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10.00 GENERAL NOTES

These standards and specifications are published by the Camino Real Regional Utility Authority (CRRUA) as an aid in design and construction to entities working in the CRRUA service territory. All main line utility design must be done under the direction of and stamped by an engineer registered in the State of New Mexico.

10.10 PURPOSE

These design standards are minimum standards applicable to CRRUA projects and permits and do not relieve the engineer of following sound engineering principles that protect the health, safety, and welfare of the general public.

CRRUA may perform random construction inspections without prior notifications. Any contractors found to be installing material other than the approved material from a certified submittal will be banned for a minimum of 3 years from completing any projects for CRRUA or for projects that will be dedicated to CRRUA. By accepting projects for service by CRRUA, contractors must agree to compliance with these specifications.

Uses having direct or indirect wastewater discharge into a CRRUA wastewater management system are required to comply with these standards and subsequent revisions. The Executive Director of CRRUA will have the authority to interpret and guide decisions relating to these standards. All users must accept that these standards are “minimum standards” and improvements to higher performance levels may be required when justified by site or project conditions.

10.20 CRRUA REIMBURSEMENT POLICY

As a general rule all utility improvements are paid for by the entity that requests the improvement. In certain instances (line oversizing, capital improvement projects, or main line extensions) CRRUA may agree to reimburse the entity requesting the utility improvement for a portion of the expenses associated with design and construction of the utility. Such reimbursements shall be evaluated on a case by case basis until such time as a specific policy is developed as a standard.

10.30 PROCEDURES FOR VARIANCES FROM POLICIES

The CRRUA Executive Director, or designee, may approve a request for a variance from these standards. A variance is a slight deviation, not a complete disregard, from the numerical requirements in these standards. A variance from these standards shall not set any precedent for future variances. It is recommended that CRRUA staff be contacted prior to submitting a formal request for variance.

10.40 BACKFLOW PREVENTION

All connections, including but not limited to residential, commercial, and industrial users, where there is an auxiliary water supply shall have no direct or indirect cross connection with potable water systems, unless an approved air gap or an approved reduced pressure principle backflow prevention assembly shall protect CRRUA's public water system.

10.50 GREASE TRAPS

Grease traps fall under the International Plumbing Code and are regulated by CRRUA's designated inspector(s). A grease interceptor or automatic grease removal device shall be required to receive the drainage from fixtures and equipment with grease-laden waste located in food preparation areas, such as in restaurants, hotel kitchens, hospitals, school kitchens, bars, factory cafeterias and clubs.

Fixtures and equipment shall include pot sinks, prerinse sinks; soup kettles or similar devices; wok stations; floor drains or sinks into which kettles are drained; automatic hood wash units and dishwashers without prerinse sinks. Grease interceptors and automatic grease removal devices shall receive waste only from fixtures and equipment that allow fats, oils or grease to be discharged.

Where lack of space or other constraints prevent the installation or replacement of a grease interceptor, one or more grease interceptors shall be permitted to be installed on or above the floor and upstream of an existing grease interceptor.

10.60 UTILITY EXTENTION LIMITS

All CRRUA owned utility mains that are extended for service to a property shall be extended to the most distant limits of any property that is being developed. In the event that a dedicated and paved right of way is constructed, all utilities must be constructed to paving limits of the project, or road limits plus 5 feet, as determined by CRRUA.

10.70 UTILITY SERVICE CONNECTIONS

Every lot in the CRRUA service area shall have separate CRRUA owned utility service connections, unless specifically authorized by the CRRUA Executive Director, or designee.

10.80 NON CRRUA JURISDICTION

For CRRUA owned utility mains or service lines needing a permit from an entity other than CRRUA, the permit request of the other entity must be initiated by the person requesting the proposed construction. The party making the permit request is responsible for any fees associated with the permit process.

20.00 PERMITS

A utility permit will be required to install utility mainlines (pipe, conduit, wire, or similar conveyance) and the service connections to the utility's mainline infrastructure within the CRRUA service territory and within rights-of-way or private properties.

20.10 GENERAL

The Utility Contractor shall be responsible for obtaining all construction permits for any proposed work. If any work is completed without an advanced approved permit, the contractor will be required to pay double the permit fees for the associated work. Utilities located outside the limits of the CRRUA service area or outside public Right of Way shall conform to the requirements of Dona Ana County AND the requirements of the appropriate jurisdiction.

20.20 PERMITS FOR CRRUA UTILITIES IN PUBLIC AGENCY RIGHTS OF WAY

Water and Wastewater utility lines are typically located in public Rights of Way. CRRUA does not own nor control access to utilize these spaces and therefore requires contractors to obtain permits from the appropriate government agency charged with managing the respective properties.

The entity responsible for construction of the utilities must obtain a permit application form from the appropriate agency. The entity responsible for construction of the utilities is responsible for completing the permit application form and for all expenses associated with completing the form and occupying the public space, including appropriate insurance requirements. Specific requirements for the agencies most likely to be encountered are listed below.

NMDOT

Permission to place utilities in NMDOT Rights of Way are granted to CRRUA from the NMDOT. As such, the permit application form must be reviewed and signed by the CRRUA Executive Director, or designee, prior to being submitted to NMDOT. The entity responsible for construction of the utilities must obtain a permit application form from NMDOT.

In compliance with NMDOT requirements, AS-BUILT drawings of utility installation within the Rights of Way must be submitted to the NMDOT through CRRUA within 30 days of completion of the permitted work on the project. Failure to submit AS-BUILT drawings will result in cancellation of the permit and withdrawal of approval of the utility installation by CRRUA. As-built drawings must be submitted to CRRUA for review and approval prior to being submitted to NMDOT. A copy of NMDOT requirements for As-Built drawings may be obtained from NMDOT.

More information at: <https://www.dot.nm.gov/infrastructure/engineering-publications/forms-and-checklist/>.

Dona Ana County

Permission to place utilities in Dona Ana County Right of Way is granted to CRRUA from Dona Ana County. Therefore, the Dona Ana County permit application form must be reviewed and signed by the CRRUA Executive Director, or designee, prior to being submitted to Dona Ana County. The entity responsible for construction of the utilities may obtain a permit application form from Dona Ana County. More information at:

<https://www.donaanacounty.org/departments/community-services/building-services/permit-requirements>.

ELEPHANT BUTTE IRRIGATION DISTRICT (EBID)

Permissions to place utilities in EBID Right of Way are granted to CRRUA from the EBID. Consequently the permit application form must be reviewed and signed by the CRRUA Executive Director, or designee prior to being submitted to EBID. More information available at: <https://www.ebid-nm.org/permits-policies>.

UNION PACIFIC

All permitting within Railroad Right of Way shall be done only by CRRUA with assistance as required from the entity responsible for construction of the utilities. To place utilities in Union Pacific's Right of Way, you need to meet certain requirements, including the parameters listed below. More information at: <https://www.uprr.com/rem/ucs/jas/#/home>.

Location:

The encroachment must be within 5 feet of the property line, at least 35 feet from the nearest track's centerline, and at the right-of-way's outer limits.

Drawings:

Construction drawings must include general notes and symbols, special details, small-scale maps of the encroachment route, shoring plans, pipeline marker signs, and details of proposed poles.

Poles:

Unguyed poles must be at least 10 feet plus the pole's height above the groundline from the nearest track's centerline. If guying is required, the guys must be placed to prevent the pole from falling or leaning towards the tracks. High voltage poles and structures (34.5kV and higher) must be located off the railroad right of way.

Crossings:

Crossings cannot be installed within 500 feet of the end of any railroad bridge, or 300 feet from the centerline of any culvert or switch area.

Casing:

Casing must extend at least 30 feet or 2(D)+20 feet from the outside track's centerline on each side, whichever is greater. "D" is the depth of the casing's bottom below the railroad subgrade. The casing must extend beyond the right-of-way limit if needed to reach the specified length.

INTERNATIONAL BOUNDARY AND WATER COMMISSION (US-IBWC)

The US-IBWC in accordance with public law no. 370-74th congress (49 stat.906) tasks the US-IBWC with operation and maintenance of a license and permit program designed to either permit or not permit all projects including but not limited to, event(s), construction, right of entry, recreational, or commercial over, through, or under the US-IWBC Right of Way. More information: <https://ibwc.azurewebsites.net/organization/engineering/realty/>.

CITY OF SUNLAND PARK

A considerable amount of the CRRUA service area is within the municipal boundaries of Sunland Park, New Mexico. The City of Sunland Park must review, approve, and permit any work proposed to be completed within their Rights-of-way. More information at: <https://sunlandpark-nm.gov/community-development/>.

30.00 EXISTING UTILITIES

Existing Utilities within the boundaries of a project shall be adjusted as required to conform with the final grades of a project. The entity responsible for construction of the utilities is responsible for all expenses associated with all adjustments.

40.00 EASEMENT USE AND WIDTHS

Use of land encumbered by CRRUA's utilities is limited to uses that do not interfere with the operation, maintenance, or construction of the utilities or other uses within the easement. Easement widths stated in these standards are minimum widths only. The CRRUA Executive Director may request greater widths than the stated minimums, when the extra width is necessary for operation, maintenance, or construction of the utilities within the easement.

Easements for utilities should be located such that the utilities can be maintained by wheeled light construction equipment. Utilities located through areas that will be expensive to repair or maintain (i.e. extensive landscaping, drainage ponds, etc.) will require sleeving of the utility. For utility easements in commercial areas, parking lots or paved drives are preferred locations.

50.00 GENERAL CONSTRUCTION SPECIFICATIONS

The construction specifications contained in this document includes the criteria, standards, and regulations related to the design of water and wastewater systems for general development. These standards outline criteria for the most common type of installations and are not intended to cover all types of installations.

The engineer of record is expected to identify appropriate design parameters and this document is not intended to be a detailed design handbook. Criteria and standards presented are those determined to be the minimum acceptable values necessary to result in system designs having satisfactory functional characteristics, durability, and operational suitability.

50.10 DEFINITIONS

The definition of terms used within this document shall be as follows:

ENTITIES:

OWNER – CRRUA, The City of Sunland Park, or Dona Ana County, New Mexico. The Owner's representative shall be the contract administrator (herein: C.A.), who shall be in charge for the Owner, acting personally or through any and all assistants duly authorized such as: Project Managers, Engineers, Inspectors (herein: P.M., or designee).

CONTRACTOR – The entity in responsible charge of the construction improvements.

SUPERINTENDENT – That individual, or individuals, having authority to represent the Contractor on a daily basis regarding the project.

PROJECT:

The permitted installation, alteration, or adjustment of any portions of the CRRUA water distribution system, or sewer collection system either by contract to CRRUA or authorized by permit issued by a public agency within the CRRUA service territory.

CONTRACT DOCUMENTS:

The set of plans, specifications, agreements, these Standards, and all referenced applicable standards and specifications and Ordinances appurtenant to the Project.

BRAND NAME OR EQUAL:

Where the brand name or equal specification is shown within these standards, drawings, and specifications, the use of the brand name is for the purpose of describing the standard of quality, performance, and characteristics desired and is not intended to limit or restrict competition. All manufacturers' products listed are preferred. Others may be submitted to the CRRUA Executive Director, or designee, for pre-approval, prior to bid opening for CRRUA contracted projects.

50.20 ACCEPTANCE OF IMPROVEMENTS, SUBMITTALS, RECORD DRAWINGS AND WARRANTIES

UTILITY WORK CONTRACTED DIRECTLY BY CRRUA:

For preliminary acceptance of utility improvements, and prior to connection to the CRRUA utility system, the Contractor shall be required to submit utility blueline drawings, annotated with any and all Project changes ("As-Builts"), for review and approval by the P.M. Such drawings shall be submitted to the P.M., or designee, for approval and acceptance. Utility improvements cannot be tied into the existing system until As-Built working drawings (Contractor generated blueprints are acceptable) of the improvement have been submitted to, and accepted, by the P.M. on that project. All coupons for waterline connections shall be removed and accounted for by the P.M or designee and documented on project as-builts. PM or designee shall inspect and approve equipment used prior to tapping. If a coupon is lost during tap operation, the contractor shall immediately notify PM or designee. The contractor shall coordinate with CRRUA Water Section to determine probable coupon location. The contractor shall be responsible for all coupon retrieval or cost thereof.

UTILITY WORK NOT CONTRACTED DIRECTLY BY CRRUA:

With a request for final acceptance of utility improvements, the Contractor shall finalize and complete all Project changes to the As-Builts and submit one (1) set of said completed As-builts, and a computer-aided drawing on recordable computer disc, or other electronic format acceptable to the P.M., and a detailed material listing, said submittal being herein the Project Record Drawings submittal, and is required prior to Subdivision approval and acceptance. The P.M., or designee, shall inspect said improvements to determine whether the installations are acceptable and whether they conform to these Utilities Standards and the Contract Documents. The submittal of electronic drawing files may be waived by the P.M. Upon approval and acceptance by the P.M., the Record Drawing submittals are the Project's "Record Drawings".

The P.M. shall be the final authority for acceptance or rejection of pipe and other materials installed. The entity responsible for construction (herein: Contractor), and their representative (herein: Superintendent), shall ensure that all materials and procedures are proper and in compliance with CRRUA requirements in every respect. The Contractor shall be held responsible and accountable for everything that comes under or is related to the proper and complete execution of the utility system's installation, either directly or indirectly. All coupons for waterline connections shall be removed and accounted for by the P.M or designee and documented on project as-builts. PM or designee shall inspect and approve equipment used prior to tapping. If a coupon is lost during tap operation, the contractor shall immediately notify PM or designee.

SUBMITTALS:

Submittals for construction of water and sewer utility improvements may be required at the option of the P.M., or the CRRUA Executive Director.

AS-BUILTS / RECORD DRAWINGS:

The Contractor shall submit As-Builts (Project and Contract Documents annotated with any and all Project changes) on the construction site at all times. The drawings shall be maintained and kept current with all changes daily throughout the Project.

WARRANTIES:

The Contractor shall provide warranties for quality of installation and performance for a 12 month period. This warranty provision shall also extend to improvements adversely affected by faulty or failed installation relative to adjacent and incidental infrastructure and property.

50.30 CONCRETE MATERIALS

The Contractor shall submit a copy of an approved concrete mix design to be used on CRRUA projects and permits to the P.M., or designee. The approved copy of the mix design can be obtained from a concrete supplier. The concrete supplier should have in his file a copy of a CRRUA approved mix design to be used.

The submitted mix design must be an original (no photocopies) and embossed with the seal of and signed by the New Mexico Professional Engineer certifying the mix design. Prior approved mix designs that have been accepted by the City of Sunland Park or Dona Ana County may be presented for approval by reference.

No concrete shall be placed on any project until the P.M., or designee, has approved the concrete mix design.

50.40 ASPHALT MATERIALS

The Contractor shall submit an asphalt mix design to the P.M. for approval. No asphalt shall be placed on any project until the P.M. has approved the asphalt mix design.

The submitted mix design must be original (no photocopies) and embossed with the seal of, and signed by, the Professional Engineer certifying the mix design.

The asphaltic concrete classification to be placed on any project shall conform to the applicable jurisdiction within which it is being placed (City of Sunland Park, Dona Ana County, State of NM, etc....)

50.50 REMOVALS

All removals shall be disposed of at a "permitted sanitary landfill", or CRRUA approved site for clean fill only.

50.60 TRAFFIC CONTROL PLANS

The Contractor shall submit a Traffic Control Plan (TCP). The TCP shall meet the requirements of the latest edition of the Manual of Uniform Traffic Control Devices ("MUTCD"). The submittal shall be approved by the P.M., or designee prior to commencing construction. TCP's shall be in conformance with MUTCD traffic control specifications and applicable City or County Standards, where applicable.

50.70 SAW CUTTING AND PATCHING EXISTING PAVEMENT

The Contractor shall make pavement cuts for utility connections and other required operations by saw cutting the existing asphalt pavement in neat, straight lines prior to initiation of excavation as directed by the P.M., or designee, and by the Contract Documents. The method and equipment used for saw cutting shall be approved by CRRUA before any such cuts are made.

All pavement cuts shall be made producing square, clean and straight edges parallel to or at right angles with the street or roadway right-of-way line (whichever is appropriate) while being of uniform width throughout. No repaving (patching) shall be allowed until these pavement cut conditions are met.

Pavement cuts shall be kept to the minimum width necessary to perform the required utility, roadway, or drainage work, or to accommodate the Contractors paving equipment. The Contractor shall not be allowed to leave more than 1,000 linear feet of utility trench asphalt patching incomplete. The P.M. shall stop any further removal of asphalt until such time as the Contractor has caught up with patching per the above limit.

If the Contractor does not repave (patch) for a period during which the weather changes radically, or in excess of one (1) week, the P.M. shall retake density tests at the Contractor's expense. Any rework or further testing to bring the subgrade to the required 95 percent of Modified Proctor will be at the Contractor's sole expense.

50.80 LANDSCAPING RESTORATION

The Contractor shall minimize the removal or damage to any landscaping or improvements within or adjacent to the parkway and sidewalks. Any removal of landscaping or improvements will have to be approved by the P.M. prior to removal. Any removed/damaged landscaping or improvements shall be replaced to existing condition with like material. All replacement items shall be approved by the P.M. prior to installation. The installation of replacement items shall be to the P.M.'s satisfaction. Any replacement of damaged or removed items will be at the Contractor's expense and shall be specifically included within supplied warranties.

50.90 SIGNAGE

The Contractor shall minimize the removal or damage to any signage within or adjacent to the parkway and sidewalks. Any removal of signage will have to be approved by the P.M. prior to removal. Any removed/damaged signage shall be replaced to existing condition with like material. All replacement items shall be approved by the P.M. prior to installation. The installation of replacement items shall be to the P.M.'s satisfaction. Any replacement of damaged or removed items will be at the Contractor's expense.

60.00 GENERAL NOTES

The following sections outline the general requirements for construction of water or wastewater components within the CRRUA service area.

60.10 COORDINATION OF WORK

The Contractor shall coordinate work schedules with the public, farmer's irrigation/work schedules while working in the temporary construction easements. The Contractor shall repair all asphalt/gravel driveways and turnouts that are damaged during construction, to existing condition.

Water for construction purposes is the sole responsibility and expense of the Contractor that requires the water. Water for construction purposes is usually available for a fee from the CRRUA system. Construction water is generally made available by means of a CRRUA furnished meter attached to a fire hydrant. The charges for construction water consist of a monthly rental fee plus a cost based on the actual amount of water usage recorded by the meter. Since fees vary, the contractor is encouraged to determine the current cost of the service prior to utilizing the service.

During periods of system capacity shortages, CRRUA reserves the right to prohibit the supply of construction water.

60.20 LAYOUT OF WORK

The Contractor shall employ registered professional surveyors to accomplish all project control staking and base line staking, as becomes necessary, and shall ensure proper locations of the pipeline and its appurtenances.

The Contractor shall be responsible for adherence to the lines and grades of the plans and profiles as designed. The method of adherence will be by placing cut stakes along the project and observing the directions of the cut stakes, as may be appropriate. It is the responsibility of the Contractor that professional standards of meeting lines and grades are required.

When any control or base line staking, triangulation station, benchmark, corner, monument, witness mark, or other similar reference point that becomes removed or obliterated by reason of the construction, out of accident or necessity, it shall be the Contractors responsibility to cause said points to be established by a registered surveyor and to record a plat of that survey to be recorded with the Dona Ana County Clerk, in conformance with applicable surveying standards.

60.30 PIPELINE LOCATION

The Contractor shall realize and consider that the pipeline and appurtenance routes will be intersected by underground and above ground obstructions. The Contractor is responsible for determining the existence and location of any obstructions and for adequately and properly avoiding and protecting any permanent obstructions, or obstructions having ownership or value, from harm or damage. The pipeline and appurtenances shall be installed along the routes and in the locations shown on the Contract Documents contained herein as specified herein or as specified by the P.M. The pipeline shall be laid along the centerline of those routes and at the depths specified. The Contractor shall employ licensed surveyors to accomplish all project control staking and base line staking, as becomes necessary, and shall ensure proper locations of the pipeline and its appurtenances.

Accurate as-builts shall be maintained and kept current daily throughout the project. The as-built drawings shall indicate the location of mainline and service lines with respect to right-of-way and property lines. All stopples, valves and fittings, etc., shall be adequately referenced to obvious, easily described, permanent objects. The as-builts shall be turned to the P.M. before a tie to the existing system is allowed.

The Contractor shall return everything along the construction route to its original condition to the satisfaction of the P.M. All damage to property that occurs as a result of the Contractor's work shall be completely repaired or replaced to its original condition and to the satisfaction of the P.M.

The Engineering Drawings shall reflect the location of sewer manholes to establish alignment outside of the wheel path on the roadway surface.

60.40 TRENCHING, EXCAVATIONS, AND BACKFILLING

All trenches shall be dug and maintained as per the requirements of the latest OSHA Trench Safety Standards and Specifications. The working conditions in the trench shall also conform to these Standards.

The Contractor shall utilize proper equipment and methods as are necessary to properly locate the trench or excavation along the lines required by the Contract Documents and to dig the trench or excavation to the proper depths in accordance with these Standards. Removal of unknown, unforeseen, unidentified, underground obstacles (such as concrete, rocks, metal objects, wood objects, hard soil, etc.), if not addressed elsewhere in contractual documents with the Owner, shall be considered a change of conditions to the Project and shall be referred to the P.M. for concurrence.

The Contractor shall perform all excavations to the depths indicated in the permitted Project documents or specified herein. Any excavation beyond the authorized depths shall be filled with suitable compacted material up to the proper depth (before installation of the pipeline) at the Contractor's expense.

Utility Soil Bedding and Backfilling shall conform to the following:

1. Utilities should be bedded in fine-grained granular material such as fine, poorly graded (uniform) sand in a fashion to avoid the development of any voids around utility lines placed. Embedment material shall be provided and installed such that a minimum of 85% Modified Proctor, per American Association of State Highway and Transportation Officials (AASHTO) T-180, densities are achieved for the pipe zone backfill.
2. For all Utility lines refer to NMDOT for suitable backfill. Providing suitable backfill will be required per specifications.
3. All soil bedding materials used should be non-plastic. All soil bedding materials should extend a minimum of 4 inches in all directions, except for gas lines having 6" minimum above and below the pipe.
4. All utility trenches should be backfilled with compacted soil below structural elements, including foundations, interior and exterior flat concrete work, and paved parking or drive areas. Although the backfill should be compacted, care should be taken not to damage the utility during backfilling and subsequent compaction.
5. Backfill materials may be native soils free of contaminants such as debris and rubble, however, no material having a maximum individual particle size or agglomeration clod size greater than two and one-half (2½) inches shall be placed within twelve (12) inches of the utility piping installed.

