

**KINGSLAND
MUNICIPAL UTILITY DISTRICT**

**CONSTRUCTION AND DEVELOPMENT
STANDARDS AND PROCEDURES**

Adopted by District Board of Directors: October 28, 2013

**KINGSLAND MUNICIPAL UTILITY DISTRICT
CONSTRUCTION AND DEVELOPMENT STANDARDS AND PROCEDURES**

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1) GENERAL PROVISIONS

A) Purpose and District Contact Information

The Kingsland Municipal Utility District (District) Board of Directors (Board) has determined that it is in the best interest of the District and its residents for all development plans including subdivisions and re-subdivisions to be reviewed and approved to ensure the integrity of systems and to plan for future needs.

The District is responsible for the collection and treatment of wastewater within the District's boundary and service area. Other entities that are responsible for public health and safety which may require additional development review and/or permit requirements in the Kingsland area are as follows:

- Kingsland Water Supply Corporation (water service)
- Llano or Burnet County (local public roadways and drainage)
- Texas Department of Transportation (State roadways)
- Lower Colorado River Authority (Highland Lakes and water quality)
- Texas Commission on Environmental Quality (environmental, water quality)

These standards and procedures provide for uniform and standard criteria for wastewater utility development and construction within the District service areas, and may be updated from time to time. It is the developer's responsibility to obtain and comply with the latest District standards and procedures as well as additional requirements from other entities as noted above.

These standards and procedures shall apply to all new wastewater service requests with two (2) or more Living Unit Equivalent (LUE) connections regardless of whether or not District annexation will be a consideration for the service request, and shall be considered additional to those procedures within the District's Subdivision Annexation Policy.

The District General Manager and Board of Directors may be contacted at:

Kingsland Municipal Utility District
100 Ingram Street
Kingsland, Texas 78639
Office: (325) 388-4559
Fax: (325) 388-5003
Website: www.kingslandmud.com

B) Project Review Requirements

Developers are encouraged to engage in discussions with the District at the concept level of the project and include the District in key planning or field review phases which may be significant to the purpose of providing wastewater collection and treatment service to the subdivision or development.

All new development requests for wastewater service which include two (2) or more LUE's will be required to comply with the following procedures prior to beginning construction of the project (Unless directed otherwise by the District General Manager):

1. **Preliminary Feasibility Review:** The developer shall submit sufficient information to the District for a feasibility determination regarding existing wastewater collection and treatment capacity. The feasibility submittal requirements shall include, at a minimum:
 - A map or preliminary plat showing the proposed subdivision, its proximity to existing District wastewater collection facilities, and those proposed improvements necessary to connect such facilities. The map or preliminary plat must show at a minimum the topographic features available on standard USGS 24,000 scale quadrangle maps as well as the dimensions of the lots and/or tracts that result from the subdivision of the property.
 - The current District boundary as it relates to the proposed subdivision, and any known or proposed easements and/or rights of way that may be required to provide service from existing District facilities.
 - The intended land use of the subdivision or development, including detailed information concerning the types of land uses proposed.
 - The ultimate projected wastewater load (maximum day) of the subdivision or development as well as the anticipated wastewater loads for each type of land use.
 - A proposed calendar of events, including design, plat approval, construction phasing and initial occupancy, and the approximate date upon which service from the District will first be required.

New development projects located outside of the District boundary, or in some instances, larger projects may require additional review regarding the availability of wastewater service capacity from the District. Should additional information be determined necessary to review the proposed development, the developer shall submit additional information on a case by case basis.

2. **Plan Review Fee Schedule:** The following plan review fee schedule shall be applied, depending on the size and complexity of the project. The following fee schedule does not include certain Annexation Fees which may be applicable per the District's Subdivision Annexation Policy.

2 - 20 Living Unit Equivalent Connections (LUE's):	\$ 1,000
21 - 50 LUE's:	\$ 1,500
Greater than 50 LUE's:	\$ 2,000

This fee shall be paid upon invoice from the District, and will be held in escrow to compensate the District for expenses that may be incurred in reviewing such requests, including, but not limited to engineering, legal, and plan review research.

Any costs in excess of the original review fee shall also be paid by the Developer. Any remaining fee that was not incurred by the District will be refunded to the Developer upon completion of the feasibility or plan review phase.

3. **District Approval:** Following a preliminary review of the proposed subdivision or development by the General Manager or Board of Directors and prior to plan approval as noted below, the District shall issue a letter to the developer regarding the availability of wastewater service to the property.
4. **Plan and Specification Approval:** Upon completion of the feasibility review, the developer shall submit 95% plans and specifications for the proposed development to the District for review and comment by the District's Engineer. Upon satisfaction of the District's review comments, final plans and specifications sealed by a Registered Professional Engineer licensed to practice in the State of Texas shall be submitted for final approval and signature by the District Engineer. The plans and specifications shall include, at a minimum, the following items:
 - Compliance with the District's construction standards and specifications, to include a District approval signature block on the cover sheet.
 - Compliance with TCEQ Rule 30 TAC Chapter 217 regarding design criteria for domestic wastewater systems.
 - A final plat showing the legal description and the dimensions of the lots and/or tracts that result from the subdivision of the property. The plat must be signed and sealed by a Surveyor licensed to practice in the State of Texas. The Federal Emergency Management Agency (FEMA) 100-year floodplain limits must be shown on the plat.
 - Existing conditions including District boundary, adjacent property owners, and District owned facilities based on field survey or best available information provided from District mapping. The approximate location of all other existing above ground and below ground utilities as well as topographic surface contours must also be shown on the plans.
 - Wastewater service plan view at a scale sufficient to show the service connections, line sizes and valve locations, easements and rights of way, and lot layout of the proposed development.
 - Plan and profile sheets for all wastewater pressure mains greater than 4-inches in diameter and all gravity mains within the proposed development, to include identification of percent grade for all proposed pipe runs. The profile view should include the existing and proposed finished grade as well as all surface barriers, roadways, drainage features, and utility crossings.
 - Detailed site plan and profile, electrical plan, and mechanical plans for all proposed lift stations.

- Wastewater construction details both required by the District and project unique. All existing and proposed material specifications should be shown and clearly identified.

It is the responsibility of the developer's Engineer to design, specify, and adequately size all internal and connecting wastewater collection facilities. The Engineer must account for any special conditions that may be necessary and appropriate such as topography, hydraulic conditions, air valve, isolation valve, and flushing valve locations, local soil conditions, and groundwater or flooding risk.

5. **Easement Acquisition:** All wastewater lines that will be accepted by the District for operation and maintenance must be located within a public right of way, public utility easement with District access, or in a private utility easement dedicated to the District. All easements shall be a minimum of fifteen (15) feet in width.

District approval of development construction plans and specifications will not be granted until all appropriate and necessary easements have been surveyed and recorded. Conveyance of all easements shall be at no cost to the District and shall be in accordance with the applicable local, state, and federal laws and regulations.

The District shall review and approve the documents prior to filing. Upon District request, the developer shall field survey and clearly mark all applicable easement boundaries to allow field inspection by District staff.

6. **Indemnity Agreement:** An agreement shall be executed between the District and the Developer whereby the developer agrees to indemnify and hold harmless the District from and against all liability and expenses which may be incurred by the District as a result of defective design, construction, or installation of the development facilities on behalf of the developer.

C) Construction Inspections and District Acceptance

The District shall inspect the installation of all wastewater collection facilities which are connected to the District systems. District staff and/or inspectors shall make periodic checks during all phases of construction to see that the contractor or developer is complying with the construction standards and following the engineering plans approved by the District's Engineer. Any deviation or revision to the approved engineering plans shall be made in writing by the developer and submitted to the District staff for approval prior to the actual field change.

The District's construction inspections do not relieve the contractor, developer, and design engineer of the responsibility to construct the facilities in accordance with the District approved plans and specifications, the rules and regulations of the TCEQ and the construction standards of the District.

The developer shall be responsible for all reasonable inspection and testing expenses incurred by the District during construction of the project. All applicable inspection and testing fees will be paid by invoice from the District by monthly invoice as they are incurred.

The total inspection and testing expenses invoiced to the developer by the District shall not exceed more than 2.5% of the total construction cost of the applicable wastewater facilities.

Upon completion of construction and prior to District acceptance of the facilities for operation and maintenance, the District shall be provided with:

1. Final As-Built drawings approved and certified by the developer's Engineer showing the water and wastewater facilities as they were constructed within the development.
2. Pertinent and applicable Operation and Maintenance manuals for all lift stations, valves, or other special equipment installed as part of the development.
3. Materials and pipeline testing reports required during construction of the project. This shall include a video of all completed wastewater gravity mains for internal inspection by District staff.
4. Certificate of completion from the developer's Engineer who designed the facilities certifying that the construction of the facilities has been completed in accordance with the plans and specifications approved by the District.
5. Contractor's affidavit of bills paid.
6. Maintenance Bond between the District and the construction contractor's bonding company to make required repairs within the first 2-years following District acceptance of the project. The Maintenance Bond shall be for 10% of the total construction contract costs for installation of the water, wastewater, drainage, and roadways within the development, and provided to the District on or before the date of final acceptance by the Board of Directors.
7. Payment of all inspection and testing expenses invoiced by the District.
8. Approval of final site cleanup by the District General Manager.
9. Any required easements filed in the District's name that may be in addition to those required prior to District approval of the plans and specifications.

2) CONSTRUCTION STANDARDS

The following construction standards shall be incorporated, as appropriate, within the developer's construction plans and specifications prior to District approval.

These standards are provided by the District as general guidance only. It is the responsibility of the developer's Engineer to design, size, and specify appropriate materials for the construction of the proposed wastewater collection facilities based on site specific conditions and current Local, State, and Federal regulations.

A) Title Page (add the following to the plans as stated)

Accepted for Construction:

Kingsland Municipal Utility District District Engineer	Date
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Review of the plans by the District is limited to the wastewater facilities, and does not indicate a review of the adequacy of the design of facilities. In approving these plans, the District must rely on the adequacy of the work of the design engineer.

B) General Notes (add the following to the plans as stated)

1. Kingsland Municipal Utility District (District) shall be notified at least 48-hours prior to:
 - a. Conducting a pre-construction conference;
 - b. beginning of each phase of construction;
 - c. making any connection to the District's existing systems;
 - d. testing of wastewater lines or critical equipment; and,
 - e. final walk-through of facilities.
2. The Contractor shall allow entry by the District's representative on the land or premises for the purpose of inspection of conditions on the premises during all phases of construction.
3. No construction of any wastewater collection facilities shall be allowed during non-business hours to include weekends and holidays, unless prior approval is received by the District in writing.
4. No valves will be opened which connect new services to the existing District system without prior District approval and a District representative present. All wastewater lines will be flushed and properly tested prior to connecting to the existing system.
5. If any wastewater main or service line is intended to be constructed under a wall or other structure which would render the line inaccessible for repair, that line shall be sleeved or encased to allow for removal of the length of line beneath the barrier.
6. Contractor shall comply with the requirements of TCEQ Rule 30 TAC 290.44 relating to separation of water and wastewater lines.

