

NORDIC VALLEY SEWER IMPROVEMENT DISTRICT

Construction Standards and Specifications

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SECTION 100 – GENERAL PROVISIONS

This section establishes the administrative framework and overarching requirements for design and construction of water and sewer infrastructure within the District. It defines the applicability of these standards, responsibilities of design professionals and contractors, required submittals, and coordination with governing agencies.

These provisions are intended to ensure clarity, consistency, and conformance with state and local regulations. All development activity impacting public water or sewer systems must comply with the provisions outlined herein. If the items are not covered by Nordic Valley Public Improvement District Standards and Specifications then applicable APWA drawings and specifications may be proposed. All proposed APWA Standards and Specifications must be reviewed by the District, which reserve the right to approve, modify, or reject the standard(s).

101 PURPOSE AND SCOPE

This document sets forth the minimum requirements for planning, designing, and constructing water and sewer infrastructure intended for dedication to the District. These standards apply to all new developments, modifications to existing systems, and connections to District-owned facilities. The following general parameters define the scope:

1. Applies to both public and private development requiring utility service.
2. Includes standards for materials, installation, testing, and documentation.
3. Does not replace regulatory requirements of the State of Utah or other authorities having jurisdiction.
4. All work must be subject to review, inspection, and approval by the District.

102 AUTHORITY AND ENFORCEMENT

The District reserves the authority to interpret, enforce, and amend these standards as needed. All sewer and water construction must be performed in accordance with these requirements unless written deviation is approved.

The District may suspend work found to be non-compliant or posing a hazard to public infrastructure or the general public. This right does not relieve the contractor of their sole responsibility for maintaining a safe worksite in accordance with OSHA and applicable safety regulations.

Variances must be requested in writing and approved prior to implementation.

Unauthorized deviations may result in rejection of work and delayed acceptance.

District staff or designated representatives must be granted access to inspect work at any time.

103 DEFINITIONS

Terminology used throughout these specifications must be interpreted as defined in this section. Consistent terminology ensures clarity across construction documents, inspections, and correspondence. The following definitions must apply:

- District – The governing water and sewer authority adopting these standards.
- Engineer – A professional engineer licensed in the State of Utah responsible for project design and submittals.
- Contractor – The party performing installation of infrastructure in accordance with approved plans and specifications.
- Inspector – District staff or representative assigned to observe and document construction progress and conformance.
- Submittal – Any document, drawing, or product sample provided for District review and approval.
- Approved Equal – A product or material determined by the District to meet or exceed the specified standard.
- Easement – A recorded legal right to access and maintain utility infrastructure located on private property.
- As-Built Drawings – Construction record drawings showing all deviations from the approved plans.
- Main Line – The primary public pipeline for water distribution or wastewater collection.
- Service Line – A branch pipe from the main line that serves a single property or structure.

104 ABBREVIATIONS

The following abbreviations may be used within this document and referenced technical standards. All referenced standards must be the most current adopted version unless otherwise noted:

- AASHTO – American Association of State Highway and Transportation Officials
- ACI – American Concrete Institute
- ANSI – American National Standards Institute
- ASTM – American Society for Testing and Materials

- AWWA – American Water Works Association
- CAD – Computer-Aided Design
- DEQ – Utah Department of Environmental Quality
- DIP – Ductile Iron Pipe
- DWG – Drawing (AutoCAD file format)
- EPA – United States Environmental Protection Agency
- HDPE – High Density Polyurethane
- NSF – National Sanitation Foundation
- NPS – Nominal Pipe Size
- NVSID – Nordic Valley Sewer Improvement District
- OD – Outside Diameter
- OSHA – Occupational Safety and Health Administration
- PDF – Portable Document Format
- ROW – Right-of-Way
- SCADA – Supervisory Control and Data Acquisition
- SDR – Standard Diameter Ratio
- UDOT – Utah Department of Transportation

105 PLAN SUBMITTALS

All utility construction must be based on approved plans prepared by a licensed professional engineer. Plan submittals must be reviewed for conformance with these standards and applicable regulations. The following requirements apply:

1. Submittals must include plan and profile sheets, details, notes, specifications, calculations, and easement documentation.
2. All plans must be drawn to scale and include a north arrow, legend, and benchmark references.
3. Digital submittals must include PDF and CAD format.
4. Revisions made during review must be clouded and dated.
5. Construction must not commence prior to plan approval and required permits.

6. The district requires preliminary and final submittals. Failure to conform with district standards may result in additional submittals.
7. Construction Drawings
 - 7.1 One digital copy of Construction Drawings shall be submitted to the District Engineer for preliminary review.
 - 7.2 One digital copies of Construction Drawings shall be submitted to the District Engineer for final approval.
 - 7.3 One full size digital copies of Construction Drawings shall be submitted to the District Engineer before the start of construction. These drawings shall be stamped by the District Engineer and distributed as required.
8. All Easements and Land Acquisition
 - 8.1 One copy of all necessary Easement forms shall be submitted to the District Engineer for review.
 - 8.2 One signed copy of all necessary Easement forms shall be submitted to the District Engineer for final approval and recordation.
 - 8.3 All necessary permits shall be submitted to the District Engineer for final approval. Required permits include but are not limited to state and county utility line permits, canal crossing permits, Railroad crossing permits, Army Corp. of Engineer permits, etc.
 - 8.4 All necessary permits and easements must be submitted prior to final approval being granted by the District.

District Engineer's Authority

The District Engineer shall review submitted Construction Drawings for compliance with these Design Standards and Construction Specifications.

The District Engineer shall note any changes to Construction Drawings, required to bring Construction Drawings into compliance with these Design Standards and Construction Specifications.

Required changes shall be made to Construction Drawings and returned to the District Engineer for final approval.

SECTION 200 – GENERAL

This section outlines the minimum design standards for water and sewer infrastructure within the District. These standards are intended to ensure that all utility systems are designed for safety, reliability, efficiency, and long-term maintainability. They provide technical criteria for layout, pipe sizing, pressure management, appurtenance placement, and coordination with adjacent infrastructure. Designs developed under these standards must support both immediate service needs and future expansion while protecting public health and complying with applicable regulations.

All designs must comply with current Utah Administrative Code requirements, including R309 (Drinking Water Systems) and R317 (Wastewater Systems), and must conform to the latest applicable AWWA, ASTM, and NSF standards. In addition to meeting these technical codes, design engineers must consider future operational access, constructability, and service expansion when preparing construction documents.

All structures and pipe placed under or in roads shall be sufficient strength to support, with an adequate factor of safety, the backfill, road surfacing and H-20 per AASHTO standard specifications, truck loading with impact. Higher loading requirements may be required by the district.

201 Water

This subsection outlines design standards specific to the potable water system, including sizing, pressure management, fire protection, and system layout. These requirements support the safe delivery of drinking water, fire suppression capability, and operational efficiency, and the District's water master plan. The following requirements apply:

201.1 Pipe Sizing and System Layout

Water mains must be sized to meet peak demand and fire flow requirements. Systems must be looped where feasible to improve redundancy and water quality. The following standards apply:

1. Minimum main diameter: 8 inches.
2. Minimum Pipe Cover: 60 inches.
3. Hydraulic modeling must demonstrate ≥ 40 psi under peak day + fire flow conditions.
4. Dead-end mains must terminate at a fire hydrant.

5. Designs must support future expansion.
6. Pipe on 20 percent slopes or greater must be anchored to district standards.
7. SCADA system must be installed to district standards.

201.2 PRESSURE AND VELOCITY STANDARDS

Water systems must maintain adequate pressure and limit velocity to minimize head loss. System performance must fall within acceptable ranges to preserve infrastructure and ensure service reliability. The following performance criteria must apply:

8. Operating pressure: 40–110 psi.
9. PRVs required for static pressures >110 psi.
10. Max velocity: 6 fps during peak flow.

201.3 FIRE PROTECTION REQUIREMENTS

Fire protection infrastructure must meet local fire authority requirements and provide adequate flow and accessibility. Water system design must include provisions for fire flow and hydrant placement. The following standards must apply:

1. Fire flow: must comply with the International Fire Code Appendix B (2021).
2. Residual pressure ≥ 20 psi during fire flow.
3. Hydrant spacing must comply with International Fire Code Appendix C (2021).
4. Hydrants must include valves, delineators, and be accessible year-round.
5. Hydrant placement must account for snow removal.
6. Additional fire protection requirements may be required upon Fire Marshall review.
7. Refer to additional requirements from District's Water Master Plan.

201.4 UTILITY SEPARATIONS

Proper separation between utilities is required to prevent cross-contamination and maintain system integrity. Designs must meet state and District standards to ensure safety and operability. The following minimum separations must be observed:

1. Horizontal: ≥ 10 feet of clearance between water and sewer.
2. Vertical: Water ≥ 18 inches of clearance above sewer.
3. Encasement and/or sleeving will be required where separations cannot be met.

201.5 EASEMENT AND RIGHT-OF-WAY REQUIREMENTS

Water mains must be placed within legal corridors that provide sufficient access for maintenance and future extension. These corridors must be recorded and kept clear of obstructions. The following criteria must apply:

1. Easement width: 20 feet minimum for single utility. Additional width may be required where the depths of pipe exceeds 15-feet.
2. Shared corridor: 30 feet minimum.
3. No permanent structures allowed within easements.

201.6 WATER LATERALS

Service laterals must be designed to preserve water quality and provide consistent pressure to each connection. Materials and configurations must conform to District standards for durability, reliability, and tree protection. The following requirements apply:

Material: Type K copper or HDPE per AWWA C901.

1. Minimum size: 3/4 inch.
2. Service must include corporation stop, and meter box.

201.7 WATER METERS

Water meters are critical components of the potable water system, providing accurate usage measurement and enabling system monitoring and service accountability. All meter installations must meet District standards for durability, accuracy, access, and inspection. Meters must be

installed within approved vaults or boxes, in accordance with Nordic Valley Sewer Improvement District construction specifications.

1. Meters shall be located within 7 feet of the street-side property line and must not be located in driveways.
2. Water meters are supplied by the District; contractor shall provide all other materials and labor.
3. Precast or cast-in-place concrete, watertight, H-20 traffic-rated lids marked "WATER."
4. Vaults must include sump pit for drainage, passive ventilation (two minimum), and OSHA-compliant access steps.
5. 3/4" - 1" meter: Vault to include Mueller Therma-Coil 18" DIA. or equal PVC box.
6. 1½"-2" meters: Vault to include Mueller H-1423-2N setter with adapters and drain gravel base.
7. 4" meters: Must include flanged compound or magnetic meter, bypass piping with isolation valves, strainer, and pipe supports.

201.7 WATER TANKS

Tanks must be designed to meet operational, fire flow, and emergency storage needs. Sites must support maintenance access and security. The following features and criteria must be included:

1. Design per Utah Administrative Code R309-545.
2. Include overflow, vent, hatch, level indicator, and sample tap.
3. Site must have drainage, access, and security fencing.

201.8 WELLS

Wells must meet regulatory source protection requirements and ensure reliable service under varying operating conditions. Construction and equipping must support compliance, operational flexibility, and backup provisions. The following standards apply:

11. Design per Utah Administrative Code R309-515.
12. Include check valve, sample tap, flow meter, and vault.
13. Backup power may be required.

Private wells are not allowed.

201.9 PRESSURE REDUCING VALVES

PRVs must be used to maintain safe operating pressures in high elevation or over pressurized zones. Each installation must be fully accessible and adequately drained. The following installation requirements apply:

14. Installed in concrete vaults with isolation valves.
15. Include gauges and bypass piping.

201.10 AIR RELEASE AND AIR VACUUM RELIEF

Air release and vacuum valves must prevent air locking and vacuum conditions that can damage infrastructure. These valves must be strategically located and protected from freezing or flooding. These components must be installed as follows:

1. Install at high points in the system.
2. Vaults must drain and include isolation valves.

201.11 BACKFLOW PREVENTOR

Backflow preventers shall protect potable water supplies from contamination due to backpressure or backsiphonage in both domestic and fire suppression systems. Devices must meet all relevant codes and standards, be made of corrosion-resistant materials, and be installed for accessibility and performance monitoring.

1. If a dedicated fire line provides service to a fire sprinkler system an approved backflow prevention assembly will be required.
2. Any irrigation system connections to public water systems will require backflow prevention.

202 Sewer

This subsection addresses design of gravity sewer systems, including alignment, slope, appurtenances, and service laterals. Sewer designs must ensure continuous flow, ease of maintenance, and long-term durability. All sewer design must comply with Utah Administrative Code R317-3-2.

202.1 PIPE SIZING AND SYSTEM LAYOUT

Sewer mains must be sized to convey projected peak flows for full build-out. Layouts must avoid excessive bends and include manholes for access. The following standards apply:

1. Minimum main diameter: 8 inches.
1. Minimum Pipe Cover: 60 inches.
2. Manholes required at junctions, changes in direction, and max 400-foot intervals.
3. Terminal manholes required at all dead ends.

202.2 CAPACITY AND MINIMUM SLOPES

Sewer systems must maintain adequate slope to prevent solids accumulation and flow stagnation. Pipe slopes must be consistent with minimum flow velocity requirements and allow for long-term system performance with minimal maintenance. The following minimum slopes apply:

Pipe Diameter (inches)	Minimum Slope (%)
8	0.40
10	0.28
12	0.22
15	0.15

18	0.12
21	0.10
24	0.08

1. Greater slopes are encouraged where feasible to improve self-cleansing velocity and reduce the risk of sediment buildup.

Sewer lines with 20 percent slopes or greater must be anchored to district standards.

202.3 MANHOLES

Manholes provide access for maintenance and inspection and must be watertight and durable. They must be located and constructed in accordance with District standards. The following standards apply:

1. General
 - 1.1 Precast per ASTM C478, 48-inch inside diameter minimum.
 - 1.2 Watertight frames and covers.
 - 1.3 Inverts must be channelized.
 - 1.4 Manholes must not be positioned in waterways
 - 1.5 A 0.20-foot minimum elevation step must be provided in all junction manholes; except where accepted otherwise by the district engineer. Manholes with mainline slopes greater than 5% must match slope through manhole.
 - 1.6 Drop manholes are discouraged, but may be necessary due to physical constraints. Drop manholes are not to be used to merely avoid extra depth in trench unless unusual circumstances exist.
2. Minimum Size
 - 2.1 Manhole diameters must be at least 4-feet in diameter

- 2.2 Manholes on sewer lines greater than 12-inches must be 5-feet in diameter
 - 2.3 Manholes with three or more main lines connecting must be 5 feet in diameter
 - 2.4 Manholes deeper than 14 feet shall be 5-feet in diameter
3. Location:
- 3.1 Maximum distance between manholes must be 400-feet from centerline to centerline
 - 3.2 All abrupt grade changes
 - 3.3 All changes in horizontal alignments (except curves)
 - 3.4 All changes in pipe sizes
 - 3.5 All junctions of sewer mains
 - 3.6 All points of tangency of each reverse curve.

202.4 CLEANOUTS

Cleanouts must be accessible year-round and:

- 1. Cleanouts can not be used as an alternative to manholes on sewer lines 8-inches in diameter or greater.
- 2. All sanitary sewer clean-outs must conform to the requirements of Utah State Department Health Code and the International Plumbing Code
- 3. Cleanouts are required at all bends on pipes under 8-inches in diameter
- 4. Cleanouts are required within 5 feet of a building

202.4 UTILITY SEPARATIONS

Sewer mains must maintain proper separation from potable water systems to protect public health. These separations must be clearly shown on design plans and maintained during construction. The following separations must apply:

1. Horizontal separation: ≥ 10 feet from water.
 2. Vertical: Sewer ≥ 18 inches below water.
1. Encasement and/or sleeving will be required where separations cannot be met.

202.5 EASEMENT AND RIGHT-OF-WAY REQUIREMENTS

Sewer infrastructure must be located in corridors that provide long-term access and accommodation equipment. Easements must be recorded and free of permanent obstructions. The following apply:

1. Easement width: 20 feet minimum. Additional width may be required for pipes more than 15-feet in depth.
2. Increase to 30 feet for deep mains or shared corridors.

