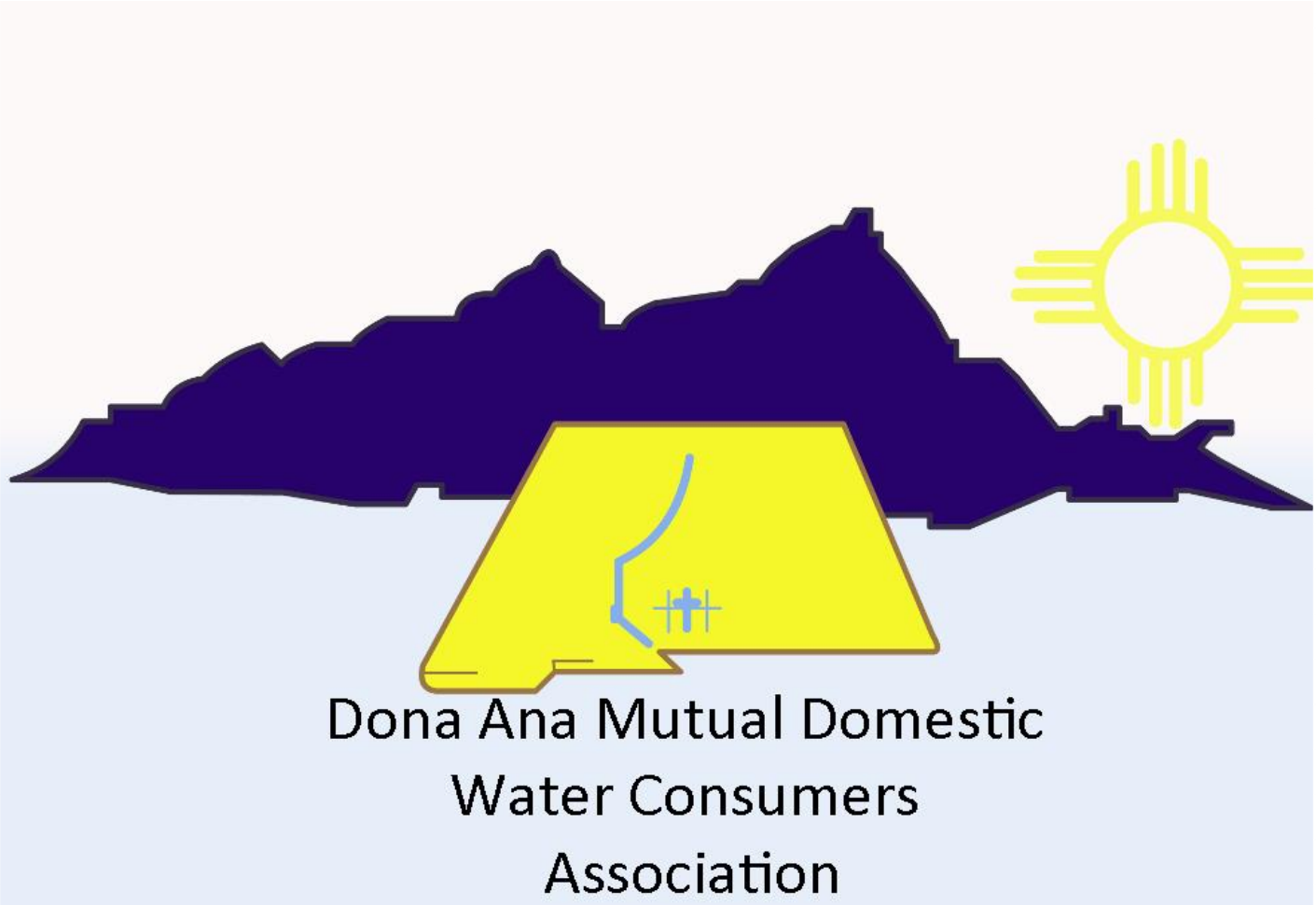

DEVELOPMENT MANUAL

June 2025

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1 INTRODUCTION

1.1 GENERAL

The following utility development standards serve as guidelines and requirements for the design and construction of water and sewer systems for or will be dedicated to the Doña Ana Mutual Domestic Water Consumers Association (DAMDWCA). These guidelines and requirements shall apply to new water and sewer systems as well as any existing systems planned for upgrade, modification, expansion, or rehabilitation.

The information provided in these utility development standards is the minimum standards applicable to DAMDWCA utilities. These utility development standards will not relieve the design professional from the responsibility of meeting the current accepted standards of all entities having authority over segments of the project undergoing design. DAMDWCA may also require that more extraneous design standards be used on a specific project on a case-by-case basis. All design for the DAMDWCA shall be coordinated with the Association's Executive Director or designee.

All design elements related to water and sewer infrastructure shall be completed and stamped under the supervision of a Professional Engineer registered in the state of New Mexico.

1.2 DISCLAIMER

These utility development standards have been produced and developed by the Doña Ana Mutual Domestic Water Consumers Association through the work of Bohannan Huston, Inc. with the assistance of similar utility development standards and design manuals utilized by comparable entities in the state of New Mexico, listed in Section 1.4 below.

Doña Ana Mutual Domestic Water Consumers Association does not and will not guarantee, certify, or assure the safety or performance of any products, components, systems tested, installed, or operated in accordance with these guidelines.

1.3 EFFECTIVE DATE OF STANDARDS

These utility development standards shall be made effective immediately following the review and signed approval by the Doña Ana Mutual Domestic Water Consumers Association Executive Director or designee.

1.4 REFERENCED SPECIFICATIONS

The following list of documents and references are hereby incorporated into these Contract Documents by reference as applicable. Should any referenced specification come into conflict with a DAMDWCA specification, the specification that requires the most regulated conditions shall be given precedence over the opposing specification.

1. American Association of State Highway and Transportation Officials- Standard Test Methods
2. American Concrete Institute Building Code Requirements for Reinforced Concrete-Latest Applicable Edition
3. American National Standards Institute
4. American Society for Testing and Materials- Standards and Publications

5. American Standards for Steel-Steel Weld Fitting Standards
6. Americans With Disabilities Act- Latest Applicable Edition
7. American Water Works Association Standards- All Latest Applicable Editions
8. City of Las Cruces Standard Specifications for Road Construction-Latest Applicable Edition
9. City of Las Cruces General Conditions-Latest Applicable Edition
10. City of Las Cruces Subdivision Code- Latest Applicable Edition
11. Code of Federal Regulations- All Latest Applicable Regulations
12. Great Lakes-Upper Mississippi River Board
13. International Building Code- Latest Applicable Edition
14. International Fire Code- Latest Applicable Edition
15. International Plumbing Code- Latest Applicable Edition
16. Manual on Uniform Traffic Control Devices- Latest Applicable Edition
17. National Association of Corrosion Engineers- Corrosion Control Standards
18. New Mexico Environmental Department Recommended Standards for Water Facilities- Latest Edition
19. New Mexico Standard Specifications for Public Works Construction
20. New Mexico Underground Property Damage Law- Chapter 62, Article 14, NMSA 1978, and associated amendments.
21. Occupational Safety and Health Act- Construction Industry Standards; Safety Requirements
22. Subcontractors Fair Practices Act- NMSA 1978 and associated amendments.
23. Uni-Bell PVC Pipe Association Standards- All Latest Applicable Regulations

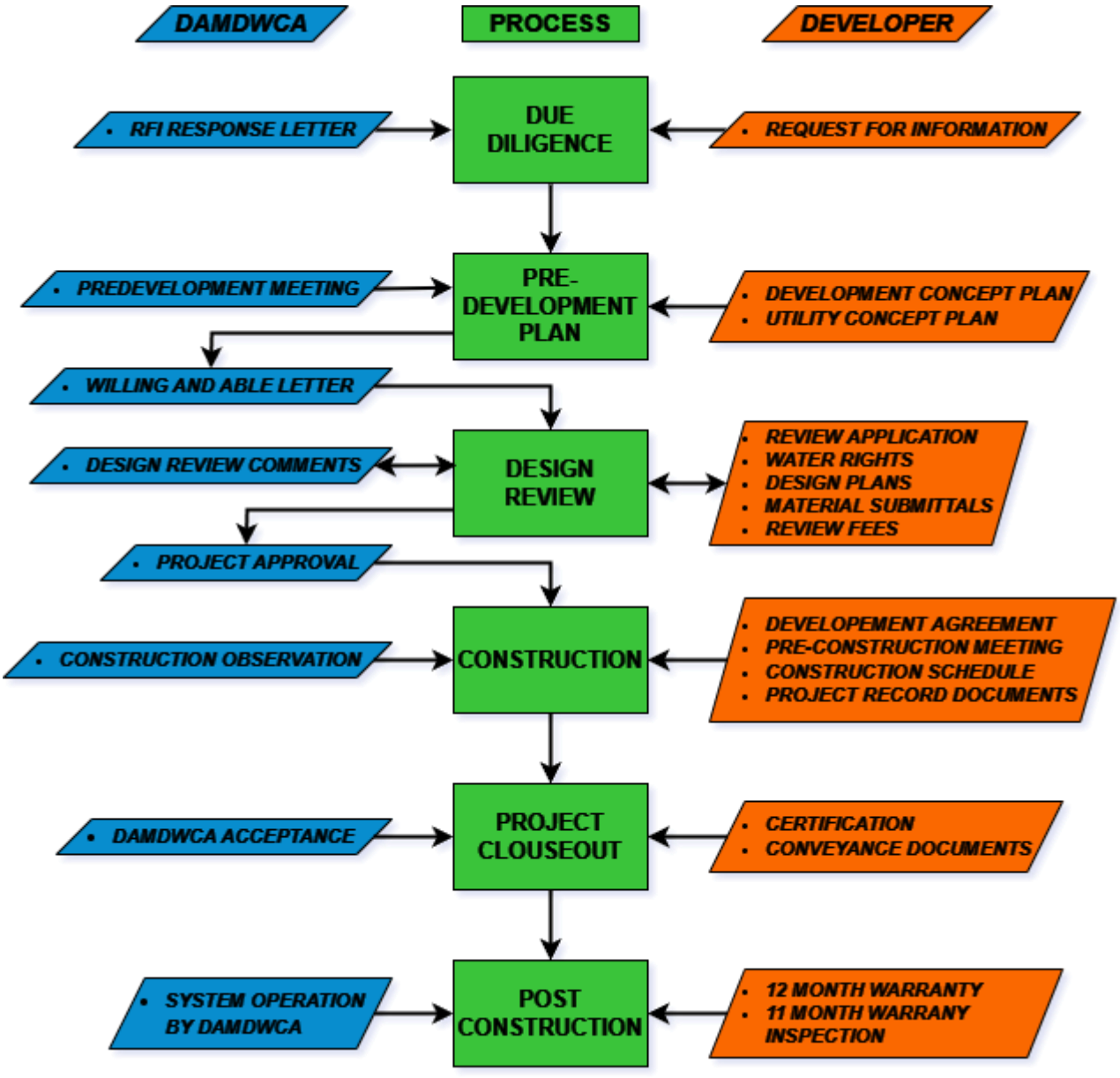
1.5 ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADD	Average Daily Demand
ANSI	American National Standards Institute
APWA	American Public Works Association
ASA	American Standards for Steel
ASTM	American Standards for Testing and Materials
AWWA	American Waterworks Association
CPB	Construction Programs Bureau
DAC	Doña Ana County
DAMDWCA	Dona Ana Mutual Domestic Water Consumers Association
DI	Ductile Iron
DWB	Drinking Water Bureau
EBID	Elephant Butte Irrigation District
FPS	Feet Per Second
FT	Feet
GPD	Gallons Per Day
GPM	Gallon Per Minute
GLUMRB	Great Lakes-Upper Mississippi River Board
IBC	International Building Code
IFC	International Fire Code
IPC	International Plumbing Code
IN	Inches

LCFD	Las Cruces Fire Department
LPSS	Low Pressure Sewer System
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of Corrosion Engineers
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
OSHA	Occupational Safety and Health Act
PDD	Peaking Daily Demand
PE	Polyethylene Pressure Piping
PF	Peaking Factor
PM	Project Manager
PPI	Plastic Pipe Institute
PRV	Pressure Reducing/Regulating Valve
PSI	Pounds Per Square Inch
PSIG	Pounds Per Square Inch Gauge
PVC	Polyvinyl Chloride Pressure Piping
ROW	Right-Of-Way
SDR	Standard Dimension Ratio
UFC	Uniform Fire Code

2 DEVELOPMENT POLICIES

2.1 DEVELOPMENT FLOW CHART



2.2 DUE DILIGENCE

1. This *Developer's Manual* will periodically go through updates, additions, and revisions that may change requirements or processes. It is the responsibility of stakeholders to ensure they are using the most recent version.
2. Realtors, investors, developers, and engineers are encouraged to contact DAMDWCA during the due diligence phase of any land purchase for residential or commercial development. Information about potential water and sewer service connection points can be provided.

Obtaining this information in advance of project commitment is highly beneficial since the cost of providing water and sewer service to any given tract of land depends upon distance from existing mains, topography, and capacity available in the system. Land which appears to be easy to serve with a sewer or water extension may actually require the installation of upgrades to the system. It is best for all involved that these factors be known as far in advance as possible. To facilitate any information that DAMDWCA can provide in regard to water and sewer service availability, Developer must fill out and submit a *Request for Information (RFI)*. The RFI form is attached as **APPENDIX A: REQUEST FOR INFORMATION**.

3. Typical turnaround time for an RFI is 10 working days.

4. Information from DAMDWCA during the due diligence process does not constitute approval or relieve the developer from completing proper engineering design. Rather, this process informs real estate professionals, investors, developers, and engineers so that water and sewer infrastructure requirements for any given tract are better understood prior to purchase.

5. Design reviews have a typical turnaround time up to thirty (30) business days depending upon project complexity and staff workload. Please note that all plan sets submitted to DAMDWCA must be stamped by a New Mexico licensed engineer. All <u>final</u> plan sets must be stamped and sealed by a NM licensed engineer.

6. Applicants shall refer to **Section 2.1** for illustration of the processes in which to obtain approval and ownership acceptance for a new water or sewer system. Failure to follow the processes in the order presented and/or provide a complete submittal package as defined in this Manual will result in delays to the issuance of the willing and able to provide service letter, review approval, and ownership acceptance.

7. Upon completion and final acceptance by DAMDWCA of all facilities constructed under the following policies and guidelines, said facilities shall become the property of DAMDWCA and DAMDWCA shall be responsible for operation and maintenance. However, for a period of one year from the date of final acceptance of the facility, the developer shall be responsible for any repairs needed that are a result of improper or inadequate construction practices or faulty materials and equipment.

2.2.1 DAMDWCA Membership

The following policy is in accordance with Article IV of the Bylaws of the Doña Ana MDWCA.

1. Members
   Property owners within and in the vicinity of the community of Doña Ana and surrounding areas, County of Doña Ana, New Mexico, being reasonably accessible to the system of the association and who are in need of water for domestic and related purposes and/or the collection and disposal of sewage, and who are eligible for membership as provided by article iv of the articles of incorporation, may be admitted to membership upon application therefor and the payment of a membership fee plus the current tap-in fee per meter and water right fee as approved by the association's board of directors. However, the membership may be denied if the capacity of the association's system is exhausted by the need of its existing members, and if

it is physically or financially impossible for the association to acquire additional facilities to accommodate new members. In the event of a shortage of water, the association shall take appropriate measures to meet the needs of the association.

2. Cost of meter installation
   Any member applying for a connection shall pay the actual cost of the connection.
   A. Approval of membership
      All applications for membership shall be passed on by the board of directors. Applications for or subscriptions to membership in this association shall be in the form approved and provided by the board of directors. Membership shall not be denied because of the applicant's race, color, creed, national origin or sex.

   B. Member Rights
      Each member of the association has equal rights, privileges and obligations. No member has more than one vote in the affairs of the association regardless of the number of services or connections under a member's name.

   C. Voting
      Each member shall be entitled to one vote only. Voting by proxy or by mail will not be permitted, except that absentee voting by mail is permitted in elections for the board of directors under article v of the articles of incorporation.

   D. Notification
      At any time that a schedule of the matters proposed to be presented for action at a meeting of the members is known in advance of such meeting, the secretary treasurer shall send to each of the members a copy of such proposed schedule with the notice of said meeting.

2.2.2 Service Area

DAMDWCA's water and sewer service areas are different in some areas and can only provide water or sewer service within their respective boundaries. It is the policy of DAMDWCA that in order to provide sewer service that person or entity must also be a water customer. Any requests for water or sewer services that do not adhere to these policies must have the approval of DAMDWCA prior to the initiation of any development reviews.

2.2.3 Water Rights Policy

The following policy applies to all applications for water service submitted to the Association by subdivides, developers or commercial users beginning July 1, 2019, unless the Applicant has submitted a Dona Ana County or City of Las Cruces approved subdivision plat by September 30, 2019.

1. Any development proposing to connect to the Association shall be required to transfer ownership of sufficient water rights to meet the needs of the subdivision.
2. The developer must provide the Association with the water rights information at the time service is requested so that the proposed water rights can be evaluated for suitability. The developer may submit water rights information at any time during the development and plan approval process for evaluation. The Association shall notify the Developer within thirty (30) days of the date of submission of the water rights information if the proposed rights are suitable and acceptable to the Association.

3. The water rights transferred to the Association must be groundwater rights with a priority date not later than 1960 in the amount of ½ of an acre foot per year (consumptive use) for each house, single family residential lot, or residential unit (i.e. within multiple unit apartments, etc. sought to be served by Dona Ana Mutual Domestic Water Consumers Association The Association shall determine on a case by case basis, the water rights conveyance requirement for commercial, industrial or similar type of use other than residential, that is proposed to be served by the Association, if it has the ability to serve such commercial or industrial uses.
4. The Office of the State Engineer may also determine the amount of water rights required to serve the effected land to be a different quantity. The Board of Directors shall accept the larger of the amount of needed water rights as between the Office of the State Engineer's determination and the Board's as set forth in this policy.
5. Prior to connecting any new connections in a subdivision, the developer must change the point of diversion and place of use of the water rights to the Association's closest point of diversion.
6. Upon approval by the Office of the State Engineer of the change of place of use and point of diversion, the developer shall transfer ownership of the water rights to the Association.
7. Where it can be shown to the satisfaction of the Association that a parcel of land identified in an application does not have appurtenant pre-1960 groundwater rights and after due diligence and reasonable efforts the Developer is unable to obtain sufficient water rights at the then current fair market value as determined by a current appraisal of the water rights by a licensed appraiser, the Association in its discretion may allow the Developer to pay to the Association a sum equivalent to the value of the amount of water necessary to offset the consumptive use that would result from the existing and future development of the lands effected in the application. Until changed by Resolution of the Board of Directors, the sum is fixed at $5,000 per acre-foot of groundwater rights. The cash payment shall be made at a time designated by the Board of Directors, after considering the application, but shall be before delivering water service. The manner of payment shall be determined by the Board of Directors of the Association.
8. The Association shall determine the acceptability of all groundwater or surface water rights proposed for conveyance and may reject those deemed inadequate due to later priority dates or other matters of concern to the Association based upon Office of the State Engineer records, EBID records or other public records.
9. All conveyances of water rights provided for in this policy shall comply with applicable laws of the State of New Mexico, rules and regulations and applicable permit or license conditions of the New Mexico Office of the State Engineer.
10. If any portion of this policy shall be declared unconstitutional or invalid by a judgment or decree of any court of competent jurisdiction, such unconstitutionality or invalidity shall not affect any of the remaining portions of this policy.
11. This policy shall be interpreted pursuant to the laws of the State of New Mexico.

2.2.4 Water and Wastewater Connection Fees

1. New Water Connections and Relocations

Table 1: Water Connection Fees

Meter Size	Service Line (Up to 25-ft)	Water Right Fee	Total Charge
3/4"	$1,318	$3,000	$4,318
1"	$1,885	$3,750	$5,635
1.5"	$2,793	$4,500	$7,293
2"	$4,331	$6,000	$10,331
3"	$9,009	$8,000	$17,009
4"	$9,335	$12,000	$21,335
6"	$11,907	$18,000	$29,907
Pavement Cut (Up to 3 sq. ft.)			$500

A. Meter sizes are determined by the Association
B. Meter relocation charges are the same as the connection charges
C. $150 Unable to Connect Service Charge
This charge shall be made when Doña Ana MDWCA is notified by the user or user's representative that the service site is ready for service and connection and utility personnel have been scheduled to physically connect service, but are unable to connect the service due to, among other things, work site obstructions or incomplete service installation necessary for the utility to perform the necessary and appropriate connection.

D. Terms and Conditions for New Water Service Connection
When a new meter is requested, this initiates the service connection process for water services. A Service Order for a new water connection shall not be scheduled until all pertinent impact fees as defined in the Development Impact Fee schedule and connection fees are paid. Fees are paid when a utility account is established with Doña Ana MDWCA Customer Service. The new connection for the residential construction site will be coordinated by Doña Ana MDWCA personnel and establish the final location of the water meter.

New residential construction sites that are found connected to the water system without establishing a utility account and bypassing payment of fees and charges for new connections, shall be deemed as theft of service and illegally connected to the water system.

Doña Ana MDWCA shall have the right to disconnect or refuse to connect or reconnect any utility service where there is evidence that theft of utility service (i.e., water connection) has occurred. Doña Ana MDWCA shall immediately disconnect water services and assess the user or user's representative an assessment of $250.00 per instance of illegal connection. The illegal connection assessment shall be paid in full plus any and all unpaid fees and charges for new connection services and the establishment of a utility account.

2. New Wastewater Connections

Table 2: Wastewater Connection Fees

Line Size	Service Line (Up to 25-ft)
4-in	$1,600
6-in	$1,800
Over 6-in	Contact Association
Pavement Cut (Up to 3 sq. ft)	$500

A. $150 Unable to Connect Service Charge
This charge shall be made when Doña Ana MDWCA is notified by the user or user's representative that the service site is ready for service and connection and utility personnel have been scheduled to physically connect service, but are unable to connect the service due to, among other things, work site obstructions or incomplete service installation necessary for the utility to perform the necessary and appropriate connection.

B. Terms and Conditions for New Wastewater Service Connection
When a connection is requested, this initiates the service connection process for wastewater services. A Service Order for a new wastewater connection shall not be scheduled until all pertinent impact fees as defined in the Development Impact Fee schedule and connection fees are paid. Fees are paid when a utility account is established with Doña Ana MDWCA Customer Service. The new connection for the residential construction site will be coordinated by Doña Ana MDWCA personnel and establish the final location of the wastewater connection.

New residential construction sites that are found connected to the wastewater system without establishing a utility account and bypassing payment of fees and charges for new connections, shall be deemed as theft of service and illegally connected to the wastewater system.

Doña Ana MDWCA shall have the right to disconnect or refuse to connect or reconnect any utility service where there is evidence that theft of utility service (i.e., water or wastewater connection) has occurred. Doña Ana MDWCA shall immediately disconnect water services and assess the user or user's representative an assessment of $250.00 per instance of illegal connection. The illegal connection assessment shall be paid in full plus any and all unpaid fees and charges for new connection services and the establishment of a utility account.

2.2.5 Water and Wastewater Impact Fees

A Water and Wastewater Development Impact Fee is assessed for each new connection to the Doña Ana MDWCA water and wastewater system based on water meter size.

The fee is also applicable to any increase in the size of an existing meter. The fee will be assessed for any such increase in an amount representing the difference between the fee that would be imposed for the existing meter size and the fee imposed for the size of the proposed meter.

Table 3: Water and Wastewater Impact Fees

	Water Impact Fees		Wastewater Impact Fees			
Meter Size	**Residential**	**Commercial**	**Residential**	**Commercial**	**Treatment Fee (Picacho Hills)**	**Treatment Fee* (All Other Areas)**
3/4" x 5/8"	$1,642.00	$1,642.00	$777.20	$777.20	$1,165.80	$2,726.00
1-in	$3,613.00	$3,613.00	$1,438.40	$1,438.40	$2,157.60	$5,997.00
1.5-in	$6,359.00	$6,359.00	$2,876.40	$2,876.40	$4,314.60	$13,085.00
2-in	$17,908.00	$17,908.00	$4,602.00	$4,602.00	$6,903.00	$23,989.00
3-in	$42,844.00	$42,844.00	$9,484.40	$9,484.40	$14,226.60	$59,972.00
4-in	$65,005.00	$65,005.00	$19,430.00	$19,430.00	$29,145.00	$95,955.00
6-in	$122,037.00	$122,037.00	$38,860.00	$38,860.00	$58,290.00	$152,656.00

**Based on Current City of Las Cruces Impact Fees and subject to change*

1. Collection of Fee
   The Impact Fee may be paid in full at the time of application for service or payable in up to 48 monthly payments at 4% annual interest. This installment payment option is available only to Residential and Non-Rental water connections and to the property owners thereof.

2. General Terms Applicable to All Impact Fees
   For property owners who enter into an installment payment option, whether they are the utility user or not (in the case of renters/lessees), the monthly payment amount will be billed to the property owner. Failure to pay the sums due may result in termination of all Association utility services to the property; in a lien being filed on the property; and in any other collection remedy available to the Association. In the event the property owner sells or transfers ownership of the property when there is a User Surcharge balance due, the full unpaid balance is due on or before Association utility service for the property is transferred to a new user. The "due on sale or transfer" requirement also applies to foreclosure, deed in lieu of foreclosure, or short sales, and to probate or death transfers. No penalties will be assessed for early payment of the development impact fee amount.

2.2.6 Willing and Able to Provide Service Letter

This letter only advises you that water and/or sewer is available to service this project. This is not an approval to connect to these facilities or a certification that there is adequate capacity in the system to serve the proposed development. Capacity is issued on a first-come, first-serve basis. Therefore, capacity cannot be guaranteed until a complete set of plans has been received and approved by DAMDCA.

2.3 PRE-DEVELOPMENT PLAN

2.3.1 Developer's Concept Plan

1. The developer shall provide a concept plan of the development as early as possible to the Association. It is recommended that a pre-development meeting take place between DAMDWCA and the developer once the concept plan has been submitted. The intent of the meeting will be for DAMDWCA to provide feedback on potential utility connection points and/or upgrades that may be required. The concept plan needs to include the following at a minimum:

A. Vicinity Map
B. Conceptual Site Plan
C. Building locations (if available)
D. Lot lines, right-of-way boundaries, and proposed zoning for each lot
E. Identify existing water/wastewater utilities – this should be gathered during the due diligence

2.3.2 Utility Concept Plan Review

Depending on the size and/or complexity of the proposed development, DAMDWCA may require a conceptual utility plan be developed and submitted. Developer shall create a conceptual utility layout plan(s) showing general sizes, locations, connection points, and upgrades (if necessary) as discussed at the concept plan meeting.

2.4 DEVELOPMENT SUBMITTAL REQUIREMENTS

The development review process begins when a Development Review Request Form has been completed and submitted to DAMDWCA. The review request form is attached in **APPENDIX B**.

2.4.1 Subdivision/Development Information

1. Summary in table form for each land use type (e.g., Single family residential, multi-family residential, commercial, etc.) that includes the following information. This table can also be included on the Overall Utility Plan (Section 2.4.2).
   A. Land Use
   B. Number of Parcels for SFR
   C. Number of Parcels and Units for MFR
   D. Number of commercial lots and total square footage of buildings (if known) or total acreage.
   E. Any other land use categories with relevant counts or size information
   F. Water/Wastewater per unit demands and summarized for each land use category

2.4.2 Construction Drawings

1. Shall be prepared by a registered professional engineer licensed in the State of New Mexico. All drawings shall be on 24”x36” sheets and allow for the following:
   A. Titleblock
   B. North Arrow
   C. Horizontal Scale (both written and graphic)
      a. Maximum scale 1”=30” for plan and profile sheets
   D. Vertical Scale (profile/section sheets only)
      a. 1”=5” preferred, 1”=10” maximum
   E. Name/Logo of Engineer or Company
   F. Professional Engineer’s seal
      a. Stamped and unsigned for preliminary drawings
      b. Stamped, signed, and dated for final drawings
2. Overall Utility Plan
   A. A detailed overall utility plan that consists of the planned utility improvements for the development that shows:
      a. Water - Pipeline sizes, valves, hydrants, service line stubouts

b. Wastewater – Pipeline sizes, flow directions, manholes, service line stubouts, air release valves (forcemains)
c. Gas – Pipeline locations and service line stubouts
d. Electrical/Communication – Utility poles, underground conduits, surface infrastructure (i.e. pull boxes, transformers, etc.)

B. All street names, right-of-way boundaries (identify width), easements (identify type and width), and property lines.
C. Any easements and/or property dedicated specifically to DAMDWCA must be clearly shown on the drawing and annotated with appropriate recording information (e.g. Instrument No.) from the Dona Ana County Clerk.
D. Locations and nature in which the water/wastewater utility improvements will connect to existing infrastructure. Sizes of existing infrastructure at these locations need to be shown.
E. Identify land use (e.g., single family residential, multi-family residential, commercial, etc.) and lot size for each parcel.
F. Maximum horizontal scale – 1" = 100'. Multiple sheets (with appropriate match lines) can be used for larger developments or subdivisions that do not fit on one sheet at the maximum scale.

3. Plan and Profile Drawings
   A. All street names including crossing and adjacent streets shown in the drawings
   B. Right-of-way boundaries, property lines, and easement boundaries (identify type and width)
   C. Existing and proposed 1-ft contours
   D. All existing utilities within and/or immediately adjacent to the development where connections are proposed. Include sizes/materials for water and wastewater utilities owned by DAMDWCA.
   E. Plan notes for utility pipelines and appurtenances to include stationing, offset (if applicable), northing, and easting.
   F. Profile notes for utility pipelines including size, material, slopes (if applicable), and fittings.
   G. Profile notes for utility crossings including utility type, size, and vertical separation.

2.4.3 Material/Equipment Submittals

1. To be submitted with final review
2. Product data sheets and/or manufacturer drawings for each required material or equipment with clear marks identifying the pertinent size, materials, and models to be installed.
3. Water Systems
   A. Water mains - pipeline, valves, fittings, joint restraints, detectable warning tape, tracing wire, and test boxes
   B. Valve vaults, covers, and frames
   C. Services – saddle, corporation stop, service tubing
   D. Fire/flush hydrants
   E. Additional items may be identified during the preliminary review.
4. Wastewater Systems
   A. Sewer mains – pipeline
   B. Manholes, vaults, covers, and frames
   C. Forcemains – pipeline, fittings, valves, joint restraints, detectable warning tape, tracing wire, and test boxes
   D. Services – Wyes, service pipe, fittings, caps

E. Additional items may be identified during the preliminary review.

2.4.4 Other Requirements

1. Disinfection and Sampling Plan
   A. In accordance with **Section 6.12** of these specifications, NMED guidelines, and AWWA C651
   B. The disinfection and sampling plan must be submitted to NMED along with the construction plans. The submittal to NMED must comply with their *Application for Construction or Modification of a Public Water Supply System*. This application form can be found on the NMED website. The application, any NMED response letter(s), and subsequent NMED approval letter must be provided to DAMDWCA before project approval.
2. Utility Permits (as required)
   A. Dona Ana County
   B. City of Las Cruces
   C. New Mexico Department of Transportation
   D. Elephant Butte Irrigation District
   E. Bureau of Land Management
   F. Bureau of Reclamation
   G. New Mexico State Land Office
   H. Union Pacific/BNSF
   I. International Boundary and Water Commission
   J. US Army Corps of Engineers
   K. Other agencies as required
3. Utility easements needed for permanent installation of utility infrastructure.
4. Real property deeded to DAMDWCA as required

2.5 DEVELOPMENT APPROVAL

Once all requirements have been met, DAMDWCA will issue an approval letter in writing with remaining items that need to be addressed prior to construction. Along with any project specific requirements, these items will need to be completed at or before the pre-construction meeting include:

1. Construction schedule
2. SWPPP (if required)
3. Two (2) full size printed copies of the approved construction plans and digital PDF.

2.5.1 Standard Development Agreement

Once a project approval has been granted, the Developer must complete (w/ all attachments) and submit the *Standard Development Agreement* included in **APPENDIX C**.

2.6 CONSTRUCTION

All construction work related to water and wastewater utilities must be completed in accordance with this document and coordinated with DAMDWCA or their representative including any testing, disinfection procedures, and sampling. Failure to do so may result in the work not being approved and redone. A minimum of 5 working days is required before the start of utility work and/or schedule modifications. Additionally:

1. DAMDWCA water valves are not to be operated by the contractor or sub-contractor and must be completed by DAMDWCA personnel unless otherwise approved.
2. All shutdowns must be approved and scheduled. A shutdown request must provide a minimum of 72 hours of notice so that affected customers can be notified. No shutdowns will occur on Mondays or Fridays unless a justification (related to operations) can be made to the advantage of a shutdown on those days. Schedule delays and cost reductions are not valid justifications.
3. A minimum of 48 hours of notice is required for any connections to existing water or wastewater utilities. More time may be required depending on the complexity or impacts to the utility's customers.
4. Typical working hours are from 7:00 AM to 5:30 PM, Monday through Friday excluding holidays. Any work outside of those hours must be approved by DAMDWCA.

2.6.1 Pre-construction Meeting

The developer or a representative shall coordinate and oversee a pre-construction meeting between the developer, developer's engineer, general contractor, water/wastewater utility contractor (if not the general contractor), and DAMDWCA. The purpose of this meeting is to ensure that the approved plans and construction requirements are clear. At the pre-construction meeting the Developer shall provide:

1. Written schedule of the project clearly stating beginning and ending dates specific to the water/wastewater utility installations.
2. An organizational chart of key personnel including project managers, superintendents, and foremen of the general contractor who will be responsible for completing the utility work. The organization chart shall designate who will be the primary and secondary points of contact with DAMDWCA. Changes to these personnel must be communicated in writing to DAMDWCA.
3. The licensed surveyor/company who will be responsible for construction staking and the as-built survey will need to be included in the organizational chart.

2.6.2 Construction Observation

Once a construction schedule has been submitted, DAMDWCA will provide the Developer with an estimated cost of construction fees including administration, inspection, GIS on-boarding, and updates to the Association's hydraulic water model. This is only an estimate based on the accepted construction schedule and is subject to change.

Part-time or full-time inspection of ongoing projects will be made by a DAMDWCA representative during the construction phase to ensure conformance with the approved plans and this development manual. Projects approved for construction by the DAMDWCA automatically authorize DAMDWCA representatives' access to the construction site at all times for the purpose of inspecting constructed facilities or observing construction operations in progress. DAMDWCA representatives will take appropriate action when improper material or unacceptable workmanship is detected on the project and will notify the DAMDWCA Executive Director, Contractor, Engineer and/or Developer.

2.6.3 Project Record Documents

2.6.3.1 Contractor's Construction as-built Drawings

1. Swing ties shall be measured from a permanent surface feature to the center of the relevant feature to the nearest 1-ft. Permanent features used shall be included in the surveyed

background provided in the design drawings. Vegetation is not considered a permanent surface feature.

2. A full-size printed copy and digital PDF copy of the Developer's construction as-built drawings are to be submitted once construction is complete.
3. Sewer Utility
   A. Each manhole shall be notated with three (3) swing ties (measurements from a permanent surface features) to the center of the manhole cover.
   B. Sewer service wyes should be measured along the sewer main pipe from the nearest manhole and the distance notated on the as-built drawings.
   C. The sewer service cap to be notated with a depth, to the nearest ½-ft, from the ground surface.
   D. For service stub-outs that are not installed perpendicular to the sewer main, the cap location shall also be notated with three (3) swing ties.
   E. For sewer forcemains installed parallel to paved roadways:
      a. The distance between roadway centerline and forcemain shall be noted on the as-built drawings at least once per sheet and at any bend or change in alignment direction.
      b. Each bend or change in alignment direction should also have three (3) swing ties notated.
      c. Each cleanout, air release/vacuum valve vault, and wire trace test box (if not integrated into cleanout collar) shall be notated with three (3) swing ties.
   F. For sewer forcemains not installed parallel to paved roadways:
      a. The offset distant (perpendicular) from a permanent surface feature must be noted at least once per sheet and at any change in alignment direction.
      b. Each bend or change in alignment direction should also have three (3) swing ties notated.
      c. Each cleanout, air release/vacuum valve vault, and wire trace test box (if not integrated into cleanout collar) shall be notated with three (3) swing ties.
   G. Deviations of the pipe inverts, pipe slopes, or manhole rim elevations shall be notated by striking though the original profile notation and writing in the as-built information.
4. Water Utility
   A. For waterlines installed parallel to paved roadways:
      a. The distance between roadway centerline and waterline shall be noted on the as-built drawings at least once per sheet and at any bend or change in alignment direction.
      b. Each bend or change in alignment direction should also have three (3) swing ties notated.
      c. Each air release/vacuum valve vault shall be notated with three (3) swing ties.
   B. For waterlines not installed parallel to paved roadways:
      a. The offset distant (perpendicular) from a permanent surface feature must be noted at least once per sheet and at any change in alignment direction.
      b. Each bend or change in alignment direction should also have three (3) swing ties notated.
   C. Each air release/vacuum valve vault, fire hydrant, flush hydrant, gate valve, service tap, and wire trace test box shall be notated with three (3) swing ties.
   D. If a waterline profile is included, any deviations from stated depths or elevations must be notated by striking through the original notation and writing in the as-built information.

2.6.3.2 As-Built Survey

1. All installed utilities and other work performed must be surveyed using standard survey practices using the projection and coordinate system parameters of the project's survey control report.
2. Survey points to be delivered to Engineer in a *.csv file using a Point, Northing, Easting, Elevation (Z), Description (PNEZD) format.
3. Subsurface Features
   A. All subsurface features shall be surveyed prior to covering or backfilling.
   B. Linear features must be surveyed at regular intervals no more than 100 feet apart on straight runs, curved pipe must be surveyed at each joint of pipe.
   C. Straight gravity sewer pipelines only need survey at the manholes.
   D. Horizontal and vertical fittings and pipe deflections
   E. Pipe inverts at manholes
   F. Utility pipe termination/cap points, including utility service stubouts
   G. Service tees, taps, and wyes
4. Surface Features
   A. Valves, Valve Vaults
   B. Fire Hydrants
   C. Meters
   D. Wire Trace Test Boxes
   E. Manholes
   F. Air Release/Vacuum Valve Vaults
   G. Cleanouts

2.6.4 GIS File Submission Requirements

2.6.4.1 General Requirements

All mapping elements shall be based off of the as-built survey and submitted as an ESRI shapefile (*.shp) or ESRI file geodatabase (*.gdb) referencing:

1. Coordinate System: New Mexico State Plan Central
2. Datum: NAD83 and NAVD88
3. Units: US Survey Feet
4. Spatial location of features within the GIS file(s) must be based on the as-built survey data collected during construction.

2.6.4.2 Water Utility GIS Layer Names and Attribution

Table 4 lists the layer names and accompanying attributes for each utility asset type.

Table 4: GIS Layer Names and Attributes

Layer_Name	
Attributes	**Description**
Water_Lines	
Size	Pipe Diameter (inches)
Material	Pipe Material (C900 PVC, DI, etc.)
Date_Installed	Date Installed

Casing	
Size	Diameter (inches)
Material	Pipe Material (C900 PVC, DI, etc.)
Date_Installed	Date Installed
Water_Valves	
Size	Valve Size (inches)
Manufacturer	Valve Manufacturer
Model	Valve Model
Category	Control, System, Hydrant
Valve_Type	PRV, Gate, Ball, Butterfly, etc.
Date_Installed	Date installed
Valve_Turns	Turns to open/close
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z coordinate in NMSP Central
Water_PRV	
Size	PRV Size (inches)
Manufacturer	PRV Manufacturer
Model	PRV Model
Set_Pressure	PRV set pressure (psi)
Upstream_Pressure	Line pressure upstream of PRV (psi)
Downstream_Pressure	Line pressure downstream of PRV (psi)
Strainer	Yes/No
Strainer Model	Model of strainer
Telemetry	Yes/No
Vault_Size	Vault dimension (4'x6' or 4' diameter)
Date_Installed	Date installed
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z coordinate in NMSP Central
Water_Fire_Hydrants	
Inlet_Size	Diameter of hydrant inlet connection (inches)
Manufacturer	Hydrant Manufacturer
Manufacturer_Date	Date
Manufacturer_Location	City, State
Model	PRV Model
Date_Installed	Date installed
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z coordinate in NMSP Central
Water_Meters	
Serial Number	Meter SN
Manufacturer	Meter Manufacturer
Size	Size (inches)
Model	Meter model
Model_Reg	Register Model
Date_Installed	Date installed
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Water_Service_Lines	

Curb_Stop_Size	Valve size (inches)
Material_Type	Service line material
Size	Meter size (inches)
Date_Installed	Date installed
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Depth of main line at connection point
Water_Storage_Tanks	
Capacity	Tank size (MG)
Material	Steel, Concrete, etc.
Date_Installed	Date installed
Overflow_Elevation	Overflow elevation
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z (ground) coordinate in NMSP Central
Water_Wells	
Size	Well casing Diameter(inches)
Depth	Well depth (feet)
Date_Installed	Date installed
State_Engineer_Number	NMOSE Number
Drawdown	Drawdown (feet bgs)
Depth_To_Water	Depth to static water level (feet bgs)
Pump_Model	Pump model
Pump_Cap	Pump capacity (GPM)
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z (ground) coordinate in NMSP Central
Water_Other_Utility_Pts	
Type	Type of asset
Size	Size/description
Date_Installed	Date installed
WW_Lines	
Size	Pipe Diameter (inches)
Material	Pipe Material (C900 PVC, DI, etc.)
Date_Installed	Date Installed
UP_MH_Invert	Invert elevation at upstream MH (ft)
Down_MH_Invert	Invert elevation at downstream MH (ft)
WW_Manholes	
Size	Manhole size (feet)
Material	Manhole material
Date_Installed	Date installed
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z (rim) coordinate in NMSP Central
WW_Lift_Stations	
No_Pumps	Number of pumps
Pump_Cap	Pumping capacity (gpm)
Pump_Model	Pump model

Date_Installed	Date installed
Horsepower	Horsepower of pump
Inlet_Elevation	Elevation of influent pipe
Inlet_Diameter	Inlet diameter (inches)
Outlet_Elevation	Elevation of discharge pipe
Outlet_Diameter	Diameter of discharge pipe (inches)
Lift_Station_Depth	Depth of lift station
Lift_Station_Size	Lift station area (SQ Ft)
Treatment	Treatment type
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z (rim) coordinate in NMSP Central
WW_Cleanouts	
Count	Single or double
Size	Pipe diameter (inches)
Date_Installed	Date installed
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z (ground) coordinate in NMSP Central
WW_Valvepits	
No_Connection	0, 1, 2, 3, or 4
Size	Pipe size (inches)
Date_Installed	Date installed
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z (rim) coordinate in NMSP Central
Depth	Depth of valve pit (feet)
WW_Vacuum_Stations	
No_Pumps	Number of pumps
Pump_Cap	Pumping capacity (gpm)
Pump_Model	Pump model
Date_Installed	Date installed
Horsepower	Horsepower of pump
Inlet_Elevation	Elevation of influent pipe
Inlet_Diameter	Inlet diameter (inches)
Outlet_Elevation	Elevation of discharge pipe
Outlet_Diameter	Diameter of discharge pipe (inches)
Vacuum_Station_Depth	Depth of lift station
Vacuum_Station_Size	Lift station area (SQ Ft)
Tank_Size	Size of tank (gallons)
Easting	X coordinate in NMSP Central
Northing	Y coordinate in NMSP Central
Elevation	Z (ground coordinate in NMSP Central

2.6.4.3 Other Construction Documentation

Additional documentation must be collected during construction and submitted to DAMDWCA to include:

1. Pipeline Leak Testing
2. Bacteriological Testing

3. CCTV pipeline inspections for gravity sewer mains
4. Compaction Testing for trenches related to water/wastewater utility installations

All testing requires a DAMDWCA representative to be present. Include all testing results including any non-passing tests in project documentation.

2.7 CERTIFICATION AND CONVEYANCE

2.7.1 Project Closeout Documentation

In addition to the required design and construction documents that need to be submitted, the following documents must be executed to submitted to DAMDWCA before Owner's Certification and Acceptance will be granted.

1. Certification of Project Performance (**APPENDIX E**) – To be completed by the Developer's Engineer of Record certifying that the water/wastewater utilities have been in accordance with the approved plans and specifications.
2. Certified Construction Cost – This cost reflects the installed costs and includes all water and wastewater utility infrastructure installed during the project that will be transferred to DAMDWCA to own and maintain. Costs shall be separated by utility type. The certified construction cost must be signed and sealed by the engineer of record.
3. Assignment of All Warranties and Guarantees (**APPENDIX F**)
4. Contractor's Release of Liens (**APPENDIX G**) – To be completed by general contractor, water/wastewater utility sub-contractor(s), and material suppliers.
5. Grantor's Agreement (**APPENDIX H**) – Agreement to be filled out by the Developer to transfer ownership of assets to DAMDWCA.