7. Contractor shall designate an English speaking representative at the project site for all District inspections and correspondence.

C) Material Specifications

1. All materials shall be new, and comply with the latest and applicable standards including, but not limited to, the Association of American Water Works (AWWA), American National Standards Institute (ANSI), American Standard of Testing and Materials (ASTM) and installed and tested according the manufacturer's recommendations and local plumbing codes.
2. Materials that will come in direct contact with wastewater effluent including pumps, valves, pipelines, and fittings must be corrosion resistant and recommended for use in wastewater applications by the manufacturer. No galvanized pipe will be allowed.
3. Wastewater pipe, valves, and fittings connected to the District's pressurized collection system shall have a minimum working pressure rating of 100 psi. The design engineer shall account for any potential surge pressures and adjust the working pressure rating accordingly.
4. Wastewater collection mains 2-inches or larger in diameter shall be push-on (bell and spigot) rubber gasket joints with appropriate thrust restraint. All ductile iron pipe, valves, and fittings must be wrapped in polyethylene with min. 8-mil. thickness.
5. Gravity flow wastewater collection mains shall be minimum SDR-26 rating for wall thickness, and minimum 6-inch diameter.
6. Metallic locator tape 12-inches wide and marked "Sewer" shall be installed in the trench of all pipelines at 18-inches below finished grade prior to backfilling.
7. No water designated or blue pipe will be allowed in wastewater applications. All valve boxes, lids, and manhole covers must be marked "Sewer".
8. A granular material with maximum particle size of 1/4" shall be utilized for pipe embedment. The District must approve all material used for pipe embedment and trench backfill.

D) Inspections and Testing

1. The District shall inspect and approve of the workmanship and materials utilized or involved in the construction of the wastewater collection facilities, which may include the following:
 - a. All materials used in the work;
 - b. the completed trench for each section of work;
 - c. pipe and tubing after under-bedding installation, over bedding, and laying of detectable tape;
 - d. fittings, fixtures, and appurtenances after installation and blocking, if required, but before bedding or backfill is placed;
 - e. all required pressure, vacuum, and materials testing;
 - f. a final inspection; and,

- g. any other inspections deemed necessary by the District.**
- 2. All materials testing will be the responsibility of the Contractor, and shall be coordinated with the District's representative. Passing reports of all required tests shall be provided to the District prior to acceptance of the facilities for operation and maintenance. At a minimum, the following tests are required and shall be conducted per TCEQ Rule 30 TAC 217.57:**
 - Hydrostatic pressure testing of all wastewater pressure lines at 100 PSI for 4-hours to demonstrate compliance with the minimal allowable leakage rate. Flush all wastewater pressure lines prior to testing to remove excessive dirt and debris.
 - Vacuum testing (10-inches of mercury for 2.0 minutes after vacuum pump is off) of all manholes prior to application of a coating and independently of the connecting pipelines. The vacuum must be at least 9.0 inches of mercury following the test.
 - Low pressure air test for all gravity sewer mains, independently of the connecting manholes.
 - Deflection (mandrel) pulls to check for excessive deflection in gravity sewer mains. The mandrel shall be pulled by hand and conducted after the final backfill has been in place for 30 days. The rigid mandrel shall have an outside diameter equal to 95% of the inside diameter of the pipe.
 - Videotape all gravity sewer mains after final testing and cleaning is complete, for internal visual inspection by District staff.
 - Compaction tests shall be performed on all wastewater main trenches at 500-foot intervals minimum, or as directed by the District's representative.
 - Compressive strength and slump tests for all structural concrete to meet design engineer's specifications, if applicable.
 - Coating tests for all concrete manhole and lift station linings to demonstrate specified thickness, if applicable.

3) STANDARD DETAILS

The following standard details have been made available by the District for the developer's Engineer to include in the construction plans and specifications. It is the responsibility of the developer's Engineer to ensure the appropriate use of these standard details.

WW01 – Typical Grinder Pump Installation

WW02 – Standard Pressure Wastewater Connection

WW03 – Air Release for Wastewater Force Main

WW04 – Small Diameter (3" or Less) Force Main Flushing Assembly

WW05 – Buried Valve, Valve Box, and Cover

WW06 – Wastewater Main Trench and Surface Repair Detail

WW07 – Wastewater Pressure Main Thrust Blocking

WW08 – Utility Crossing

WW09 – Encasement Detail with Casing Spacers (Public ROW)

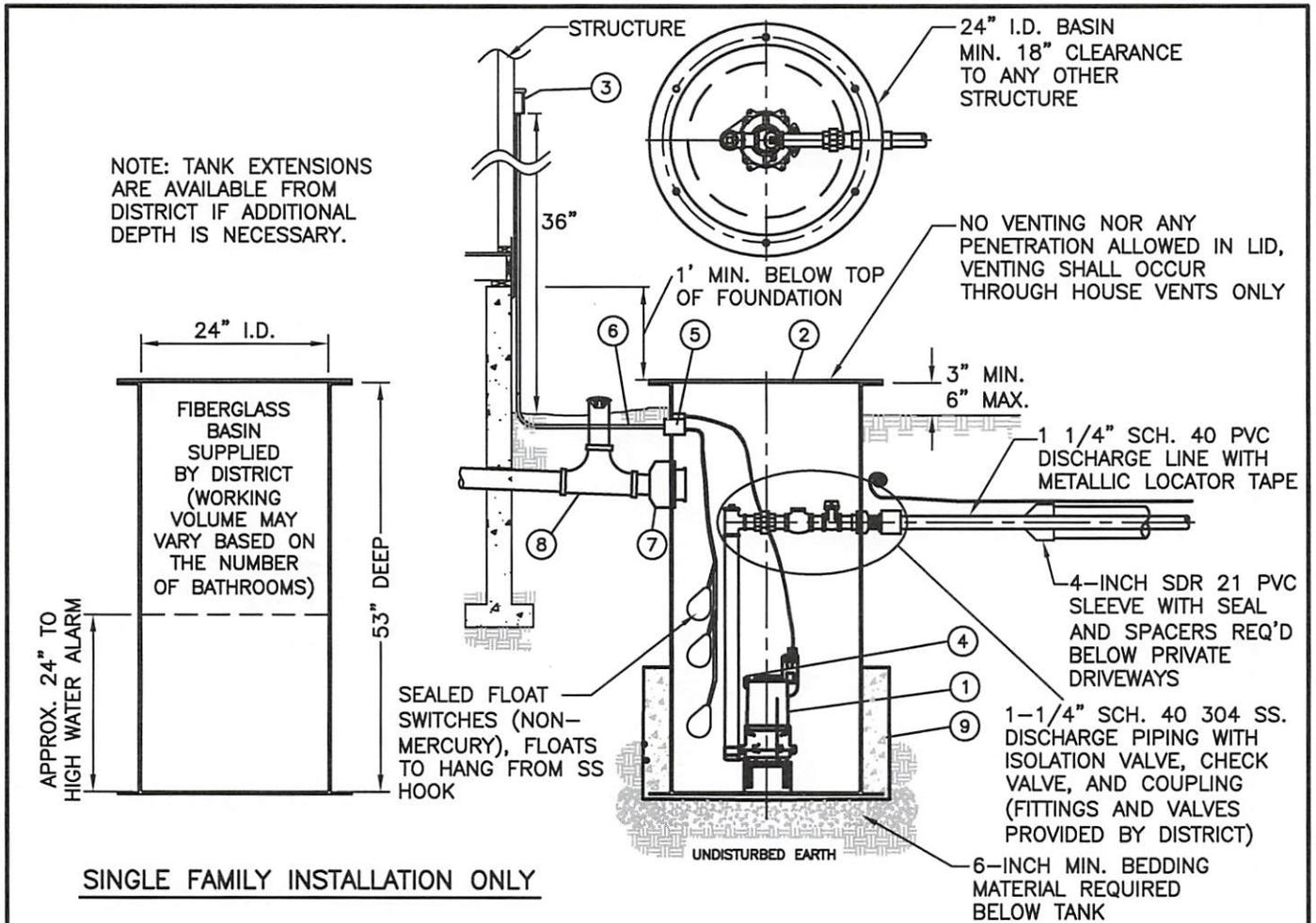
WW10 – Precast Wastewater Manhole (Gravity Systems)

WW11 – Precast Wastewater Manhole with Drop Connection (Gravity Systems)

WW12 – Flow Patterns for Invert Channels (Gravity Systems)

WW13 – Wastewater Service Connections (Gravity Systems)

WW14 – End of Main Wastewater Cleanout (Gravity Systems)



REFERENCE DISTRICT PLUMBING AND ELECTRICAL INSTALLATION INSTRUCTIONS FOR ADDITIONAL REQUIREMENTS.

NOTES:

1. 2 HP, 240 VOLT, SINGLE PHASE SIMPLEX GRINDER PUMP PROVIDED BY DISTRICT.
2. FIBERGLASS REINFORCED POLYESTER (F.R.P.) BASIN AND SEALED LID PROVIDED BY DISTRICT.
3. SIMPLEX PUMP CONTROL PANEL WITH ALARM LIGHT PROVIDED BY DISTRICT. INSTALL PANEL ON OUTSIDE WALL NO FURTHER THAN 15- FEET FROM GRINDER BASIN.
4. LIFTING EYES - FOR LIFTING COMPLETE GRINDER PUMP. LIFTING ROPE TO BE PROVIDED BY DISTRICT.
5. 2-INCH ELECTRICAL ENTRY HUB PROVIDED BY DISTRICT.
6. GRINDER PUMP AND ALARM LEADS MUST BE INSTALLED IN 2-INCH CONDUIT WITH ELECTRICAL SWEEPS.
7. 4-INCH TANK INLET HUB SUPPLIED BY DISTRICT, MUST BE INSTALLED A MINIMUM 20 INCHES FROM TOP OF BASIN, AND NO LESS THAN 12 INCHES FROM BOTTOM OF BASIN. TANK OUTLET PRE-INSTALLED BY DISTRICT.
8. GRAVITY SERVICE LINE WITH 2-WAY 4-INCH CLEAN-OUT AND BACKWATER PROTECTION VALVE SET DOWNSTREAM OF CLEAN-OUT.
9. CONCRETE ANCHOR MAY BE REQUIRED BY DISTRICT IN CERTAIN AREAS WHERE FLOTATION IS POSSIBLE DUE TO GROUND WATER OR FLOOD RISK.

