GENERAL NOTES PERTINENT 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 plat (record plat). See the subdivision plat (record plat) for location and size of easements and rights-of-ways.

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 owner 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.

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, vibratory 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 tests will be determined on 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 85 percent of the maximum dry density as determined from the modified Proctor compaction 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 the slopes 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 Geotechnical Engineer 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. The acceptable moisture contents during the filling operation in the remaining areas are from 2 to 8 percent above the optimum moisture control.

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-1800 Compaction Test" (ASTM D-1557).

9. Fills in rear yard areas only shall be compacted, but the compaction criteria may be reduced to 85% of maximum density as determined by the "Modified AASHTO T-1800 Compaction Test" (ASTM D-1557).

SANITARY SEWER CONSTRUCTION

I. GENERAL

1. No area shall be cleared without authorization from the project engineer.

2. The sanitary sewer contractor shall perform a complete installation as shown on the plans, stated in these notes, or reasonably implied there from, all in accordance with the plans and notes as interpreted by the project engineer.

3. Before sewer construction begins, the owner shall employ a competent, licensed surveyor to establish the lines and grades of the sanitary sewers being constructed. The contractor shall pick up the cut sheets at the office of the surveyor.

4. The contractor shall notify the Duckett Creek Sanitary District at least two days in advance of the start of construction. Contact Duckett Creek Sanitary District, at telephone (636) 441-1244..

II. SPECIFICATIONS

1. All materials used shall meet the following specifications:

Plastic Pipe: Polyvinyl Chloride pipe conforming to the requirements of ASTM D-3034 Standard Specifications for the PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings, SDR 35.

Fittings: Fittings for PVC Pipe shall be of the same material and strength requirements as the sewer, as well as monolithic in construction.

Manholes: Precast reinforced concrete manholes conforming to the standard specifications for precast reinforced concrete manhole sections, ASTM-C478 and the approved Standard Details of Sewer Construction of 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 pipes sizes 8 inch through 15 inch and be 48 inches for pipe sizes larger and for inside drop manholes.

Manhole Frames and Covers: Gray Iron Castings conforming to the requirements of the specifications for Grey Iron Castings, ASTM A48. All castings shall be clean and free of scale, adhesions or inclusions. They shall be fabricated of 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 D-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.

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 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 connecting pipe or 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 upgrade in a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade.

6. All PVC Sanitary Sewer Pipe shall be bedded with Bedding Aggregate. The bedding aggregate shall extend from 4 inches below the pipe to the pipe springline. All PVC Sanitary Sewer Pipe shall be backfilled with Aggregate Backfill; for non-paved areas, the Aggregate Backfill shall extend from spring line of pipe to 6 inches over the pipe; for paved areas the Aggregate Backfill shall extend from spring line of pipe to the ground surface. Refer to detail "PIPE BEDDING CLASS "C" (FOR ALL PIPE EXCEPT REINFORCED CONCRETE PIPE".

7. 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", (ASTM-D-1557). All other trench backfills shall be water jetted.

8. All sanitary sewer manholes shall be waterproofed on the exterior in accordance with Missouri Department of Natural Resources Specification 10-CSR-8.120 (7)(E).

9. All sanitary sewer construction shall be performed in accordance with Duckett Creek Sanitary District specifications. The contractor shall assist the Duckett Creek Sanitary District personnel in the inspection and testing of the sanitary sewers.

10. The minimum vertical distance between the basement floor elevation and the flowline elevation of the sanitary sewer line at the corresponding house connection point shall not be less than the diameter of the sanitary sewer main plus 2-1/2 feet.

11. All manhole bases to have a minimum slope of 0.2' along the invert flowline.

12. All manhole tops shall be built to the elevations shown on the plans. If no top elevation is shown, contact the engineer for such information.

13. Provide clean-out on all laterals over 100 L.F. and at all major angle points in laterals.

STORM SEWER CONSTRUCTION

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, stated in these notes, or reasonably implied there from, all in accordance with the plans and notes as interpreted by the project engineer.

3. Before sewer construction begins, the owner shall employ a completed, 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 City of O'Fallon, at telephone (636) 379-5599.

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 C76, with shell thickness designated "Wall B" and with Circular Reinforcement in Circular Pipe or to the requirements of Reinforced Concrete Elliptical 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 sides 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.