6. Minimum Backfill and Trench Compaction Requirements:

Utility Construction	Percent of Modified Proctor Density (ASTM D-1557)	
	Fill or Backfill Placement	Maximum Finished Lift Thickness (in.)
<u>In Roadway:</u> Shallower than 36 " of Grade	95	6
<u>In Roadway:</u> Deeper than 36 " of Grade	95	12
<u>Outside Roadway:</u> Shallower than 36 " of Grade	90	12
<u>Outside Roadway:</u> Deeper than 36 " of Grade	90	18

During excavation, material suitable for backfilling must be stockpiled in an orderly manner. Materials unsuitable for back filling, as directed by the P.M., shall be wasted in a suitable location. Where material is excavated from a trench and piled adjacent to the trench that material shall be piled in such a way that the toe of the slope of the material is at least two (2) feet from the edge of the trench. Alongside streets or roadways, material excavated from the trench shall, wherever possible, be piled along the street or roadway (traffic) side of the trench.

Should any rock, coarse stone, boulders, gravel, or other materials be encountered which would prevent the obtainment of suitable bedding, the trench shall be excavated to at least six (6) inches, for coated steel gas lines, four (4) inches for all other utilities, of extra depth and backfilled and properly compacted to grade with suitable material.

The Contractor shall furnish all work and items necessary for the completion and maintenance of the trench, including flood or water control, shoring, cofferdams, diversion dikes, sheeting, piling, bracing, sloping, etc.

All grading in the vicinity of trenches or other excavations shall be controlled to prevent surface water from flowing into the excavations or damaging other property. Any water accumulated in the excavations shall be removed by pumping or by other Owner's approved methods, at the Contractor's expense.

Should the trench or excavation bottom become unstable from the entrance of surface water into the open excavation, the saturated soil shall be removed and suitable backfill placed and compacted to grade, at the Contractor's expense. All trenches shall be cut to the line and grade as shown on the permitted Project documents and as specified herein.

The bottom of the trench shall be smooth, without discontinuities and shall provide uniform support along the entirety of the pipeline without allowing the pipe to bend or sag.

Trench sides shall be smooth, uniform, free of discontinuities and protrusions such as roots, limbs, abandoned utility lines, asphalt material or other matter which may present a hazard to either the pipe, pipe coating or personnel. The minimum allowable trench width shall be as shown in the Contract Documents.

All coated and/or wrapped utilities damaged during trenching or other excavations shall be cleaned up and again coated and wrapped throughout the excavation (throughout the exposed length) in accordance with the applicable Standards at no added expense to the Owner. This coat and wrap shall be proven to be proper and complete by the Contractor. This shall be done in part by completely Holiday testing steel wrapped lines (jeeping). These recoated and rewrapped (or exposed) lines shall be tested in the presence of the P.M., or designee, immediately prior to backfilling.

All harmful debris such as sharp stones, rocks, boulders, cans, paper, skids, stumps, roots, miscellaneous vegetation, tires, loose wire, and other extraneous matter shall be removed from the trench prior to lowering of the pipe and/or backfilling. No such debris which may be injurious to the pipe or pipe coating or which may create a corrosive cell or hot spot shall come in contact with the pipe or pipe coating before, during, or after backfilling.

Minimum density requirements for backfill shall be as follows:

1. Within street, roadway, highway, or railroad rights-of-way shall be 95 percent of Modified Proctor maximum density at a moisture content within plus or minus two percent (+/- 2%) of optimum moisture.
2. Outside of street, roadway, highway, or railroad rights-of-way shall be 90 percent of Modified Proctor maximum density.
3. Utility service lines in yards (min. four (4) inches wide, max. six (6) inches wide) shall be 85 percent of Modified Proctor maximum density.

Tamping to consolidate backfill shall be done by placing the backfill in layers and compacting with the proper tools. Compaction methods and equipment may utilize hand or mechanical tampers, rollers, etc. The equipment and procedures proposed shall be subject to the approval of the P.M. The use of "Hydro-Hammers" and other such "stampers" shall not be allowed.

The Contractor shall take extreme care and shall ensure that all drain ditches, spillways, watercourses, streets, highways, roadways and railroads are kept open at all times. The Contractor shall at all times keep the construction area cleanup completed to within one (1) block of the completed backfill, or 1000 lineal feet of trench, as directed by the P.M.

The location of mechanical compression couplings in existing steel gas piping uncovered during construction shall be brought to the attention of the P.M., or designee, and shall be shown on as-built drawings.

Flowable fill may be used in shallow, narrow trench excavations. Materials shall conform to the standard specifications for road construction for the jurisdiction within which the utility is installed. Flowable fill may not be used for utility embedment material unless authorized by the P.M., or designee. Use of flowable fill is discouraged in areas of collapse prone soils and expansive soils that are moisture sensitive and in areas of large excavations. The Contractor shall be responsible for all paving, repaving, and pavement patching in accordance with the said Road Construction Standards.

On streets and roadways having surfaces which have been graveled or stabilized with base material, the Contractor shall blade the surfacing material away from the area of the trench and stockpile such material in a windrow which is clear of the construction operations. After the utility line has been installed and the trench backfilled and compacted, the area shall be properly graded and the surfacing material shall be re-spread to its original lines and stabilized by watering and rolling to its original condition.

60.50 SERVICE INTERRUPTION /NOTICE OF SCHEDULED WORK

The Contractor shall obtain the permission of the P.M., or designee, before making any connections with existing utility mains. The required operations of the existing system components will be performed by the P.M.

The Contractor shall submit a work plan, detailing the performance of necessary activities, for prior approval of the P.M., or designee. The Contractor shall notify the P.M. of all utility shutoffs that he plans to make, the day and time they are to be made, the estimated length of time the utility will be out of service, and manpower available for the performance of same. The Contractor may be required to perform certain work activities at night when, in the opinion of the P.M., or designee, it will be necessary for the convenience of the Owner and the general public. Work shall be started upon the direction of the P.M., or designee, and shall be completed in a prompt, efficient manner in coordination and cooperation with any and all other utilities concerned.

The Contractor, with prior approval of the P.M., shall notify the utility customers that will be affected of the impending shutoff. The utility customers shall be given ample time, 48 hours, to provide themselves with temporary supply measures.

Notification shall be by personal contact, or door hanger notice, and by notice in a local newspaper. Any interruption of service shall be for as short a time as possible. No service should be interrupted for a period longer than four hours except with the permission of the P.M., or designee.

When construction work requires that service to CRRUA customers be interrupted, the Contractor must request approval for the interruption from the P.M., or designee, at least 48 hours in advance.

The P.M., or designee, may adjust scheduled interruptions to occur during minimum use periods. If an emergency interruption occurs, the Contractor shall immediately notify the P.M. and CRRUA and shall restore service as soon as possible.

It shall be the P.M., or designee's, option to assist the Contractor in restoring service during scheduled or emergency interruptions if, in their opinion, the work to restore service is not progressing in a timely manner. Costs incurred by CRRUA will be reimbursed to CRRUA by the Contractor based upon CRRUA's invoice.

60.60 SCHEDULE OF WORK

Subgrade to be established ± 0.2 FT prior to any utility corridor being utilized. Sewer corridor to be installed first, followed by water and gas. All main lines shall be installed, tested, and accepted by the P.M., or designee, prior to final subgrade elevations and lines being established.

60.70 UTILITY STUBOUTS

Locations of utility stubouts and services shall be marked on the curb top, once only, by branding as "S" for sewer, "W" for water, and "G" for gas. Failure to mark stubouts and services, within 12 inches of their horizontal placement, shall constitute grounds for rejection of the subdivision plat and/or rejection of the utility system extension. All coupons for waterline connections shall be submitted and accounted for by the P.M. on that project and a memo certifying such has occurred to be submitted to the Deputy Director of Water.

60.80 CONSTRUCTION REQUIREMENTS

CLEANUP – The Contractor shall leave the project in a clean and neat condition.

MATERIAL TESTING FAILURES – The cost of all density re-tests, due to failures, shall be paid by the Contractor. A receipt from the testing lab indicating that the Contractor has met his obligations will be necessary prior to acceptance of the utility project. A certificate will also be required from the testing lab certifying that all failures have been successfully retested.

"AS BUILT" and "RECORD" DRAWINGS – For utility work on CRRUA contracts, the Contractor shall prepare an accurate, detailed set of "As Built" drawings for the utilities installed. The Owner will provide the Contractor with a set of plans for the preparation of the "Record" drawings and the Contractor shall record thereon locations, depth, size, type of material, any other pertinent data, and all changes made in the utility system. The Contractor shall turn over the completed set of plans to the owner prior to acceptance of the project by CRRUA.

VALVE BOX AND MANHOLE RAISING – The Contractor shall be responsible for raising all valve boxes and manhole rings and covers after roadway surface treatment.

60.90 CONNECTION TO EXISTING SYSTEMS

At least 48 hours prior to starting any work involving connections to the existing system, the Contractor shall notify the P.M., or designee. Replacement of paving shall follow the backfill by not more than three (3) days, nor more than 1000 lineal feet of trench width following the back fill specifications of the jurisdiction within which the work is completed.

61.00 PUBLIC CONVENIENCE AND ACCESS

The Contractor shall conduct and schedule his work at all times so that a minimum of obstructions to traffic and other inconveniences to the public occurs. The Contractor shall maintain access to properties. The testing, purging, transfer of service and backfill of each section of line shall immediately follow the installation.

Where the pipeline routes cross secondary streets, the excavation shall be backfilled to provide a roadway prior to the end of the workday. Construction by open excavation across major streets and thoroughfares shall be carried and completed to approximately the roadway centerline and the trench backfilled prior to excavation across the remaining roadway section so that traffic will not be interrupted.

The Contractor shall provide and set barricades and flashing lights along all open excavations and at points where the construction operation creates hazards to the public. The spacing of barricades and lights shall be adequate to insure the public a warning of the hazard and shall follow the MUTCD Standards and directions of the P.M., or designee. Flares and/or lights shall be kept burning from sunset to sunup. Barricades shall be painted and fitted with reflectors to increase visibility.

61.10 EARTH RETAINING STRUCTURES

A design drawing stamped by a registered professional engineer must be submitted for any retaining wall that protects City-operated utility infrastructure. The design must be approved by CRRUA. The construction must be permitted through the appropriate jurisdiction (City of Sunland Park or Dona Ana County etc.)

61.11 POTHOLING AND EXPLORATION

Shall be done in accordance with the Underground Damage Protection Law (UDPL)

- Contractor shall call 811 prior to starting construction.
- When potholing, it is the contractor's responsibility to find the marked utility within the UDPL's 18" tolerance zone.
- No horizontal excavating without enlarging the size of the excavation.
- If the line cannot be found within the 18" tolerance zone, contract the utility owner.

61.12 GPS LOCATION OF NEW UTILITY LINES

All new utility lines shall be surveyed as built (with GPS points measured in the trench) prior to any backfilling. Any area backfilled prior to these measurements will be subject to re-excavation for such documentation.

70.00 UTILITY PLAN REVIEW STANDARDS

The following sections outline the minimum standards for utility plan reviews within the CRRUA service area.

70.10 BUILDING PERMIT REVIEW

For all new construction that does not include utility main extensions, with the exception of single family residential subdivisions, a complete site plan must be submitted. The information shown below is specifically requested by CRRUA for the utility phase review. It is recognized that, depending upon the permit requested, there is some overlap and duplication of requirements.

- North arrow, scale and address of proposed building
- Party making the tie in to existing CRRUA utilities
- Point of service connection to utility main and size of utility service line
- Location and size of all existing utility main lines, service lines, meters, electrical enclosures, and easements
- Location of all concrete flat work
- Location of all retaining walls & details
- Location of all trees or the following note "Trees not to be planted within 10 feet of service line"
- Required water demand in GPM based on applicable codes and intended use
- CRRUA owned utility mains in private property need adequate easements to CRRUA for operations and maintenance. All necessary easement locations must be shown on the plans when submitted for review. All easements must be filed and recorded in the Dona Ana County public records, and a recorded copy of the easements must be delivered to CRRUA before final approval of the plans.
- Location of all proposed and existing fire hydrants
- Location of all proposed and existing manholes
- Location of all proposed and existing valves
- Location of all existing power lines

70.20 BUILDING PERMIT REVIEW UTILITY EXTENSIONS

For all new construction that includes utility main extensions, with the exception of single family residential subdivisions, a site plan must be submitted that contains the information required in the most recent edition of the jurisdiction's Building Code for the type of permit

requested. All main line utility design must be done under the direction of and stamped by an engineer registered in the State of New Mexico.

The information shown below is specifically requested for review by CRRUA, for the utility phase review. It is recognized that, depending upon the permit requested, there is some overlap and duplication of requirements.

- Party making the tie in to existing CRRUA utilities
- Location of all existing & proposed utilities
- All proposed fittings must be labeled on the plans
- Sanitary & Storm sewer line sizes, slopes, and invert elevations
- Manhole stationing and rim elevation
- Pipe sizes & depth depicted
- Final plans must be signed, dated & stamped by the person in responsible charge of the work
- CRRUA owned utility mains in private property need adequate easements to CRRUA for operations and maintenance. All necessary easement locations must be shown on the plans when submitted for review. All easements must be filed and recorded in the Dona Ana County public records, and a recorded copy of the easements must be delivered to CRRUA before final approval of the plans.

70.30 SUBDIVISION PLAN REVIEW

All construction plans for subdivisions shall contain the information required in the most recent edition of the City of Sunland Park or Dona Ana County Subdivision Code as appropriate, as well as the following information.

- All proposed fittings and valves must be shown and labeled on the plans
- For sewer lines pipe distance is measured horizontally from center of manhole to center of manhole

80.00 WATER DESIGN STANDARDS

The following sections outline the water design standards for construction of water components within the CRRUA service area.

80.10 GENERAL NOTES

Conditions may exist which will necessitate deviations from these standards. Deviations from these standards shall have prior approval of the CRRUA Executive Director or designee before being designed. Nothing in these standards shall relieve the design engineer from the responsibility of meeting the current standards of all entities having jurisdiction over segments of the particular project being designed.

Entities having possible jurisdiction over projects in the CRRUA service area include, but are not restricted to, the following agencies. Contact and more specifics are provided in section 20.20 of these standards.

- City of Sunland Park
- Dona Ana County
- New Mexico Department of Transportation
- Elephant Butte Irrigation District
- Union Pacific Railroad
- New Mexico Environment Department

The designer is reminded that the Sunland Park and Dona Ana County Fire Department's review construction projects to ensure compliance with the Uniform Fire Code and appropriate fire flow standards as mandated by various entities.

80.20 WATER SYSTEM MODEL

All design professionals are required to identify the latest water system model parameters from CRRUA and its engineering advisors. These water system models shall be used for verification of fluid flow conditions, line sizes, fire flow requirements, and other design elements that depend on analysis of fluid flow characteristics. Such verification, performed by CRRUA and its plan review professionals, shall verify the continuity of designed elements to the existing system.

During peak day conditions, velocities in water mains shall not exceed 5 feet per second (fps). During peak day, including fire flow conditions, velocities in water mains shall not exceed 7 fps.

80.30 STANDARD LOCATIONS

The following sections outline the requirements for standard location of water components within the CRRUA service area.

80.31 ENTRY TO LOTS (SERVICES)

Special cases not covered in the table below will be determined on a case-by-case basis in consultation with CRRUA.

TYPE OF LOT	LOCATION OF SERVICE – ORIENT BY STANDING IN STREET AND FACING LOT
Residential - 36 ft wide or greater	Center of lot
Multifamily	Center of lot then manifolded to individual meters as required
Commercial use within a Subdivision	Center of lot
Commercial use not in a subdivision	Site specific
Mobile home park	Site specific
Mobile home subdivision	Center of lot
<ol style="list-style-type: none">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 of 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 property owner's expense.	

80.32 NON-STANDARD LOT ENTRY LOCATIONS

To avoid utility conflicts due to manholes and utility services on opposite side of street, the following protocol shall be used. Any deviation from the standards stated in the above table will require dimensioning of the utility moved.

1. Sewer can vary from 5-15 feet left from water if necessary to avoid utility conflicts.
2. If moving the sewer will not avoid conflicts,
 - A. The water can be moved up to 5 ft left or right with the sewer 10 ft. left of lot centerline location.
 - B. The sewer can then vary from 5-15 feet left from water as required.

Any lot entry location that differs from the above protocol requires approval of the CRRUA.

80.33 IN STREET RIGHT OF WAY (MAINS)

The following sections outline the requirements for in street main lines within the public rights-of-way within the CRRUA service area.

80.34 NEW CONSTRUCTION

Water mains shall typically be located in a dedicated street right of way 10 ft. from the centerline of the street on the North or East Side of the street. Water main location may be considered on a case-by-case basis for a street that changes direction to the extent that maintaining standard utility location would cause utility lines to cross. Approval by CRRUA is required for a deviation in standard location, such as the case described above.

Utility system piping thrust is to be restrained by the use of restrained joint fittings. Concrete thrust blocking shall be utilized only where project site conditions are not applicable to the use of restrained joint fittings.

The CRRUA Executive Director, or designee, shall approve of the use of concrete thrust blocking where applicable. The size and shape of concrete thrust blocks shall be as indicated within these Standards. The concrete shall be placed such that no concrete is in contact with any bolts or nuts on the piping system. The lengths of restrained joint piping and details of joint restraint glands, clamps, friction slabs or anchors shall be as indicated within these standards and in conformance with the manufacturer's published recommendations.

80.35 CURVED ALIGNMENTS

Curved alignments are allowed when the geometry of the project configuration dictates. Utility line locations through such curved portions shall typically follow the standard locations as indicated above. Curved alignments of water mains by pipe or joint deflection shall not exceed those limits as indicated in the American Waterworks Association (AWWA) C605-13, for PVC materials, and AWWA C600-17, for Ductile Iron materials, or the applicable edition.

For PVC materials the longitudinal bending in the PVC barrel shall not result in a bending radius that is less than the following minimum limits (see C605-94 for additional):

Nominal Pipe Size (in.)	Minimum Bending Radius (ft.)
4	100
6	144
8	189
10	231
12	275

For Ductile Iron materials, joints may be deflected when required. Joint deflections shall not exceed the values listed in AWWA C600-99. For design purposes, joint deflections shall not exceed 80% of those values. The design values to be used are listed below:

Nominal Pipe Size (in.)	Approx. 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

80.40 STANDARD SEPARATION

Standard separation of water mains or service lines from other utilities shall be as shown below (or as shown on Drawing UA-1):

PARALLEL UTILITY LINES – HORIZONTAL SEPARATION (MEASURED FROM CENTER OF UTILITY)						
	Gas		Sewer		Water	
	Main	Service	Main	Service	Main	Service
Gas Main	5 FT.	5 FT.	10 FT.	5 FT.	10 FT.	5 FT.
Gas Service	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
Sewer Main	10 FT.	5 FT.	10 FT.	5 FT.	10 FT.	5 FT.
Sewer Service	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
Water Main	10 FT.	5 FT.	10 FT.	5 FT.	5 FT.	5 FT.
Water Service	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
Storm Sewer	10 FT.	5 FT.	10 FT.	5 FT.	5 FT.	5 FT.
Wire Utility	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
Manhole	10 FT.	6 FT.	NA	NA	10 FT.	6 FT.

Separation may vary with field conditions and CRRUA approval. A separation of 10 ft. between water and sewer mains will be measured from outside of pipe to outside of pipe.

FOR UTILITY LINES THAT ARE CROSSING VERTICAL SEPARATION MEASURED FROM OUTER SURFACE OF UTILITY						
	GAS		SEWER		WATER	
	MAIN	SERVICE	MAIN	SERVICE	MAIN	SERVICE
GAS MAIN	12 IN.	6 IN.	12 IN.	12 IN.	12 IN.	12 IN.
GAS SERVICE	6 IN.	6 IN.	6 IN.	6 IN.	12 IN.	12 IN.
SEWER MAIN	12 IN.	6 IN.	12 IN.	6 IN.	24 IN.	6 IN.
SEWER SERVICE	6 IN.	6 IN.	6 IN.	6 IN.	6 IN.	6 IN.
WATER MAIN	12 IN.	12 IN.	24 IN.	6 IN.	12 IN.	6 IN.
WATER SERVICE	12 IN.	12 IN.	6 IN.	6 IN.	6 IN.	6 IN.
STORM SEWER	12 IN.	6 IN.	12 IN.	6 IN.	12 IN.	6 IN.
WIRE UTILITY	12 IN.	12 IN.	12 IN.	6 IN.	12 IN.	6 IN.

Gas mains passing under sewer mains will be sleeved. Sleeves shall extend a minimum of 5 feet to each side from the outer side of the sewer main. Sleeves can be any pipe material if the sleeve color is yellow or painted yellow. Pipe spacers shall be used to protect the carrier pipe.

When water mains cross sewer mains the crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. When it is impossible to obtain proper horizontal and vertical separation as stipulated in the above two tables, the sewer shall be designed and constructed equal to water pipe and shall be pressure tested, throughout the limits of watertight construction and a minimum of 10 feet each side of the obstruction, to assure watertight connections prior to backfilling. The minimum limits of pressure pipe installation shall be 10" each side of line obstruction.

The vertical separations listed for gas mains apply to poly lines only and do not apply to steel gas lines. Vertical separation from steel gas lines shall be twenty-four (24) inches for a High Pressure and eighteen (18) inches for Low Pressure.

80.41 WATER LINES OUTSIDE OF STREET/ROAD R-O-W

The following sections outline the requirements for water lines outside of street / public rights-of-way within the CRRUA service area.

80.42 MAINS

All CRRUA owned water mains shall be in either a CRRUA utility easement or City/County/State right-of-way of adequate width for installation and maintenance. The minimum acceptable width is 20 ft. for a single line. Additional utilities within an easement

will require an easement width greater than the minimum. Location of any CRRUA utility within drainage ways and other nonstandard utility corridors requires CRRUA approval.

Water distribution lines may be located between residential lots in utility easements along lot/property lines with prior approval by CRRUA. Water mains along lot/property lines must be sleeved in a steel casing accessible from both ends and have a 20 ft. minimum width utility easement. No walls, parallel to the water utility placement, will be allowed within seven (7) feet of the water utility placement.