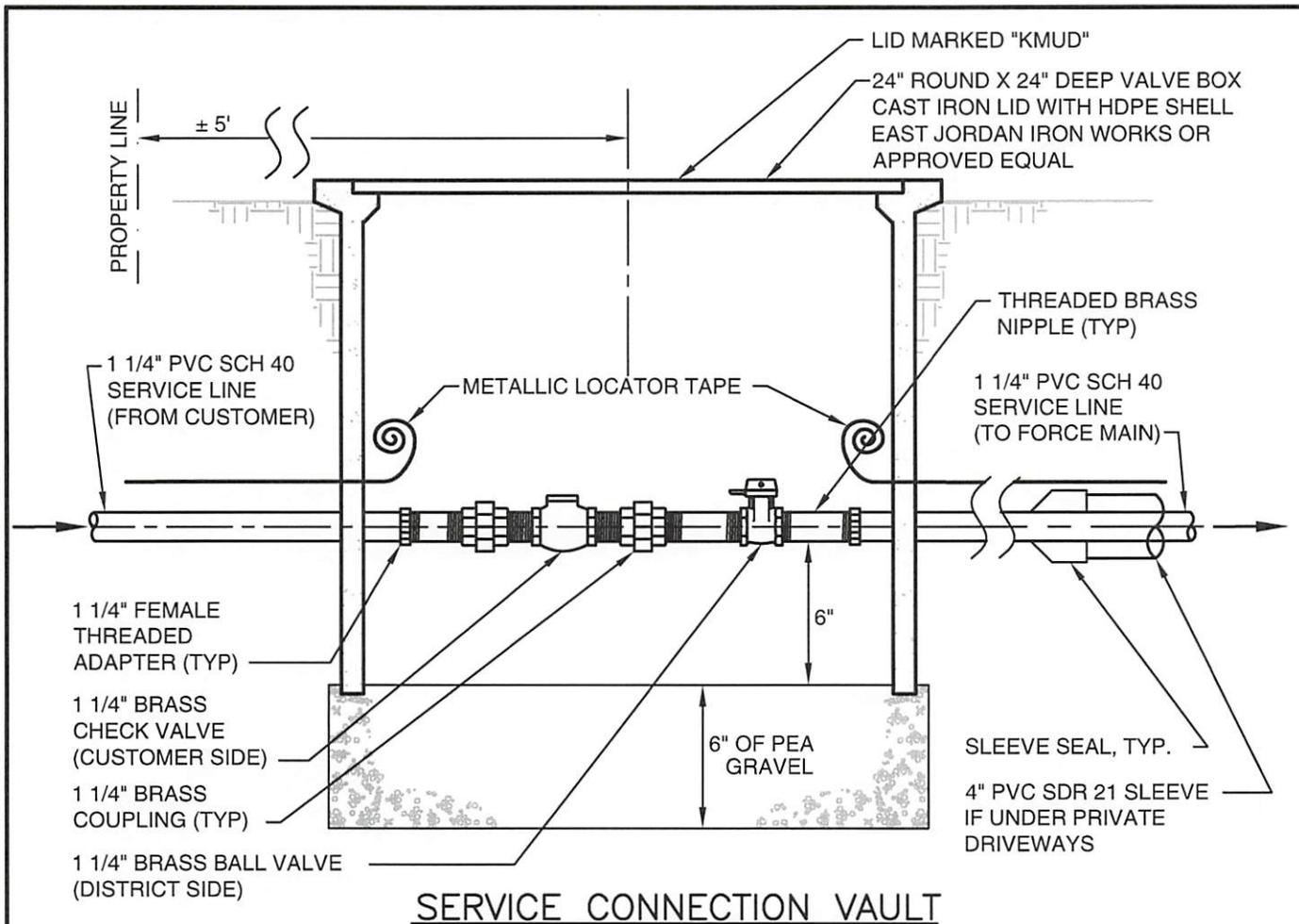


KINGSLAND MUNICIPAL UTILITY DISTRICT
KINGSLAND, TEXAS

Scale: NTS		
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Rev.#	Date	By

TYPICAL GRINDER PUMP
INSTALLATION

STANDARD
DETAIL
WW-1

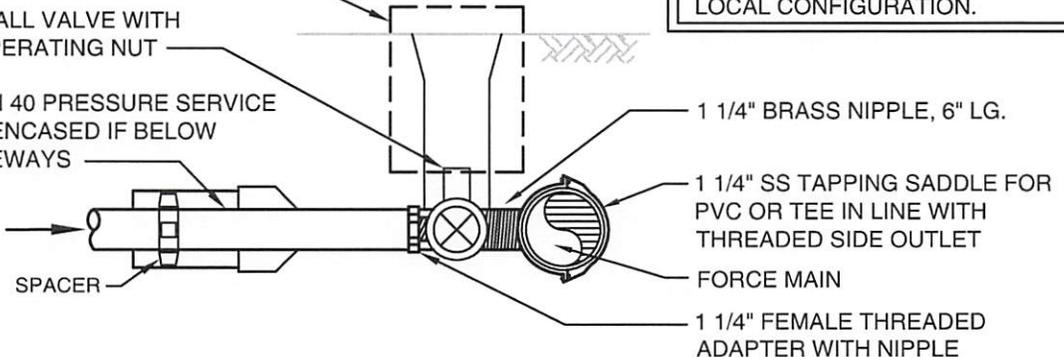


NOTE: DOUBLE SERVICE CONNECTIONS WILL REQUIRE A 2-INCH PIPELINE, VALVE, AND TAP ACROSS ROADWAY AND AT FORCE MAIN. REFERENCE PLANS FOR LOCAL CONFIGURATION.

BURIED VALVE, VALVE BOX, & COVER PER DISTRICT REQUIREMENTS

1 1/4" BRASS BALL VALVE WITH 2" SQUARE OPERATING NUT

1 -1/4" PVC SCH 40 PRESSURE SERVICE LINE, SLEEVE ENCASED IF BELOW PRIVATE DRIVEWAYS

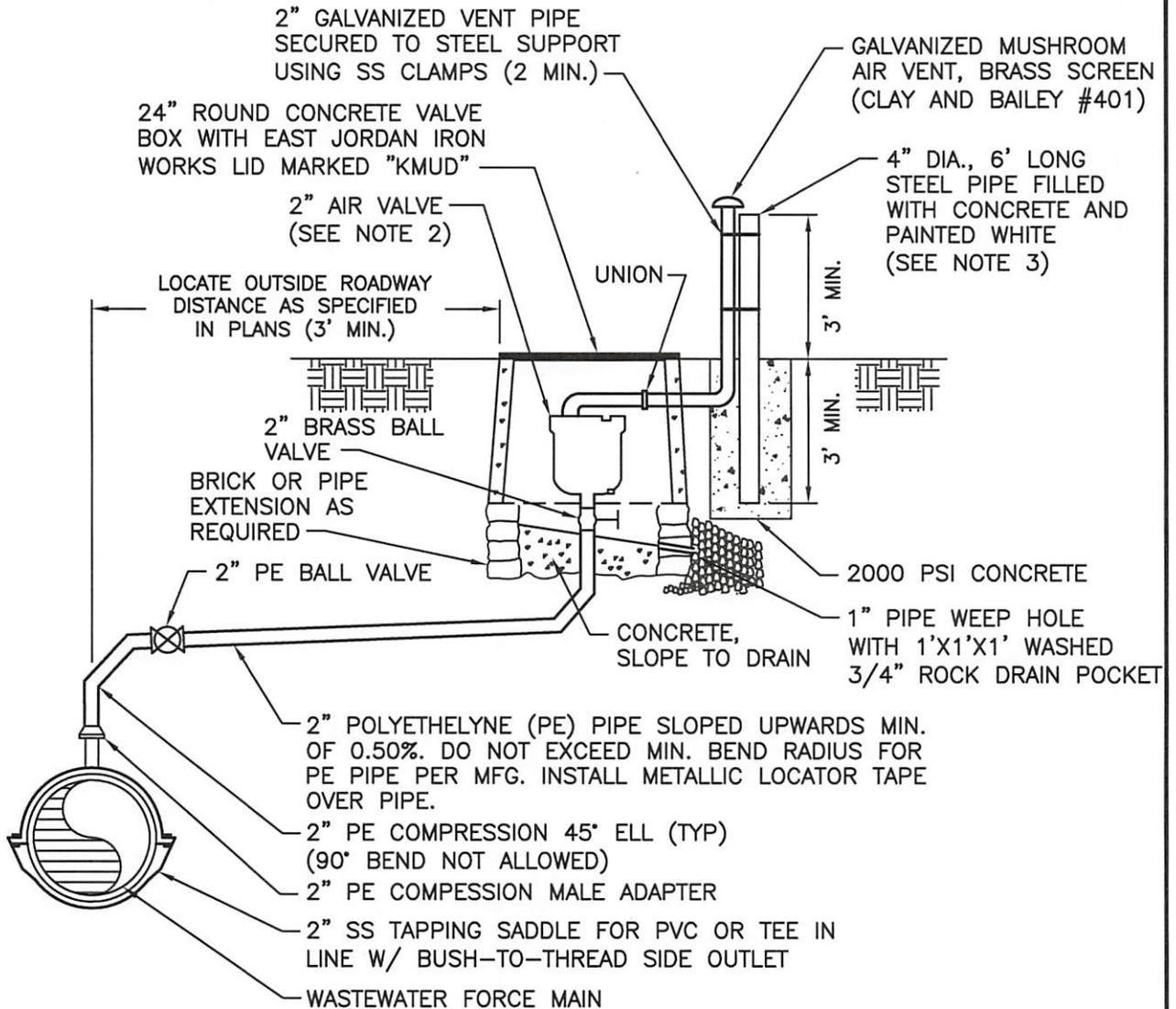


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KINGSLAND, TEXAS

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STANDARD PRESSURE
WASTEWATER CONNECTION

STANDARD
DETAIL
WW-2



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE MIN. 100 PSI PRESSURE CLASS.
2. COMBINATION AIR RELEASE AND VACUUM VALVE SHALL BE ARI MODEL D-025, OR ARI MODEL S-025 FOR AIR RELEASE ONLY. LOCATION AND TYPE AS SPECIFIED ON PLANS.
3. AIR VENT PIPE RISER SHALL BE AS NEAR AS PRACTICAL TO RIGHT-OF-WAY LINE WITH MINIMUM CLEARANCE OF 18" FROM ANY OBSTACLE, AND NOT TO CONFLICT WITH SIDEWALK, DRIVEWAYS, OR OTHER PEDESTRIAN TRAFFIC.
4. AIR VENT PENETRATION THROUGH CONCRETE VALVE BOX SHALL BE CORE BIT DRILLED. FILL VOID WITH GROUT. MAINTAIN RISING GRADE ON ALL AIR VALVE AND VENT PIPING.