202.6 SEWER LATERALS

Sewer laterals must convey wastewater from buildings to the public main and be sized to prevent blockages. Laterals must be accessible and watertight. The following standards apply:

1. Material: PVC SDR-35.
2. Minimum size: 4 inches (residential), 6 inches (commercial).
3. Cleanouts are required at ROW and every 50 feet for long runs.
4. A manhole must be installed when an 8-inch or larger sewer is connected to an equal or larger diameter sewer.
5. A 6-inch sewer lateral must be constructed at a minimum slope of 1 percent
6. 1 4-inch sewer lateral must be constructed at a minimum slope of 2 percent
7. It is the designer's responsibility to recognize the possibility of reverse flow in service laterals serving lots or buildings with plumbing fixtures below the nearest upstream sewer manhole rim. In such instances, suitable backflow prevention must be provided.

202.7 LIFT STATIONS

Lift stations may be used only when gravity service is infeasible and must be designed for reliability and redundancy. All proposals need approval from District Engineer for their use. Control systems, backup power, and site access are critical to long-term performance. Design standards include:

1. Duplex submersible pumps with 2× peak flow capacity.
2. Include wet well, backup power or storage, bypass connection, and SCADA.
3. Site must have secure access, lighting, and drainage.
4. Must be lined with OBIC 1000 or approved equivalent liner.

SECTION 300 – MATERIALS

This section defines the minimum material requirements for construction of potable water and sanitary sewer systems within the District. These specifications apply to all pipes, fittings, valves, hydrants, manholes, service connections, and bedding materials installed as part of any public utility project. The intent is to ensure high-quality, durable components that conform to nationally recognized performance standards and are compatible with District operations and maintenance practices.

All materials must be new, undamaged, and listed as approved by the District. Unless noted otherwise, materials must conform to AWWA, ASTM, and NSF standards and be installed in accordance with the manufacturer's published recommendations. Submittals and cut sheets must be provided for all components, and substitution of alternate materials requires prior written approval by the District.

301 Water

This subsection establishes acceptable materials for water mains, service lines, valves, hydrants, fittings, and trench backfill. These components must be compatible with potable water service, pressure-rated, and certified to NSF 61 where applicable.

301.1 MAINS

Water mains must be constructed from pressure-rated, corrosion-resistant materials suitable for continuous underground service. These materials must be compatible with potable water applications and capable of withstanding installation stresses and internal pressures. The following specifications must apply:

1. Ductile Iron Pipe (DIP): AWWA C151, Class 400 minimum, with cement-mortar lining per AWWA C104 and bituminous coating.
2. PVC: AWWA C900, DR-18 minimum, gasketed joints per ASTM D3139, gaskets per ASTM F477.
3. HDPE: AWWA C906 for approved applications.
4. All pipes must be marked with manufacturer name, pressure class, and NSF 61 certification.
5. All non-metallic pipe must include a 12-gauge insulated copper tracer wire.

301.2 SERVICES

Water service lines must deliver safe, reliable drinking water from the main to individual users while withstanding pressure fluctuations and corrosion. Materials must be certified for potable use and compatible with District construction practices. The following standards apply to 3/4" to 4" services:

1. Tubing: Type K copper or HDPE per AWWA C901.
2. Corporation stops: AWWA C800, threaded or compression type.
3. Meter setters and boxes must conform to District detail, including backflow prevention where applicable.

301.3 FITTINGS AND RESTRAINT SYSTEMS

Fittings and joint restraint systems are critical to maintaining pipeline integrity under normal and surge pressure conditions. These components must be selected to match the pipe type and operating environment. The following criteria apply:

1. Fittings: Ductile iron, mechanical joint, per AWWA C110 or C153.
2. Minimum pressure rating: 250 psi.
3. Restraint: Mechanical joint restraint (e.g., MEGA-LUG or approved equal) in lieu of thrust blocks where specified.
4. All bolts and hardware must be corrosion-resistant and coated for direct burial.
5. Concrete thrust blocks must be installed per 401-2.

301.4 VALVES

Valves control system flow and isolate segments for maintenance, testing, or emergency shutdown. They must be constructed and rated to withstand the full working pressure of the water system. The following requirements apply:

1. Gate valves (4"–16"): AWWA C509 or C515, resilient wedge, non-rising stem.
2. Valves <4": Bronze wedge gate or ball valve.

3. Butterfly valves ($\geq 16"$): AWWA C504, Class 150B.
4. Valve boxes: Two-piece cast iron, traffic-rated, marked "WATER."
5. All valves must open left (counterclockwise) and be rated for 250 psi minimum.

301.5 FIRE HYDRANTS

Fire hydrants are critical to fire protection and system flushing and must meet both national and local performance requirements. They must be configured for visibility, accessibility, and ease of operation. The following specifications apply:

1. Comply with AWWA C502.
2. Nozzle configuration: Two 2½" hose nozzles and one 4½" pumper nozzle.
3. Inlet: 6" MJ connection with mechanical joint restraint.
4. Hydrant must open left (counterclockwise) and include breakaway flange and safety coupling.
5. Approved models: Mueller Centurion, American-Darling B-62B, Clow, or equal.
6. Minimum bury depth: 6 feet.

301.6 TAPPING SLEEVES AND SADDLES

Tapping sleeves and saddles enable pressurized connections to existing mains and must be secure, watertight, and appropriately rated. Materials must resist corrosion and be compatible with both the pipe and the tapping process. The following standards apply:

1. Tapping sleeves: Stainless steel body with flange outlet and full circumferential gasket.
2. Saddles: Double strap, bronze body with stainless steel hardware.
3. Tapping of asbestos cement (AC) pipe is prohibited unless explicitly approved in writing by the District.

301.7 PIPE BEDDING AND BACKFILL MATERIALS

Pipe trench will support the pipe evenly and protect against differential settlement or surface loading. The following materials and requirements apply:

1. Bedding: Clean, crushed granular material ($\frac{3}{4}$ " minus or sand), free of organics and rocks >1 inch.
2. Initial backfill: Same as bedding, to 12 inches above pipe.
3. In existing or proposed roadways, trench backfill must also conform to the standards of the public agency having jurisdiction. Where differences occur, the more stringent requirement must govern.
4. The contractor must coordinate with the city, county, or state agency to ensure trench restoration and compaction meet all applicable standards.

302 Sewer

This subsection defines material requirements for sewer mains, service laterals, manholes, and trench backfill. Materials must provide corrosion resistance, watertight performance, and long-term durability in gravity-flow sanitary applications. The following criteria apply:

302.1 MAINS

Sanitary sewer mains must be built from materials that resist corrosion and deformation while supporting long-term flow under gravity conditions. Pipe joints must remain watertight and stable under buried conditions. The following pipe types and standards apply:

1. PVC SDR-35 per ASTM D3034 for depths up to 15 feet.
2. PVC SDR-26 or DIP for depths greater than 15 feet or where noted by District.
3. DIP must include ceramic epoxy lining for corrosion resistance.
4. Minimum diameter: 8 inches.
5. Joints: Gasketed per ASTM D3212; gaskets per ASTM F477.
6. All pipe must be clearly marked with manufacturer name, size, class, and applicable standard.

302.2 SERVICES

Sewer service laterals carry wastewater from buildings to the public main and must maintain reliable flow without leakage or intrusion. Joints and connections must remain sealed, and installation must support proper slope and cleanout access. The following standards apply:

1. Minimum diameter: 4 inches for single-family, 6 inches for multifamily/commercial.
2. Material: PVC SDR-26 or SDR-35 with solvent weld or gasketed joints.
3. Connections: Factory wyes, Inserta-Tees, or District-approved saddles.
4. Field taps on mainline pipe are not permitted.

302.3 MANHOLES

Sanitary sewer manholes provide vertical access for inspection, cleaning, and maintenance and must be structurally sound and sealed. They must be designed to withstand surface loading and prevent groundwater infiltration. The following apply:

1. Precast concrete per ASTM C478, 48-inch minimum ID.
2. Eccentric cones unless otherwise approved.
3. Joints sealed with rubber gasket, mastic, or joint wrap.
4. Base may be precast or cast-in-place with smooth, channeled inverts.
5. Frames and covers: Cast iron, traffic-rated, labeled "SANITARY SEWER," gasketed or bolted in high groundwater areas.
6. Cone and wall sections must conform with ASTM C-478.
7. All manholes to be H-20 rated.

302.4 PIPE BEDDING AND BACKFILL MATERIALS

Bedding and backfill materials for sewer pipes must protect alignment and prevent infiltration, settlement, or collapse. These materials must be compacted properly to avoid differential movement and to ensure system longevity. The following requirements apply:

1. Bedding: Clean $\frac{3}{4}$ " minus gravel or sand, compacted beneath and around haunches. Minimum 6" depth.
2. Backfill: Compacted in uniform lifts; free of organics and rocks >3 inches.
3. Backfill in roadways must also meet the standards of the jurisdictional roadway agency.

4. Where standards differ, the more restrictive governs. The contractor is responsible for coordinating with all applicable agencies.

SECTION 400 – INSTALLATION REQUIREMENTS

This section outlines the minimum requirements for the installation of water and sewer infrastructure, including excavation, bedding, pipe placement, backfilling, and installation of appurtenances such as valves, hydrants, manholes, and service connections. Proper installation is critical to ensure long-term functionality, maintain public health and safety, and comply with regulatory and District standards.

All materials must be installed in accordance with the manufacturer's recommendations, applicable ASTM and AWWA standards, and the detailed provisions of this section. The contractor must ensure that construction is performed by qualified personnel using proper equipment and methods. Where installation occurs within public right-of-way or other regulated areas, all additional requirements of the governing agency must also apply. The contractor is responsible for coordinating with the District and other utility owners during all phases of installation.

401 Water

This section outlines the installation procedures and requirements for potable water system components, including trenching, pipe laying, valves, hydrants, and backfill. Installations must be precise, properly supported, and fully restrained to ensure service reliability and long-term performance. The following requirements must apply:

401.1 TRENCHING AND EXCAVATION

Water system trenches must be excavated to provide proper grade, clearance, and bedding depth without compromising safety. Contractors must follow best practices and all applicable codes to prevent damage to adjacent utilities and provide a stable working environment. The following standards must be observed:

1. Minimum trench width: per Standard Detail 401-1.
2. Trench bottom must be smooth and free of rock, debris, and standing water.
3. Over-excavated areas must be refilled with compacted granular material.
4. Trenches must comply with OSHA and local excavation safety regulations.
5. Trench boxes or shoring must not rest directly on pipe.

Water settling or “jetting” of trenches backfill not allowed.

401.2 PIPE LAYING PROCEDURES

Water pipe must be installed to maintain uniform slope, protect against deflection, and ensure positive joint seating. Pipe and gaskets must be clean and undamaged prior to insertion. The following procedures must be followed:

1. Install pipes with bell ends facing upstream unless otherwise approved.
2. All bedding must be properly compacted before placing pipe.
3. Gaskets must be clean, lubricated, and correctly seated.
4. Tracer wire must be installed above all non-metallic mains and secured at valves and hydrants.
5. Joint deflection must not exceed manufacturer's recommendations. When Looping is necessary, refer to Standard Detail 401-5.
6. Pipe must be placed gently in trench.

401.3 JOINTING METHODS

All joints must be assembled using manufacturer-approved techniques and materials. Pipe joining methods must ensure watertight performance and structural integrity under pressure. The following standards apply:

1. Push-on joints must be fully inserted and evenly seated.
2. Mechanical joints must use lubricated gaskets and properly torqued bolts.
3. Solvent-welded joints, where allowed, must fully cure before testing or backfill.
4. Joints must be watertight and tested under Section 500.

401.4 THRUST RESTRAINT AND BLOCKING

All directional changes, valves, and end fittings must be properly restrained to prevent movement under pressure. Restraint systems must be selected based on thrust force calculations and surrounding soil conditions. The following requirements apply:

1. Concrete thrust blocks must be poured against undisturbed native soil and formed to avoid contact with bolts and joints.

2. Joint restraint systems (e.g., MEGA-LUG) must be used where concrete blocks are not feasible or where required by the District.
3. Restraint lengths must be calculated based on pipe diameter, pressure class, and soil type.
4. All restrained joints must be documented on as-built. Refer to Standard Detail 401-2.

401.5 VALVE AND FITTING INSTALLATION

Valves and fittings must be installed level, plumb, and fully supported with proper access for operation and maintenance. These appurtenances must be restrained and protected from settlement or shifting. The following standards must be met:

1. Provide thrust blocks and joint restraint where required.
2. Valve boxes must be independently supported and centered over the operating nut.
3. Valve boxes must be flush with finished grade and marked in accordance with District standards.
4. Air release valves must be located at high points and placed in drained, vented Refer to Standard Detail 401-7 and Standard Detail 401-12.

401.6 HYDRANT INSTALLATION

Fire hydrants must be installed at accessible locations with appropriate isolation valves and drainage. Hydrant installations must be stable, properly restrained, and configured for freeze protection. The following requirements apply:

1. Install hydrants vertical and plumb with the nozzles 18 inches above finished grade.
2. Connect to the main using a 6-inch tee and gate valve with joint restraint.
3. Hydrant barrels must be set to match the depth of cover with extensions minimized.
4. Provide drain rock around the base unless drains are to be plugged by District directive. Refer to Standard Detail 401-4.

401.7 SERVICE LINE INSTALLATION

Water services must be installed without sharp bends and must maintain continuous grade and protection from frost. The following guidelines must be followed:

1. Use continuous runs of approved tubing or pipe with no sharp bends.
2. Corporation stops must be oriented for accessibility.
3. Meter boxes must be located per plan and flush with final surface.
4. Services under roadways must be sleeved or bored per jurisdictional requirements. Refer to Standard Detail 401-6 and Standard Detail 401-11.

401.8 BACKFILLING AND COMPACTION

Backfill operations must protect the installed pipe from damage and ensure support and surface stability. The following requirements apply:

1. Bedding and initial backfill must follow Section 301.7.
2. Backfill to be compacted to 95% of maximum dry density (AASHTO T99).
3. In roadways, compaction, materials, and trench restoration must conform to the standards of the jurisdictional roadway authority.
4. Stones larger than 3 inches must not be used within 12 inches of the pipe.

401.9 TRENCH SAFETY REQUIREMENTS

All trenching and excavation activities must comply with OSHA and local safety regulations. The contractor is solely responsible for ensuring trench safety for both workers and the general public. The following trench safety measures must be followed:

1. Protective systems (e.g., trench boxes, sloping, or shoring) must be provided as required by OSHA based on trench depth and conditions.
2. Open trenches must be properly barricaded, signed, and protected at the end of each workday.
3. The District assumes no responsibility for enforcement of safety regulations; this responsibility lies entirely with the contractor

401.10 PROTECTION OF EXISTING UTILITIES

All known and discovered utilities must be protected from damage before, during, and after construction. The following requirements apply:

1. Locate and pothole existing utilities prior to excavation.
2. Maintain clearances per utility owner standards.
3. Any damage must be reported and repaired immediately in coordination with the utility owner.

401.11 STUB AND CAP PIPE

Where future extensions are planned, mains and laterals must be stubbed and capped per District standards. The following requirements must apply:

1. All stubs must be capped or plugged with watertight, pressure-rated fittings.
2. Provide warning tape and tracer wire for future identification.
3. Stubs must be shown on the record drawings with length, depth, and location reference.
4. Provide upright 2x4 wood marker from stub end to 2' above grade, spray paint above grade blue.

401.12 Meter Vault

This specification outlines the requirements for a precast or cast-in-place meter vault designed to house water metering equipment. The vault shall provide secure, durable, and accessible housing for utility monitoring in accordance with local utility standards and project-specific design criteria.

1. Vault Type: Precast concrete or cast-in-place, watertight construction.
2. Dimensions: Minimum interior clear space of 4' x 4' x 6' (length x width x height), or as required by utility.
3. Access: Traffic-rated, non-corrosive access hatch with a minimum 30" diameter opening.
4. Lid: H-20 load-rated lid with locking mechanism, marked "WATER".

