-1557). Natural slopes steeper than 1 vertical to 5 horizontal to receive fill will have horizontal benches, with minimum widths of 12 feet and maximum height of 5 feet, cut into before the placement of any fill. The fill shall be loosely placed in horizontal layers not exceeding 8 inches in thickness and compacted in accordance with the specifications given below. The Contractor shall be responsible for determining the acceptability of the soils placed. Any unacceptable soils placed shall be removed at the contractor's expense.  
6. The sequence of operation in the fill areas will be fill, compact, verify acceptable soil density, and repetition of the sequence.  
7. The surface of the fill shall be finished so that it will not impound water. If at the end of a day's work, it would appear that there may be rain prior to the next working day, the surface shall be finished smooth. If the surface has been finished smooth for any reason, it shall be scarified before proceeding with the placement of succeeding lifts. Fill should not be placed on frozen ground, nor shall filling operations continue when the temperature is such as to permit the layer under placement to freeze.  
8. All fills shall be compacted to 90% of maximum density as determined by the "Modified AASHTO T-180 Compaction Test" (ASTM D-1557).  
9. All fill placed under proposed storm and sanitary sewer, proposed roads, and/or paved areas shall be compacted to 95% of maximum density as determined by the Modified AASHTO T-180 Compaction Test or 100% of maximum density as determined by the Standard Proctor Test AASHTO T-99. All fill placed in proposed roads shall be compacted from the bottom of the fill up. All tests shall be verified by a soils engineer concurrent with grading and backfilling operations. The moisture content of the soil in the fill areas is to correspond to the compactive effort as defined by the Standard or Modified Proctor Test. Optimum moisture content shall be determined using the same test that was used for compaction. Soil compaction curves shall be submitted to the City of O'Fallon prior to placement of fill. Proof rolling may be required to verify soil stability at the discretion of the City of O'Fallon.

GENERAL NOTES PERTAINING TO ALL CONSTRUCTION OPERATIONS  
1. Underground utilities shown on these plans have been plotted from available records and information, and their locations shall be considered approximate only. The verification of the actual location of all underground utilities, either shown or not shown on these plans, shall be the responsibility of the contractor(s) and the verification of the actual location shall be performed prior to beginning work.  
2. Easements and right-of-ways will be provided for streets, sanitary sewers, storm sewers, water mains and private utilities on the subdivision plot (record plat). See the subdivision plot (record plat) for location and size of easements and rights-of-way.  
3. All construction shall be performed in accordance with the specifications, ordinances, rules, regulations, guidelines and/or policies of the local governing jurisdictional authority.  
GRADING NOTES  
I. GENERAL  
1. No area shall be cleared without authorization from the project engineer.  
2. All grading work performed shall be within a 0.2 foot tolerance of the grades shown on the grading plan.  
3. A Geotechnical Engineer shall be employed by the owner and be on site during grading operations.  
4. The grading contractor shall perform a complete grading and compaction operation as shown on the plans, stated in these notes, or reasonably implied therefrom, all in accordance with the plans and notes as interpreted by the Geotechnical Engineer.  
5. Before the grading begins, the contractor shall employ a competent, licensed surveyor to establish all lines and grades.  
6. The contractor shall notify the Geotechnical Engineer at least two days in advance of the start of the grading operation.  
7. The developer shall supply City construction inspectors with soil reports prior to or during site soil testing.  
8. No slope shall be steeper than 3 (horizontal) to 1 (vertical).  
9. All erosion control systems shall be inspected and necessary corrections made within 24 hours of a rainstorm resulting in one-half inch of rain or more.  
II. SPECIFICATIONS  
1. Site preparation includes the clearing of all stumps, trees, bushes, shrubs, and weeds; the grubbing and removal of roots and other surface obstructions from the site; and the demolition and removal of any man-made structures. The unsuitable material shall be burned (after securing permits) and/or properly disposed of on site. Topsoil and grass in the fill areas shall be thoroughly disced prior to the placement of any fill. The Geotechnical Engineer shall approve the discing operation.  
2. Compaction equipment shall consist of tamping rollers, pneumatic-tired rollers, or high speed impact type drum rollers acceptable to the Geotechnical Engineer. The roller shall be designed so as to avoid the creation of a layered fill without proper blending of successive fill layers.  
3. Observation and Testing: The Geotechnical Engineer shall observe and test the placement of the fill to verify that specifications are met. A series of fill density test will be determined of each lift of fill. Interim reports showing fill quality will be made to the owner at regular intervals.  
4. The Geotechnical Engineer shall notify the contractor of rejection of a lift of fill or portion thereof. The contractor shall rework the rejected portion of fill and obtain notification from the Geotechnical Engineer of its acceptance prior to the placement of additional fill.  
5. Placing and Compaction of Fill: All areas to receive fill shall be scarified to a depth of not less than 6 inches and then compacted to at least 90 percent of the maximum dry density as determined from the Modified Proctor Test (ASTM-D-1557). Natural slopes steeper than 1 vertical to 5 horizontal to receive fill will have horizontal benches, with minimum widths of 12 feet and maximum height of 5 feet, cut into before the placement of any fill. The fill shall be loosely placed in horizontal layers not exceeding 8 inches in thickness and compacted in accordance with the specifications given below. The Contractor shall be responsible for determining the acceptability of the soils placed. Any unacceptable soils placed shall be removed at the contractor's expense.  
6. The sequence of operation in the fill areas will be fill, compact, verify acceptable soil density, and repetition of the sequence.  
7. The surface of the fill shall be finished so that it will not impound water. If at the end of a day's work, it would appear that there may be rain prior to the next working day, the surface shall be finished smooth. If the surface has been finished smooth for any reason, it shall be scarified before proceeding with the placement of succeeding lifts. Fill should not be placed on frozen ground, nor shall filling operations continue when the temperature is such as to permit the layer under placement to freeze.  