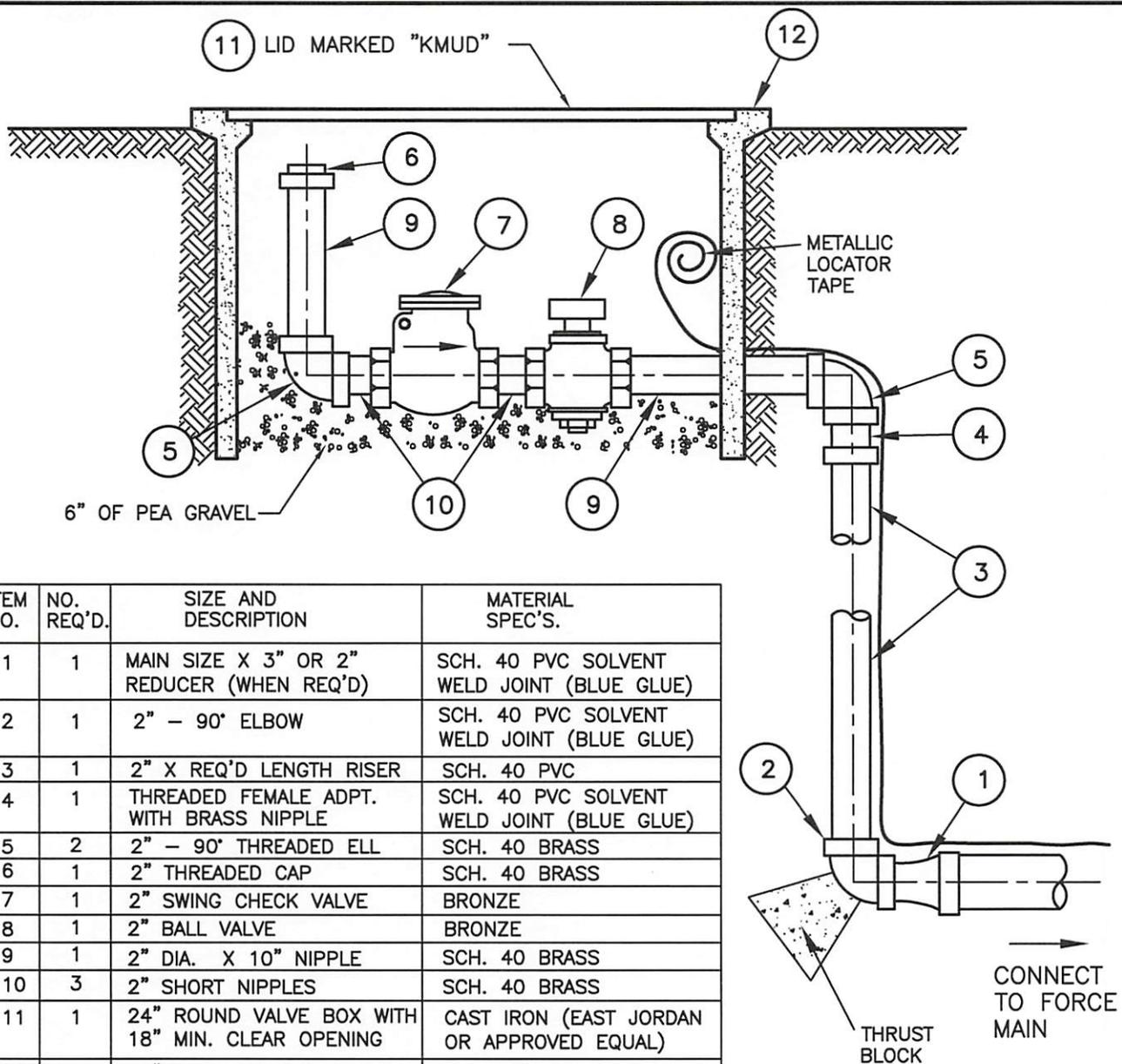


KINGSLAND MUNICIPAL UTILITY DISTRICT
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AIR RELEASE FOR
WASTEWATER FORCE MAIN

STANDARD
DETAIL
WW-3



ITEM NO.	NO. REQ'D.	SIZE AND DESCRIPTION	MATERIAL SPEC'S.
1	1	MAIN SIZE X 3" OR 2" REDUCER (WHEN REQ'D)	SCH. 40 PVC SOLVENT WELD JOINT (BLUE GLUE)
2	1	2" - 90° ELBOW	SCH. 40 PVC SOLVENT WELD JOINT (BLUE GLUE)
3	1	2" X REQ'D LENGTH RISER	SCH. 40 PVC
4	1	THREADED FEMALE ADPT. WITH BRASS NIPPLE	SCH. 40 PVC SOLVENT WELD JOINT (BLUE GLUE)
5	2	2" - 90° THREADED ELL	SCH. 40 BRASS
6	1	2" THREADED CAP	SCH. 40 BRASS
7	1	2" SWING CHECK VALVE	BRONZE
8	1	2" BALL VALVE	BRONZE
9	1	2" DIA. X 10" NIPPLE	SCH. 40 BRASS
10	3	2" SHORT NIPPLES	SCH. 40 BRASS
11	1	24" ROUND VALVE BOX WITH 18" MIN. CLEAR OPENING	CAST IRON (EAST JORDAN OR APPROVED EQUAL)
12	1	24" DEEP SHELL	HDPE (EAST JORDAN OR APPROVED EQUAL)

NOTES:

1. FOR IN-LINE FLUSH VALVE ASSEMBLY, INSTALL BRONZE BALL VALVE WITH 2" OPERATING NUT AND CAST IRON VALVE BOX ACCESS WITHIN 2' OF UPSTREAM SIDE OF TEE ON FORCE MAIN.
2. LOCATE VALVE ASSEMBLY OUTSIDE OF ROADWAY AND TRAFFIC AREAS.
3. CLEAR GLUE IS NOT ALLOWED FOR PVC SOLVENT WELD JOINTS.

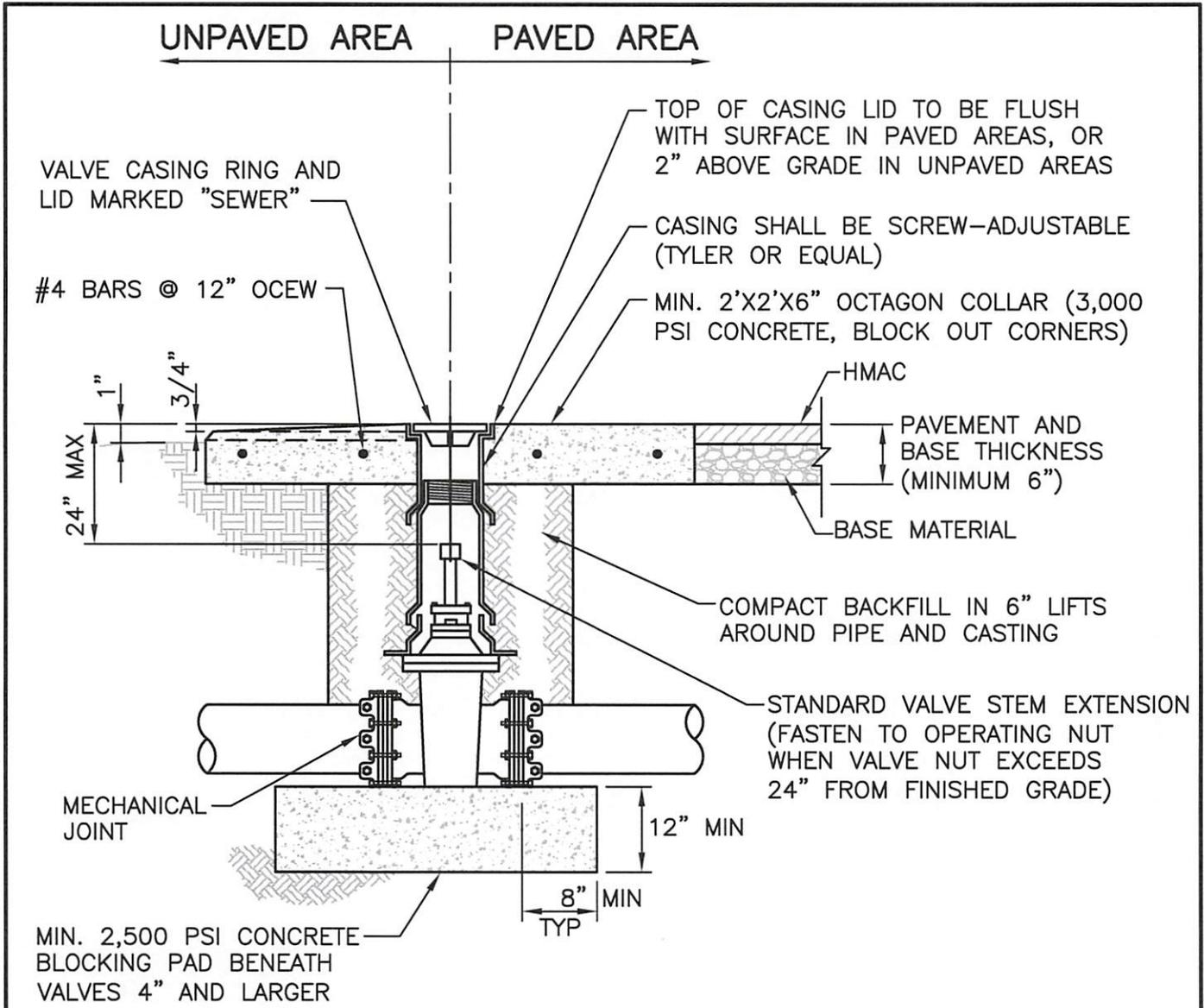


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SMALL DIAMETER (3" OR LESS) FORCE MAIN
FLUSHING ASSEMBLY

STANDARD
DETAIL
WW-4



NOTES:

1. VALVES IN RAW WASTEWATER SERVICE SHALL BE ECCENTRIC RESILIENT PLUG TYPE WITH CAST IRON BODY, ACRYLONITRILE-BUTADIENE (NBR) PLUG, WELDED-IN NICKEL SEAT. PROVIDE WORM GEAR ACTUATOR WITH 2" SQUARE NUT. ACTUATOR SHALL HAVE RADIAL SHAFT AND ROLLER THRUST BEARINGS. PLUG VALVES SHALL BE BY VALMATIC.
2. VALVES IN WASTEWATER FORCE MAINS 3" DIAMETER AND BELOW SHALL BE BRASS BALL TYPE WITH 2" OPERATING NUT.
3. VALVE CASING, RING, LID, ETC., SHALL BE DESIGNED FOR HS-20 LOADING WHERE INSTALLED IN PAVED AREAS.