CRRUA utility easements in Mobile Home Parks require the same standards as above. For privately owned Mobile Home Park streets, the minimum easement for utilities in the street is the total paved width of the street, or a minimum of 30 ft. if the street is not paved.

Location and width of transmission main easements outside of dedicated street right of way shall be approved on a case-by-case basis by CRRUA. Distribution lines in commercial centers, shopping malls, and multifamily complexes shall be located 20 feet from any structures and preferably shall be located in parking areas or driveways, in lieu of landscaped areas.

80.43 SERVICES

For Service lines in a customer's yard, no dedicated utility easement is required. The utility has an implied easement to the water meter and to the face of the dwelling for the limited purposes of enforcement and inspection of back flow prevention devices.

Placing a service line through a neighbor's yard to reach a different customer is discouraged but, when allowed by CRRUA, requires a minimum 10-foot-wide recorded utility easement from property owner to property owner. The water service in the recorded easement will be maintained and owned by the customer up to the water meter, located at the City Right of Way line. Connecting a service line to a fire hydrant assembly is discouraged but may be allowed by the CRRUA Executive Director or designee.

80.50 STANDARD DEPTH OF LINE BELOW FINISHED GRADE

The standard depth for water mains shall be as shown in the table below.

WATER MAIN	
LOCATION	DEPTH TO TOP OF PIPE
In Established Street	3 Ft. Minimum; 5 Ft. Maximum
Not In Established Street	4 Ft. Minimum; 5 Ft. Maximum - Site Specific
Arroyos	5 Ft. Minimum – Site Specific

The standard depth for water service lines shall be as shown below.

WATER SERVICE LINE	
LOCATION	DEPTH TO TOP OF PIPE
In Customer's Yard	1.5 Ft. Minimum; 5 Ft. Maximum
In Established Street	2 Ft. Minimum; 5 Ft. Maximum
Not In Established Street	3 Ft. Minimum; 5 Ft. Maximum – Site Specific
Arroyos	5 Ft. Minimum – Site Specific

80.60 WATER LINES BELOW CONCRETE

Water lines may be placed under concrete slabs if Ductile Iron pipe and fittings are used. Blockouts in the concrete must be provided for valves and other fittings where access is required. Service lines and lines downstream from the water meter may be placed under concrete.

80.70 DESIGN PRESSURES

Design pressures for water pressure zones shall be as shown below.

MAXIMUM OPERATING PRESSURE	MINIMUM OPERATING PRESSURE
Static Condition - 100 Psig	Static Condition - 50 Psig
	Dynamic Peak Day Usage - 40 Psig
	Fire Flow Conditions 20 Psig Residual Dynamic Peak Day

80.80 DESIGN DEMAND

Design demand for single-family residential units shall be 1.0 gallon per minute per residence for the peak day. All other design loads shall be based on actual expected load.

80.90 FIRE FLOW CONSIDERATIONS

For fire lines in commercial centers serving sprinkler systems within buildings, the fire line shall be owned and operated by CRRUA up to the point where the sprinkler line leaves a public owned right of way or utility easement associated with said line. A valve is required on the fire line adjacent to the main.

Fire lines in commercial centers serving hydrants shall be owned and operated by CRRUA up to and including the hydrant. A utility easement of 15 feet (minimum) shall be provided for the above fire lines. Fire lines in commercial centers serving hydrants shall not be extended from one commercial property to another without approval of CRRUA.

The minimum fire flow for all residential single or multi-family areas shall be 1000 GPM plus the peak day demand with 20 psi residual pressure at the hydrant as determined by CRRUA model. Under the above conditions, the maximum design velocity allowed in water mains is 7 feet per second.

In residential zones, fire hydrants shall be located at a spacing not to exceed 500 feet. For dead end streets and cul-de-sacs, a fire hydrant must be located at the end of the street or provide a 2-inch flushing hydrant. The distance between fire hydrants is measured by the centerline distance of the roads adjacent to the fire hydrants.

Fire flow requirements and hydrant spacing shall be reviewed and approved by the City of Sunland Park or Dona Ana County Fire Department. For high density residential and all non-residential zones, fire flow requirements and hydrant spacing will be determined on a case-by-case basis in consultation with CRRUA and the City of Sunland Park or Dona Ana County Fire Marshall.

The preferred location of fire hydrants is at the point of curvature of property lines at street intersections. If it is necessary to locate fire hydrants away from intersections, the preferred location is at the extensions of property lines. If the sidewalk is adjacent to the curb in a public Right of Way, the standard location for fire hydrants is behind the sidewalk. If a parkway exists between the curb and sidewalk, the standard location for the fire hydrant is in the parkway.

A clear area must be maintained for a minimum radius of 3 feet from the center of the fire hydrant adjacent to the hose and pumper nozzles and for a minimum radius of 1.5 feet to the rear of the hydrant. No structures that would interfere with the accessibility and operation of the fire hydrant are allowed in the clear area.

In all cases, fire hydrants shall be located such that the location does not conflict with American Disabilities Act (ADA) requirements. Fire hydrants that are not protected from traffic by curbs or other structures shall be protected by steel bollards located such that the bollards do not interfere with the accessibility and operation of the fire hydrant.

81.00 MINIMUM LINE SIZE

The following sections outline the requirements for minimum line size within the public rights-of-way within the CRRUA service area.

81.01 MAINS

All mains that are capable of being extended shall have a minimum diameter of 8 inches. Larger diameters may be required based on available pressures and demands. Lines less than 8-inch diameter may be used if supported by the CRRUA Water System Model. If the Fire hydrant is not located at the end of Cal-De-Sac, as the water demand decreases then the main line size can be decrease from 8" and 6" to 4".

81.02 SERVICES AND METERS

All service lines to individual customers shall be $\frac{3}{4}$ inch minimum diameter. Larger diameters may be required based on available pressures and demands. CRRUA may require a one inch (1") minimum water service line to an individual customer. This potential requirement, for residential uses, will be based on the lot size, projected water demand, and when projected static pressures for individual customers are at 60 psi or below, based on the design lot elevation.

Domestic meters 2" and smaller are to be sized as per the International Plumbing Code. All other meters are to be sized as per the American Water Works Association standards. Intermittent use, such as irrigation, shall not exceed 3 hours per day. All water meters are supplied by CRRUA Utilities.

81.10 VALVES

Location of valves shall be designed to minimize service disruptions due to water outages of any kind. As general design criteria, valve locations should be designed to limit the number of connections without service to 30, in the event of a water outage. When locating valves to meet the above criteria, valves shall be located at the intersection of mains with one less valve than the number of lines leading into the intersection, unless otherwise requested by CRRUA. Cul de sacs shall have separate valves off the main for isolation. Stub-outs require valves.

All main line ties into the existing water system, that are not extensions of existing lines shall be accomplished using a tapping tee and tapping valve with no water outage associated with the tie into the existing system. Valve stem extensions shall be required and installed on all valves for which the valve operator is more than 5 feet below the finished grade.

81.20 PUMPING STATIONS

The location and design of all pumping stations will be accomplished under the direction of CRRUA.

81.30 LOOPING OF WATER MAINS

Where feasible, it is a requirement that water mains be looped in order to improve circulation and reliability and to reinforce pressure.

90.00 WATER MATERIAL SPECIFICATIONS

The following sections outline the material specifications for water installations within the CRRUA service area.

General:

1. All manufacturers' products listed are preferred. Others may be submitted to CRRUA for pre-approval, prior to construction.
2. All brass fittings are to be of Domestic manufacture only. Brass fittings from Mueller Co., or Ford Meter Box Co. (Ford) are acceptable.
3. Water distribution piping from 4" through 12" may be C-900 DR 18 PVC or Ductile Iron. Water transmission piping of 14" or greater shall be Ductile Iron only. Polyethylene (PE) pressure piping will be approved on a case-by-case basis, as determined by the Utilities Director, or designee.
4. Other materials typically used in well houses, and pump stations are not included herein. The need for information on these should be addressed as necessary to the CRRUA Executive Director or designee.
5. All specification references include any and all updates or replacements.
6. Abbreviations used herein:

AWWA – American Waterworks Association

ASTM – American Society for Testing Materials

ITEM	DESCRIPTION	SIZE	SPEC	MANUFACTURER
1.	Polyvinyl Chloride Pipe (C-900 DR 18 PVC) Pressure Class 235 min. Integral bell end w/ elastomeric gaskets	4" – 12"	AWWA: C900-18	
2.	Ductile Iron Pipe (DI) Mechanical Joints (MJ) or Push On Joints, Cement-Mortar Lining, Asphaltic Coating or Polyethylene Casement	4" – 64"	AWWA: C151/A21.51-96, C111/A21.11-00, C104/A21.4-95, C150/A21.50-96, C105/A21.5-99	U.S. Pipe American Ductile Iron Pipe McWane Ductile Griffin.
3.	DI and Gray Iron Fittings, and Compact (Short Body) Fittings MJ or MJ by Flanged, Asphaltic Coating, Cement-Mortar Lined and Asphaltic Lined or Epoxy Lined (see also Sewer Material Section)	4" – 48"	AWWA: C110/A21.10-98, C153/A21.53-00, C111/A21.11-00, C104/A21.4-95, C116/A21.16-98	
4.	Cross-linked Polyethylene (PEX) 3306. Color to be Blue. (use PEX only)	¾" – 2"	AWWA: C904-16	
5.	Polyethylene (PE) Pressure Piping and Fittings	4" – 63"	AWWA: C906-15	
6.	Service Saddles For C900 PVC pipe and DI pipe and A.C. pipe, sized 4"-12" for taps sized ¾" – 2", saddles may be nylon or epoxy coated ductile Iron with double stainless steel (304L) straps. All saddle taps shall be threaded AWWA Taper (CC) thread.	¾" – 2"	AWWA: C800-01	Mueller Co. DR2S, SS5 & SS7 series. Smith Blair series 317 Romac 202N, 306. Ford Meter FS303, FC202. JCM 406 A.Y. McDonald Mfg. Co.
7.	Corporation Stops Brass plug type, 100psi rating for ¾" and 1", 300psi for 1 ½" and 2", inlet AWWA Taper (CC) thread, outlet (to PE tubing, CTS) ¾" and 1" by Mueller Insta-Tite, 1 ½" and 2" by compression connection.	¾" – 2"	AWWA: C800-01	Mueller B-25008, P-25008, B-25006, H-15013, P-15013, H-15008, P-15008, H15006. Ford Meter F1000, FB1000 A.Y. McDonald Mfg. Co. – 4701 B-22
8.	Angle Meter Valves Brass fitting, pack joint or Mueller Insta-Tite or Conductive Compression for PE tubing (CTS) by meter flange fitting (for 1 ½"-2"), or by meter swivel nut (for ¾" – 1")	¾" – 2"	AWWA: C800-01	Mueller- H-14258, P-14258, H-14267, H-14277, P14277. Ford Meter- FV43 Series, BA43 Series, KV43 Series A.Y. McDonald Mfg. Co.

ITEM	DESCRIPTION	SIZE	SPEC	MANUFACTURER
9.	Valve Boxes Two-piece, screw adjustable, w/"WATER" cast in lid, extension range of 27"-32" or as required. Valve box must be able to accommodate a locking lid.			Tyler Pipe, Star Pipe Products East Jordan Iron Works. A.Y. McDonald Mfg. Co.
10.	Gate Valves - Resilient seat, nonrising stem (NRS), 2" square nut driver, epoxy coating, pressure ratings 4" – 12" = 200psi, 16" and 20" = 150psi. No Double Disc allowed. CCW opening, "O" ring stem seals. Tapping valves shall match the above, and sized for full size shell cutter use, and shall be flanged with alignment lip to fit tapping sleeve, outlet to be MJ with flange for attachment of drilling machine and adapter.	4" – 72"	AWWA: C509-01 or C515, C550-01	Mueller Co. Clow Valve Co. Kennedy – Guardian K81D East Jordan Iron Works
11.	Butterfly Valves -Elastomeric seat, cast iron disc with stainless steel disc edge, gear actuator type, 2" square nut driver, MJ ends, Epoxy coating interior.	14" – 72"	AWWA: C504-00, C550-01	Mueller Linesal III, class 150 Clow Valve Co. Groundhog Valve
12.	Air Release, Air/Vacuum and Combination Air Valves –		AWWA: C512-99	APCO Val-Matic
13.	Control Valves, Pressure Actuating Valves, Pressure Sustaining Valves, Pressure Reducing Valves, Check Valves	4" – 72"	AWWA: C510-97 C511-97 C512-99	Cla-Val or approved equal
14.	Fire Hydrants: 1 ½" Pentagon Point to Flat, 2AD 1-5 4 ½" NST Pumper 2-4 2 ½" NST Hoses OL Vermillion Red. Operating nut (bronze) w/weatherproof and tamper resistant cap, opening, min Two each 2 ½" and one 4 ½" nozzles with N.S.T. threads, 6" inlet shoe, MJ connection for DI or C900 PVC. 2 auto drains, nonkinking nozzle cap chains. All hydrants shall be complete with all accessories included and shall be lubricated.		AWWA C502, C111/A21.11-00, C110/A21.10-98, C151/A21.51-02, C550-01	<u>CRRUA Standard shall be:</u> WaterMaster 5CD250 FH 6" MJ Shoe - East Jordan Iron Works <u>Alternatives Require Exec Director Prior Approval:</u> Mueller Co. – Super Centurion 200, Clow – Medallion, Kennedy – Guardian K81D

ITEM	DESCRIPTION	SIZE	SPEC	MANUFACTURER
15.	Restrained Joint Fittings Couplings for DI, PVC, with MJ	4" – 72"	ANSI/AWWA – C153/A21.53 UL Requirements	U.S. Pipe - Field Lok, TR Flex, XTRA Flex, USIFlex. JCM Ind. – SUR-Grip. Romac Ind. - GripRing, 600 Series, 400 Series. EBAA Iron – MEGALUG, 2000PV Series. Mueller – AquaGrip fitted components. Star Pipe Products – StarGrip. American Fast Grip Gasket Sigma Corporation
16.	Tapping Saddles Full Circle type			Romac Ind.- SST Smith Blair - 662, 663 Mueller - H304, H300DI JCM 432, 462
17.	Transition Fitting Epoxy coating (Nylon optional), stainless steel bolts/nuts			Romac Ind. – 501 Viking Johnson Smith Blair – OMNI Mueller – 500series, MaxiFit series. Total Piping Solutions- Hymax 2000 Sigma Corporation
18.	Tracing Wire HMW-PE insulation, 45 mils, blue, solid copper conductor	#12 AWG		Paigespec, Kris-Tech Wire Co. Coleman Cable
19.	Direct Bury Splice Kits Yellow direct bury wire connector, rated up to 600v. Silicon filled.		Per manufacturer's specifications.	3M – DBR kits. King Safety Products – Direct Bury Wire Connectors. Dryconn connector. Ideal – Model #60
20.	Casing Spacers (insulators) Injection molded high-density polyethylene material with low friction coefficient and high dielectric strength.			T.D. Williamson, Inc. – M-2 Plastic Thinsolator Public Works Marketing – Raci casing spacers
22.	Casing End Seals Complete with stainless steel adjustable band clamps.			T.D. Williamson, Inc. – Z seals PWM – Wrap-around End Seal

ITEM	DESCRIPTION	SIZE	SPEC	MANUFACTURER
23.	Extruded Sealing Tape (Joint Sealant) Butyl Resin Sealant formula, conforming to Federal and State Highway Specifications, summer grades or warmer climates.		ASTM C-990	Public Works Marketing, Inc.- Ram Neck. Concrete Sealants Inc. – CS 102, CS 102B
24.	Test Station - Nonconductive ABS plastic construction, 2 ½" I.D., 18" shaft length, with flared ends, and cast iron lid and collar. Terminal block of reinforced polyester laminate with 2 wire terminals. Blue, locking lid with pentagonal bolt cast in the center, allowing a quarter turn to open.			Handley Industries – PT5L C.P. Test Services – C.P. Mini Box.
25.	Casing – Black, plain end, standard schedule steel pipe.		API Grade B, or ASTM A 53	
26.	Curb Stops – Brass fitting, Pack Joint or Mueller Insta-Tite or conductive compression for PE tubing (CTS) Both ends.	¾" – 2"	AWWA: C800-01	Mueller H-15209, P-15209 - H-5215 Ford Meter B41-333 Sigma Corporation A.Y. McDonald Mfg. Co.
27.	Warning Tape – Six inch width, with a permanent APWA water line blue pigment and bold, black lettering on one side at a minimum of 30" along its length reading "CAUTION WATER LINE BURIED BELOW". The tape material shall be formulated from 100% virgin polyolefin or polyethylene resins. Resins shall be chemically inert and shall not degrade when exposed to acids, alkalis and other destructive substances found in soil.		<u>ASTM Method/ Property/ Value</u> D2103-05/ Thickness/ 4.0 mil. D2103/ Weight/ 18.5 lbs/1000 ft² D882-02/ 3" Tensile Strength/ 34lbs,2,800 psi D882-75b/ Elongation/ 800% D-2582/ PPT Resistance/ 14 LBF D2578/ Printability/ 45 Dynes Mfg. Specs. / Message Repeat/ Varies by Legend Mfg. Specs. / Printed Inks/ Flexo 9605	PRO-LINE Safety Products – Nondetectable underground utility marking tape, super stretch. Reef Industries Terra Tape-Standard

ITEM	DESCRIPTION	SIZE	SPEC	MANUFACTURER
28	<p>Water meter Box – Standard Traffic Bearing Box Completed Water Meter Box must meet AASHTO H-20 loading requirements.</p> <p>Water Meter Box lid shall be designed to meet the American Association of State Highway and Transportation Officials AASHTO H-20 loading. (see detail drawing UW2)</p>		<p><u>AASHTO M 199</u></p> <p><u>AASHTO M 306-05</u></p>	<p>East Jordan Iron Works product number – 32131035A02</p> <p>Western Precast Concrete Inc. DFW Plastic Inc. – 1500 series DFW1500.12.1 for 5/8" x 3/4" – 1", 1 1/2", 2" and 3" – 4" meters.</p>

100.00 WATER CONSTRUCTION SPECIFICATIONS

This standard covers the installation of water piping systems, which are, or intended for, integration into or rehabilitation of the CRRUA Utilities water distribution system.

100.10 GENERAL

All piping and accessory materials shall be new and unused. The water line and appurtenances shall be installed as shown on the Contract Documents.

Existing water lines found in the field without tracing wire shall be reported immediately and kept uncovered until documented by GPS. Contractor will be required to keep the waterline uncovered until CRRUA completes the GPS work.

All DI fittings or corresponding bolts shall be wrapped in 6 mil plastic.

100.20 DEFINITIONS

See General Information Section

100.30 REFERENCES

The following documents, as applicable, are hereby incorporated into Contract Documents by reference. If any referenced specification is in conflict with a CRRUA specification, the specification requiring the most stringent condition shall take precedence. All materials, labor and equipment required to adhere to CRRUA utility standards, City of Sunland Park standards, or Dona Ana County standards, whichever is most applicable and most stringent. The following industry standards shall also be incorporated by reference.

- AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
- INTERNATIONAL BUILDING CODE – latest applicable edition
- INTERNATIONAL PLUMBING CODE – latest applicable edition

- AMERICAN CONCRETE INSTITUTE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318) - latest applicable supplements. Herein: "ACI 318"
- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) - Standard Test Methods
- OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) - Construction Industry Standards; Safety Requirements
- NEW MEXICO ENVIRONMENT DEPARTMENT, all latest applicable regulations including: Solid Waste Bureau, 20 NMAC 9.1 Air Quality Bureau, Asbestos section and all applicable regulations
- CODE OF FEDERAL REGULATIONS, all latest applicable regulations including: 40 CFR part 763, 29 CFR part 1926
- NEW MEXICO Underground Property Damage Law, Chapter 62, Article 14, NMSA 1978, and as may be amended
- SUBCONTRACTOR'S FAIR PRACTICES ACT, NMSA 1978, and as may be amended
- AMERICANS WITH DISABILITIES ACT, latest applicable edition
- AMERICAN WATER WORKS ASSOCIATION STANDARDS, (AWWA) the latest applicable editions of: AWWA Manual M3, Safety Practices for Water Utilities, AWWA Manual M17, Installation of Fire Hydrants, AWWA C600-99, Installation of Ductile Iron Water Mains, AWWA C605-94, Underground Installation of Polyvinyl Chloride (PVC), AWWA C651, Disinfecting Water Mains
- UNI-BELL PVC PIPE ASSOCIATION STANDARDS (UNI-BELL), as applicable, and specifically the latest editions of: UNI-B-8, Recommended Practice for Direct Tapping of Polyvinyl Chloride UNI-PUB-8, Tapping Guide for PVC Pressure Pipe

100.40 RECEIVING HANDLING AND STORAGE

It is the responsibility of the Contractor to receive, handle, and store all pipe and appurtenances in such a manner as to insure delivery and placement in their final location in sound, undamaged condition as per this Standard, and AWWA Standards, and to the acceptance of the P.M., or designee, All materials, handling methods, and storage conditions at the Project location are subject to the P.M., or designee, inspection. Neither inspection nor the lack of P.M., or designee, inspection shall relieve the Contractor of the responsibility to provide and install materials meeting these Standards.

Stored materials shall be kept free from damage. Interiors of pipe and appurtenances shall be kept free from dirt or other foreign matter at all times. Pipe gaskets shall be stored out of direct sunlight, away from heat sources.

Factory installed gaskets shall not be removed from the joints unless damaged or subject to damage.

Pipe stored outdoors and expected to be exposed to direct sunlight for periods of one year or more after delivery shall be covered with canvas or other opaque material with provision for adequate air circulation, as per ANSI/AWWA Standard C605-94. PVC pipe that has been subjected to excess ultraviolet radiation as identified by color fading or chalking shall be considered damaged and shall not be used. Damaged or otherwise unacceptable materials shall be removed from the Project site and replaced as necessary.

The interior of pipe and appurtenances shall be thoroughly cleaned of foreign matter before lowering into the trench and shall be kept clean during operations. Plugging or other means acceptable to the P.M., or designee, shall be required of all pipe and appurtenances open ends at all times when work on that pipe is not in progress.