8. All fills shall be compacted to 90% of maximum density as determined by the "Modified AASHTO T-180 Compaction Test" (ASTM D-1557).  
9. All fill placed under proposed storm and sanitary sewer, proposed roads, and/or paved areas shall be compacted to 95% of maximum density as determined by the Modified AASHTO T-180 Compaction Test or 100% of maximum density as determined by the Standard Proctor Test AASHTO T-99. All fill placed in proposed roads shall be compacted from the bottom of the fill up. All tests shall be verified by a soils engineer concurrent with grading and backfilling operations. The moisture content of the soil in the fill areas is to correspond to the compactive effort as defined by the Standard or Modified Proctor Test. Optimum moisture content shall be determined using the same test that was used for compaction. Soil compaction curves shall be submitted to the City of O'Fallon prior to placement of fill. Proof rolling may be required to verify soil stability at the discretion of the City of O'Fallon.

GENERAL NOTES PERTAINING TO ALL CONSTRUCTION OPERATIONS  
1. Underground utilities shown on these plans have been plotted from available records and information, and their locations shall be considered approximate only. The verification of the actual location of all underground utilities, either shown or not shown on these plans, shall be the responsibility of the contractor(s) and the verification of the actual location shall be performed prior to beginning work.  
2. Easements and right-of-ways will be provided for streets, sanitary sewers, storm sewers, water mains and private utilities on the subdivision plot (record plat). See the subdivision plot (record plat) for location and size of easements and rights-of-way.  
3. All construction shall be performed in accordance with the specifications, ordinances, rules, regulations, guidelines and/or policies of the local governing jurisdictional authority.  
GRADING NOTES  
I. GENERAL  
1. No area shall be cleared without authorization from the project engineer.  
2. All grading work performed shall be within a 0.2 foot tolerance of the grades shown on the grading plan.  
3. A Geotechnical Engineer shall be employed by the owner and be on site during grading operations.  
4. The grading contractor shall perform a complete grading and compaction operation as shown on the plans, stated in these notes, or reasonably implied therefrom, all in accordance with the plans and notes as interpreted by the Geotechnical Engineer.  
5. Before the grading begins, the contractor shall employ a competent, licensed surveyor to establish all lines and grades.  
6. The contractor shall notify the Geotechnical Engineer at least two days in advance of the start of the grading operation.  
7. The developer shall supply City construction inspectors with soil reports prior to or during site soil testing.  
8. No slope shall be steeper than 3 (horizontal) to 1 (vertical).  
9. All erosion control systems shall be inspected and necessary corrections made within 24 hours of a rainstorm resulting in one-half inch of rain or more.  
II. SPECIFICATIONS  
1. Site preparation includes the clearing of all stumps, trees, bushes, shrubs, and weeds; the grubbing and removal of roots and other surface obstructions from the site; and the demolition and removal of any man-made structures. The unsuitable material shall be burned (after securing permits) and/or properly disposed of on site. Topsoil and grass in the fill areas shall be thoroughly disced prior to the placement of any fill. The Geotechnical Engineer shall approve the discing operation.  
2. Compaction equipment shall consist of tamping rollers, pneumatic-tired rollers, or high speed impact type drum rollers acceptable to the Geotechnical Engineer. The roller shall be designed so as to avoid the creation of a layered fill without proper blending of successive fill layers.  
3. Observation and Testing: The Geotechnical Engineer shall observe and test the placement of the fill to verify that specifications are met. A series of fill density test will be determined of each lift of fill. Interim reports showing fill quality will be made to the owner at regular intervals.  
4. The Geotechnical Engineer shall notify the contractor of rejection of a lift of fill or portion thereof. The contractor shall rework the rejected portion of fill and obtain notification from the Geotechnical Engineer of its acceptance prior to the placement of additional fill.  
5. Placing and Compaction of Fill: All areas to receive fill shall be scarified to a depth of not less than 6 inches and then compacted to at least 90 percent of the maximum dry density as determined from the Modified Proctor Test (ASTM-D-1557). Natural slopes steeper than 1 vertical to 5 horizontal to receive fill will have horizontal benches, with minimum widths of 12 feet and maximum height of 5 feet, cut into before the placement of any fill. The fill shall be loosely placed in horizontal layers not exceeding 8 inches in thickness and compacted in accordance with the specifications given below. The Contractor shall be responsible for determining the acceptability of the soils placed. Any unacceptable soils placed shall be removed at the contractor's expense.  
6. The sequence of operation in the fill areas will be fill, compact, verify acceptable soil density, and repetition of the sequence.  
7. The surface of the fill shall be finished so that it will not impound water. If at the end of a day's work, it would appear that there may be rain prior to the next working day, the surface shall be finished smooth. If the surface has been finished smooth for any reason, it shall be scarified before proceeding with the placement of succeeding lifts. Fill should not be placed on frozen ground, nor shall filling operations continue when the temperature is such as to permit the layer under placement to freeze.  
8. All fills shall be compacted to 90% of maximum density as determined by the "Modified AASHTO T-180 Compaction Test" (ASTM D-1557).  
9. All fill placed under proposed storm and sanitary sewer, proposed roads, and/or paved areas shall be compacted to 95% of maximum density as determined by the Modified AASHTO T-180 Compaction Test or 100% of maximum density as determined by the Standard Proctor Test AASHTO T-99. All fill placed in proposed roads shall be compacted from the bottom of the fill up. All tests shall be verified by a soils engineer concurrent with grading and backfilling operations. The moisture content of the soil in the fill areas is to correspond to the