5. Drainage: Sump pit provided for dewatering; connection to storm drain if required.
6. Piping Penetrations: Factory-installed pipe sleeves with water-tight boots.
7. Ventilation: Minimum two (2) passive vents unless otherwise directed by the utility.
8. Interior Fittings: Aluminum ladder rungs or fiberglass steps meeting OSHA standards.
9. Meter Support: Brackets or rails to securely mount utility-provided water meters and appurtenances.
10. Installation: Vault set level on a 6" minimum crushed gravel base; backfill with compacted granular material.
11. Refer to Standard Detail 401-8, 401-9, and 401-11.

402 Sewer

This section details requirements for gravity sewer system installation, including excavation, bedding, pipe placement, manhole installation, and service connections. All installations must ensure proper slope, alignment, and protection from infiltration. The following standards must be met:

402.1 TRENCHING AND EXCAVATION

Trenches for sewer mains and laterals must be excavated to achieve proper slope and uniform bedding. The following standards apply:

1. Minimum trench width: pipe outside diameter plus 18 inches.
2. Trench bottom must be free of large stones and shaped to support the pipe.
3. Over-excavation must be backfilled with compacted bedding material.
4. Contractor is responsible for trench safety and public protection per Section 401.9.

402.2 BEDDING AND BACKFILL

Sewer pipe bedding and backfill must support alignment and reduce long-term settlement risk. These materials must be properly selected and compacted. The following requirements apply:

1. Bedding must follow material requirements in Section 302.4.

2. Backfill in roadways must meet the jurisdictional agency's standards for compaction and restoration.

402.3 PIPE INSTALLATION

Gravity sewer pipe must be laid to line and grade to maintain consistent slope and prevent flow stagnation. The following installation procedures apply:

1. Minimum slopes must meet or exceed Section 203.2.
2. Pipe must be laid with bell ends upstream and true to line and grade.
3. Pipes must be joined using manufacturer-recommended methods.
4. Interior of pipe must be cleaned prior to installation and kept clean during construction.
5. Pipe must be laid gently in trench.

402.4 MANHOLE INSTALLATION

Manholes must be constructed to provide watertight access at designated intervals and transitions. The following requirements must apply:

1. Bases must be precast or cast-in-place with formed or channeled inverts.
2. Risers must be vertically aligned and sealed at each joint.
3. Frames and covers must be installed flush with final grade and sealed in flood-prone or high groundwater areas.
4. External joint wraps or flexible sealants must be used to ensure watertightness.
5. Manholes must have a minimum at 1 grade ring.

402.5 SERVICE INSTALLATION

Service laterals must be installed to maintain proper slope and cleanout access and must be sealed against infiltration. The following installation standards apply:

1. Connections must use factory wyes or Inserta-Tees—no field taps allowed.
2. Laterals must be bedded and backfilled per Section 302.4.

SECTION 500 – TESTING

This section outlines the minimum testing and documentation requirements for all newly installed water and sewer infrastructure, including hydrostatic pressure testing, leakage testing, disinfection, bacteriological sampling, air testing, deflection testing, and CCTV inspection.

All testing must be performed by the contractor at their expense and under their direction, using qualified personnel and calibrated equipment. Testing must demonstrate conformance with these specifications, applicable AWWA or ASTM standards, and regulatory requirements. The contractor must coordinate with the District to schedule all witnessed tests. No segment of the system must be placed into service until all testing has been completed and accepted by the District in writing.

To meet these requirements, the following testing procedures must apply:

501 Water

501.1 HYDROSTATIC PRESSURE TESTING

Water mains must be hydrostatically tested to verify structural integrity and confirm the ability to withstand operating pressures. Testing must be performed in accordance with AWWA C600 and must meet the following requirements:

1. Test pressure: 200 psi or 1.5 times working pressure, whichever is greater.
2. Test duration: Minimum 2 hours.
3. The test segment must be filled slowly to eliminate air and maintained under pressure throughout the test period.
4. All thrust blocks and mechanical restraints must be in place and cured before testing.
5. Pressure gauges must be calibrated and approved by the District prior to use.

501.2 LEAKAGE TESTING

Leakage testing must be conducted as part of the hydrostatic test to ensure that water loss remains within acceptable limits. All leakage must be measured, calculated, and compared to the AWWA maximum allowable rate using the formula below:

1. Allowable leakage (L), in gallons per hour:

2. $L = (N \times D \times \sqrt{P}) / 7400$

Where:

N = number of joints

D = nominal diameter (in inches)

P = average test pressure (in psi)

3. Any leakage exceeding the allowable must be located and corrected, followed by a retest.
4. Visible leaks are not permitted under any circumstances, even if total leakage is within the allowable.

501.3 DISINFECTION PROCEDURES

All newly installed potable water systems must be disinfected prior to being placed into service to ensure compliance with public health requirements. The disinfection process must follow AWWA C651 and must include the following steps:

1. Disinfection must use the continuous-feed method unless otherwise approved.
2. Chlorine concentration: Minimum 25 ppm for 24 hours, with residual ≥ 10 ppm at end of contact period.
3. Disinfection must be followed by thorough flushing until chlorine residual is below 1 ppm.

501.4 BACTERIOLOGICAL TESTING

Following disinfection and flushing, bacteriological testing is required to verify the absence of harmful microorganisms. Testing must conform to AWWA C651 and applicable state drinking water regulations.

1. Two consecutive samples (taken at least 24 hours apart) must show absence of total coliform.
2. Sampling must occur at locations selected by the District representative.
3. Samples must be analyzed by a certified laboratory.
4. Test results must be submitted to the District for review and approval prior to service connection.

501.5 FLUSHING REQUIREMENTS

Newly installed waterlines must be flushed to remove sediment, debris, and excess chlorine before connection to the active system. Flushing procedures must be conducted under controlled conditions in accordance with the following requirements:

1. Flushing velocity must be at least 2.5 fps.
2. Flushing must occur prior to and after disinfection.
3. Hydrants and blow-offs must be used for controlled discharge.
4. Flushing water must be dechlorinated before entering natural waterways or storm drains.

501.6 TESTING DOCUMENTATION

All testing activities must be documented and submitted to the District for review and acceptance. The following information must be included in the test report package:

1. Testing dates and personnel
2. Pipe segment locations
3. Pressure and leakage results
4. Chlorine residual levels
5. Bacteriological lab results
6. Certification of gauge calibration

502 Sewer

502.1 LOW PRESSURE AIR TESTING

Gravity sewer mains must be tested with low-pressure air to confirm joint integrity and ensure that the pipeline is free from leaks. Testing must follow ASTM F1417 and meet the following requirements:

1. Minimum test pressure: 3.5 psi (after stabilization).
2. Allowable pressure drop: ≤ 1.0 psi during the test period (typically 5 minutes).

3. Test duration is based on pipe diameter and length.
4. All plugs and caps must be properly rated and secured.
5. Air testing is required after manholes and laterals are in place and backfilled.

502.2 DEFLECTION TESTING

Flexible sewer pipe must undergo deflection testing to verify that deformation under load does not exceed acceptable limits. Testing must be conducted no sooner than 30 days after backfilling, unless otherwise approved by the District.

1. Maximum allowable deflection: 5% of average inside diameter.
2. Mandrel diameter must be a rigid, non-adjustable sizing device.
3. Any pipe failing deflection testing must be replaced and retested.

502.3 INFILTRATION/EXFILTRATION TESTING

Where site conditions indicate potential for groundwater infiltration or leakage, infiltration or exfiltration testing must be performed. The following limits and procedures must apply:

1. Infiltration (groundwater entering pipe):
 2. Allowable: 200 gallons per inch diameter per mile per day.
3. Exfiltration (water loss from pipe under head pressure):
 - 3.1 Test head: ≥ 4 feet above crown at upstream manhole.
 - 3.2 Duration: 2 hours minimum.
4. Use clean, potable water for exfiltration tests.

502.4 MANDREL AND CCTV INSPECTION

All sewer mains must be inspected after testing to confirm alignment, joint condition, and interior cleanliness. Inspections must be performed using closed-circuit television (CCTV) and/or mandrel testing as required by the District.

1. CCTV inspection must be completed after successful air or exfiltration testing.

2. Footage must show alignment, slope, joint conditions, and interior defects.
3. Mandrel testing must be performed to verify deflection as an alternative or in addition to CCTV if requested by the District.
4. All video files and inspection logs must be submitted in digital format for review.

SECTION 600 – INSPECTION AND APPROVALS

This section outlines the procedures and responsibilities related to inspection, documentation, punch list resolution, and formal acceptance of water and sewer infrastructure. All work is subject to inspection by the District and must meet the standards set forth in these specifications.

It is the responsibility of the contractor to notify the District when work is ready for inspection and to provide safe access to the site at all times. No portion of the system must be accepted or placed into service until it has been inspected, tested, and approved in writing by the District.

601 CONSTRUCTION OBSERVATION

Construction observation allows the District to monitor progress, verify compliance with approved plans, and identify deficiencies prior to system acceptance. Observation ensures the work meets quality standards and is in line with approved design and specifications. The following requirements apply during construction:

1. Inspections may occur at any time without prior notice.
2. The contractor must provide at least 48 hours' notice when requesting a scheduled inspection.
3. Work covered prior to inspection must be uncovered at the contractor's expense if required.
4. The District may suspend work if conditions are unsafe or noncompliant.
5. All deficiencies noted during inspection must be corrected prior to acceptance.

602 TESTING AND CERTIFICATION

All testing required under Section 500 must be successfully completed and documented before any portion of the system is accepted. Testing results must confirm that all performance and installation criteria have been met. The following requirements apply to test certification and submittal:

1. Test reports must include dates, results, locations, equipment used, and signatures of responsible personnel.
2. Any failed test must be corrected and retested at no cost to the District.

3. No system component may be connected to the active system until testing is accepted in writing.

603 PUNCH LIST PROCEDURES

Once construction is substantially complete, the District will perform a final inspection and issue a punch list of remaining items. All punch list items must be completed and re-inspected prior to acceptance. The following procedures must be followed:

1. Punch list work must be completed within 30 calendar days unless otherwise approved.
2. The District will re-inspect all corrected work before issuing acceptance.
3. Failure to complete punch list work in a timely manner may delay acceptance and bonding release.

604 FINAL ACCEPTANCE

Final acceptance will be granted only after all inspection, testing, and submittal requirements have been fulfilled to the satisfaction of the District. Contractors must formally request final review. The following conditions must be met:

1. The contractor must request final acceptance in writing.
2. The District will confirm that all requirements have been met prior to issuing written approval.
3. Final acceptance does not relieve the contractor of warranty obligations under Section 700.

605 AS-BUILT DRAWING REQUIREMENTS

As-built drawings are required to document actual construction conditions and must reflect any deviations from the approved plans. These drawings ensure accuracy of system records for future operation and maintenance. The following standards apply:

1. As-builts must show the horizontal and vertical location of all pipes, valves, hydrants, manholes, service laterals, and appurtenances.

2. Drawings must include distances from known reference points (e.g., property lines, curb faces).
3. Digital files must be submitted in PDF and CAD (DWG or DXF) formats.
4. The District reserves the right withhold final acceptance until complete and accurate as-builts are received.

SECTION 700 – SPECIAL CONDITIONS AND NOTES

This section addresses site-specific conditions, environmental considerations, project coordination responsibilities, and other requirements that fall outside the scope of standard installation practices. These provisions supplement the general requirements of this document and are intended to clarify the expectations of the District when special circumstances arise.

The contractor is responsible for understanding and complying with all applicable local, state, and federal regulations and must incorporate these requirements into all phases of construction. Unless otherwise directed in writing, the requirements of this section are fully enforceable as part of the District's acceptance process.

701 WINTER CONSTRUCTION

Construction during freezing weather must be executed with additional precautions to protect materials, prevent damage, and ensure long-term performance. Cold weather conditions affect curing times, material integrity, and the ability to maintain service-ready infrastructure. The following requirements apply:

1. All materials must be stored in a manner that prevents freezing or exposure to subfreezing temperatures prior to installation.
2. Water system components must not be installed in frozen trench subgrades or where frost exists in the bedding or backfill.
3. Hydrants, valves, meter boxes, and other appurtenances must be protected from freezing during and after installation.
4. Temporary heating and insulation may be required to protect curing concrete, coatings, or other temperature-sensitive products.
5. The District may suspend or reschedule work during extreme cold or mandate protective measures at the contractor's expense.

702 CONSTRUCTION NEAR SENSITIVE AREAS

Projects that intersect or border wetlands, streams, source water protection zones, or other environmentally sensitive areas must be constructed with additional care. Additional protective measures, documentation, and agency coordination may be required in these areas. The following requirements must apply:

1. All work must comply with applicable environmental permits, restrictions, and mitigation plans.
2. No equipment staging, fuel storage, or material stockpiling is permitted within protected areas unless explicitly approved.
3. Erosion and sediment control measures (e.g., silt fences, wattles) must be installed and maintained in working order.
4. Dewatering discharge must be filtered and directed to approved locations away from water bodies or stormwater inlets.
5. Any disturbance outside approved limits must be restored at the contractor's expense to conditions acceptable to the District and regulatory agencies.

703 COORDINATION WITH OTHER UTILITIES

Coordination with other utilities is essential to maintain safety, prevent service interruptions, and ensure successful project completion. Utility locations must be verified and protected throughout construction. The following requirements apply:

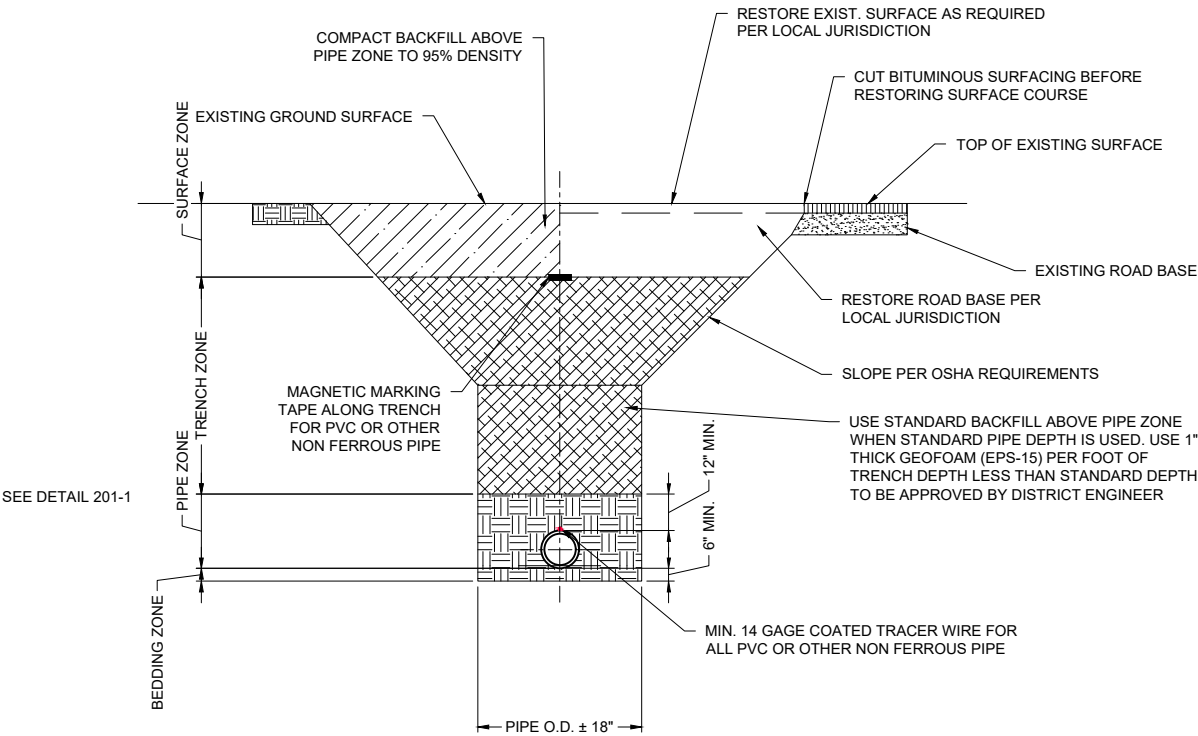
1. Contact Blue Stakes (811) at least 48 hours prior to any excavation.
2. Pothole and verify the horizontal and vertical location of all critical utilities prior to installation.
3. Notify utility owners and the District of any discovered conflicts or unmarked utilities.
4. Coordinate any utility shutdowns, relocations, or protection efforts with the appropriate utility owner.
5. Any utility damage caused by the contractor must be immediately reported and repaired to the satisfaction of the utility owner.