100.50 PIPE INSTALLATION

Trench excavations shall be made to at least four (4) inches below the pipe barrel to allow for the placement of bedding material. If the foundation of the trench is yielding, the Contractor shall over excavate and stabilize the trench. Where running or standing water occurs in the trench bottom, the water shall be removed from the trench. The trench shall be kept free from water during installation operations by suitable means until the pipe has been installed and backfill placed and compacted to a sufficient height to prevent pipe flotation. Soil migration in the pipe zone shall be prevented by use of a geotextile material or embedment material gradation or other suitable means with prior approval of the P.M., or designee. All pipe that has the grade or joint disturbed after lying shall be taken up and re-laid. Pipe shall not be laid in water or when trench or weather conditions are unsuitable for the work, except by permission of the P.M., or designee. All unconnected ends of pipes shall have a valve, plug, or cap installed.

Bedding material shall be added for a minimum of four (4) inches in depth, uniform in cross-section and profile, and shall be compacted to a minimum of 90% Standard Proctor, AASHTO T-99 for Type III or Type IV trenches (see referenced AWWA Standards).

Bell holes at each joint shall be provided to permit the joint to be assembled and the pipe to be supported uniformly for the full length of the pipe. Pipe shall be laid to the line and/or grade as indicated in the Contract Documents.

Field cuts for PVC pipe may be made with circular saws, handsaws or similar equipment. Field cuts shall provide a smooth end at a right angle to the longitudinal axis of the pipe. Spigot ends shall be deburred, beveled, and re-marked with the insertion line. The length and angle of field bevels should match the factory bevels.

Field cuts for ductile iron pipe (DI) may be made with abrasive pipe saws, rotary wheel cutters, or similar equipment if allowed or specified by the pipe manufacturer. The cut ends and rough edges shall be ground smooth, and for push-on joints, the cut end shall be beveled as per the manufacturers' recommendations.

The sealing surface of the pipe spigot end, the pipe bell, fitting, and the elastomeric gaskets shall be cleaned immediately before assembly. Factory installed gaskets should not be removed for cleaning. The joint shall be free of dirt, sand, grease, or foreign material. Pipe manufacturers approved lubricants shall be applied as specified to gasketed joints when assembling. Only gaskets supplied by the pipe and fittings manufacturer shall be used.

Push-on joints shall be made by insertion of the spigot end into the bell end. The installed pipe joint shall be kept straight while pushing the joint to completion at the insertion depth as specified by the manufacturer. Any deflections required by the Contract Documents shall be made after the joint is assembled. Timber headers shall be used against the pipe when mechanical equipment is used for pushing. Visual inspection of all assembled joints is required of the Contractor. Additional inspections by feeler gauge or other methods may be required by the P.M., or designee.

Mechanical joints on PVC shall be assembled in accordance with the fittings manufacturer's published recommendations. Pipe spigot ends may require shortening for use with mechanical joints or fitting joints.

Mechanical joints on DI shall have the socket and plain ends cleaned. Lubrication and additional cleaning should be provided by brushing both the gasket and plain end with soapy water or an approved pipe lubricant (per AWWA C111/A21.11) just prior to installing the gasket on the plain end. The gland and then the gasket shall be installed on the plain end. Keeping the joint straight during assembly, the pipe shall be inserted into the socket firmly and evenly around the circumference. Assemble the gland and socket components and insert the joint manufacturer's bolts and nuts and hand tighten. Any required deflections shall be made after joint assembly but before tightening the bolts. Tighten the bolts to the normal range of torque as indicated in AWWA C600-99 (75-90 ft.lb. for 4"-24" nominal diameter joints with $\frac{3}{4}$ " bolts) while maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. Tightening the joint is accomplished by a process of alternately tightening bolts on opposing sides. The process is repeated until all bolts are within the required torque range.

Any restrained joints used, on PVC or DI, shall be installed as per the manufacturer's published recommendations.

PVC pressure pipe may accommodate longitudinal bending, if the Contract Documents require curvature of lines. The Contractor shall block or brace pipe joints to ensure that bending of PVC pressure pipe does not result in axial deflection in the gasketed or mechanical joints that exceeds the manufacturer's published limits. The longitudinal bending in the PVC pipe barrel shall not result in a bending radius that is less than the minimum limits established in AWWA C60594, or latest edition. Bending of PVC pipe barrels larger than 12 inches nominal diameter is to be done only with prior approval of the Utilities Director and shall be determined by the pipe manufacturer's published axial-joint-deflection limits. PVC pressure pipe greater than 12 inches nominal diameter may be used on Projects only with the prior approval of the CRRUA Executive Director.

DI pipe may be deflected at the joints when required by the alignments specified in the Contract Documents. The amount of joint deflection shall not exceed that shown in AWWA C60099, or latest edition. The deflections listed are maximum deflections and shall not be exceeded. For design purposes, deflection shall be limited to 80 percent of the values listed in the referenced standard.

Water Main and Service Line Soil Bedding and Backfilling shall conform to:

Water lines should be bedded in fine-grained granular material such as fine, poorly graded (uniform) sand in a fashion to avoid the development of any voids around the water lines placed. Bedding material shall be provided and installed such that 90% Standard Proctor, per ASSHTO T-99, densities are achieved for the pipe zone. For all Utility lines refer to NMDOT for suitable backfill. Providing suitable backfill will be required per specifications.

All soil bedding materials used should be non-plastic. All soil bedding materials should extend a minimum of 4 inches in all directions.

All utility trenches should be backfilled with compacted soil below structural elements, including foundations, interior and exterior flat concrete work, and paved parking or drive areas. Although the backfill should be compacted, care should be taken not to damage the utility during backfilling and subsequent compaction. Testing frequencies are to be per applicable jurisdictional Standard Specifications for Roadway Construction. For emergency or schedule repairs less than 300 linear feet, a minimum of 2 densities are required (1 mid-level and 1 final grade) during normal working hours per open excavation. After hours work requires final grade densities morning of next working day.

Backfill materials may be native soils, however, no material having a maximum individual particle size or agglomeration clod size greater than two and one-half (2½) inches shall be placed within twelve (12) inches of the utility piping installed.

Minimum Backfill Compaction Requirements

Utility Construction	Percent of Modified Proctor Density (ASTM D-1557)		
	Existing Surface Preparation	Fill or Backfill Placement	Maximum Finished Lift Thickness (in.)
In Roadway: Shallower than 36 " of Grade	N/A	95	6
In Roadway: Deeper than 36 " of Grade	N/A	95	12
Outside Roadway: Shallower than 36 " of Grade	N/A	90	12
Outside Roadway: Deeper than 36 " of Grade	N/A	90	18

Thrust restraints shall be provided for each dead end, valve, bend, tee, and any unrestrained hydrant, at reducers or fittings otherwise unrestrained, and where changes in pipe diameters or directions occur.

Utility system piping thrust is to be restrained by the use of restrained joint fittings. Concrete thrust blocking shall be utilized only where Project site conditions are not applicable to the use of restrained joint fittings. The P.M., or designee, shall approve of the use of concrete thrust blocking where applicable. The size and shape of concrete thrust blocks shall be as indicated within these Standards. The concrete shall be placed such that no concrete is in contact with any bolts or nuts on the piping system. The lengths of restrained joint piping and details of joint restraint glands, clamps, friction slabs or anchors shall be as indicated within these Standards and in conformance with the manufacturer's published recommendations.

Fittings and valves shall be provided and installed as indicated within the Project Documents and these Standards. All valves shall be placed with operating stems vertical, excepting butterfly valve operating stems, which shall be horizontal. The full weight of valves and fittings shall not be carried by the pipe. Thrust blocking or restraint shall be provided for fittings and valves as indicated within these Standards.

Hydrants shall be installed as per these Standards and AWWA Manual M17.

Installation of Blue Pavement Markers required on street in-line with hydrant. Location noted on plans. Bonnet & Caps color paint per flow rate required. (Refer to jurisdiction fire code).

Taps to the existing water system shall have a level 3 operator, as a minimum, overseeing the work in accordance with 20.7.4 NMAC.

Saddle tapping of water mains shall be as per AWWA Manual M23, and UNI-BELL UNI-PUB-8. Direct tapping of corporation stops into water mains is not allowed. No handheld drills, twist drills, or auger bits shall be allowed in tapping PVC or Ductile Iron. Shell type cutters, which retain the cut coupon, shall be used in the tapping machines. Taps shall be made at 9 and 3 o'clock around the circumference of the main. Two spiral wraps of three-mil PTFE (Teflon) tape shall be applied clockwise to the inlet threads on the closed corporation stop. Liquid sealants or other thread lubricants shall not be used. The maximum outlet size by use of a corporation stop or service saddle shall be 2 inch. If larger taps are required, a tapping sleeve and valve or other applicable fitting shall be used.

Service lines shall be installed at not less than the minimum depth indicated. The Contractor shall leave the water turned on or off as it was found prior to meter transfers to obviate inconvenience to the customer in the first case or damage in the second. Water service lines, including the piping, meter, and the meter box, shall lie in a line perpendicular to the street's centerline. Services lines shall be snaked in trench 12 inches to 24 inches from the corporation stop.

100.60 WARNING TAPE AND TRACING WIRE

TAPE: During the backfilling process, all PVC and Ductile Iron water mains, service lines and system appurtenances shall have a continuous warning tape placed immediately above them and throughout their length at a height of twelve (12) to thirty (30) inches above the mains and twelve (12) inches for services. The tape shall be six (6) inches wide. Tape material shall be formulated from 100 percent virgin polyolefin resins. Resins shall be pigmental for chemical stability and resistance to sulfide staining (color fastness).

Tape shall be constructed by the mechanical (non-adhesive) lamination of two plies of three layer blown film in such a manner as to produce a bi-axially oriented structure. The tape shall be able to provide a 700 percent elongation prior to rupture as per ASTM-D882.

The tape shall meet or exceed the standards provided in the Materials Specification List, included in these Standards. The warning tape shall be manufactured with a permanent APWA water line blue pigment at a maximum of every thirty (30) inches along its length, be imprinted with a continuous warning message as follows: "CAUTION WATER LINE BURIED BELOW"

At tees, tape ends, etc., the warning tape shall be tied together (spliced) with knot to create a continuous warning tape throughout the length of the pipeline and associated branch lines, appurtenances, etc.

TRACING WIRE: In addition to the installation of warning tape, copper tracing wire is to be installed with all water mains. This includes all mains, and individual hydrants. The tracing wire shall be taped, using electrical tape, on top of the pipe at ten (10) foot centers, for the total length of the pipe.

The tracing wire shall be 12 AWG (average wire gauge), solid core, copper wire (solid core meaning one (1) single continuous strand of copper wire). In addition, the wire insulating coating (jacket) shall be blue in color and shall have 45 mils of polyethylene insulation thickness and high molecular weight. Also, the tracing wire shall be HMW – PE and rated for UL 600V construction. The wire shall be suitable for wet or dry applications. The wire size (gauge) shall be continuously affixed (printed on) the entire length of all tracing wire coating and shall be easily read.

Where a splice is required, or when a three (3) way splice is necessary, the wires shall be joined together with an appropriate size (blue) wire nut which shall then be placed inside a 3M brand Direct Bury Splice kit (DBR), or approved equal, of appropriate size. No bare wire shall be left exposed anywhere. All wires shall be spliced to all other wires for a continuous tracing wire system.

All hydrants shall have Test Boxes, connected onto the tracing wire system as per detailed drawings herein, shall be required.

No electrical connections of the tracing wire to any metal pipes or metal service lines will be allowed and care shall be taken to ensure that the tracing wire is not damaged during installation. The tracing wire is required to be successfully tested, using an approved (by Gas L&M Supervisor) electromagnetic locating equipment such as Subsite Utili-gard, Rigid, Metrotec, or 3M, by the Contractor and at his expense, for continuous signal (continuity test) across all main and service lines before asphalt is installed, and prior to subgrade preparation. Locatability Check: Must be requested a minimum of 48 hours (two working days) prior to tie-in. Locatability check will be conducted by the Utility Locating Program of the Utilities Department. Tracing wire must have a continuous locating signal before pipe is accepted by the P.M., or designee. If an issue is found with the locatability of the utility line (Gas, Water, Sewer, or Reclaimed Water) it is the responsibility of the contractor at his expense to correct those issues prior to tie-in.

100.70 INSPECTION AND TESTING

Contractors are required to provide on-site personnel to verify that all valves are functional and open, the valve boxes and covers are clear of debris and installed correctly during and at final inspection.

Lines shall be filled slowly with potable water while venting all air. Precautions shall be taken to prevent entrapping air in the lines. After filling, lines shall be flushed at blow offs and dead ends at a high velocity. Valves shall be closed slowly to prevent excessive surges while maintaining positive pressure at all times throughout the new line. Flushing water shall be discharged without causing erosion damage, nuisance, or interruption of traffic. Disposal of flushing water shall be as indicated in the Contract Documents or as directed by the P.M., or designee.

The Contractor is required to hydrostatic test all water mains, laterals, dead ends, service lines and appurtenances in accordance with AWWA C600-99 (for Ductile Iron lines), or AWWA C605-94 (for PVC lines). The test shall be conducted in the presence of the P.M., or designee. The test shall be conducted without being connected to the existing Las Cruces Utilities system, unless approved in advance by the Utilities Director or P.M. If connection to the existing Las Cruces Utilities system is approved, the Contractor shall assume any and all responsibility in case of damage or failure of the existing system. Leakage through connections to the existing system, leaks in the existing lines, or leaking existing valves under the test pressure will invalidate the test. The Contractor shall provide all taps, gauges, and necessary equipment for filling and venting air and personnel for conducting the tests. All such equipment shall be subject to the approval of the P.M., or designee. Tests shall be performed only after the pipeline has been properly filled, flushed, and purged of all air. The specified test pressure shall be applied by means of an approved pumping assembly connected to the pipe in a manner satisfactory to the P.M., or designee. If necessary, the test pressure shall be maintained by additional pumping for the specified time during which the system and all exposed pipe, fittings, valves, and hydrants shall be examined for leakage. All visible leaks shall be corrected. All defective elements shall be repaired or removed and replaced and the test repeated.

The Contractor may perform simultaneous pressure and leakage tests or perform separate pressure and leakage tests on the installed system at test durations and pressures specified. The Contractor is responsible for the costs of all testing.

The duration of the pressure test shall be one hour continuous. The applied pressure shall be one hundred fifty (150) pounds per square inch (psi) or 1.5 times the normal working pressure of the line, whichever is greater. The leakage test shall be maintained for a period of two continuous hours. A leakage test pressure of one hundred fifty (150) psi, or 1.5 times the normal working pressure of the line, shall be applied to all lines.

The simultaneous pressure and leakage test shall be of two (2) hour duration, at an applied pressure of 150 psi, or 1.5 times the normal working pressure of the line, whichever is greater.

For any and all of the above tests, accurate measurements shall be made of the volume of water required to maintain the test pressure, the variation in test pressure, and starting and ending test times.

100.80 DISINFESTION

The Contractor is required to disinfect all new potable water mains, and their appurtenances, and all existing water system portions that have undergone repairs or reconfigurations as part of the Project Documents. The disinfection procedures and requirements shall be in accordance with AWWA C65114, or applicable revisions.

The sanitary handling of materials, the practices during construction, and the continual inspection of the work are the primary means for ensuring the sanitary condition of the water main. Three methods of disinfecting newly constructed water mains are typically utilized, depending on the circumstances involved.

The Tablet Method consists of adding dry calcium hypochlorite, conforming to AWWA B300-18 or latest revision, in granular form or in 5-gram (g) tablets containing approximately 65% available chlorine by weight. This method may be used only if the pipe and appurtenances are kept clean and dry during construction. The method gives an average chlorine dose of approximately 25 mg/L over a required contact time of 24 hours. The granules are placed in the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-foot intervals. If tablets are used, they are attached by a food grade adhesive (such as Permatex clear RTV Silicone Adhesive Sealant by Loctite Corp.) on the inside, top of the main and equally distributed at each end of the pipe joint. The number of tablets required per joint of pipe are given below, with one tablet being required to be placed in each hydrant, hydrant branch, and other appurtenances:

Number of 5-g. calcium hypochlorite tablets required (25 mg/L dose).

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

The Granular Method: The amount of granular calcium hypochlorite to be at the beginning of the main and at each 500-foot interval, if granules are used shall be as follows:

Ounces of Calcium Hypochlorite granules per 500-foot interval

Nominal Pipe Diameter	Calcium Hypochlorite granules
4 in.	1.7
6 in.	3.8
8 in.	6.7
10 in.	10.5
12 in.	15.1
14 in. and larger	D x D x 15.1 *

*D is the inside pipe diameter in feet.

The tablet method precludes preliminary flushing of the main. When the installation is complete, the main shall be filled slowly and all air pockets eliminated. This water shall remain in the piping for at least 24 hours. Detectable chlorine residuals should be found at each sampling point after the 24-hour period. The residuals must be reported to the P.M., or designee.

The continuous feed method consists of placing calcium hypochlorite granules in the main during construction (optional). The main is then flushed to remove all particulates and re-filled with chlorinated potable water. The chlorinated water shall be fed into the new system at a measured rate. Within 10 feet of the feed point, a constant rate of chlorine injection shall be fed into the system such that the water will have not less than 25 mg/L of free chlorine. Chlorination shall not cease until the new system is fully filled with the heavily chlorinated water. This water shall be chlorinated so that after a 24-hour holding period in the main there will be a free chlorine residual of not less than 10 mg/L.

The slug method may also be used in disinfecting large diameter mains where continuous feed methods are impractical. This method consists of placing calcium hypochlorite granules as per the above method, flushing the main, then chlorinating the main by slowly flowing through the main a slug of water dosed with chlorine to a concentration of 100 mg/L. The slow rate of flow shall completely fill the main and its appurtenances and will expose them to the chlorinated water for a period of not less than 3 hours.

Flushing of the pipeline and appurtenances shall occur after the applicable retention period, and at other points depending on the method of chlorination. This flushing shall be into an area subject to the approval of the P.M., or designee. Flushing velocities in the main lines shall be a minimum of 2.5 feet per second.

Water samples shall then be taken from the newly installed piping system by the Contractor. The sampling process shall be witnessed by the P.M., or designee. The P.M. shall, at the time of sampling and from the same sampling port, test the discharge for residual chlorine. Residual chlorine values shall be below 0.5 parts per million (ppm). Higher residual chlorine values shall require the Contractor to re-flush the new piping system prior to re-sampling. When residual values are in the acceptable range, the Contractor shall take two consecutive sets of acceptable samples, taken at least 24 hours apart. At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set from the end of the line, and one set from each branch. The Contractor shall collect and submit samples to the local New Mexico Environment Department certified laboratory for testing. Testing shall be for the absence of coliform and the presence of chlorine residual. Testing results shall be forwarded to the Contractor and the P.M., or designee, before acceptance of the tested system or portion. Testing costs shall be the responsibility of the Contractor.

If trench water or excessive debris has entered the new main during construction, the samples shall be taken at intervals of approximately 200 feet. These samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing.

Failure to produce satisfactory bacteriological results shall be cause for the new main to be reflushed and resampled. If these check samples also fail to produce acceptable results, the main shall be re-chlorinated by the continuous feed or slug method until satisfactory results are obtained. In no case shall an existing service be transferred to a new line, or a new service connected to a meter until the bacteriological analyses are satisfactory.

When small installations are constructed without the extensions of mains, such as main line taps only, chlorination of trench and equipment used, and materials (tapping valves, fittings) is required. See AWWA C651-14, or latest edition, for further details.

100.90 ASBESTOS CONTAINING MATERIALS

All asbestos containing materials encountered in the process of accomplishing the Project shall be dealt with in strict conformance to the cited references contained herein.

It is the Contractor's responsibility to follow all EPA, OSHA, NM Solid Waste Management Regulations, and all other regulations when working with asbestos-cement pipe. Cutting of AC pipe shall not be allowed.

At the point of tie-in to existing AC lines, the Contractor shall excavate to the nearest joints and remove the section of pipe in one piece. The AC pipe must remain wet and encapsulated with 6 ml or thicker plastic bag per NM Solid Waste Management Regulations until the pipe is delivered to the Special Waste Facility. Existing AC water line pipe shall remain abandoned in place wherever possible.

110.00 SANITARY SEWER DESIGN STANDARDS

The following sections outline the wastewater design standards for construction of wastewater components within the CRRUA service area.

110.10 GENERAL NOTES

Conditions may exist which will necessitate deviations from these standards. Deviations from these standards shall have prior approval of CRRUA before being constructed. Nothing in these standards shall relieve the design engineer from the responsibility of meeting the current standards of all entities having jurisdiction over the particular project being designed. Entities having possible jurisdiction over projects in the CRRUA service area include but are not restricted to the following agencies.

- New Mexico Department of Transportation Elephant Butte Irrigation District
- All Railroads
- All Mutual Domestic Water Consumer Associations
- City of Sunland Park
- Dona Ana County
- International Boundary and Water Commission
- United States Environmental Protection Agency
- New Mexico Environment Department

110.20 SEWER SYSTEM MODEL

Conditions may exist which will necessitate deviations from these standards. Deviations from these standards shall have prior approval of CRRUA before being constructed. Nothing in these standards shall relieve the design engineer from the responsibility of meeting the current standards of all entities having jurisdiction over the particular project being designed.

100.30 STANDARD LOCATIONS

The following sections outline the design standards for standard locations of wastewater components within the CRRUA service area.

ENTRY TO LOT (SERVICES)

Special cases not covered in the table on the following page will be determined on a case-by-case basis in consultation with CRRUA.

TYPE OF LOT	STANDARD LOCATION OF SERVICE ORIENT BY STANDING IN STREET AND FACING LOT
Residential-36 Ft Wide Or Greater	10 Ft. Left of Water
Multifamily	10 Ft. Left of Water Then Manifolded At Property Line By Property Owner As Required

Commercial Use Within A Subdivision	10 Ft. Left of Water
Commercial Not In A Subdivision	Site Specific
Mobile Home Park	Site Specific
Mobile Home Subdivision	10 Ft. Left of Water
<ul style="list-style-type: none"> Services shall be perpendicular to the main line on straight roads, radial on curves, and straight from the main or manhole (manhole is preferred) to the property line at the termination of cul-de-sacs. Lot entry standards for corner lots are measured from the pc of the lot corner. 	

NON-STANDARD LOT ENTRY LOCATIONS

To avoid utility conflicts due to manholes and utility services on opposite side of street, the following protocol shall be used. Any deviation from the standards stated in the above table will require dimensioning of the utility moved.