2.7.2 Project Documentation Checklist

☐	Right-of-way Permits	☐	Pipe Testing Documentation
☐	Recorded Utility Easements	☐	Bacteriological Testing Results
☐	Recorded Property Deeds	☐	CCTV Gravity Sewer Pipelines
☐	Contractor's As-Builts (Printed)	☐	Certificate of Project Performance
☐	Contractor's As-Builts (PDF)	☐	Certified Construction Costs
☐	As-Built Survey Points	☐	Assignment of Warranties and Guarantees
☐	GIS File(s)	☐	Contractor's Release of Liens (incl. subs)
☐	Compaction Tests	☐	Grantor's Agreement
☐	O&M Manuals	☐	Closeout USB drive

Some items listed above may be submitted during construction, however a USB drive with all documentation must be provided as part of the closeout of the project.

2.7.3 Owner's Certifications and Acceptance

Once all project documentation has been received and conditions met, DAMDWCA will issue their

certification and acceptance letter to the developer. At this point the 12-month warranty period will begin. DAMDWCA will take ownership and operational responsibilities of the water/wastewater utility infrastructure. The contractor's bond must stay in place for the full 12 months following owner acceptance.

3 UTILITY ENGINEERING SUMMARY

3.1 GENERAL

Designs incorporating the DAMDWCA utility development standards must provide a Utility Engineering Summary from the respective developer, engineer, or builder to DAMDWCA. At minimum, the Utility Engineering Summary must include the following:

1. An overview of the proposed project and basis of design, including planned improvements, service demands, and flows.
2. Fire flow analysis.
3. Bentley WaterGEMS hydraulic model analysis.
4. System layout and construction drawings.

If specific requirements cannot be provided by the developer, additional development review fees may be required.

4 WATER DESIGN STANDARDS

4.1 GENERAL

During the undergoing design or construction of a DAMDWCA water utility-based project, it may be necessary that the design or construction of that project deviate from these utility development standards. Should a project require such a deviation, prior approval must be granted by the DAMDWCA Executive Director or designee before the design, installation, or construction can commence. No part or parts of these utility development standards relieve the Design Professional from the responsibility of meeting all current standards of all entities having jurisdiction over complete or partial aspects of the project being designed. All DAMDWCA owned, operated, or dedicated water systems, unless otherwise specified by the DAMDWCA Executive Director, must utilize these utility development standards.

One crucial aspect to any project in its developing stages is the development or compilation of an agency approval list by the Design Professional. The agency approval list is required to accurately show all agencies which will require review and corresponding approval for construction to begin.

The agencies that may have possible jurisdiction over DAMDWCA include, but are not restricted to:

1. All Railroad Groups
2. Doña Ana County
3. Elephant Butte Irrigation District
4. New Mexico Department of Transportation
5. New Mexico Environment Department

In addition to these agencies, the Design Professional must also gain approval from the DAC Fire Marshal that the project being designed, installed, or constructed is complaint to the UFC and that adequate fire flow standards have been incorporated into the system.

4.2 WATER SYSTEM MODEL

As stated in Section 2 of these utility development standards, the DAMDWCA water system is to be modeled by the DAMDWCA designated engineer using WaterGEMS software. Once the DAMDWCA Executive Director or designee has reviewed and approved that the Utility Engineering Summary, outlined in Section 2, is sufficient, the information included in that design will be applied to the water system model to verify items such as line sizes, fire flow requirements, fluid flow conditions, and more are adequate and relevant to the installation and design of any upgrade, modification, expansion, or rehabilitation considerations for the DAMDWCA water system. Only the specific DAMDWCA utilized water system model, in its most recent approved version, and WaterGEMS software may be used for verification of the design submittal.

The proposed design, installation, or construction proposed for the DAMDWCA water system must receive verification and approval by the DAMDWCA Executive Director or designee before work may begin. The following water design standards must be incorporated into a planned deliverable design to be submitted as a part of the final Utility Engineering Summary outlined in Section 2.

4.3 GENERAL DESIGN CRITERIA

The Design Professional should utilize all applicable local codes in the design of a water, gravity sewer, or vacuum sewer system, prioritizing these utility development standards unless otherwise directed or approved by the DAMDWCA Executive Director or designee. These codes include, but are not limited to, the following:

1. American Association of State Highway and Transportation Officials- Standard Test Methods
2. American Concrete Institute Building Code Requirements for Reinforced Concrete-Latest Applicable Edition
3. American National Standards Institute
4. American Public Works Association Standards, latest applicable edition.
5. American Society for Testing and Materials- Standards and Publications
6. American Standards for Steel-Steel Weld Fitting Standards
7. American Water Works Association Standards- All Latest Applicable Editions
8. Americans With Disabilities Act- Latest Applicable Edition
9. City of Las Cruces General Conditions-Latest Applicable Edition
10. City of Las Cruces Standard Specifications for Road Construction-Latest Applicable Edition
11. City of Las Cruces Subdivision Code- Latest Applicable Edition
12. Code of Federal Regulations- All Latest Applicable Regulations
13. International Building Code- Latest Applicable Edition
14. International Fire Code- Latest Applicable Edition
15. International Plumbing Code- Latest Applicable Edition
16. Manual on Uniform Traffic Control Devices- Latest Applicable Edition
17. National Association of Corrosion Engineers- Corrosion Control Standards
18. New Mexico Environmental Department Recommended Standards for Water Facilities- Latest Edition
19. New Mexico Standard Specifications for Public Works Construction
20. New Mexico Underground Property Damage Law- Chapter 62, Article 14, NMSA 1978, and associated amendments.
21. Occupational Safety and Health Act- Construction Industry Standards; Safety Requirements
22. Subcontractors Fair Practices Act- NMSA 1978 and associated amendments.

23. Uni-Bell PVC Pipe Association Standards- All Latest Applicable Regulations

Sizing and routing for water system lines must be coordinated with the DAMDWCA water model and approved by the DAMDWCA Executive Director or designee. Water infrastructure for use within the DAMDWCA water system must be sized to provide Peak Day Water Demand flow, plus fire flow for fire protection. Public fire hydrants and private sprinkler systems must also provide sufficient fire flow before final approval will be given.

When designing and sizing water lines, the Hazen-Williams formula must be used. A friction coefficient factor "C" of one hundred and twenty (120) must be used for new DI water main design calculations. A "C" factor of one hundred and thirty (130) must be used for new PVC water main design calculations. Other "C" factors must be requested and approved by the DAMDWCA Executive Director or designee before being used in the final design.

For peak flow conditions, the water main velocity must not exceed five (5) fps. During peak flow plus fire flow conditions, the water main velocity must not exceed seven (7) fps.

4.3.1 DESIGN PRESSURES

The design water pressure to be used in any respective design considerations for the DAMDWCA water system is to be forty (40) psig for the minimum operating pressure and one hundred (100) psig for the maximum operating pressure.

4.3.2 DESIGN DEMANDS

All design demands must utilize the actual expected demand for the water system being designed, except for single-family residential units which must utilize an average design demand of 0.20 gpm per residence. For non-residential water demands the design loading should be calculated using generally accepted engineering practices and references. Final design loading is subject to DAMDWCA approval.

4.3.3 PEAKING FACTORS

The peaking factor that must be used in any respective design considerations for the DAMDWCA water system is 2.0 when applied to average demands.

4.3.4 FIRE FLOW AND HYDRANT CONSIDERATIONS

For all areas, a minimum fire flow of one thousand (1,000) gpm should be used for design purposes, with the addition of the peak day demand. In addition, a residual pressure at the hydrant must be twenty (20) psi with water velocity in the water main not to exceed seven (7) fps. These values must also be verified by the DAMDWCA designated Engineer and within the DAMDWCA water model.

Fire hydrant spacing must not exceed five hundred (500) feet. Dead end streets and cul-de-sacs must have a fire hydrant located at the end of the street. Spacing of fire hydrants shall be measured by taking the total distance between the centerline points of the respective roadways adjacent to the fire hydrant.

The preferred location of fire hydrants is between and at the extension of property lines. When possible, fire hydrants should be placed away from street intersections to avoid interruptions in traffic flow. Should a design necessitate a fire hydrant be located at street intersections, the fire hydrant must be placed at the point of curvature of the property lines at those street intersections.

Fire hydrants must be located behind the sidewalk should a sidewalk be located adjacent to a curb in a public ROW. If a parkway lies between the curb and the sidewalk, the fire hydrant must be placed in the parkway. Regardless of location, a fire hydrant must have a clear area maintained around the hydrant itself. The clear area consists of a clear radius three (3) feet from the center of the fire hydrant adjacent to the hose and pumper nozzles and a radius of one and a half (1.5) feet to the rear of the hydrant. Structures must not be placed within the clear area in a manner that would interfere with the regular access or operation of the fire hydrant.

Fire hydrants must never be placed in a manner that would conflict with ADA requirements.

iHydrants must be incorporated into any development. If only one hydrant is needed for a development, it must be an iHydrant. If multiple hydrants are to be installed one (1) iHydrant must be installed for every seven (7) traditional hydrants. The preferred location(s) of iHydrant installations will be determined by DAMDWCA.

Steel bollards should be used to protect fire hydrants that do not utilize curbs, sidewalks, or other structures. Bollards must adhere to the clear area spacing described above.

Commercial center buildings which use fire line sprinkler systems will be owned and operated by DAMDWCA up to the point where the sprinkler line leaves a ROW or DAMDWCA utility easement containing that sprinkler line. In addition, a valve must be installed on the fire line adjacent to the water main supplying that fire line. A suitably sized meter is required to be installed on any fire line that will be connected to a building.

Commercial centers which use a hydrant connected fire line will be owned and operated by the DAMDWCA up to the hydrant itself and utilize a fifteen (15) foot wide DAMDWCA utility easement. A commercial center using a fire line connected hydrant cannot extend into another commercial property without DAMDWCA Executive Director or designee approval.

4.4 WATER MAINS

4.4.1 MINIMUM PIPELINE SIZES

All mains must have a minimum diameter of eight (8) inches, with larger diameter pipe allowable should the available pressures and demands necessitate the increase in pipe sizing.

4.4.2 ALLOWABLE VELOCITIES

The design velocity for distribution mains should not exceed three (3) fps for peak day flow and seven (7) fps for fire flow and peak day flow, depending on which is limiting.

4.4.3 NEW CONSTRUCTION IN DEDICATED RIGHT OF WAY

Water mains must be located within a dedicated ROW ten at a minimum of ten (10) feet from the centerline of the roadway. The water main should also be located on either the northern or eastern side of the roadway. Deviation from this location standard must be approved on a case-by-case basis by the DAMDWCA Executive Director or designee.

4.4.4 MAIN LINES OUTSIDE OF DEDICATED RIGHT OF WAY

DAMDWCA owned water mains must always be located within a DAMDWCA owned utility easement or ROW. Easements, permits, or other documentation must be acquired to ensure a DAMDWCA water main may be accessed for operations and maintenance by DAMDWCA operators. The minimum acceptable width for an easement is fifteen (15) feet for a single line. Should additional utilities also be located within a single DAMDWCA utility easement, that easement will require a greater width than the fifteen (15) foot minimum. DAMDWCA utility easement location and width outside of this standard must be approved on a case-by-case basis by the DAMDWCA Executive Director or designee.

4.4.5 CURVED ALIGNMENTS

Curved alignments may be used if the planned project configuration dictates it. The locations of utility lines that follow these curved alignments should still follow the standard location requirements as described in Section 4.4.3 and Section 4.4.4.

The curved alignments of water mains must comply to the limits set by AWWA C605-94 or the most recent applicable AWWA standard for PVC materials and AWWA C600-99 or the most recent applicable AWWA standard for DI materials.

The longitudinal bending for PVC materials in the barrel of the PVC must not result in a bending radius less than the limits set in **Table 5** below.

Table 5: Minimum Bending Radius in PVC Piping

Nominal Pipe Size (in.)	Minimum Bending Radius (ft.)
4	100
6	144
8	189
10	231
12	275
Additional Data Available in AWWA C-605	

Joints made with DI materials may be deflected when the geometry of the piping alignment necessitates it. When a joint deflection is to be used, it must comply with the values listed in AWWA C600-99. Joint deflections, for design purposes, must not exceed 80% of those values. Design values for the approximate radius of curve of DI materials utilizing joint deflection are given below in **Table 6**.

Table 6: Design Values for Ductile Iron Curved Alignments

Nominal Pipe Size (in.)	Approximate Radius of Curve (ft.)			
	Push on Joint		Mechanical Joint	
	18 ft. Joint	20 ft. Joint	18 ft. Joint	20 ft. Joint
4	260	290	155	170
6	260	290	180	200
8	260	290	240	270
10	260	290	240	270
12	260	290	240	270
14	430	480	360	400
16	430	480	360	400
18	430	480	430	480
20	430	480	430	480
24	430	480	540	600

4.4.6 STANDARD DEPTH OF WATER MAINS BELOW FINISHED GRADE

Water mains must be placed to meet the minimum/maximum depth requirements shown below in **Table 7**.

Table 7: Depth of Water Main Below Finished Grade

Location	Depth to Top of Pipe
In Surfaced Roadway	3 ft. Minimum -5 ft. Maximum is Allowed
In Unsurfaced Roadway	4 ft. Minimum -5 ft. Maximum is Allowed
Drainage Channel	5 ft. Minimum- Site Specific

4.4.7 STANDARD SEPARATION FOR MAIN LINES

The standard separation of water main lines with respect to other utilities must conform to **Table 8** and **Table 9** shown below, unless approved by the DAMDWCA Executive Director or designee.

Table 8: Horizontal Separation for Parallel Utility Lines

Utility	Water Main (ft.)
Gas Main	10
Gas Service	5
Sewer Main	10**
Sewer Service	5
Water Main	5
Water Service	5
Storm Sewer	5
Wire Utility	5
Manhole	10
Notes:	*** 10 ft. separation between water and sewer mains to be measured from outside of pipe to outside of pipe*

Table 9: Vertical Separation for Crossing Utility Lines and Water Mains

Vertical Separation for Crossing Utility Lines	
Utility	**Water Main (in.)**
Gas Main	18
Gas Service	12
Sewer Main	18
Sewer Service	6
Water Main	12
Water Service	6
Storm Sewer	18
Wire Utility	18
Note: Water mains that cross sewer mains must have the crossing arranged such that sewer joints will be equidistant and as far as possible from the water main joints and the sewer main be made of C900 DR18 piping.	

4.4.8 LOOPING OF WATER MAINS

The design of water mains should also include looping of the water main lines to reinforce the pressure in the system while also improving the circulation and overall reliability of the water system itself.

4.4.9 FUTURE CONNECTIONS

Future main extensions that are provided by terminal connections or “stub-outs,” the extension must extend twenty (20) feet beyond the pavement. A restrained valve must also be installed at the end of the stub-out. Future connections installed beyond the stub-out or terminal main extension must have the entire future main flushed, chlorinated, and pressure tested.

4.4.10 VALVES

Valves must be located so that service disruptions are minimized due to water outages of any kind. Valves must be located to limit the number of connections without service in the event of a water outage to 30. Valves must be located at the intersection of mains with one (1) valve on each leg of the intersection. For example, a three (3) way or tee intersection would require three (3) valves to be installed at the legs of each intersecting line. A four (4) way cross connection would require four (4) valves to be installed at the legs of each intersecting line. Valve installation and location on mains may change depending on site specific plans and must be verified by the DAMDWCA water model and be approved by the DAMDWCA Executive Director or designee.

Main lines that tie into the existing water system and are not extensions of existing lines must use a tapping tee and valve to eliminate water outages. Other connection methods must be approved by the DAMDWCA Executive Director or designee.

Valves located at larger depth than five (5) feet from finished grade must have valve stem extensions installed.

4.4.11 AIR/VACUUM VALVE ASSEMBLIES

Air/vacuum relief valves must be installed along water transmission lines according DAMDWCA Standard Drawing W-06 and must be justified using the DAMDWCA water model. The placement and design of air/vacuum relief valves must be approved by the DAMDWCA Executive Director or designee.

4.5 WATER SERVICE LINES

4.5.1 MINIMUM LINE SIZES, INCLUDING METERS

Service lines to an individual customer must be a minimum of three-fourths (3/4) inches in diameter. Should the DAMDWCA water model allow or require it, larger diameter pipe sizes may also be used.

As the IPC requires, domestic water meters must be two (2) inches or smaller. Other meter sizes must conform to respective AWWA standards. Domestic water meters larger than 3/4-inch requires prior approval from the DAMDWCA Executive Director or designee. All water meters will be supplied by the DAMDWCA.

Irregular water use exceeding three (3) hours per day is not permitted.

4.5.2 STANDARD ENTRY TO LOT LOCATIONS

Service lines entering a lot should follow **Table 10** shown below. Locations that deviate from the locations shown in that table will require DAMDWCA Executive Director or designee approval.

Table 10: Service Locations by Lot Type

Lot Type	Location of Service (Oriented by Standing in Street and Facing Lot)
Residential- 36 ft. Wide or Greater	Within 5-ft of outer edge of property
Multifamily	Within 5-ft of outer edge of property then manifolded to individual meters as required
Commercial Use with Subdivision	Site specific
Commercial Use Not in Subdivision	Site specific
Mobile Home Park	Site specific
Mobile Home Subdivision	Within 5-ft of outer edge of property
Notes:	*1. Services shall be perpendicular to the main line on straight roads, radial on curves, and straight from the main to the property line at the termination of cul-de-sacs.*
	2. Lot entry standards for corner lots are measured from the pc on the lot corner.
	3. Concrete driveways must not be placed over water meters and service lines. If the service line must be relocated, it will be at the expense of the property owner.

4.5.3 NON-STANDARD ENTRY TO LOT LOCATIONS

Should a conflict exist such that the standard entry to lot locations cannot be followed, the following non-standard entry to lot locations may be utilized and will require approval from the DAMDWCA Executive Director or designee.

1. Sewer may vary five to fifteen (5-15) feet left from the water service line.
2. If relocating the sewer line will not solve the conflict:
3. The water service line may be moved to left or right of the sewer service line for a maximum of five (5) feet left or right with the sewer service line located up to ten (10) ft. to the left of the lot centerline.
4. The sewer service line may be located five to fifteen (5-15) feet left from the water service line as required.

4.5.4 STANDARD DEPTH OF SERVICE LINES BELOW FINISHED GRADE

Water service lines must be placed to meet the minimum/maximum depth requirements shown below in **Table 11**.

Table 11: Depth of Water Service Line

Location	Depth to Top of Pipe
In Customer's Yard	1.5 ft. Minimum-3 ft. Maximum
In Established Street	2.5 ft. Minimum-5 ft. Maximum
Not in Established Street	3 ft. Minimum- Site Specific. 5 ft. Maximum.
Arroyos	5 ft. Minimum- Site Specific

4.5.5 STANDARD SEPERATION FOR SERVICE LINES

The standard separation of water service lines with respect to other utilities must conform to **Table 12** and **Table 13** below unless approved by the DAMDWCA Executive Director or designee.

Table 12: Horizontal Separation for Parallel Utility Line and Water Service Lines

Utility	Water Service (ft.)
Gas Main	5
Gas Service	5
Sewer Main	5
Sewer Service	5
Water Main	5
Water Service	5
Storm Sewer	5
Wire Utility	5
Manhole	6

Table 13: Vertical Separation for Crossing Utilities Line and Water Service Lines

Utility	Water Service (in.)
Gas Main	12
Gas Service	12
Sewer Main	6
Sewer Service	6
Water Main	6
Water Service	6
Storm Sewer	6
Wire Utility	6

4.5.6 SERVICE LINES OUTSIDE OF STREET OR RIGHT OF WAY

No meters shall be placed within private property.

4.5.7 BACKFLOW PREVENTION ASSEMBLIES

The contractor will use, and furnish, a backflow prevention assembly when the contractor does not already have an air-gap method of using purchased DAMDWCA purchased water for construction, and at any location indicated by the DAMDWCA. Backflow prevention assemblies must be a make, model, and size that is approved by the DAMDWCA Executive Director or designee.

Suitable backflow prevention assemblies, to gain approval, must conform to the manufacturer's specifications and any applicable lab and field performance standards set by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research: List of Approved Backflow Prevention Assemblies. An existing backflow prevention assembly may be approved for continued use, should a higher degree of protection not be required. If the existing backflow prevention assembly is not on the list of approved devices, it may continue to be used so long as it can be properly tested and maintained (e.g., parts are still available for repair).

No connections will be allowed between non-potable water sources and potable water sources.

4.6 PRODUCTION WELL DESIGN

All water production wells shall conform to the requirements as set forth in the most recent revision of

the NMED's Recommended Standards for Water Facilities and these utility development standards. All applicable forms and requirements through the New Mexico State Office of State Engineer shall be the direct responsibility of the Design Professional.

Careful care and consideration must be taken to reduce the designed production well's impact on nearby wells. In addition, design efforts should be centered around the reduction of potential drawdown and head losses. All water production wells must be designed under the direction of the DAMDWCA Executive Director or designee.

4.7 WATER STORAGE FACILITIES

All water storage facilities shall conform to the requirements as set forth in the most recent revision of the NMED's Recommended Standards for Water Facilities and these utility development standards. Applicable AWWA standards and specifications must be incorporated into the design of any water storage facility, and the design must be under the direction of the DAMDWCA Executive Director or designee.
All storage facilities shall have built-in provisions for draining as well as access and provisions for cleaning including a suitable source of water. The overall objectives of finished water storage are to:

1. Assist in meeting peak flow requirements.
2. Equalize system pressures.
3. Provide emergency water supply to account for possible component failure.
4. Provide for fire flow conditions.
5. Provide additional treatment capabilities as needed.

4.7.1 CHLORINATION SYSTEM REQUIREMENTS

These utility development standards regarding water storage facilities' chlorination system requirements do not have a set design criterion that must be maintained for all sites. Modern technologies, client preference, and other factors may produce a design that adequately satisfy the requirements set by various local, state, and federal agencies. **Table 14**, seen below, provides minimum concentrations, monitoring methods, and volume turnover times that must be achieved by a design plan considered for chlorination systems used by a DAMDWCA water storage facility. Chlorine system designs must be approved by the DAMDWCA Executive Director or designee.

Table 14: Chlorine Facilities Minimum Design Criteria

Item	Design Criteria
Low Level Chlorine	0.2 PPM
High Level Chlorine	0.8 PPM
Design Chlorine Dosage	1.0 PPM
Volume Turnover Maximum Time Required	3 Days
Chlorine Monitoring	Constant, Amperometric Method

4.8 PUMPING STATIONS

The design of all water pumping facilities and booster stations must conform to the requirements as set forth in the most recent revision of the NMED's Recommended Standards for Water Facilities and these utility development standards. Pump selection and design shall be done by or under the direct supervision of a register Professional Engineer in the State of New Mexico and at the direction of the

DAMDWCA Executive Director or designee.

All pumping stations must consist of a minimum of two (2) pumps with the capacity to provided fire demand, peak day demand, and peak hour demand. This requirement is a common design consideration made so that should one pump become taken out of service for maintenance, repair, or other reason, the remaining pump(s) shall still be capable of producing the fire demand, peak day demand, and peak hour demand.

The horsepower rating of each pump motor shall be such that the motor will carry continuously the maximum lead that is possible to develop at any point on the pump curve without exceeding 95% the motor nameplate rating and without using the service factor.

4.9 PRESSURE REDUCING STATIONS

Pressure reducing or pressure regulating valves (PRV) shall be utilized to control pressures within a distribution system. PRV's shall be sized on a case-by-case basis and shall be constructed in accordance with DAMDWCA Standard Drawing w-07 and at the direction of the DAMDWCA Executive Director or designee.

All PRV's shall contain "low flow" bypasses. At the discretion of the DAMDWCA Executive Director or designee, a redundant PRV shall be installed simultaneously with the main PRV to allow for water usage during down time and maintenance on the main PRV.

5 WATER UTILITY MATERIAL SPECIFICATION LIST

5.1 GENERAL

1. The following lists are the preferred products to be used in a DAMDWCA water utility system. Other products may be submitted to the DAMDWCA Executive Director or designee for approval before being used in construction.
2. Any brass fittings listed in the following water utility material specification list must be manufactured within the United States. Brass fittings from Mueller Co. or AY McDonald are acceptable.
3. Piping materials for use in water distribution that are four (4) inches through twelve (12) inches may be made from C-900 DR 18 or DI materials. Pressure piping material may be made of PE materials but must be approved on a case-by-case basis by the DAMDWCA Executive Director or designee.
4. Pump station and well house related materials are not included within this water utility material specification list. Instead, any materials to be used for pump stations or well houses will require approval from the DAMDWCA Executive Director, or designee, on a case-by-case basis.
5. Backflow prevention assemblies must comply with Section 3.5.7: Backflow Prevention Assemblies of these utility development standards.
6. This water utility material specification list includes all replacements or updates.

5.2 MATERIAL SPECIFICATION LIST

ITEM	DESCRIPTION	SIZE	SPECIFICATION	MANUFACTURER
1.	**Polyvinyl Chloride Pipe (C-900 DR 18 PVC):** Must be pressure class 235 integral bell end piping with elastomeric gaskets.	4-12 in.	a. AWWA: C900-07. b. ASTM 2241 c. NSF 61	
2.	**Ductile Iron Pipe (DI):** Must use mechanical joints or push-on joints. Outside coating to be bituminous, approximately 1 mil thick. Inside coating to be cement lined.	4-64 in.	a. ANSI A21.51/AWWA C151/C104 b. ASTM A536, Grade 60/42/10 c. NSF 61	•U.S. Pipe. •American Ductile Iron Pipe. •McWayne Ductile. •Griffin Pipe Products.
3.	**Polyethylene (PE) Pressure Tubing for Water Service** Cross-linked polyethylene (PEX)-CTS, with a minimum pressure class of 160 psi and have a code PEX 3306 and be blue in color.	¾-2 in.	a. AWWA C904	
4.	**Restrained Joint Fittings** Must be used for DI and PVC piping with MJ fittings.	4-72 in.		•U.S. Pipe: Field Lok, TR Flex, •XTRA Flex, USIFlex •JCM Industries: Sur-Grip •Romac Industries: GripRing, 600 Series, 400 Series •EBAA Iron: Megalug, 2000 PV Series. •Mueller Co.: AquaGrip Fitted Components •Star Pipe Products: StarGrip
5.	**DI and Gray Iron Fittings, and Compact (Short Body) Fittings** Must be used for MJ or MJ by flanged, with asphaltic coating, cement-mortar lining, asphaltic lining, or epoxy lining.	4-48 in.	a. AWWA/ANSI C110/A21.10-98, C153/A21.53-00, C111/A21.11-00, C105/A21.4-95, C116/A21.16-98 b. ASTM A 536, Grade 80/60/03 or 70/50/05.	

6.	**<u>Polyethylene (PE) Pressure Piping and Fittings</u>**	4-63 in.	a. AWWA: C906-99	
7.	**<u>Transition Fitting</u>** Must have an epoxy coating, nylon optional, with stainless steel bolts and nuts			•Romac Industries: 501 •Viking Johnson •Smith Blair: OMNI •Mueller Co.: 500 Series, MaxiFit Series.
8.	**<u>Extruded Sealing Tape (Joint Sealant)</u>** Must have a butyl resin sealant formula that conforms to Federal and State Highway Specifications and be suitable for summer grades or warmer climates.		a. ASTM C-990	•Public Works Marketing, Inc.: Ram Neck. •Concrete Sealants Inc.: CS 102, CS 102B
9.	**<u>Gate Valves</u>** Must use a resilient seat, non-rising stem (NRS), have a 2" square nut driver, be epoxy coated, have a pressure rating of 200 psi for 4-12" sizes and 150 psi for 16 and 20" sizes. Wedge must be cast iron and fully encapsulated in molded rubber, including guides. Stem nut to be bronze and rigidly enclosed in the wedge to maintain alignment. Stem material to be stainless steel (AISI420) or equivalent. Stem seats must be replaceable while the valve is under pressure. Bonnet bolts must not be exposed to the environment unless made of 316 stainless steel. Double discs must not exist in the valve. Must have a CCW opening with O-ring stem seals. Tapping valves must match the requirements above and be sized for use with a full-size shell cutter and be flanged with the alignment lip to fit the tapping sleeve. The outlet must be MJ with a flange for the attachment of the drilling machine and adapter.	4-72 in.	a. AWWA C509-01 or C515, C550-01	•Mueller Co. •Clow Valve
10.	**<u>Butterfly Valves</u>** Must use an elastomeric seat with a cast iron disc with a stainless-steel disc edge, use a gear actuator type, have a 2" square nut driver, MJ ends, and an epoxy coated interior. Valve actuators must be made by the butterfly valve manufacturer. Valve actuators must use a traveling nut type and withstand a minimum of 300 ft. lbs. torque at the	14-72 in.	a. AWWA C504-00, C550-01	•Mueller Co.: Lineseal III, Class 150. •Clow Valve Co.: Groundhog Valve

	full open or full closed position. Valve actuators must be fully gasketed and sealed, capable of withstanding 10 psi submergence without leaking, have a minimum of 16 turns from a fully open to fully closed position, and use a 2 in. AWWA nut.			
11.	**Air Release, Air/Vacuum and Combination Air Valves** Must have a cast iron body, cover, and baffle and a stainless-steel trim and float. Valves should be sized for up to 800 gpm.		a. AWWA C512-99	•APCO •Val-Matic
12.	**Control Valves, Pressure Actuating Valves, Pressure Sustaining Valves, Pressure Reducing Valves, Check Valves**	4-72 in.	a. AWWA: C510-97, C511-97, C512-99.	•Cla-Val or Approved Equal
13.	**Meter Setters w/ Check Valves** Must use a brass fitting and use a pack joint or Mueller Insta-Tite or conductive compression for PE tubing (PEX) by using a meter flange fitting for 1 ½"-2" or a meter swivel nut for ¾"-1".	¾-2 in.	a. AWWA: C900-01	•Mueller Co. •AY McDonald
14.	**Valve Boxes** Must be a two-piece, screw adjustable model with the word "DAMDWCA WATER" cast into the lid, have an extension range of 27-32" or as required, and be able to use a locking lid. Must have a minimum thickness of metal at any point of 3/16". Cast iron valve boxes must be factory painted inside and out with manufacturer's recommended asphalt paint.			•Tyler Pipe •Star Pipe Products •East Jordan Iron Works
15.	**Fire Hydrants** Must be a dry barrel, compression, traffic type hydrant and use a 1 ½" pentagon operating nut made of bronze. Must open CCW, with the openings being two 2 ½" nozzles and one 4 ½" nozzle with NST threads. Must have a 5 ¼" main valve opening and 6" inlet shoe, have a MJ connection for DI materials or C-900 PVC materials, have a ground line within 2" of a two-piece breakaway flange, and non-kinking nozzle cap chains. Must have two drain outlets above the lower flange of the hydrant shoe assembly. Centerline of hose nozzle must be 18" min. above ground line. Hydrant must have a 200-psi working		a. AWWA: C502-94, C111/A21.11-00, C110/A21.10-98, C151/A21.51-02, C550-01.	•Clow: Admiral •iHydrant

	pressure. Lower barrel to shoe connection must have a minimum of six bolts made of stainless steel. All hydrants must have a standard manufacturer 10-year warranty and include a manufacturer's wrench supplied with each hydrant installed. Must have an epoxy interior lining with the exterior painted red. All hydrants shall be complete with all accessories included and be lubricated before being put into service.			
16.	**Service Saddles** For C900 PVC, DI pipe, or Class pipe, sized 4"-12" for taps sized ¾"-2", saddles must be bronze with double stainless steel (304l) or bronze straps. All saddle taps must be threaded AWWA taper (cc) thread.	¾-2"	a. AWWA: C800-01	•Mueller Co.: DR2S, SS5 and SS7 Series •Smith Blair: Series 317 •Romac: 202N, 306 •JCM: 406
17.	**Tapping Saddles-Full Circle Type** Must be ductile iron with galvanized steel straps and rubber sealing gasket and mechanical joint type. Minimum pressure rating of 250 psi. Must have two end gaskets sets that allow to fit all classes of cast iron pipe or approved equal.			•Romac: SST •Smith Blair: 662, 663 •Mueller Co.: H304, H-615, H300 DI •JCM: 432, 462 •AY McDonald
18.	**Corporation Stops** Must be a brass plug type with a 100-psi pressure rating for ¾" and 1" sizes, 300 psi for 1 ½" and 2" inlet sizes, have an AWWA taper (CC) thread, have an outlet to PEX tubing, of ¾" and 1" by Mueller Insta-Tite, and have a 1 ½" and 2" by a compression connection.	¾-2"	a. AWWA C800-01	•Mueller Co.: B-25008, P-25008, B-25006, H-15013, P-15013, H-15008, P-15008, H-15006. •AY McDonald
19.	**Curb Stops** Must use a brass fitting, pack joint or Mueller Insta-Tite or conductive compression for PEX tubing on both ends	¾-2"	a. AWWA C800-01	•Mueller Co.: H-15209, P-15209, H-5215 •AY McDonald
20.	**Casing** Must be black, with plan ends and made of standard schedule steel pipe.		a. API Grade B b. ASTM A-53	
21.	**Casing End Seals** Must be complete with stainless steel adjustable band clamps.			•T.D. Williamson, Inc.: Z Seals •PWM: Wrap-Around End Seal
22.	**Casing Spacers (Insulators)** Must be injection molded high-density polyethylene		a. Manufacturer Instructions.	•T.D. Williamson, Inc.: M-2 Plastic Thinsolator

	material with a low friction coefficient and high dielectric strength.			•PWM: Raci Casing Spacers
23.	**<u>Tracing Wire (Open Trench)</u>** #12 AWG solid steel core soft drawn wire with 30-mil HMW-PE insulation, blue in color, 30-volt rating, 450# average tensile break load. **<u>Tracing Wire (Bored Installation)</u>** #12 AWG solid steel core soft drawn wire with 45-mil HMW-PE insulation, blue in color, 30-volt rating, 1,150# average tensile break load.		a. ASTM D-1248	•Paigespec •Kris-Tech Wire Co. •Coleman Cable •Copperhead Industries
24.	**<u>Direct Bury Splice Kits</u>** Must have a 50-volt rating.			•3M •DryConn
25.	**<u>Test Station</u>** Must be constructed out of non-conductive ABS plastic materials, have an inside diameter of 2 ½", have a 17" shaft length, have flared ends, and have a cast iron lid and collar. The terminal block must be constructed of reinforced polyester laminate with two wire terminals. Must have a blue locking lid with a pentagonal bolt cast into the center, allowing a quarter turn to open.			•Copperhead Industries – Snake Pit Roadway
26.	**<u>Warning Tape</u>** Must have a six-inch width with a permanent APWA water line blue pigment and bold, black letters one side at a minimum of 30" along the length. The words, "CAUTION WATER LINE BURIED BELOW." The tape material must be made of 100% virgin polyolefin or polyethylene resins which are chemically inert and will not degrade when exposed to acids, alkalis and other destructive substances commonly found in soil.		a. The Following are Given in Order of ASTM Method/Property/Value b. ASTM D2103-05/Thickness/4.0 mil. c. ASTM D2103/Weight/18.5 lbs. per 1000 ft.2 d. ASTM D882-02/3" Tensile Strength/34 lbs. and 2,800 psi. e. ASTM D882-75b/Elongation/800% f. ASTM D2582/ PPT Resistance/ 14 lbs. per foot. g. ASTM D2578/ Printability/ 45 dynes.	•Pro-Line Safety Products: Non-detectable underground utility marking tape, super stretch. •Reef Industries: Terra Tape, Standard

			h. Manufacturing Specifications/Message Repeat/Varies by Legend i. Manufacturing Specifications/ Printed Inks/ Flexo 9605.	

6 WATER CONSTRUCTION SPECIFICATIONS

6.1 GENERAL

The following section provides the minimum acceptable requirements and specifications for the installation of water utility infrastructure intended for connection to or operation with the DAMDWCA water distribution system. All materials must be new, of highest quality, and be in first class condition when installed unless specified within the Contract Documents or approved by the DAMDWCA Executive Director or designee. Materials that fall into a similar category such as pipe fittings and appurtenances must be of the same type and same manufacturer when used repeatedly in a project. The water system and appurtenances must be installed as shown on the Contract Documents.

The Contractor is responsible for all construction permitting required to perform the work presented in the Contract Documents. The Contractor must make all necessary explorations of the work site to determine the location of existing utilities, pipes, valves, or other underground structures. DAMDWCA or a designee will supply all available information, though this information cannot be guaranteed as accurate.

Existing utilities within the boundaries of a project shall be adjusted as required to conform to the final grades of a project. The entity responsible for construction of the proposed utilities is responsible for all expense associated with any adjustments to existing or proposed utilities.
Construction for water system infrastructure shall be done in accordance with applicable AWWA standards. All work shall be performed under applicable OSHA standards.

The Contractor is fully responsible with contacting and coordinating with DAMDWCA unless specified within the Contract Documents or approved by the DAMDWCA Executive Director or designee.

All materials that come into contact with drinking water or water treatment chemicals must conform to NSF/ANSI Standard 61 unless approved by the DAMDWCA Executive Director or designee.

6.2 RECEIVING, HANDLING, AND STORAGE

The Contractor is responsible for the receiving, handling, and storage of all elements of the proposed water system design as presented in the Contract Documents. This must be done in a way to ensure that the materials, at the time of installation, will be in a sound and undamaged condition as described in these utility development standards and to the acceptance of the Executive Director or designee.

All materials and the receiving, handling and storage of those materials are subject to Executive Director or designee inspection. The Contractor is responsible to receive, handle, store, and install all materials, and will not be relieved from this responsibility due to the lack of an Executive Director or designee, or from the lack of an inspection.

All materials must be kept free from damage. Pipe interiors and appurtenances must be kept free from debris, dirt, or other foreign matter. Pipe gaskets should be stored in a manner that does not expose the gaskets to direct sunlight or sources of heat. Gaskets that are factory installed must not be removed from pipe joints unless the gaskets are damaged or at risk of being damaged.

Pipe and appurtenances must be lifted with hoists with broad, well-padded contacted surfaces. Pipe may be rolled on skidways in a manner that will avoid shock to the piping. Pipe must never be dropped.

Pipe must not be rolled or skidded against another pipe already on the ground.

Should a pipe be expected to be stored outdoors and subjected to direct sunlight for a year or more proceeding delivery of the pipe materials, canvas or a similar opaque material must be used to cover the piping as per ANSI/AWWA Standard C605-94. Proper air circulation must also be able to access the pipe being stored. Should a pipe show signs of damage, such as the fading of color or chalking in PVC piping, then that pipe cannot be used.

Should any materials be unusable, whether it be from damage or conflicts with Contract Documents or approval from Executive Director (or designee), the materials must be removed from the site and replaced, as necessary.

Open pipe ends should always be plugged or suitably covered to the acceptance of the Executive Director or designee before installation. In addition, pipe interiors should be cleaned before installation and be kept clean.

6.3 PIPE INSTALLATION

6.3.1 GENERAL

Pipe must be installed as indicated in these utility development standards. All pipes must be laid and maintained at the required lines and grades, with fittings, valves, and hydrants at the required locations. Joints must be centered, with all valve and hydrant stems plumb. Mechanical or push on joints are to be used for exterior locations.

The Contractor must always protect structures adjacent to the Project site and surrounding areas during pipe installation, with work always and only taking place within available easements. The Contractor must temporarily support, protect, and maintain all underground surface utility structures, drains, sewers, and other obstructions encountered during the progress of work.

Wherever existing utility structures or branch connections leading to main sewers or to main drains, other conduits, ducts, pipes, or structures present an obstruction to the grade and alignment of the pipe, the existing features must be permanently supported, removed, relocated, or reconstructed by the Contractor. The Contractor must coordinate this work with the Owner of the utility, structure, or obstruction encountered.

Repair and/or replacement of existing water lines damaged during construction must have the material match existing or at least quality as listed in the water utility material specification list.

Pipe sleeves must be installed when pipes pass through concrete or masonry. Install the sleeves where practical before new concrete is installed. Sleeve seals should be watertight, with modular sealing elements when the sleeve is placed in a slab with one side against soil.

6.3.2 SUBMITTALS

Submittals must be provided to demonstrate compliance with these utility development standards. These submittals include, but are not limited to, the following:

1. Testing laboratory results on bedding materials to demonstrate compliance with Specifications.
2. Stabilization material, if required.
3. Imported bedding and backfill material, if required.
4. Dewatering procedures, if required.
5. Stabilization procedures, if required.
6. Baseline proctor density test results (five (5)-point moisture density curves).
7. Baseline testing location plan.
8. Soil Testing Lab Certification.
9. Product data for materials included in Section 4: Water Utility Material Specification List of these utility development standards.

6.3.3 INSPECTION

The Contractor must verify location and invert elevation of existing piping, underground utilities, and any obstructions before construction begins.

6.3.4 DEWATERING

The Contractor must provide and maintain adequate dewatering equipment to remove and dispose of surface and groundwater entering an excavation, trench, or other parts of work as applicable to prevent the pipe from floating. Costs associated with dewatering will be the sole responsibility of the Contractor.

The Contractor must protect excavation during subgrade preparation and continually thereafter, until the structure to be built or the pipe to be installed is completed, to the extent that no damage from hydrostatic pressure, floatation or other cause will result.

The Contractor must dewater excavations extending to or below groundwater by lowering and keeping the groundwater level at least twelve (12) inches below the bottom of the excavation.

The Contractor is responsible for the condition of any pipe or conduit used for drainage, and all drainage pipes, ditches, etc. must be left clean and free of sediment at the completion of dewatering.

6.3.5 SHORING AND SHEETING SYSTEMS

The protection of employees in excavations must conform to applicable OSHA Standards. Any trench protection and modification to trenching safety plans must be submitted to the Executive Director or designee in writing to be maintained as part of the record.

The Contractor must install all shoring and sheeting systems required to prevent cave-ins and protect his employees and adjacent property and structures in accordance with current OSHA standards. No extra payment will be made for these items, the cost thereof being merged with and considered a part of the cost for the related excavation.

Before sheeting is withdrawn, or trench boxes moved forward, they shall be raised, in place, just above the pipe crown to safely allow the Contractor to completely fill any voids left in the pipe zone.

6.3.6 STABILIZATION

The Contractor must thoroughly compact and consolidate trench bottoms, so they remain firm, dense,

and intact during required construction activities. The Contractor must remove all mud during excavation to attain a firm trench bottom. The Contractor must reinforce trench bottoms with crushed rock or gravel for twenty-four (24) inches below the embedment layer if it is oversaturated with groundwater during construction activities. Where trench bottoms out in rock, rock is to be removed to eight (8) inches below the bottom of pipe and replaced with bedding material.

Granular stabilization material shall be used to replace soft, spongy, or other unsuitable material, including rock encountered in excavation, to the depths necessary to support the pipe or structure. Stabilization materials shall be underlying bedding material (as applicable) and shall consist of suitable hard, durable granular material having a maximum size of 6-inches, graded so that a maximum of 20% passes a No. 4 sieve. Granular stabilization is not anticipated. If required, a price for granular stabilization shall be negotiated between the Contractor and
the Owner.

6.3.7 TRENCH EXCAVATION

All trenching operations must follow applicable OSHA regulations. The Contractor shall be responsible for safety on the job site and must designate a trained "competent person" knowledgeable in trench safety to supervise the work.

Trenching over five (5) feet deep must have shoring or be benched back before entry. Do not open more trench in advance of pipe being laid than is necessary to expedite the work (not to exceed six hundred (600) feet). Except when jacking and boring is indicated on the Drawings or specified in the Contract Documents, all trench excavations must be by open cut from the surface. All trenches must be completely backfilled at the end of each working day, unless otherwise approved by the DAMDWCA Executive Director or designee. No excavation may be left open without the use of proper barricades and warning lights conforming to the Manual of Uniform Traffic Control Devices (ANSI D6.1) or applicable permit regulations.

Excavations made for trenches must be at least four (4) inches below the pipe barrel to account for the installation of bedding materials. If a trench foundation shows signs of yielding, the Contractor must over excavate the trench and use stabilization methods to prevent foundation yielding from occurring. Geotextile material or other approved embedment material must be used to prevent soil migration in the pipe zone following approval of the Executive Director or designee. Bedding materials must also meet the criteria described in Section 5.3.8: Trench Backfilling and Section 5.3.9: Backfill and Bedding Materials in these utility development standards.