Storm Manholes: Storm Manholes shall be precast reinforced concrete manholes conforming to the standard specifications for precast reinforced concrete manholes sections, ASTM-C478. 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 pipes sizes 8 inch through 15 inch and be 48 inches for pipe sizes larger and for inside drop manholes.

Curb Inlets and Area Inlets: Curb Inlets and Area Inlets and the precast top units for same shall conform to the Standard Construction Specifications for Sewers and Drainage Facilities of the Metropolitan St. Louis Sewer District, 1986.

Manhole Frames and Covers: Gray Iron Castings shall conform to the requirements of the specifications for Grey Iron Castings, ASTM A48. All castings shall be clean and free of scale, adhesions or inclusions. They shall be fabricated of 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 A joints shall be used with concrete pipe and reinforced concrete pipe and shall be constructed with approved compatible bituminous jointing material, in accordance with the requirements of this specification. Unless specifically required by the Project Plans, any approved bituminous sealing compound may be used. The clean, dry, surfaces of the interior of the pipe bell, groove, or socket, and the exterior of the spigot or tongue and the shoulders shall be primed and uniformly coated with an approved compatible bituminous primer, as recommended by the manufacturers of the sealing compound and the primer. It shall be done sufficiently in advance of applying the joint compound to permit proper drying and hardening and to provide a suitable uniform prepared surface for proper adhesion of the jointing material. The primer shall not be heated or diluted. When pre-mixed sealing compound is used with slip?joint or tongue and groove pipe, the jointing compound shall be evenly spread on the surface of both the tongue and the groove of the joint from the tip to the shoulder in sufficient amount to completely fill and seal the joint to both surfaces of the pipe barrel when the joining pipes have been forced together to form the completed joint. If bell and spigot pipe is used, oakum or a similar approved packing material shall be imbedded in the sealing compound to support and keep the inner surfaces of the joining pipe in alignment.

Protruding joint material shall be removed from the interior surface of the pipe, and the pipe joint troweled to give a continuous smooth interior pipe surface before the next pipe is laid. On the outside of the pipe, any material protruding from the solidly filled joint shall be neatly shaped, compacted, and smoothed over the joint.

Bedding Aggregate: Bedding Aggregate shall conform to the following:

For Pipes 27 inch in diameter and smaller:

Sieve	% by Weight Passing 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:

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:

Sieve	% by Weight Passing Maximum	Minimum
12 inch	90	70
6 inch	30	10
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 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 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 connecting pipe or 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 upgrade in a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade.

6. Trench backfills under paved areas shall be of backfill aggregate material. Trench backfills outside paved areas may be earthen backfill. 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", (ASTM-D-1557). All other trench backfills shall be water jetted.

7. All storm sewer pipe shall be bedded with bedding aggregate. The bedding aggregate shall extend from 4 inches below the pipe to the pipe springline.

8. All storm sewer construction shall be performed in accordance with the City of O'Fallon specifications. The contractor shall assist City personnel, or representatives in the inspection of the storm sewers.

9. All storm manhole, area inlet and curb inlet tops shall be built to the elevations shown on the plans. If no elevation is shown, contact the engineer for such information.

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 Public Water District #2 at least two days in advance of the start of construction. Contact P.W.D. #2 at telephone (636) 561-3737.

II. SPECIFICATIONS

1. All materials used shall meet the following specifications:

Polyvinyl Chloride (PVC) Pipe: PVC pipe shall be furnished in accordance with AWWA Standard C900 (latest revision).

Outside diameter (OD) of pipe shall be equivalent to that of DIP. Pipe sized 4" through 12" shall be Class 150, DR 18, except in those areas where the company has determined that pressures may exceed 100 psi, in which case the pipe shall be Class 200, DR 14. It shall be the responsibility of the contractor to check with the company prior to ordering any PVC pipe, in order to determine which class pipe shall be furnished. Pipe smaller than 4" shall be Class 200 SDR 21.

Copper: Copper tubing up to 2" shall be used for supplying service from the main to the meter valve or meter setting. The tubing shall be Type K and shall conform to standards set by ASTM B88 as referenced in AWWA Standard C800 (latest revision).

Fittings: All fittings shall be furnished in accordance with AWWA Standard C110 (latest revision), or alternatively AWWA Standard C153 (latest revision). All fittings shall be mechanical joint, cement-mortar lined, asphaltic coated, and shall have a minimum pressure rating of 250 psi for 12" and smaller, and 150 psi for 16" and larger.