1. Sewer can vary from 5-15 feet left from water if necessary to avoid utility conflicts.
2. If moving the sewer will not avoid conflicts.
 - The water can be moved up to 5 ft left or right with the sewer 10 ft. left of the centerline location.
 - The sewer can then vary from 5-15 feet left from water as required.

Any lot entry location that differs from the above protocol requires approval of the CRRUA Executive Director.

NEW CONSTRUCTION IN STREET RIGHT OF WAY (MAINS)

Sewer mains shall typically be located in a dedicated public right of way along the centerline of the street. Every effort shall be made to align the manholes outside of the wheel path of travel for the roadway within the right of way.

100.40**STANDARD SEPARATION**

Separation of sewers from other utilities shall be as shown below.

FOR UTILITY LINES THAT ARE PARALLEL HORIZONTAL SEPARATION (MEASURED FROM CENTER OF UTILITY)						
	GAS		SEWER		WATER	
	MAIN	SERVICE	MAIN	SERVICE	MAIN	SERVICE
GAS MAIN	5 FT.	5 FT.	10 FT.	5 FT.	10 FT.	5 FT.
GAS SERVICE	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
SEWER MAIN	10 FT.	5 FT.	10 FT.	5 FT.	10 FT.	5 FT.
SEWER SERVICE	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
WATER MAIN	10 FT.	5 FT.	10 FT.	5 FT.	5 FT.	5 FT.
WATER SERVICE	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
STORM SEWER	10 FT.	5 FT.	10 FT.	5 FT.	5 FT.	5 FT.
WIRE UTILITY	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.	5 FT.
MANHOLE	10 FT.	6 FT.	NA	NA	10 FT.	6 FT.
<ul style="list-style-type: none"> • Separation may vary with field conditions and Utilities Director approval. • 10 ft. separation between water and sewer mains to be measured from outside of pipe to outside of pipe. 						

FOR UTILITY LINES THAT ARE CROSSING VERTICAL SEPARATION (MEASURED FROM OUTSIDE SURFACE OF UTILITY)						
	GAS		SEWER		WATER	
	MAIN	SERVICE	MAIN	SERVICE	MAIN	SERVICE
GAS MAIN	12 IN.	6 IN.	12 IN.	12 IN.	12 IN.	12 IN.
GAS SERVICE	6 IN.	6 IN.	6 IN.	6 IN.	12 IN.	12 IN.
SEWER MAIN	12 IN.	6 IN.	12 IN.	6 IN.	24 IN.	6 IN.
SEWER SERVICE	6 IN.	6 IN.	6 IN.	6 IN.	6 IN.	6 IN.
WATER MAIN	12 IN.	12 IN.	24 IN.	6 IN.	12 IN.	6 IN.
WATER SERVICE	12 IN.	12 IN.	6 IN.	6 IN.	6 IN.	6 IN.
STORM SEWER	12 IN.	6 IN.	12 IN.	6 IN.	12 IN.	6 IN.
WIRE UTILITY	12 IN.	12 IN.	12 IN.	6 IN.	12 IN.	6 IN.
<ul style="list-style-type: none"> • In intersections gas mains go under all other utilities except sewer. • Gas mains passing under sewer mains will be sleeved. Sleeves shall extend a minimum of 5 feet to each side from the outer side of the sewer main. Sleeves can be any pipe material if the sleeve color is yellow or painted yellow. Pipe spacers shall be used to protect the carrier pipe. • When water mains cross sewer mains the crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. • When it is impossible to obtain proper horizontal and vertical separation as stipulated in the above two tables, the sewer shall be designed and constructed equal to water pipe and shall be pressure tested, throughout the limits of watertight construction and a minimum of 10 feet each side of the obstruction, to assure watertight connections prior to backfilling. The minimum limits of pressure pipe installation shall be 10' each side of line obstruction. • The vertical separations listed for gas mains apply to poly lines only and do not apply to steel gas lines. Vertical separation from steel lines shall be twenty-four (24) inches for a High Pressure and eighteen (18) inches for Low Pressure. 						

100.50 SEWER LINES OUTSIDE OF STREET/ROAD RIGHT OF WAY

CRRUA prefers all water and wastewater utility lines to be located in public easements or rights of way. In conditions that require private easements, CRRUA will require utility easements with terms in perpetuity.

100.51 MAINS

Sewer mains shall be in either a public utility easement or public right-of-way of adequate width for installation and maintenance. Manholes must always have vehicular access from a dedicated roadway.

FOR SEWER LINES NOT IN A STREET	
DEPTH TO INVERT	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	10 FT
Note: Additional utilities within an easement will require an easement width greater than the minimum.	

Sewer mains may be located between residential lots in public utility easements along lot/property lines with prior approval by the CRRUA Executive Director, or designee. Sewer mains along lot/property lines must be sleeved in a steel casing accessible from both ends and have a 15 ft. minimum width utility easement. No walls, parallel to the sewer utility placement, will be allowed within seven (7) feet of the sewer placement.

Location of any CRRUA utility within drainage ways and other nonstandard utility corridors requires CRRUA approval. Such drainage ways shall not have rigid (concrete) lining. Public utility easements in Mobile Home Parks require the same standards as above. For privately owned Mobile Home Park streets, the minimum easement for utilities in the street is the total paved width of the road.

100.52 SERVICES

For Service lines in a customer's yard, no dedicated public utility easement is required. The customer is responsible for maintenance (ex. Sewer stoppages) of the line from the yard to where the service line intercepts the main sewer line.

Any repairs and/or replacement to the service line from the property line to where the service line intercepts the main sewer line is the responsibility of CRRUA.

Placing a service line through a neighbor's yard to reach a different customer is discouraged but, when allowed by CRRUA, requires a minimum 10-foot-wide recorded utility easement from property owner to property owner. The sewer service line in the recorded easement will be maintained and owned by the customer up to where the service line intercepts the main sewer line.

All sewer service lines shall have a cleanout at the point where the service line leaves the public right of way or easement. See detail drawing for more guidance. This cleanout is not intended to replace any sewer cleanout that is required under other codes or ordinances.

100.60 MINIMUM DEPTH OF LINE BELOW FINISHED GRADE

This section will outline requirements for minimum depth of sewer mains and services below the finished grade.

100.61 GRAVITY MAIN LINES

The minimum depth for Gravity PVC Sewer Mains shall be as required to adequately serve the proposed connection and shall be at least as shown in the table below. Sump pumps are not allowed for individual connections without prior approval of the CRRUA Executive Director.

GRAVITY PVC SEWER MAIN	
LOCATION	DEPTH FROM CENTERLINE FINISH GRADE TO INVERT OF PIPE
In Existing Or Future Street	6 FT. MINIMUM
Not In Existing Or Future Street	6 FT. MINIMUM – SITE SPECIFIC
Arroyos	6 FT. MINIMUM – SITE SPECIFIC –Additional protection may be required, based on engineering requirements.
All Locations	20 FT. RECOMMENDED MAXIMUM DEPTH. Depths deeper than 20 ft. may be allowed on a case-by-case basis. For depths greater than 15 ft., design documentation or calculations may be required from the engineer.

Lines shallower than the above table may be allowed on a case-by-case basis under the following conditions:

1. Prior approval of the CRRUA Executive Director is obtained,
2. Ductile Iron pipe is used, and there is sufficient depth to run sewer services below any water and gas main crossings.

100.62 GRAVITY SERVICE LINES

The minimum depths for sewer service lines shown below are for typical residential subdivisions. Sewer service line depths should be designed to serve the entire lot especially for non-standard residential and commercial lots. Deeper than the minimum sewer service line depths may be required on a case-by-case basis and the service line depths should be shown on the construction plans.

PVC SERVICE LINE	
LOCATION	DEPTH TO TOP OF PIPE
In Customer's Yard	2.5 FT.
In Established Street	3.0 FT.
Not In Established Street	3.0 FT.

The maximum depth of sewer service lines shall be five (5) feet from the finish grade to the top of the pipe measured at the property line, unless prior approval is obtained from the CRRUA Executive Director.

100.70 DESIGN LOADS

Design loads for single-family residential units shall be 107 gallons/unit/day x 3 (peak day) x 3.2 (persons per unit). All other design loads shall be based on actual expected load.

100.80 MINIMUM GRAVITY LINE SIZE

This section outlines the minimum sewer line size for various applications.

100.81 GRAVITY MAIN LINES

All gravity mains that are capable of being extended shall be a minimum 8-inch diameter. Dead end mains that can never be extended may be 6-inch diameter, if sufficient capacity exists in the line.

100.82 GRAVITY SERVICE LINES

All service lines to individual customers shall have a minimum diameter of 4 inches. Larger diameters may be required based on actual loads.

100.90 SEWAGE LIFT STATIONS

Sewage lift stations shall be designed on a case-by-case basis and shall be subject to the approval of the CRRUA Executive Director. In all cases, sewage pumps will be three phase and three phase power must be available at the lift station unless otherwise approved by the CRRUA Executive Director. Prior to design, the designer is to meet with the CRRUA designee to review the design requirements for the specific location / project.

101.00 GRAVITY LINE DESIGN CRITERIA

This section outlines the minimum requirements for design of gravity lines within the CRRUA service area.

101.01 HORIZONTAL ALIGNMENT

A manhole is required for any change in horizontal alignment that is greater than pipe manufacturer's recommendation, or any change in vertical alignment, or where 2 or more main lines connect. Curved sewer lines are allowed in accordance with pipe manufacturers' recommendations. No fittings shall be used to change direction in lieu of a manhole.

101.02 VERTICAL ALIGNMENT

The minimum slope for a sewer line shall be as shown in the following table.

MINIMUM SLOPE ALLOWED	
PIPE DIAMETER (Inches)	SLOPE (Percent)
6	0.6
8	0.4
10	0.3
12	0.2
15	0.2
18	0.2
21	0.2
24	0.2
GREATER THAN 24	0.2

All sewer lines shall be bedded in suitable embedment materials. All sewer lines designed for slopes at or less than 0.5% shall be bedded in suitable embedment materials that have been pre-shaped. Pre-shaping the consolidated placement surface shall be by means of a template made to fit the lower part of the sewer pipe exterior for a width of at least 60% of the sewer pipe breadth. The minimum thickness of the suitable embedment materials is four (4) inches.

For sewer lines greater than 8-inch diameter, the design flow must warrant the increased line size to utilize a larger size. A larger than the required line diameter will not be allowed without design flow justification, and approval of CRRUA.

101.03 SERVICE LINES

The minimum slope for a 4-inch sewer service will be 2 percent and for a 6-inch sewer service line will be 1 percent. Service lines shall be located below gas mains or water mains.

All service lines must have a cleanout where the service lines enter private property. The cleanout shall be installed at the subdivision stage. The home builder will be responsible to adjust clean out to grade and for repairing the cleanout if damaged during home construction.

No manifolding of service lines is allowed between different owners. Individual service lines must run from customer to main only unless a variance is approved by the CRRUA Executive Director. Service connections to sewer mains shall be made with standard WYES installed at the time of main construction. For services to be installed on standard PVC or ductile iron sewer mains where no WYE exists, approved sewer saddles may be used.

Insert-a-Tee connections may be used on services connecting into existing concrete pipe or ribbed PVC interceptor (large diameter) sewers, with the approval of the CRRUA Executive Director.

101.10 MANHOLE DESIGN CRITERIA

A manhole is required for any change in horizontal alignment that is greater than pipe manufacturer's recommendation, any change in vertical alignment, where 2 or more main lines connect, and at a spacing not to exceed 450 ft. Manhole spacing is measured from center of manhole to center of manhole. A manhole shall be required where 2 or more main lines connect. A manhole or cleanout (see detail drawings) is required at the end of any line.

Curved sewer lines are allowed in accordance with pipe manufacturers' recommendations. No fittings shall be used to change direction in lieu of a manhole. Upon recommendation of the CRRUA Executive Director, spacing between manholes may be limited to a maximum of 350 feet for curved sewer lines.

A cleanout may be used at the upstream end of a line that can never be extended. All service lines must connect to the sewer main downstream from the cleanout. Manholes shall be Pre-Cast Concrete designed to meet the American Association of State Highway and Transportation

Officials (AASHTO) H-20 loading. (see detail drawings). Manholes shall be accessible by 2-wheel drive vehicles 24 hours every day and shall be approachable by dedicated 15 ft. (minimum) Right of Way or City utility easement.

Sanitary sewer pipe shall be installed continuously thru manholes including fitting where feasible. There shall be a minimum drop of 0.10 ft. in the direction of flow across a manhole if not continuous pipe. If a pipe is run through a manhole, the top half of a 36-inch section of the pipe must be removed within the manhole to allow access for inspection, and the minimum slopes shall apply. Only sanitary sewer pipes are allowed within a manhole.

Any main line and service line entering a manhole with an invert elevation greater than 1.5 ft. higher than the crown of the downstream pipe shall utilize a Drop. Where the drop is less than 1.5 feet the invert shall be placed at the base of the manhole.

Manholes in areas prone to flooding or running water may be required to have a bolted and watertight cover, see detail drawings US-10 and US-11. The P.M., or designee, may require manholes to be of this type, based on field conditions. Insert-a-Tee connections may be used on mains connecting into existing concrete pipe or ribbed PVC interceptor (large diameter) sewers, with the approval of the CRRUA Executive Director.

Manholes shall be coated with a pre-approved coating system when required at the discretion of the CRRUA Executive Director. Epoxy coating will be mandated in areas where high volume and high corrosive conditions exist within the sewer system. Coating systems and application methods shall be approved prior to design acceptance.

101.20 FORCE MAIN DESIGN CRITERIA

All force mains shall conform to previously mentioned design criteria as well as the following.

- All force mains shall be C-900 PVC or Ductile Iron with a minimum cover of 36 inches to the top of the pipe.
- All bends requiring a fitting shall have restrained joints. All fittings on force mains shall be restrained joint.
- Force mains shall enter the manhole with the force main invert within 1 ft. above the crown of the downstream main leaving the manhole. A pipefitting will be required to divert the flow from the force main entering the manhole, such that the gap and angle between the manhole outflow and the force main is minimized in order to maintain sanitary conditions.
- Force mains shall be designed under the same hydraulic constraints as water lines including the use of air release - vacuum relief valves as necessary.
- All force main designs shall be reviewed on an individual basis by CRRUA.

101.30 LOW PRESSURE SEWER SYSTEMS

It is the policy of CRRUA to utilize conventional gravity sewer systems in combination with regional lift stations and wet wells. The CRRUA Executive Director may, at his/her sole discretion, on a case-by-case basis, grant a waiver to approve a low-pressure sewer system (LPSS).

LPSS waiver criteria that must be met include, but are not limited, to the following:

1. LPSS is limited to a maximum of the equivalent of approximately 50 residential customers.
2. Information must be shown to indicate that a conventional system is not practical or feasible. Relative initial cost will be considered but will not necessarily be a determining factor.
3. Ownership, operation, and maintenance of the individual grinder pumps will rest with the customer and not with CRRUA.
4. The future expandability of the current CRRUA sewer system must not be compromised by the LPSS.
5. Appropriate notice must be given to potential LPSS customers concerning the ownership operation, and maintenance of the various components of the system.
6. Individual grinder pumps that empty directly into an existing sewer main will be considered on a case-by-case basis, with ownership operation, and maintenance of the grinder pump and accessories resting with the customer.
7. Owners and occupants of premises served by LPSS should expressly release CRRUA from any and all liabilities associated with the use, operation, and/or malfunction of the LPSS.
8. Developers and property owners should bear all the expense of the design, permitting, and construction of LPSS.
9. If an LPSS is desired to be utilized, a request must be made to the CRRUA Executive Director and a written decision must be obtained prior to submitting construction plans for review. Approval of an LPSS by waiver does not indicate approval of LPSS construction plans; it merely establishes the right to submit plans for an LPSS.

101.32 OWNERSHIP AND MAINTENANCE RESPONSIBILITY

The customer is responsible for all operation, maintenance, operation, and associated costs for all components of the LPSS located upstream of the public ROW line. The system will be owned and maintained by CRRUA from all points downstream of the public ROW line.

101.32 LPSS DESIGN REQUIREMENTS

Some of the design requirements CRRUA will expect are listed below. It should be noted that meeting the requirement listed below is not sufficient in and of itself to assure approval. Since the systems have several components that interact, the requirements may be changed to meet specific conditions.

System should be designed so that “design flow” is achieved twice a day with a minimum of 2 ft/sec velocity in the force main. $Q = AN + 20$ from the EPA is an acceptable formula for general design purposes, where Q in gpm; $A=0.5$; N is number of residences upstream of location analyzed; 20=gpm.

A professional engineer using an accepted modeling system such as KY-Pipes should analyze the total system, or a system developed by the manufacturer. The analysis should be furnished to CRRUA as part of the approval process.

System should be designed to prevent undue retention time of wastes in the pressure sewer where biological and chemical activity may produce gases. Force main location for LPSS should be in the centerline of the road and should conform to force main design standards. Variations from centerline location will be on a case by case basis and will require approval of the CRRUA Executive Director.

A two-way cleanout will be placed between each grinder/station and the ROW line. An isolation valve will be placed on the CRRUA side of the cleanout. Complete and accurate as-builts must be provided prior to acceptance of the system. The CRRUA Executive Director may, at his/her sole discretion, on a case-by-case basis, require odor control measures at the downstream exit point of the force main.

The grinder/pump station, including associated components, should be placed near the front lot line in the standard sewer service location outside of the public ROW and within a utility easement. The station should not be within an enclosed building. It is anticipated that the station will be located within an approximately 4 ft. square easement created specifically for the station adjacent to the ROW. The owner/developer/engineer is responsible for a joint meeting with CRRUA, City of Sunland Park Community Development staff (or) Dona Ana County Community Development Department staff, and wire utilities representatives to resolve easement concerns.

This joint meeting and any final easement decisions must occur prior to Final Plat and Construction Plans submittal.

The grinder/pump station should be designed to meet the International Plumbing Code (IPC) Section 712 requirements for Sumps and Ejectors. The grinder/pump station should be an integrated unit with the wet well. The grinder/pump station should be installed concurrent with and as part of the construction of the residence/house. The pump station

will require inspection in conjunction with the plumbing inspection. All components including the grinder/pump station should be completed prior to a certificate of occupancy being issued.

101.33 LPSS DESIGN RECOMMENDATIONS

Engineer is encouraged to consult EPA manual “Alternative Wastewater Collection Systems” Chapter 2 – October 1991 publication date.

[Http://www.epa.gov/ord/nrmrl/pubs/625191024/625191024ch2.pdf](http://www.epa.gov/ord/nrmrl/pubs/625191024/625191024ch2.pdf)

It is recommended that the grinder/ pump station manufacturer should have a minimum of 25,000 units installed and operating. The Manufacturer of the grinder/pump station should have a service center with sufficient expertise and spare parts within 100 miles from Sunland Park, New Mexico.

120.00 SANITARY SEWER MATERIAL SPECIFICATIONS

The material specifications within this section shall be the minimum allowable for CRRUA sewer system construction and reconstruction.

All manufacturers' products listed are preferred. Others may be submitted to the CRRUA Executive Director for pre-approval, prior to construction. Sewer distribution piping from 4" through 15" may be smooth exterior wall per ASTM D3034, above 12" may be profile exterior (ribbed) pipe per ASTM F794. All specification references include any and all updates, replacements and revisions.

Abbreviations used herein:

ASTM	American Society for Testing and Materials
Uni-Bell	Uni-Bell PVC Pipe Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AWG	American Wire Gauge
HMW-PE	High Molecular Weight-Polyethylene

ITEM	DESCRIPTION	SIZE	SPECIFICATION	MANUFACTURER
1.	PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings The standard dimension ratio (SDR) of all pipe and fittings shall be a minimum of 35. Pipe joints shall be integral bell, bell and spigot type with rubber gasket. Smooth wall interior, exterior may be ribbed pipe. Fittings (force mains, drop manholes) shall be full body and/or gasketed.	4" – 36"	ASTM D 3034 (pipe) ASTM D 3212 (joints) ASTM F 477 (gaskets) ASTM F679 ASTM F794 ASTM F949 Uni-Bell Uni-B-9	
2.	Polyvinyl Chloride Pipe (C-900 PVC) Pressure Class 150 min. Integral bell end w/ elastomeric gaskets, GREEN color only for sewer line.		See Water Utility Material Specification List.	
3.	Ductile Iron Pipe and fittings with ceramic epoxy lining See also Water Material Spec. for D.I. pipe and fittings.	4" – 64"	See also Water Material Spec. Lining qualified under: ASTM E-96, G-95, B-117, G-14, D-714, D-1308. The linen shall be 40 mil, nominal.	See also Water Material Spec. Protecto 401 Ceramic Epoxy
4.	Polyethylene (PE) Pipe and Fittings	4" – 63"	See also Water Material Spec. AWWA C906-99	See also Water Material Spec.
5.	Manhole Frames and Covers To meet H-20 Loading, Labeling required (See Detail S8)	30" clear opening	AASHTO M 306-05 (or latest publication) Made in America	EJ 2014 A Cover and 2014 Z Frame Alternates by Approval Only
6.	Concrete Precast Manholes 4 to 6ft dia., 24, 32 or 36-inch cones, 5inch min. wall thickness. 6ft. dia., flat top, 7-inch min. wall thickness. Completed manholes must meet AASHTO H-20 loading requirements. Joints to be sealed.	Per US-5, 6, 7	ASTM C 478 AASHTO M 199 ACI Standard 318	Western Precast Concrete, Inc. Leco Industries
7.	Inflow Protectors Sized to fit manhole and removable, with relief or check valve to vent at one psi.	Per US11		East Jordan Iron Works, Pollard Water, J.C. Utility Sales.