6.3.7.1 ALIGNMENT, GRADE, AND MINIMUM COVER

The Contractor must:

1. Establish alignment and grade or elevation from offset stakes
2. Excavate trenches so pipes can be laid straight at uniform grade, without dips or bumps, between the terminal elevation indicated on the Contract Documents.
3. Comply with pipe specification sections regarding vertical and horizontal alignment and max joint deflection.
4. Provide water lines to have minimum depth of cover and bury as shown on the Contract Documents. The minimum depth of cover, if not listed on the plans, is three (3) feet six (6)

inches as measured from the established road grade or the surface of the permanent improvement to the top barrel of the pipe.

In general, grade shall follow surface contours unless otherwise shown on the Contract Documents.

6.3.7.2 LIMITING TRENCH WIDTHS

The Contractor must:

1. Excavate to a width able to provide adequate working space and pipe clearances for proper pipe installation, jointing and embedment.
2. If needed to reduce earth loads to prevent sloughing, cut banks back on slopes extending not lower than one (1) foot above the top of the pipe.
3. Comply with minimum trench widths and minimum clearances between installed pipe and trench wall:
   H. Minimum pipe size eighteen (18) inches or less:
   I. Minimum trench width: O.D. plus sixteen (16) inches.
   J. Minimum clearance: eight (8) inches.
   K. Minimum pipe size larger than eighteen (18) inches:
   L. Minimum trench width: O.D. plus twenty-four (24) inches.
   M. Minimum clearance: twelve (12) inches.

6.3.7.3 MECHANICAL EXCAVATIONS

The Contractor must:

1. Not use mechanical excavations where its operation would damage trees, buildings, culverts or other existing property, structures, or utilities above or below ground. Instead, hand excavation should be used in these areas.
2. The use of mechanical equipment of a type, design, and construction, must be operated so that:
3. Rough trench bottom elevation can be controlled.
   A. Uniform trench widths and vertical sidewalls are obtained from one (1) foot above the top of the installed pipe to the bottom of the trench.
   B. Trench alignment is such that pipe is accurately laid to specified alignment and is centered in the trench with adequate clearance between pipe and trench sidewalls.
   C. Not undercut trench sidewalls.

6.3.7.4 CUTS IN SURFACE CONSTRUCTION

The Contractor must:

1. Make surface cuts no larger than necessary to provide adequate working space.
2. Cut a clean groove not less than one and one-half (1½) inches deep along each side of trench or around perimeter of excavation area.
3. Remove pavement and base course to provide shoulder not less than six (6) inches wide between cut edge and top edge of trench.
4. Do not undercut trenches in a way that will result in the bottom trench width being wider than the top trench width.
5. Make pavement cuts to and between straight or accurately marked curved lines parallel to trench centerline or limits of excavation.

6. Where the trench crosses driveways or other surface construction, remove and replace the surface construction between saw cuts as specified for pavement.

6.3.7.5 EXCAVATION BELOW PIPE

The Contractor must:

1. Except as otherwise required, excavate trenches below the underside of pipes to provide for installation of the pipe bedding.
2. Where in earth:
   A. Trench bottoms for six (6) inches and smaller pipe may be excavated below pipe subgrade and granular embedment must be provided.
   B. Trench may be graded to provide uniform and continuous support (between bell boles or end joints) of the installed pipe.

6.3.7.6 BELL HOLES

The Contractor must:

1. Excavate to provide adequate clearance for tools and methods of pipe installation.
2. Do not allow any part of bells or couplings to contact the trench bottom, walls, or granular embedment when pipe is joined.
3. Provide bell holes at each joint to allow the joint to be assembled and the pipe supported uniformly for the entire length of the pipe.

6.3.8 TRENCH BACKFILLING

Backfill must not be installed during freezing weather conditions, unless approved by the Executive Director or designee. Frozen materials must not exist within any backfill or fill being installed. Backfill or fill based work must not occur on frozen surfaces.

Trenches shall not be backfilled until the Engineer or Owner's Representative has inspected and approved the pipe installation and jointing as being in compliance with the requirements of these utility development standards.

Bedding and initial backfill materials to a depth of 12-inches above the pipe shall be carefully deposited in layers not more than 6-inches thick, loose measurements, wetted to optimum moisture content and hand or mechanically compacted to, at minimum, 95% of the reference density for this material as described in Section 5.3.10: Compaction Requirements, Methods, Testing and Field Quality Control of these utility development standards. From 12 inches above the pipe to ground surface, the excavated material shall be placed in layers not to exceed 12-inches, thick loose prior to compaction.

Wherever trenches have not been properly filled, or if settlement occurs, they shall be reopened to the depth required for proper compaction and refilled and re-compacted as specified above and approved by the DAMDWCA Executive Director or designee.

Compaction methods and equipment may utilize hand and mechanical tampers and rollers. The equipment and procedures proposed by the Contractor shall be subject to the approval of the DAMDWCA Executive Director or designee.

In general, backfill will be that material originally excavated from the trench that meets the proper

classifications, and will extend from 12 inches above the pipe to surface grade. Final backfill material shall be the same as that within the pipe embedment area except that the inclusion of a limited number of stones up to 6-inches in diameter will be permitted upon approval by the DAMDWCA Executive Director or designee.

Embedment materials, which consists of the bedding, haunch, and initial backfill material, shall be placed in 6-inch loose lifts and compacted as described herein. If over-excavation is required, bedding material is to be compacted to 95% of the maximum dry density as determined by the Modified Proctor density test (ASTM D-1557). Haunching material shall be placed by hand and worked under the pipe haunch to provide adequate side support for the pipe and eliminate voids. Haunching and initial backfill material shall be compacted to 85% of the maximum dry density as determined by the Modified Proctor density test (ASTM D-1557).

Final backfill shall not be placed until the pipe embedment material is placed and compacted, and the Engineer or Owner's Representative have inspected and approved the installation. Final backfill shall be placed in loose lifts not to exceed 10-inches unless otherwise approved by the Engineer or Owner's Representative.

Under existing and proposed roadways, to 10-feet on either side of the road, bedding and backfill materials shall be carefully deposited in layers not more than 6-inches thick, loose measurements, wetted to optimum moisture content and mechanically compacted as described in Section 5.3.10: Compaction Requirements, Methods, and Testing.

In areas where pavement is to be replaced, or in roads that are to be paved, no rocks or stones that will interfere with subgrade preparation shall be included in the backfill within 12-inches of the finished subgrade elevation. The upper 12-inch layer, forming the subgrade for pavements, shall be compacted to a density of at least 95% (ASTM D-1557 - Modified Proctor Test).

Cement slurry can be substituted for compacted native backfill and subgrade if approved by Engineer or Owner's Representative. The cement slurry shall consist of one sack of cement to one cubic yard of concrete sand and shall be placed from the concrete truck at a slump of six (6) to eight (8) inches. Steel plates five-eights (5/8) inches thick are to be placed over the trench with at least six (6) inches overlap on each side and edged with asphalt.

6.3.9 BACKFILL AND BEDDING MATERIALS

All backfill material shall be approved in advance of installation by the Engineer or Owner's Representative. Materials shall be obtained from areas approved by the Engineer or Owner's Representative. Backfill material will not be paid for separately but shall be considered as subsidiary to and a part of the cost for the applicable contract bid item.
Embedment materials, being the material from the bottom of the trench to the top twelve (12) inches above the pipe, includes the pipe bedding material (upon which pipe is laid), haunching material (extending from the pipe bottom to the pipe centerline), and initial backfill material (extending from the pipe centerline to twelve (12) inches above the pipe). Native soil used for embedment must be free from clods of earth or stones larger than one (1) inch in any dimension, organic refuse, debris, frozen soil, and other objectionable material. If the native soil does not meet these criteria, the Contractor shall screen the material as applicable or import special bedding material.
The following material list provides criteria for bedding and embedment materials:

1. Bedding Materials:
   A. Bedding materials are those materials located a maximum of 8" below bottom of pipe to the bottom of pipe, depending on bedding class or condition required.
   B. Native material meeting ASTM D2321, Class I, II and III, granular non-cohesive
   C. soils are acceptable as bedding material.
   D. In no case shall initial backfill material contain particles with any dimension greater than 1.25."
   E. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.
   F. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

2. Haunch Materials:
   A. Haunch materials are those materials located from the bottom of pipe to the spring line of pipe.
   B. Native material meeting ASTM D2321, Class I, II and III, granular non-cohesive soils are acceptable for use as haunch material.
   C. In no case shall haunch material contain particles with any dimension greater than ¾."
   D. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.
   E. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

3. Initial Backfill Materials:
   A. Initial backfill material is that material placed above the bedding and haunch material, from the spring line around and over the pipe to 12" above the top of the pipe.
   B. Native material meeting ASTM D2321, Class I, II and III, granular non-cohesive soils are acceptable for use as initial backfill material.
   C. In no case shall initial backfill material contain particles with any dimension greater than ¾."
   D. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.
   E. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

4. Final Backfill Materials:
   A. Final backfill materials are those materials placed in the trench between the initial backfill material and the top of the trench.
   B. Native material meeting ASTM D2321, Class I, II and III, IV or V are acceptable for use as final backfill material, except for areas beneath paved surfaces requiring engineered fill.
   C. In no case shall final backfill material contain rocks with any dimension greater than 6".
   D. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.
   E. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

5. Materials Not Allowed:
   A. All pipe bedding and backfill material shall be clean and free of any contaminants that could endanger public health such as petroleum, oil, or waste contaminated material.
   B. Mine tailings shall not be used for pipe bedding or backfill material.

6. Imported Special Backfill Material: If required, special bedding and backfill material shall consist of sand, sandy gravel, or other suitable granular material having a maximum plasticity index of 6, with 100% of the bedding material smaller than 3/4-inches, and no more than 5% passing a No. 200 sieve.

6.3.10 COMPACTION REQUIREMENTS, METHODS, TESTING, AND FIELD QUALITY CONTROL

Unless otherwise superseded by applicable right-of-way permits, initial and final backfill and gravel surfacing shall be compacted to the following minimum requirements. The minimum acceptable percent of compaction is the in place dry density divided by the reference density multiplied by one hundred (100). Compacted soil must also be at plus or minus two (2) percent of the optimum moisture content.

1. Under any existing or proposed pavement, curb and gutter, sidewalk, roadway, shoulder, alley, slab, footing, canal embankment, or when within two (2) feet of above.
   A. Compact to 95% ASTM D-1557.
2. Within any gas, electric, or telephone utility easement, or within any street or road right-of-way outside the limits defined in item 5.3.10.A above.
   A. Compact to 90% ASTM D-1557.
3. All other locations not defined not defined in items 5.3.10.A or 5.3.10.B above.
   A. Compact to 85% or 100% of adjacent natural ground ASTM D-1557.

The Contractor, at their expense, must provide densities for the various bedding and backfill materials used. All tests must be performed by a certified soil testing laboratory approved by the Engineer, the DAMDWCA Executive Director or designee. If reference to natural ground is used, a nuclear gauge may be used to measure the density of the natural ground. The Contractor must submit for approval a testing plan which identified proposed testing locations prior to the start of any excavation work. The Contractor must provide copies of the Modified Proctor Tests with five (5) point minimum moisture vs. density curves.

The Contractor must coordinate the collection of soil samples for proctor testing with the DAMDWCA Executive Director or designee so that a DAMDWCA representative is on-site when the soil samples are collected.

Mechanical compaction methods are permitted, but water jetting methods are not permitted. The backfill must be uniformly moistened to plus or minus two (2) percent of the optimum moisture content, placed in sufficiently thin layers to obtain the specified results, and compacted with hand and/or pneumatic tamp, roller, hydro hammer, or other device which will obtain the specified density without injury to the pipe or related structures.

Backfill density testing must be performed in accordance with the latest versions of ASTM D-1556 (Sand Cone Method), ASTM D-2167 (Rubber Balloon Method), ASTM D-2216 (Moisture Content), ASTM D-2922 (Nuclear Density), and ASTM D-3017 (Nuclear Moisture Content). The Contractor must perform initial field density tests for each location as specified within this section at the expense of the Contractor.

The Contractor must perform at least one (1) compaction test every lift at each of the locations described in Section 5.3.10.A above in increments of two hundred fifty (250) linear feet. One

compaction test must be performed every lift on each five hundred (500) linear feet of trench at locations described in Section 5.3.10.B or 5.2.10.C above. Exact test locations must be specified by the DAMDWCA Executive Director or designee. DAMDWCA may perform additional tests at their own discretion.

Should the results of any compaction tests indicate insufficient compaction, the area in question must be reopened to a depth required for proper compacting, refilled, compacted, and tested again at the expense of the contractor until a successful result is achieved. Two copies of the test results of any retesting performed by the Contractor must be provided to the DAMDWCA Executive Director or designee, for approval prior to any permanent surfacing.

Improperly placed backfill, or locations where settlement has occurred, must be reponed to the depth required for proper compaction, refilled, and then compacted at the expense of the Contractor. The surface must be restored and resurfaced if necessary to accomplish any required grades.

6.3.11 INSTALLATION

Should a pipe have the grade or joint disturbed after that pipe is installed, the pipe must be removed and reinstalled. During reinstallation, all open ends of pipes must continue to have a valve, plug, or similar cap installed to prevent the interior of the pipe from being filled with debris.

Pipes must be cut in a neat and clean manner without damage to the pipe. Pipe cutting measurement must be taken at the site.

PVC pipe may be field cut with circular saws or similar equipment. Field cutting must be done to give a smooth end at a right angle to the longitudinal axis of the pipe. Spigot ends must be deburred and beveled to provide a smooth texture to the pipe end and re-marked with the insertion line. The factory bevels should be matched by the length and angle of the field bevels.

DI pipe may be field cut with rotary wheel cutters, pipe saws, or similar equipment so long as it conforms to the pipe manufacturer's specifications. The cut ends and any rough edges must be ground to a smooth finish. Push on joints must have the cut end beveled, so long as it conforms to the pipe manufacturer's specifications.

The pipe spigot end's sealing surface, as well as fittings, pipe bells, and any elastomeric gaskets, must all be cleaned immediately before being assembled. Any factory installed gaskets must not be removed to be cleaned. All lumps, blisters, burrs, or excess coating must be removed from the socket and plain ends of each pipe. Pipe joints must be free of any debris such as dirt, sand, grease, or other foreign material. Lubricants that conform to the pipe manufacturer's specifications may be applied as outlined in those specifications during assembly or be a vegetable soap solution suitable for use on potable water systems. Only manufacturer provided gaskets for the respective pipe may be used.

When distributing pipe materials at the work site, each piece of pipe must be unloaded opposite or near the final location where the pipe will be laid into the trench. Pipe must be installed in such a manner that only a minimum amount of damage to the pipe exterior can occur. Any damaged piping must be repaired or replaced with approval from the Executive Director or designee.

The direction of bells, unless otherwise directed, must be laid with the bell ends facing the direction in

which the work is progressing and lettering on pipe face up. Pipe laid on an appreciable slope must be laid with bell ends facing uphill. The procedure for installing push on joints must be by inserting the spigot end into the bell end of the pipe in a manner that will not allow for the entrance of soil or other contaminants. The pipe must be kept straight while pushing the joint in until the installation is completed. Should a deflection in the pipe be needed as required by the Contract Documents, it must be done after the assembly of the joint. Timber headers must be used against the pipe when the pushing action is done by mechanical equipment. The Contractor must visually inspect all assembled joints when completed, and additional inspections by using a feeler gauge or similar methods may be required by the Executive Director or designee.

6.3.12 THRUST RESTRAINTS AND THRUST BLOCKING

Thrust blocking, anchors, joint harnesses, or other acceptable means of pipe movement prevention must be used for un-lugged bell and spigot ends, all un-flanged tees, Y branches, bends deflecting twenty-two and a half (22 ½) degrees or more, plugs and caps, fittings in fills or unstable grounds, and if located above grade or in an exposed structure. The installation of these pipe movement prevention must be done whether indicated in the Contract Documents or not.

MJ used on PVC must conform to the manufacturer of the fitting's specifications. The spigot ends of the pipe may require shortening to be used with MJ or fitting joints.

At each dead end, bend, valve, tee, unrestrained hydrant, unrestrained reducers, or fittings, and in changes in pipe diameters or direction, thrust restraints must be provided.

The socket and plain ends of MJ on DI pipe must be cleaned. The gasket and plain end should also be lubricated by brushing the two components with soapy water or an approved pipe lubricant as per AWWA C111/A21.11, immediately before the gasket is installed on the plain end. The gland and gasket must then be installed on the plain end. The pipe can then be inserted into the socket so that the socket is firm and even around the circumference, with the joint held straight during the assembly. The gland and socket components must then be assembled before inserting the joint manufacturer approved bolts and nuts. The bolts and nuts must then be hand tightened. Should any deflection in the pipes be required, they must be done after the joint assembly is done and before the bolts are tightened. The bolts must then be tightened to the normal torque range as per AWWA C600-10 and the manufacturer's specification. The gland and the face of the flange must have the same distance between the two at all points around the socket. The joint can then be tightened by alternately tightening the bolts on opposing sides until all bolts meet the required torque range.

Should a PVC or DI joint restraint be used, it must be installed per the manufacturer's recommendations and specifications.

Concrete thrust blocking may only be used when the Project site conditions do not allow the use of MJ fittings unless shown on the Contract Documents. The DAMDWCA Executive Director or designee must approve the use of concrete thrust blocking before it may be installed. The concrete thrust blocking must be located in such a way as to not come into contact with any bolts or nuts on the piping system necessary to be accessed for repair. If blocking is not practical or optional to the Contractor, metal harness anchorages across the joint must be installed. The Contractor must provide joint restraint computations for metal harnesses for continuous use.

6.3.13 DEFLECTIONS

Should the Contract Documents require the curvature of PVC pipelines, longitudinal bending may be used. The Contractor must use block or brace pipe joints to make sure that the PVC pressure pipe's bending does not result in a deflection of the gasketed or MJ that would exceed the manufacturer's published limits. This longitudinal bending in the PVC pipe must not result in a bending radius less than the limits set in AWWA C605-13 or the latest applicable edition of those standards.

Any bending of PVC pipe larger than twelve (12) inches (nominal diameter) must be first approved by the DAMDWCA Executive Director and must conform to the values set by the pipe manufacturer's axial-join-deflection limits. Table 1: Minimum Bending Radius in PVC Piping of these utility development standards gives values for the minimum PVC deflections.

Should the Contract Documents require deflection at the joints of DI pipe, the amount of joint deflection must not exceed values given in AWWA C600-10 or the latest edition. The design of the deflected alignment must be limited to 80 percent of the values given in Table 2: Design Values for DI Curved Alignments.

6.3.14 FITTINGS AND VALVES

Installation of valves, fittings, or closure pieces must be performed in a neat and clean manner without damage to the pipe. Fittings must be provided and installed as indicated within the Contract Documents and these utility development standards. Thrust restraints must be provided for fittings and valves as indicated within these utility development standards.

Valves must be placed with the operating stems in a vertical orientation, except for butterfly valve operating stems, which may be installed in a horizontal orientation. The full weight of the valves must not be supported by the pipe alone. Thrust blocks or restraints, or a combination of the two, must be provided for valves as described within these utility development standards.

The concrete collars used around valves must be eight (8) inches thick, have poured four thousand (4,000) psi concrete with two (2) number three (#3) rebar rings within the concrete installed around the valve "tops" that are flush with the existing grade or pavement. Concrete collars to be stamped with pipe size, flow direction with an arrow (if applicable), and a 'D' for distribution piping or 'T' for transmission piping. The Executive Director or designee shall determine pipe classification. A 72-hour curing time is required prior to traffic loading, unless approved for otherwise by the DAMDWCA Executive Director or designee.

6.3.15 SADDLE TAPPING

The saddle tapping of water mains must be performed as described in AWWA Manual M23 and UNI-BELL and UNI-PUB-8. Corporation stops must not be directly tapped into the water mains. Handheld drills, auger bits, or twist drill may be used to tap into PVC or DI pipe. Tapping machines which retain the cut coupon must be used in tapping machines. The taps themselves must be made at nine (9) and three (3) o'clock around the circumference of the main. Two (2) spiral wraps of three (3) mil PTFE (Teflon) tape or pipe joint compound with PTF must be applied clockwise to the inlet threads on the closed corporation stop. A two (2) inch maximum outlet size is to be used for a corporation stop or service saddle. Verify the dimension of the outlet fitting and insert stiffener to match the PEX tube material standard. Should a larger tap be needed, a tapping sleeve and valve, or other approved

applicable fitting, must be used. The rotation of the saddle must be as shown on the Drawings.

6.3.16 SERVICE LINES

The water service lines, meter, meter box, and the piping must be located perpendicular to the street centerline. The service lines must be snaked in a trench, ensuring no bends exist in the service line twenty-four (24) inches from the corporation stop at the main line.

All water service lines must be installed per plan and in accordance with the Association's Utility Standards. The length of the PEX tubing must be extended to allow for horizontal and vertical deflections. The deflections must not exceed the minimum bend radius per manufacture's recommendations.

Both ends of the PEX tubing must be supported in place and restrained from any movement. No jointing of PE tubing will be accepted. Compaction around the corp. stop must be a minimum of 90% ASTM D-1557.

6.4 PRODUCTION WELLS

Water production wells shall be constructed in accordance with these utility development standards, applicable NMED Standards, applicable AWWA Standards, and the DAMDWCA Standard Drawings. All design shall be done under the direction of the Executive Director or designee.

6.5 WATER STORAGE FACILITIES

Water storage facilities shall be constructed in accordance with these utility development standards, applicable NMED Standards, applicable AWWA Standards, and the DAMDWCA Standard Drawings. All design shall be done under the direction of the Executive Director or designee.

6.6 PUMPING STATIONS

Water pumping facilities and booster stations shall be constructed in accordance with these utility development standards, applicable NMED Standards, applicable AWWA Standards, and the DAMDWCA Standard Drawings. All design shall be done under the direction of the Executive Director or designee.

6.7 PRESSURE REDUCING STATIONS

Pressure Reducing Stations shall be constructed in accordance with these utility development standards, applicable AWWA Standards, and the DAMDWCA Standard Drawings. All design shall be done under the direction of the Executive Director or designee.

6.8 WARNING TAPE AND TRACING WIRE

During the installation of backfill, all PVC and DI water mains, service lines, and any system appurtenances must have a six (6) inch wide warning tape installed continuously above them, with the tape installed fifteen (15) inches below the final grade. At tape ends, tees, and similar locations, the warning tape must be tied or spliced together with a knot to create a continuous warning tape system throughout the length of the water line system. Taping materials must conform to the water material specifications list given in these utility development standards. In addition to that material, the tape

must have a permanent APWA water line blue pigment at a maximum of thirty (30) inches along the length of the tape. As stated in the water material specifications of these utility development standards, the tape must have an imprinted continuous warning message stating: “CAUTION WATER LINE BURIED BELOW.”

Copper tracing wire must be installed in addition to the installation of warning tape with all installed water mains, including individual hydrants. Black duct tape shall be used to attach the tracing wire on top of the pipe at ten (10) foot centers along the total length of the pipe.

As stated in the water material specifications of these utility development standards, the tracing wire must be twelve (12) AWG with solid core and copper wire. The wire’s insulating coating or jacket must be blue in color with forty-five (45) mils of polyethylene insulation thickness of high molecular weight. The tracing wire must be HMW-PE and have a UL 600V rating for construction. The wire must also be usable in wet or dry applications. The wire gauge itself must be continuously attached along the entire length of all tracing wire coating and be able to be easily read.

Should a splice be required, or if a three (3) way splice is necessary, the wires must be joined together with a blue wire nut of suitable size placed inside a direct bury splice kit of suitable size. Bare wires must not be exposed anywhere, and all wires must be spliced to all other wires for a continuous tracing wire system.

All hydrants must have the tracing wire run up and around the hydrant by using a tee splice. The end of the wire must not be bare and have the coating jacket intact. The DAMDWCA Executive Director or designee will direct the location and frequency of test boxes. Testing boxes connected into the tracing wire systems will be required where hydrants are not used or where hydrant spacing is more than the minimum 500-foot requirement set within these utility development standards.

The tracing wire must not have any electrical connections to any metal pipes or metal service lines, and the tracing wire must not be damaged during its installation. Tracing wire must be tested for a continuous signal and shorts to ground across the entirety of the main and service lines before any asphalt or subgrade preparation may be installed or placed. The tracing wire must be able to conduct a continuous signal before piping will be accepted.

6.9 HYDRANTS

Hydrants must be installed as per these utility development standards and AWWA Manual M17. Hydrants must be installed with concrete blocking as per DAMDWCA Standard Drawing W-10 and the Contract Drawings. For all new construction, an iHydrant must be installed for every seven (7) standard fire hydrants installed. If less than 7 fire hydrants are to be installed one of them must be an iHydrant.

6.10 BACKFLOW PREVENTION ASSEMBLIES

Backflow prevention assemblies shall be constructed in accordance with these utility development standards, applicable NMED Standards, applicable AWWA Standards, and DAMDWCA Standard Drawing W-14A, W-14B, and W-15. All design shall be done under the direction of the Executive Director or designee.

6.11 INSPECTION AND TESTING

Hydrostatic tests must be performed by the Contractor on all water mains, laterals, dead ends, service lines and appurtenances as described in AWWA C600-10 for DI lines and AWWA C605-13 for PVC lines. These tests must be conducted while the Executive Director or designee is present.

Tests must be conducted while being disconnected to the existing DAMDWCA water system, unless otherwise approved by the DAMDWCA Executive Director or designee. Should the DAMDWCA Executive Director or designee approve testing while connected to the DAMDWCA existing water system, the Contractor will assume all responsibility should damage or failure to and of the existing water system occur.

Any taps, gauges, or necessary equipment needed to conduct the tests must be provided by the Contractor. A digital pressure gauge must be used for the testing. This equipment must be approved by the Executive Director or designee before being used for testing. Testing must only be conducted after the water line has been filled, flushed, and evacuated of all air. The Executive Director or designee must approve of the pumping assembly and pipe connection needed to apply the specified test pressure. The test pressure may also be maintained, if necessary, by additional pumping for the specified time needed to examine the system, exposed pipe, fittings, valves, and hydrants for leaks.
The hydrostatic pressure and leakage testing procedure are as follows:

1. Disconnect fixtures, equipment and accessories that may be damaged by pressure testing.
2. Plug any ends as required.
3. Water lines must be filled slowly with potable water using a pump connected to pipe in a satisfactory manner while air in the line is vented. Precautions must be taken so that air does not become trapped inside the lines. The lines must be flushed at blow offs and dead ends at a high velocity once they are filled.
4. All visible leaks must be repaired or corrected. Any elements that are defective must be repaired or removed and replaced. The test may be repeated until the minimum allowable leakage requirements have been met.
5. Retest repaired joints, pipes and fittings until the system is tight and the test results are satisfactory to the Engineer.
6. Flush water from the tested line at the conclusion of testing. Flushing water must be done in a manner that will not cause erosion damage, nuisances, or traffic interruptions. Flushed water should be disposed as indicated in the Contract Documents or as directed by the Executive Director or designee.

Any leaks in the connections to the existing system, leaks in the existing water lines, or leaks in any existing valves while subjected to the testing pressure will invalidate the test.

6.11.1 TEST DURATION

The pressure test must be performed at one hundred fifty (150) psi. The duration of the pressure test is one (1) hour for every one thousand (1,000) linear feet of pipe, or at a minimum for 2 hours.

6.11.2 LEAKAGE REQUIREMENTS

The testing allowance is hereby defined as the quantity of makeup water that must be supplied into the newly installed piping or valve sections within that piping needed to maintain one hundred and fifty (150) psi. This makeup water quantity is to be measured after air has been evacuated from the lines and

the pipe has been filled with water. The testing allowance must not be measured by a drop-in pressure gauge within a test section over a length of time.

The testing allowance is hereby defined as the quantity of makeup water that must be supplied into the newly installed piping, or any valve section within that piping, to maintain the pressure at +/- five (5) psi of the specified tests pressure, after air has been evacuated from the lines and the pipe is filled with water. The testing allowance is not measured by a drop-in pressure within a test section over a length of time.

Installation of pipe will not be accepted if the makeup quantity of water is greater than that determined in the following formulae:

$$L = \frac{N * D * \sqrt{P}}{3{,}700}$$

Where:

L=Allowable Leakage, in gallons per hour.
N= Number of joints in the length of pipeline tested.
D=Nominal diameter of pipe, in inches.
P=Average test pressure during hydrostatic test, in psi (gauge pressure).

6.12 DISINFECTION

The Contractor must disinfect all new potable water mains and their appurtenances, as well as any portions of the existing water system that have had repairs or reconfigurations performed on them as part of the Contract Documents. The Contractor must provide personnel, equipment and supplies necessary for the disinfection of water mains. The procedures used for disinfection must be as per described in AWWA C651-99 or applicable revisions and AWWA Manual M12. Contractor to submit a disinfection plan to the Executive Director or designee. The Executive Director or designee must be present during the disinfection and testing.

6.12.1 SUBMITTALS

The Contractor shall submit a Disinfection Program that complies with all standards mentioned herein to be approved by the Executive Director or designee. This Disinfection Program shall include the following information:

1. Compliance with Standards, i.e., AWWA C651.
2. All Cleaning Equipment to be used.
3. Type and form of disinfectant to be used.
4. Method of chlorination.
5. Method of dichlorination (as required), equipment used.
6. Flushing method and locations, drainage facilities if applicable.
7. Testing laboratory to be used.

The Contractor shall also submit two copies of test reports that complies with all standards mentioned herein to be approved by the Executive Director or designee. These tests reports should be as follows:

1. Disinfection Report, including:
   A. Date issued, project name and location.
   B. Treatment Contractor's name, address, and phone number.
   C. Type and form of disinfectant used.
   D. Time and date of disinfectant injection start.
   E. Time and date of disinfectant injection completion.
   F. Test locations.
   G. Initial and twenty-four (24) hour disinfectant residuals in ppm for each outlet tested.
   H. Time and date of flushing start.
   I. Time and date of flushing completion.
   J. Disinfectant residual after flushing in ppm for each outlet tested.
2. Bacteriological report, including:
   A. Date issued.
   B. Project name and location.
   C. Laboratory's name, certification number, address, and phone number.
   D. Time and date of water sample collection.
   E. Name of person collecting samples.
   F. Test Location.
   G. Time and date of laboratory test start.
   H. Coliform bacteria test results for each outlet tested.
   I. Certification that water conforms or fails to conform to bacterial standards of the Federal Safe Drinking Water Act.
   J. Bacteriologist's signature.
3. Notarized affidavit submitted by Contractor confirming that the disinfection procedure was completed and conforms to applicable AWWA standards.
4. Contractor to present sampling plan to engineer and NMED Drinking Water Bureau for approval, at a minimum of 30 days in advance of disinfection activities. This sampling plan must be displayed upon construction plan set project overview.

6.12.2 PROJECT DELIVERY, STORAGE AND HANDLING

Materials delivered to the project for use in disinfection testing must be protected against damage and contamination. Caution labels must be maintained on hazardous materials. Samples must be maintained in a dry storage room with temperatures of uniform as possible between sixty (60) degrees F (15.6°C) and eighty (80) degrees F (26.7°C).

6.12.3 MATERIALS

Disinfectant materials must conform to ANSI/AWWA B301. Sodium hypochlorite must be in liquid form (5-15% available chlorine). Calcium hypochlorite must be in a granular tablet form. Do not use calcium hypochlorite intended for swimming pool disinfection.

6.12.4 EXECUTION

The sanitary conditions of the water main are contingent on the sanitary handling of materials, the practices during construction, and continual inspections of the work being performed.

The Contractor shall verify that the water system is completed and thoroughly cleaned to the conditions which are satisfactory to the Executive Director or designee. The Contractor shall insure that the

existing system is isolated from the portion that is to be disinfected to ensure disinfection solutions do not enter the actively operating system.

All pipe network fittings and tools to be in water or fitting interior contact, which are to be used for direct existing system connections shall be swabbed or bathed in a 1% hypochlorite solution immediately prior to construction. All temporary pipeline connections to the active distribution system shall be through an approved reduced pressure zone backflow preventer. See AWWA C651 Figure 1 for reference.

6.12.4.1 WATER MAINS

Water mains must be disinfected as described in AWWA C651 Section 4.4: "Methods of Chlorination." There are three methods of disinfection that the Contractor may utilize.: the chlorination tablet/granule method, the continuous feed method, and the slug method. These three different methods are described in more detail below.

Should small installations be constructed without the extensions of mains, as in the case of main line taps alone, then the trench and equipment must be chlorinated along with any materials such as tapping valves and fittings. AWWA C651-99 describes this in further detail.

6.12.4.1.1 TABLET METHOD OR GRANULE METHOD

The tablet method of disinfection requires the addition of dry calcium hypochlorite, conforming to AWWA B300, latest revision, in granular form or in five (5) gram tablets containing approximately 65% available chlorine by weight. Pipes and appurtenances must be kept clean and dry during construction for this method to be utilized. An average chlorine dose of approximately twenty-five (25) mg/L applied is required, with a contact time of twenty-four (24) hours. The granules must be placed in several locations, including in the upstream end of the first section of piping, at the upstream end of each branch main, and at five hundred (500) foot intervals throughout the new piping system.

Should tablets be used, they must be attached by food grade adhesive on the internal top of the main line and equally distributed at each end of the pipe joint. **Table 15** below gives the number of tablets required per joint of pipe, with one tablet is required to be placed at each hydrant, hydrant branch, and at other appurtenances. Water must be introduced at a velocity of one (1) fps or less.

Table 15: Number of 5 gr Calcium Hypochlorite Tablets Required

Nominal Pipe Diameter (in.)	Length of Pipe Joint (ft.)				
	13 or Less	18	20	30	40
4	1	1	1	1	1
6	4	1	1	2	2
8	4	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7
16	4	6	7	10	13

Should granules be used, the specific amount of granular calcium hypochlorite to be placed at the beginning of the main and at each 500-foot interval is given in **Table 16**.

Table 16: Ounces of Calcium Hypochlorite Granules per 500-ft Interval

Nominal Pipe Diameter (in.)	Calcium Hypochlorite Granules Quantity (oz.)
4	1.7
6	3.8
8	6.7
10	10.05
12	15.1
14 and Larger	D^2x15.1
D= Inside Pipe Diameter (ft.)	

6.12.4.1.2 CONTINUOUS FEED METHOD

The continuous feed method of disinfection requires the placement of calcium hypochlorite granules in the main during construction. After placement of the granules, the main is flushed to remove any particulates, and then refilled with chlorinated potable water. A measured rate must be used when feeding the chlorinated water into the new system. At a point ten (10) feet within the feed point, chlorine injection must be fed at a constant rate into the system so that the water will never have less than twenty-five (25) mg/L of free chlorine. The chlorination may not stop until the new water system is fully filled with heavily chlorinated water, and be done so that after a twenty-four (24) holding period, the main will not have a free chlorine residual less than ten (10) mg/L.

6.12.4.1.3 THE SLUG METHOD

The slug method of disinfection requires a procedure similar to the continuous feed method, with calcium hypochlorite granules being placed during construction. Once the granules are placed, the main is flushed and then chlorinated by flowing a slug of water dosed with chlorine with a concentration of fifty (50) mg/L. The flow, provided at a slow rate, will completely fill the main and appurtenances and expose those elements for a period not less than three (3) hours.

The flushing of the pipeline and appurtenances must occur after the retention period, and at any other points depending on the chlorination method. The flushing of the lines must discharge into an area approved by the Executive Director or designee. Flushing velocities of the main lines must be done at a velocity of two and a half (2.5) feet per second at minimum.

6.12.4.2 WATER STORAGE RESERVOIRS

Water storage reservoirs shall be disinfected in accordance with AWWA C652 Section 4.3 “Methods of Chlorination”. Three methods are available to the Contractor for use, they include: full tank, high concentration wall spray, and two-step bottom high concentration process.

6.12.4.2.1 FULL TANK METHOD

The full tank method must introduce sodium hypochlorite to provide a free chlorine residual of not less than ten (10) mg/L after twenty-four (24) hours. Tank to be completely full.

6.12.4.2.2 HIGH CONCENTRATION WALL SPRAY METHOD

The high concentration wall spray method shall provide a minimum free chlorine residual of two hundred (200) mg/L to be sprayed on all interior surfaces. The floor shall be rinsed prior to filling.

Proper ventilation shall be provided for the duration of the disinfection work.

6.12.4.2.3 TWO-STEP BOTTOM HIGH CONCENTRATION PROCESS METHOD

The high concentration wall spray method shall provide a minimum free chlorine residual of two hundred (200) mg/L to be sprayed on all interior surfaces. The floor shall be rinsed prior to filling. Proper ventilation shall be provided for the duration of the disinfection work.

6.12.4.3 WATER WELLS

Water wells shall be disinfected in accordance with AWWA C654, latest revision.

6.12.5 BACTERIOLOGICAL TEST

Regardless of the testing method, water samples must be taken from the newly installed piping system by the Contractor. The sampling process must be witnessed by the Executive Director or designee. The Contractor must test the discharge of residual chlorine and the time of sampling form the sampling port. The levels of residual chlorine must be below five tenths (0.5) ppm. Higher residual chlorine values than this limit will require the contractor to re-flush the new piping, and a new sample to be taken.

Once the residual values are in an acceptable range the Contractor must take two consecutive sets of acceptable samples taken, at minimum, 24 hours apart. At least one set of samples must be collected from segments of one thousand-two hundred (1,200) feet of the new water main, with an additional set collected from the end of the line and once sample collected from each branch. The Contractor must collect and submit the samples to a local New Mexico Environment Department certified lab for testing. Lab testing must conform to the "Standard Methods for the Examination of Water and Wastewater," latest edition, published by the AWWA. The testing must account for the absence of coliform and presence of the chlorine residual. The results of this testing result must be forwarded to the Contractor and the Executive Director or designee before the tested system or portion will be accepted. The Contractor is responsible for the costs of testing.

Should trench water or excessive debris enter the new main during construction, sampling must be taken at two hundred (200) feet instead of the respective sampling lengths given in these utility development standards. These samples must be taken from water that has been standing in the new water main at least 16 hours from the final flushing of the line.

If the bacteriological results are not satisfactory, the main must be re-flushed and resampled. If the resampling still produces a failed result, the main must be re-chlorinated by continuous feed or slug methods until passing results are obtained. An existing service may not be transferred to a new line, or a new service connected to a meter until the bacteriological analyses produce a satisfactory result.

6.12.6 FLUSHING

6.12.6.1 PRELIMINARY FLUSHING

Prior to chlorinating, the main shall be flushed to eliminate air pockets and remove particulates. Maintain minimum two and one-half (2.5) fps velocity during all flushing activities. Refer to AWWA C651 Table 3 for reference of flow requirements for various pipe diameters. Adequate drainage must be provided during flushing operations.

6.12.6.2 FINAL FLUSHING

After the applicable retention period, remove all water used for disinfection from tested reaches prior to putting into service. Inspect the discharge location and determine if the highly chlorinated discharge will cause damage to the surrounding environment. If necessary, the discharge shall be treated with neutralizing chemical. The need for dichlorination may vary from site to site and is subject to approval by the Executive Director or designee. Any flushed water containing residual chlorine concentrations higher than one hundred (100) mg/L shall be treated with neutralizing chemicals as required to meet this limitation. Flushing should continue until chlorine measurements show the concentration leaving the flush point is no higher than the normal operating residual.

No facilities shall be put into service until all tests are completed and test reports are submitted to the Executive Director or designee.

6.13 MATERIALS CONTAINING ASBESTOS

Should a material containing asbestos be encountered at any point of the Project, the materials must be addressed in strict conformance to the references cited within these utility development standards. The Contractor must follow all EPA, OSHA, NM Solid Waste Management Regulations, and any other regulations when working with the asbestos-cement pipe. The AC pipe must not be cut. At the point at which existing AC lines are tied into, the Contractor must excavate to the nearest joints and remove the section of pipe in one piece. The AC pipe is to remain wet and encapsulated with 6 ml of thicker plastic bag per the NM Solid Waste Management Regulations until the pipe is delivered to the Special Waste Facility. The Existing AC water line pipe must remain abandoned in place at all possible locations.

7 GRAVITY SEWER DESIGN STANDARDS

7.1 GENERAL

During the undergoing design or construction of a DAMDWCA gravity sewer utility-based project, it may be necessary that the design or construction of that project deviate from these utility development standards. Should a project require such a deviation, prior approval must be granted by the DAMDWCA Executive Director or designee before the installation or construction can commence. No part or parts of these utility development standards relieve the design professional from the responsibility of meeting all current standards of all entities having jurisdiction over complete or partial aspects of the project being designed. All DAMDWCA owned, operated, or dedicated gravity sewer systems, unless otherwise specified by the DAMDWCA Executive Director, must utilize these utility development standards.

One crucial aspect to any project in its developing stages is the development or compilation of an agency approval list by the design professional. The agency approval list is required to accurately show all agencies which will require review and corresponding approval for construction to begin.

The agencies that may have possible jurisdiction over DAMDWCA include, but are not restricted to:

1. All Railroad Groups
2. Doña Ana County
3. Elephant Butte Irrigation District
4. New Mexico Department of Transportation
5. New Mexico Environment Department

The proposed design, installation, or construction proposed for the DAMDWCA wastewater system must receive verification and approval by the DAMDWCA Executive Director or designee before work may begin. The following wastewater design standards must be incorporated into a planned deliverable design to be submitted as a part of the Utility Engineering Summary outlined in Section 2 of these utility development standards. The design of a wastewater system should conform to both these utility development standards and the NMED CPB Wastewater Recommended Standards for Wastewater Facilities.

7.1.1 DESIGN LOADS

For design purposes, the expected wastewater loading for a single-family residential unit is to be computed using the following formula: design load= seventy (70) gallons/unit/day x peak hour factor of three (3) x three point two (3.2) persons per unit. For any other wastewater source, the design loading should be calculated using generally accepted engineering practices and references. Final design loading is subject to DAMDWCA approval.

7.1.2 GENERAL DESIGN CRITERIA

The Design Professional should utilize all applicable local codes in the design of a water, gravity sewer, or vacuum sewer system, prioritizing these utility development standards unless otherwise directed or approved by the DAMDWCA Executive Director or designee. These codes include, but are not limited to, the following:

1. American Association of State Highway and Transportation Officials- Standard Test Methods
2. American Concrete Institute Building Code Requirements for Reinforced Concrete-Latest Applicable Edition
3. American National Standards Institute
4. American Public Works Association Standards, latest applicable edition.
5. American Society for Testing and Materials- Standards and Publications
6. American Standards for Steel-Steel Weld Fitting Standards
7. American Water Works Association Standards- All Latest Applicable Editions
8. Americans With Disabilities Act- Latest Applicable Edition
9. City of Las Cruces General Conditions-Latest Applicable Edition
10. City of Las Cruces Standard Specifications for Road Construction-Latest Applicable Edition
11. City of Las Cruces Subdivision Code- Latest Applicable Edition
12. Code of Federal Regulations- All Latest Applicable Regulations
13. International Building Code- Latest Applicable Edition
14. International Fire Code- Latest Applicable Edition
15. International Plumbing Code- Latest Applicable Edition
16. Manual on Uniform Traffic Control Devices- Latest Applicable Edition
17. National Association of Corrosion Engineers- Corrosion Control Standards
18. New Mexico Environmental Department Recommended Standards for Water Facilities- Latest Edition
19. New Mexico Standard Specifications for Public Works Construction
20. New Mexico Underground Property Damage Law- Chapter 62, Article 14, NMSA 1978, and associated amendments.
21. Occupational Safety and Health Act- Construction Industry Standards; Safety Requirements
22. Subcontractors Fair Practices Act- NMSA 1978 and associated amendments.
23. Uni-Bell PVC Pipe Association Standards- All Latest Applicable Regulations

Sizing and routing for gravity sewer system lines must be approved by the DAMDWCA Executive Director or designee.

7.2 GRAVITY SEWER LINE DESIGN CRITERIA

Gravity sewer mains are to have a minimum size of eight (8) inches in diameter. Should a sewer line be greater than eight (8) inches in diameter, justification for the larger pipe size is required and will not be permitted without approval from the DAMDWCA Executive Director or designee.

7.2.1 HORIZONTAL ALIGNMENT

Sewer pipeline alignments are expected to be straight from manhole to manhole. Manholes must be placed at a maximum spacing of 400 feet for straight pipeline alignments and at any change in direction of the pipeline regardless of length. Fittings can not be used in place of manholes.

A curved sewer line is permitted so long as it meets the minimum bending radius set by the pipe manufacturer.

7.2.2 VERTICAL ALIGNMENT

Table 17 below displays the minimum slopes for gravity sewer lines.

Table 17: Minimum Slope for a Gravity Sewer Line

Pipe Diameter	Slope
8 in.	0.40%
10 in.	0.28%
12 in.	0.22%
15 in.	0.15%
18 in.	0.12%
21 in.	0.10%
24 in.	0.10%
Greater than 24 in.	0.10%

7.2.3 STANDARD DEPTH OF GRAVITY SEWER MAINS BELOW FINISHED GRADE

Table 18 below gives the minimum depth of bury for gravity PVC sewer mains.