704 NON-CONFORMING WORK

Any work not completed in accordance with the approved plans, District standards, or these specifications must be considered non-conforming. Contractors must correct deficiencies in a timely manner to avoid project delays and ensure system integrity. The following requirements apply:

1. The contractor must notify the District immediately when deviations from plans or standards are identified.
2. The District reserves the right to require removal and replacement of non-conforming materials or installation at the contractor's expense.
3. Corrective work must be completed within the time frame specified by the District to avoid delays in acceptance.
4. Continued failure to comply with correction notices may result in withholding of inspections or final approval.
5. Non-conforming work that is accepted by the District as-is must not waive future warranty obligations or inspection authority.

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NOTES:
EXCAVATION: TRENCH SHALL MEET ALL CURRENT OSHA REQUIREMENTS AND UOSH REQUIREMENTS FOR SAFETY.
BACKFILL: BACKFILL OPERATIONS SHALL COMPLY WITH APLWA 33-05-20 AND MATERIALS SHALL COMPLY WITH APWA 31-05-13 AND 32-11-23 WITH THE FOLLOWING MATERIAL SELECTION:

	UNIMPROVED AREAS	PAVEMENT AREAS
BEDDING	DETAIL 201-1	DETAIL 201-1
PIPE ZONE	DETAIL 201-1	DETAIL 201-1
TRENCH ZONE	NATIVE OR IMPORTED SOIL	UNTREATED BASE COURSE
SURFACE ZONE	NATIVE TOP SOIL	UNTREATED BASE

SEWER ROCK PEA GRAVEL AND RECYCLED AGGREGATE ARE NOT ALLOWED AS BACKFILL.

COMPACTION: COMPACTED TO 95% OF MAXIMUM DRY DENSITY PER AASHTO T99.

	UNIMPROVED AREAS	PAVEMENT AREAS
PIPE ZONE	PER PIPE MANUFACTURE RECOMMENDATION	PER PIPE MANUFACTURE RECOMMENDATION
TRENCH ZONE	92% OF ASTM D 698	95% OF ASTM D 1557
SURFACE ZONE	80% OF ASTM D 698	95% OF ASTM D 1557

WATER SETTLING OR "JETTING" OF TRENCHES BACKFILL NOT ALLOWED

INSTALLATION OF PIPE: INSTALL PIPE PER APWA 33-11-00 "WATER DISTRIBUTION AND TRANSMISSION SYSTEMS." INSTALL PIPE ON STABLE FOUNDATION WITH UNIFORM BEARING. SHAPE TRENCH BY HAND TO FIT BOTTOM QUADRANT OF PIPE ALLOWING SPACE FOR PIPE BELLS.

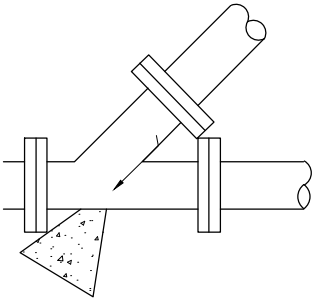
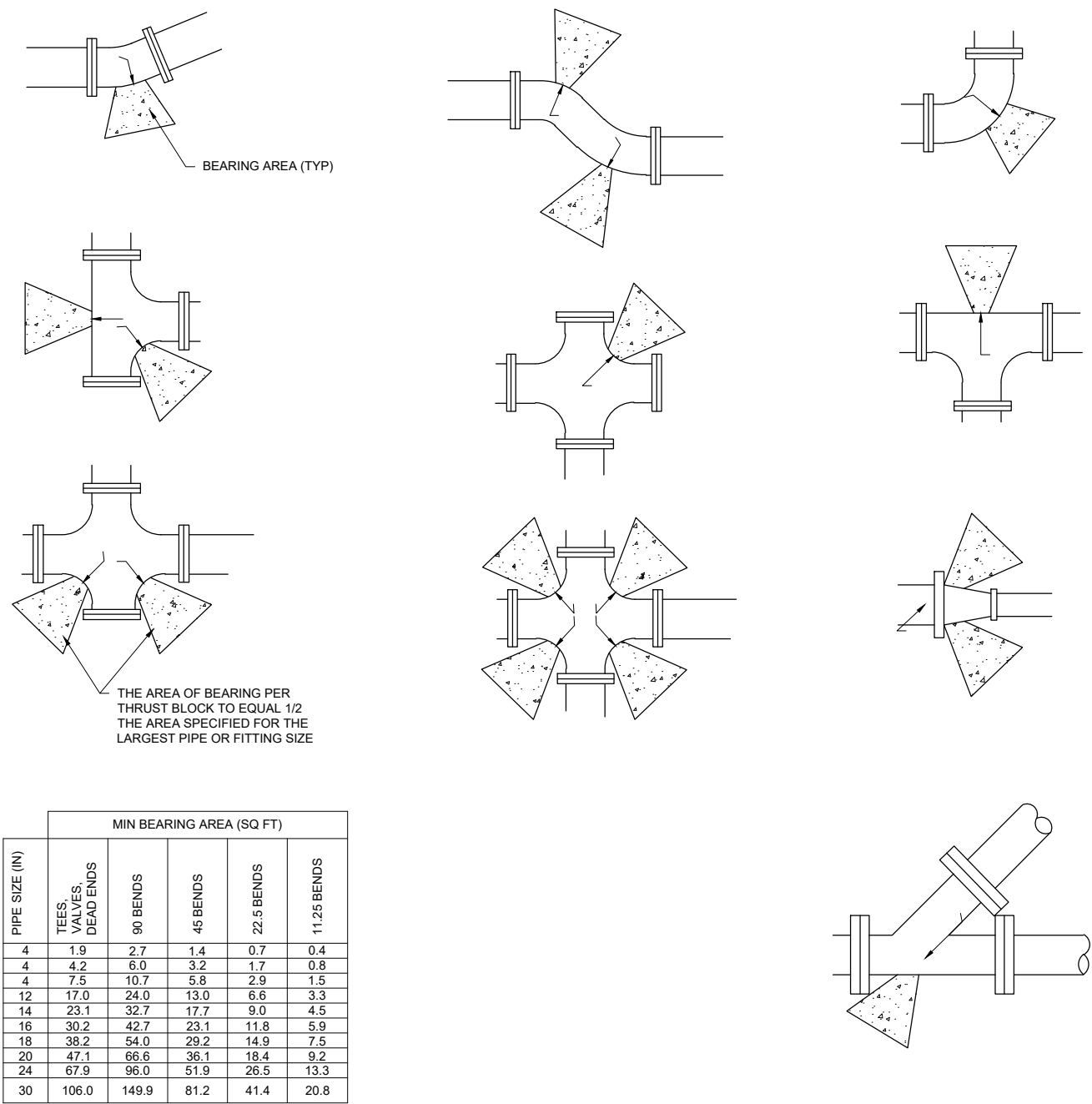
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NORDIC VALLEY
WATER
INFRASTRUCTURE

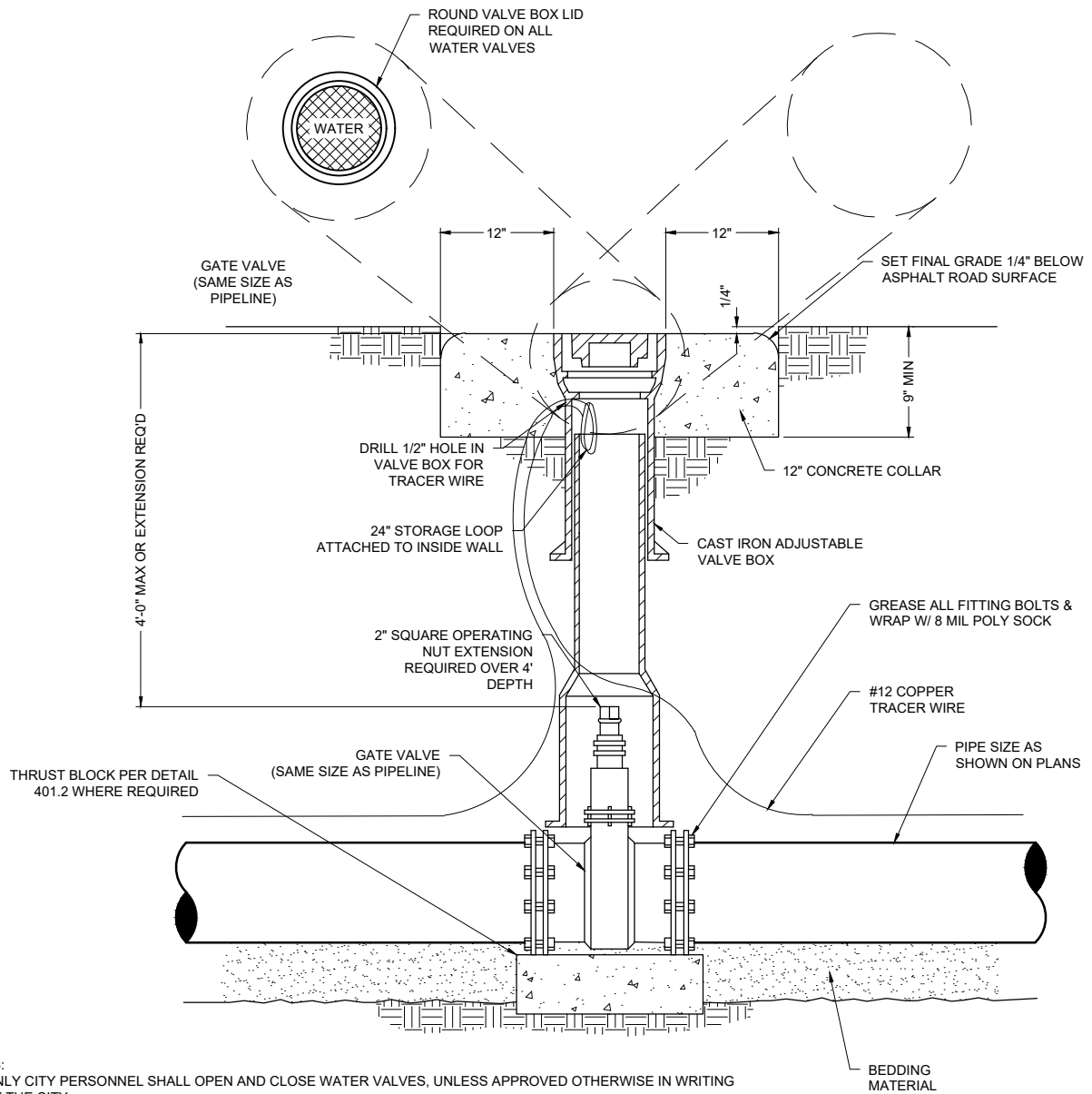
WATERLINE TRENCH

401-1

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UPDATED: MAY 2025		
NORDIC VALLEY WATER INFRASTRUCTURE	THRUST BLOCK	401-2



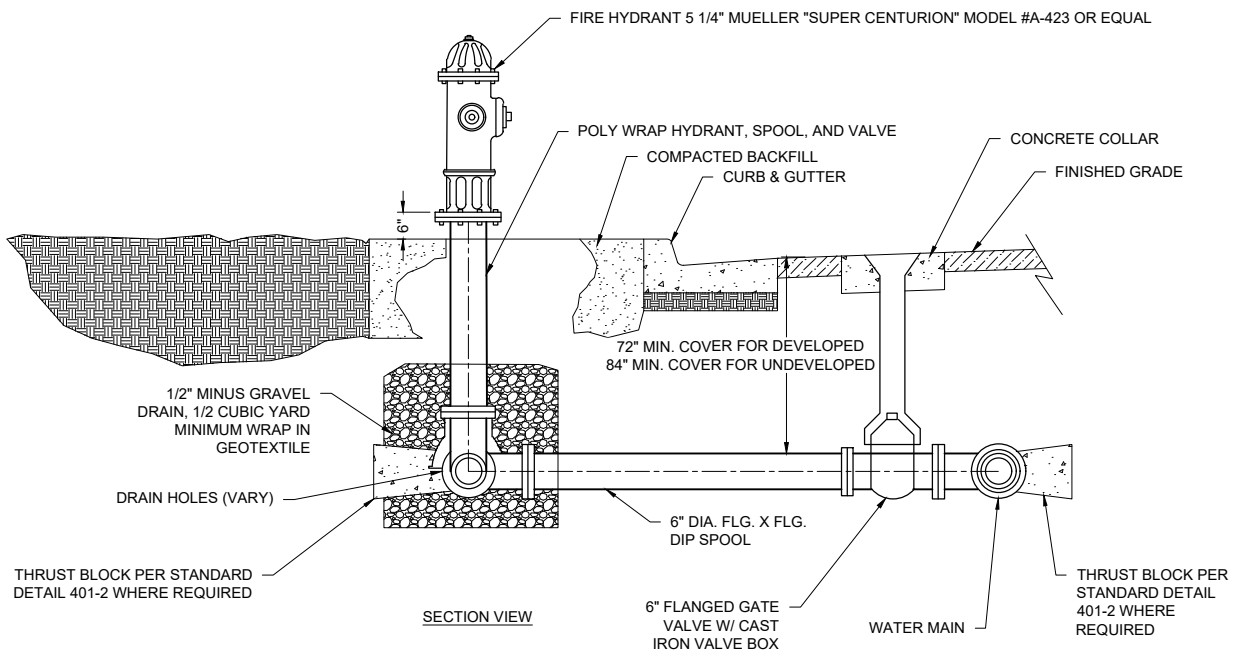
- NOTES:
- 1. ONLY CITY PERSONNEL SHALL OPEN AND CLOSE WATER VALVES, UNLESS APPROVED OTHERWISE IN WRITING BY THE CITY.
 - 2. ALL CONCRETE COLLARS SHOWN WITH VALVE BOXES SHALL BE INSTALLED AFTER ASPHALT HAS BEEN INSTALLED.
 - 3. INSTALL AND COMPACT ALL BACKFILL MATERIAL PER STANDARD DETAIL 401-1

UPDATED: MAY 2025

NORDIC VALLEY
WATER
INFRASTRUCTURE

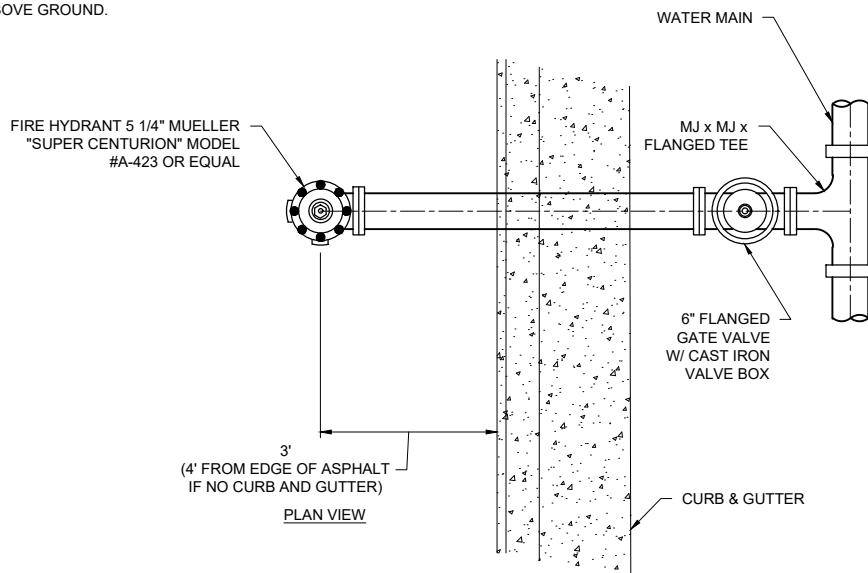
GATE VALVE

401-3



NOTES:

1. HYDRANT SHALL BE "TRAFFIC-RATED" TYPE WITH A REPLACEABLE BREAK-AWAY UNIT IMMEDIATELY ABOVE GROUND.



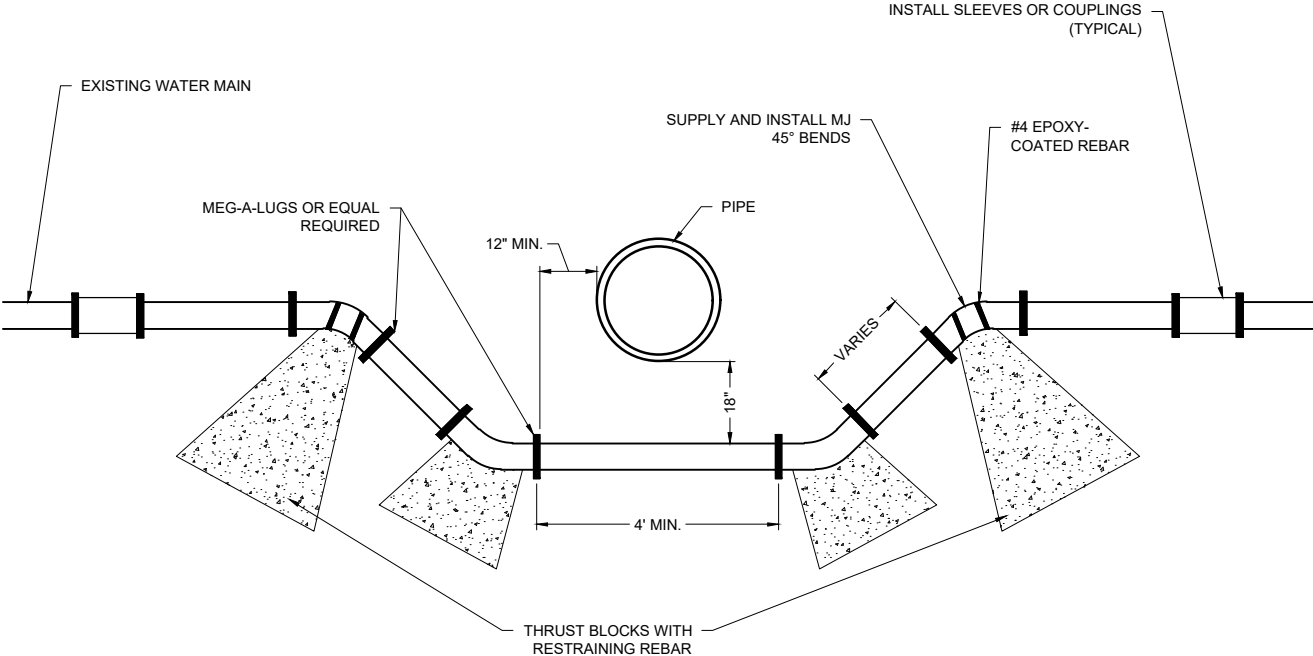
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NORDIC VALLEY
WATER
INFRASTRUCTURE

HYDRANT
CONNECTION

401-4

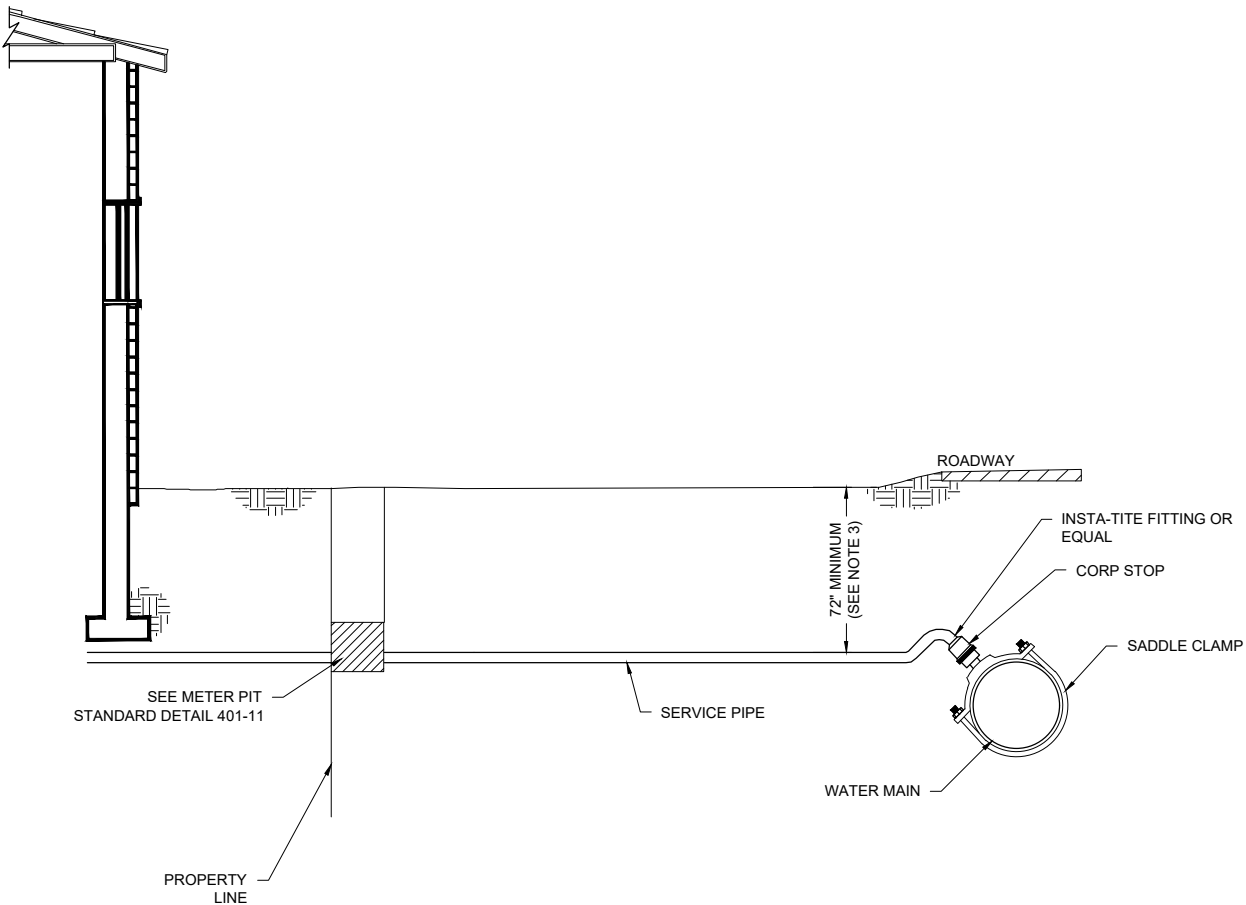
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NOTES:
1. DISTRICT TO BE GIVEN 24 HOUR NOTICE BEFORE LOOPING ANY WATERLINE

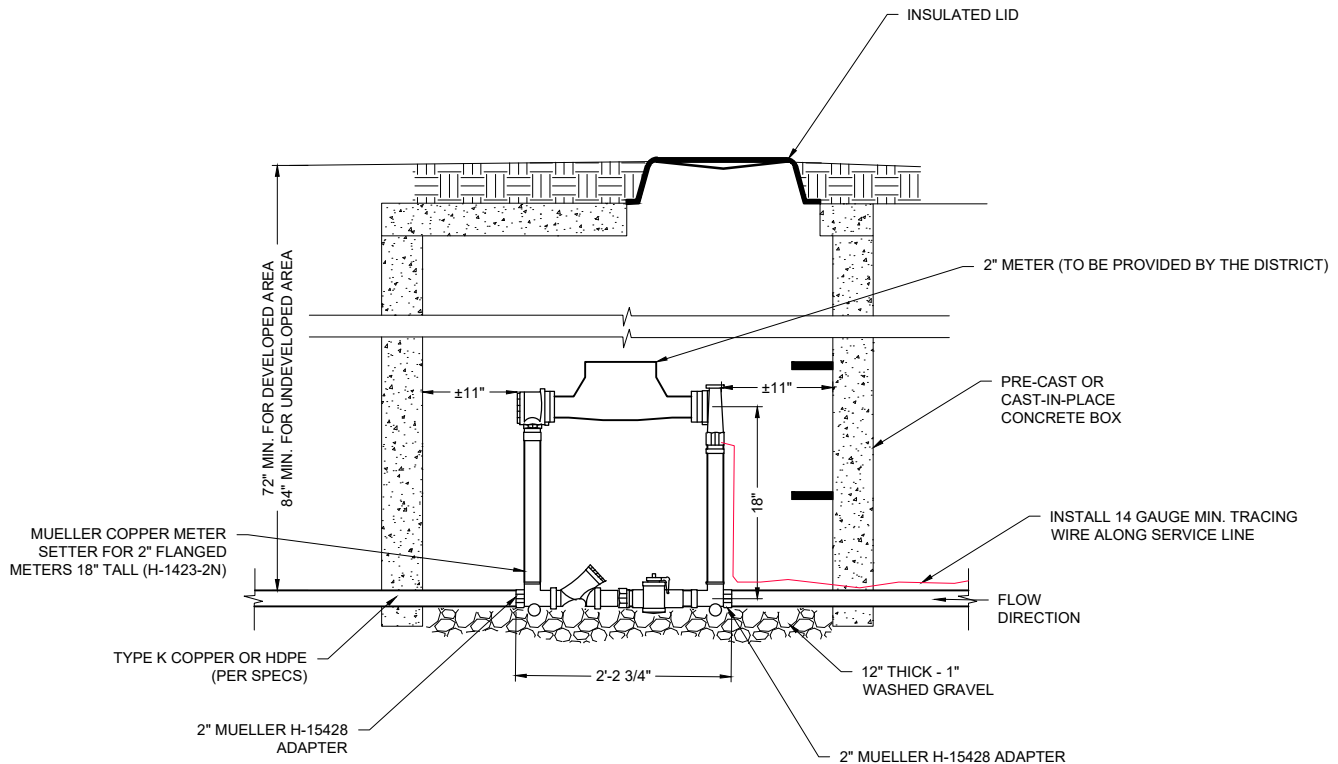
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NORDIC VALLEY WATER INFRASTRUCTURE	WATERLINE LOOP	401-5

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- NOTES:
- 1. SEE STANDARD DETAIL 401-1 FOR WATER TRENCH REQUIREMENTS
 - 2. NO LATERALS ARE TO BE INSTALLED WITHIN 5' OF BEDROCK
 - 3. 72" MINIMUM COVER FOR DEVELOPED AREA AND 84" MINIMUM COVER FOR UNDEVELOPED AREAS. COVER REQUIREMENT MAY BE REDUCED PER RECOMMENDATION BY APPROVED GEOTECHNICAL REPORT. GEOTECHNICAL REPORT SHALL SPECIFICALLY ADDRESS FROST DEPTH AND PIPE FREEZING POTENTIAL.
 - 4. PLACE TAPS A MINIMUM OF 24 INCHES APART AND FROM THE END OF PIPE

UPDATED: MAY 2025		
NORDIC VALLEY WATER INFRASTRUCTURE	SERVICE LATERAL	401-6



NOTES:

1. INSPECTION: METER BOX AND SERVICE LINE SHALL BE INSPECTED BY DISTRICT PRIOR TO BACKFILLING.
2. BACKFILL: INSTALL BACKFILL IN LIFTS NOT EXCEEDING 8" AFTER COMPACTION. COMPACT EACH LIFT TO AN AVERAGE DRY DENSITY OF 97% WITH NO DENSITY TEST RESULT LESS THAN 92%
3. WATER METER SHALL BE PROVIDED BY DISTRICT
4. PLACEMENT: ALL METERS ARE TO BE INSTALLED WITHIN 7 FEET OF THE PROPERTY LINE (STREET SIDE) AND MUST BE PLACED NEAR MIDPOINT OF THE T NOT BE LOCATED IN A DRIVEWAY.
5. PIPE SPLICES SHALL BE MADE USING A COMPRESSION FITTING; MUELLER 110 COMPRESSION CONNECTION (MUELLER H-15403)
6. CONTRACTOR SHALL SUPPLY ALL MATERIALS AND LABOR, EXCLUDING THE WATER METER.
7. NEW SUBDIVISIONS SHALL HAVE WATER SERVICE STUBBED TO A POINT APPROXIMATELY 1 (ONE) FOOT BEYOND UTILITY EASEMENT.
8. 1 1/2-INCH METER INSTALLATION TO BE SIMILAR; USING 1 1/2-INCH METER, PIPE, FITTINGS AND SETTER.

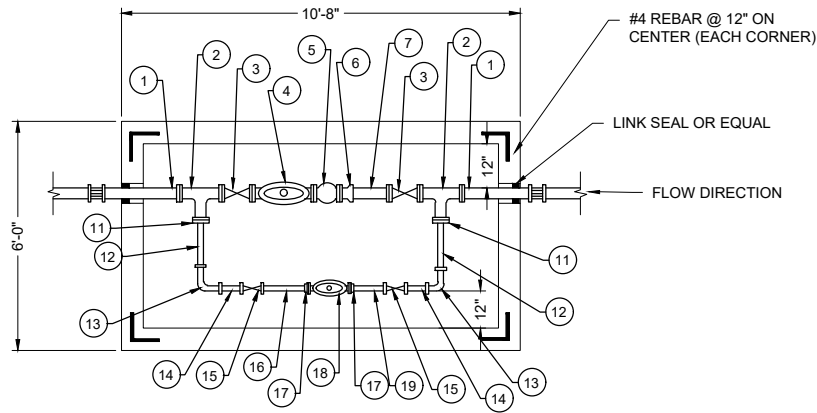
UPDATED: MAY 2025

NORDIC VALLEY
WATER
INFRASTRUCTURE

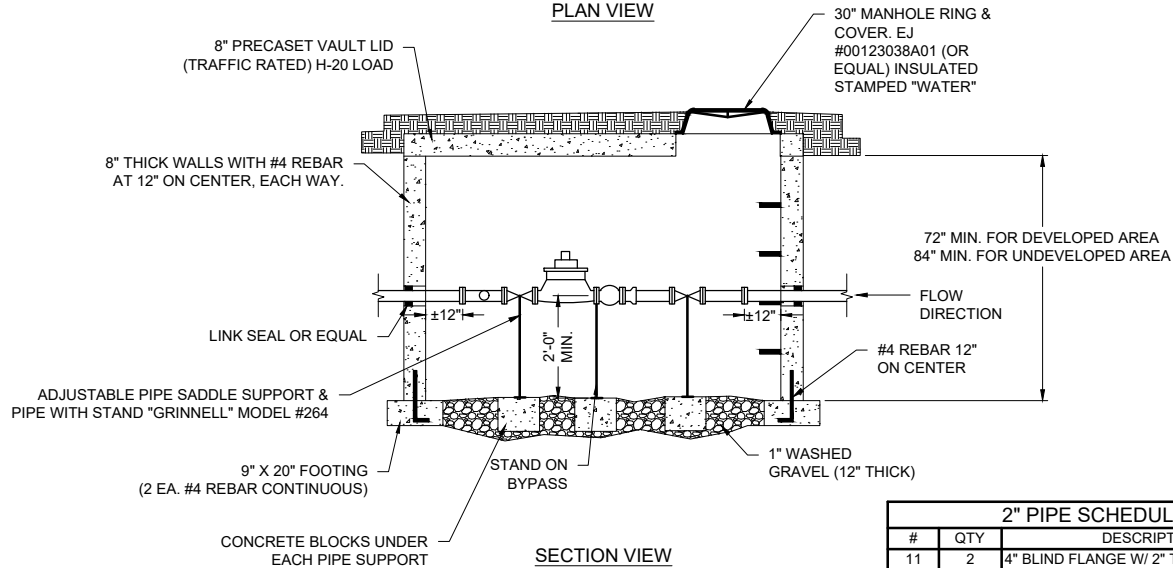
1 1/2" - 2" METER
VAULT

401-8

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PLAN VIEW



SECTION VIEW

NOTES:

1. INSPECTION: METER BOX AND SERVICE LINE SHALL BE INSPECTED BY DISTRICT PRIOR TO BACKFILLING.
2. BACKFILL: INSTALL BACKFILL IN LIFTS NOT EXCEEDING 8" AFTER COMPACTION. COMPACT EACH LIFT TO AN AVERAGE DRY DENSITY OF 97% WITH NO DENSITY TEST RESULT LESS THAN 92%.
3. ALL 4" INTERIOR FITTINGS TO BE FLANGED AND ALL 2" INTERIOR FITTINGS TO BE GALVANIZED, SCHEDULE 40 (THREADED).
4. WATER METERS SHALL BE PROVIDED BY DISTRICT.
5. PLACEMENT: ALL METERS ARE TO BE INSTALLED WITHIN 7 FEET OF THE PROPERTY LINE (STREET SIDE) AND MUST BE PLACED NEAR MIDPOINT OF THE LOT AND MUST NOT BE LOCATED IN A DRIVEWAY.
6. CONTRACTOR SHALL SUPPLY ALL MATERIALS AND LABOR, EXCLUDING THE WATER METER.
7. NEW SUBDIVISIONS SHALL HAVE WATER SERVICE STUBBED TO A POINT APPROXIMATELY 1 (ONE) FOOT BEYOND UTILITY EASEMENT.