ITEM	DESCRIPTION	SIZE	SPECIFICATION	MANUFACTURER
8.	Inserta Tees			Inserta Fittings Co.
9.	Sewer Saddles		Romac "CB" Sewer Saddles Strap – Stainless Steel Casting - Ductile Iron Gasket - ASTM D 2000	Romac Industries
10.	Casing End Seals Complete with stainless steel adjustable band clamps.			T.D. Williamson, Inc. – Z seals PWM – Wrap-around End seal
11.	Casing Spacers (insulators) – Injection molded high-density polyethylene material with low friction coefficient and high dielectric strength.			T.D. Williamson, Inc. – M-2 Plastic Thinsolator Public Works Marketing – Raci casing spacers
12.	Extruded Sealing Tape (Joint Sealant) Butyl Resin Sealant formula, conforming to Federal and State Highway Specifications, summer grades or warmer climates.		ASTM C-990	Public Works Marketing, Inc.- Ram Neck. NPC Bidco, Inc. – Bidco C-56 preformed butyl mastic sealant Concrete Sealants Inc. – CS 102, CS 102B
13.	Manhole Stop Rings		ASTM C-923	Newby Rubber, Inc.-Water Works Gaskets
14.	Tracing Wire(force mains only) HMW-PE insulation, 45 mils, solid copper conductor, color shall be green.	#12 AWG		Paigespec, Kris-Tech Wire Co. Coleman Cable

ITEM	DESCRIPTION	SIZE	SPECIFICATION	MANUFACTURER
15.	Direct Bury Splice Kits - Yellow direct bury wire connector, rated up to 600v. Silicon filled.	Three (3) #12 solid copper conductors	Per manufacturer specifications	3M – DBR kits. King Safety Products – Direct Bury Wire Connector. Dryconn Model 90120 connector Ideal – model #60
16.	Warning Tape Six inch width, with a permanent APWA sewer line green pigment and bold, black lettering on one side at a minimum of 30" along its length reading "CAUTION SEWER LINE BURIED BELOW". The tape material shall be formulated from 100% virgin polyolefin or polyethylene resins. Resins shall be chemically inert and shall not degrade when exposed to acids, alkalis and other destructive substances found in soil.		<u>ASTM Method/ Property/ Value</u> D2103-05/ Thickness/ 4.0 mil. D2103/ Weight/ 18.5 lbs/1000 ft ² D882-02/ 3" Tensile Strength/ 34lbs,2,800 psi D882-75b/ Elongation/ 800% D-2582/ PPT Resistance/ 14 LBF D2578/ Printability/ 45 Dynes Mfg. Specs./ Message Repeat/ Varies by Legend Mfg. Specs./ Printed Inks/ Flexo 9605	PRO-LINE Safety Products – Nondetectable underground utility marking tape, super stretch. Reef Industries Terra Tape-Standard
17.	Test Station Non-conductive ABS plastic construction, 2½" I.D., 18" shaft length, with flared ends, and cast-iron lid and collar. Terminal block of reinforced polyester laminate with 2 wire terminals. Green, locking lid with pentagonal bolt cast in the center, allowing a quarter turn to open.			Handley Industries – PT5L C.P. Test Services – C.P. Mini Box.

ITEM	DESCRIPTION	SIZE	SPECIFICATION	MANUFACTURER
18.	Casing Black, plain end, standard schedule steel pipe.		API Grade B, or ASTM A 53	
19.	Repair Couplings Strong Back RC Series Repair Couplings - flex seal adjustable repair coupling with 0.012” stainless steel shield and molded in bushing. Connecting: Clay to Clay Clay to Cast Iron or Plastic Clay to Asbestos Cement Fibre or Ductile Iron Concrete to concrete Concrete to Cast Iron or Plastic Asbestos Cement Fibre (AC) or Ductile Iron to Cast Iron or Plastic AC or Ductile Iron to AC or Ductile Iron CI, PL, Copper, ST or Lead to CI, PL, Copper, ST or Lead	Gasket – Manufactured to meet material requirements of CSA B602, ASTM D 5926, ASTM C 1173 Hardness, Shore "A", Inst.-+5... 65 Tensile Strength, Min. psi.1000 Elongation at Rupture, Min% 250 Tear Strength, Min 150 lb/in Brittleness Temperature -40°F Clamps – Manufactured to the requirements of CSA B602 Clamp Housing - 301 Stainless Steel Clamp Band - 301 Stainless Steel Clamp Screw - 305 Stainless Steel Installation torque 60” lbs Shear Ring – 0.12” thick,300 Series Stainless Steel Width manufactured according to coupling width (1.50", 2.13", or 4") Length manufactured according to coupling diameter. Clamps spot welded in place. Coupling – Manufactured to conform to the performance requirements of ASTM C 1173, CSA B602 Maximum test pressure: 4.3 PSI (29.6KPA) Maximum operating temperature: 140°F nonconsistent	Fernco Inc. Mission Rubber Company LLC	

130.00 SANITARY SEWER CONSTRUCTION SPECIFICATIONS

The following section outlines the sewer construction specifications required for all CRRUA sanitary sewer installations.

130.10 GENERAL NOTES

This standard covers the installation of sanitary sewer piping systems that are intended for integration into CRRUA sewer collection system. All piping and accessory materials shall be new and unused. The sewer line and appurtenances shall be installed as shown on the Contract Documents. Deviations from these minimum standards shall have prior approval of the CRRUA Executive Director before being constructed.

130.20 DEFINITIONS

See General Information Section

130.30 REFERENCES

The following documents, as applicable, are hereby incorporated into these Contract Documents by reference. If any referenced specification conflicts with a CRRUA utility specification, the specification requiring the most stringent condition shall take precedence. All materials, labor and equipment required to adhere to CRRUA utility standards referenced specifications, CRRUA Standard Operating procedures shall be considered incidental to construction.

- CITY OF LAS CRUCES STANDARD SPECIFICATIONS FOR ROAD CONSTRUCTION - 2000 or latest edition.
- CITY OF LAS CRUCES GENERAL CONDITIONS - July 1, 1992, or most recent edition.
- CITY OF SUNLAND PARK SUBDIVISION CODE – Most recent edition.
- DONA ANA COUNTY SUBDIVISION CODE – Most recent edition.
- MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) - 2001 or applicable edition.
- AMERICAN SOCIETY FOR TESTING AND MATERIALS (Herein: “ASTM”) - 1992 or applicable edition.
- INTERNATIONAL BUILDING CODE – 2003 or applicable edition.
- INTERNATIONAL PLUMBING CODE – 2003 or applicable edition.
- ACI BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318-05) – or applicable edition. Herein: “ACI 318”
- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (Herein: “AASHTO”) - Standard Test Methods
- OCCUPATIONAL SAFETY AND HEALTH ACT (Herein: “OSHA”) - Construction Industry Standards; Safety Requirements

- NEW MEXICO Underground Property Damage Law, Chapter 62, Article 14, NMSA 1978
- SUBCONTRACTOR'S FAIR PRACTICES ACT, NMSA 1978
- AMERICANS WITH DISABILITIES ACT, Latest Edition
- AMERICAN WATER WORKS ASSOCIATION STANDARDS (Herein: "AWWA"), as applicable and the latest editions of:
 - AWWA Manual M3, Safety Practices for Water Utilities
 - AWWA C600-99, Installation of Ductile Iron Water Mains...
 - AWWA C605-94, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and ...
- UNI-BELL PVC PIPE ASSOCIATION STANDARDS, as applicable, and specifically the latest editions of:
 - UNI-B-6, Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe (and ASTM F 1417-92)
 - UNI-PUB-6, Installation Guide for PVC Solid-Wall Sewer Pipe (4-15 inch)

130.40 RECEIVING, HANDLING, AND STORAGE

It is the responsibility of the Contractor to receive, handle, and store all pipe and appurtenances in such a manner as to insure delivery and placement in their final location in sound, undamaged condition as per this Standard, and to the acceptance of the Owner.

All materials, handling methods, and storage conditions at the Project location are subject to the Owner's inspection. Neither inspection nor the lack of Owner's inspection shall relieve the Contractor of the responsibility to provide and install materials meeting these Standards.

Stored materials shall be kept free from damage. Interiors of pipe and appurtenances shall be always kept free from dirt or other foreign matter. Pipe gaskets shall be stored out of direct sunlight, away from heat sources. Factory installed gaskets shall not be removed from the joints unless damaged or subject to damage.

Damaged or otherwise unacceptable materials, as determined by the P.M., or designee, shall be removed from the Project site and replaced as necessary at no cost to CRRUA.

The interior of pipe and appurtenances shall be thoroughly cleaned of foreign matter before lowering into the trench and shall be kept clean during operations. Plugging or other means acceptable to the Owner shall be required of all pipe and appurtenances "open ends at all times" when work on that pipe is not in progress.

130.50 PIPE INSTALLATION

Pipe shall be laid to the lines and grades as indicated in the Contract Documents, and as staked on site, beginning at the low point of the project. Pipe shall be laid upgrade in a

continuous operation from structure to structure with the socket (bell) ends of the pipe directed upgrade. The Contractor shall verify existing system components for any conflicts with the Contract Documents, and shall immediately notify the P.M., or designee, of any such conflicts prior to continuing.

Trench excavations shall be made to at least four (4) inches below the pipe barrel to allow for the placement of embedment material. If the foundation of the trench is yielding, the Contractor shall over excavate and stabilize the trench. Where running or standing water occurs in the trench bottom, the water shall be removed from the trench. The trench shall be kept free from water during installation operations by suitable means until the pipe has been installed and backfill placed and compacted to a sufficient height to prevent pipe flotation. Soil migration in the pipe zone shall be prevented by use of a geotextile material or embedment material gradation or other suitable means with prior approval of the Owner. All pipe that has the grade or joint disturbed after laying shall be taken up and re-laid at no cost to Las Cruces Utilities. Pipe shall not be laid in water or when trench or weather conditions are unsuitable for the work, except by permission of the Owner. All unconnected ends of pipes shall have a valve, plug, or cap installed.

Embedment material shall be added for a minimum of four (4) inches in depth, uniform in cross-section and profile, and shall be compacted to a minimum of 90% Standard Proctor, AASHTO T-99 for Type III or Type IV trenches (see referenced AWWA Standards).

Bell holes at each joint shall be provided to permit the joint to be assembled and the pipe to be supported uniformly for the full length of the pipe. Pipe shall be laid to the line and/or grade as indicated in the Contract Documents.

Field cuts for PVC pipe may be made with circular saws, handsaws or similar equipment. Field cuts shall provide a smooth end at a right angle to the longitudinal axis of the pipe. Spigot ends shall be deburred, beveled, and re-marked with the insertion line. The length and angle of field bevels should match the factory bevels.

Field cuts for ductile iron pipe (DI), when used, may be made with abrasive pipe saws, rotary wheel cutters, or similar equipment if allowed by the pipe manufacturer. Cut ends and rough edges shall be ground smooth, and for push-on joints, the cut end shall be beveled as per the manufacturer's recommendations.

The sealing surface of the pipe spigot end, the pipe bell, fitting, and the electrometric gaskets shall be cleaned immediately before assembly. Factory installed gaskets should not be removed for cleaning. The joint shall be free of dirt, sand, grease, or foreign material. Pipe manufacturers approved lubricants shall be applied as specified to gasketed joints when assembling. Only gaskets supplied by the pipe and fittings manufacturer shall be used.

Push-on joints shall be made by insertion of the spigot end into the bell end. The installed pipe joint shall be kept straight while pushing the joint to completion at the insertion depth as specified by the manufacturer. Any deflections required by the Contract Documents shall be made after the joint is assembled. Timber headers shall be used against the pipe when mechanical equipment is used for pushing. Visual inspection of all assembled joints is required of the Contractor. Additional inspections by feeler gauge or other methods may be required by the Owner.

Mechanical joints on PVC shall be assembled in accordance with the fittings manufacturer's published recommendations. Pipe spigot ends may require shortening for use with mechanical joints or fitting joints.

Mechanical joints on DI shall have the socket and plain ends cleaned. Lubrication and additional cleaning should be provided by brushing both the gasket and plain end with soapy water or an approved pipe lubricant (per AWWA C111/A21.11) just prior to installing the gasket on the plain end. The gland and then the gasket shall be installed on the plain end. Keeping the joint straight during assembly, the pipe shall be inserted into the socket firmly and evenly around the circumference. Assemble the gland and socket components and insert the joint manufacturer's bolts and nuts and hand tighten. Any required deflections shall be made after joint assembly but before tightening the bolts. Tighten the bolts to the normal range of torque as indicated in AWWA C600-99 (75-90 ft.lb. for 4"-24" joints with $\frac{3}{4}$ " bolts) while maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. Tightening the joint is accomplished by a process of alternately tightening bolts on opposing sides. The process is repeated until all bolts are within the required torque range. Any restrained joints used, on PVC or DI, shall be installed as per the manufacturer's published recommendations.

PVC pipe may accommodate longitudinal bending, if the Contract Documents require curvature of lines. The Contractor shall block or brace pipe joints to ensure that bending of PVC pipe does not result in axial deflection in the gasketed or mechanical joints exceeding the manufacturer's published limits. The longitudinal bending in the PVC pipe barrel shall not result in a bending radius that is less than the minimum limits established in AWWA C605-94, or latest edition and also not less than 200 ft. Bending of PVC pipe barrels larger than 12 inches nominal diameter is to be done only with prior approval of the Utilities Director and shall be determined by the pipe manufacturer's published axial-joint-deflection limits.

DI pipe may be deflected at the joints when required by the alignments specified in the Contract Documents. The amount of joint deflection shall not exceed that shown in AWWA C600-99, or latest edition. The deflections listed are maximum deflections and shall not be exceeded. For design purposes, deflection shall be limited to 80 percent of the values listed in the referenced standard.

Embedment Material shall be provided and installed such that 90% Standard Proctor densities are achieved for the pipe zone backfill, per ASSHTO T-99.

Utility Soil Bedding and Backfilling Materials shall conform to the following:

Utilities should be bedded in fine-grained granular material such as fine, poorly graded (uniform) sand in a fashion to avoid the development of any voids around utility lines placed.

For all Utility Lines refer to NMDOT for suitable backfill. Providing suitable backfill will be required per specifications. All soil bedding materials used should be non-plastic. All soil bedding materials should extend a minimum of 4 inches in all directions.

All utility trenches should be backfilled with compacted soil below structural elements, including foundations, interior and exterior flat concrete work, and paved parking or drive areas. Although the backfill should be compacted, care should be taken not to damage the utility during backfilling and subsequent compaction.

Backfill materials may be native soils, however, no material having a maximum individual particle size or agglomeration clod size greater than two and one-half (2½) inches shall be placed within twelve (12) inches of the utility piping installed.

Sewers at or less than 0.5% slope:

All sewer lines shall be bedded in suitable embedment materials. All sewer lines designed for slopes at or less than 0.5% shall be bedded in suitable embedment materials that have been pre-shaped. Pre-shaping the consolidated placement surface shall be by means of a template made to fit the lower part of the sewer pipe exterior for a width of at least 60% of the sewer pipe breadth. The minimum thickness of the suitable embedment materials is four (4) inches, see drawing US-1.

Minimum Backfill Compaction Requirements

Utility Construction	Percent of Modified Proctor Density (ASTM D-1557)		
	Existing Surface Preparation	Fill or Backfill Placement	Max Finished Lift Thickness (in.)
In Roadway: Shallower than 36 " of Grade	N/A	95	6
In Roadway: Deeper than 36 " of Grade	N/A	95	12
Outside Roadway: Shallower than 36 " of Grade	N/A	90	12
Outside Roadway: Deeper than 36 " of Grade	N/A	90	18

Fittings shall be provided and installed as indicated within the Contract Documents and these Standards. All fittings shall be of the full-bodied, gasketed type. Tees and wyes shall be installed at an angle of 45 degrees above horizontal. If the depth of mains deviates such that a more vertical, or less vertical, position is deemed necessary, the Contractor may request a deviation in the placement of fittings from the P.M., or designee.

Force mains shall be constructed as per applicable Sections within these Standards for Water Utilities. Any valves, such as air release, plug, or shutoff valves, which are used or needed in force mains, shall be as required by CRRUA and as approved by the CRRUA Executive Director.

Service lines shall be installed at not less than the minimum depth and slopes indicated herein (see detail drawing US-2). Risers may be utilized where main line depths exceed seven (7) feet and while maintaining greater than minimum slopes. Care shall be taken to provide lateral support for the riser to prevent excessive pipe deflection.

Manholes shall conform to all other applicable Sections within these Standards. Concrete manhole base sections shall have minimum 2/3 strength or as directed by the P.M., or designee, prior to the placement of any extension barrels or backfill. Manholes at grade should be constructed per standard detail US-5. Concrete collars around manholes are to be constructed per standard detail US-9. Penetration into existing manholes shall be cored. A damaged manhole barrel will not be accepted. Coring into base will not be allowed.

130.60 WARNING TAPE & TRACING WIRE

TAPE: During the backfilling process, all sewer mains, service lines and system appurtenances shall have a continuous warning tape placed immediately above them and throughout their length at a height of twelve (12) to thirty (30) inches above the mains and twelve (12) inches for services. The tape shall be six (6) inches wide. Tape material shall be formulated from 100 percent virgin polyolefin resins. Resins shall be pigmental for chemical stability and resistance to sulfide staining (color fastness).

Tape shall be constructed by the mechanical (non-adhesive) lamination of two plies of three layer blown film in such a manner as to produce a bi-axially oriented structure. The tape shall be able to provide a 700 percent elongation prior to rupture as per ASTM D882. The tape shall meet or exceed the standards provided in the Materials Specification List, included in these Standards.

The warning tape shall be manufactured with a permanent APWA sewer line green pigment at a maximum spacing of every thirty (30) inches along its length, be imprinted with a continuous warning message as follows: "CAUTION SEWER LINE BURIED BELOW"

At tees, tape ends, etc., the warning tape shall be tied together (spliced) with knot to create a continuous warning tape throughout the length of the pipeline and associated branch lines, appurtenances, etc.

TRACING WIRE: In addition to the installation of warning tape, copper-tracing wire is to be installed with all force sewer mains. The tracing wire shall be taped, using electrical tape, on top of the pipe at ten (10) foot centers, for the total length of the pipe.

The tracing wire shall be 12 AWG (average wire gauge), solid core, copper wire (solid core meaning one (1) single continuous strand of copper wire). In addition, the wire insulating coating (jacket) shall be green in color and shall have 45 mils of polyethylene insulation thickness and high molecular weight. Also, the tracing wire shall be HMW – PE and rated for UL 600V construction. The wire shall be suitable for wet or dry applications. The wire size (gauge) shall be continuously affixed (printed on) the entire length of all tracing wire coating and shall be easily read.

Where a splice is required, or when a three (3) way splice is necessary, the wires shall be joined together with an appropriate size (green) wire nut which shall then be placed inside a 3M brand Direct Bury Splice kit (DBR) or approved equal of appropriate size. No bare wire shall be left exposed anywhere. All wires shall be spliced to all other wires for a continuous tracing wire system.

This wire end shall not be bare but shall have the coating jacket intact. Location and frequency of test boxes shall be as directed by the Owner. Test boxes, connected onto tracing wire system as per detailed drawings herein, shall be required at the force main ends and where spacing exceeds 500 feet. Test box locations shall be outside any street and curbing and as directed by the P.M., or designee.

No electrical connections of the tracing wire to any metal pipes or metal service lines will be allowed and care shall be taken to ensure that the tracing wire is not damaged during installation. The tracing wire is required to be successfully tested, using an approved (by Gas L&M Supervisor) electromagnetic locating equipment such as Subsite Utili-gard, Rigid, Metrotec, or 3M, by the Contractor and at his expense, for continuous signal (continuity test) across all main and service lines before asphalt is installed, and prior to subgrade preparation. Locatability Check: Must be requested a minimum of 48 hours (two working days) prior to tie-in. Locatability check will be conducted by the Utility Locating Program of the Utilities Department. Tracing wire must have a continuous locating signal before pipe is accepted by the P.M., or designee. If an issue is found with the locatability of the utility line (Gas, Water, Sewer, or Reclaimed Water) it is the responsibility of the contractor at his expense to correct those issues prior to tie-in.

130.70 INSPECTION AND TESTING

All testing required herein, including tracing wire and manhole testing, shall be accepted by the P.M., or designee, prior to roadway sub grade preparation.

All sewer lines installed shall be tested for leakage. All manholes installed may be tested for leakage at the option of the P.M., or designee. All PVC sewer lines shall be mandrel tested. All sewer mains laid at slopes flatter than or equal to the minimums, as specified within these Standards, shall be visually tested by closed circuit television camera. All testing indicated above, will be at the Contractor's expense and shall be inspected by the P.M. or designee. Visual testing of any sewer mains steeper than minimums shall be at the option of the P.M.

Mandrel testing of sewer piping by the Contractor is required of all PVC sewer mains. The mandrel testing is intended to follow ASTM D3034, latest revision. Mandrels shall be sized for a test limit of 7½% of the statistical base inside diameter of the test section of piping. ASTM and pipe manufacturer's pipe dimensions and tolerances shall be used to determine the required mandrel sizing. The Contractor shall present such dimensions and sizing data to the Owner at the time of testing. The test shall consist of the Contractor pulling or pushing the mandrel through the test section.

Leakage testing for sewer piping (includes all mains, branches, laterals, tees, wyes, services and stubs) shall follow ASTM F 1417-92, using the time-pressure drop method, or UNI-B-698, or their latest revisions. The Contractor shall furnish all equipment and

personnel necessary for conducting these tests and making measurements. All piping components failing these tests shall be located, and repaired or replaced and failed sections shall be retested. All sections tested shall maintain air pressure with a pressure drop not exceeding 0.5 psi from 3.5 to 3.0 psi in excess of any ground water pressure above the top of the sewer for a minimum amount of time (see below). Test pressures shall be adjusted by 0.43 psi for every foot of water above the top of the pipe. Lowering ground water levels, or selection of alternative test methods, approved by the CRRUA Executive Director, will be required if the air pressure required for the test exceeds nine (9) psi.

After all piping ends have been plugged or capped, air shall be slowly added to the test section until the pressure reaches 4.0 psi (plus any ground water adjustment). The pressure shall be maintained at between 3.5 to 4.0 psi for at least 2.0 minutes for stabilization of temperature conditions. After stabilization, the air shall be disconnected, lowered to 3.5 psi (plus any ground water adjustment). The time required for the pressure to decrease from 3.5 to 3.0 psi shall be recorded and compared to the minimum holding times required by pipe diameter as shown by the following table:

**Minimum Specified Time Required for a 0.5 psig Pressure Drop
For Size and Length of Pipe Indicated**

				Specification Time for Length (L) Shown (min:sec)							
Pipe Dia. (in.)	Min. Time (min:sec)	Length for Min. Time (ft.)	Time for Longer Length (sec.)	100'	150'	200'	250'	300'	350'	400'	450'
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	53:52	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	102:34	115:23

NOTE: Test sections with laterals or branches within them that fail the above required time interval, may have their required time recalculated as per the above referenced documents and be retested.