Table 18: Minimum Depth of Cover for Gravity Sewer Lines

Location	Depth from Finished Grade to Top of Pipe
In Existing or Future Street	6-ft
Not in Existing or Future Street	Site Specific
Arroyos	Site Specific
All Locations	For depths greater than 20-ft, design documentation or calculations may be required from the engineer.

A gravity PVC sewer main may be buried shallower than the values given in **Table 18**, so long as the

DAMDWCA Executive Director or designee approves it. Minimum depths could also be required to be deeper to accommodate other utility crossings to meet separation requires listed in **Section 7.2.4**.

7.2.4 STANDARD SEPARATION FOR GRAVITY SEWER MAINS

The standard vertical and horizontal separation between gravity sewer mains and other utility lines are seen in Table 16 and Table 17 below. Should sufficient horizontal and vertical separation be unachieved as outlined in Table 16 and Table 17 below, the sewer main must be designed and constructed equal to the water pipe and be pressure tested along any watertight construction and for a minimum of ten (10) feet each side of the obstruction to make sure the connections are watertight before backfilling commences.

Table 19: Horizontal Separation of Parallel Utilities and Sewer Lines

Utility	Horizontal Separation
Gas Main	10-ft
Gas Service	5-ft
Sewer Main	5-ft
Sewer Service	5-ft
Water Main	10-ft
Water Service	5-ft
Storm Sewer	10-ft
Wire Utility	10-ft
Note: Separation may vary with field conditions and DAMDWCA Executive Director approval.	

Table 20: Vertical Separation of Crossing Utilities and Sewer Lines

Utility	Gravity Sewer Main
PE Gas Main	12-in
Steel Gas Main	24-in
Gas Service	12-in
Sewer Main	12-in
Sewer Service	12-in
Water Main	18-in
Water Service	12-in
Storm Sewer	12-in
Wire Utility	12-in
Note: In intersections gas mains go under all other utilities except sewer. When water lines cross sewer lines, the crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.	

7.2.5 FUTURE CONNECTIONS

Pipe stub-outs for present and future connections may be installed where shown within the Contract Documents and with approval from the DAMDWCA Executive Director, or designee. Drops must be provided as shown within the Contract Documents, and a smooth invert formed from the stub-out into the manhole. Pipe stub-outs must have a maximum length of five (5) feet unless shown otherwise within the Contract Documents. Watertight temporary plugs must be placed in all stub-outs. The plug must be braced against blow offs.

7.2.6 TEMPORARY AND PERMANENT PLUGS

Permanent and temporary plugs must receive approval from the DAMDWCA Executive Director or designee.

Permanent plugs must be installed after thoroughly cleaning the contact surfaces or pipes that are to be abandoned or cut off. Pipes eighteen (18) inches in diameter or less must have an eighteen (18) inch thick concrete plug installed within them. Pipes with a diameter greater than eighteen (18) inches may use a brick or concrete block plug with the outside face plastered with mortar.

Temporary plugs may be installed during construction by installing a one half (½) inch plywood plug in the joint. Backfill must be installed against the plug.

7.3 MANHOLE DESIGN CRITERIA

A concentric manhole is required for any change in horizontal alignment and at any change in vertical alignment where two (2) or more main lines connect. Manholes may not be placed in an excess of four hundred (400) feet. Curved sewer lines must not have manholes placed more than three hundred and fifty (350) feet unless otherwise approved by the DAMDWCA Executive Director or designee. The spacing between manholes must be measured from center of manhole to center of manhole. A manhole is required at the end of any line. Manholes must incorporate the information shown on DAMDWCA Standard Detail S-04.

Service lines shall not connect to manhole unless approved by DAMDWCA.

Manholes must use precast concrete that meets AASHTO requirements for H-20 loading. Manholes must be accessible by two (2) wheeled drive vehicles twenty-four (24) hours a day, seven (7) days a week through a dedicated ROW or DAMDWCA owned utility easement.

A minimum drop of one tenth (0.10) of a foot is required in the direction of flow across the manhole. A drop manhole is required if an inlet invert elevation is greater than 1.5 feet higher than the outlet, see DAMDWCA Standard Drawing S-05.

A manhole placed in areas prone to flooding or running water must use a bolted, watertight cover. If a manhole is installed outside of a roadway or within a drainage flowline adjacent to a roadway, the rim shall be raised to be at least 6-inches above the expected high-water elevation. A composite lid is required when there are high levels of H2S expected or where a forcemain discharges into a manhole. Additionally, any manhole that is downstream of a forcemain and within 800 feet of the discharge location must also include a composite lid. The DAMDWCA Executive Director or designee may require manholes to be of this type in any location.

All manholes must be coated with an approved coating system as directed by the DAMDWCA Executive Director or designee.

7.4 FORCE MAIN DESIGN CRITERIA

Forcemains must be green C-900 PVC with a minimum cover of thirty-six (36) inches of cover over the top of the pipe within a dedicated roadway right-of-way and forty-eight (48) inches outside of roadways. Other pipe materials require prior approval from the Executive Director or designee.

Any bend or fitting on the force main must utilize mechanical joint restraints. Concrete thrust blocking is not allowed. Pipe joints upstream and downstream of a fitting must be restrained in accordance to the joint restraint manufacturer's restrained length recommendations.

Forcemain connections to manholes must be in accordance with DAMDWCA Drawing S-XX.

Forcemains must include air release vacuum relief valves at vertical inflection points, at a maximum spacing of 1,000 feet, or as directed by DAMDWCA.
90° bends are not allowed. Two 45° bends with a minimum spacing of 5-feet shall be used instead where necessary. At least one cleanout is required where double 45° bends are installed. The forcemain can utilize single and double cleanouts throughout the forcemain alignment. The maximum distance between single cleanouts is 500 feet and the maximum distance between double cleanouts is 1,000 feet. Single cleanouts should be utilized at pipe bends and double cleanouts should be utilized on straight runs.

7.5 SEWER PIPELINES IN A DEDICATED STREET RIGHT-OF-WAY

DAMDWCA's preference is for sewer pipelines to be installed in a dedicated right-of-way. Gravity pipelines are to be installed along the street centerline. Forcemains are to be installed on the south or west side of the right-of-way. Deviation from these locations must be approved on a case-by-case basis by the DAMDWCA Executive Director or designee.

7.6 SEWER PIPELINES OUTSIDE OF STREET RIGHT OF WAY

DAMDWCA owned sewer pipelines must be installed within a DAMDWCA utility easement if there is not a dedicated right-of-way. Easements, permits, or other documentation must be acquired to ensure a DAMDWCA sewer pipeline may be accessed for operations and maintenance by DAMDWCA. The specific widths by depth of pipe invert are given below in Table 14. Should additional utilities also be located within a single DAMDWCA utility easement, that easement may require a greater width than the minimum values displayed on Table 14.

DAMDWCA utility easement location and width outside of this standard must be approved on a case-by-case basis by the DAMDWCA Executive Director or designee. The DAMDWCA Executive Director or designee must approve the placement of any DAMDWCA utility line placed in drainage ways and other non-standard utility corridors.

Table 21: Sewer Line Easement Widths

Invert Depth	Minimum Required Easement Width
3 ft. to 6 ft.	15 ft.
6 ft. to 10 ft.	20 ft.
Greater than 10 ft.	30 ft.
Line in a Cased Sleeve	15 ft.
Note: Additional Utilities within an easement will require an easement width greater than the minimum listed within this table.	

7.7 SERVICE LINES

7.7.1 GRAVITY SEWER SERVICE LINE DESIGN CRITERIA

Gravity sewer service lines must allow for a minimum slope of two (2) percent for a four (4) inch line and one (1) percent for a six (6) inch line.

Gravity sewer service must always be located below gas mains or water mains.

A cleanout must be installed at the point where the gravity service line enters the private property. If the cleanout cannot be installed in this fashion, it must be installed within ten (10) feet of the property line. The cleanout must also be installed at the time that the connection is made between the individual service line to the DAMDWCA sewer system.

Manifolding of service lines between different owners is generally not permitted. The individual service line must run from the individual customer to the gravity sewer main, unless directed differently by the DAMDWCA Executive Director or designee.

Standard wye connections must be used when connecting gravity service lines to the sewer mains. If a wye is not used, and the service line is to be connected to a s main, then a sewer saddle may be used so long as they meet the requirements set in these utility development standards or are approved by the Executive Director or Designee.

Service lines connecting into an existing concrete piping or ribbed PVC interceptor sewer may use an Insert a Tee® connection so long as it is approved by the DAMDWCA Executive Director or designee.

7.7.2 MINIMUM LINE SIZE OF GRAVITY SEWER SERVICE LINES

Service lines that are connected to individual customers must have a minimum diameter of four (4) inches. A larger diameter pipe may be used if it is justified by actual loading.

7.7.3 STANDARD ENTRY TO LOT LOCATIONS

The standard lot entry location for a service line is shown below in Table 18: Standard Entry to Lot Locations for Gravity Sewer Service Lines. Any other proposed lot entry location must be approved on a case-by-case basis by the DAMDWCA Executive Director or designee.

Table 22: Sewer Service Lot Entry Locations

Type of Lot	Standard Location of Service
Residential-36 ft. Wide or More	Center of lot
Multifamily	Center of lot
Commercial Inside Subdivision	Center of lot
Commercial Outside Subdivision	Site Specific
Mobile Home Park	Site Specific
Mobile Home Subdivision	Center of lot
Note: Orientation is found by standing in street and facing lot. A service line must be perpendicular to the main line on straight roads, radial on curves, and straight from the main or manhole to the property line at the point of termination of cul-de-sacs. Lot entry	

standards regarding corner lots must be measured from the pc located on the lot corner.

7.7.4 NON-STANDARD ENTRY TO LOT LOCATIONS

Should a conflict exist such that the standard entry to lot locations cannot be followed, the following non-standard entry to lot locations may be utilized and will require approval from the DAMDWCA Executive Director or designee. In addition, should a utility line be unable to be installed as described in Table 18 it must be sufficiently dimensioned.

1. Sewer may vary five to fifteen (5-15) feet left from the water service line.
2. If relocating the sewer line will not solve the conflict:
   A. The water service line may be moved to left or right of the sewer service line for a maximum of five (5) feet left or right with the sewer service line located up to ten (10) feet to the left of the lot centerline.
   B. The sewer service line may be located five to fifteen (5-15) feet left from the water service line as required.

7.7.5 SERVICE LINES OUTSIDE OF STREET RIGHT OF WAY

Service lines located in a customer's yard do not require a dedicated DAMDWCA utility easement. DAMDWCA responsibility for the gravity service line ends at the main unless a cleanout has been installed at the property line. If a cleanout has been installed within ten (10) feet or at the property line, then DAMDWCA will be responsible for the service line from the main to the cleanout.

A service line should not be installed in a customer's yard to reach another customer unless approved by the DAMDWCA Executive Director. Should a service line be placed in this manner, at least a ten (10) feet wide recorded utility easement will be needed between the two respective customers. The sewer service in the easement will be owned and maintained by the customer up to the DAMDWCA cleanout at the property line. If no cleanout is installed, the customer is responsible for the service line up to the point that the service line connects to the sewer main.

All sewer service lines must have a cleanout at the location where the service line leaves the DAMDWCA ROW or easement. This specific cleanout must not be installed to replace any sewer cleanout required to be installed from codes or ordinances.

7.7.6 STANDARD DEPTH OF GRAVITY SERVICE LINES BELOW FINISHED GRADE

The minimum depth of cover for a gravity sewer service line is 3-feet at the property boundary. Gravity sewer service lines should be buried sufficiently so that the entire lot can be served, particularly with respect to non-standard residential and commercial lots. A service line may need to be installed at a depth higher than the minimums given and must be shown on the construction plans if this is the case and must be approved by the DAMDWCA Executive Director or designee.

7.7.7 STANDARD SEPARATION FOR GRAVITY SERVICE LINES

Table 19: Horizontal Separation for Crossing Utility Lines and Gravity Sewer Service Lines and Table 20: Vertical Separation for Crossing Utility Lines and Gravity Sewer Service Lines shows the minimum standard separation between gravity sewer service lines and other utilities. Should sufficient horizontal and vertical separation be unachievable as outlined in Table 19 and Table 20 below, the sewer service line must be designed and constructed equal to the water pipe and be pressure tested along any

watertight construction and for a minimum of ten (10) feet each side of the obstruction to make sure the connections are watertight before backfilling commences.

Table 23: Horizontal Separation for Parallel Utilities and Sewer Service Lines

Utility	Gravity Sewer Service Line
Gas Main	5-ft
Gas Service	5-ft
Sewer Main	5-ft
Sewer Service	5-ft
Water Main	5-ft
Water Service	5-ft.
Storm Sewer	5-ft
Wire Utility	5-ft

Table 24: Vertical Separation for Crossing Utilities and Sewer Service Lines

Utility	Gravity Sewer Service Line
Gas Main	12-in
Gas Service	6-in
Sewer Main	6-in
Sewer Service	6-in
Water Main	6-in
Water Service	6-in
Storm Sewer	6-in
Wire Utility	6-in
Note: In intersections, gas mains go under all other utilities except sewer. The vertical separations listed for gas mains applies to poly lines only and do not apply to steel gas lines. Vertical separation from steel lines shall be twenty-four (24) in. for a High Pressure and eighteen (18) in. for Low Pressure.	

7.8 SEWAGE LIFT STATIONS

The design of a sewage lift station must be designed on a case-by-case basis and must be approved by the DAMDWCA Executive Director or designee. Sewage pumps must be three phase with three phase power being made available to the lift station, unless the DAMDWCA Executive Director or designee approves otherwise. The Design Professional should meet with DAMDWCA to ensure that proper design considerations have been made for the sewage lift stations.

7.9 LOW PRESSURE SEWER SYSTEMS

A low pressure sewer system can only be utilized with approval from DAMDWCA.

For the DAMDWCA Executive Director to approve a low-pressure sewer system, the following criteria must be met:

1. 50 residential customers, or equivalent, is the maximum that a LPSS system may service.
2. An LPSS may only be used when it can be justified that the use of a gravity system is not feasible. Cost can be considered but cannot be the determining factor into whether to utilize a LPSS.

3. DAMDWCA will not own, operate, or maintain the individual grinder pumps, and those responsibilities will be with the customer.
4. The use of the LPSS must not jeopardize the future expandability of the DAMDWCA sewer system.
5. Notice must be provided to potential LPSS customers regarding the ownership and operation considerations for an LPSS system and its corresponding components.
6. Individual grinder pumps that have a direct discharge into the existing sewer main will be considered on a case-by-case basis. The customer will own and maintain the grinder pump and accessories.
7. The owners and occupants of the locations serviced by a LPSS must be organized in a way that will release DAMDWCA from all liabilities associated with the LPSS.
8. The property owners and developers are responsible for all costs associated with the design, permitting, and construction of the LPSS.
9. The DAMDWCA Executive Director or designee must receive a specific request for the installation of an LPSS system, and written approval must be received before construction plans can be submitted for review. Approval to submit construction plans does not approve the construction plans themselves.

7.9.1 OWNERSHIP AND MAINTENANCE RESPONSIBILITY

A point of service for the LPSS discharge location will be determined during the review and approval process. Ownership and maintenance for any infrastructure upstream of this location will be the responsibility of the LPSS owner. There may be more than one point of service depending on the system layout.

7.9.2 LPSS DESIGN REQUIREMENTS

The design requirements that should be considered for an LPSS system are given below. Meeting these design requirements does not necessarily mean the DAMDWCA will approve the LPSS. These requirements may also be altered to meet specific conditions.

The system should be designed so that there is a minimum velocity of 2 feet/second in the force main. Software model results or calculations certified by a registered PE in the State of New Mexico should be included with the design submission.

The system should be designed so that excessive retention times are avoided, so that gases do not have the opportunity to form due to biological or chemical activity in the pressure system. Odor control measures may be required to be installed on a case-by-case basis upstream of any point of service location.

The force main shall be located within a dedicated right-of-way or utility easement in accordance with these standards.

Single and double cleanouts shall be installed on the forcemain in accordance with these standards.

As-builts that are accurate to the constructed system and complete must be given prior to final project acceptance.

7.9.3 LPSS DESIGN RECOMMENDATIONS

The EPA Manual “Alternative Wastewater Collection Systems” should be consulted when designing an LPSS system.

It is a recommendation that before a grinder or pump station manufacturer be selected for use in the project, that manufacturer should have at least twenty-five thousand (25,000) units field installed and operating. In addition, the manufacturer should have a service center within one hundred (100) miles from the Doña Ana that offers field service, spare parts, and other expertise.

8 GRAVITY SEWER MATERIAL SPECIFICATION LIST

8.1 GENERAL

1. The following lists are the preferred products to be used in a DAMDWCA water utility system. Other products may be submitted to the DAMDWCA Executive Director or designee for approval before being used in construction.
2. Distribution piping that ranges in size from four (4) to fifteen (15) inch may utilize a smooth exterior wall, as described in ASTM D3034, and pipe sizes that are more than twelve (12) inches may utilize a ribbed exterior wall, as described in ASTM F794.
3. This water utility material specification list includes all replacements or updates.

8.2 MATERIAL SPECIFICATION LIST

ITEM	DESCRIPTION	SIZE	SPECIFICATION	MANUFACTURER
1.	**Polyvinyl Chloride (PVC) Non-Pressure:** Pipe 15" and smaller must be SDR 35 or SDR 26 and green in color. Laying length must be a standard 20 feet. Pipe identification must conform to standard ASTM classification with the SDR size stamped in green ink. Joints must use a PVC sleeve with two sealing rings or an internally cast bell with one sealing ring.	4-36 in.	a. Pipe 18" and Larger: ASTM F679 and/or UNI B9 b. Pipe 15" and Smaller: ASTM D3034 or ASTM F794 c. Joint Leakproof Rubber Rings: ASTM D3212/F477 d. Lubricant: Manufacturer's Recommendations	
2.	**Polyvinyl Chloride (PVC) Pressure:** ASTM 2241, PVC 1120 or 1220, NSF approved pipe must be SDR21 or as listed in the Contract Documents. AWWA C900 approved pipe must be SDR18 for all sizes with a pressure class of 235 psi or as listed in the Contract Documents. AWWA C905 approved pipe must be SDR18 for all sizes with a pressure class of 235 psi or as listed in the Contract Documents. Joint gasket bell ends must have elastomeric seals, and gaskets must be elastomeric. Solvent cement must be used only where specifically scheduled or shown within the Contract Documents.	4-64 in.	a. Pipe and Fittings: ASTM 2241, PVC 1120/1220, NSF approved/AWWA C900/AWWA C905 b. Joint Gasket Bell End: ASTM D3139 c. Joint Gaskets: ASTM F477 d. Solvent Cement: Manufacturer's standard	
3.	**Ductile Iron Pipe and Fittings with Ceramic Epoxy Lining:** Must use mechanical joints or push on joints. Pipes installed underground in soil must have an exterior bituminous coating applied. Pipes installed aboveground and exposed to air must have a red primer coating. Pipes must have inside coated with ceramic epoxy lining.	4-64 in.	a. Pipe and Fittings: ASTM A746 b. Joints: ANSI 21.11 c. Outside and Underground Coating: AWWA C110. d. Inside Coating: AWWA C210	•American DI Pipe •U.S. Pipe •McWayne Ductile •Griffin Pipe Products •Protecto 401 Ceramic Epoxy
4.	**Polyethylene (PE) Pipe and Fittings**	4-63 in	a. AWWA: C906-99	
5.	**Iron Manhole Frames and Covers** Must meet AASHTO H-20 loading, with the letter "DAMDWCA SEWER" cast into the manhole cover.		a. AASHTO M306 Latest Edition	•East Jordan Iron Works-2023 for Standard, 134283 for

	Manhole covers must seat at all points along the ring. Cast iron ring and covers must be rated for heavy duty traffic with a 22" minimum clear opening, solid perforated cover, and bottom flange, recessed lifting ring, minimum combined ring, and cover weight of 300 lbs., and bearing surfaces ground smooth. Aluminum ring and covers must be rated for heavy duty traffic with a 22" minimum clear opening and a minimum combined ring and cover weight of 140lb. with a locking device			Watertight, V2339 for Bolted or Vented
6	**<u>Composite Manhole Frames and Covers</u>** Must meet AASHTO H-25 loading, with the letter "DAMDWCA SEWER" cast into the manhole cover. Manhole covers must seat at all points along the ring and include penta head latches. Composite ring and covers must be rated for heavy duty traffic with a ~22" minimum clear opening, solid perforated cover, and bottom flange, recessed lifting ring,		a. AASHTO M306 Latest Edition	•East Jordan Iron Works – Durostreet 2400 Composite Assembly
7.	**<u>Concrete Precast Manholes</u>** 4 ft. diameter manholes must be constructed of precast concrete and have a minimum wall thickness of 5 in. and utilize 24 or 36 in. cones with a 22 in. minimum manhole clear opening. Cones must have same or greater reinforcement and wall thickness as the manhole section. For 6 ft. diameters, must have a minimum wall thickness of 7 in. with flat tops. All completed manholes must meet AASHTO H-20 loading requirements with sealed joints. The minimum manhole inside diameter must be 48". Joints must be a keylock type with preformed gaskets or mastic seal. Manhole adjustment rings must be constructed of precast concrete with a 6" maximum total height above the cone. Mortar to be 1-part Portland cement, ½-part		a. Precast Sections: ASTM C478, AASHTO M199, ACI Standard 318 b. Hydrated Lime: ASTM C207, Type S. c. Mortar: ASTM C387 d. Gaskets: ASTM D2240, Type A durometer e. Castings: ASTM A48	•Western Precast Concrete, Inc.

	hydrated lime, three parts sand. Gaskets may be either mastic or rubber neoprene. Mastic must be FS SS S 210 and rubber neoprene must be 40 +/- 5 hardness. Castings to be asphalt varnish coating hot dip applied at foundry applied 6 mils thick. Drop structures must be installed as indicated within the Contract Documents. Drop manholes must have the pipe material and type match that of the sewer line. The bottom manhole section must have a monolithic precast base.			
8.	**Inflow Protectors** Must be sized to properly fit the manhole and be removable, with a relief or check valve installed to vent at 1 psi.			•East Jordan Iron Works •Pollard Water •J.C. Utility Sales
9.	**Manhole Stop Rings**		a. ASTM C-923	•Newby Rubber, Inc.: Waterwork Gaskets
10.	**Insert a Tee®**			•Insert a Tee® Fittings Co.
11.	**Extruded Sealing Tape (Joint Sealant)** Must have a butyl resin sealant formula that conforms to Federal and State Highway Specifications and be suitable for summer grades or warmer climates.		a. ASTM C-990	•Public Works Marketing, Inc. Ram Neck. •Concrete Sealants Inc.: CS 102, CS 102B
12.	**Repair Couplings** Repair couplings may be used when connecting clay to clay, clay to cast iron or plastic, clay to asbestos cement fiber or ductile iron, concrete to concrete, concrete to either cast iron or plastic, asbestos cement fiber or ductile iron to cast iron or plastic, asbestos cement fiber or ductile iron to asbestos cement fiber or ductile iron CI, PL, Copper, ST, or lead to Cl, PL, Copper, ST, or lead. Must use Strong Back RC Series Repair Couplings, with a flex seal adjustable repair coupling with a 0.012 in. stainless steel shield that is molded in the		a. Gasket: CSA B602, ASTM D 5926, or ASTM C 1173 b. Clamps: CSA B602 c. Shear Ring: Must Have a Thickness of 0.12 in. and be Made of 300 Series Stainless Steel, Width Must be Made According to the Coupling Widths of 1.5 in., 2.13 in., or 4 in., Length must be Manufactured According to the Coupling Diameter. Clamps Must be put Into Place Through Spot Welding.	•Fernco Inc. Mission Rubber Company LLC

	bushing. Gaskets must have a hardness of shore "A," inst. +/- 5 from value of 65. Must have a tensile strength of 1,000 psi minimum. Must have an elongation at rupture of 250% minimum. Must have a tear strength of 150 lb./in. minimum. Must have a brittleness temperature of -40°. Clamp housing must be 301 stainless steel, with a 301 stainless steel clamp band. Clamp screws must be 305 stainless steel with an installation torque of 60 in. lbs. Shear rings must have a thickness of .12 in. using 300 series stainless steel. Shear ring width must be made according to coupling widths of 1.5 in., 2.13 in., or 4 in. Shear ring lengths manufactured according to coupling diameter. Clamps must be put into place with spot welding. Shear rings must have a thickness of .12 in.		d. Coupling: Must be Manufactured to Meet Performance Requirements of ASTM C 1173, CSA B602, a Maximum Test Pressure of 4.3 psi., And a Maximum Operating Temperature of 140° Non consistent.	
13.	**Sewer Saddles** Must use a Romac "CB" Sewer Saddle Strap Made of Stainless Steel. Must use a Casing Made of Ductile Iron. Must use a Gasket Conforming to ASTM D 2000.			•Romac Industries
14.	**Air Release, Air/Vacuum and Combination Air Valves**			•ARI D-025 SB
15.	**Casing** Must be black, with plan ends and made of standard schedule steel pipe.		a. API Grade B a. ASTM A-53	
16.	**Casing End Seals** Must be complete with stainless steel adjustable band clamps			•T.D. Williamson, Inc.: Z Seals •PWM: Wrap-Around End Seal
17.	**Casing Spacers (Insulators)** Must be injection molded high-density polyethylene material stainless steel bands.		a. Manufacturer Instructions	•API Model SSI
18.	**Tracing Wire (Open Trench)** #12 AWG solid steel core soft drawn wire with 30-		a. ASTM D-1248	•Paigespec •Kris-Tech Wire Co.

	mil HMW-PE insulation, blue in color, 30-volt rating, 450# average tensile break load. **Tracing Wire (Bored Installation)** #12 AWG solid steel core soft drawn wire with 45-mil HMW-PE insulation, blue in color, 30-volt rating, 1,150# average tensile break load.			•Coleman Cable •Copperhead Industries
19.	**Direct Bury Splice Kits** Must have a 50-volt Rating.		a. Manufacturer Instructions. a. Applicable Codes	•3M •Kind Safety Products
20.	**Test Station** Must be constructed out of non-conductive ABS plastic materials, have an inside diameter of 2 ½", have a 17" shaft length, have flared ends, and have a cast iron lid and collar. The terminal block must be constructed of reinforced polyester laminate with two wire terminals. Must have a blue locking lid with a pentagonal bolt cast into the center, allowing a quarter turn to open.			•Copperhead Industries – Snake Pit Roadway
21.	**Warning Tape** Must have a six-inch width with a permanent APWA water line blue pigment and bold, black letters one side at a minimum of 30" along the length. The words, "CAUTION SEWER LINE BURIED BELOW." The tape material must be made of 100% virgin polyolefin or polyethylene resins which are chemically inert and will not degrade when exposed to acids, alkalis and other destructive substances commonly found in soil.		The Following are Given in Order of ASTM Method/Property/Value: a. ASTM D2103-05/Thickness/4.0 mil. b. ASTM D2103/Weight/18.5 lbs. per 1000 ft.2 c. ASTM D882-02/3" Tensile Strength/34 lbs. and2,800 psi. d. ASTM D882-75b/Elongation/800% e. ASTM D2582/ PPT Resistance/ 14 lbs. per foot. f. ASTM D2578/ Printability/ 45 dynes. g. Manufacturing Specifications/Message Repeat/Varies by Legend h. Manufacturing Specifications/ Printed Inks/ Flexo 9605.	•Pro-Line Safety Products: Non-detectable underground utility marking tape, super stretch. •Reef Industries: Terra Tape, Standard

9 GRAVITY SEWER CONSTRUCTION SPECIFICATIONS

9.1 GENERAL

The following section provides the minimum acceptable requirements and specifications for the installation of gravity sewer utility infrastructure intended for connection to or operation with the DAMDWCA gravity sewer distribution system. All materials to be used in construction must not have been previously used and be in a new condition unless specified within the Contract Documents or approved by the DAMDWCA Executive Director or designee. Materials that fall into a similar category such as pipe fittings and appurtenances must be of the same type and same manufacturer when used repeatedly in a project The gravity sewer system and appurtenances must be installed as shown on the Contract Documents.

The Contractor is responsible for all construction permitting required to perform the work presented in the Contract Documents.

Existing utilities within the boundaries of a project shall be adjusted as required to conform to the final grades of a project. The entity responsible for construction of the proposed utilities is responsible for all expense associated with any adjustments to existing or proposed utilities.
All work shall be performed under applicable OSHA standards.

The Contractor is fully responsible with contacting and coordinating with DAMDWCA unless specified within the Contract Documents or approved by the DAMDWCA Executive Director or designee.

9.2 RECEIVING, HANDLING, AND STORAGE

The Contractor is responsible for the receiving, handling, and storage of all elements of the proposed gravity system design as presented in the Contract Documents. This must be done in a way to ensure that the materials, at the time of installation, will be in a sound and undamaged condition as described in these utility development standards and to the acceptance of the Executive Director or designee.

All materials and the receiving, handling and storage of those materials are subject to Executive Director or designee inspection. The Contractor is responsible to receive, handle, store, and install all materials, and will not be relieved from this responsibility due to the lack of an Executive Director or designee, or from the lack of an inspection.

All materials must be kept free from damage. Pipe interiors and appurtenances must be kept free from debris, dirt, or other foreign matter. Pipe gaskets should be stored in a manner that does not expose the gaskets to direct sunlight or sources of heat. Gaskets that are factory installed must not be removed from pipe joints unless the gaskets are damaged or at risk of being damaged.

Pipe and appurtenances must be lifted with hoists with broad, well-padded contacted surfaces. Pipe may be rolled on skidways in a manner that will avoid shock to the piping. Pipe must never be dropped. Pipe must not be rolled or skidded against another pipe already on the ground.

Should a pipe be expected to be stored outdoors and subjected to direct sunlight for a year or more proceeding delivery of the pipe materials, canvas or a similar opaque material must be used to cover the piping as per ANSI/AWWA Standard C605-94. Proper air circulation must also be able to access the pipe

being stored. Should a pipe show signs of damage, such as the fading of color or chalking in PVC piping, then that pipe cannot be used.

Should any materials be unusable, whether it be from damage or conflicts with Contract Documents or approval from the Executive Director (or designee), the materials must be removed from the site and replaced, as necessary.

Open pipe ends should always be plugged or suitably covered to the acceptance of the Executive Director or designee before installation. In addition, pipe interiors should be cleaned before installation and be kept clean.

9.3 PIPE INSTALLATION

9.3.1 GENERAL

Pipe must be installed as indicated in these utility development standards. All pipes must be laid and maintained at the required lines and grades, with fittings, valves, and hydrants at the required locations. Joints must be centered and spigots home, with all manholes plumb. Mechanical or push on joints are to be used for exterior locations.

The Contractor must always protect structures adjacent to the Project site and surrounding areas during pipe installation, with work always and only taking place within available easements. The Contractor must temporarily support, protect, and maintain all underground surface utility structures, drains and other obstructions encountered during the progress of work.

Wherever existing utility structures present an obstruction to the grade and alignment of the pipe, the existing features must be permanently supported, removed, relocated, or reconstructed by the Contractor. The Contractor must coordinate this work with the Owner of the utility, structure, or obstruction encountered.

Repair and/or replacement of existing water lines damaged during construction must have the material match existing or at least quality as listed in the water utility material specification list.

Pipe sleeves must be installed when pipes pass through concrete or masonry. Install the sleeves where practical before new concrete is installed. Sleeve seals should be watertight, with modular sealing elements when the sleeve is placed in a slab with one side against soil.

9.3.2 SUBMITTALS

Submittals must be provided to demonstrate compliance with these utility development standards. These submittals include, but are not limited to, the following:

1. Testing laboratory results on bedding materials to demonstrate compliance with Specifications.
2. Stabilization material, if required.
3. Imported bedding and backfill material, if required.
4. Dewatering procedures, if required.
5. Stabilization procedures, if required.
6. Baseline proctor density test results (five (5)-point moisture density curves).
7. Baseline testing location plan.

8. Soil Testing Lab Certification.
9. Product data for materials included in Section 7: Gravity Sewer Material Specification List of these utility development standards.

9.3.3 INSPECTION

The Contractor must verify location and invert elevation of existing piping, underground utilities and any obstructions before construction begins.

9.3.4 DEWATERING

The Contractor must provide and maintain adequate dewatering equipment to remove and dispose of surface and groundwater entering an excavation, trench, or other parts of work as applicable to prevent the pipe from floating. Costs associated with dewatering will be the sole responsibility of the Contractor.

The Contractor must protect excavation during subgrade preparation and continually thereafter, until the structure to be built or the pipe to be installed is completed, to the extent that no damage from hydrostatic pressure, floatation or other cause will result.

The Contractor must dewater excavations extending to or below groundwater by lowering and keeping the groundwater level at least twelve (12) inches below the bottom of the excavation.

The Contractor is responsible for the condition of any pipe or conduit used for drainage, and all drainage pipes, ditches, etc. must be left clean and free of sediment at the completion of dewatering.

9.3.5 SHORING AND SHEETING SYSTEMS

The protection of employees in excavations must conform to applicable OSHA Standards. Any trench protection and modification to trenching safety plans must be submitted to the Executive Director or designee in writing to be maintained as part of the record.

The Contractor must install all shoring and sheeting systems required to prevent cave-ins and protect his employees and adjacent property and structures in accordance with current OSHA standards. No extra payment will be made for these items, the cost thereof being merged with and considered a part of the cost for the related excavation.

Before sheeting is withdrawn, or trench boxes moved forward, they shall be raised, in place, just above the pipe crown to safely allow the Contractor to completely fill any voids left in the pipe zone.

9.3.6 STABILIZATION

The Contractor must thoroughly compact and consolidate trench bottoms, so they remain firm, dense, and intact during required construction activities. The Contractor must remove all mud during excavation to attain a firm trench bottom. The Contractor must reinforce trench bottoms with crushed rock or gravel for twenty-four (24) inches below the embedment layer if it is oversaturated with groundwater during construction activities. Where trench bottoms out in rock, rock is to be removed to eight (8) inches below the bottom of pipe and replaced with bedding material.

Granular stabilization material shall be used to replace soft, spongy, or other unsuitable material,

including rock encountered in excavation, to the depths necessary to support the pipe or structure. Stabilization materials shall be underlying bedding material (as applicable) and shall consist of suitable hard, durable granular material having a maximum size of 6-inches, graded so that a maximum of 20% passes a No. 4 sieve. Granular stabilization is not anticipated. If required, a price for granular stabilization shall be negotiated between the Contractor and
the Owner.

9.3.7 TRENCH EXCAVATION

All trenching operations must follow applicable OSHA regulations. The Contractor shall be responsible for safety on the job site and must designate a trained "competent person" knowledgeable in trench safety to supervise the work.

Trenching over five (5) feet deep must have shoring or be benched back before entry. Do not open more trench in advance of pipe being laid than is necessary to expedite the work (not to exceed six hundred (600) feet). Except when jacking and boring is indicated on the Drawings or specified in the Contract Documents, all trench excavations must be by open cut from the surface. All trenches must be completely backfilled at the end of each working day, unless otherwise approved by the DAMDWCA Executive Director or designee. No excavation may be left open without the use of proper barricades and warning lights conforming to the Manual of Uniform Traffic Control Devices (ANSI D6.1) or applicable permit regulations.

Excavations made for trenches must be at least four (4) inches below the pipe barrel to account for the installation of bedding materials. If a trench foundation shows signs of yielding, the Contractor must over excavate the trench and use stabilization methods to prevent foundation yielding from occurring. Geotextile material or other approved embedment material must be used to prevent soil migration in the pipe zone following approval of the Executive Director or designee. Bedding materials must also meet the criteria described in Section 8.3.8: Trench Backfill and Section 8.3.9: Backfill and Bedding Materials in these utility development standards.

9.3.7.1 ALIGNMENT, GRADE AND MINIMUM COVER

The Contractor must:

1. Establish alignment and grade or elevation from offset stakes
2. Excavate trenches so pipes can be laid straight at uniform grade, without dips or bumps, between the terminal elevation indicated on the Contract Documents.
3. Comply with pipe specification sections regarding vertical and horizontal alignment and max joint deflection.
4. Provide gravity sewer lines to have minimum bury as shown on the Contract Documents and as listed within these utility development standards.

In general, grade shall follow surface contours unless otherwise shown on the Contract Documents.

9.3.7.2 LIMITING TRENCH WIDTHS

The Contractor must:

1. Excavate to a width able to provide adequate working space and pipe clearances for proper pipe installation, jointing and embedment.

2. If needed to reduce earth loads to prevent sloughing, cut banks back on slopes extending not lower than one (1) foot above the top of the pipe.
3. Comply with minimum trench widths and minimum clearances between installed pipe and trench wall:
    A. Minimum pipe size eighteen (18) inches or less:
        c. Minimum trench width: O.D. plus sixteen (16) inches.
        d. Minimum clearance: eight (8) inches.
    B. Minimum pipe size larger than eighteen (18) inches:
        a. Minimum trench width: O.D. plus twenty-four (24) inches.
        b. Minimum clearance: twelve (12) inches.

9.3.7.3 MECHANICAL EXCAVATIONS

The Contractor must:

1. Not use mechanical excavations where its operation would damage trees, buildings, culverts or other existing property, structures, or utilities above or below ground. Instead, hand excavation should be used in these areas.
2. The use of mechanical equipment of a type, design, and construction, must be operated so that:
    A. Rough trench bottom elevation can be controlled.
    B. Uniform trench widths and vertical sidewalls are obtained from one (1) foot above the top of the installed pipe to the bottom of the trench.
    C. Trench alignment is such that pipe is accurately laid to specified alignment and is centered in the trench with adequate clearance between pipe and trench sidewalls.
3. Not undercut trench sidewalls.

9.3.7.4 CUTS IN SURFACE CONSTRUCTION

The Contractor must:

1. Make surface cuts no larger than necessary to provide adequate working space.
2. Cut a clean groove not less than one and one-half (1½) inches deep along each side of trench or around perimeter of excavation area.
3. Remove pavement and base pavement to provide shoulder not less than sixth (6) inches wide between cut edge and top edge of trench.
4. Do not undercut trenches in a way that will result in the bottom trench width being wider than the top trench width.
5. Make pavement cuts to and between straight or accurately marked curved lines parallel to trench centerline or limits of excavation.
6. Where the trench crosses driveways or other surface construction, remove and replace the surface construction between saw cuts as specified for pavement.

9.3.7.5 EXCAVATION BELOW PIPE STANDARDS

The Contractor must:

1. Except as otherwise required, excavate trenches below the underside of pipes to provide for installation of the pipe bedding.
2. Where in earth:
    A. Trench bottoms for sixth (6) inch and smaller pipe may be excavated below pipe subgrade and granular embedment must be provided.

B. Trench may be graded to provide uniform and continuous support (between bell boles or end joints) of the installed pipe.

9.3.7.6 BELL HOLES

The Contractor must:

1. Excavate to provide adequate clearance for tools and methods of pipe installation.
2. Do not allow any part of bells or couplings to contact the trench bottom, walls, or granular embedment when pipe is joined.
3. Provide bell holes at each joint to allow the joint to be assembled and the pipe supported uniformly for the entire length of the pipe.

9.3.8 TRENCH BACKFILL

Backfill must not be installed during freezing weather conditions, unless approved by the Executive Director or designee. Frozen materials must not exist within any backfill or fill being installed. Backfill or fill based work must not occur on frozen surfaces.

Trenches shall not be backfilled until the Engineer or Owner's Representative has inspected and approved the pipe installation and jointing as being in compliance with the requirements of these utility development standards.

Bedding and initial backfill materials to a depth of 12-inches above the pipe shall be carefully deposited in layers not more than 6-inches thick, loose measurements, wetted to optimum moisture content and hand or mechanically compacted to, at minimum, 95% of the reference density for this material as described in Section 8.3.10: Compaction Requirements, Methods, Testing and Field Quality Control of these utility development standards. From 12 inches above the pipe to ground surface, the excavated material shall be placed in layers not to exceed 12-inches, thick loose prior to compaction.

Wherever trenches have not been properly filled, or if settlement occurs, they shall be reopened to the depth required for proper compaction and refilled and re-compacted as specified above and approved by the DAMDWCA Executive Director or designee.

Compaction methods and equipment may utilize hand and mechanical tampers and rollers. The equipment and procedures proposed by the Contractor shall be subject to the approval of the DAMDWCA Executive Director or designee.

In general, backfill will be that material originally excavated from the trench that meets the proper classifications, and will extend from 12 inches above the pipe to surface grade. Final backfill material shall be the same as that within the pipe embedment area except that the inclusion of a limited number of stones up to 6-inches in diameter will be permitted upon approval by the DAMDWCA Executive Director or designee.

Embedment materials, which consists of the bedding, haunch, and initial backfill material, shall be placed in 6-inch loose lifts and compacted as described herein. If over-excavation is required, bedding material is to be compacted to 95% of the maximum dry density as determined by the Modified Proctor density test (ASTM D-1557). Haunching material shall be placed by hand and worked under the pipe haunch to provide adequate side support for the pipe and eliminate voids. Haunching and initial backfill

material shall be compacted to 85% of the maximum dry density as determined by the Modified Proctor density test (ASTM D-1557).

Final backfill shall not be placed until the pipe embedment material is placed and compacted, and the Engineer or DAMDWCA's Representative have inspected and approved the installation. Final backfill shall be placed in loose lifts not to exceed 10-inches unless otherwise approved by the Engineer or Owner's Representative.

Under existing and proposed roadways, to 10-feet on either side of the road, bedding and backfill materials shall be carefully deposited in layers not more than 6-inches thick, loose measurements, wetted to optimum moisture content and mechanically compacted as described in Section 8.3.10: Compaction Requirements, Methods, Testing and Field Quality Control.

In areas where pavement is to be replaced, or in roads that are to be paved, no rocks or stones that will interfere with subgrade preparation shall be included in the backfill within 12-inches of the finished subgrade elevation. The upper 12-inch layer, forming the subgrade for pavements, shall be compacted to a density of at least 95% (ASTM D-1557 - Modified Proctor Test).

Cement slurry can be substituted for compacted native backfill and subgrade if approved by Engineer or Owner's Representative. The cement slurry shall consist of one sack of cement to one cubic yard of concrete sand and shall be placed from the concrete truck at a slump of six (6) to eight (8) inches. Steel plates five-eights (5/8) inches thick are to be placed over the trench with at least six (6) inches overlap on each side and edged with asphalt.

9.3.9 BACKFILL AND BEDDING MATERIALS

All backfill material shall be approved in advance of installation by the Engineer or Owner's Representative. Materials shall be obtained from areas approved by the Engineer or Owner's Representative. Backfill material will not be paid for separately but shall be considered as subsidiary to and a part of the cost for the applicable contract bid item.
Embedment materials, being the material from the bottom of the trench to the top twelve (12) inches above the pipe, includes the pipe bedding material (upon which pipe is laid), haunching material (extending from the pipe bottom to the pipe centerline), and initial backfill material (extending from the pipe centerline to twelve (12) inches above the pipe). Native soil used for embedment must be free from clods of earth or stones larger than one (1) inch in any dimension, organic refuse, debris, frozen soil, and other objectionable material. If the native soil does not meet these criteria, the Contractor shall screen the material as applicable or import special bedding material.
The following material list provides criteria for bedding and embedment materials:

1. Bedding Materials:
    A. Bedding materials are those materials located a maximum of 8" below bottom of pipe to the bottom of pipe, depending on bedding class or condition required.
    B. Native material meeting ASTM D2321, Class I, II and III, granular non-cohesive
    C. soils are acceptable as bedding material.
    D. In no case shall initial backfill material contain particles with any dimension greater than 1.25."
    E. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.

F. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

2. Haunch Materials:
   A. Haunch materials are those materials located from the bottom of pipe to the spring line of pipe.
   B. Native material meeting ASTM D2321, Class I, II and III, granular non-cohesive soils are acceptable for use as haunch material.
   C. In no case shall haunch material contain particles with any dimension greater than ¾."
   D. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.
   E. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

3. Initial Backfill Materials:
   A. Initial backfill material is that material placed above the bedding and haunch material, from the spring line around and over the pipe to 12" above the top of the pipe.
   B. Native material meeting ASTM D2321, Class I, II and III, granular non-cohesive soils are acceptable for use as initial backfill material.
   C. In no case shall initial backfill material contain particles with any dimension greater than ¾."
   D. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.
   E. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

4. Final Backfill Materials:
   A. Final backfill materials are those materials placed in the trench between the initial backfill material and the top of the trench.
   B. Native material meeting ASTM D2321, Class I, II and III, IV or V are acceptable for use as final backfill material, except for areas beneath paved surfaces requiring engineered fill.
   C. In no case shall final backfill material contain rocks with any dimension greater than 6".
   D. Other native soil materials requiring Engineer's interpretation should have prior written approval for use.
   E. Native material not meeting the ASTM classifications shall be replaced with imported special backfill material.