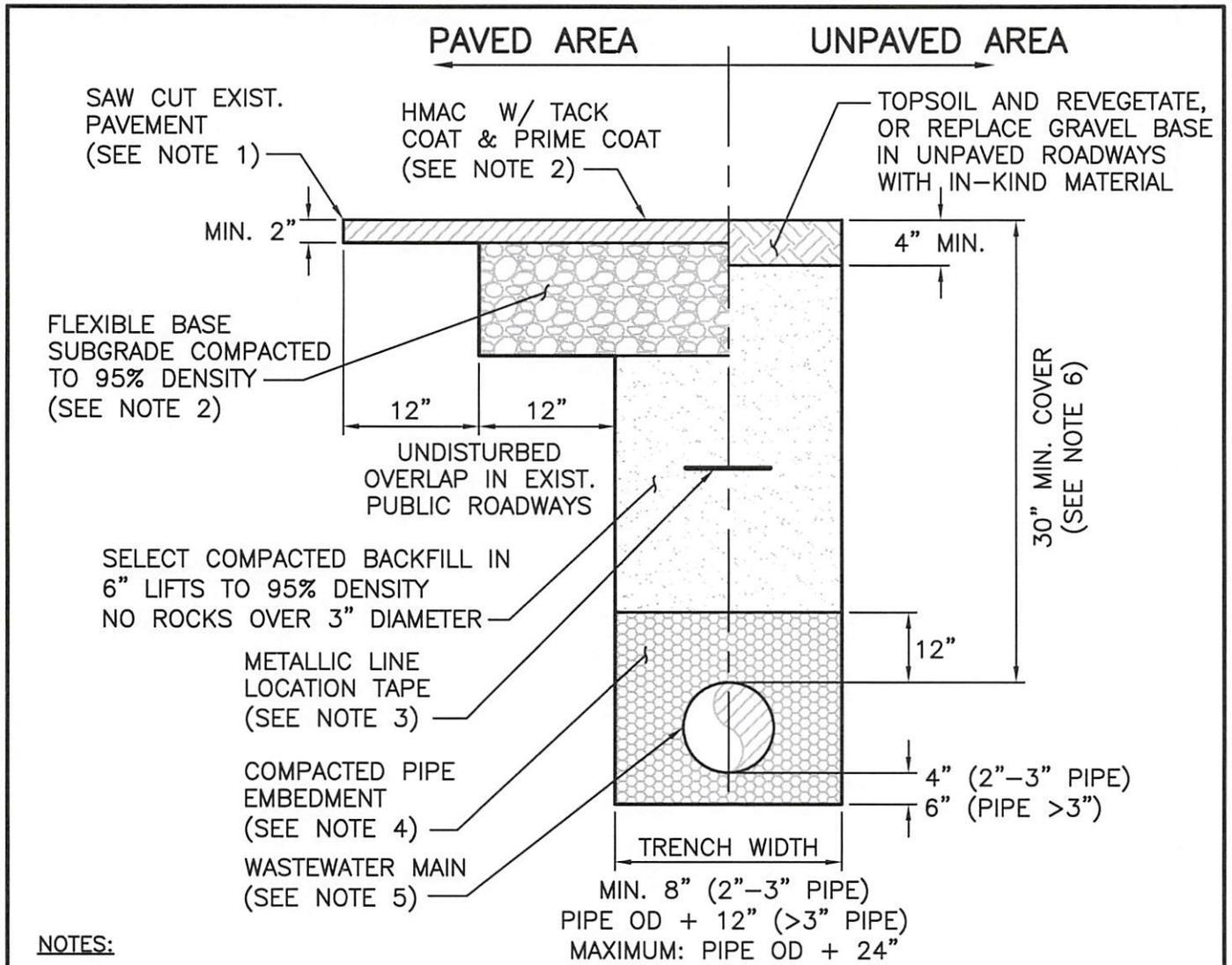


KINGSLAND MUNICIPAL UTILITY DISTRICT
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BURIED VALVE,
VALVE BOX & COVER

STANDARD
DETAIL
WW-5



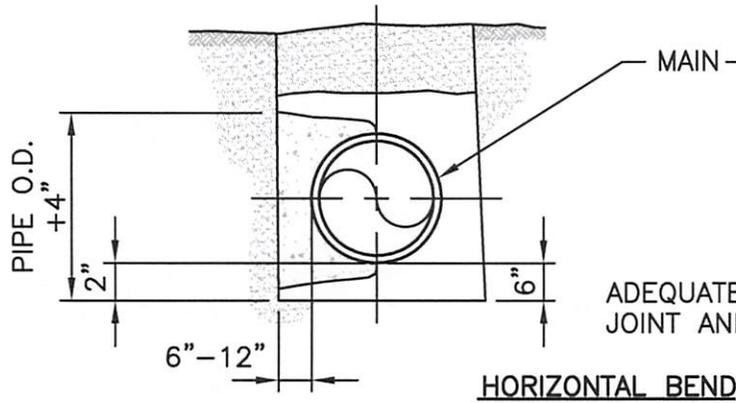
NOTES:

1. IF SAW CUT LINE FALLS WITHIN 2' OF CURB OR STRUCTURE, REMOVE AND REPLACE PAVEMENT TO THE CURB OR STRUCTURE.
2. ALL PAVING AND SUBGRADE PREPARATION SHALL MEET LOCAL COUNTY OR TXDOT SPECIFICATIONS. ROAD BASE SHALL BE REPLACED IN KIND WITH BASE THICKNESS EQUAL TO EXISTING BASE THICKNESS PLUS 3", BUT IN NO CASE LESS THAN 10".
3. METALLIC LOCATOR TAPE SHALL BE 12" WIDE AND ENCASED IN A PROTECTIVE, INERT, PLASTIC JACKET AND MARKED "SEWER". INSTALL 18" BELOW FINISHED GRADE.
4. PIPE EMBEDMENT MATERIAL TO BE APPROVED BY DISTRICT STAFF PRIOR TO INSTALLATION.
5. NO WATER DESIGNATED OR BLUE PIPE WILL BE ALLOWED IN WASTEWATER APPLICATIONS.
6. IF MINIMUM COVER CANNOT BE ACHIEVED DUE TO GRANITE OUTCROPPING AND IF SPECIFICALLY ALLOWED BY DISTRICT, ENCASE ALL SIDES OF PIPE IN 6" CONCRETE EMBEDMENT (MIN. 2,500 PSI STRENGTH CONCRETE).

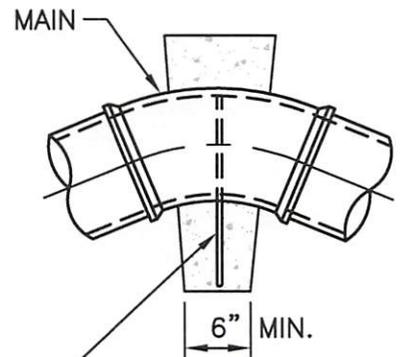
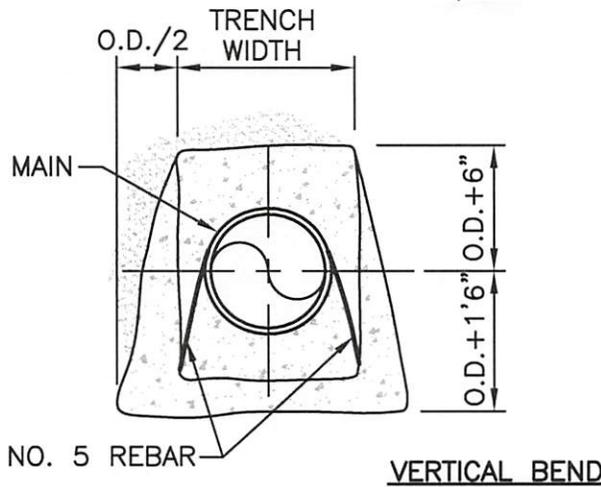
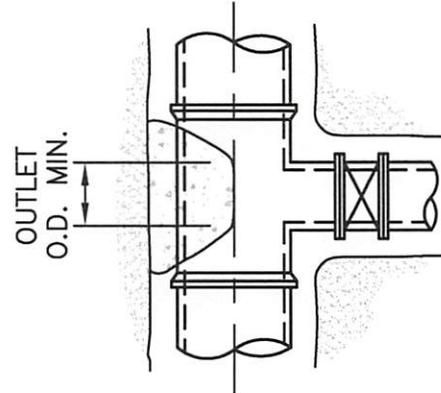
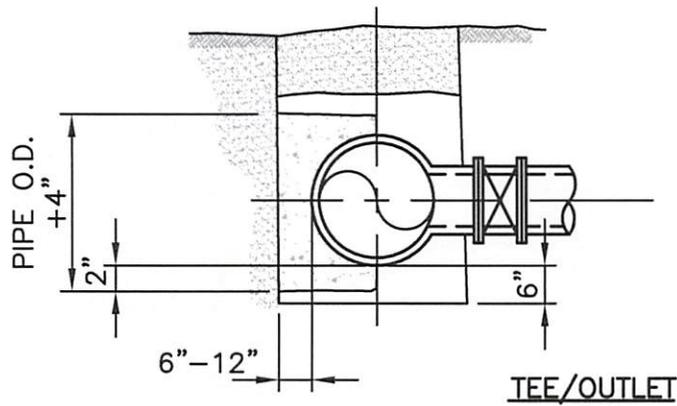
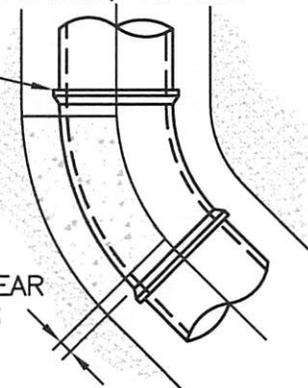
	KINGSLAND MUNICIPAL UTILITY DISTRICT			STANDARD DETAIL WW-6
	KINGSLAND, TEXAS			
	Scale: NTS			
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	Rev.#	Date	By	WASTEWATER MAIN TRENCH AND SURFACE REPAIR DETAIL

CONCRETE SHALL BE 2500 PSI MIN.

WRAP FITTINGS IN 8 MIL PLASTIC, TYPICAL



ADEQUATE TO CLEAR JOINT AND BOLTS



THRUST BLOCK DESIGN AS FOLLOWS:

- A. PIPELINE PRESSURE OF 100 PSI (ACTUAL IF HIGHER) +50% SURGE ALLOWANCE
- B. MAXIMUM SOIL BEARING PRESSURE

SOIL TYPE	BEARING PRESSURE
ROCK:	4000 LBS/SQ FT
UNDISTURBED SOIL:	2000 LBS/SQ FT
LOOSE SOIL:	1500 LBS/SQ FT

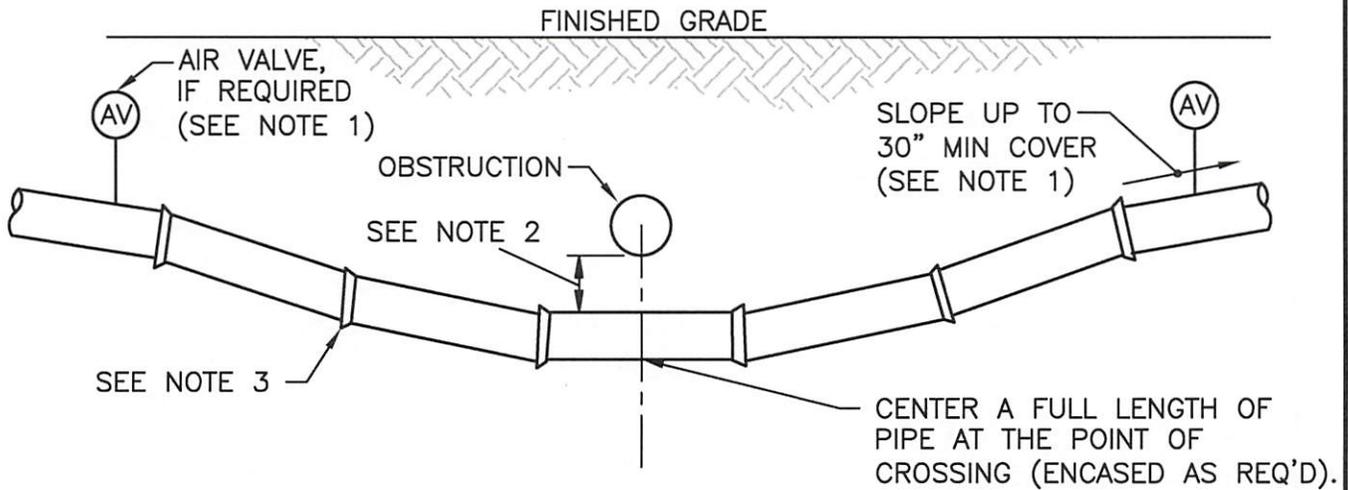


KINGSLAND MUNICIPAL UTILITY DISTRICT
KINGSLAND, TEXAS

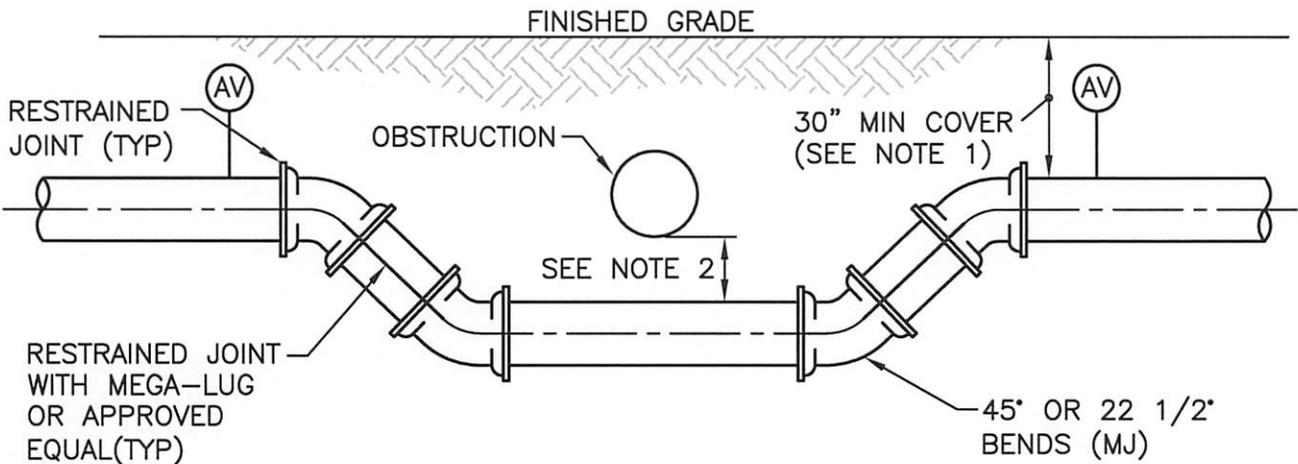
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WASTEWATER PRESSURE
MAIN THRUST BLOCKING

STANDARD
DETAIL
WW-7



STANDARD UTILITY CROSSING – DEFLECTION TYPE (SEE NOTE 4)



SPECIAL UTILITY CROSSING – FITTING TYPE

NOTES:

1. AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS ON FORCE MAINS.
2. 24" MINIMUM CLEARANCE REQUIRED FOR WATER AND WASTEWATER MAIN CROSSINGS. 12" MINIMUM CLEARANCE REQUIRED FOR OTHER TYPE UTILITIES CROSSING. CONTRACTOR MUST COMPLY WITH TCEQ CHAPTER 290.44 SEPARATION REQUIREMENTS.
3. CONSTRUCT STANDARD CROSSING USING 75% OF MANUFACTURERS RECOMMENDED MAXIMUM JOINT DEFLECTION.
4. THE DEFLECTION TYPE CROSSING SHALL BE USED WHERE POSSIBLE. ONLY UNDER SPECIFIC ORDERS BY THE DISTRICT WILL THE FITTING TYPE CROSSING BE ALLOWED.

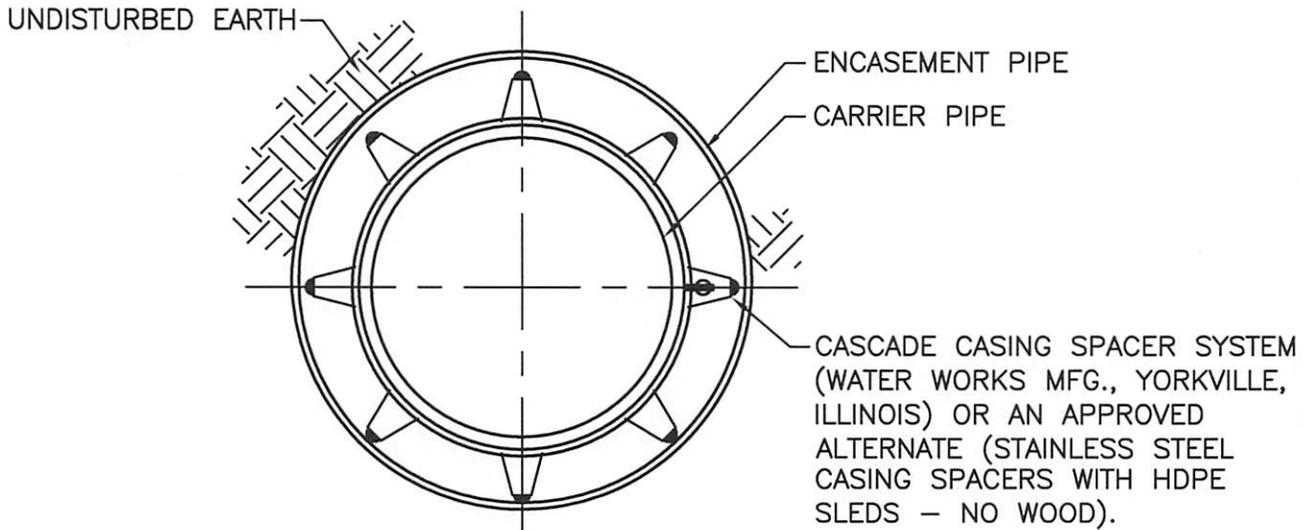


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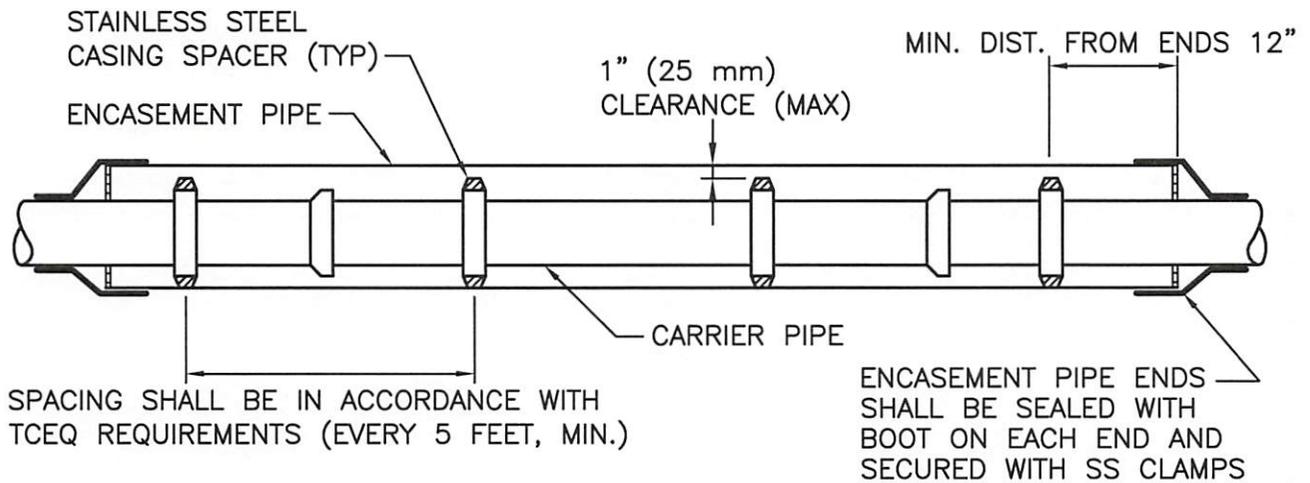
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UTILITY CROSSING

STANDARD
DETAIL
WW-8



TYPICAL SECTION WITH CASING SPACERS



CENTERLINE PROFILE

NOTES:

1. ENCASEMENT PIPE SHALL BE SMOOTH STEEL 35,000 PSI YIELD STRENGTH WITH MINIMUM WALL THICKNESS OF 1/4" (PIPE DIAMETERS OF 18" OR LESS).
2. ALL PUBLIC ROADWAY CROSSINGS IN KINGSLAND MUST MEET EITHER LLANO COUNTY, BURNET COUNTY, OR TXDOT SPECIFICATIONS AND PERMIT REQUIREMENTS.