Leakage testing of manholes shall be accomplished by the Contractor at the request of the C.A., or his designee. All sanitary sewer manholes to be tested shall be tested for leakage by plugging the inlet and outlet piping with leak-proof plugs, filling the manhole with water to a depth of four (4) feet above the top of the pipe or two (2) feet above the existing ground water level, whichever is greater, and allowing one hour for saturation of the manhole material. After the one-hour saturation period, the manhole shall be refilled to the original level. Two hours after the refilling, the difference in water surface elevation from original to final level shall be measured and converted into gallons per hour lost through manhole leakage.

The allowable leakage for manholes shall be 0.75 gallons per hour per foot diameter of the manhole. All manholes are required to be waterproof to the above leakage rate.

Manholes constructed into the groundwater may be tested at the option of the C.A. by observing the rate of infiltration over time similarly to the above depths and time rates.

Visual testing of the sewer piping may be conducted. Visual testing of all sewer mains installed at minimum slope or at flatter than minimum slopes shall be conducted at the option of the Owner. This inspection shall be by closed circuit television camera equipped with the means for measuring slopes (inclinometer). This inspection shall be performed by CRRUA, and shall be at the Contractor's expense, regardless of passing or failure.

Failure of the visual testing procedure, if conducted, shall be based on the existence of any occurrences of reversal of slopes (dips or sags) located in the tested piping. Failure of any sections shall require the Contractor to excavate and re-lay or re-bed the negative slope



SECTION 150.00

STANDARD UTILITY DRAWING DETAILS

DRAWING	DESCRIPTION	PAGE
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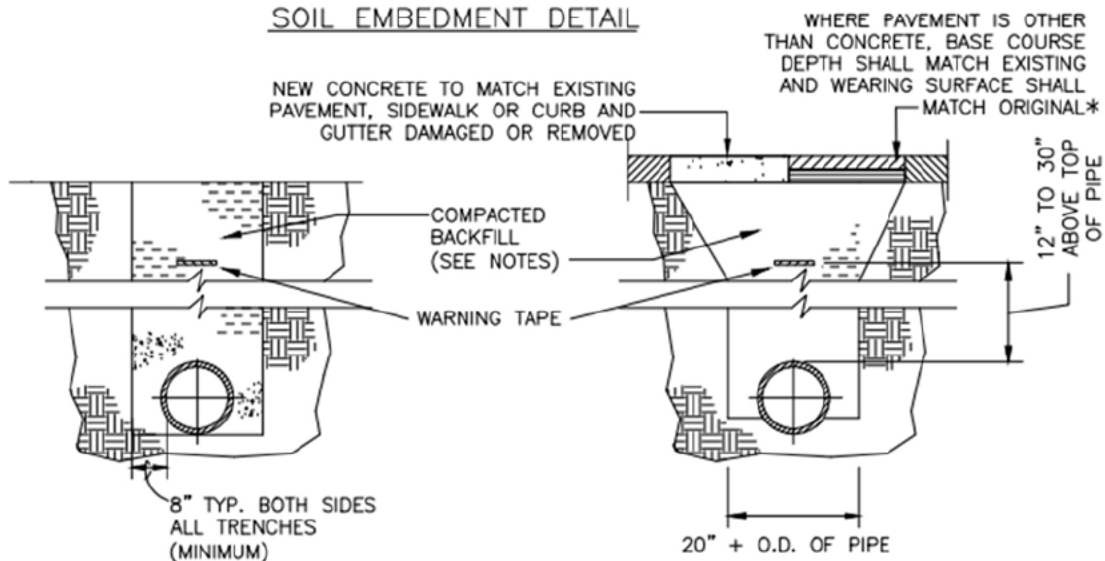
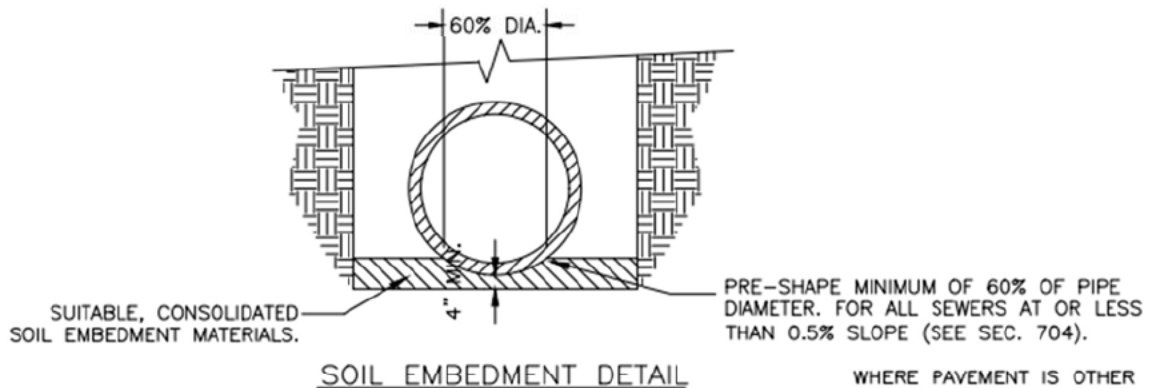
STANDARD UTILITY DRAWING DETAILS CONT...

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S1 - TYPICAL SEWER TRENCHING DETAILS

N.T.S.



UNPAVED ROAD TRENCH

BACKFILL IN UNPAVED STREETS, ALLEYS, AND DRIVEWAYS SHALL BE COMPACTED TO 90% COMPACTION AS DETERMINED BY AASHTO T-180 (ASTM D1557) UNLESS OTHERWISE NOTED

UNDER PAVEMENT

BACKFILL SHALL BE COMPACTED TO 95% COMPACTION AS DETERMINED BY AASHTO T-180 (ASTM D1557)

GENERAL NOTES:

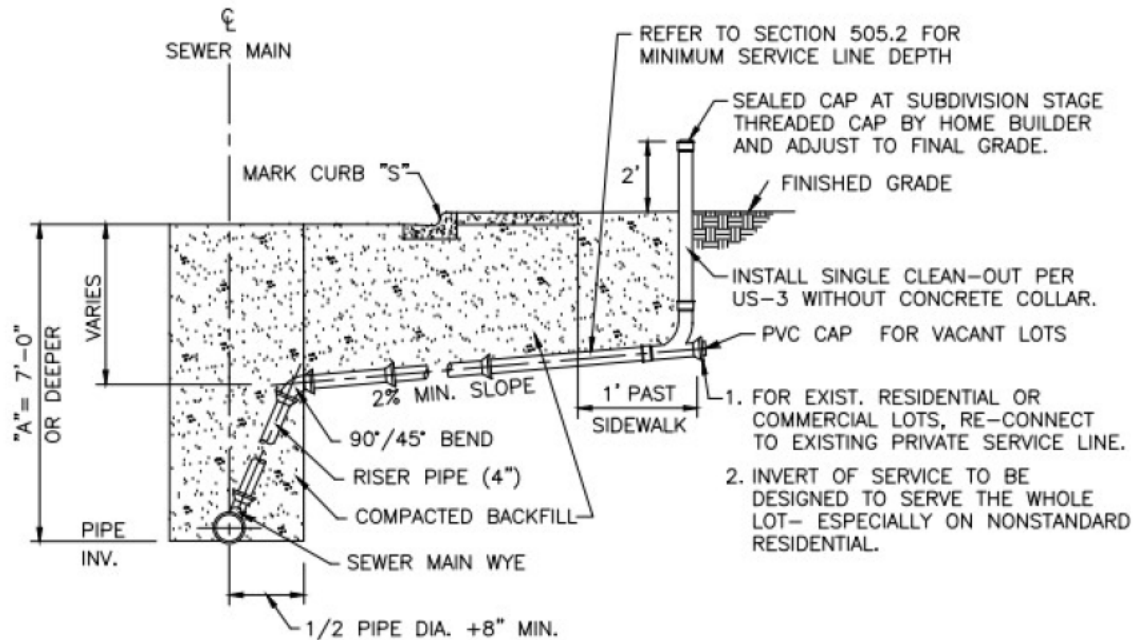
1. TRENCH WIDTHS, CROSS SECTIONS, SHALL BE IN COMPLIANT TO ALL APPLICABLE SAFETY STANDARDS AND REGULATIONS.
2. TESTING REQUIREMENTS (SEC. 706) INCLUDE VISUAL TESTING OF ALL MAIN LINES LAID AT OR FLATTER THAN MINIMUM SLOPES (PG 700-11).
3. TRACING WIRE REQUIRED TO BE PLACED ABOVE ALL FORCE MAINS.
4. TRACING WIRE IF REQUIRED TO BE TAPED TO MAIN @ 10 FT. O.C.
5. TRACING WIRE TO BE ACCESSIBLE, WITHIN VALVE BOX, SERVICE POINT, OR WITHIN AN INSTALLED TWO POINT TEST BOX, @ 500 FT. O.C. MAXIMUM.

* THE THICKNESS OF THE PAVEMENT PATCH SHALL MATCH THE DEPTH OF THE ADJACENT PAVEMENT SURFACES PLUS ONE INCH AND SHALL BE A MINIMUM 3" THICK.



S2 - TYPICAL SEWER SERVICE DETAILS

N.T.S.



NOTES:

WHEN "A" IS LESS THAN 7'-0", DELETE RISER PIPE. USE 45° ELL IN PLACE OF 90° ELL. TURN SEWER MAIN TEE OR WYE TOWARD SERVICE SIDE AT A 45° ANGLE.

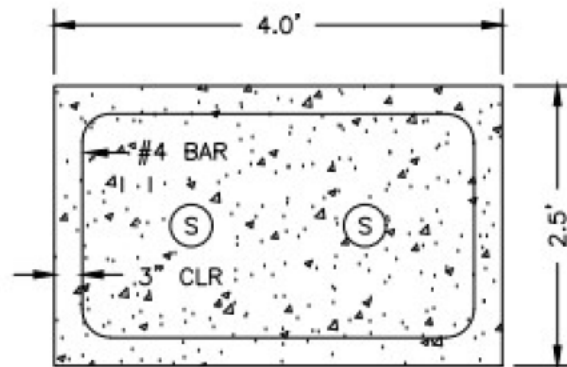
CLEAN-OUT TO BE INSTALLED AT SUBDIVISION STAGE (REFERENCE SECTION 504.2).

TRENCH WIDTHS, CROSS SECTIONS, SHALL BE IN COMPLIANCE WITH ALL APPLICABLE SAFETY STANDARDS AND REGULATIONS.



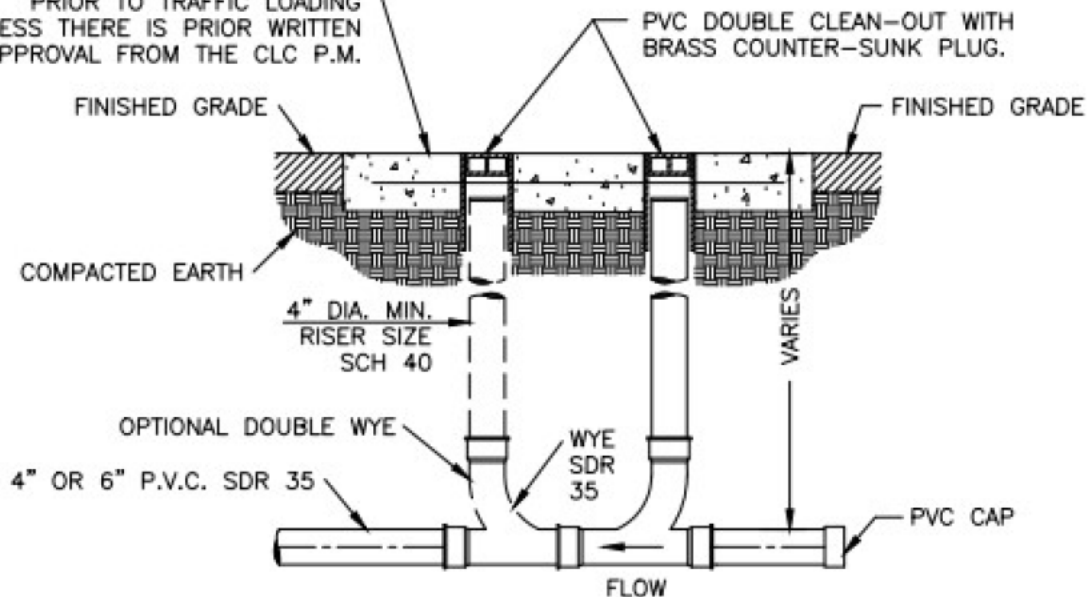
S3 - SERVICE CLEANOUT DETAIL

N.T.S.



DOUBLE CLEAN-OUT PLAN VIEW

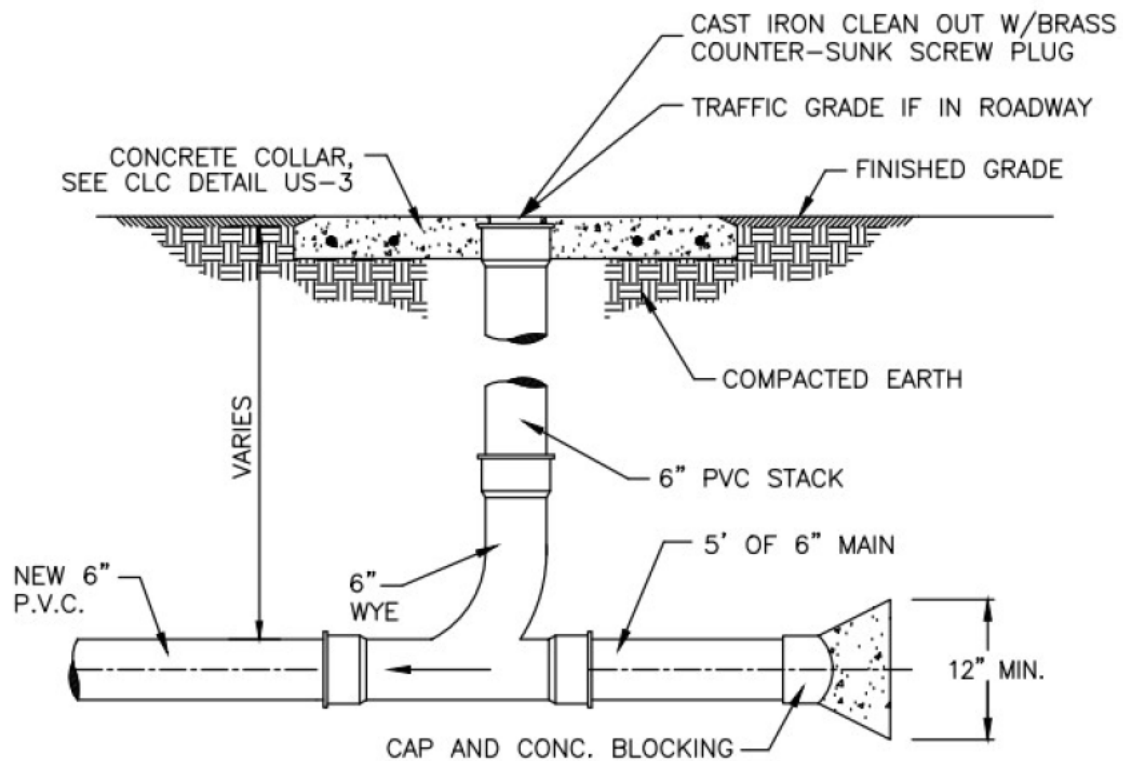
8" THICK 4000 PSI CONCRETE 72 HOURS CURING TIME IS REQUIRED PRIOR TO TRAFFIC LOADING UNLESS THERE IS PRIOR WRITTEN APPROVAL FROM THE CLC P.M.





S4 - MAIN LINE CLEANOUT DETAIL

N.T.S.



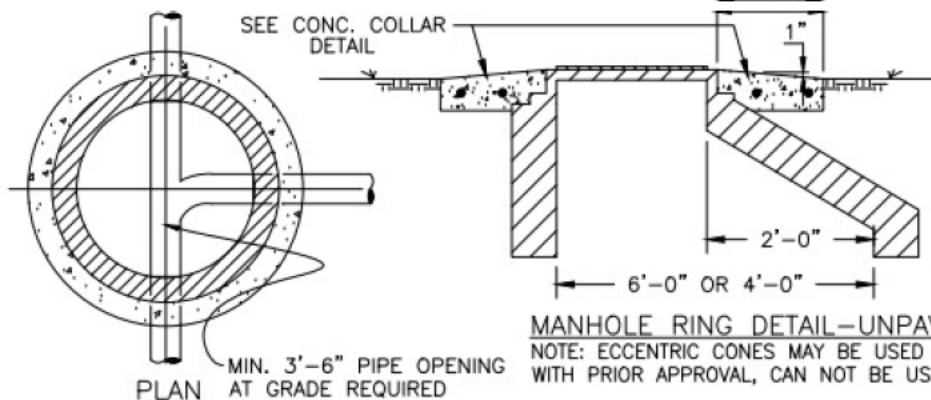
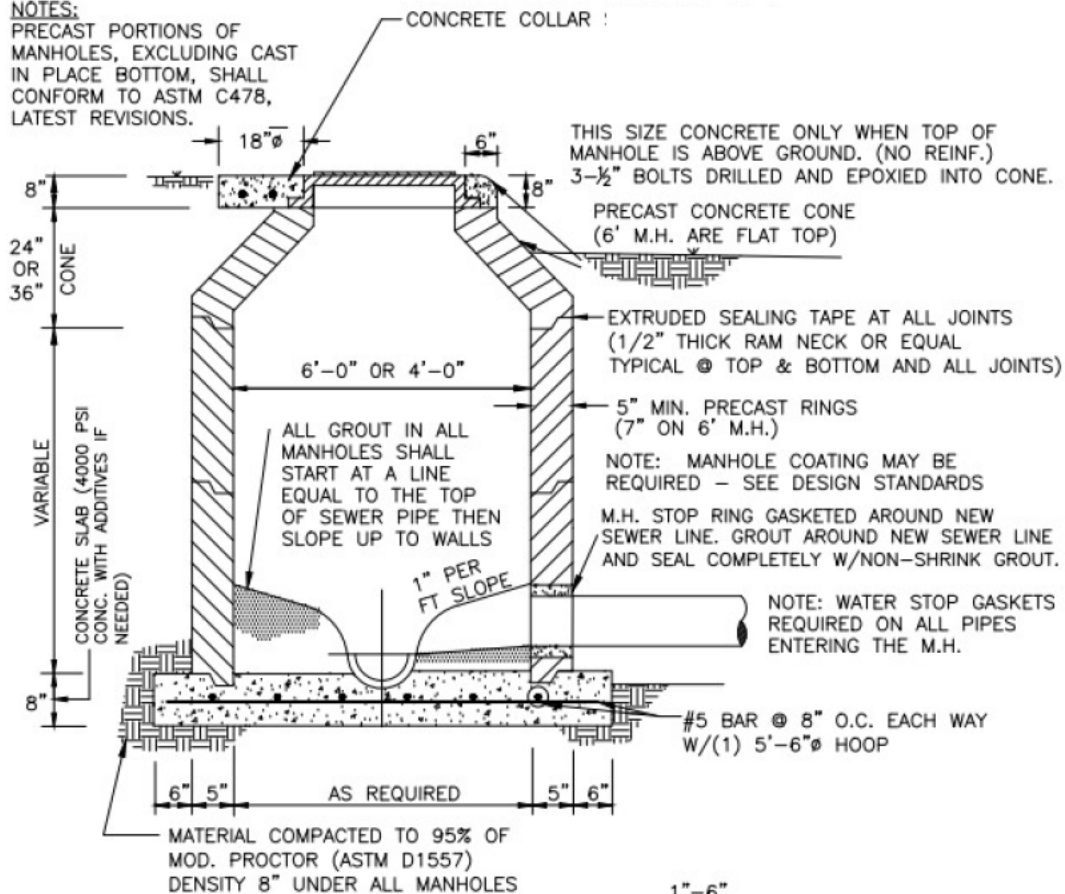


S5 - TYPICAL MANHOLE DETAIL

N.T.S.

NOTES:

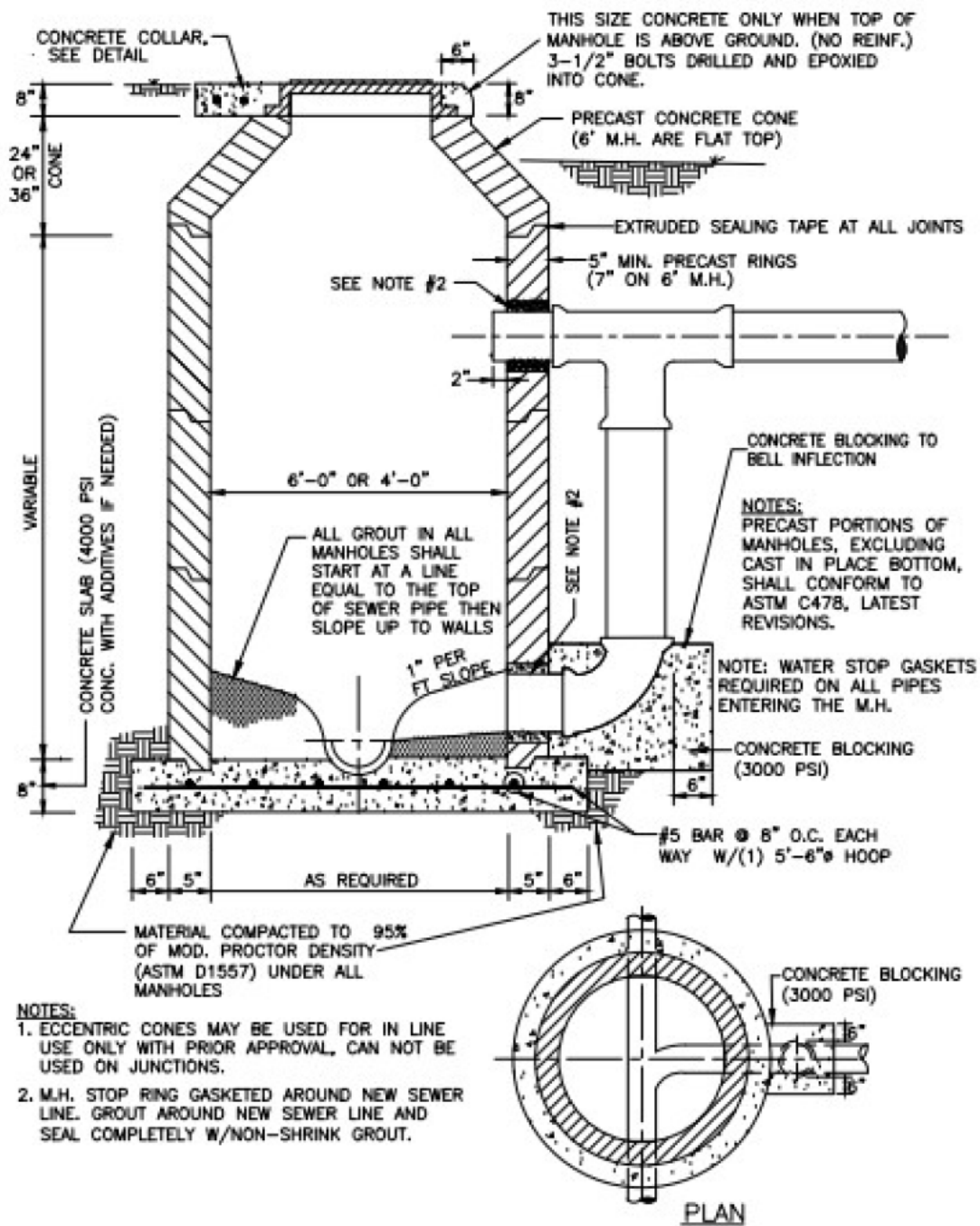
PRECAST PORTIONS OF MANHOLES, EXCLUDING CAST IN PLACE BOTTOM, SHALL CONFORM TO ASTM C478, LATEST REVISIONS.