5. Materials Not Allowed:
   A. All pipe bedding and backfill material shall be clean and free of any contaminants that could endanger public health such as petroleum, oil, or waste contaminated material.
   B. Mine tailings shall not be used for pipe bedding or backfill material.

6. Imported Special Backfill Material: If required, special bedding and backfill material shall consist of sand, sandy gravel, or other suitable granular material having a maximum plasticity index of 6, with 100% of the bedding material smaller than 3/4-inches, and no more than 5% passing a No. 200 sieve.

9.3.10 COMPACTION REQUIREMENTS, METHODS, TESTING, AND FIELD QUALITY CONTROL

Unless otherwise superseded by applicable right-of-way permits, initial and final backfill and gravel surfacing shall be compacted to the following minimum requirements. The minimum acceptable percent of compaction is the in place dry density divided by the reference density multiplied by one

hundred (100). Compacted soil must also be at plus or minus two (2) percent of the optimum moisture content.

1. Under any existing or proposed pavement, curb and gutter, sidewalk, roadway, shoulder, alley, slab, footing, canal embankment, or when within two (2) feet of above.
   A. Compact to 95% ASTM D-1557.
2. Within any gas, electric, or telephone utility easement, or within any street or road right-of-way outside the limits defined in item 8.3.10.A above.
   A. Compact to 90% ASTM D-1557.
3. All other locations not defined not defined in items 8.3.10.A or 8.3.10.B above.
   A. Compact to 85% or 100% of adjacent natural ground ASTM D-1557.

The Contractor, at their expense, must provide densities for the various bedding and backfill materials used. All tests must be performed by a certified soil testing laboratory approved by the Engineer, the DAMDWCA Executive Director or designee. If reference to natural ground is used, a nuclear gauge may be used to measure the density of the natural ground. The Contractor must submit for approval a testing plan which identified proposed testing locations prior to the start of any excavation work. The Contractor must provide copies of the Modified Proctor Tests with five (5) point minimum moisture vs. density curves.

The Contractor must coordinate the collection of soil samples for proctor testing with the DAMDWCA Executive Director or designee so that a DAMDWCA representative is on-site when the soil samples are collected.

Mechanical compaction methods are permitted, but water jetting methods are not permitted. The backfill must be uniformly moistened to plus or minus two (2) percent of the optimum moisture content, placed in sufficiently thin layers to obtain the specified results, and compacted with hand and/or pneumatic tamp, roller, hydro hammer, or other device which will obtain the specified density without injury to the pipe or related structures.

Backfill density testing must be performed in accordance with the latest versions of ASTM D-1556 (Sand Cone Method), ASTM D-2167 (Rubber Balloon Method), ASTM D-2216 (Moisture Content), ASTM D-2922 (Nuclear Density), and ASTM D-3017 (Nuclear Moisture Content). The Contractor must perform initial field density tests for each location as specified within this section at the expense of the Contractor.

The Contractor must perform at least one (1) compaction test every lift at each of the locations described in Section 8.3.10.A above in increments of two hundred fifty (250) linear feet. One compaction test must be performed every lift on each five hundred (500) linear feet of trench at locations described in Section 8.3.10.B or 8.3.10.C above. Exact test locations must be specified by the DAMDWCA Executive Director or designee. DAMDWCA may perform additional tests at their own discretion.

Should the results of any compaction tests indicate insufficient compaction, the area in question must be reopened to a depth required for proper compacting, refilled, compacted, and tested again at the expense of the contractor until a successful result is achieved. Two copies of the test results of any retesting performed by the Contractor must be provided to the DAMDWCA Executive Director or

designee, for approval prior to any permanent surfacing.

Improperly placed backfill, or locations where settlement has occurred, must be reponed to the depth required for proper compaction, refilled, and then compacted at the expense of the Contractor. The surface must be restored and resurfaced if necessary to accomplish any required grades.

9.3.11 INSTALLATION

Should a pipe have the grade or joint disturbed after that pipe is installed, it must be removed and reinstalled. During reinstallation, all open ends of pipes must continue to have a valve, plug, or similar cap installed to prevent the interior of the pipe from being filled with debris.

PVC pipe may be field cut with circular saws or similar equipment. Field cutting must be done to give a smooth end at a right angle to the longitudinal axis of the pipe. Spigot ends must be deburred and beveled to provide a smooth texture to the pipe end and re-marked with the insertion line. The factory bevels should be matched by the length and angle of the field bevels.

DI pipe may be field cut with rotary wheel cutters, pipe saws, or similar equipment so long as it conforms to the pipe manufacturer's specifications. The cut ends and any rough edges must be ground to a smooth finish. Push on joints must have the cut end beveled, so long as it conforms to the pipe manufacturer's specifications.

The pipe spigot end's sealing surface, as well as fittings, pipe bells, and any elastomeric gaskets, must all be cleaned immediately before being assembled. Any factory installed gaskets must not be removed to be cleaned. Pipe joints must be free of any debris such as dirt, sand, grease, or other foreign material. Lubricants that conform to the pipe manufacturer's specifications may be applied as outlined in those specifications during assembly. Only manufacturer provided gaskets for the respective pipe may be used.

When distributing pipe materials at the work site, each piece of pipe must be unloaded opposite or near the final location where the pipe will be laid into the trench. Pipe must be installed in such a manner that only a minimum amount of damage to the pipe exterior can occur. Any damaged piping must be repaired or replaced with approval from the Executive Director or designee.

The procedure for installing push on joints must be by inserting the spigot end into the bell end of the pipe. The pipe must be kept straight while pushing the joint in until the installation is completed. Should a deflection in the pipe be needed as required by the Contract Documents, it must be done after the assembly of the joint. Timber headers must be used against the pipe when the pushing action is done by mechanical equipment. The contractor must visually inspect all assembled joints when completed, and additional inspections by using a feeler gauge or similar methods may be required by the Executive Director or designee.

Pipes must use a rigid rubber gasket on the exterior of the pipe to seal the pipe into the grout at manholes.

Sewer lines must be cleaned of all sand, gravel, dirt, and other foreign materials after installation.

9.3.12 THRUST RESTRAINTS AND THRUST BLOCKING.

Thrust blocking, anchors, joint harnesses, or other acceptable means of pipe movement prevention must be used for un-lugged bell and spigot ends, all un-flanged tees, Y branches, bends deflecting twenty-two and a half (22 ½) degrees or more, plugs and caps, fittings in fills or unstable grounds, and if located above grade or in an exposed structure. The installation of these pipe movement prevention must be done whether indicated in the Contract Documents or not.

MJ used on PVC must conform to the manufacturer of the fitting's specifications. The spigot ends of the pipe may require shortening to be used with MJ or fitting joints.

At each dead end, bend, valve, tee, unrestrained hydrant, unrestrained reducers, or fittings, and in changes in pipe diameters or direction, thrust restraints must be provided.

The socket and plain ends of MJ on DI pipe must be cleaned. The gasket and plain end should also be lubricated by brushing the two components with soapy water or an approved pipe lubricant as per AWWA C111/A21.11, immediately before the gasket is installed on the plain end. The gland and gasket must then be installed on the plain end. The pipe can then be inserted into the socket so that the socket is firm and even around the circumference, with the joint held straight during the assembly. The gland and socket components must then be assembled before inserting the joint manufacturer approved bolts and nuts. The bolts and nuts must then be hand tightened. Should any deflection in the pipes be required, they must be done after the joint assembly is done and before the bolts are tightened. The bolts must then be tightened to the normal torque range as per AWWA C600-10 and the manufacturer's specification. The gland and the face of the flange must have the same distance between the two at all points around the socket. The joint can then be tightened by alternately tightening the bolts on opposing sides until all bolts meet the required torque range.

Should a PVC or DI joint restraint be used, it must be installed per the manufacturer's recommendations and specifications.

Concrete thrust blocking may only be used when the Project site conditions do not allow the use of MJ fittings unless shown on the Contract Documents. The DAMDWCA Executive Director or designee must approve the use of concrete thrust blocking before it may be installed. The concrete thrust blocking must be located in such a way as to not come into contact with any bolts or nuts on the piping system necessary to be accessed for repair. If blocking is not practical or optional to the Contractor, metal harness anchorages across the joint must be installed. The Contractor must provide joint restraint computations for metal harnesses for continuous use.

9.3.13 DEFLECTIONS

Should the Contract Documents require the curvature of PVC pipelines, longitudinal bending may be used. The Contractor must use block or brace pipe joints to make sure that the PVC pressure pipe's bending does not result in a deflection of the gasketed or MJ that would exceed the manufacturer's published limits. This longitudinal bending in the PVC pipe must not result in a bending radius less than the limits set in AWWA C605-13 or the latest applicable edition of those standards.

Any bending of PVC pipe larger than twelve (12) inches (nominal diameter) must be first approved by the DAMDWCA Executive Director and must conform to the values set by the pipe manufacturer's axial-join-deflection limits. Table 1: Minimum Bending Radius in PVC Piping of these utility development

standards gives values for the minimum PVC deflections.

Should the Contract Documents require deflection at the joints of DI pipe, the amount of joint deflection must not exceed values given in AWWA C600-10 or the latest edition. The design of the deflected alignment must be limited to 80 percent of the values given in Table 2: Design Values for DI Curved Alignments within these utility development standards.

9.3.14 FITTINGS AND VALVES

Fittings must be provided and installed as indicated within the Contract Documents and these utility development standards. Fittings must also be of full-bodied, gasketed type. All tees and wye fittings must be installed at a forty-five (45) degree angle above the horizontal plane. If the gravity sewer main depth is justified as to requiring a deeper or shallower depth than shown on the Construction Plans or that is as deemed necessary, the Contractor must request this to be approved by the DAMDWCA Executive Director or designee before installation. Thrust restraints must be provided for fittings and valves as indicated within these utility development standards.

Valves must be placed with the operating stems in a vertical orientation, except for butterfly valve operating stems, which may be installed in a horizontal orientation. The full weight of the valves must not be supported by the pipe alone. Thrust blocks or restraints, or a combination of the two, must be provided for valves as described within these utility development standards.

The concrete collars used around valves must be eight (8) inches thick, have poured four thousand (4,000) psi concrete with two (2) number three (#3) rebar rings within the concrete installed around the valve “tops” that are flush with the existing grade or pavement. A 72-hour curing time is required prior to traffic loading, unless approved for otherwise by the DAMDWCA Executive Director or designee.

9.3.15 FORCE MAINS

The gravity sewer force mains must be constructed as mentioned within these utility development standards. Valves that are used or needed in the force main must be as dictated within these utility development standards and approved by the DAMDWCA Executive Director, or designee.

9.3.16 SERVICE LINES

Service lines must be installed as indicated within the Contract Documents, with locations approved by the DAMDWCA Executive Director or designee. Service line locations may also be determined by the Executive Director at time of construction.

Service lines must not be installed at a depth less than the minimum depth given in these utility development standards. Risers may be used where the gravity sewer main exceeds seven (7) feet and while possessing slopes greater than the minimum described in these utility development standards.

9.3.17 MANHOLES

Manholes must conform to these utility development standards. The manhole base sections, made of pre-cast concrete, must have a minimum curing time of twenty-four (24) hours, unless otherwise specified by the Executive Director or designee before any extension barrels or backfill are placed. Manholes installed at grade must have an eight (8) inch thick, four thousand (4000) psi concrete collars, which have two (2) number three (#3) rings within that concrete, poured around their tops flush with

finished or existing grade. A minimum curing time of seventy-two (72) hours is required prior to traffic loading unless otherwise approved by the DAMDWCA Executive Director or designee.

Manhole sections with chipped or crack joints must be rejected and replaced with an undamaged section.

When placing precast manhole sections, the end sections must be cleaned with a cold bituminous mastic applied to both sections. A preformed gasket may be installed in place of the bituminous mastic. All completed manholes must be rigid and watertight.

When installing preformed gaskets, the section joints must be thoroughly cleaned before installation occurs. The gasket must be installed in conformance with the manufacturer's recommendations. Only primers furnished by the gasket manufacturer may be used.

Manhole rings and covers must be installed by placing the rings in a bed of mortar on top of the manholes. The Contractor must ensure no infiltration will enter the manhole at this location. The mortar must be installed so that it is carried over the flange of the ring. Rings must be set so that the top of the ring is flush with all surfaces subject to foot and vehicular traffic, and four (4) inches above surfaces in open, untraveled areas or as shown within the Contract Documents.

Interior manhole finishes within a precast section must be installed after removing any excess mastic until flush with the precast section. Mortar must be installed in joint openings until flush with precast sections. Any chipped areas inside the manhole must be filled in with mortar. The DAMDWCA Executive Director or designee may require interior epoxy coating systems in areas that are at risk of elevated H_2S gas accumulation. The DAMDWCA Executive Director or designee may also require an exterior coating in areas where groundwater is present.

Manhole inverts must be installed by placing concrete in the bottom of the manhole and worked until a smooth transition is achieved. Shape the invert so that it conforms to the pipe it connects to. Any rough or sharp edges that can obstruct the flow must be removed so that material does not snag. Manhole inverts must be constructed in conformance with the Contract Documents.

Drop assemblies must be constructed as shown within the Contract Documents.

Manholes installed over existing sewer lines must be constructed in the same fashion as new manholes. Existing sewer flow must always be maintained, and prior approval of the proposed method for maintaining flow must be obtained by the DAMDWCA Executive Director, or designee. The crown of the existing pipe must be broken out and an invert installed to the pipe from the new manhole. The edges of the broken pipe must be covered with mortar and troweled smooth to the new invert.

Connections to existing manholes must be made during low-flow periods, and flow must be maintained at all times. Prior approval of the proposed method for maintaining flow must be obtained by the DAMDWCA Executive Director, or designee. The existing manhole must then be broken into, and the pipe invert reformed to provide a smooth flow transition. The area around the new pipe must then be covered with mortar to ensure a watertight structure.

A flexible joint must be installed in the rigid sewer pipe within two (2) feet of the manhole.

9.4 WARNING TAPE AND TRACING WIRE

During the installation of backfill, all sewer mains, service lines, and any system appurtenances must have a six (6) inch wide warning tape installed continuously above them, with the tape installed fifteen (15) inches below the final grade. At tape ends, tees, and similar locations, the warning tape must be tied or spliced together with a knot to create a continuous warning tape system throughout the length of the water line system. Taping materials must conform to the gravity sewer material specifications list given in these utility development standards. In addition to that material, the tape must have a permanent APWA sewer line green pigment at a maximum of thirty (30) inches along the length of the tape. As stated in the water material specifications of these utility development standards, the tape must have an imprinted continuous warning message stating, "CAUTION SEWER LINE BURIED BELOW."

Copper tracing wire must be installed in addition to the installation of warning tape with all installed gravity sewer mains. Black duct tape shall be used to attach the tracing wire on top of the pipe at ten (10) foot centers along the total length of the pipe.

As stated in the water material specifications of these utility development standards, the tracing wire must be twelve (12) AWG with solid core and copper wire. The wire's insulating coating or jacket must be blue in color with forty-five (45) mils of polyethylene insulation thickness of high molecular weight. The tracing wire must be HMW-PE and have a UL 600V rating for construction. The wire must also be usable in wet or dry applications. The wire gauge itself must be continuously attached along the entire length of all tracing wire coating and be able to be easily read.

Should a splice be required, or if a three (3) way splice is necessary, the wires must be joined together with a blue wire nut of suitable size placed inside a direct bury splice kit of suitable size. Bare wires must not be exposed anywhere, and all wires must be spliced to all other wires for a continuous tracing wire system.

The end of the wire must not be bare and have the coating jacket intact. The DAMDWCA Executive Director or designee will direct the location and frequency of test boxes. Testing boxes connected into the tracing wire systems will be required at a spacing along the force main of a minimum of 500 feet, and where the force main ends. Test boxes should always be placed outside of streets and curbs as directed by the DAMDWCA Executive Director or designee.

The tracing wire must not have any electrical connections to any metal pipes or metal service lines, and the tracing wire must not be damaged during its installation. Tracing wire must be tested for a continuous signal and shorts to ground across the entirety of the main and service lines before any asphalt or subgrade preparation may be installed or placed. The tracing wire must be able to conduct a continuous signal before piping will be accepted.

9.5 INSPECTION AND TESTING

The testing requirements within these utility development standards, which includes tracing wire and the testing of manholes, must be accepted by the DAMDWCA Executive Director or designee, before any sub grade preparation may begin. The Executive Director or designee must inspect all testing. The Contractor is responsible for all costs associated with a test method and must provide all testing materials needed for the respective testing procedure. The Contractor must submit the planned method of leakage testing to the DAMDWCA Executive Director or designee for approval before testing begins.

PVC sewer mains must undergo deflection testing, low-pressure air testing, exfiltration testing, visual grade, and alignment testing, and undergo flushing. Manholes must undergo leakage testing. All other pipe mains must undergo low-pressure air testing, exfiltration testing, visual grade, and alignment testing, and undergo flushing.

9.5.1 DEFLECTION TESTING

Mandrel testing may be used to evaluate that the maximum allowable deflection (reduction in vertical inside diameter) is achieved. The maximum deflection for PVC pipe is five (5) percent unless approved by the DAMDWCA Executive Director or designee. Up to seven and one half (7.5) percent may be allowed 30 days after final backfilling is completed. Deflection testing is not required for ductile iron sewer mains. Deflection testing may be conducted using a properly sized go-no-go mandrel or deflectometer.

Deflection testing using a mandrel must be compliant to ASTM D3034 or latest applicable edition or revision. The mandrels must be sized for a testing limit of seven and a half (7.5) percent of the statistical base that is inside the diameter of the portion of piping being evaluated. The pipe manufacturer's pipe dimensions and ASTM standards must be used when determining the sizing of the mandrel. It is the responsibility of the Contractor must present this information to the Owner prior to the testing time. The test procedure can be summarized as the Contractor pulling/pushing the mandrel through the section of piping undergoing the testing.

Deflection testing is required in all cases between manholes. All locations with excessive deflection must be excavated and repaired by re-bedding or replacement of the pipe.

9.5.2 LOW-PRESSURE AIR TESTING

The low-pressure air leakage testing for installed sewer piping, which includes the sewer main itself, fittings, branches, laterals, and other components, must comply to ASTM F 1417-92. This leakage testing must utilize the time pressure drop method. UNI-B-6-98 or the latest edition or revision. Any equipment and personnel needed to conduct the tests, take, and record measurements, and any other materials must be provided and paid for by the Contractor. Should a component of the sewer system fail the leakage test, that component must be located, removed, and replaced, repaired, and retested until a successful test is achieved.

The pipe sections and components that are to undergo leakage testing must maintain air pressure without dropping half (0.5) a psi in the range of three and a half (3.5) to three (3) psig after the added pressure caused by ground water is incorporated, explained further in the next paragraph. The minimum amount of time that the leakage test must be conducted is seen below in Table 21: Gravity Sewer Leakage Testing Duration for 0.5 psig Pressure Drop.

Table 25: Gravity Sewer Leakage Testing Duration

Pipe Diam. (in.)	Min. Time (Min.:Sec.)	Length for Min. Time (ft.)	Time for a Longer Length (sec.)	Specification Time (min:sec) Based on Length (L)							
				100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	1:53	597	0.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926L	21:33	32:19	43:56	53:32	64:38	75:24	86:10	96:57
36	17:00	66	15.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:53	115:23

Note: Should a lateral or branch containing test section fail the above time interval, the time may be recalculated as shown in the above applicable utility development standards.

If groundwater is present during the low-pressure air leakage testing, the testing pressure must be adjusted by forty-three hundredths (0.43) psi for every foot of water existing above the top of the sewer pipe. Should the ground water level or other condition cause the required pressure for the test to exceed nine (9) psi, the contractor may attempt to eliminate the groundwater presence or utilize an alternative test methodology upon approval of the DAMDWCA Executive Director or designee.

The procedure for leakage testing of gravity mains, fittings, and other components entails the plugging or capping of all open ends. Air is then slowly added to the testing section until a four (4) psi. pressure is achieved, plus any additional pressure due to ground water. At this point, the line and components must not drop more than half (0.5) psi for at least two (2) minutes. This time period is only for stabilization of the temperature. From this point, air is disconnected to the line, and lowered to three and a half (3.5) psi plus any adjustments due to ground water. A time is then recorded from the time it takes for the pressure to drop from three and a half (3.5) psi to three (3) psi, plus any adjustments for groundwater. The time for this to occur is then compared to Table 21. A recorded time shorter than that displayed on Table 21 will result in a failed attempt.

9.5.3 EXFILTRATION TESTING

Exfiltration testing for leakage must be performed on twenty-five (25) percent of the reaches of sewer piping between manholes as selected by the Executive Director. Should any reaches fail, the Executive Director may request that additional reaches be added to the testing length.
The Contractor may choose to test either single or multiple reaches of piping. The Contractor must provide all necessary piping between the reach to be tested and the water supply, along with all required materials and equipment.
The exfiltration testing procedure begins with blocking off all manhole openings expect those

connecting with the reach of pipe to be tested. The pipe must then be filled with water to the minimum depth at upper ends: four (4) feet above the pipe invert or four (4) feet above the groundwater level, whichever is higher. Water must then be added as required to maintain a constant level.
The maximum allowable exfiltration is one hundred (100) gallons per day per inch of nominal pipe diameter per mile of pipe. Manholes must be considered a section of forty-eight (48) inch pipe.
Failed reaches of pipe section must be isolated until a leak can be found. Leaks or other cause for excess exfiltration must be repaired or replaced as needed until a successful testing result can be achieved.

9.5.4 LEAKAGE TESTING OF MANHOLES

Manholes must be tested for leakage using either the hydrostatic or vacuum testing procedures described below.
The hydrostatic leakage testing of manholes must be in accordance with ASTM C-969. The mains into and out of the manhole must be plugged using a suitable device, such as a tethered pneumatic plug. The manhole must then be filled with clean or dyed water up to the ring of the manhole. A period of one hour must then pass to allow for concrete absorption and to allow the water level to stabilize. After this hour has passed, the manhole must be refilled to the original level and the water level recorded. The hydrostatic tests then begins and must be administered for four (4) hours. If the water level drops more than one-quarter (1/4) of an inch per foot of depth over the four (4) hour period, than the leakage is considered excessive, and the Contractor must make all necessary repairs and retest the manhole. The exterior of the manhole must also be inspected during this period for visible evidence of leakage. Visible moisture, sweating, or the production of beads of water on the exterior of the manhole must not be considered leakage, but any water running across the exterior concrete surface will be considered as leakage and must be repaired to the satisfaction of the Executive Director regardless of the volume of water lost during the test.
The procedure for vacuum leakage testing of manholes must be in accordance with ASTM C-1244. The vacuum test head must be placed inside the top section of the manhole. The seal is then inflated in accordance with the manufacturers' recommendations. A vacuum of ten (10) inches of mercury must be drawn and the vacuum pump shut off. With valves closed, record the time that elapses from the moment the vacuum pump is shut off to the moment that the vacuum pressure drops to nine (9) inches of mercury. The test can be considered passed should the elapsed time be greater than sixty (60) seconds for 48-inch diameter manholes, seventy-five (75) seconds for 60-inch diameter manholes, and ninety (90) seconds for 72-inch diameter manholes. Should a manhole fail this test, remove the testing equipment from the manholes, locate, repair, and/or replace any sources or cause of the leaks until a successful testing result is achieved.

9.5.5 SEWER PIPING VISUAL GRADE AND ALIGNMENT TESTING

Sewer main final grades must be installed in a way in which no noticeable depressions or humps in the finished grade can be identified. In addition, invert elevations of the installed main must not exceed plus or minus two-tenths (0.2) of a foot from the elevations either shown or computed from the Construction Drawings.

Sewer main final grades must be inspected through visual testing. This testing must be conducted on up to twenty (20) percent of the total pipeline quantity to ensure that the minimum slope, or flatter than that value, complies to values shown within the Contract Documents. Visual testing must be performed using a Contractor supplied remotely operated CCTV robot equipped with the means for measuring slope akin to the function of an inclinometer. The testing must also be able to produce a pipeline profile report. This testing must be done in the presence of the Executive Director or designee. The Contractor

must assume all costs of visual testing regardless of if the test passes or fails.

Should the inclinometer or like device detect any dips or sags located in the tested piping finished grades, the visual test can be considered a failure. Failure of any visually tested pipe sections will require the Contractor to excavate and re-lay or re-bed the piping until a successful test is completed.

Sewer main alignments must be inspected by visual testing using a light source. After the gravity sewer lines have been completely backfilled and the Contractor has verified the line is ready for visual testing, DAMDWCA Executive Director or designee must check the alignment by shining a light between manholes. Any deviation from true line or grade may be cause for rejection of the line. Any deviation from the true line or grade which prevents water from draining by gravity from the sewer system, including manholes, must be corrected so that the facilities comply with the Contract Documents. For horizontal alignment only, a deviation allowance of one-quarter (0.25) of the inside of the pipe diameter may be exempted by the DAMDWCA Executive Director or designee.

9.5.6 FLUSHING

The Contractor must flush all sewer lines prior to the pre-final inspection so that all sand, silt, and other foreign material which might have entered the pipe during construction is removed. The water used for flushing must be of domestic quality unless otherwise approved by the DAMDWCA Executive Director or designee. Flushing must be made after the line has been completely backfilled. The Contractor must dispose of all water and foreign matter after flushing in an approved manner.

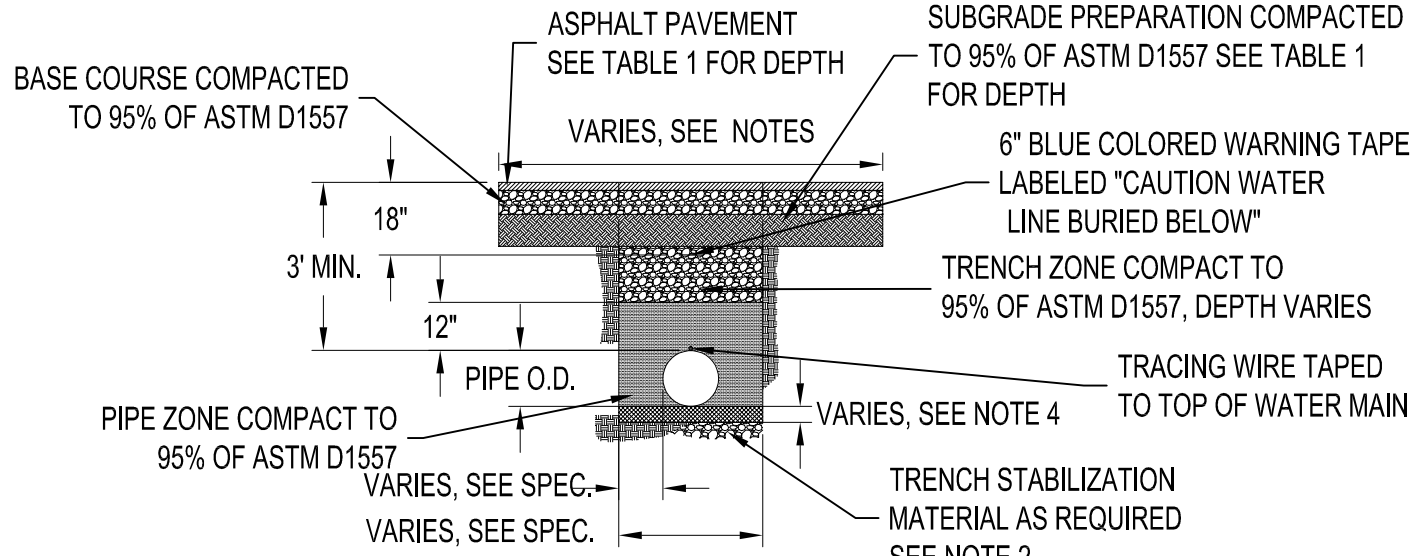
10 AIR VACUUM SEWAGE SPECIFICATIONS

DAMDWCA's preferred method of wastewater transport is the utilization of gravity sewer systems. The DAMDWCA Executive Director, or designee, must approve of the request to utilize air vacuum technology.

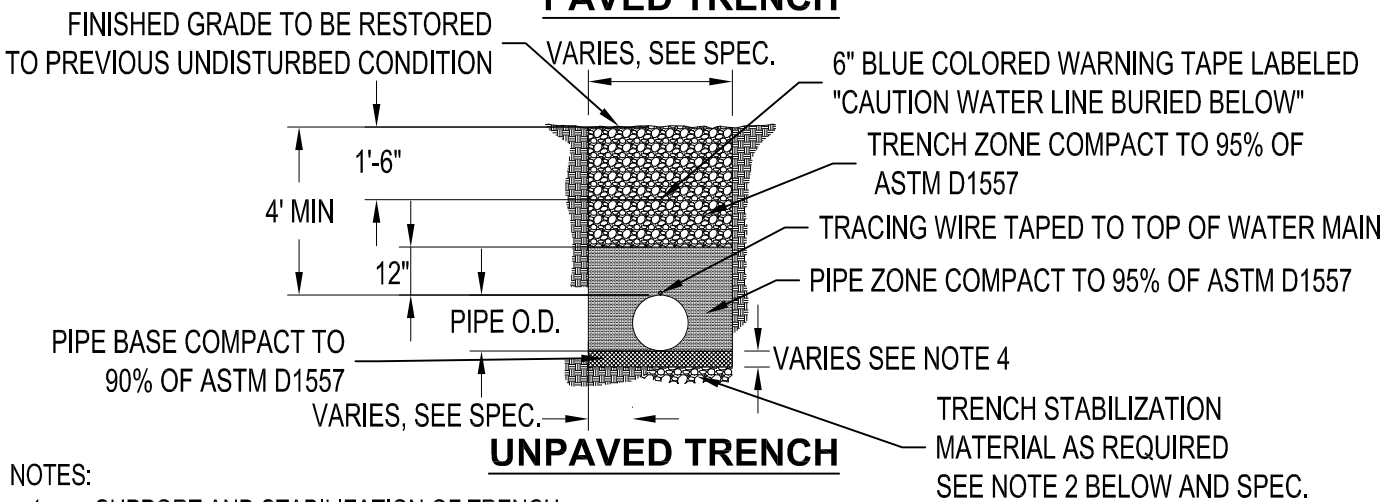
If approval is given by the DAMDWCA to the Design Professional, the following stipulations must also be adhered to:

1. DAMDWCA will only consider air vacuum sewage systems designs that utilize The Aqseptence Group® Airvac® products.
2. It must be known to the Design Professional that critical design considerations, including but not limited to peak day flow, system head losses, pit locations, number of connections allowed to each pit, main and service line alignments, and sawtooth piping design. The system design must meet Airvac® design criteria and approval. It is in the best interest of the Design Professionals to consult Airvac® during the design process and to utilize the Airvac® Municipal Design Manual.
3. Airvac® representatives must review the Design Professional's final design and construction drawings and approve of those items before construction begins.
4. Any work, materials, travel, or other items that Airvac® may charge to assist with the design, testing and operation of the system must be paid for by the Owner/Developer of the proposed air vacuum development system.

11 WATER UTILITY DETAILS



PAVED TRENCH



UNPAVED TRENCH

NOTES:

1. SUPPORT AND STABILIZATION OF TRENCH WALLS MAY BE NECESSARY.
2. ENGINEERED FILL SHALL BE REQUIRED FOR PIPE BASE AND PIPE ZONE WHEN COHESIVE SOILS ARE ENCOUNTERED.
3. COMPACT BACKFILL IN LOOSE LIFTS AND COMPACTION DENSITY AS LISTED IN LRGPWWA SPECIFICATIONS.
4. PIPE BASE THICKNESS:
   - 4.1. PIPE OD=16" OR SMALLER-PIPE BASE=4"
   - 4.2. PIPE OD=18" OR LARGER-PIPE BASE=6"
5. PAVEMENT CUT WIDTH:
   - 5.1. 10' FOR DAC
   - 5.2. AS APPROVED FOR NMDOT.

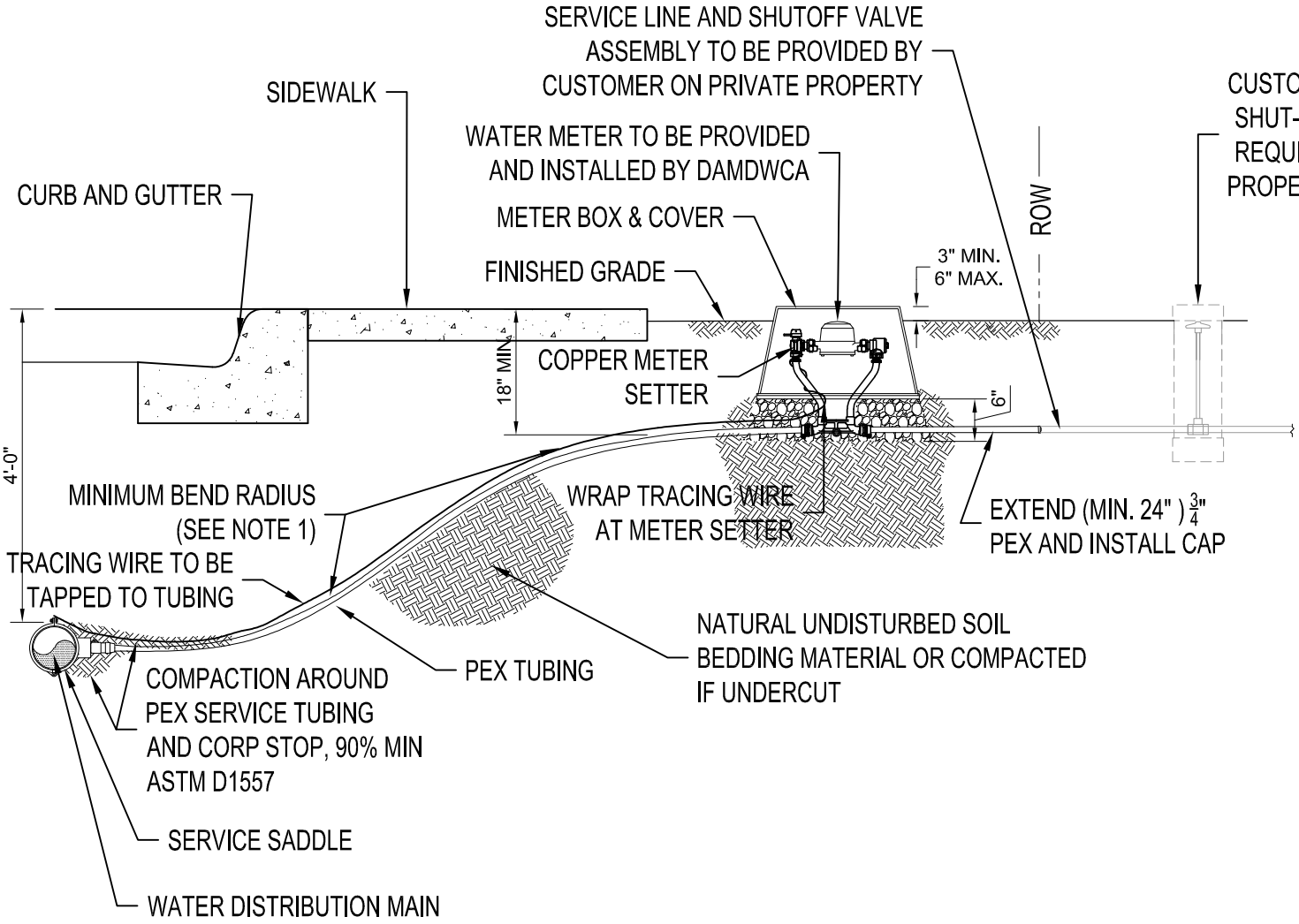
TABLE 1

LOCATION	ASPH. PVMT. DEPTH.	SUB GRD. PREP. DEPTH
DAC LOCAL ROADWAY	2 IN.	8 IN.
DAC COLLECTOR ROADWAY	3 IN.	8 IN.
DAC ARTERIAL ROADWAY	4 IN.	12 IN.
NMDOT ROADWAY	4 IN.	12 IN.

Dona Ana Mutual Domestic Water Consumers Association

TYPICAL WATER TRENCHING DETAILS

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-01	DRAWING NO. W-01



NOTES:

1. MINIMUM BEND RADIUS FOR HORIZONTAL AND VERTICAL BENDS NOT TO EXCEED 20X O.D. OF THE PE PIPING BEING USED.
2. SERVICE LINE IS TO CONNECT PERPENDICULAR TO THE WATER DISTRIBUTION MAIN.

Dona Ana Mutual Domestic Water Consumers Association

TYPICAL RESIDENTIAL WATER SERVICE FOR 3/4" TO 1" METERS.

REVISION	COMMENTS	BY	DATE
		###	###

FILE NAME: DAMDWCA-W-02	ORIG. DATE: 6/16/2025	LAST REVISION: ###	SCALE: NTS
DRAWING NO. W-02	APPROVED BY: TRH		

NOTES:

1. MINIMUM BEND RADIUS FOR HORIZONTAL AND VERTICAL BENDS NOT TO EXCEED 20X O.D. OF THE PEX PIPING BEING USED.
2. SERVICE LINE IS TO CONNECT PERPENDICULAR TO THE WATER DISTRIBUTION MAIN.

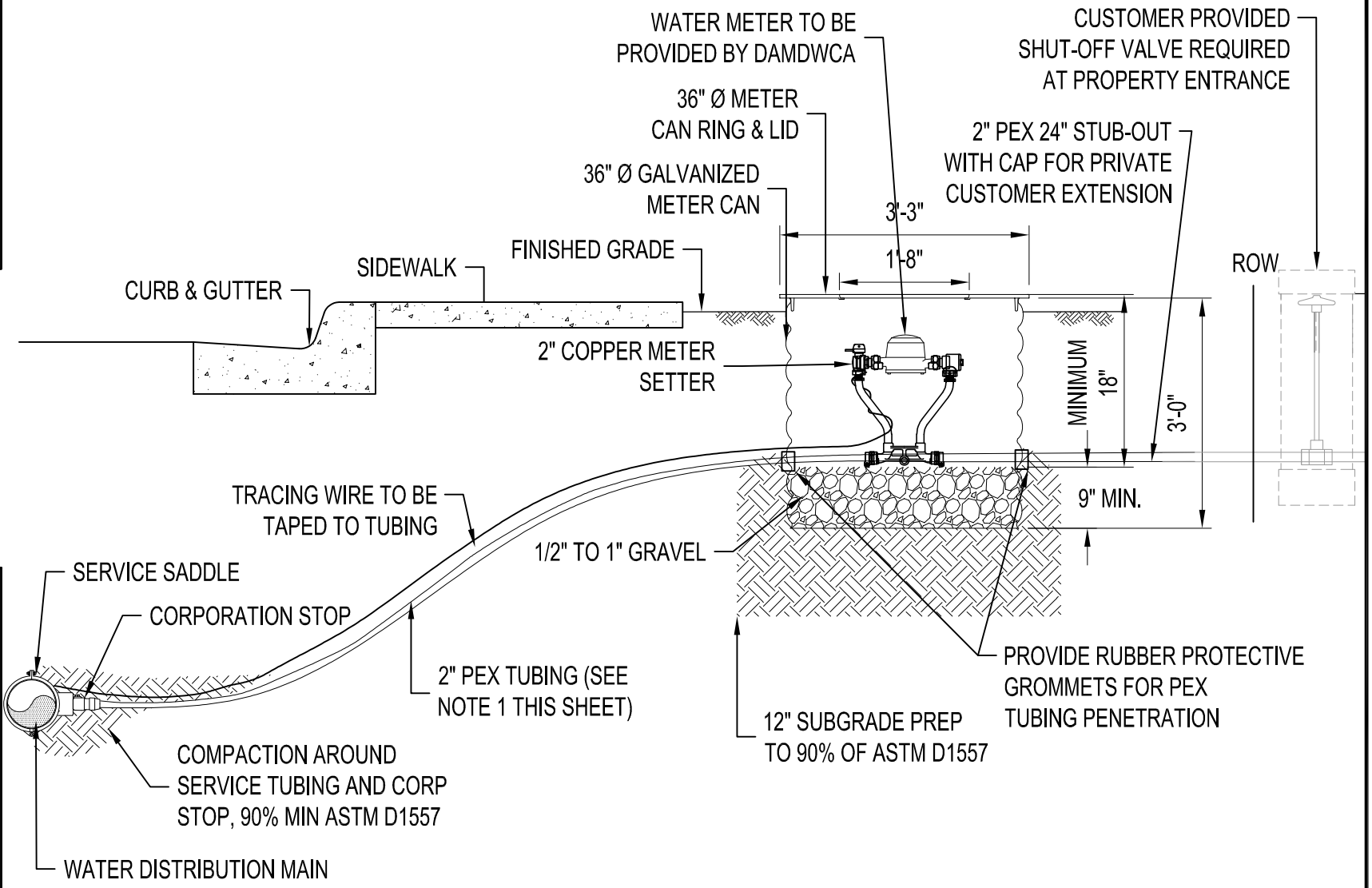
Dona Ana Mutual Domestic Water Consumers Association

INTERIM STAGE RESIDENTIAL WATER SERVICE FOR ¾" TO 1" METERS.

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-2A	DRAWING NO. W-2A

Dona Ana Mutual Domestic Water Consumers Association

TYPICAL COMMERCIAL WATER SERVICE FOR 1-1/2" TO 2" METERS.

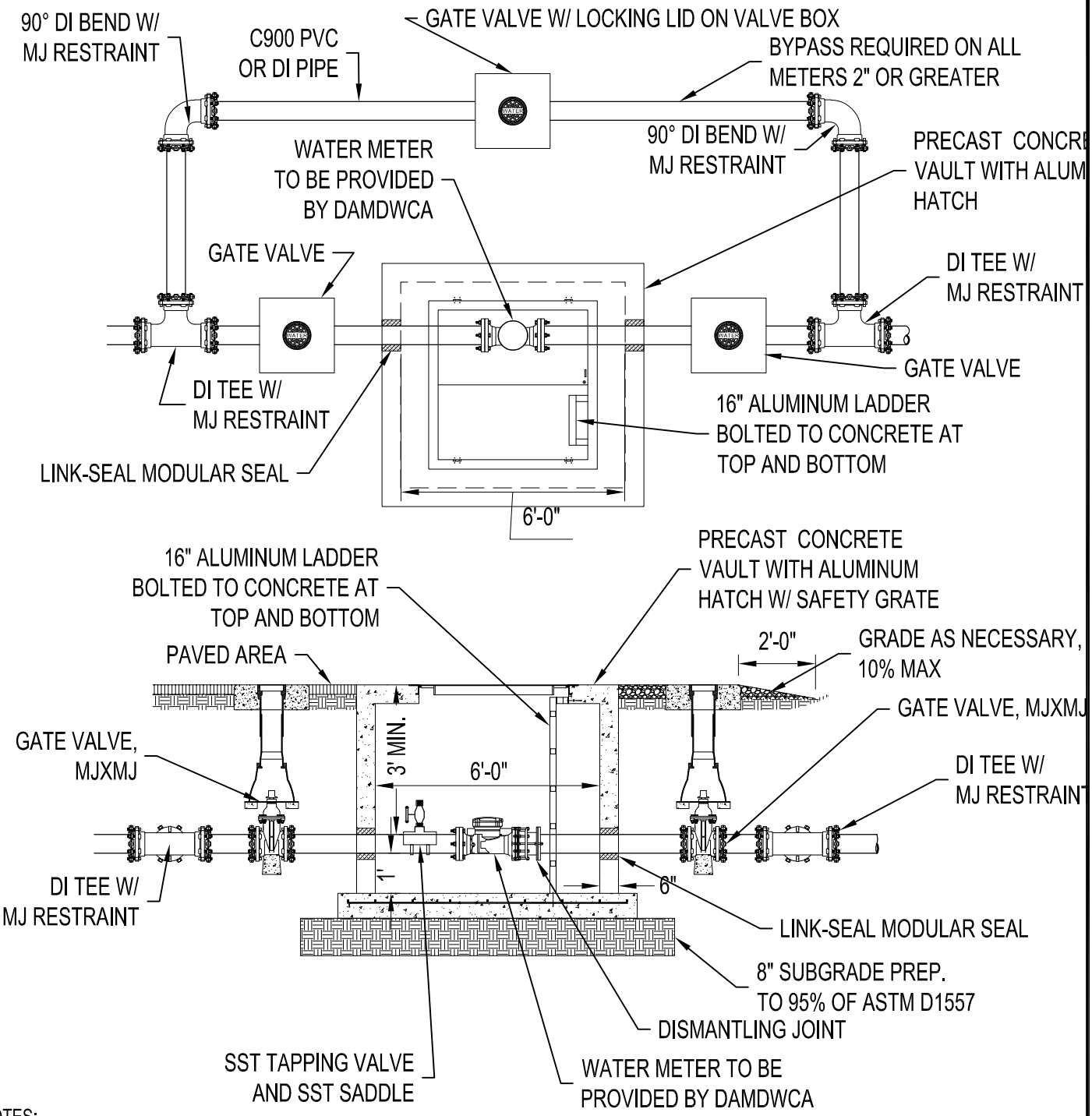


NOTES

1. MINIMUM BEND RADIUS FOR HORIZONTAL AND VERTICAL BENDS NOT TO EXCEED 8XOD OF THE PE PIPING BEING USED.
2. SERVICE LINE IS TO CONNECT TO WATER DISTRIBUTION MAIN AT AN ANGLE OF 10-20° ABOVE HORIZONTAL.