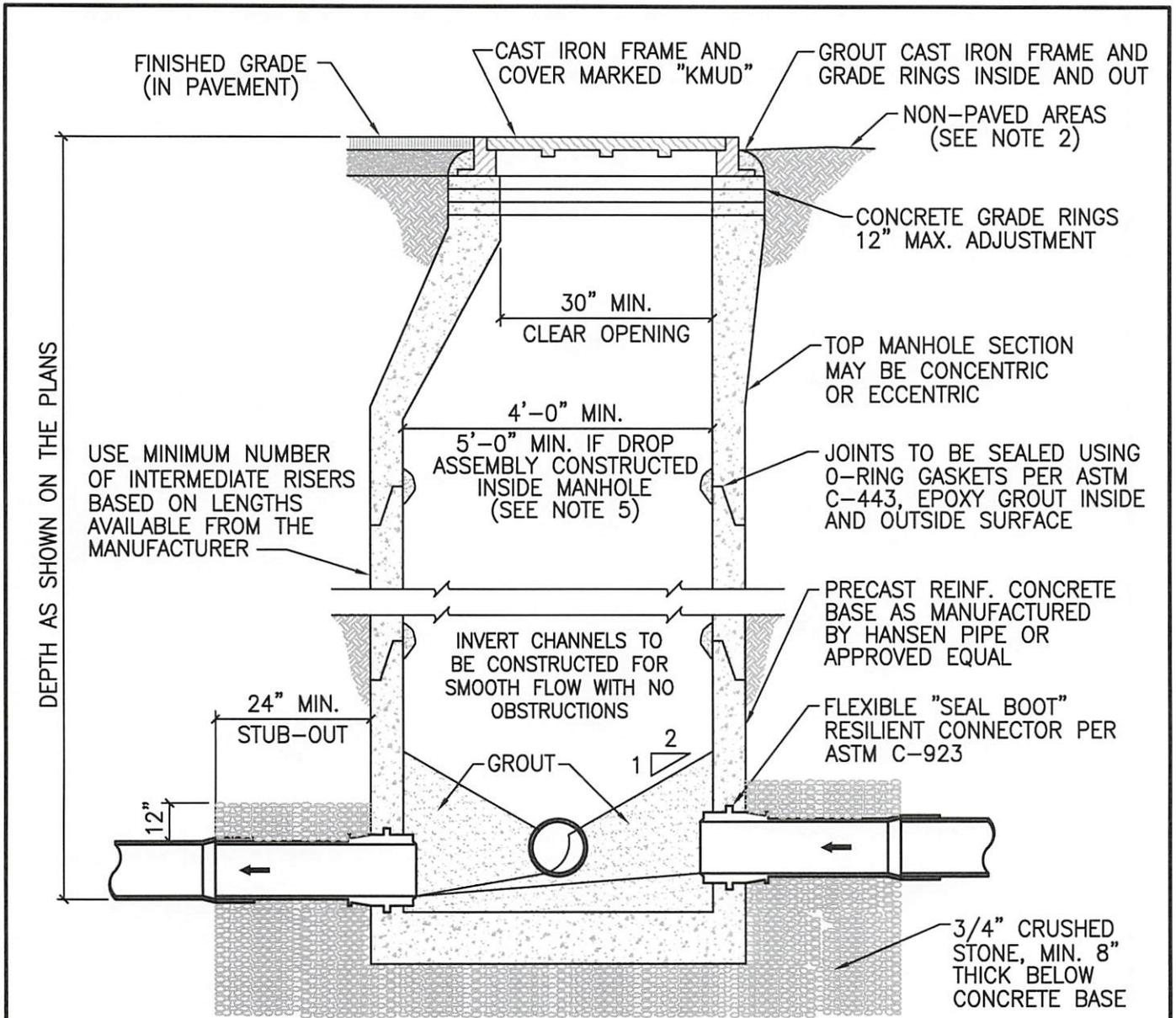


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ENCASEMENT DETAIL
WITH CASING SPACERS
(PUBLIC ROW)

STANDARD
DETAIL
WW-9



NOTES:

1. PRECAST CONCRETE MANHOLE DESIGN AND REINFORCEMENT SHALL CONFORM TO ASTM C-478, WITH MINIMUM 4,000 PSI CONCRETE.
2. WHERE MANHOLES ARE OUTSIDE OF PAVEMENT, ENSURE ADJACENT GRADES PROVIDE POSITIVE DRAINAGE DIRECTED AWAY FROM THE MANHOLE COVER.
3. WHENEVER A PRESSURIZED FORCE MAIN CONNECTION IS MADE TO THE MANHOLE, ENTIRE INTERIOR CONCRETE SURFACE TO BE COATED WITH 100 MILS MINIMUM THICKNESS RAVEN 405 EPOXY COATING, OR APPROVED EQUAL, AND APPLIED AFTER MANHOLE HAS PASSED THE VACUUM TEST.
4. BACKFILL MANHOLE USING MINIMUM 12" COMPACTED LIFTS WITH APPROVED MATERIAL.
5. CAST-IN-PLACE MANHOLE BASE WILL BE ALLOWED UPON DISTRICT APPROVAL.
6. DROP CONNECTIONS ARE REQUIRED WHENEVER AN INFLUENT SEWER IS LOCATED MORE THAN 2'-0" ABOVE THE MAIN INVERT CHANNEL. IF DROP IS 6" TO 2'-0", AN OVERSIZED FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM (REFERENCE DETAIL WW-11).

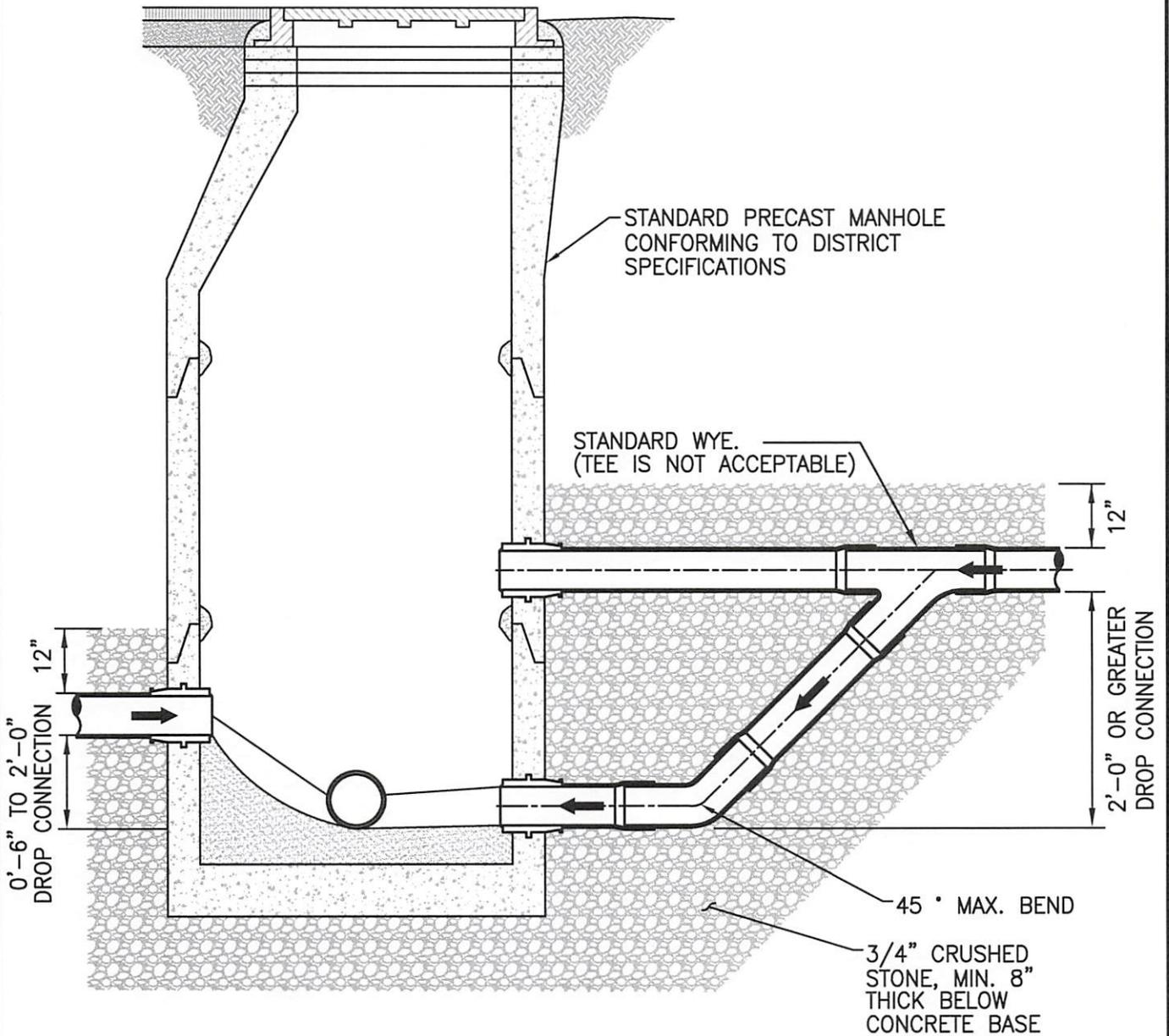


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PRECAST WASTEWATER
MANHOLE
(GRAVITY SYSTEMS)

STANDARD
DETAIL
WW-10



NOTES:

1. DROP CONNECTIONS ARE REQUIRED WHENEVER AN INFLUENT SEWER IS LOCATED MORE THAN 2'-0" ABOVE THE MAIN INVERT CHANNEL. IF DROP IS 6" TO 2'-0", AN OVERSIZED FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM.
2. WHENEVER PVC IS USED IN SANITARY SEWER LINES, SOLVENT TYPE JOINT PVC FITTINGS MAY BE UTILIZED IN THE DROP ASSEMBLY ONLY.
3. INTERNAL DROP CONNECTION PERMITTED ONLY WITH DISTRICT APPROVAL.



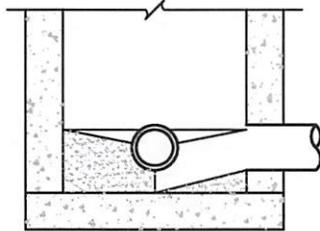
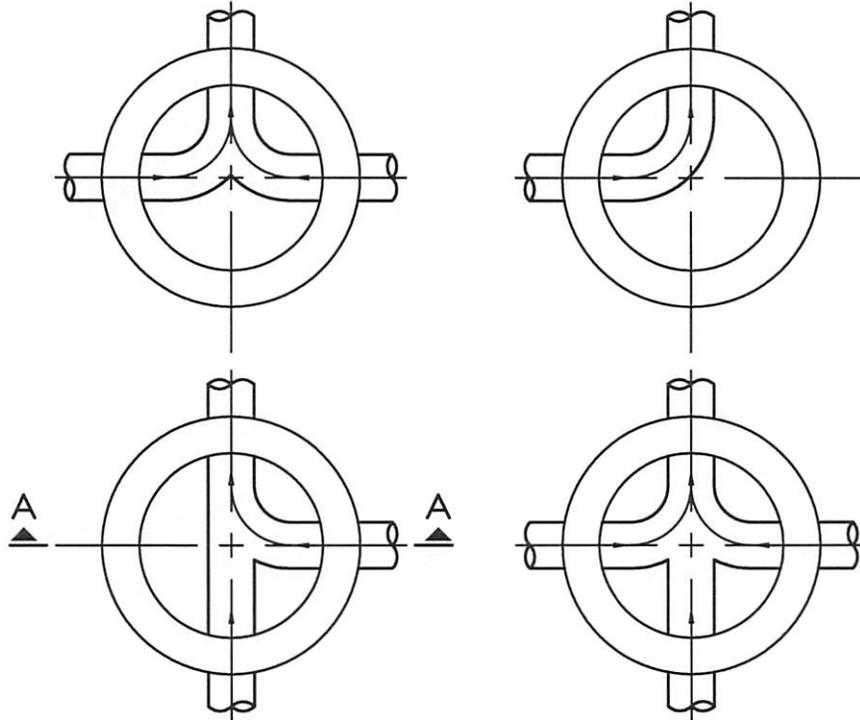
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PRECAST WASTEWATER
MANHOLE WITH DROP
CONNECTION
(GRAVITY SYSTEMS)

STANDARD
DETAIL
WW-11

FLOW PATTERNS FOR INVERT CHANNELS



SECTION "A-A"

NOTES:

1. INVERT CHANNELS TO BE CONSTRUCTED FOR SMOOTH FLOW WITH NO OBSTRUCTIONS.
2. SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS PROVIDING FOR SMOOTH FLOW.
3. CHANNELS FOR FUTURE CONSTRUCTIONS (STUBS) SHALL BE CONSTRUCTED, FILLED WITH SAND, AND COVERED WITH 1" OF MORTAR.
4. SLOPE MANHOLE ITSELF WITH A 1:2 SLOPE FROM MANHOLE WALL TO CHANNEL.
5. INVERT SHALL BE A MINIMUM OF 1/2 THE DIAMETER OF THE LARGEST PIPE OR 4" DEEP.