2" PIPE SCHEDULE

#	QTY	DESCRIPTION
11	2	4" BLIND FLANGE W/ 2" TAP
12	2	±23" NIPPLE
13	2	2" 90° ELBOW
14	2	2"x8" NIPPLE
15	2	2" GATE VALVE (MUELLER) #2380-8**
16	1	2" X ±21.5" NIPPLE
17	2	2" SCREW-ON FLANGE
18	1	2" AMCO C700 METER*
19	1	2" ±14" NIPPLE

* SUPPLIED BY DISTRICT

** GATE VALVE SHALL BE FURNISHED WITH A HANDWHEEL.

4" PIPE SCHEDULE

#	QTY	DESCRIPTION
1	1	FLxPE D.I. SPOOL LENGTH = ±48"
2	1	4"x4"x4" FLGD. TEE
3	1	4" FLxFL GATE VALVE (MUELLER)
4	1	4" FLxFL AMCO C3000 COMPOUND
		METER* OR AQUA MASTER MAG-METER
5	1	FLANGED METER STRAINER
6	1	4" FLANGED COUPLING ADAPTER
7	1	FLxPE D.I. SPOOL LENGTH = ±16"

* SUPPLIED BY DISTRICT

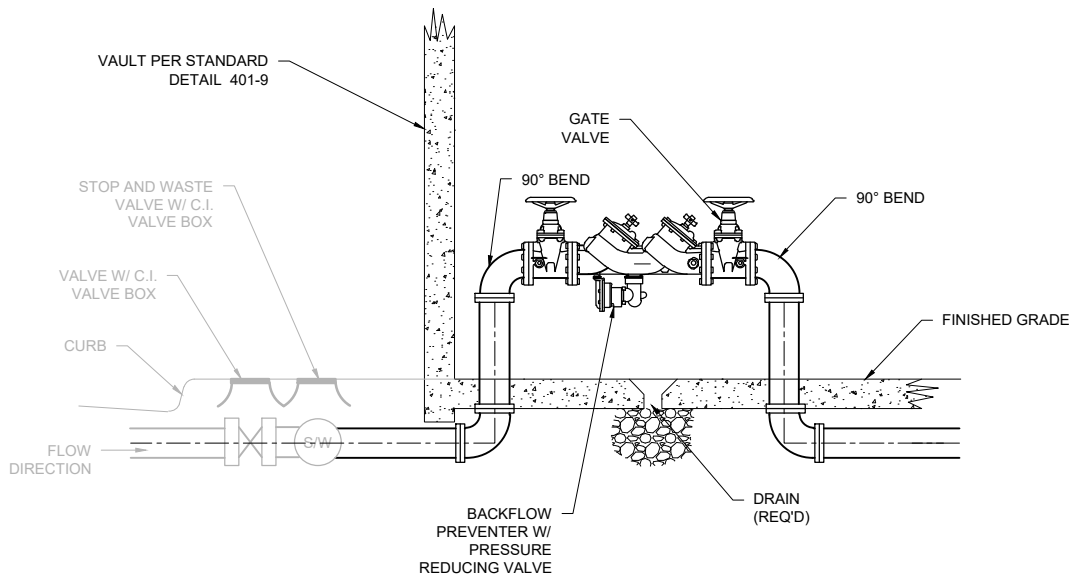
UPDATED: 2025

NORDIC VALLEY
WATER
INFRASTRUCTURE

4" METER VAULT

401-9

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4" PIPE SCHEDULE	
QTY	DESCRIPTION
2	4" FLxFL D.I. SPOOL (LG = ±11.5")
2	4" FLxFL 90° BEND
2	4" GATE VALVE (MUELLER)**
1	4" FLxFL D.I. SPOOL (LG = ±12")
1	4" AMCO T3000 TURBINE METER
1	4" FLxFL METER STRAINER
1	4" FLANGED COUPLING ADAPTER
1	4" FLxPE D.I. SPOOL (LG = ±17")

* SUPPLIED BY DISTRICT

** GATE VALVE SHALL BE FURNISHED WITH A HANDWHEEL.

8" & 6" PIPE SCHEDULE	
QTY	DESCRIPTION
2	8" MECHANICAL COUPLINGS
2	8" FLxPE D.I. SPOOL (LG = ±38")
2	8"x6"x4" FLxFLxFL TEE
2	6" FLxFL GATE VALVE (MUELLER)**
1	6" FLxFL AMCO C3000 COMPOUND
	METER* OR AQUAMASTER MAG-METER*
1	6" FLANGED METER STRAINER
1	6" FLANGED COUPLING ADAPTER
1	6" FLxPE D.I. SPOOL (LG = ±17")

* SUPPLIED BY DISTRICT

** GATE VALVE SHALL BE FURNISHED WITH A HANDWHEEL.

NOTES:

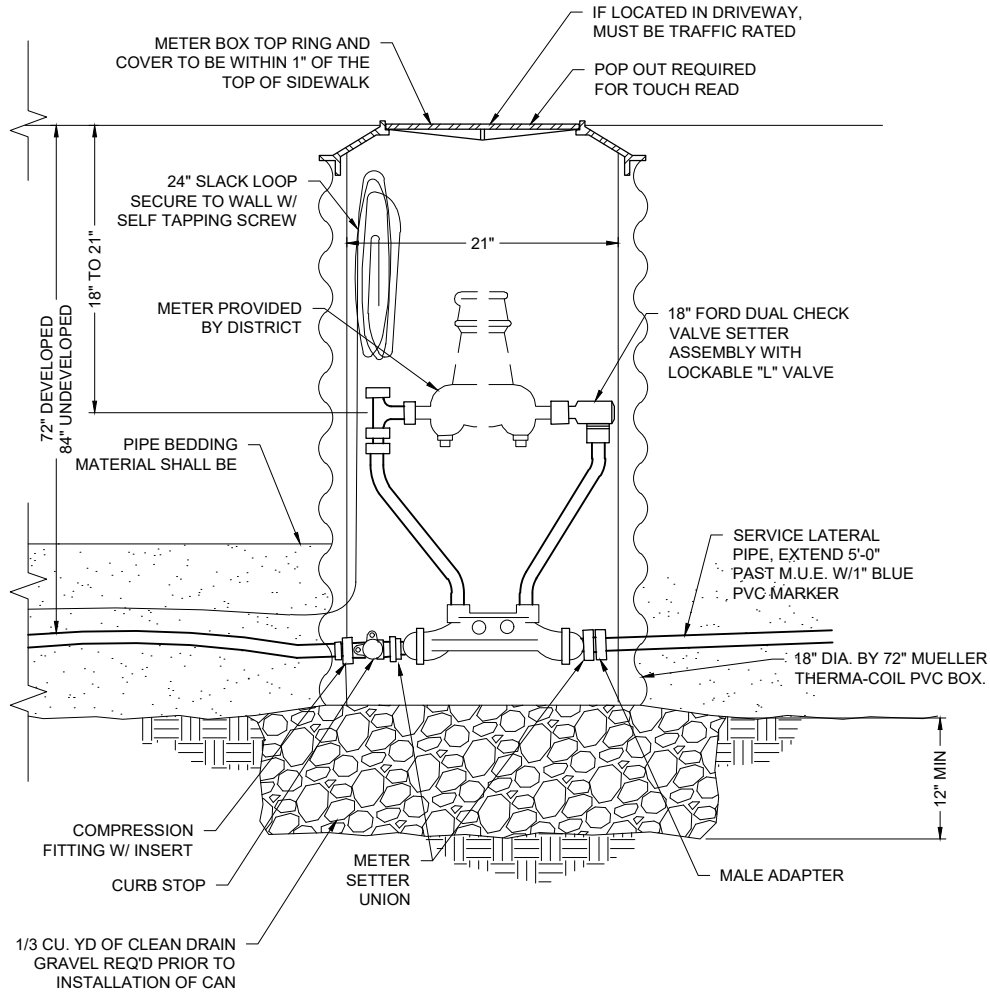
1. ALL INTERIOR FITTINGS TO BE FLANGED, UNLESS OTHERWISE INDICATED.
2. EPOXY PAINT COATING ON ALL EXPOSED PIPING

UPDATED: MAY 2025

NORDIC VALLEY
WATER
INFRASTRUCTURE

TYPICAL BACKFLOW
PREVENTOR

401-10



NOTES:

1. NO COUPLINGS SHALL BE ALLOWED BETWEEN THE MAIN AND METER BASE.
2. WATER SERVICE CONNECTIONS LARGER THAN 1" REQUIRE PRIOR SUBMITTALS AND APPROVAL BY THE CITY.
3. WHEN USING H.D.P.E. INSERTS SHALL BE INSTALLED WHERE FITTINGS ARE PLACED.
4. ALL SHUTOFF CONTROLS MUST BE FACING UPWARD TO BE USEABLE WHEN ACCESSED.
5. IF METER IS TO BE LOCATED IN A DRIVEWAY, A 30" CONCRETE OR PVC BARREL WILL BE REQUIRED. ALSO, A B-5343 FLANGE OR EQUIVALENT AND AN A-1180 TRAFFIC RATED LID OR EQUIVALENT WILL BE REQUIRED.

UPDATED: MAY 2025

NORDIC VALLEY
WATER
INFRASTRUCTURE

3/4" METER

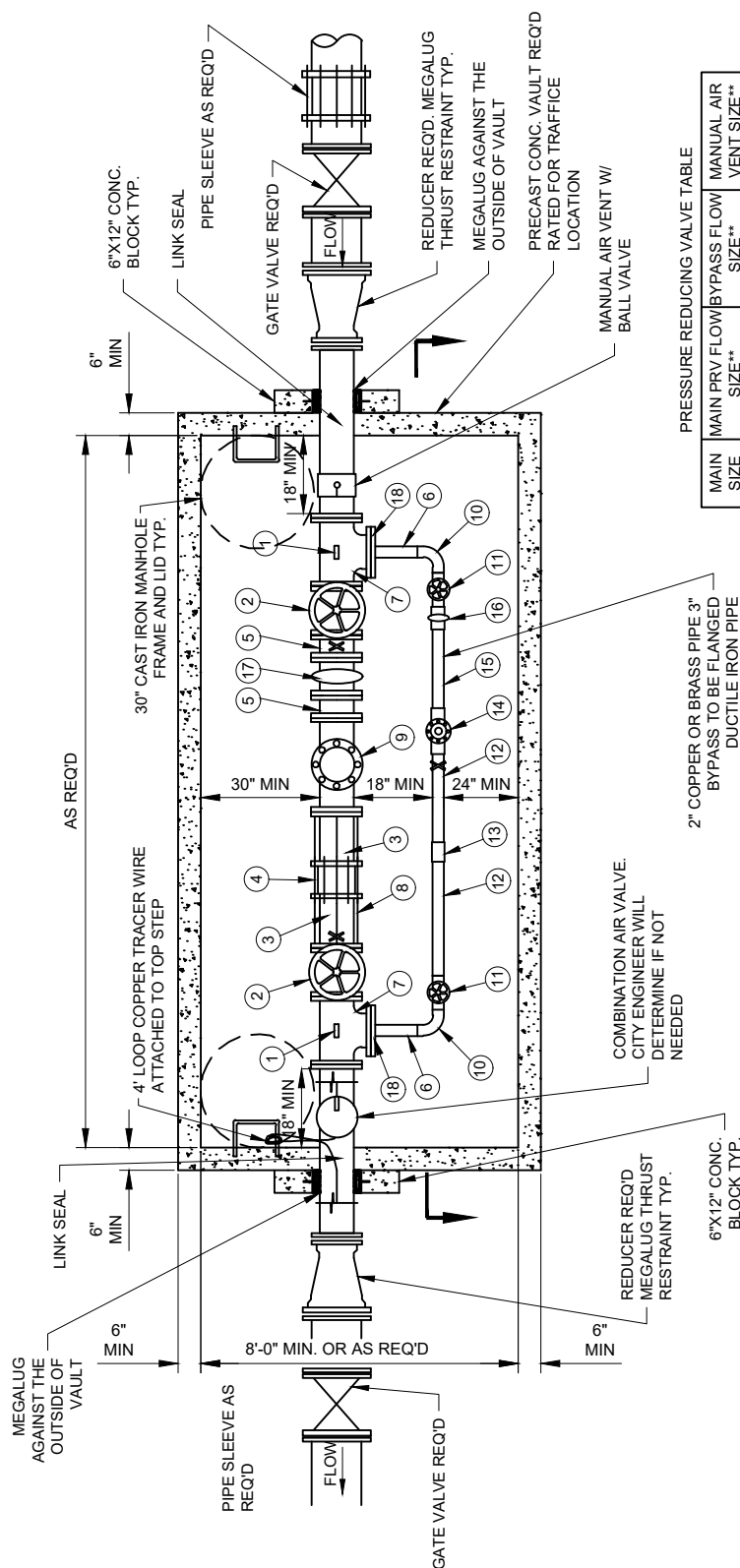
401-11

UPDATED: MAY 2025

NORDIC VALLEY
WATER
INFRASTRUCTURE

PRESSURE REDUCING VALVE

401-12
SHEET 1 OF 2



PLAN VIEW

PRESSURE REDUCING VALVE TABLE

MAIN SIZE	MAIN PRV FLOW SIZE**	BYPASS FLOW SIZE**	MANUAL AIR VENT SIZE**
8"	6"	2"	1"
10"	8"	2"	1 1/2"
12"	8"	3"	2"

UNLESS OTHERWISE DIRECTED BY CITY ENGINEER

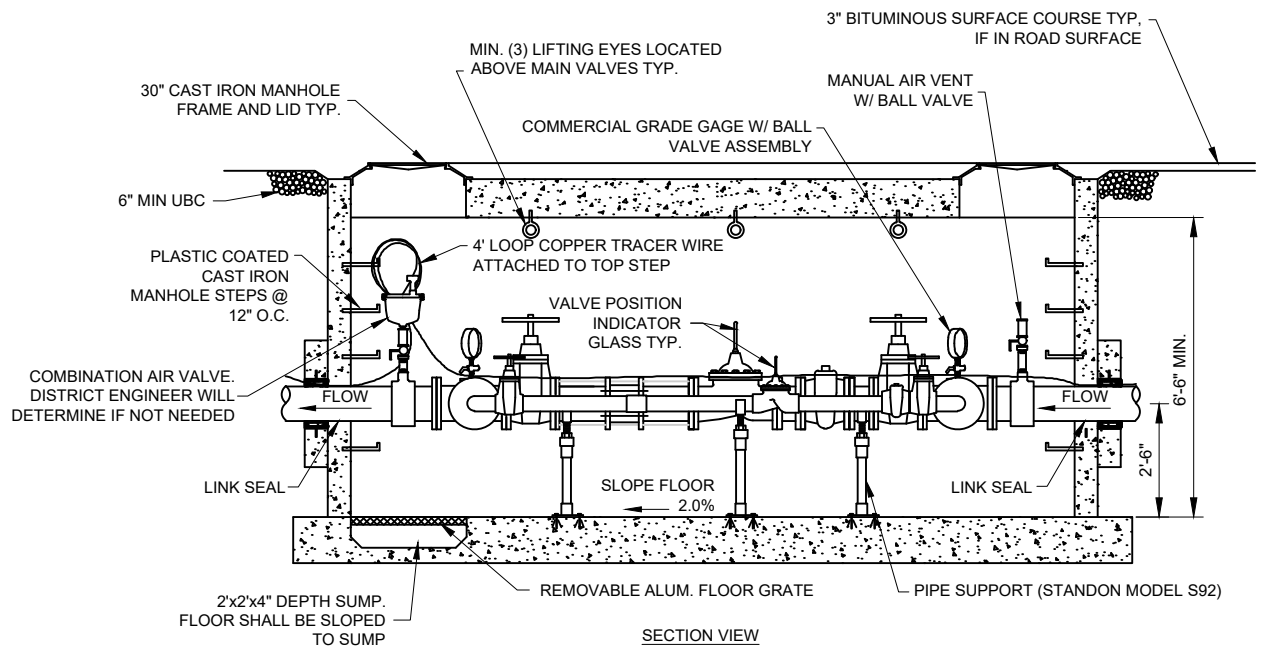
NOTES:

2. "ANTI-CAVITATION INSERT HYTROL VALVE (100-01KO) SHALL BE INSTALLED ONLY WHEN REQUIRED BY DISTRICT ENGINEER.
3. PRECAST VAULT TO HAVE SOLID FLOOR W/ PUMP. VAULT SHALL BE WATER TIGHT.
4. PVP PILOT SYSTEM SHALL BE STAINLESS STEEL TUBING, VALVES, & FITTINGS. ALL PVP'S SHALL HAVE STAINLESS STEEL TRIM. VALVES SHALL BE DESIGNED FOR HIGH TRAFFIC AREAS.
5. ALL BOLTS TO BE STAINLESS STEEL W/ NON-STAINLESS STEEL NUTS. BYPASS LINES SHALL HAVE GATE VALES W/ RESILIENT SEATS, OR BALL VALVES.
6. HYDEC PRE-ASSEMBLED PACKAGES ARE AN APPROVED EQUAL SUBMITTALS ON ALL PVP ASSEMBLES ARE REQ'D. ALL PRESSURE SETTINGS TO BE APPROVED BY DISTRICT.
7. MANUAL AIR-VENT AND COMBINATION AIR VALVE ARE TO BE VENTED OUTSIDE WHERE PRACTICAL. VARIATIONS ARE TO BE APPROVED BY DISTRICT ENGINEER.
8. MEGALUG OR BELL RESTRAIN ALL JOINTS WITHIN 20 FEET OF REDUCER.