REVISION	COMMENTS	BY	DATE
		###	###

FILE NAME: DAMDWCA-W-03	ORIG. DATE: 6/16/2025	LAST REVISION: ###
DRAWING NO. W-03	APPROVED BY: TRH	SCALE: NTS



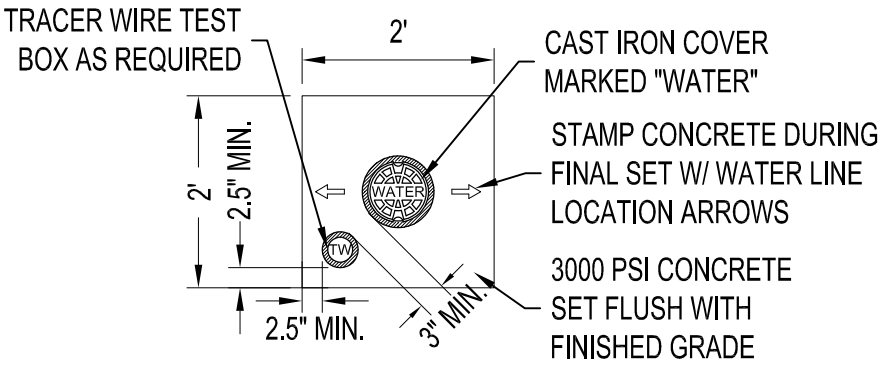
NOTES:

1. BYPASS IS REQUIRED ON ALL METERS LARGER THAN 2". PLACEMENT OF BYPASS PIPING AND VALVES TO BE COORDINATED WITH DAMDWCA.

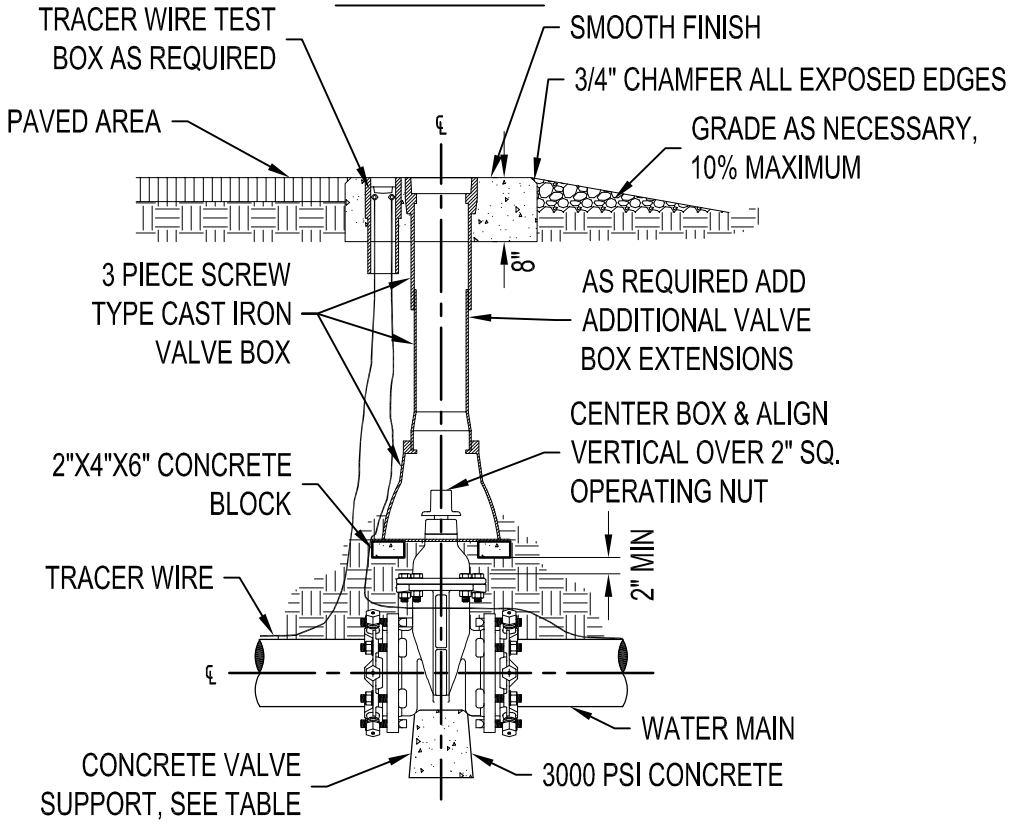
Dona Ana Mutual Domestic Water Consumers Association

COMMERCIAL WATER SERVICE FOR LARGER THAN 3" METERS

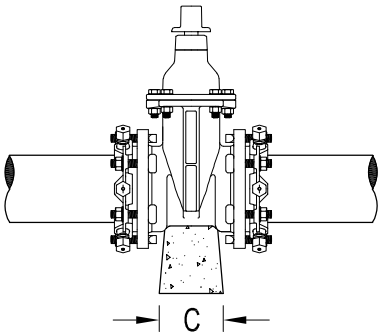
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-04	DRAWING NO. W-04



PLAN VIEW

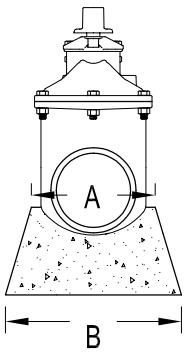


PROFILE VIEW



VALVE SUPPORT TABLE

VALVE SIZE	A	B	C
4 IN.	10 IN.	20 IN.	6 IN.
6 IN.	12 IN.	22 IN.	8 IN.
8 IN.	12 IN.	22 IN.	8 IN.
10 IN.	14 IN.	24 IN.	8 IN.
12 IN.	16 IN.	26 IN.	8 IN.
16 IN.	24 IN.	36 IN.	8 IN.



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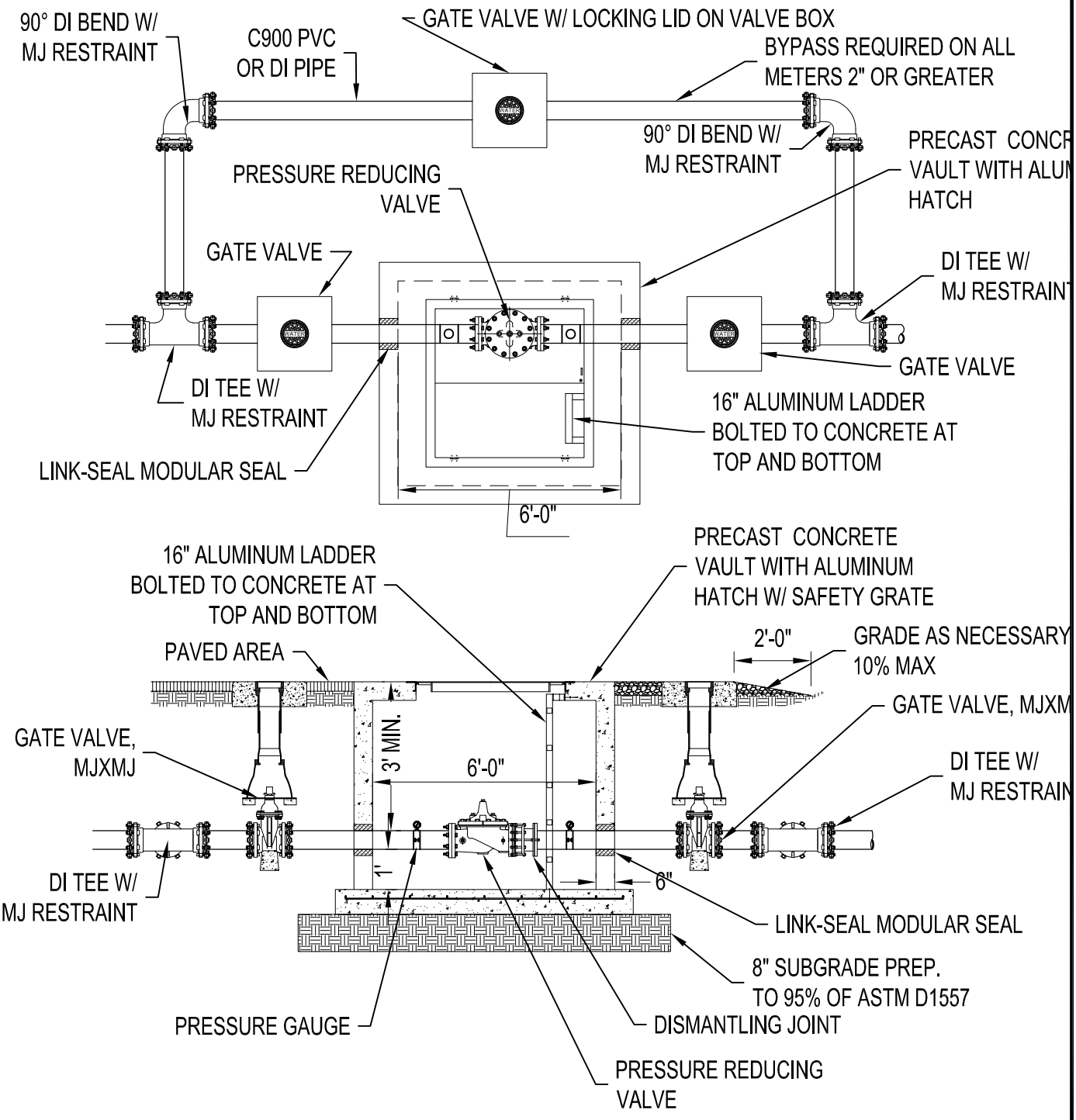
TYPICAL WATER VALVE DETAIL

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-05	DRAWING NO. W-05



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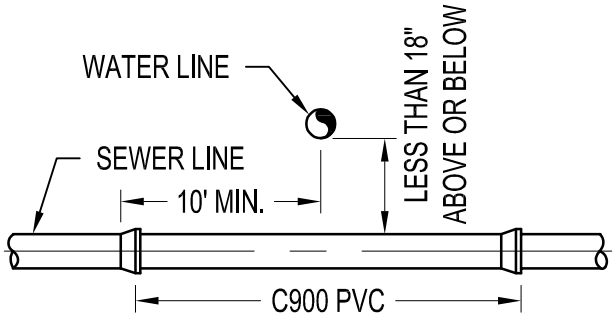
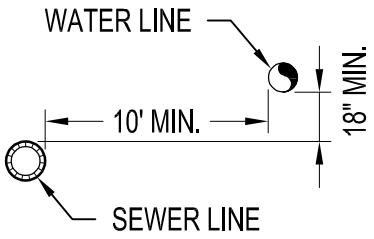
PRV VALVE VAULT

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-07	DRAWING NO. W-07



CROSSED LINES



PARALLEL LINES

NOTE:

1. FOR PARALLEL PIPELINES THAT DO NOT MEET THE 10' HORIZONTAL AND 18" VERTICAL SEPARATION REQUIREMENTS, PVC C900 OF EQUAL DIAMETER SHALL BE USED FOR THE SEWER PIPELINE.
2. FOR PIPELINE CROSSINGS THAT DO NOT MEET THE 18" VERTICAL SEPARATION REQUIREMENTS, PVC C900 OF EQUAL DIAMETER SHALL BE USED FOR THE SEWER PIPELINE. JOINTS FOR THE SEWER AND WATER PIPELINES SHOULD BE SPACED 10' AWAY FROM THE CROSSING.

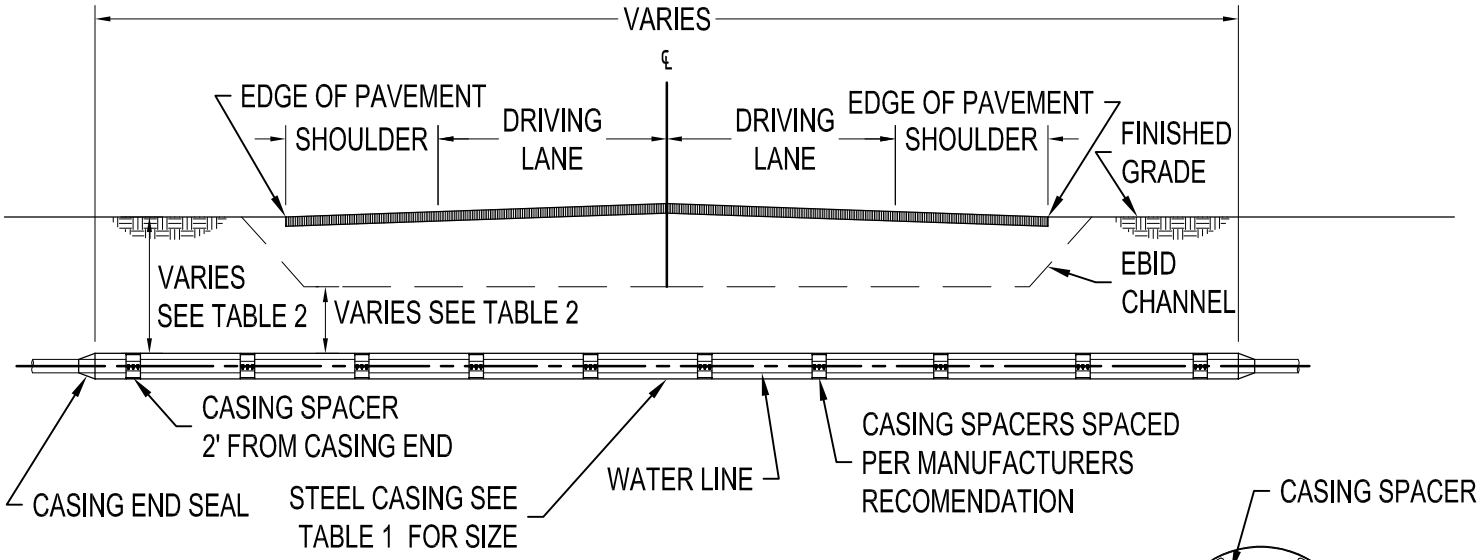
Dona Ana Mutual Domestic Water Consumers Association

PARALLEL AND CROSSED WATER/SEWER LINES

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-08	DRAWING NO. W-08

Dona Ana Mutual Domestic Water Consumers Association

WATER LINE BORE AND CASING



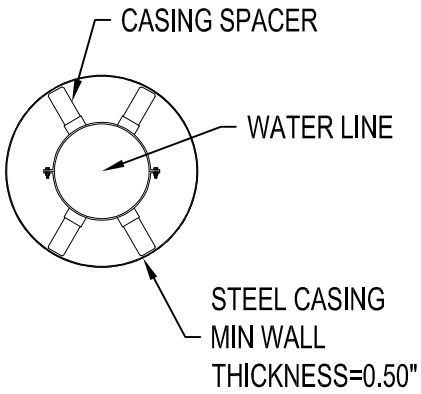


TABLE 1

PIPE DIAMETER	CASING DIAMETER
4"	8"
6"	12"
8"	16"
10"	20"
12"	24"
16"	32"

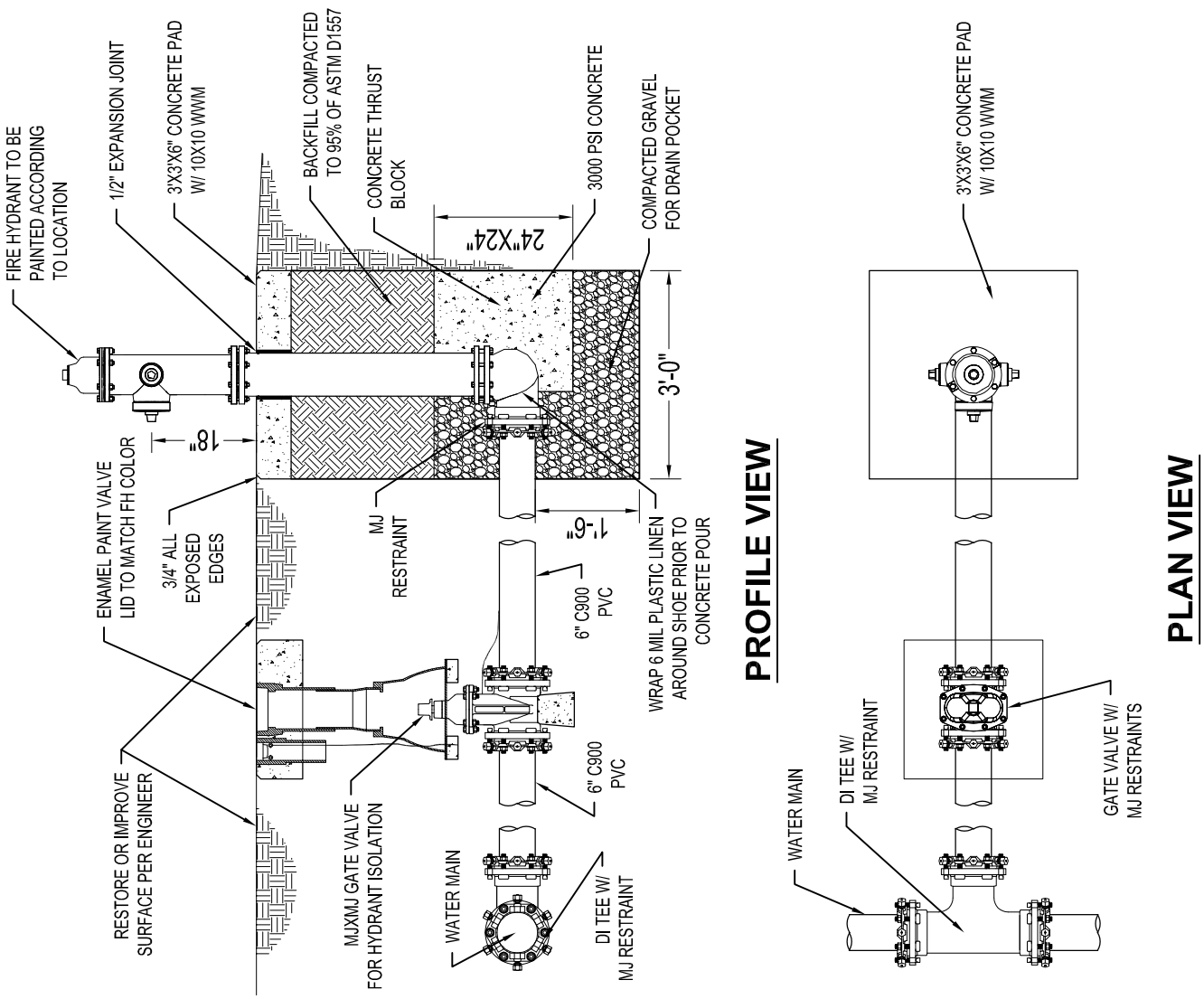
TABLE 2

ENTITY	MIN. BURY DEPTH
NMDOT ROW	5'
DAC ROW	4'
EBID ROW	4'
RAILROAD ROW	4'

NOTES:

1. BORE PIT SHALL BE A MINIMUM DISTANCE OF 5' FROM EDGE OF PAVEMENT
2. AS APPLICABLE WATER LINE TO BE RESTRAINED, BY THE USE OF RESTRAINED MECHANICAL JOINTS THROUGH CASING

REVISION		
COMMENTS		
BY	###	###
DATE	###	###
FILE NAME: DAMDWCA-W-09	ORIG. DATE: 6/16/2025	LAST REVISION: ###
DRAWING NO. W-09	APPROVED BY: TRH	SCALE: NTS



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FIRE HYDRANT DETAIL

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-10	DRAWING NO. W-10

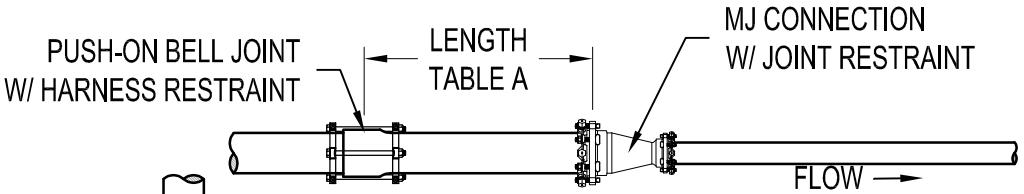
REVISION		
COMMENTS		
BY	###	###
DATE	###	###
FILE NAME: DAMDWCA-W-11	ORIG. DATE: 6/16/2025	LAST REVISION: ###
DRAWING NO. W-11	APPROVED BY: TRH	SCALE: NTS

Dona Ana Mutual Domestic Water Consumers Association

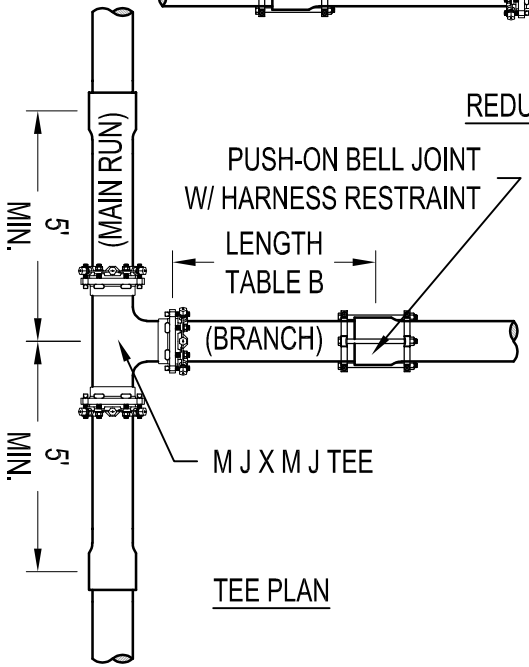
MECHANICAL JOINT RESTRAINT DETAILS 1

TABLE B

LENGTH TO BE RESTRAINED (L)								
	90° HORIZ. ELBOW	45° HORIZ. ELBOW	22 1/2° HORIZ. ELBOW	11 1/4° HORIZ. ELBOW	45° VERT. OFFSET 3.5' TO 5.0'	22½° VERT. OFFSET 3.5' TO 5.0'	11¼° VERT. OFFSET 3.5' TO 5.0'	DEAD END/ IN-LINE VALVE
3"	10'	5'	5'	5'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	UPPER - 10' LOWER - 5'	30'
4"	20'	10'	5'	5'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	UPPER - 10' LOWER - 5'	40'
6"	20'	10'	5'	5'	UPPER - 30' LOWER - 10'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	50'
8"	30'	10'	10'	5'	UPPER - 40' LOWER - 10'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	70'
10"	30'	20'	10'	5'	UPPER - 50' LOWER - 20'	UPPER - 30' LOWER - 10'	UPPER - 10' LOWER - 5'	80'
12"	30'	20'	10'	5'	UPPER - 50' LOWER - 25'	UPPER - 30' LOWER - 15'	UPPER - 15' LOWER - 10'	90'
14"	40'	20'	10'	5'	UPPER - 60' LOWER - 25'	UPPER - 30' LOWER - 15'	UPPER - 15' LOWER - 10'	110'



REDUCER PLAN



TEE PLAN

TABLE B NOTES:

1) CONTACT ENGINEER FOR RESTRAINT LENGTHS ASSOCIATED WITH OTHER VERTICAL OFFSET DEPTHS.

TABLE A

		LENGTH RESTRAINED (L)					
		LARGE					
		3"	4"	6"	8"	10"	12"
SMALL	3"		20'	40'	50'	70'	80'
	4"			30'	50'	60'	80'
	6"				30'	50'	70'
	8"					30'	50'
	10"						50'
	12"						

TABLE A NOTES:

1) FLOW FROM LARGE SIZE TO SMALL SIZE PIPE.

GENERAL DESIGN RESTRAINT NOTES:

1) BASIS OF DESIGN-EBAA IRON
2) PIPE MATERIAL: PVC Class 150
3) SOIL TYPE: SC, CLAYEY SAND, SANDY CLAY
4) TRENCH TYPE: 4
5) TEST PRESSURE: 150 psi
6) FACTOR OF SAFETY: 1.5 TO 1
7) DEPTH OF BURY: 3 FEET UNLESS OTHERWISE STATED.
8) ALL JOINTS WITHIN LENGTH "LGTH" ARE TO BE RESTRAINED.

TABLE C

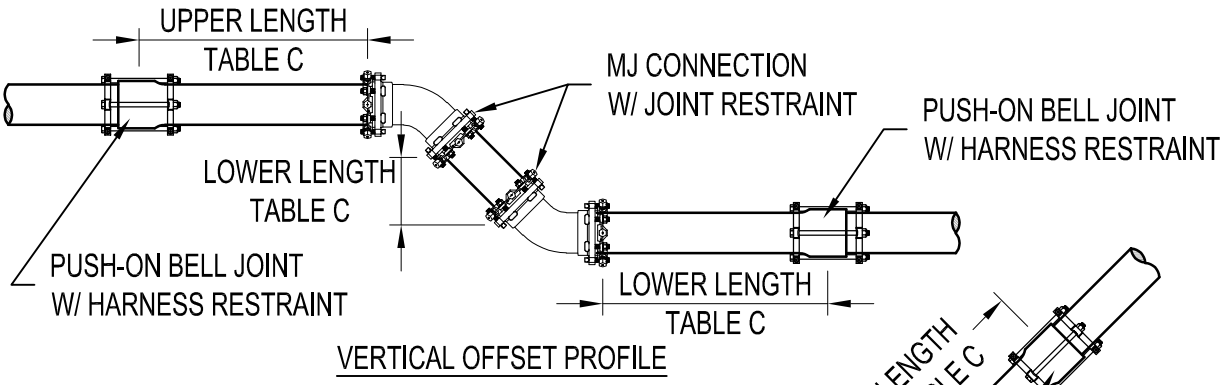
	LENGTH RESTRAINED (L) BRANCH (RESTRAINED)						
RUN	3"	4"	6"	8"	10"	12"	14"
3"	5'	10'	30'	50'	70'	80'	80'
4"	5'	10'	30'	50'	70'	80'	80'
6"	5'	10'	20'	40'	60'	70'	70'
8"	5'	10'	10'	30'	50'	70'	70'
10"	5'	10'	10'	30'	50'	60'	60'
12"	5'	5'	5'	20'	40'	60'	60'
14"	5'	5'	5'	5'	25'	45'	65'

TABLE C NOTES:

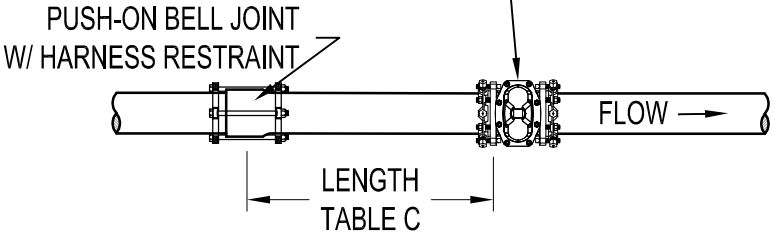
1) SHORTEST DISTANCE ALLOWABLE BETWEEN TEE END AND FIRST PIPE JOINT ON MAIN RUN IS 5 FEET.
2) FLOW DIRECTION THROUGH TEE DOES NOT AFFECT LENGTH OR JOINT TO BE RESTRAINED.

GENERAL DESIGN RESTRAINT NOTES:

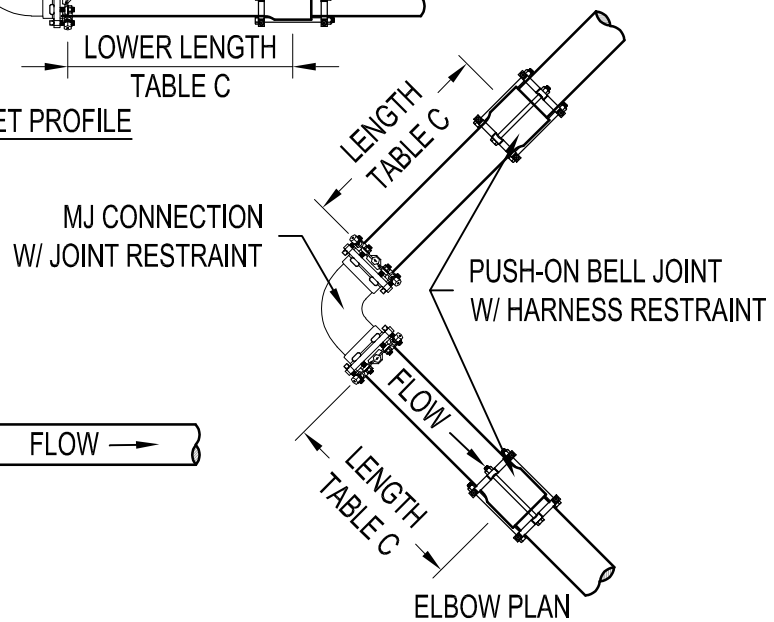
1) BASIS OF DESIGN-EBAA IRON
2) PIPE MATERIAL: PVC Class 150
3) SOIL TYPE: SC, CLAYEY SAND, SANDY CLAY
4) TRENCH TYPE: 4
5) TEST PRESSURE: 150 psi
6) FACTOR OF SAFETY: 1.5 TO 1
7) DEPTH OF BURY: 3 FEET UNLESS OTHERWISE STATED.
8) ALL JOINTS WITHIN LENGTH "LGTH" ARE TO BE RESTRAINED.



VERTICAL OFFSET PROFILE



VALVE PLAN

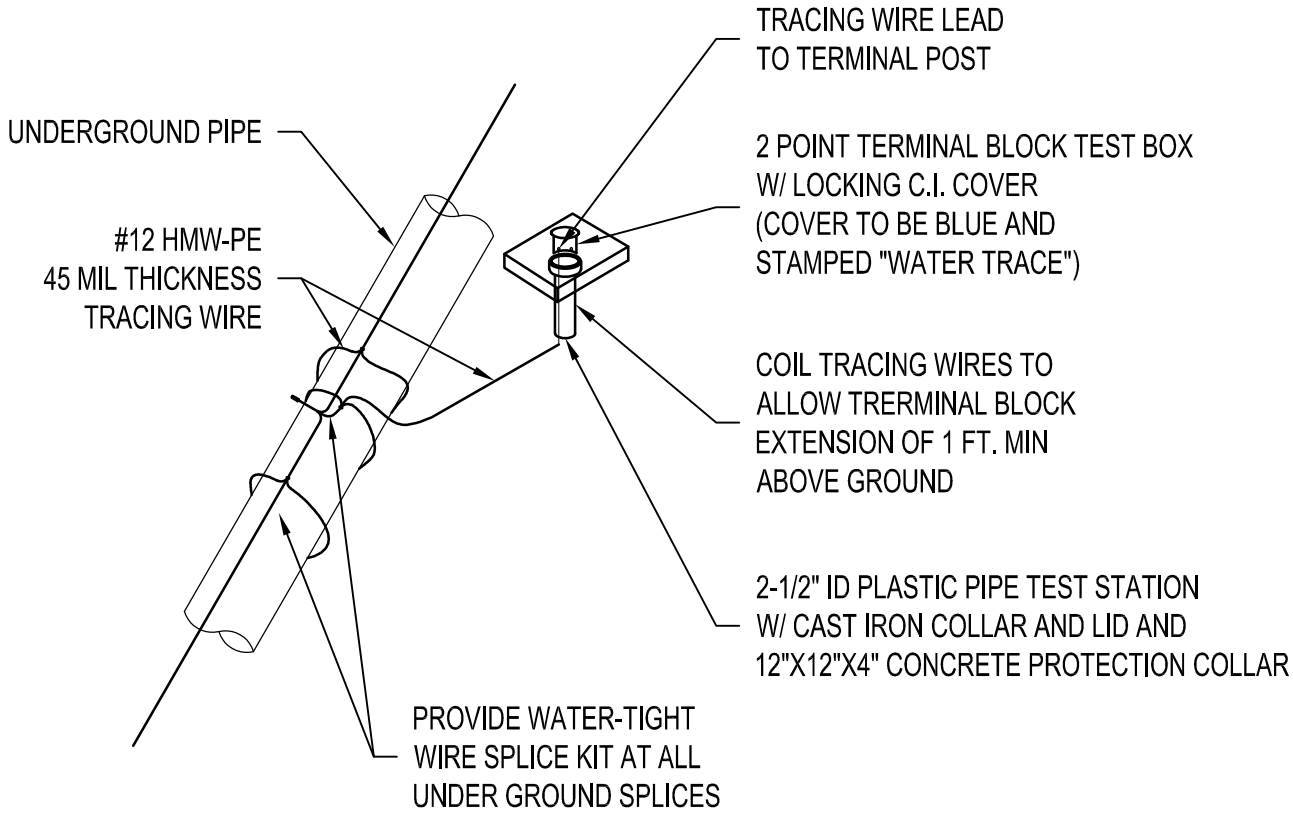


ELBOW PLAN

Dona Ana Mutual Domestic Water Consumers Association

MECHANICAL JOINT RESTRAINT DETAILS 2

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-12	DRAWING NO. W-12



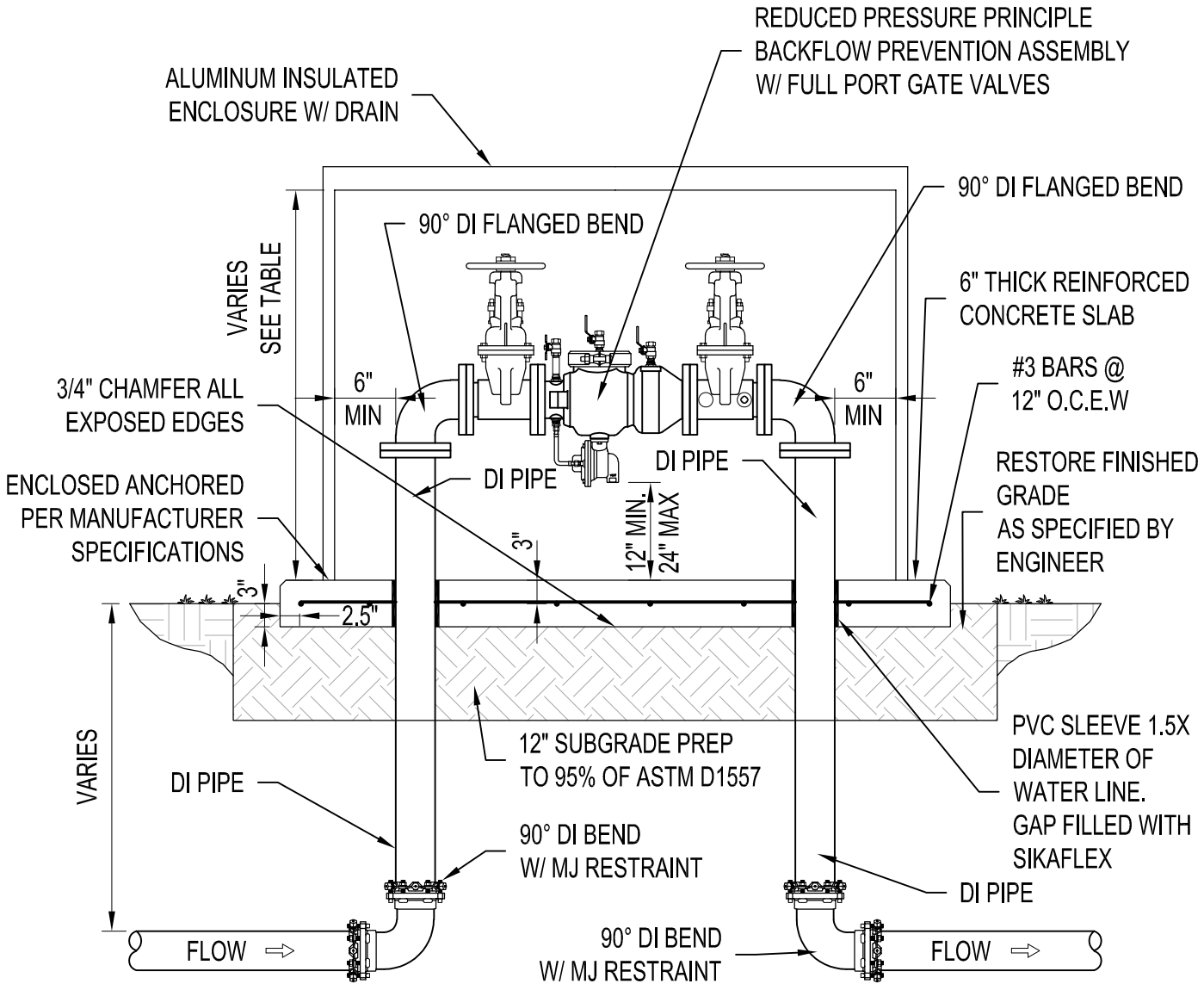
NOTES:

1. THE DISTANCE BETWEEN TEST BOXES SHALL NOT EXCEED 1500 FEET AS MEASURED ALONG THE BURIED PIPE.
2. USE VALVE BOXES IN PLACE OF TEST BOXES WHEN VALVES ARE SPACED LESS THAN 1500 FEET.
3. SPACING AND LOCATION OF TEST BOX AT EACH FIRE HYDRANT.
4. SPACING AND LOCATION OF TEST BOXES TO BE DETERMINED BY OWNER AND ENGINEER.

Dona Ana Mutual Domestic Water Consumers Association

TRACING WIRE TEST BOX

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-13	DRAWING NO. W-13



PROFILE VIEW

NOTE: PLAN VIEW SHOWN ON DRAWING W-14B

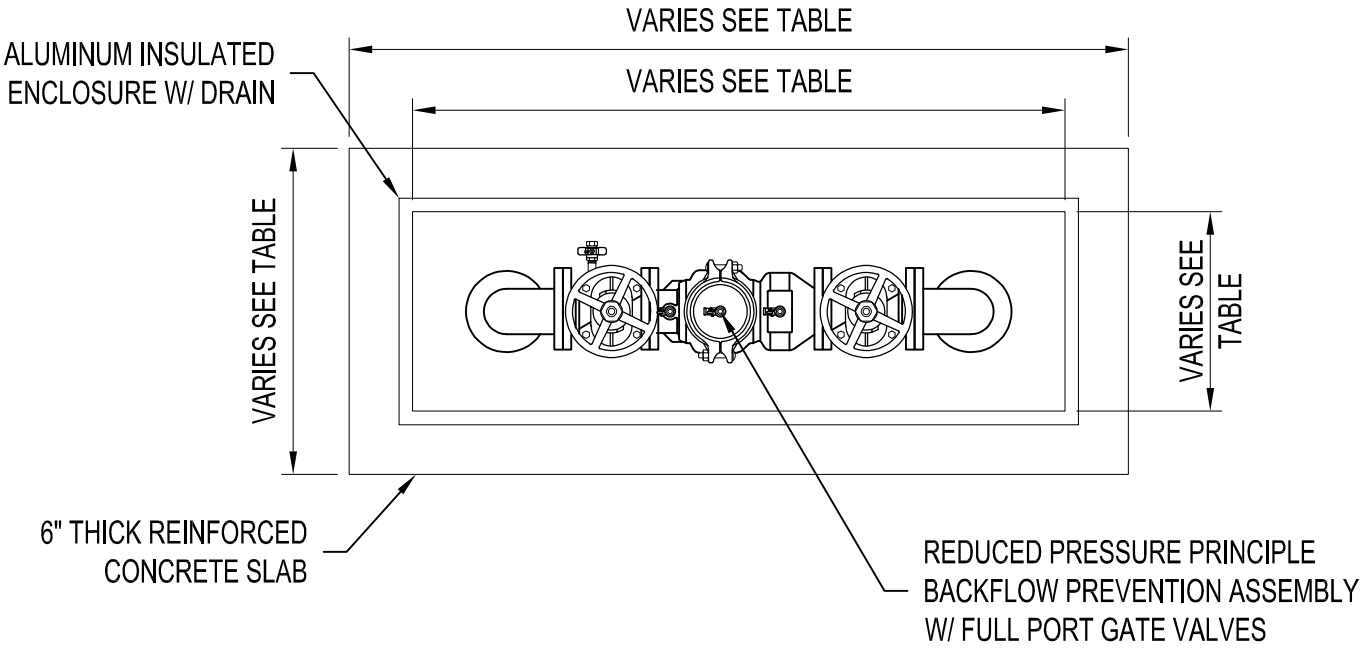
Dona Ana Mutual Domestic Water Consumers Association

3" AND LARGER BACKFLOW PREVENTION ASSEMBLY

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-14A	DRAWING NO. W-14A

TABLE

PIPE DIAMETER (IN.)	CONC. PAD LENGTH (IN.)	CONC. PAD WIDTH (IN.)	ENCLOSURE LENGTH (IN.)	ENCLOSURE WIDTH (IN.)	ENCLOSURE HEIGHT (IN.)
3	86	36	72	22	50
4	86	36	72	22	50
6	100	40	86	26	54
8	114	50	100	36	64
10	134	52	120	38	64