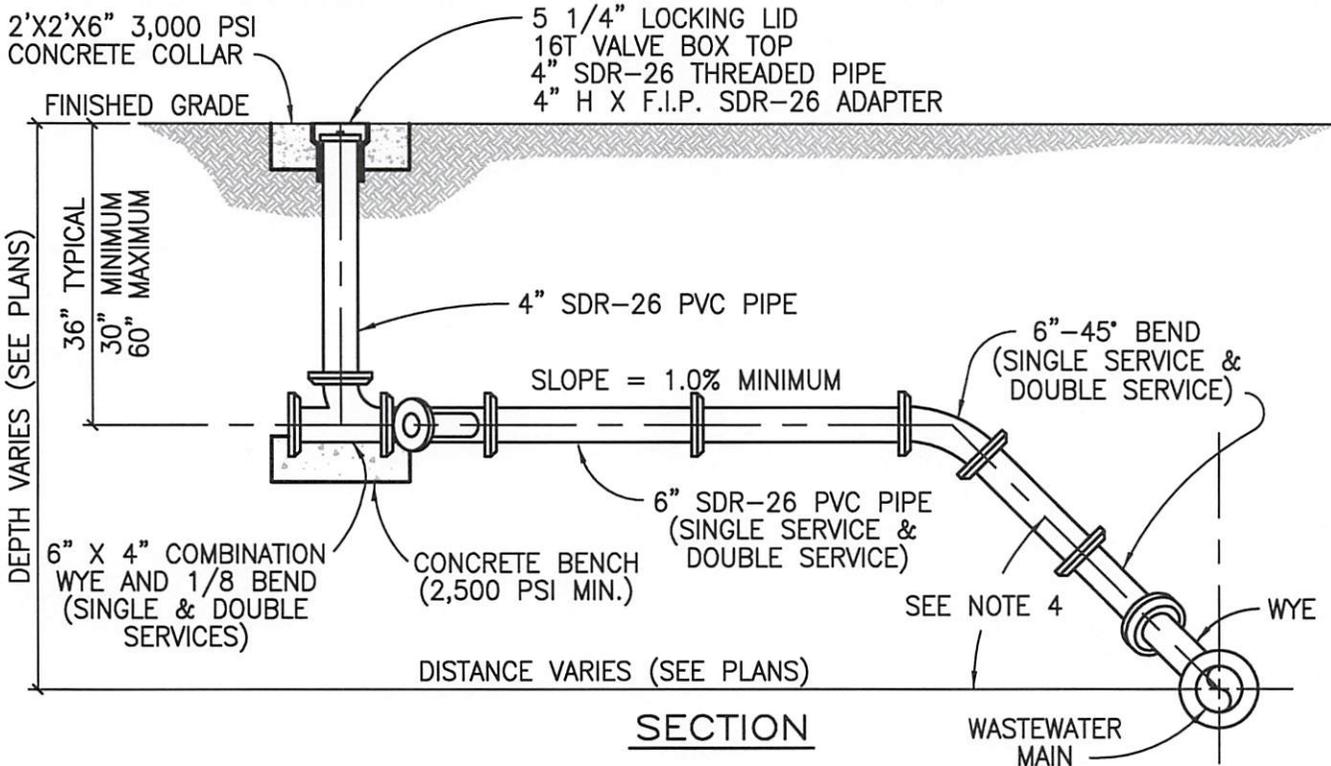


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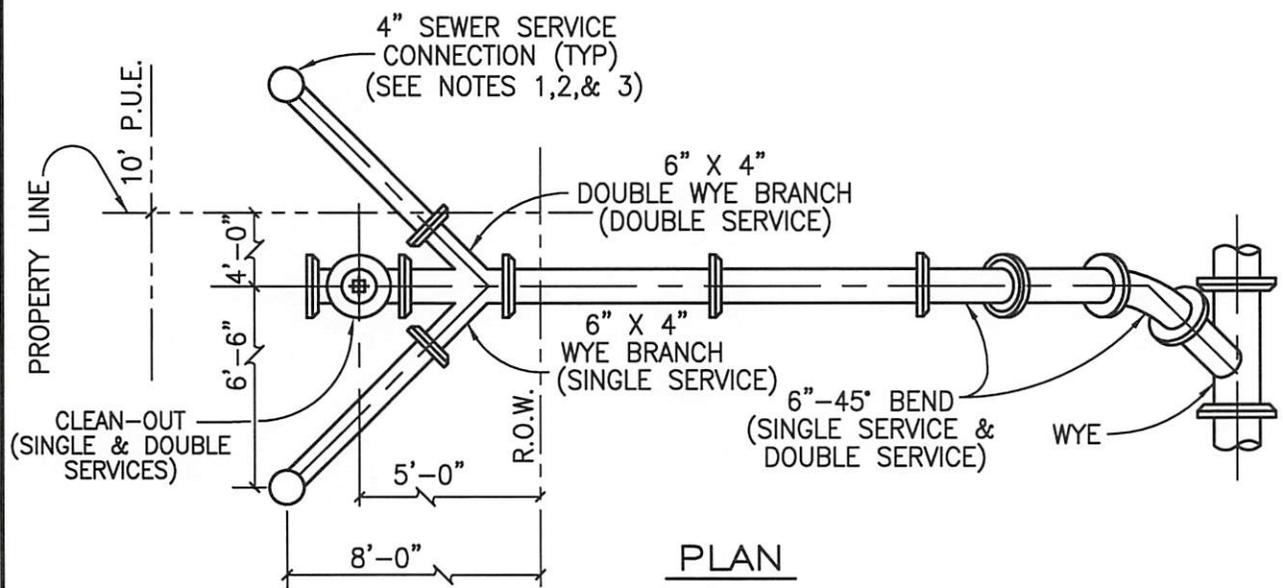
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FLOW PATTERNS FOR
INVERT CHANNELS
(GRAVITY SYSTEMS)

STANDARD
DETAIL
WW-12



SECTION



PLAN

NOTES:

1. SERVICE CONNECTION RISERS SHALL TERMINATE 8' INSIDE THE PROPERTY LINE.
2. THE END OF EACH SERVICE CONNECTION RISER SHALL BE EXTENDED 12" ABOVE FINISH GRADE.
3. EACH SERVICE CONNECTION SHALL BE PLUGGED WATER-TIGHT WITH AN APPROVED CAP OR PLUG.
4. SEWER SERVICE SLOPE TO BE 45° OFF CENTERLINE OF MAIN.
5. CONTRACTOR SHALL MARK ON A CLEAN SET OF PLANS THE FINAL STATIONING OR DISTANCE AND DIRECTION FROM MANHOLE TO EACH SERVICE LATERAL FOR RECORD DRAWING PURPOSES.

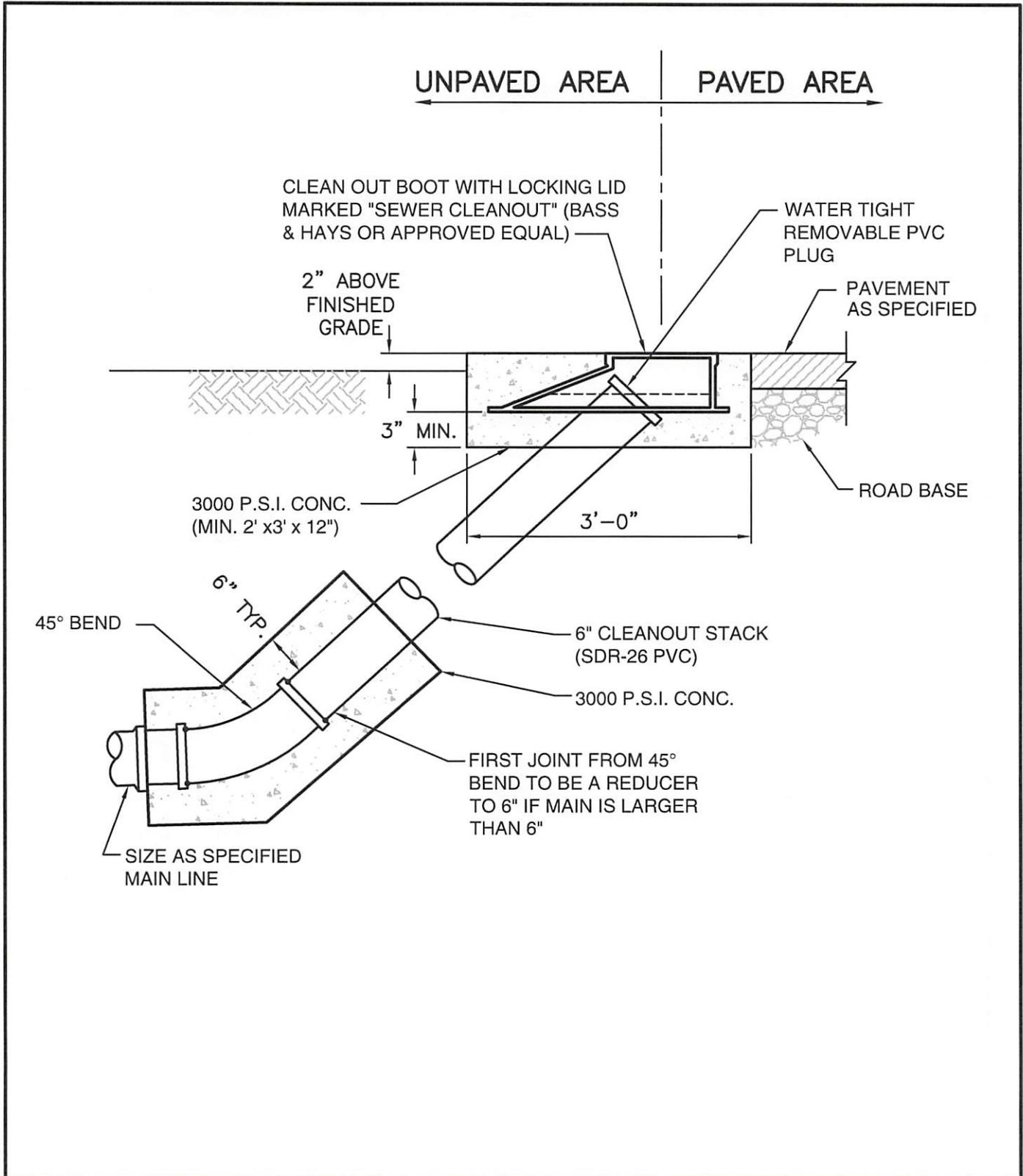


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WASTEWATER SERVICE CONNECTIONS (GRAVITY SYSTEMS)

**STANDARD DETAIL
WW-13**



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**END OF MAIN
WASTEWATER CLEANOUT
(GRAVITY SYSTEMS)**

**STANDARD
DETAIL
WW-14**