PIPE FITTING & VALVE SIZES WILL VARY BASED ON MAINLINE PIPE SIZE

EQUIPMENT SCHEDULE			EQUIPMENT SCHEDULE		
NO.	DESCRIPTION	REMARKS	NO.	DESCRIPTION	REMARKS
1	PRESSURE GAUGE ASSEMBLY	2 REQ'D, OIL FILLED, (0-200 PSI)	11	BALL VALVE	2 REQ'D
2	GATE VALVE	2 REQ'D	12	THREADED SPOOL	1 REQ'D (CUT INTO 2 PIECES)
3	FLANGED SPOOL	1 REQ'D (CUT INTO 2 PIECES)	13	THREADED UNION/FLEX COUPLING	1 REQ'D
4	FLEX COUPLING	1 REQ'D	14	PRESSURE REDUCING VALVE	CLA-VAL MODEL 92-01 SKKO 150# THREADED
5	FLANGED SPOOL	2 REQ'D	15	THREADED SPOOL	1 REQ'D
6	THREADED SPOOL	2 REQ'D	16	STRAINER	NEPTUNE 53120-000 ENVIROBRASS II
7	FLANGED TEE	2 REQ'D	17	STRAINER	NEPTUNE 52000-402 ENVIROBRASS II
8	ALL-THREAD	4 REQ'D	18	BLIND FLANGE W/2" THREADED TAP	2 REQ'D
9	PRESSURE REDUCING VALVE	*CLA-VAL MODEL 92-05 YBGSCKKO.150# FLANGE	X	LOCATION OF PIPE SUPPORT	
10	THREADED 90° ELL.	2 REQ'D			

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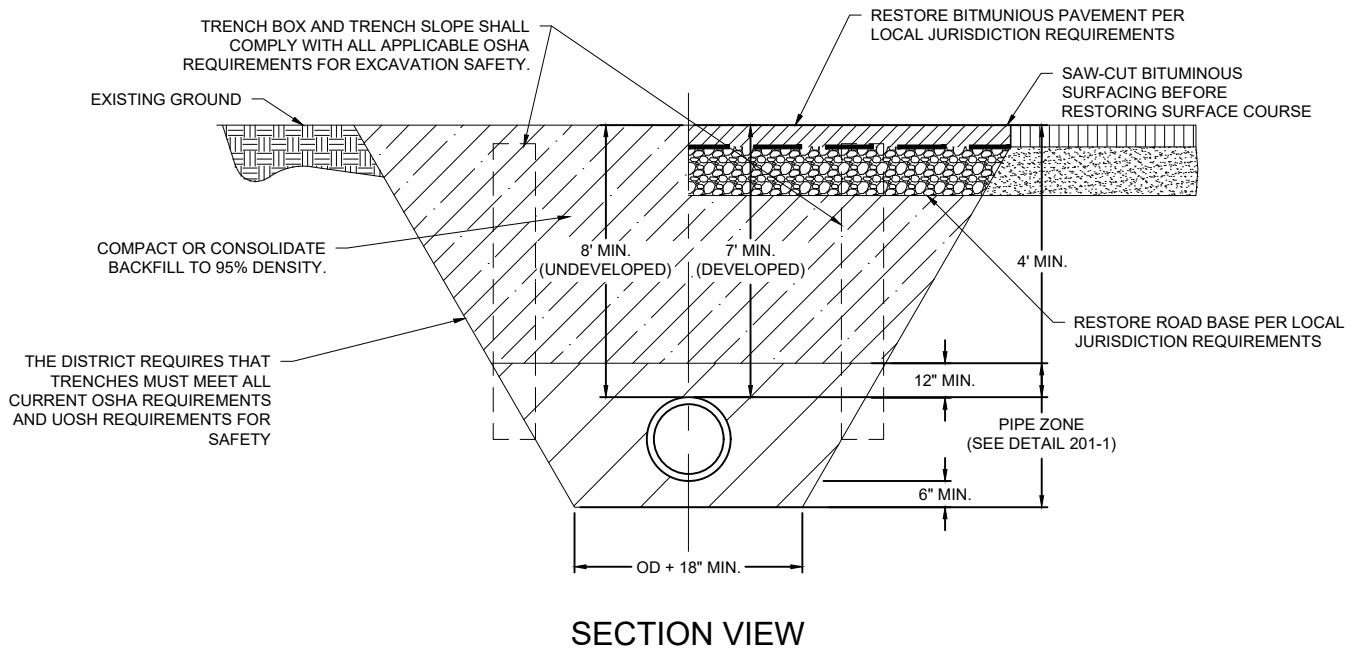


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NORDIC VALLEY
WATER
INFRASTRUCTURE

PRESSURE REDUCING VALVE

401-12
SHEET 2 OF 2

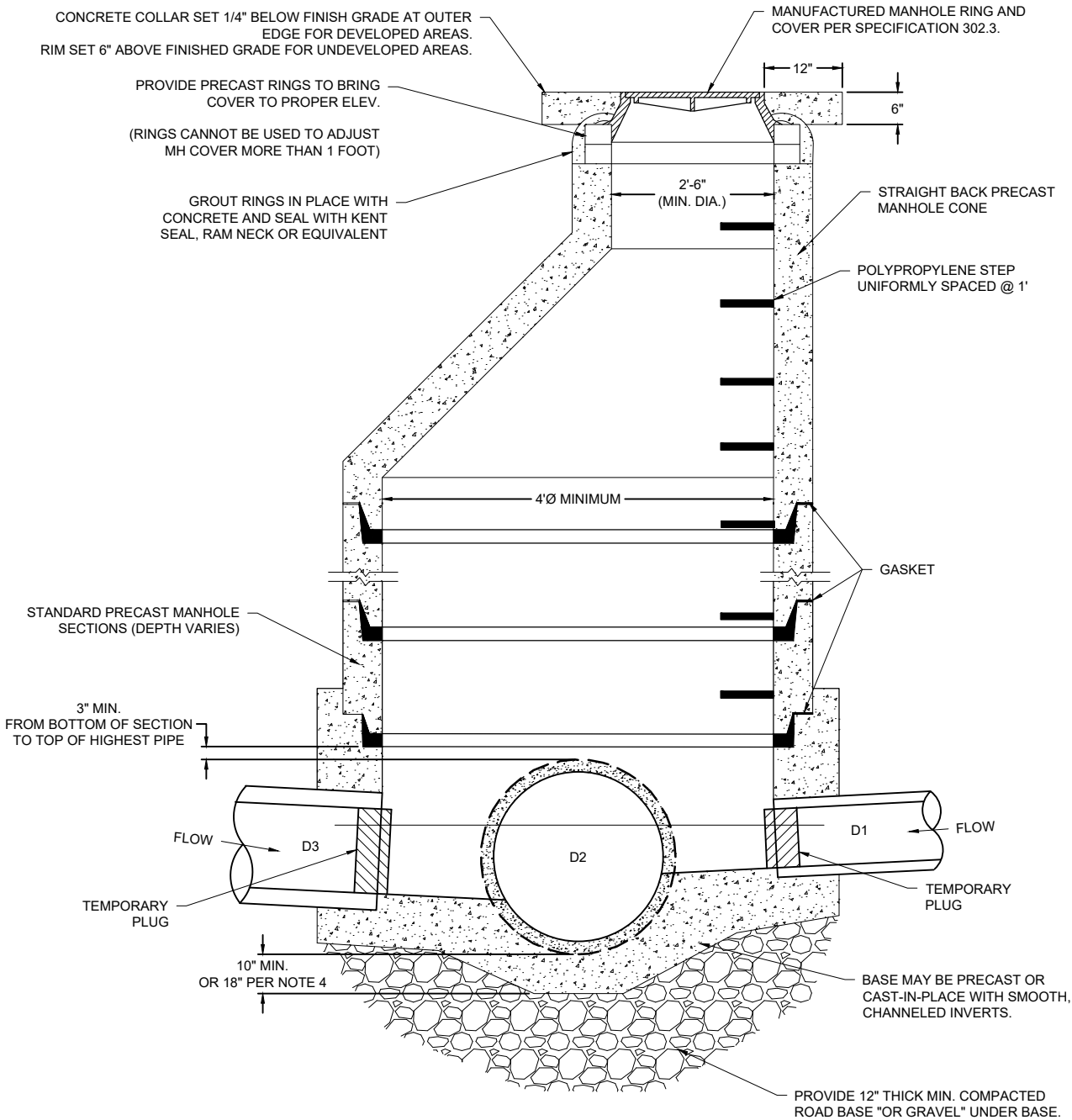


NOTES:

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SEWER TRENCH

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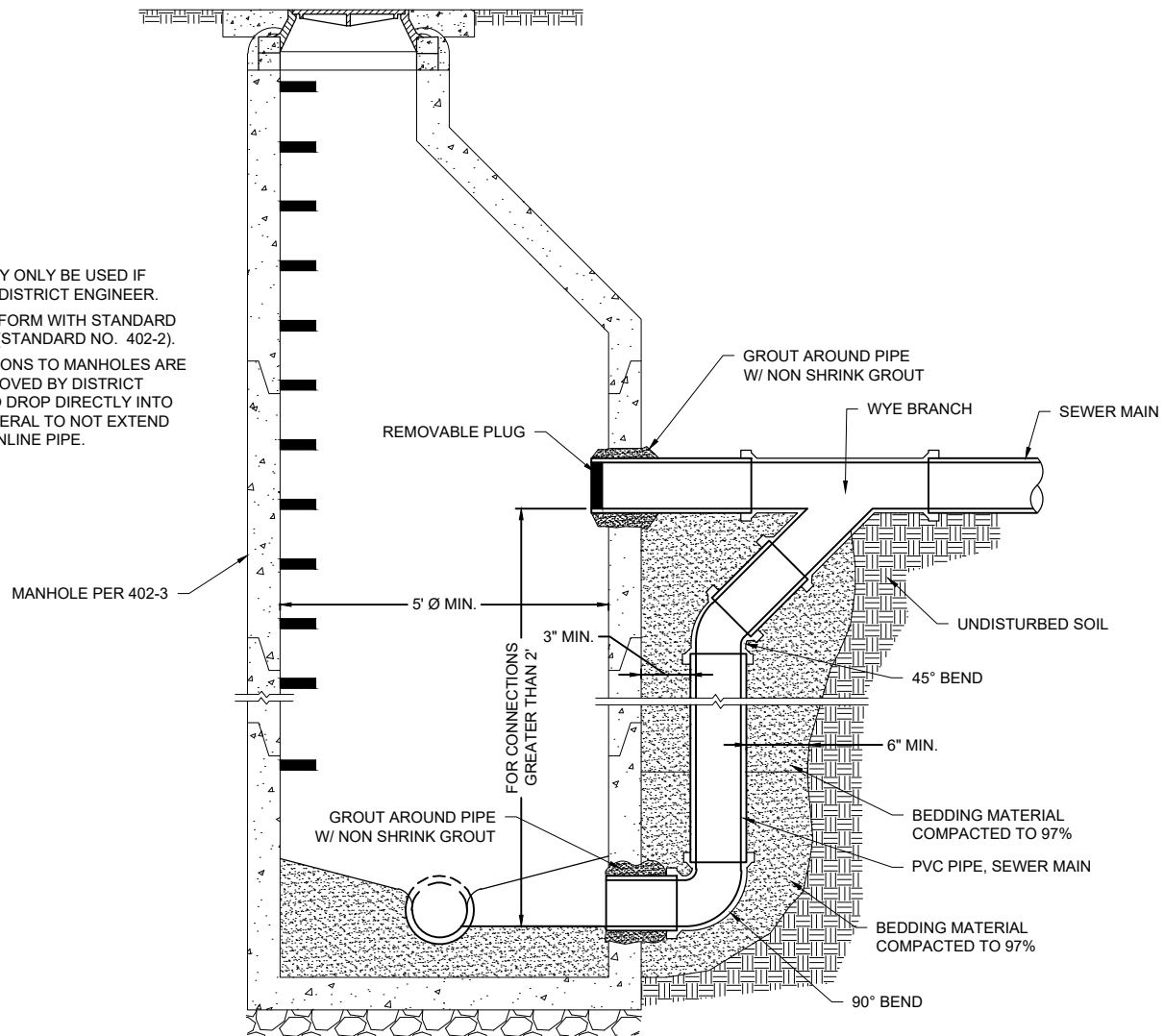


- NOTES:
- 1. IF GRADE ALLOWS, INVERTS OF D1 & D3 SHALL BE REQUIRED TO MATCH TOP OF D2.
 - 2. REMOVE DEBRIS, TEMPORARY PLUGS AND PLYWOOD FROM INSIDE OF MANHOLES ONCE GRADING HAS BEEN COMPLETED AND FINAL SURFACING IS IN PLACE.
 - 3. IF MANHOLE BASE IS TO BE POURED IN PLACE, FOLLOW SAME PATTERN AS SHOWN EXCEPT USE 10" MIN WALL THICKNESS.
 - 4. MANHOLES DEEPER THAN 20 FEET MUST HAVE AN 18" THICK CONCRETE BASE.

UPDATED: MAY 2025		
NORDIC VALLEY SEWER INFRASTRUCTURE	SEWER MANHOLE	402-3

NOTES:

1. DROP MANHOLE MAY ONLY BE USED IF APPROVED BY THE DISTRICT ENGINEER.
2. MANHOLES TO CONFORM WITH STANDARD MANHOLE DETAILS (STANDARD NO. 402-2).
3. LATERAL CONNECTIONS TO MANHOLES ARE ALLOWED AS APPROVED BY DISTRICT ENGINEER FLOW TO DROP DIRECTLY INTO FLOW LINE AND LATERAL TO NOT EXTEND BELOW TOP OF MAINLINE PIPE.