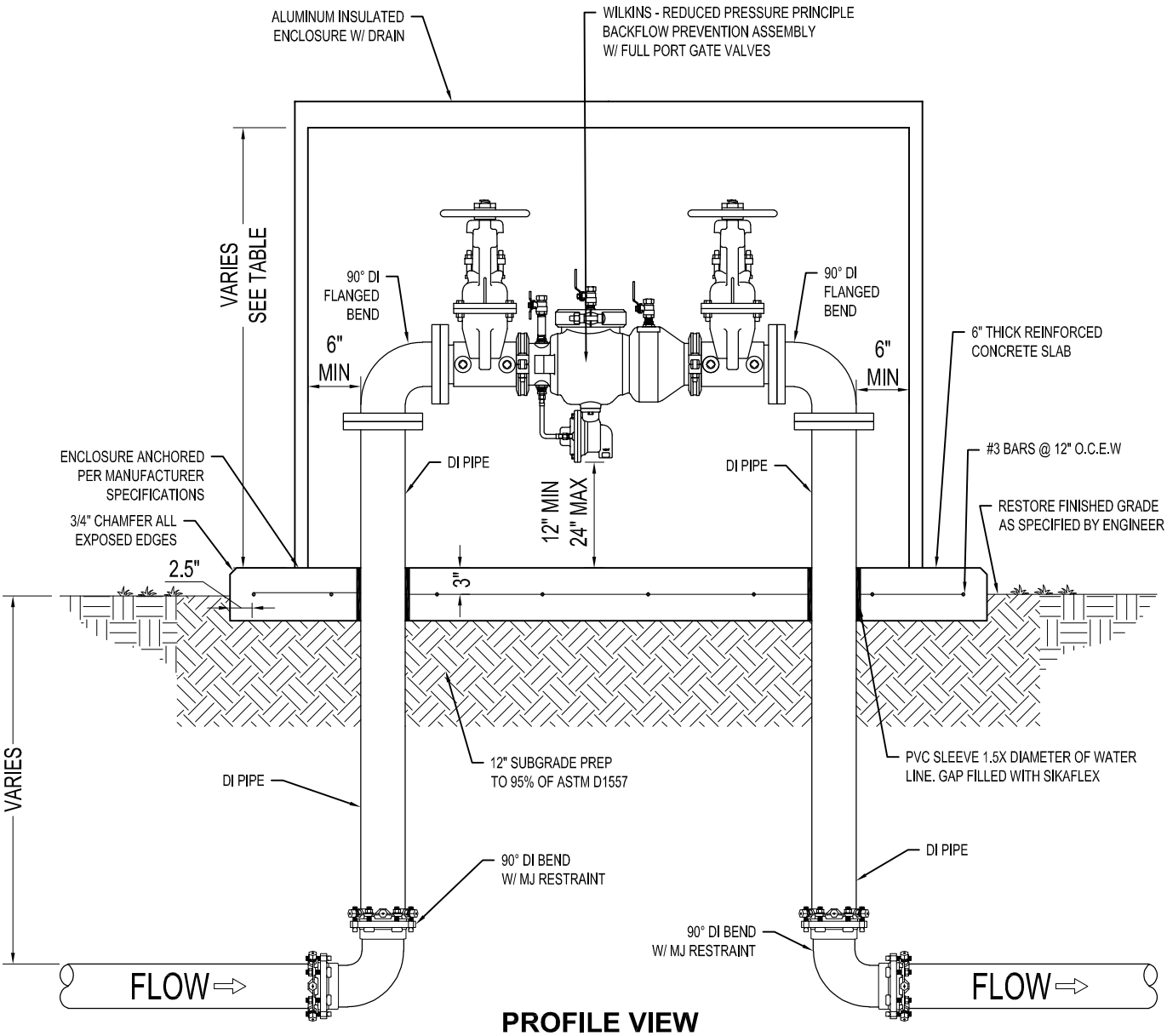


PLAN VIEW

Dona Ana Mutual Domestic Water Consumers Association

3" AND LARGER BACKFLOW PREVENTION ASSEMBLY

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-14B	DRAWING NO. W-14B

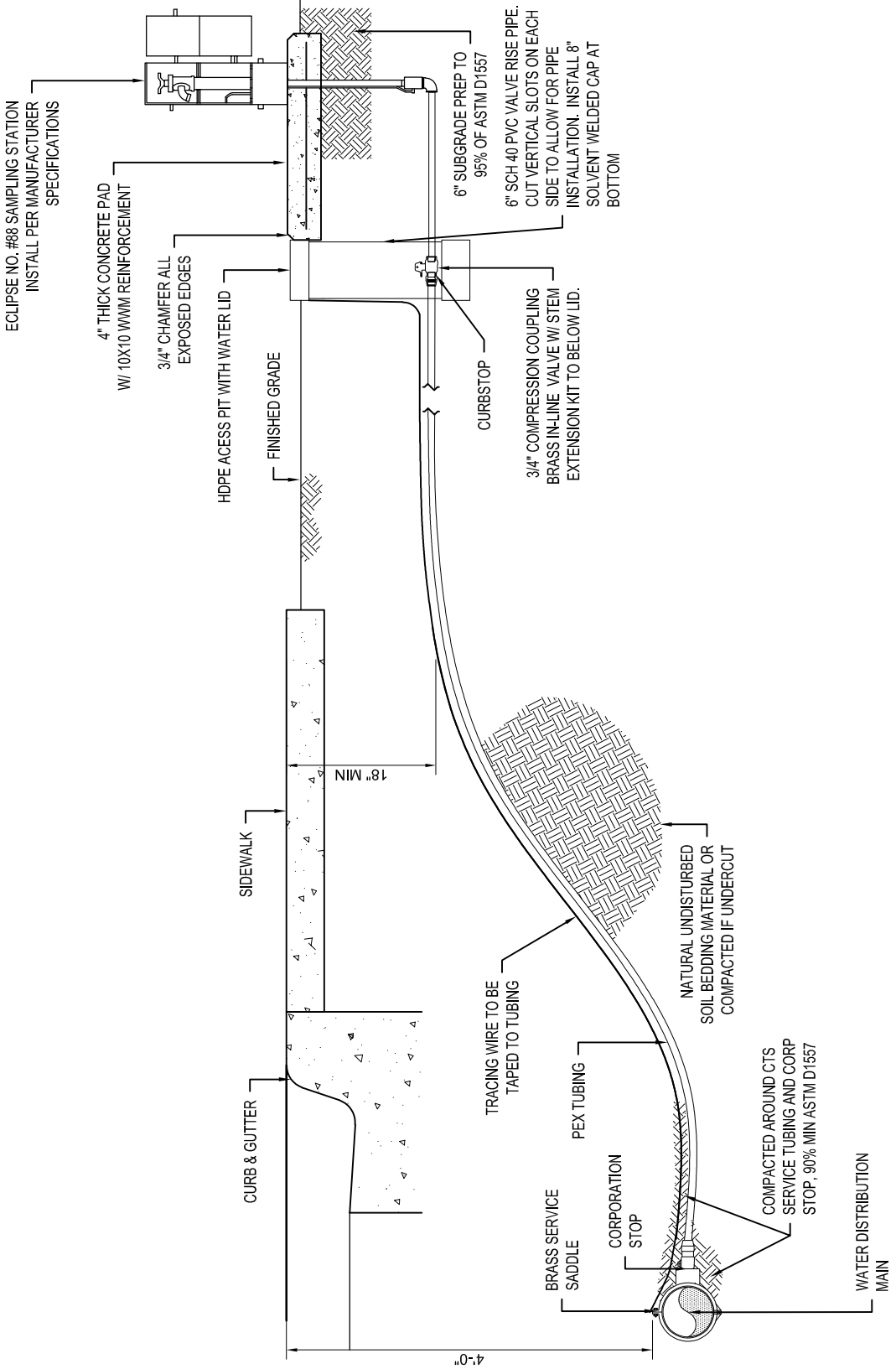


PROFILE VIEW

Dona Ana Mutual Domestic Water Consumers Association

REDUCED PRESSURE BACKFLOW PREVENTER FOR LESS THAN 3" SERVICES

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-15	DRAWING NO. W-15



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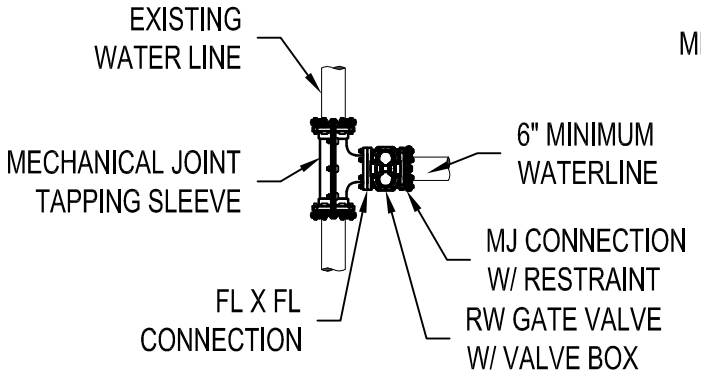
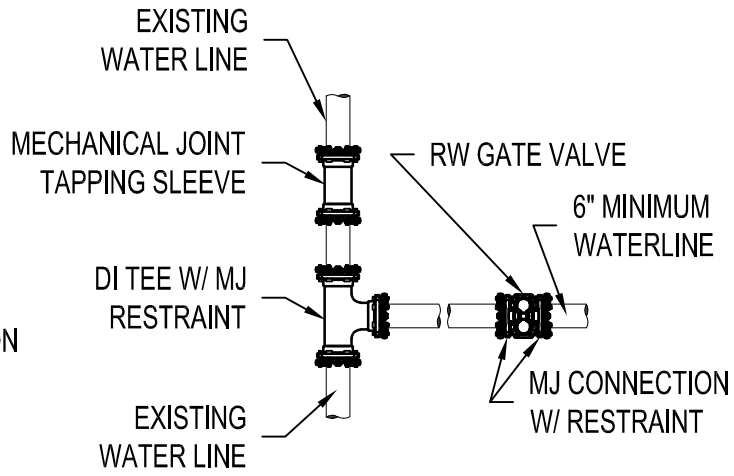
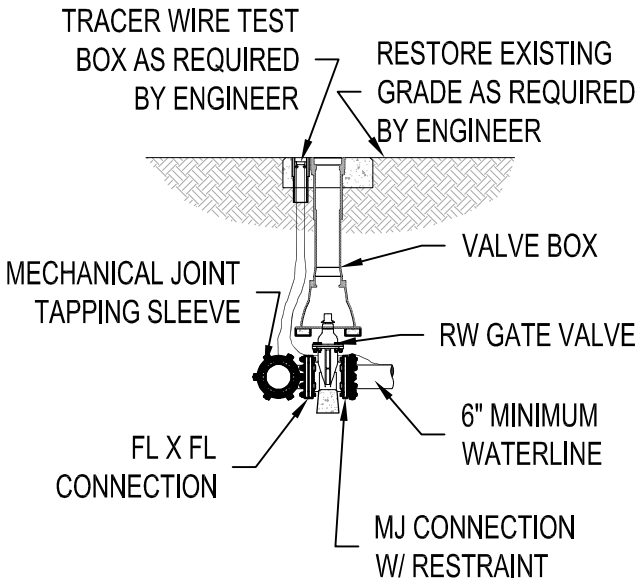
SAMPLING STATION

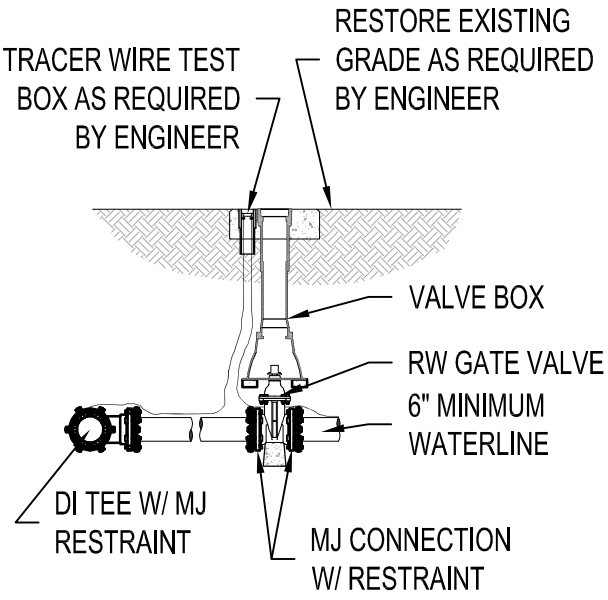
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-16	DRAWING NO. W-16







Pressurized Connection



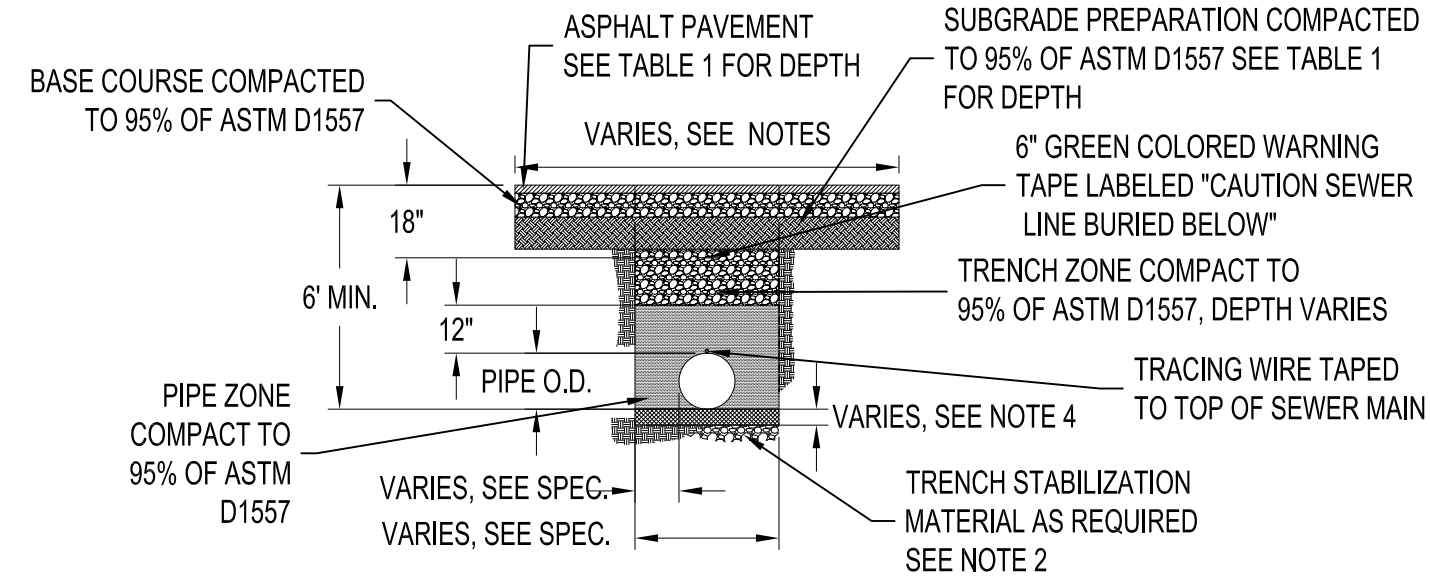
Unpressurized Connection

Dona Ana Mutual Domestic Water Consumers Association

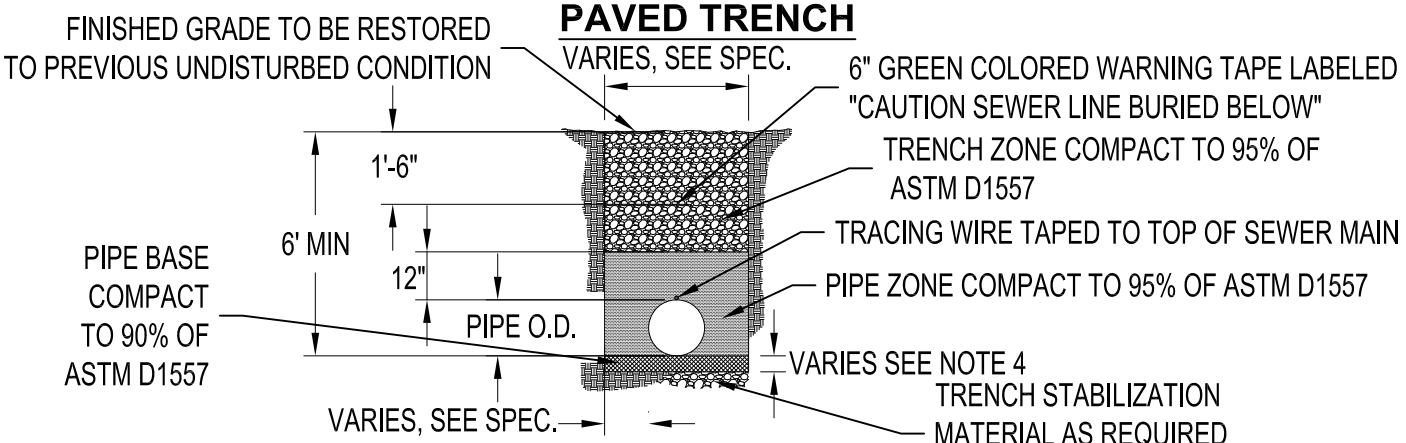
PRESSURIZED AND UNPRESSURIZED CONNECTIONS

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-W-17	DRAWING NO. W-17

12 SEWER UTILITY DETAILS



PAVED TRENCH



UNPAVED TRENCH

NOTES:

1. SUPPORT AND STABILIZATION OF TRENCH WALLS MAY BE NECESSARY.
2. ENGINEERED FILL SHALL BE REQUIRED FOR PIPE BASE AND PIPE ZONE WHEN COHESIVE SOILS ARE ENCOUNTERED.
3. COMPACT BACKFILL IN LOOSE LIFTS AND COMPACTION DENSITY AS LISTED IN DAMDWCA SPECIFICATIONS.
4. PIPE BASE THICKNESS:
   - 4.1. PIPE OD=16" OR SMALLER-PIPE BASE=4"
   - 4.2. PIPE OD=18" OR LARGER-PIPE BASE=6"
5. PAVEMENT CUT WIDTH:
   - 5.1. 10' FOR DAC
   - 5.2. AS APPROVED FOR NMDOT.

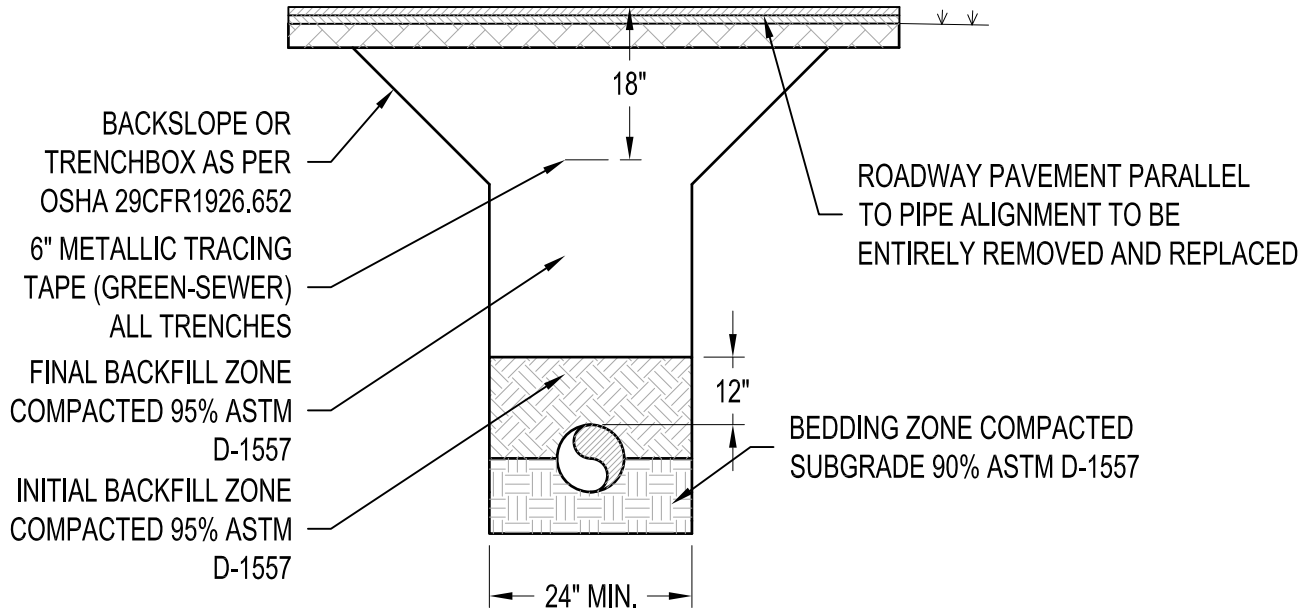
TABLE 1

LOCATION	ASPH. PVMT. DEPTH.	SUB GRD. PREP. DEPTH
DAC LOCAL ROADWAY	2 IN.	8 IN.
DAC COLLECTOR ROADWAY	3 IN.	8 IN.
DAC ARTERIAL ROADWAY	4 IN.	12 IN.
NMDOT ROADWAY	4 IN.	12 IN.

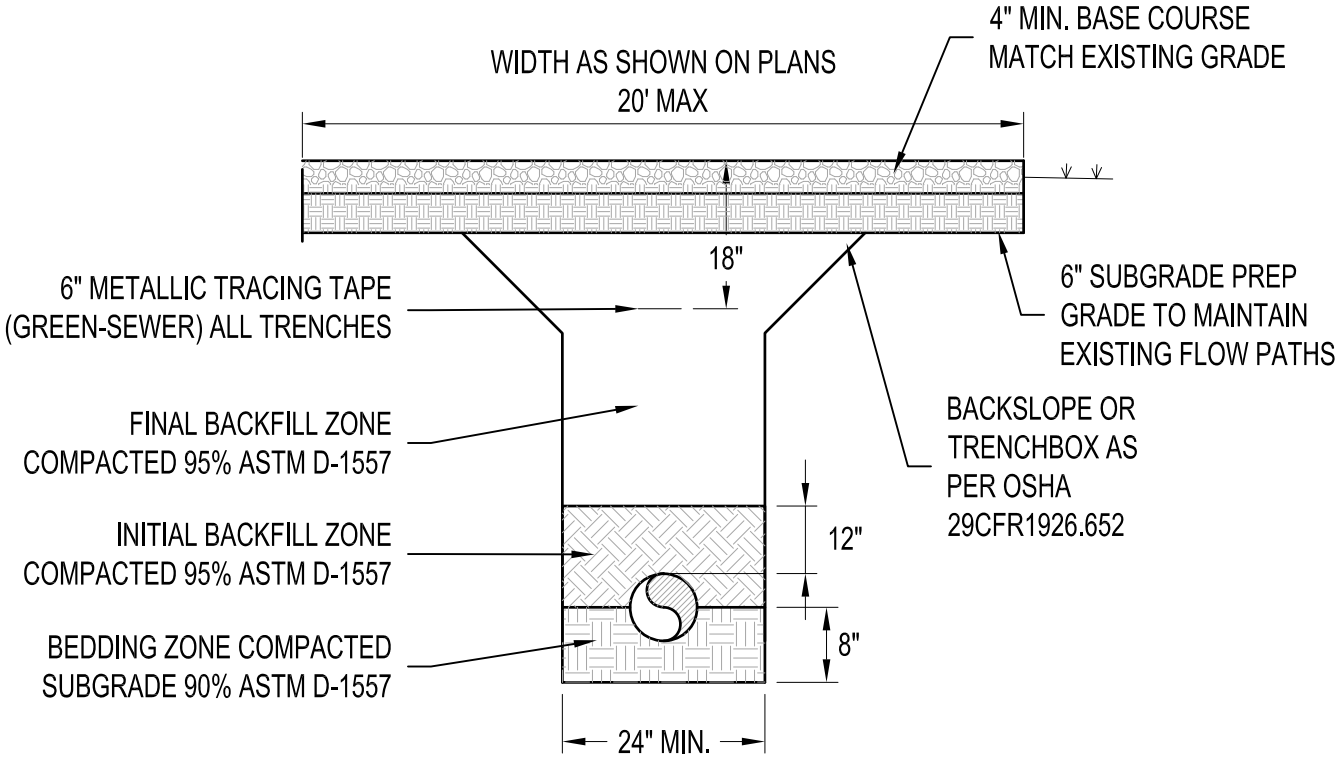
Dona Ana Mutual Domestic Water Consumers Association

TYPICAL FORCE MAIN TRENCHING DETAILS

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-01	DRAWING NO. S-01



PAVED AREA



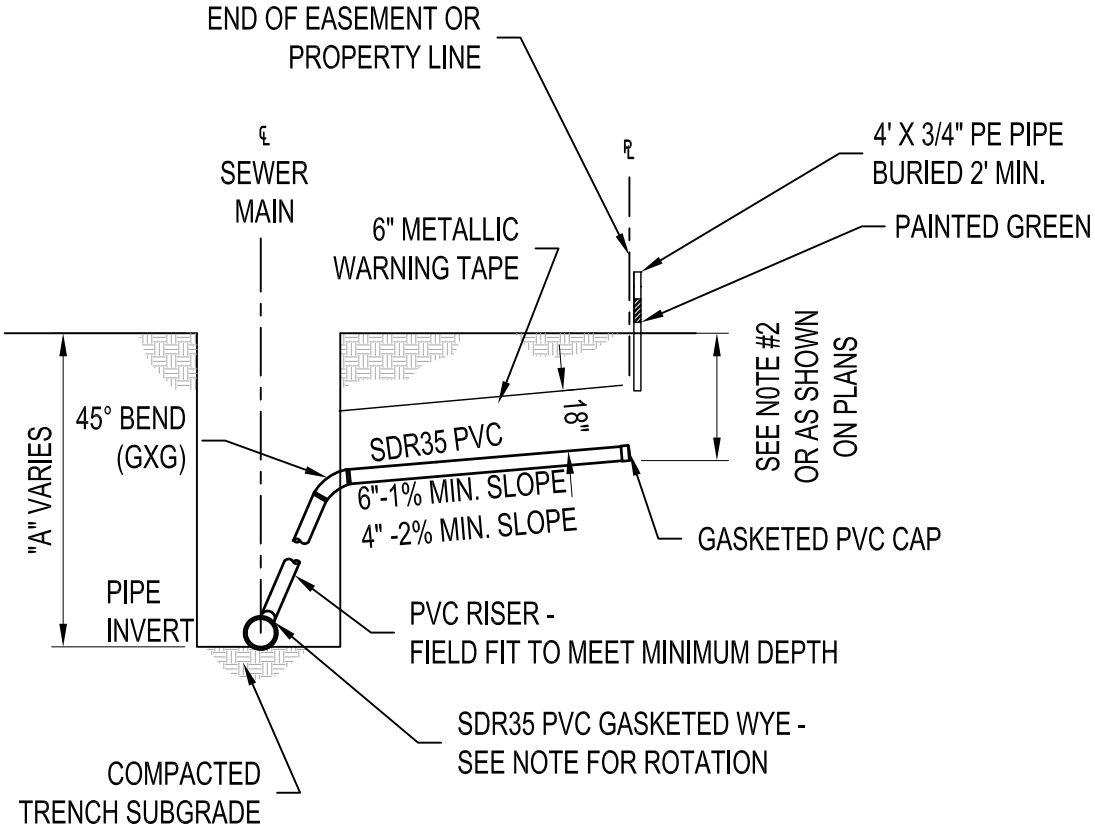
UNPAVED AREA

NOTE: WITHIN TRAVELED ROADWAYS OR RIGHT-OF-WAYS. THE TOP 24" (MIN) OF SOIL SHALL BE STOCKPILED SEPARATELY DURING EXCAVATION AND PLACED BACK AT THE TOP OF THE TRENCH DURING BACKFILL.

Dona Ana Mutual Domestic Water Consumers Association

TYPICAL SEWER TRENCHING

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-02	DRAWING NO. S-02



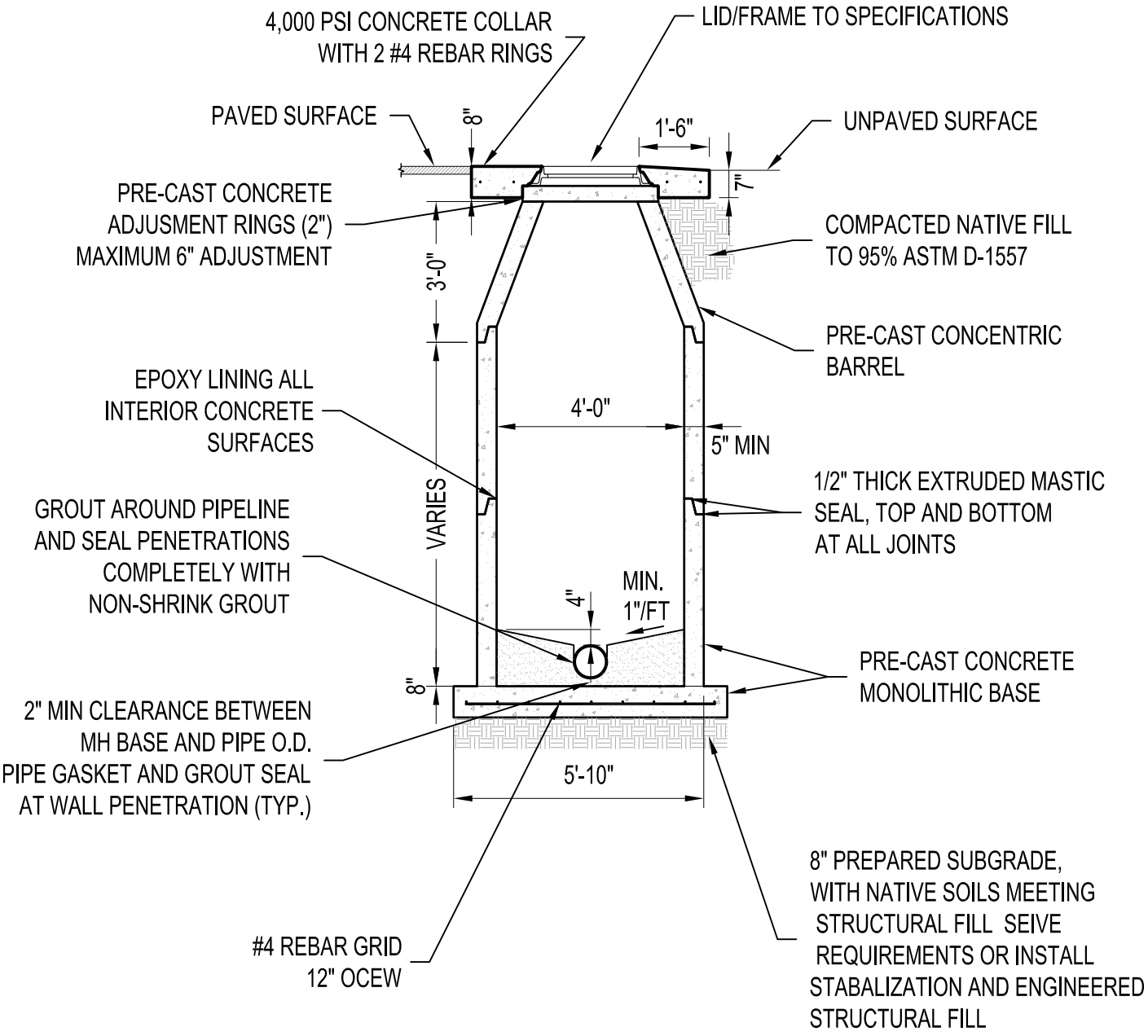
NOTES:

1. WHEN "A" IS LESS THAN 8'-0", DELETE RISER PIPE AND 45° BEND. TURN SEWER MAIN WYE TOWARD SERVICE SIDE AT AN ANGLE IN ORDER TO PROVIDE A 2% SLOPE (1% SLOPE FOR 6" PIPE) FOR THE SERVICE PIPE.
2. INVERT OF SERVICE STUBOUT TO BE INSTALLED TO SERVE ENTIRE LOT WITH ADEQUATE FALL ON PRIVATE LOT @ 2% SLOPE ($\frac{1}{4}$" PER FOOT).

Dona Ana Mutual Domestic Water Consumers Association

TYPICAL GRAVITY SEWER SERVICE CONNECTION

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-03	DRAWING NO. S-03

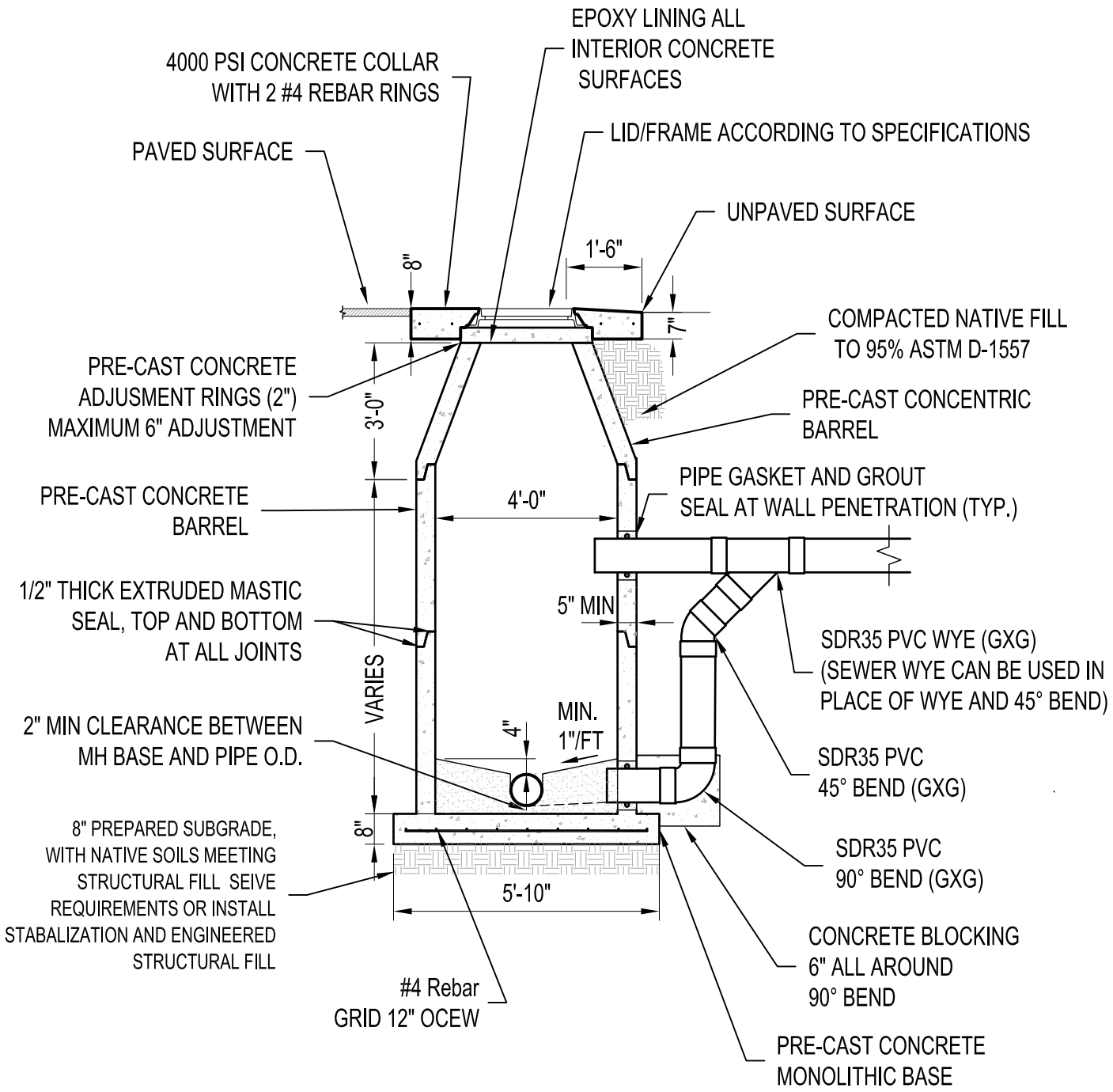


*NOTE: ALL EXPOSED INTERIOR CONCRETE AND GROUTED SURFACES (INCLUDING BASE) TO BE COATED PER SPECIFICATIONS.

Dona Ana Mutual Domestic Water Consumers Association

CONCENTRIC CONE MANHOLE

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-04	DRAWING NO. S-04

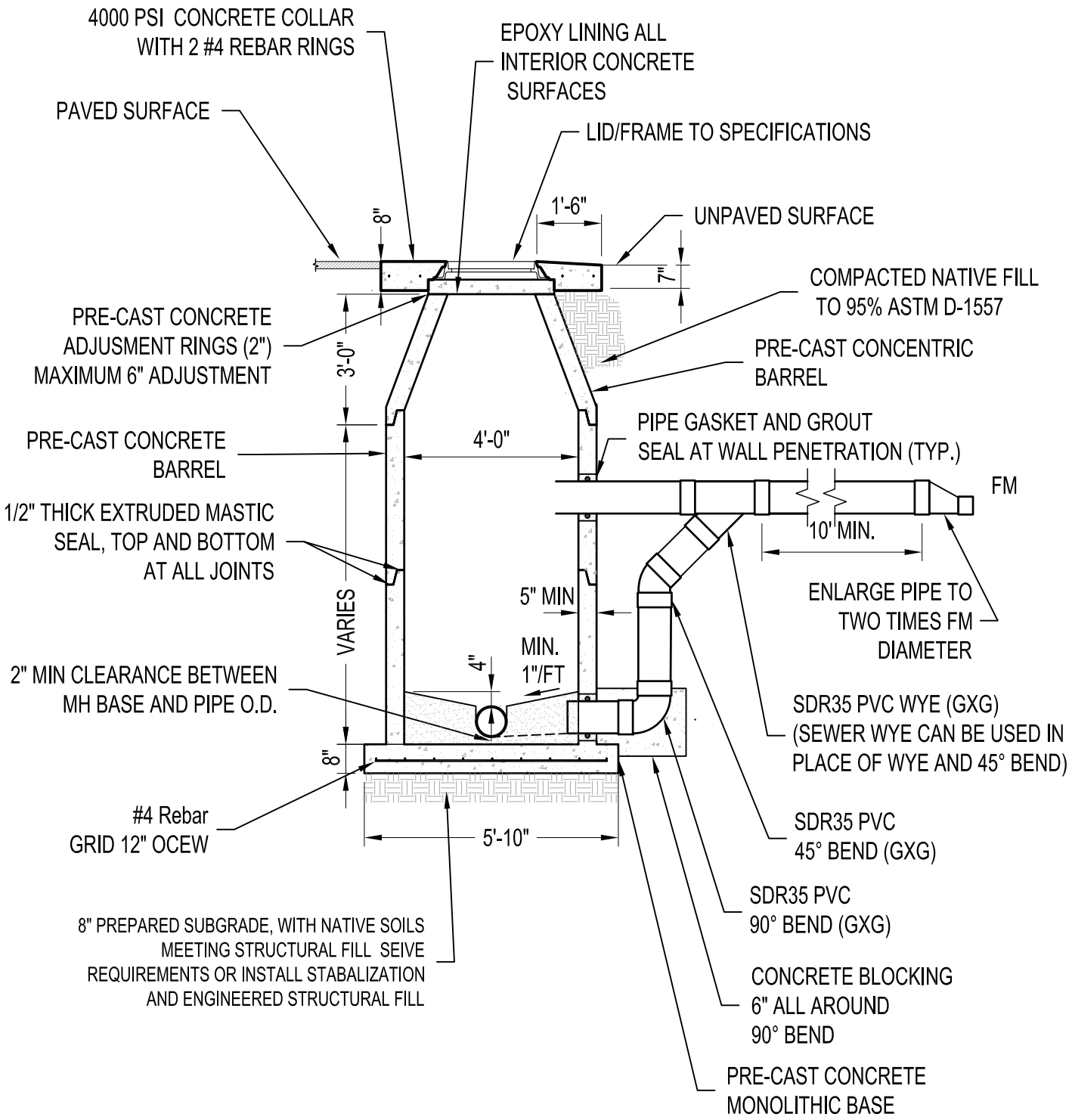


*NOTE: ALL EXPOSED INTERIOR CONCRETE AND GROUTED SURFACES (INCLUDING BASE) TO BE COATED PER SPECIFICATIONS.

Dona Ana Mutual Domestic Water Consumers Association

DROP MANHOLE

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-05	DRAWING NO. S-05

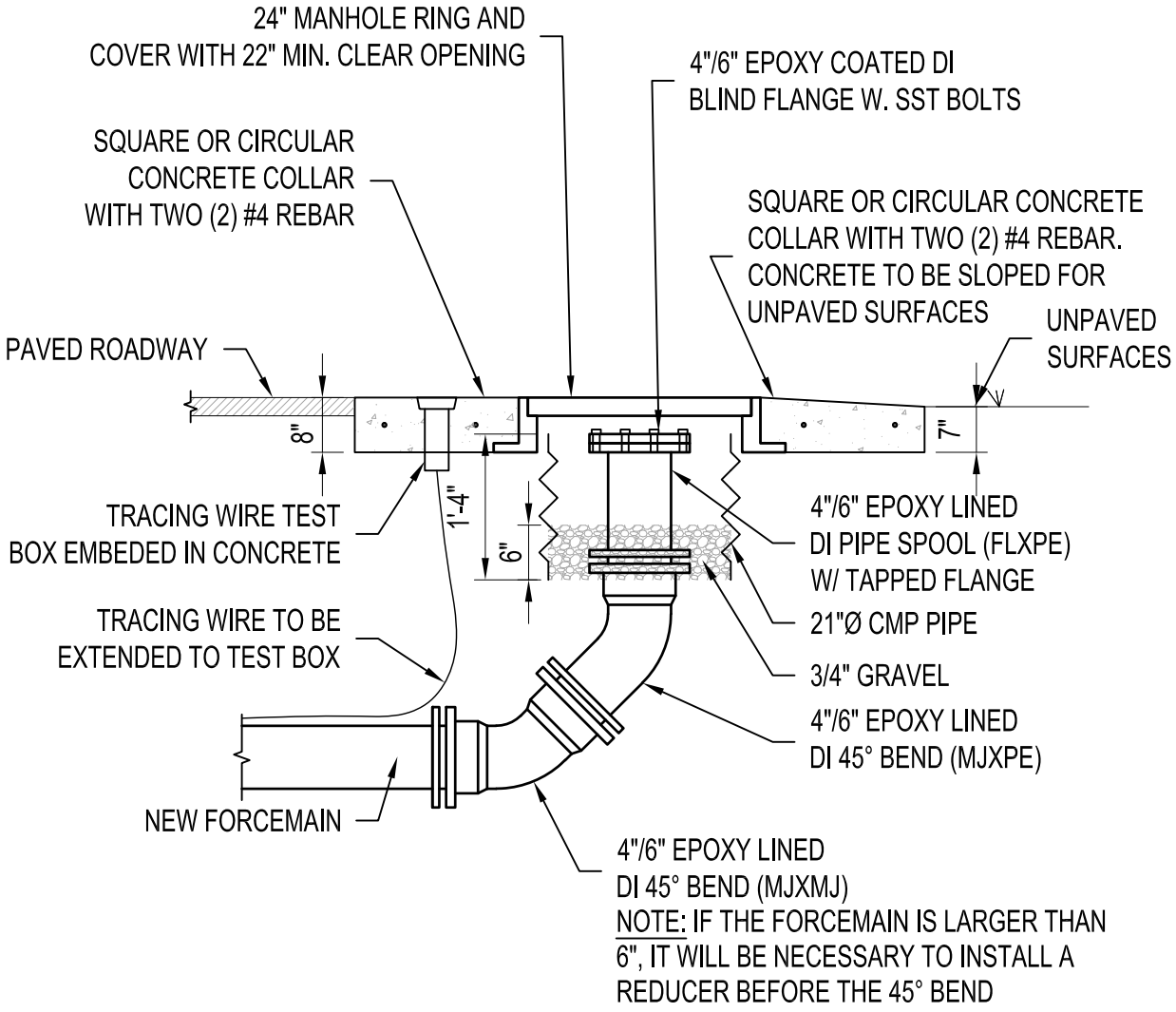


*NOTE: ALL EXPOSED INTERIOR CONCRETE AND GROUTED SURFACES (INCLUDING BASE) TO BE COATED PER SPECIFICATIONS.