Valves, Hydrants and Accessories:

a. Valves shall meet one of the following specifications:

Resilient Seated Gate: Resilient Seated Gate Valves shall be furnished in accordance with AWWA Standard C509 (latest revision). Valves shall be mechanical joint, have "O" ring seals, two inch square operating nuts, clockwise rotation to close, and shall be designed for a minimum working pressure of 200 psi.

Double Disc Gate: Double Disc Gate Valves shall be furnished in accordance with AWWA Standard C500 (latest revision). Valves shall be mechanical joint, nonrising stem, with "O" ring seals, two inch square operating nuts, clockwise rotation to close, and shall be designed for a minimum working pressure of 200 psi.

Butterfly: Butterfly valves used will be 14" or larger and shall be furnished in accordance with AWWA Standard C04 (latest revision). Valves shall be mechanical joint, nonrising stem, with "O" ring seals, two inch square operating nuts, clockwise rotation to close and shall be designed for a minimum workingpressure of 200 psi.

Tapping: Valvesfor sue with a tapping sleeve may be either of theResilient Seated or Double Disc type gate valve,except that the end connections shall be flangedby mechanical joint. Diameter of valve opening shll be such that the tapping machine cutters shall notcause damage to the valve. Tapping sleeves hall be for 150 psi minimum working pressure.

b. Fire Hydrants: re hydrants shall be Mueller Centurion A-423 or Ameran Darling B-62-B, and shall be yellow in color. re hydrants shall be furnished in accordance withAWWA Standard C502 (latest revision). Hoseoutlet connection threads will be National Standd Threads in all divisions except as otherwise indicad. Hydrants shall have replaceable "brikable" sections, inlet connection of 6" size meanical joint shoe, with 4-1/2" valve opening minimu, 1-1/2" pentagon operating nut, clockwise rotatn to close (5-1/4" valve opening may be used can alternate to the standard 4-1/2" valve opening. The 5-1/4" valve opening shall be used in all cas where local ordinances require.) Hydrants shall ave two hose outlets, and one steamer connetion. Burial depths for hydrants will and may varyput shall not be less than 4 feet. The steamer onection shall be less than 12" nor greater than " above finish grade. The contractor shall furnish d install all spool pieces as may be necessary to just hydrants to the proper height. Hydrants shabe located 2'-0" from back of curb.

c. Valve Boxes: alve boxes shall be of cast iron, extension slee type suitable for a depth of cover of at least 4 et. Valve boxes shall be not less than 5 inchesn diameter, shall have a minimum thickness at ny point of 3/16 inch, and shall be provided with itable cast iron bases and covers. Covers shall he the word "Water" cast thereon. All parts of th valve boxes, bases and covers shall be coated by pping in bituminous varnish. Valve boxes to be new extension sleeve type.

d. Locating Wire: No. 8 coated solid copper wire and looped into va boxes.

Polyethylene Encasement for "DIP", or Ductile Iron Pipe, Valves, and Fittings: Polyethylene encasement shall be furnished in accordance with AWWA Standard C105 (latest revision). Minimum tube and sheet size, strength, thickness, etc. shall be in accordance with this Standard. Polyethylene sheets or tubing shall be used for all pipe lengths, with a minimum of 12" overlap at each joint. Slack in the tubing shall be taken up to make snug fit. Excess material shall be folded back over top of pipe, securing the fold at quarter points along the length of the pipe. Polyethylene encasement shall be used on all valves and fittings. Where polyethylene wrapped pipe, valves or fittings joins an adjacent pipe that is not wrapped, the polyethylene wrap shall be extended to cover the adjacent pipe for a distance of at least 3 feet. All polyethylene shall be secured in place with adhesive tape, designed for use on polyethylene. Contractor shall take care to insure that the pipe, valves and fittings are free from lumps of clay, mud, cinders, etc. prior to wrapping same.

2. All water main construction performed shall be in accordance with the requirements of Public Water District #2 Water Main Construction Specifications and Requirements.

NOTES & SPECIFICATIONS
WINGHAVEN CENTRE
APRIL 2002 **02-620**
REV. 16 AUG. 2002
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STATE OF MISSOURI
RICHARD SCOTT MUSSER IV
NUMBER E-18838
REGISTERED PROFESSIONAL ENGINEER
8-28-02

O'Fallon File No. 9831.37.01