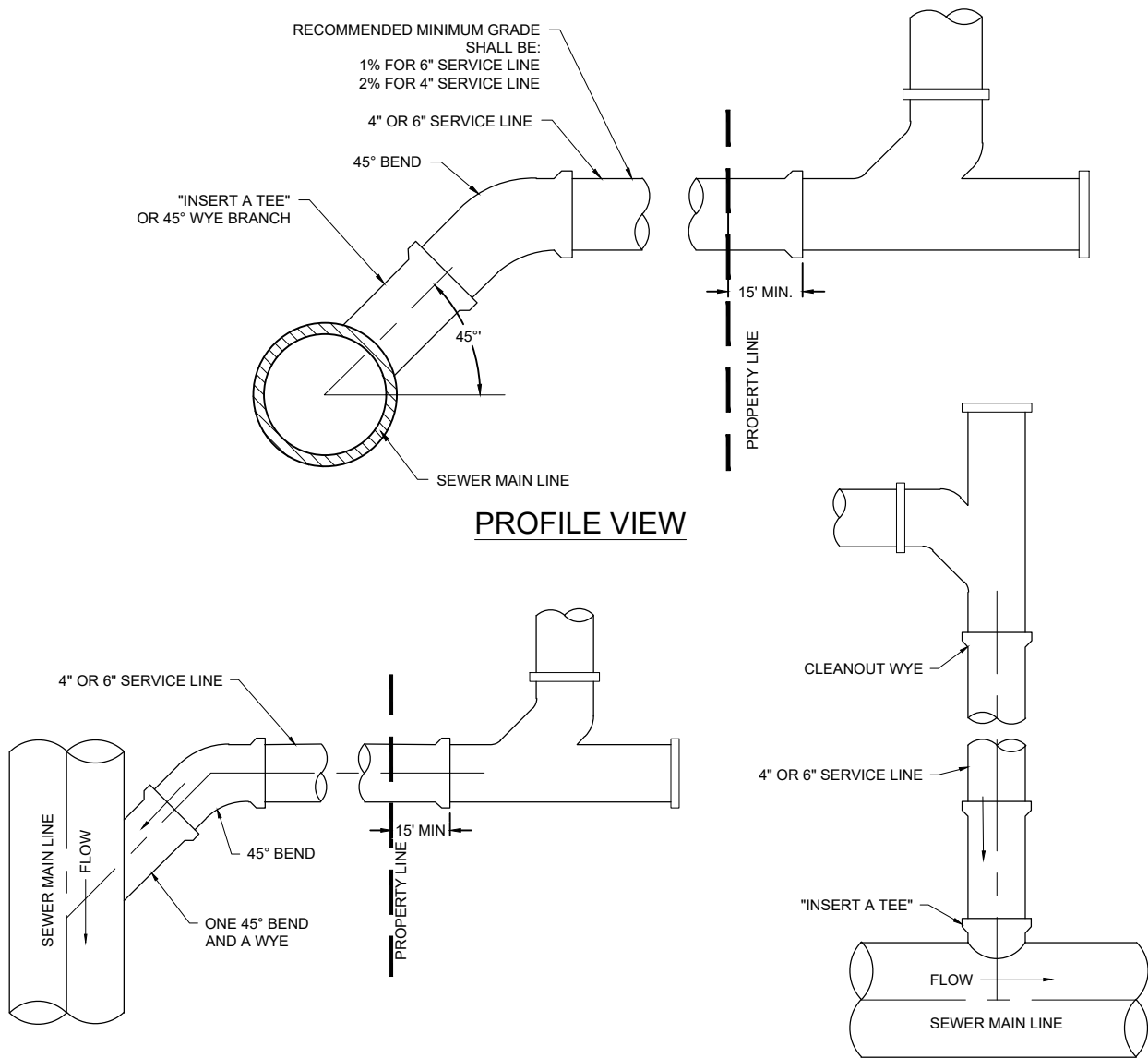
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NORDIC VALLEY
SEWER
INFRASTRUCTURE

DROP MAMHOLE
FOR CONNECTIONS GREATER THAN 2'

402-4

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SECTION VIEW - 45° WYE BRANCH

SECTION VIEW - "INSERT A TEE"

NOTES:

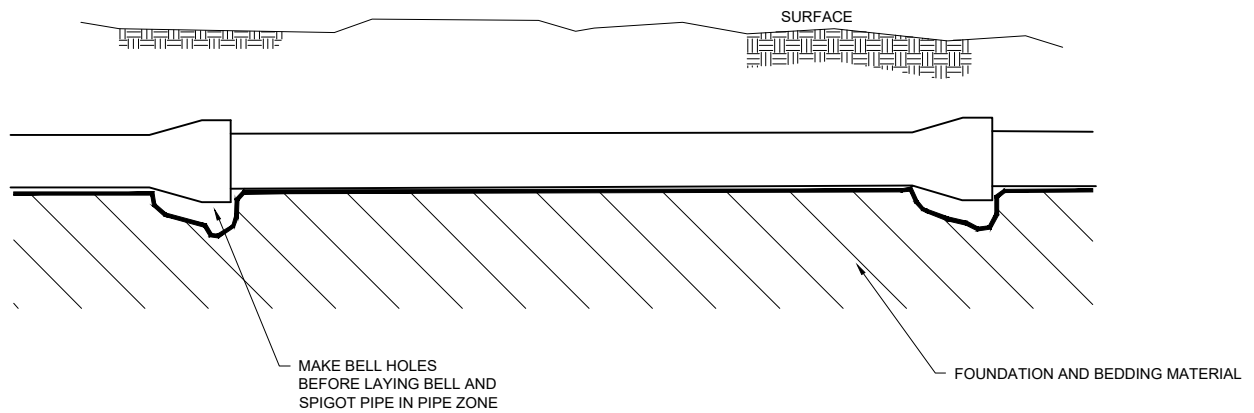
1. ALL HOUSE SERVICES SHALL BE 4" DIAMETER. COMMERCIAL AND PUBLIC SERVICES SHALL BE 6" DIAMETER UNLESS DIRECTED OTHERWISE AND SHALL BE EXTENDED FROM MAIN LINES TO PROPERTY LINES.
2. ALL 90° BENDS AT CONNECTION TO MAIN MUST BE CONSTRUCTED WITH ONE 45° BEND AND A WYE.
3. NOTIFY DISTRICT 24 HOURS IN ADVANCE OF ANY CONNECTION. EVERY CONNECTION TO BE INSPECTED BY DISTRICT.
4. CONNECTION TO USERS TO BE DONE BY OTHERS.
5. IN AREAS WHERE SEWER LATERALS ARE NEEDED TO SERVICE A BASEMENT 11' MIN. DEPTH IS RECOMMENDED. IF THE SEWER LINE IS NOT 11' DEEP A NOTE MUST BE PLACED ON THE PLANS "BEFORE EXCAVATING BASEMENTS, CONTRACTOR MUST VERIFY SEWER DEPTH"

UPDATED: MAY 2025

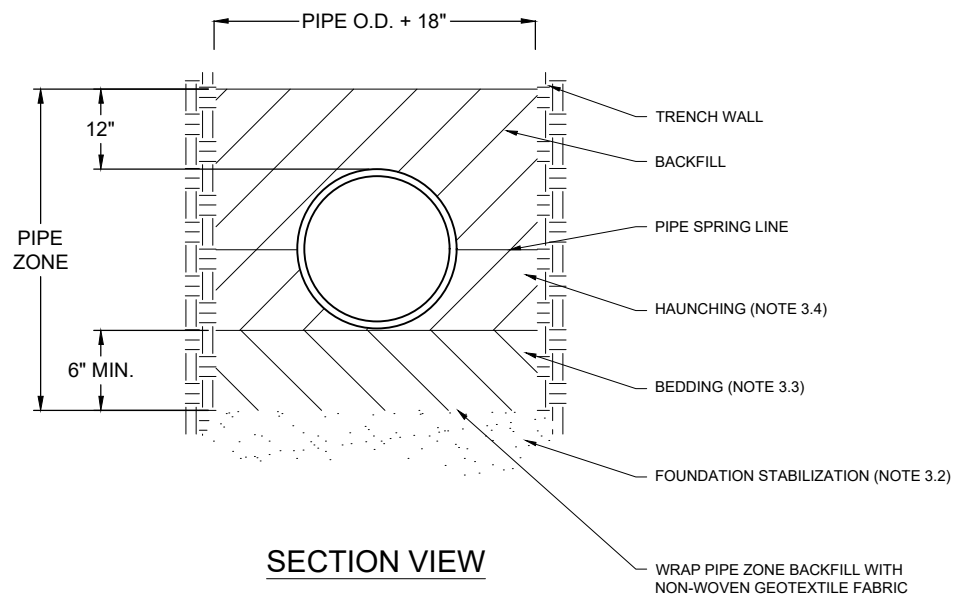
NORDIC VALLEY
SEWER
INFRASTRUCTURE

SERVICE CONNECTION

402-5



ELEVATION VIEW



SECTION VIEW

INSTALLATION:

PLASTIC PIPE: FOLLOW ASTM D 2321

"STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY=FLOW APPLICATIONS"

METAL PIPE: FOLLOW ASTM A 798

"STANDARD PRACTICE FOR INSTALLING FACTORY-MADE CORRUGATED STEEL PIPE FOR SEWERS AND OTHER APPLICATIONS"

INSTALLATION IN BEDROCK REQUIRES 18" PIPE BEDDING, 24" PIPE ZONE WIDTH, AND CHECK DAMS EVERY 450'.

NOTES:

1. EXCAVATE THE PIPE ZONE: WIDTH IS MEASURED AT THE PIPE SPRING LINE AND INCLUDES ANY NECESSARY SHEATHING. PROVIDE WIDTH RECOMMENDED BY PIPE MANUFACTURER. FOLLOW MANUFACTURER'S RECOMMENDATIONS WHEN USING TRENCH BOXES.
2. FOUNDATION STABILIZATION: OBTAIN ENGINEER'S PERMISSION BEFORE INSTALLING COMMON FILL. VIBRATE TO STABILIZE. INSTALLATION OF STABILIZATION-SEPARATION GEOTEXTILE WILL BE REQUIRED TO SEPARATE BACKFILL MATERIAL AND NATIVE SUBGRADE MATERIALS IF COMMON FILL CANNOT PROVIDE A WORKING SURFACE OR PREVENT SOILS MIGRATION.
3. BEDDING: FOLLOW APWA SECTION 33 05 20 REQUIREMENTS AND THE FOLLOWING PROVISIONS.
 - 3.1. FURNISH 3/4" MINUS WASHED ROCK FOR PLASTIC PIPE AND 1" MINUS WASHED ROCK FOR CONCRETE PIPE MATERIAL UNLESS SPECIFIED OTHERWISE BY PIPE MANUFACTURER.
 - 3.2. MAXIMUM LIFT THICKNESS IS 8-INCHES
 - 3.3. BEDDING IMMEDIATELY UNDER THE PIPE SHOULD NOT BE COMPACTED, BUT LOOSELY PLACED.
 - 3.4. COMPACTION IS 95 PERCENT OR GREATER RELATIVE TO A MODIFIED PROCTOR DENSITY, APWA SECTION 31 23 26.
4. PIPE ZONE: DO NOT USE SEWER ROCK, PEA GRAVEL, OR RECYCLED RAP AGGREGATE IN THE PIPE ZONE. WATER JETTING IS NOT ALLOWED.
 - 4.1. MAXIMUM LIFT THICKNESS IS 8-INCHES BEFORE COMPACTION. COMPACTION IS 95 PERCENT OR GREATER RELATIVE TO A MODIFIED PROCTOR DENSITY, APWA SECTION 31 23 26 UNLESS PIPE MANUFACTURER REQUIRES MORE STRINGENT INSTALLATION.
 - 4.2. SUBMISSION OF QUALITY CONTROL COMPACTION TEST RESULT DATA DEVELOPED FOR THE HAUNCH ZONE MAY BE REQUESTED BY ENGINEER AT ANY TIME. CONTRACTOR IS TO PROVIDE RESULTS OF TESTS IMMEDIATELY UPON REQUEST.

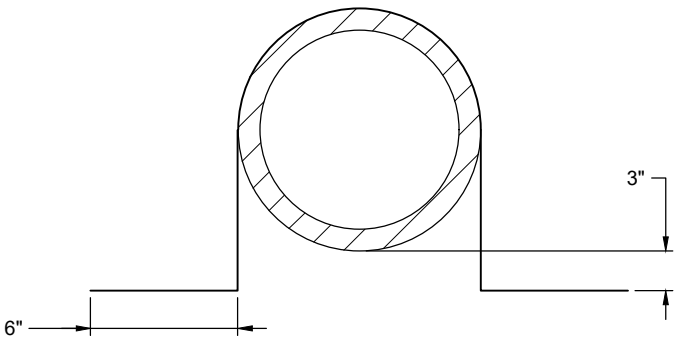
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NORDIC VALLEY
GENERAL
INFRASTRUCTURE

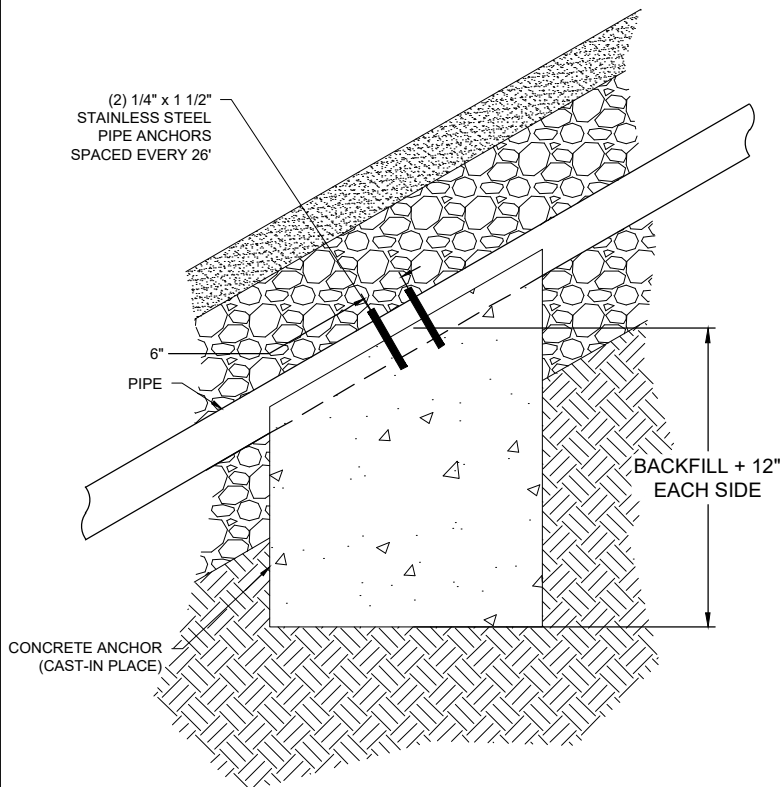
PIPE ZONE BACKFILL

201-1

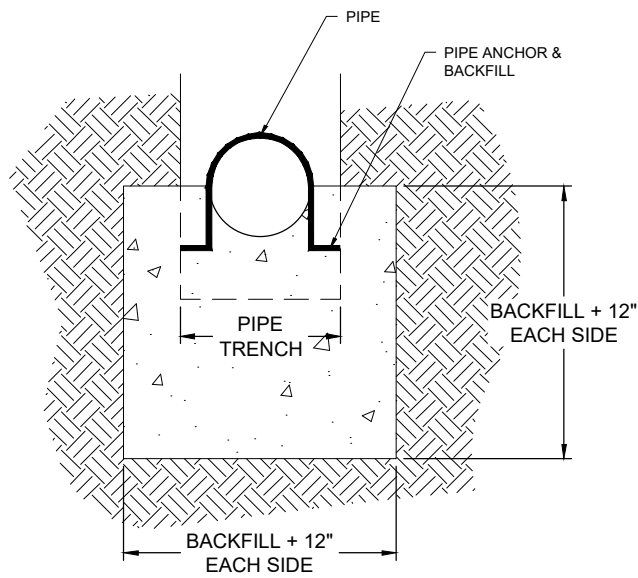
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PIPE ANCHOR STRAP DETAIL



PROFILE VIEW



SECTION VIEW

UPDATED: MAY 2025		
NORDIC VALLEY GENERAL INFRASTRUCTURE	PIPE ANCHOR	201-2