Dona Ana Mutual Domestic Water Consumers Association

FORCE MAIN TIE MANHOLE

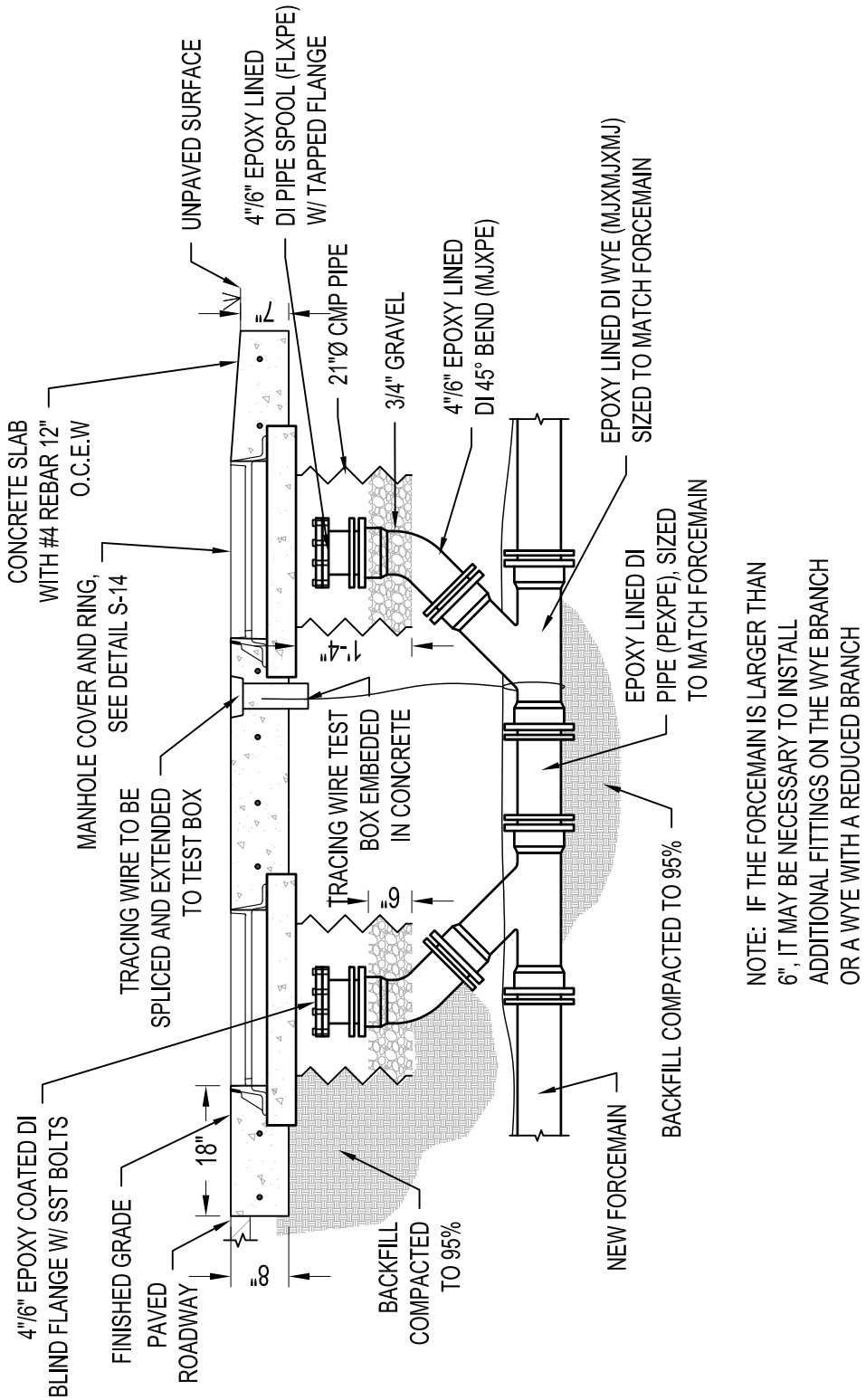
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-06	DRAWING NO. S-06



Dona Ana Mutual Domestic Water Consumers Association

4"/6" FM SINGLE CLEANOUT

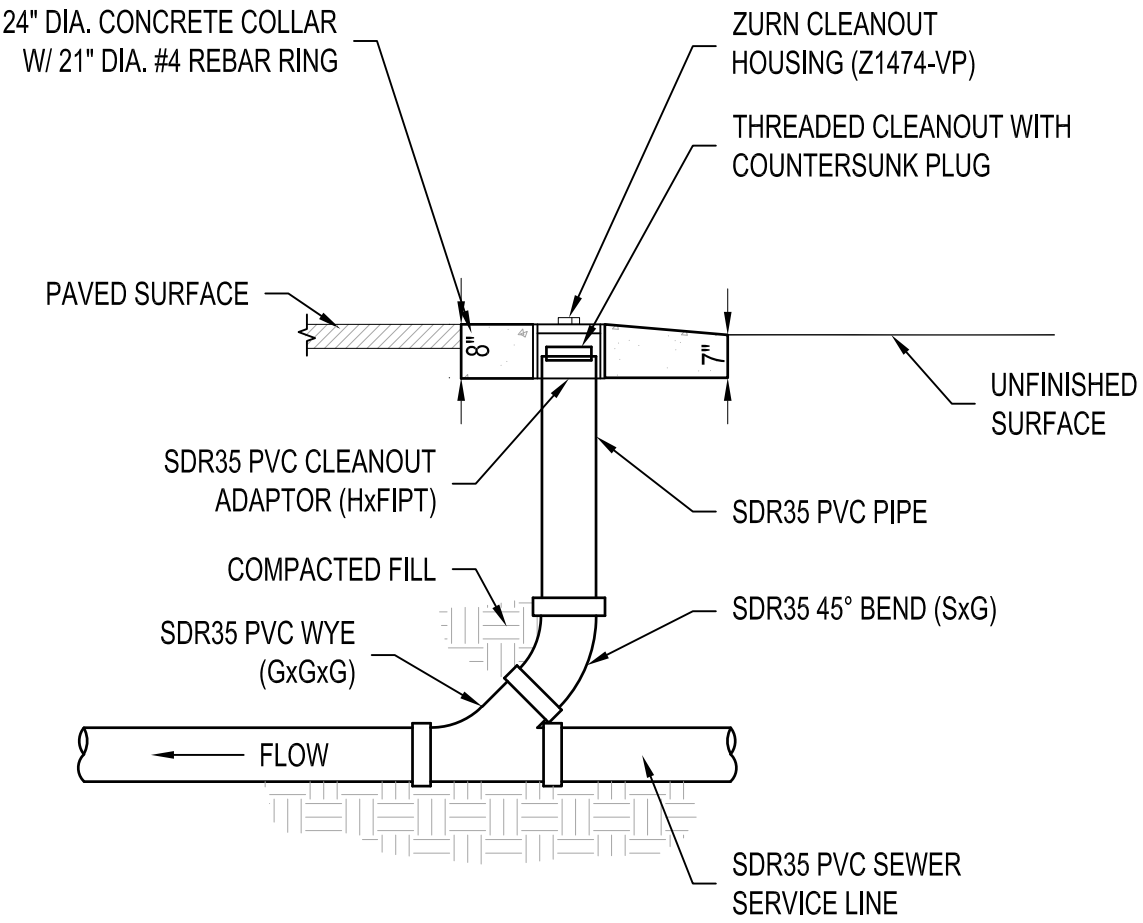
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-07	DRAWING NO. S-07



Dona Ana Mutual Domestic Water Consumers Association

4"/6" FM DOUBLE CLEANOUT

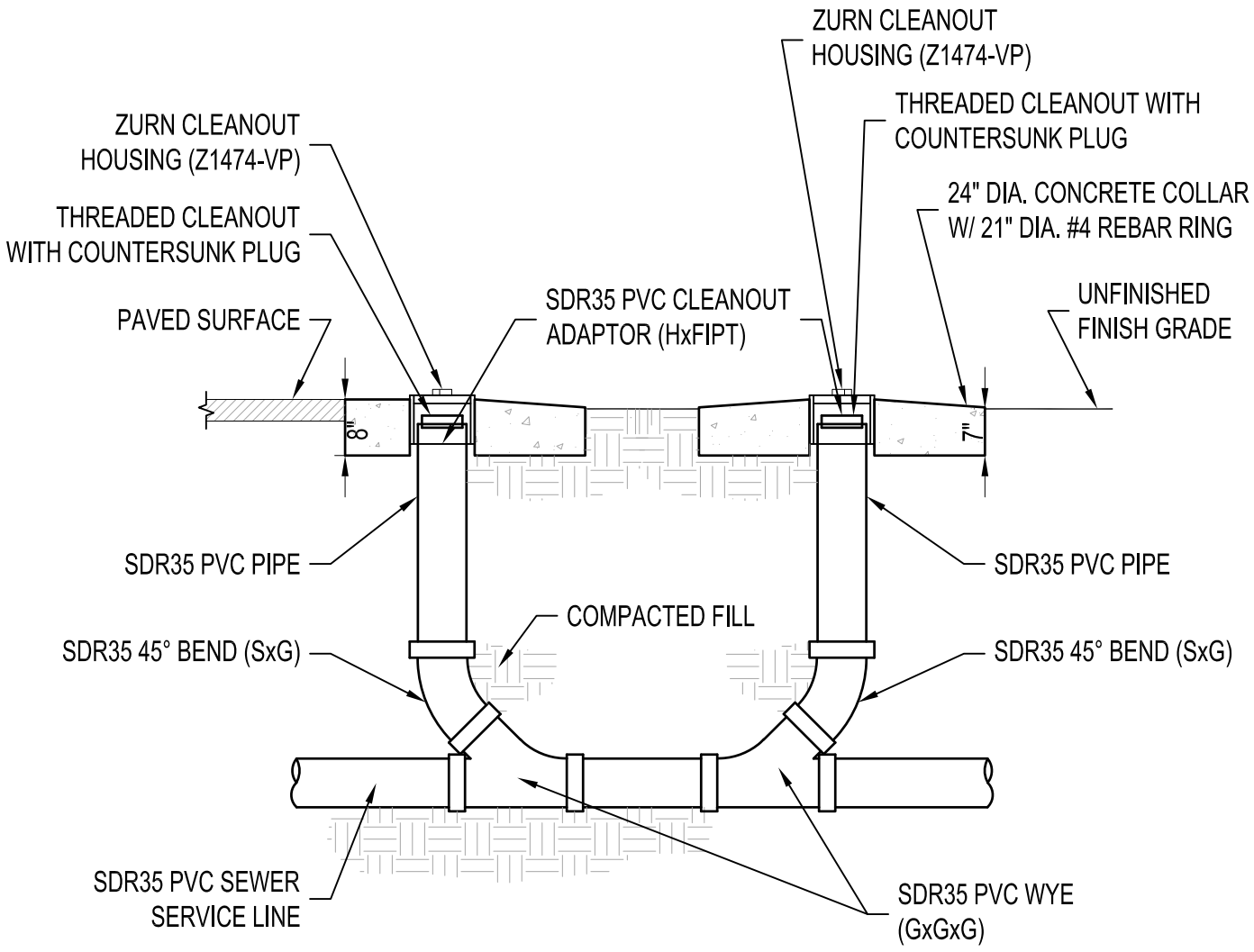
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-08	DRAWING NO. S-08



Dona Ana Mutual Domestic Water Consumers Association

4"/6" SINGLE CLEANOUT

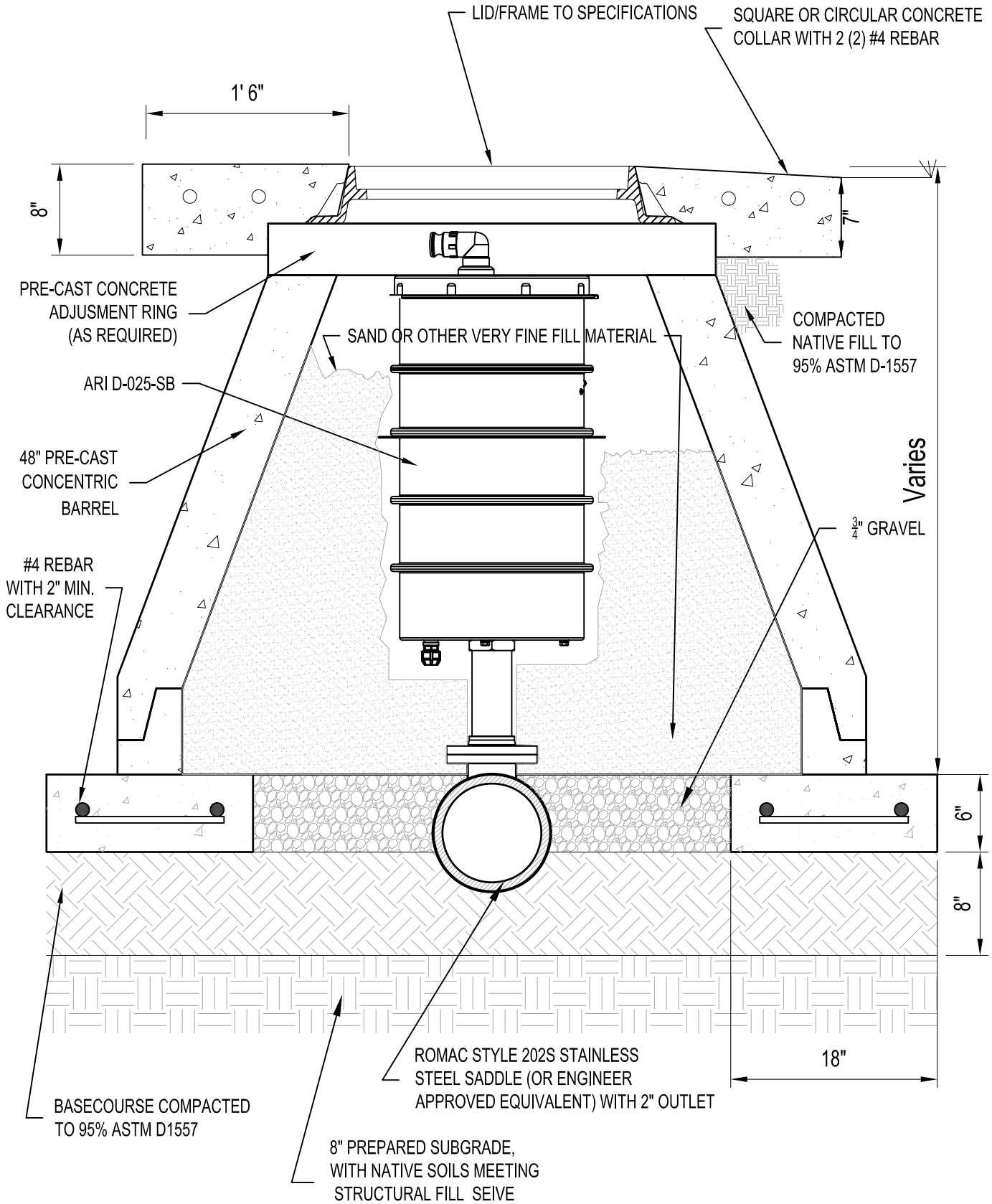
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-09	DRAWING NO. S-09



Dona Ana Mutual Domestic Water Consumers Association

4"/6" DOUBLE CLEANOUT

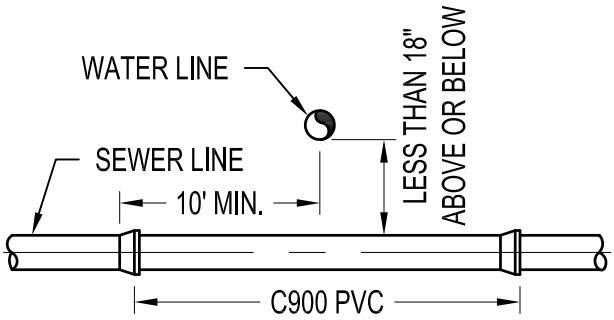
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-10	DRAWING NO. S-10



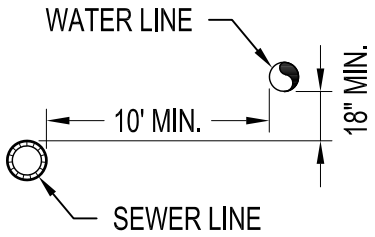
Dona Ana Mutual Domestic Water Consumers Association

FORCEMAIN AIR RELEASE/ VACUUM VALVE

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-11	DRAWING NO. S-11



CROSSED LINES



PARALLEL LINES

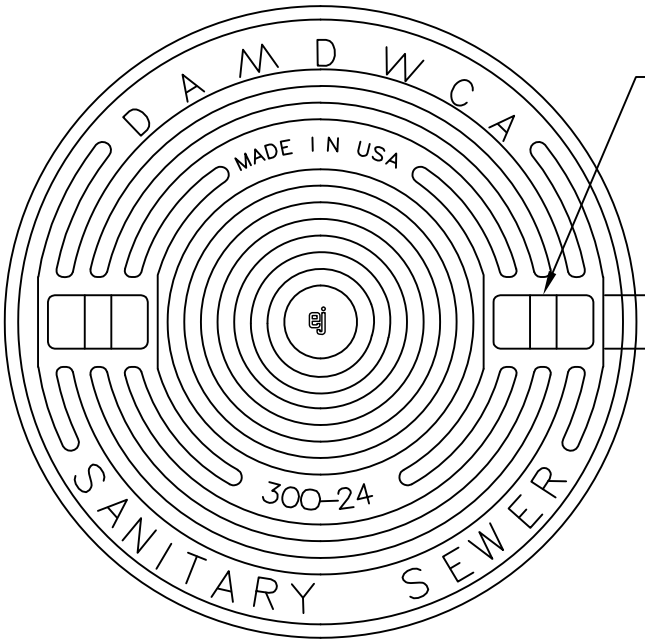
NOTE:

1. FOR PARALLEL PIPELINES THAT DO NOT MEET THE 10' HORIZONTAL AND 18" VERTICAL SEPARATION REQUIREMENTS, PVC C900 OF EQUAL DIAMETER SHALL BE USED FOR THE SEWER PIPELINE.
2. FOR PIPELINE CROSSINGS THAT DO NOT MEET THE 18" VERTICAL SEPARATION REQUIREMENTS, PVC C900 OF EQUAL DIAMETER SHALL BE USED FOR THE SEWER PIPELINE. JOINTS FOR THE SEWER AND WATER PIPELINES SHOULD BE SPACED 10' AWAY FROM THE CROSSING.

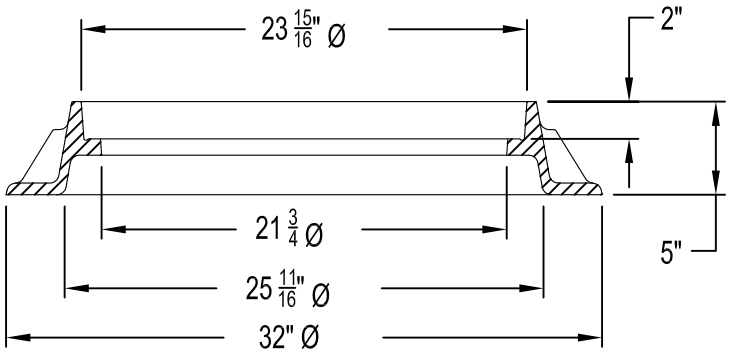
Dona Ana Mutual Domestic Water Consumers Association

PARALLEL AND CROSSED WATER/SEWER LINES

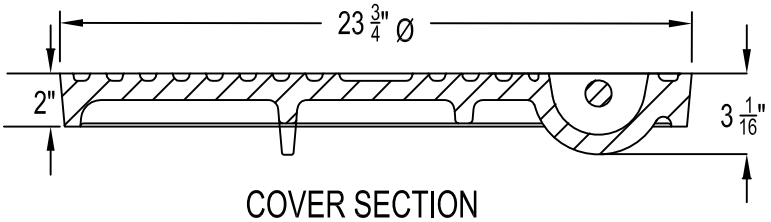
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-12	DRAWING NO. S-12



PLAN VIEW



FRAME SECTION



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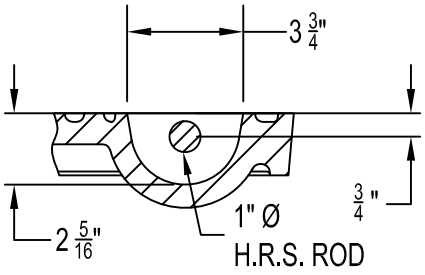
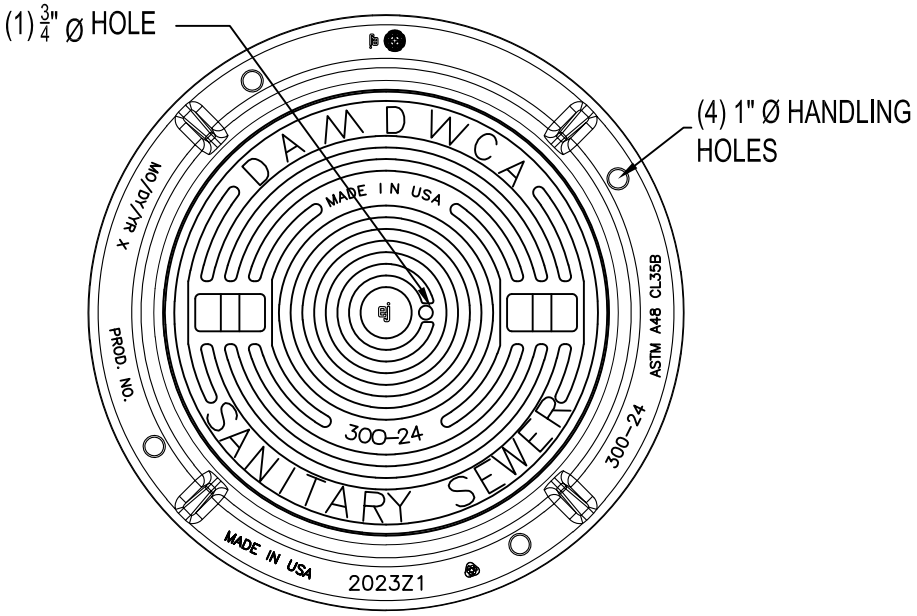


PICK BAR DETAIL

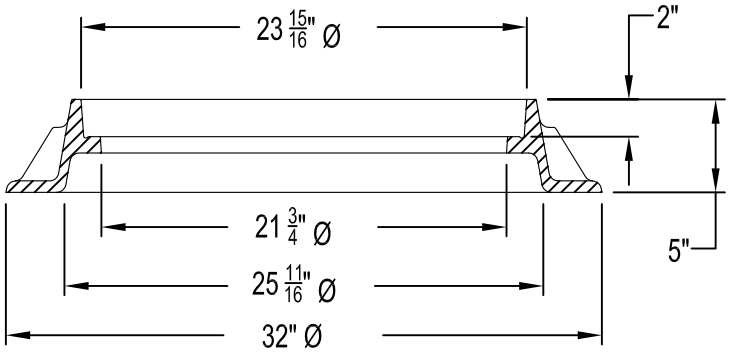
Dona Ana Mutual Domestic Water Consumers Association

UNVENTED IRON MANHOLE

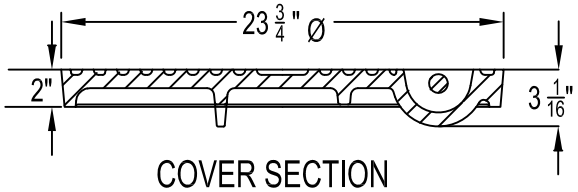
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-13	DRAWING NO. S-13



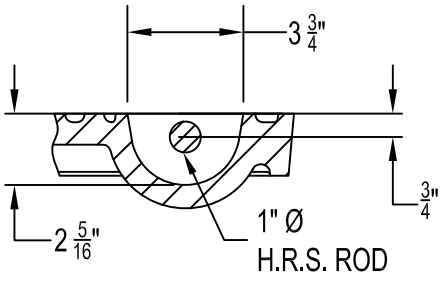
PLAN VIEW



FRAME SECTION



COVER SECTION

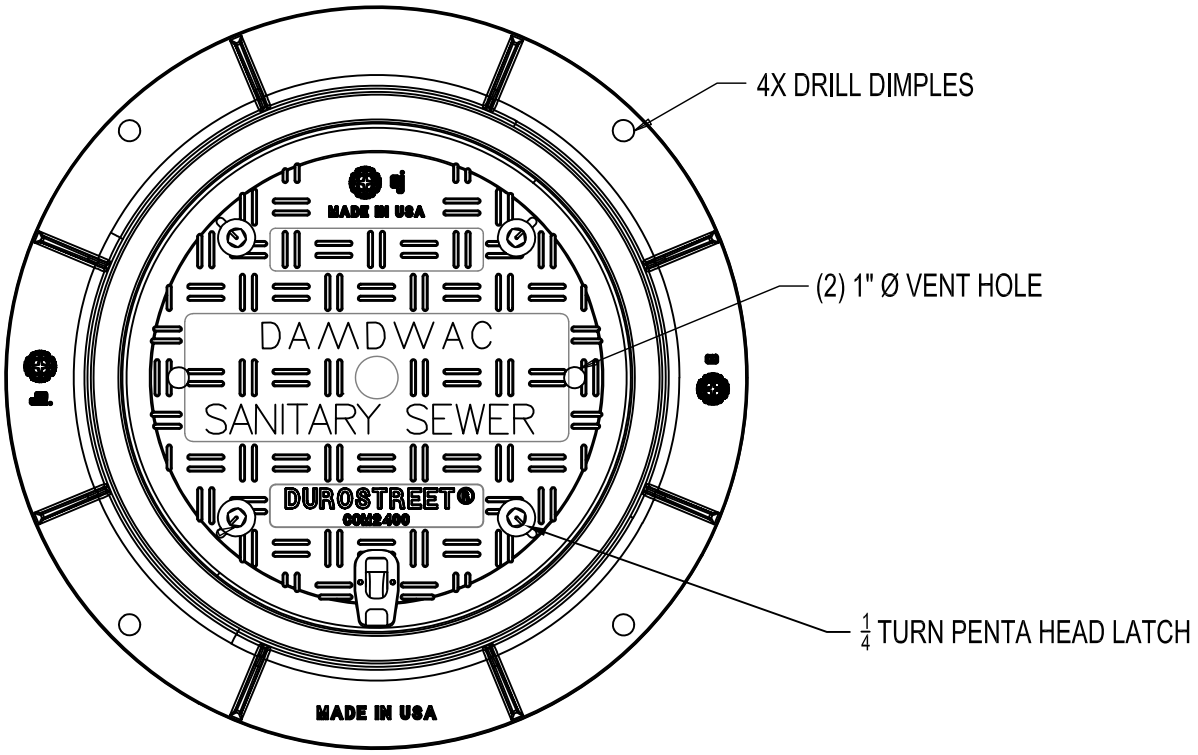


PICK BAR DETAIL

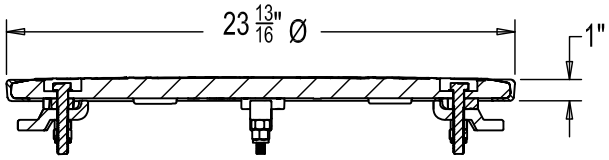
Dona Ana Mutual Domestic Water Consumers Association

VENTED IRON MANHOLE

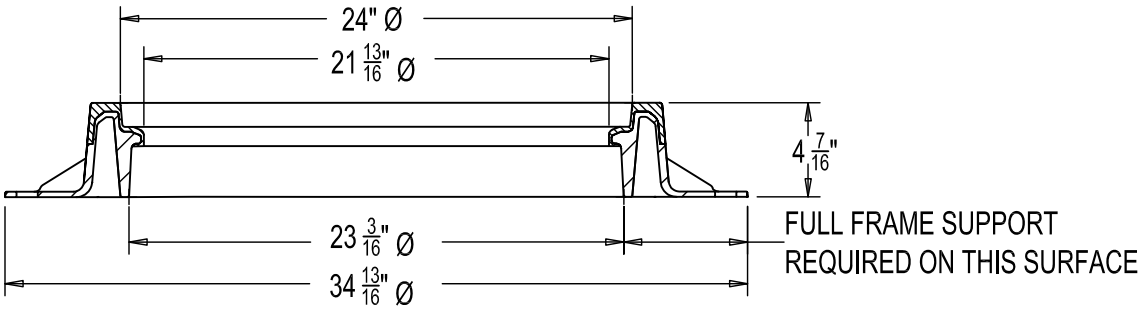
		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-14	DRAWING NO. S-14



PLAN VIEW



FRAME SECTION



COVER SECTION

Dona Ana Mutual Domestic Water Consumers Association

COMPOSITE MANHOLE

		###	###	LAST REVISION: ###	SCALE: NTS
		###	###	ORIG. DATE: 6/16/2025	APPROVED BY: TRH
REVISION	COMMENTS	BY	DATE	FILE NAME: DAMDWCA-S-15	DRAWING NO. S-15

APPENDICIES

APPENDIX A: REQUEST FOR INFORMATION

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

REQUEST FOR INFORMATION (RFI)

Requested By

- ☐ Design Engineer
- ☐ Developer
- ☐ Real Estate Agent
- ☐ Appraiser
- ☐ Contractor
- ☐ Other

Contact Information

Name: _____
Company: _____
Phone: _____
Email: _____
Specify: _____

Land Information

Parcel Account Number: R_____ Acres: _____

Adjacent Roadway/Intersection: _____

Parcel Owner: _____

Development Concept

- ☐ Subdivision Residential — Est. Number of Units: _____
- ☐ Subdivision Mixed Use — Est. Number of Units: _____
- ☐ Commercial — Commercial Type: _____
- ☐ Single Family Home
- ☐ Multifamily Home — Est. Number of Units: _____
- ☐ Other — Specify: _____

Information Being Requested

- ☐ Water Service Availability
- ☐ Sewer Service Availability
- ☐ Other _____

_____ _____
(SIGNATURE OF REQUESTER) *(DATE)*

_____
(PRINT NAME OF REQUESTER)

RFI Response Disclaimer:
All costs for extensions of water or sewer systems are the responsibility of the developer, including all costs related to design, permitting, easements, construction, inspection, and conveyance. The information provided in this response must be verified for accuracy by the requester's licensed professionals. DAMDWCA does not guarantee its accuracy or completeness.

RFI Response (General Comments):

- [ ] DAMDWCA does not provide water service to this area
- [ ] This project will require a water pipeline extension
- [ ] DAMDWCA does not provide sewer service to this area
- [ ] This project will require a lift station and forcemain to provide sewer service
- [ ] This project will require an extension of the gravity sewer system
- [ ] This project will require an extension of the vacuum sewer system
- [ ] A map of nearby DAMDWCA water/wastewater utilities is attached

APPENDIX B: DEVELOPMENT REVIEW REQUEST FORM

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

DEVELOPMENT REVIEW REQUEST FORM

Project Name: _____

Project Location: _____

Developer: _____

Engineer: _____

Submittal Date: _____

Received By: _____

Project Type	Residential:		Commercial:	
Utilities to be Reviewed	Water:		Wastewater:	
Total Number of Lots				
Review (Concept*, Draft, Final)				
Cover/Review Response Letter Included	Yes:		No:	
Full Size Printed Copies (2)	Yes:		No:	
Digital PDF on USB Drive	Yes:		No:	
Water Rights Info Included	Yes:		No:	
Review Fee Submitted	$			
**If Review Request is only for the concept review, full size printed copies and water rights info do not need to be submitted. Only the concept design in PDF and concept review fee needs to be submitted.*				

Thank you for submitting your plan set. We will strive to respond to your submittal within 30 days. However, please be aware that there are times when the review process may take longer than 30 days depending on staff availability and project scope. For final draft and final design reviews, only complete plan sets that conform to Section 2.4 of the *DAMDWCA's Developers Manual* requirements will be reviewed. We look forward to working with you on your project. ALL REVIEW FEES AND WATER RIGHTS TO BE REVIEWED ARE DUE WITH THIS SUBMITTAL.

_____ _____
(SIGNATURE OF OWNER / DEVELOPER / REPRESENTATIVE) *(DATE)*

_____
(PRINT NAME OF OWNER / DEVELOPER / REPRESENTATIVE)

Water Rights Disclaimer: Any development proposing to connect to the Association shall be required to transfer ownership of sufficient water rights to meet the needs of the subdivision. The water rights transferred to the Association must be groundwater rights with a priority date not later than 1960 in the amount of ½ of an acre foot per year (consumptive use) for each house, single family residential lot, or residential unit (i.e. within multiple unit apartments, etc.) sought to be served by Dona Ana Mutual Domestic Water Consumers Association. The Association shall determine on a case-by-case basis, the water rights conveyance requirement for commercial, industrial or similar type of use other than residential, that is proposed to be served by the Association, if it has the ability to serve such commercial or industrial uses.

Proposed Water Rights to be transferred:

Priority Date: _____ LRG File Number: _____

Design Review Fees:

Concept Design Review				$1,500
Water OR Wastewater Only				
Up To 24 Lots				$2,500
25 lots or greater				$25/add'l lot
Water AND Wastewater				
Up To 24 Lots				$3,500
25 lots or greater				$35/add'l lot
Total Fee Due[1]				$
Cash:		Check:		Chk. #
[1]*All fees are subject to New Mexico Gross Receipt Tax*				

APPENDIX C: STANDARD DEVELOPER'S AGREEMENT

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

STANDARD DEVELOPMENT AGREEMENT

This development agreement executed on this _____ day of _____, 20____ between Dona Ana Mutual Domestic Water Consumer Association (DAMDWCA) and _____ (DEVELOPER).

Developer has requested to expand and/or enhance the water and/or sewer system within the DAMDWCA service area to server a proposed new development known as:

_____

It is understood and agreed by the DEVELOPER and DAMDWCA that the purpose of this Agreement is ultimately to assure that the public utilities involved will be constructed in accordance with the approved plans, in a work like manner, utilizing accepted industry practices, and dedicated to DAMDWCA as fit for their intended use, free and clear of any liens or encumbrances.

TERMS AND CONDITIONS

1. The DEVELOPER will construct the facilities in accordance with the approved design plans and in observance of DAMDWCA staff or their representatives.
2. The presence of DAMDWCA staff or their representatives during construction does not relieve the DEVELOPER from their responsibilities of adhering to the approved design plans and the standards set forth in the *DAMDWCA Development Manual*.
3. It is the responsibility of the DEVELOPER to coordinate construction activities with DAMDWCA and/or their representatives. An updated schedule is to be available at all times.
4. In the performance of the work, the DEVELOPER agrees to indemnify and hold harmless DAMDWCA, its staff and contractors, from all liability of any claim resulting from the DEVELOPER or any contractor or subcontractor related to the project described in this agreement executing of the work.
5. Any work within a public right-of-way must be coordinated in advance with those agencies and must adhere to requirements set forth in their respective utility permits and requirements.
6. The DEVELOPER warrants that he will enter into a construction contract for this work with a utility contractor who is experienced and properly licensed in performing this type of construction. The DEVELOPER's contractor and any subcontractor doing work under this agreement shall execute a Hold Harmless Agreement, attached as Exhibit X, which shall become part of this Development Agreement.
7. The Owner agrees to integrate this Development Agreement into their construction contract and requires expressly in the construction contract that the contractor will be bound to comply with the provisions hereof. The Owner and his contractor confirm that

they are familiar with, and will fully comply with the additional insurance and other requirements set forth on Exhibit X, which is attached hereto and made a part of this Agreement for all purposes. DAMDWCA shall be provided with a copy of the Insurance Certificate evidencing coverage for the full term of the project and shall be named as an additional insured on the Owner's General Liability and Automobile Liability policies.

8. The DEVELOPER has engaged the following Contractor and Subcontractors for this work:

   General Contractor: _____

   Contact Name: _____ Phone: _____

   Utility Subcontractor: _____

   Contact Name: _____ Phone: _____

   Utility Subcontractor: _____

   Contact Name: _____ Phone: _____

   DAMDWCA must be notified in writing of any changes to the contractor's named in this agreement.

9. DEVELOPER represents and warrants that all work was performed in a good and workmanlike manner, in accordance with the approved plans, or as otherwise provided in this Agreement. This warranty shall remain in full force and effect for a period of one year from and after the date of Certification and Acceptance by DAMDWCA of all the facilities or work shown on the plans under this Development Agreement. The Owner further agrees to be fully responsible for the repair and maintenance of the improvements for a period of one year from the date of acceptance by DAMDWCA.
10. The Owner will not allow any liens to be threatened or filed against the utility work completed or property which is the subject of this Agreement.
11. Thirty (30) days prior to the expiration of the one-year warranty period, DEVELOPER agrees to an inspection of the facilities or improvements by DAMDWCA or a representative. Any work associated with this agreement that is not functioning for its intended purpose must be corrected by the DEVELOPER and at their sole expense.
12. The DEVELOPER shall post an acceptable Performance Bond with DAMDWCA in accordance with the State of New Mexico's Little Miller Act (13-4-18 to 13-4-20 NMSA 1978) to ensure completion and warranty of the improvements as well as labor and material payments. The bond must be executed by a corporate surety licensed to do business in New Mexico.
13. The DEVELOPER and Surety's obligation to correct any defective workmanship and materials under the bond shall remain in effect for the full one-year warranty period set forth herein.
14. The DEVELOPER agrees to promptly execute their rights and remedies under this bond and, at the option of DAMDWCA, to assign to DAMDWCA all rights and remedies under this bond upon the issuance of the Letter of Final Acceptance or to include DAMDWCA as a beneficiary on the Bond.
15. In the event DEVELOPER fails to comply with the provisions hereof, DAMDWA may take such actions to which it may be entitled by law or equity, including, but not limited to

stopping the work, seeking specific performance of this Agreement, or suing for damages.

16. The DEVELOPER represents that it currently holds title or has presented evidence that it has entered a contract to purchase and obtain title, to the property in the same way it signs this Agreement. The terms and provisions thereof shall be binding upon, and to vest (inure) to the benefit of, the parties hereto and their successors, assigns, heirs and personal representatives.
17. The DEVELOPER shall not assign any interest in this Agreement (whether by assignment or novation) without the prior written consent of DAMDWCA.

_____
(COMPANY NAME)

_____ _____
(SIGNATURE OF AUTHORIZED AGENT) *(DATE)*

_____ _____
(PRINT NAME OF AUTHORIZED AGENT) *(TITLE)*

Dona Ana Mutual Domestic Water Consumer Association

_____ _____
(SIGNATURE OF EXECUTIVE DIRECTOR) *(DATE)*

_____
(PRINT NAME OF EXECUTIVE DIRECTOR

APPENDIX D: UTILITY EASEMENT FORM

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

UTILITY EASEMENT FORM

KNOW ALL MEN BY THESE PRESENTS:

That in consideration of One Dollar ($1.00) and other good and valuable consideration paid to _____ and _____, hereinafter referred to as GRANTOR, by Doña Ana Mutual Domestic Water Consumers Association (DAMDWCA), hereinafter referred to as GRANTEE, the receipt of which is hereby acknowledged, the GRANTOR does hereby grant, bargain, sell, transfer, and convey unto the GRANTEE, its successor and assigns, a perpetual easement with the right to erect, construct, install, and lay, and thereafter use, operate, inspect, repair, maintain, replace, and remove

WATER AND/OR WASTEWATER UTILITIES AND ALL RELATED APPURTENANCES

over, across, and through the land of the GRANTOR situate in Doña Ana County, State of New Mexico said land being described as follows:

See description in attached Exhibit A *(Attach property deed as Exhibit A)*

together with the right of ingress and egress over adjacent lands of the GRANTOR, his successors and assigns, for the purposes of this easement.

The easement shall be _____ feet in width, described as follows:

a new _____ foot wide water and wastewater utility easement, to Dona Ana Mutual Domestic Water Consumers Association as described in the Easement Exhibit and attached as Exhibit "B"

The consideration hereinabove recited shall constitute payment in full for any damages to the land of the GRANTOR, hid successors and assigns, by reason of the installation, operation, and maintenance of the structures or improvements referred to herein. The GRANTEE covenants to maintain the easement in good repair so that no unreasonable damage will result from its use to the adjacent land of the GRANTOR, his successors and assigns.

The grant and other provisions of this easement shall constitute a covenant running with the land for the benefit of the GRANTEE, its successors, and assigns.

_____ _____
Grantor Date

State of New Mexico)
) SS.
County of Doña Ana)

This instrument was acknowledged before me on the _____ day of _____, 20____, by

_____.

My commission expires:

_____
Notary Public
(Seal)

_____ _____
Grantor Date

State of New Mexico)
) SS.
County of Doña Ana)

This instrument was acknowledged before me on the _____ day of _____, 20____, by

_____.

My commission expires:

_____
Notary Public
(Seal)

APPENDIX E: CERTIFICATION OF PROJECT PERFORMANCE

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

CERTIFICATION OF PROJECT PERFORMANCE

Developer: _____

Engineer of Record (EoR): _____

Project Name: _____

General Contractor: _____

Water/Wastewater Utility Subcontractor: _____

I, _____, of the firm of _____, a Registered Professional Engineer in the State of New Mexico, and engineer of record for the above referenced project, do hereby certify that I have inspected the project and to the best of my knowledge it was completed according to plans and specifications and/or duly authorized change orders. Attached with this Certification of Project Performance is an itemized certified construction cost of the water and/or wastewater utility system improvements.

_____

(EoR sealed and dated stamp)

APPENDIX F: ASSIGNMENT OF WARRANTIES AND GUARANTEES

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

ASSIGNMENT OF WARRANTIES AND GUARANTEES

To: Dona Ana Mutual Domestic
Water Consumers Association
5535 Ledesma Drive
Las Cruces, NM 88007

Grantor of Utilities: _____

Contractor: _____

Development Name: _____

STATE OF NEW MEXICO
COUNTY OF DONA ANA

The undersigned do hereby assign, transfer, bargain and convey unto the Dona Ana Mutual Domestic Water Consumers Association all its rights, title and interest in and to all warranties, express or implied, covering warranting, applying or pertaining to all goods, equipment, and materials of whatsoever kind, furnished, delivered, or installed related to any water or wastewater utilities that will be conveyed to Dona Ana Mutual Domestic Water Consumers Association in said project referenced above.

Also, the undersigned does hereby certify that to the best of his knowledge, information and belief that the warranties attached hereto include all warranties of the contractors, and all subcontractors. And all suppliers of materials and equipment furnished, delivered or used for or in said contract referenced above.

IN TESTIMONY WHEREOF, this Agreement made this ____ day of _____, 20____.

_____ Address: _____
Grantor

_____

State of New Mexico)
) SS.
County of Doña Ana)

This instrument was acknowledged before me
on the _____ day of _____, 20____, by

_____.

My commission expires:

_____
Notary Public

APPENDIX G: CONTRACTOR'S RELEASE OF LIENS

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

CONTRACTOR RELEASE OF LIENS

To: Dona Ana Mutual Domestic
Water Consumers Association
5535 Ledesma Drive
Las Cruces, NM 88007

Developer: _____

Contractor: _____

Development Name: _____

STATE OF NEW MEXICO
COUNTY OF DONA ANA

The undersigned contracted directly with the Developer to construct water and/or sewer improvements made part of the above stated project, more particularly the work and/or materials provided (Property) by the Contractor is described as follows: _____

_____

The undersigned, as a Contractor for the above named Development hereby certifies that he/she has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the project referenced above for which DAMDWCA might in any way be held responsible.

The undersigned does hereby waive and release any lien rights to, or claim of lien with respect to and on said above described Development, and the improvements thereon, and on the monies or other considerations due or to become due from the Developer, on account of labor, services, materials, fixtures, apparatus or machinery heretofore or which may hereafter be furnished by the undersigned to or for the above described Development by virtue of said contract.

The undersigned certifies that (i) there are no known liens on the Property, (ii) the undersigned has not received a notice of claim of lien on funds due related to the Property, (iii) there are no other claims outstanding which would entitle the holder thereof to claim a lien on the Property, including no outstanding retention of title agreements or security interests for any materials, appliances, equipment, fixtures, or furnishings placed upon or installed as part of the Property. The undersigned certifies that they have not created, suffered, assumed or agreed to any defect, lien, encumbrance, or adverse matter affecting title to the Property except matters of record and matters disclosed herein. The undersigned agrees to promptly defend, remove, bond, or otherwise dispose of any defect, lien, encumbrance, adverse claim, or other matter, if any, created, first appearing in the public records, or attaching subsequent to the date of this

Agreement, but prior to the date the Dona Ana Mutual Domestic Water Consumers Association acquires for value the easement, interest or facilities to be conveyed.

The undersigned understands and agrees that this Agreement relates to all services rendered, work done, and materials furnished for the Development by undersigned in any and all capacities, and not solely for any particular item.

The undersigned warrants that they have not assigned nor will assign their claims for payment, nor right to perfect a lien against the Property, and that undersigned has the right to execute this Agreement.

IN TESTIMONY WHEREOF, this Agreement made this ____ day of _____, 20____.

_____	_____
(CONTRACTOR NAME)	*(ADDRESS)*
_____	_____
(SIGNATURE OF AUTHORIZED REPRESENTATIVE)	*(PHONE)*
_____	_____
(PRINT NAME OF AUTHORIZED REPRESENTATIVE)	*(TITLE)*

APPENDIX H: GRANTOR'S AGREEMENT

DOÑA ANA MUTUAL DOMESTIC WATER CONSUMERS ASSOCIATION
MAILING ADDRESS: P.O. BOX 866 • DOÑA ANA, NM • 88032
PHYSICAL ADDRESS: 5535 LEDESMA DR • LAS CRUCES, NM 88007
(575) 526-3491 OFFICE • (575) 526-9306 FAX

GRANTOR'S AGREEMENT

To: Dona Ana Mutual Domestic
Water Consumers Association
5535 Ledesma Drive
Las Cruces, NM 88007

Developer/Grantor: _____

Development Name: _____

STATE OF NEW MEXICO
COUNTY OF DONA ANA

The undersigned owns in fee simple, and no other person or entity owns any share of, water and/or sewer improvements made part of the above stated project, more particularly described as follows (the "Property"): _____

_____

The undersigned certifies there are no pending suits, judgments, executions, or encumbrances against the Grantor in the State of New Mexico or in any Federal Court.

The undersigned has paid in full or otherwise has satisfied or will satisfy all obligations for all materials and equipment furnished, for all work, labor and services performed, and for all known indebtedness and claims against the undersigned for damages arising in any manner in connection with the construction/repair of the Property for which the owner or his property might in any way be held responsible, and further that no financing statements, chattel mortgages, conditional bills or sale or retention of title agreements have been given or executed by undersigned for or in connection with any material, appliances, equipment, fixtures, or furnishings placed upon or installed as part of the Property.

The undersigned certifies there are no outstanding bills incurred for labor employed and/or materials used in making any repairs or improvements on or to the Property. No labor, professional design or surveying services have been performed on, at or to the Property, nor has any labor been performed towards the construction of any structure on or to the Property, and no materials, supplies, or equipment of any kind that could be used in connection with such work have been delivered to, placed on or made part of the Property. There are no unpaid bills or liens against the Property. If any unpaid bills or liens shall be discovered, then the Grantor agrees to be responsible for payment of any such bills or liens.

Grantor shall indemnify and hold the Dona Ana Mutual Domestic Water Consumers Association harmless of and from any and all loss, cost, damage, and expense of every kind, including attorney's fees, which the Dona Ana Mutual Domestic Water Consumers Association shall or

may suffer or incur to become liable for under its policies, directly or indirectly, out of the improvement to the Property, or on account of any mechanic's, materialman's or any other type of lien or claim, or in connection with the enforcement of this Agreement.

The undersigned certifies that they have not created, suffered, assumed or agreed to any defect, lien, encumbrance, or adverse matter affecting title to the Property except matters of record and matters disclosed herein. The undersigned agrees to promptly defend, remove, bond, or otherwise dispose of any defect, lien, encumbrance, adverse claim, or other matter, if any, created, first appearing in the public records, or attaching subsequent to the date of this Agreement, but prior to the date the Dona Ana Mutual Domestic Water Consumers Association acquires for value the easement, interest or facilities to be conveyed.

IN TESTIMONY WHEREOF, this Agreement made this ____ day of _____, 20____.

_____ _____

(GRANTOR'S NAME) *(ADDRESS)*

_____

(SIGNATURE OF AUTHORIZED REPRESENTATIVE)

_____ _____

(PRINT NAME OF AUTHORIZED REPRESENTATIVE) *(TITLE)*