S6 - TYPICAL MANHOLE DETAIL WITH DROP DETAIL

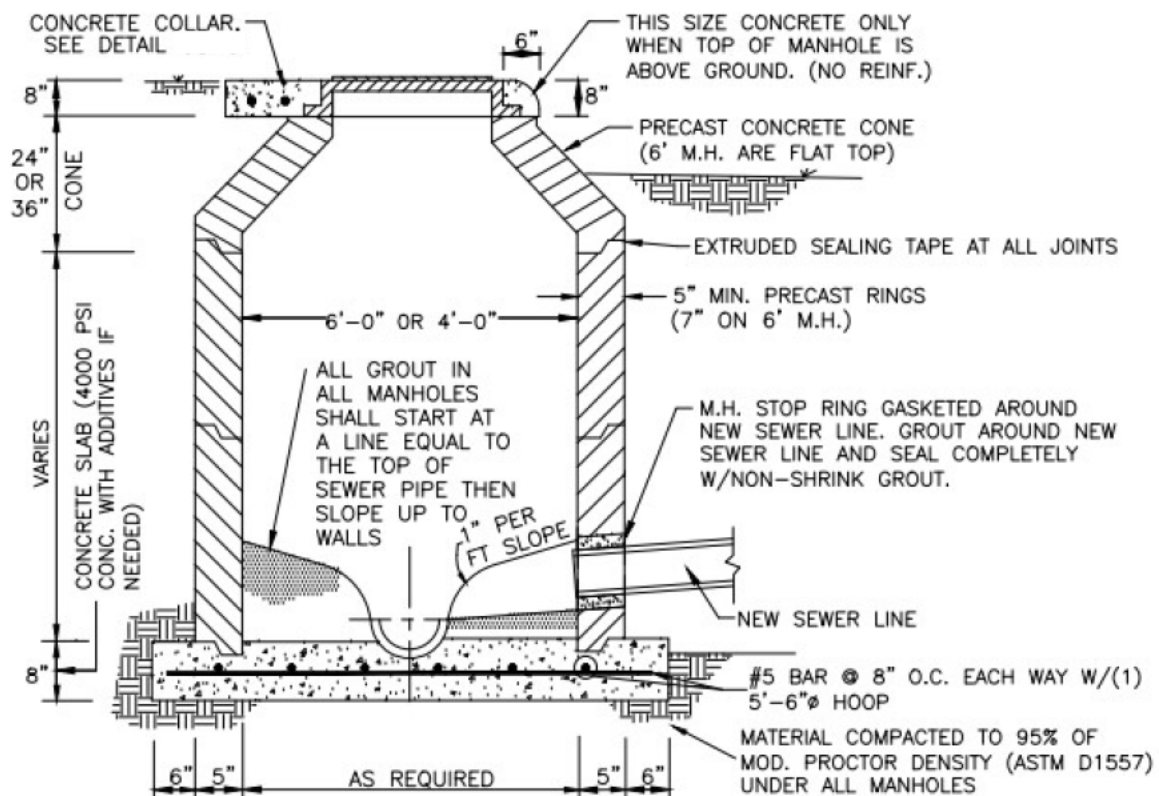
N.T.S.





S7 - TAPPING INTO AN EXSTING STANDARD MANHOLE DETAIL

N.T.S.



GENERAL NOTES:

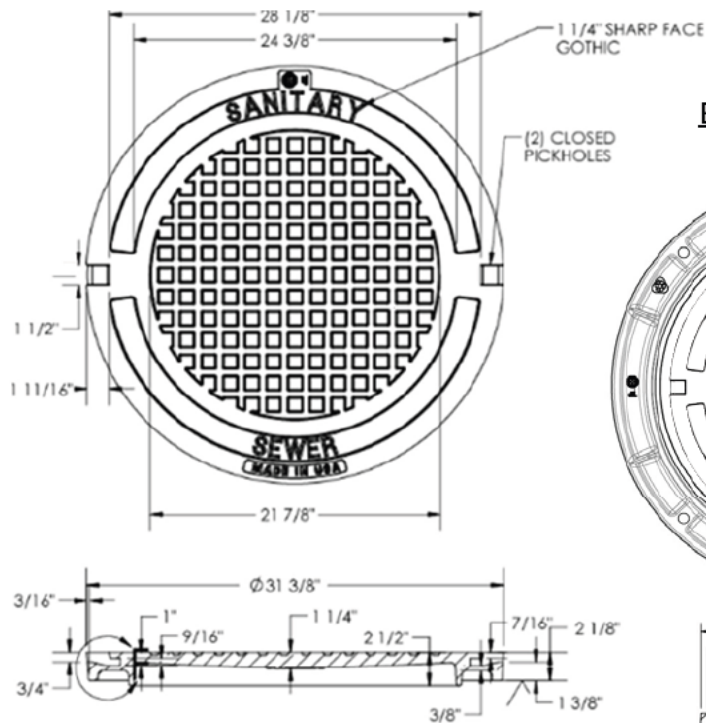
1. IF NEW PIPE INVERT IS BELOW EXISTING GROUTED SHELF, SHELF IS TO BE CUT OUT AS NEEDED AND REGROUTED
2. PRECAST PORTIONS OF MANHOLES, EXCLUDING CAST IN PLACE BOTTOM, SHALL CONFORM TO ASTM C478, LATEST REVISIONS.



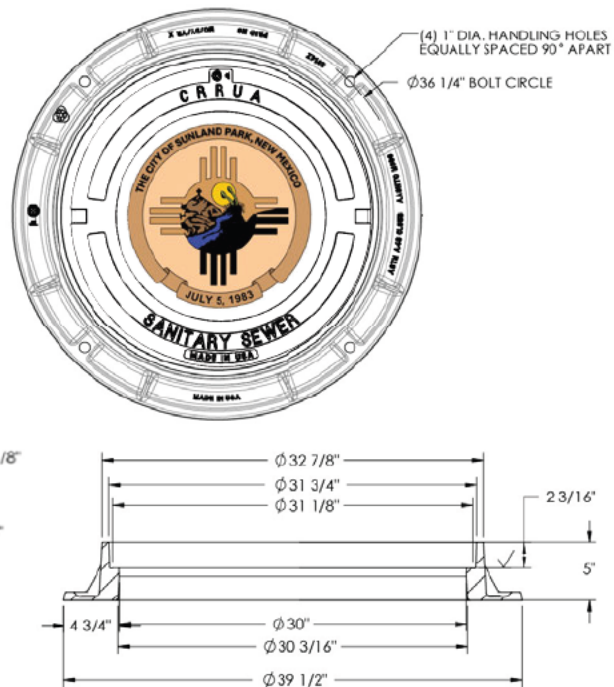
S8 – 30” CLEAR OPENING MANHOLE LID AND FRAME

N.T.S.

EJCO 2014A SERIES MANHOLE LID



EJCO 2014Z LID FRAME



NOTES:

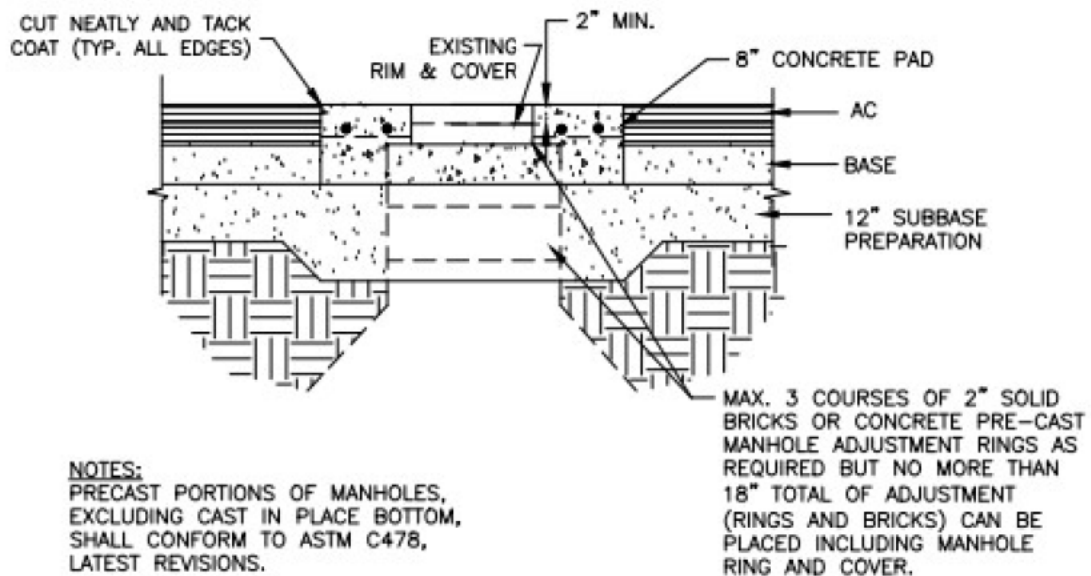
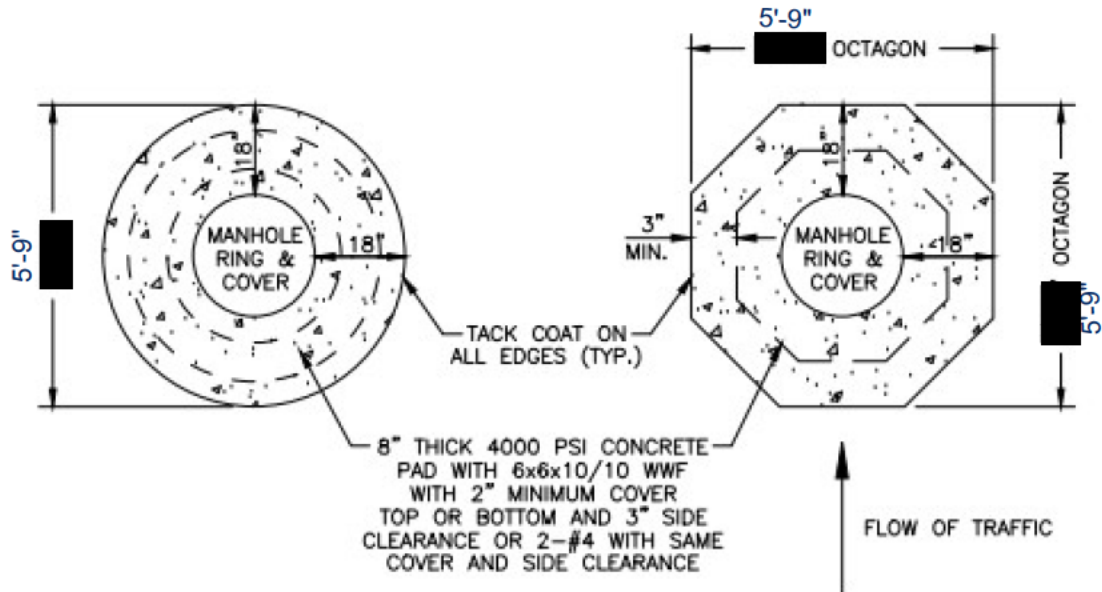
Manhole lids shall have the following identifiers:

1. Wording text on lid "Sanitary Sewer" and "CRRUA" and
2. Either "City of Sunland Park" or "Dona Ana County" logo depending on jurisdiction of installation.
3. Exceptions may be granted for Temporary or Alternative application with advanced approval of the Executive Director.



S9 - MANHOLE ADJUSTMENT DETAIL

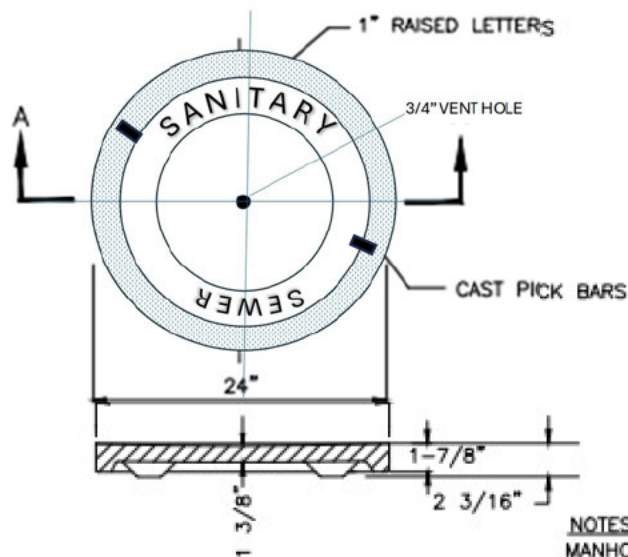
N.T.S.





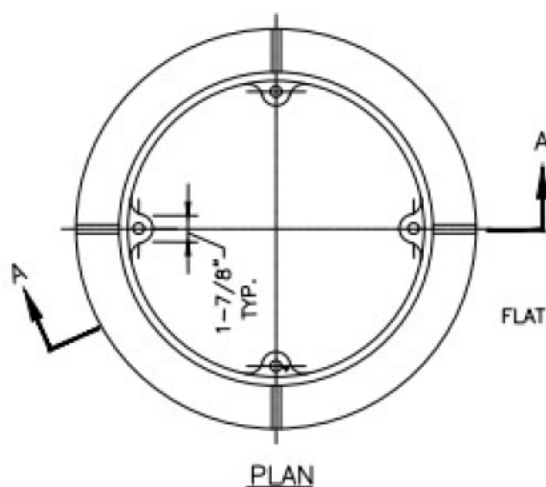
S10 - WATERTIGHT MANHOLE RING AND COVER DETAIL

N.T.S.



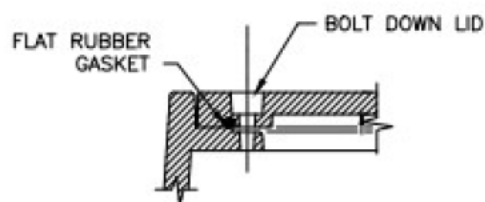
SECTION A-A

NOTES:
MANHOLE SHALL MEET AASHTO M 306-05
(OR LATEST PUBLICATION) H-20 LOADING
AND BE THE FOLLOWING: EAST JORDAN
IRON WORKS 00134283 (OR APPROVED
EQUAL).



PLAN

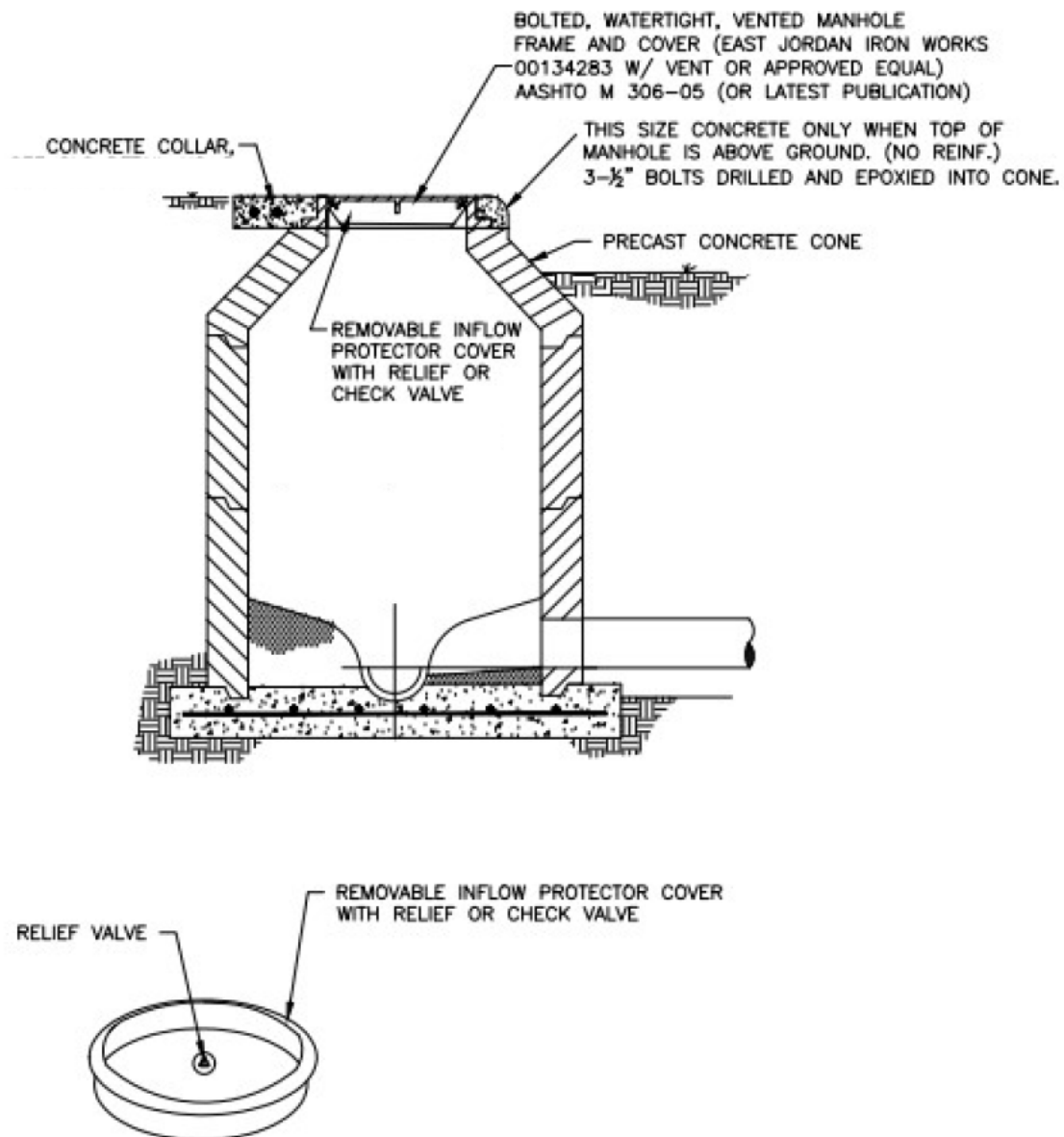
MIN TOTAL WT.- 300
LBS. MIN COVER 135
LBS MIN RING WT. -165 LBS

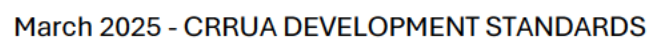


BOLT-DOWN DETAIL



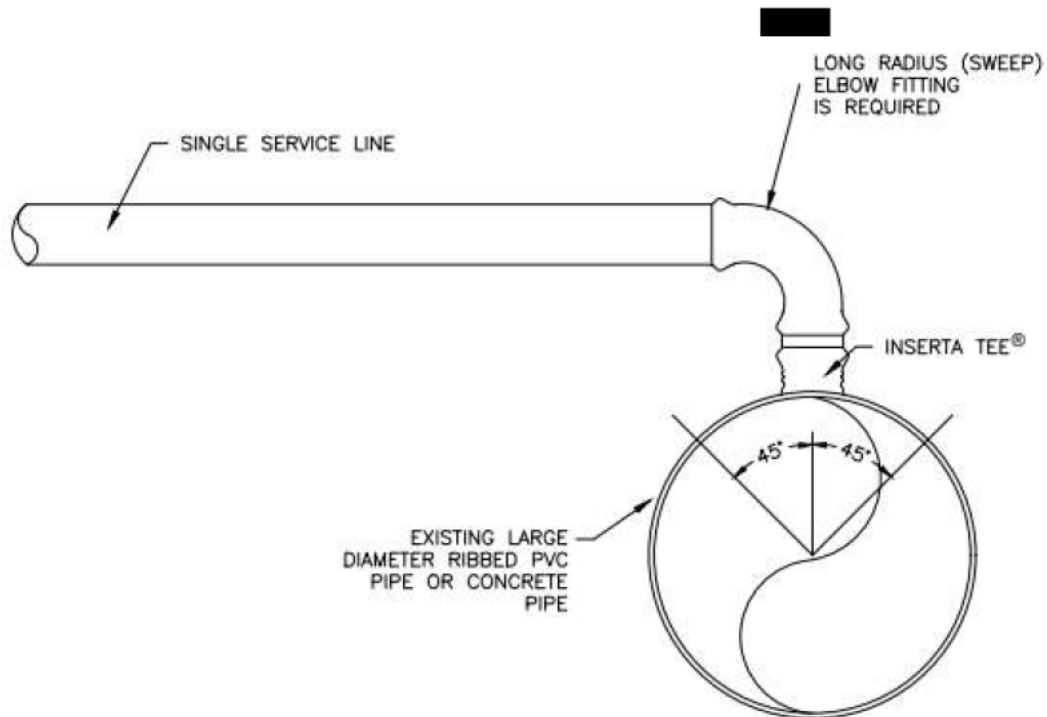
S11 - WATERTIGHT VENTED MANHOLE DETAIL N.T.S.







S13 - SERVICE LINE INSERTA TEE CONNECTION DETAIL N.T.S.



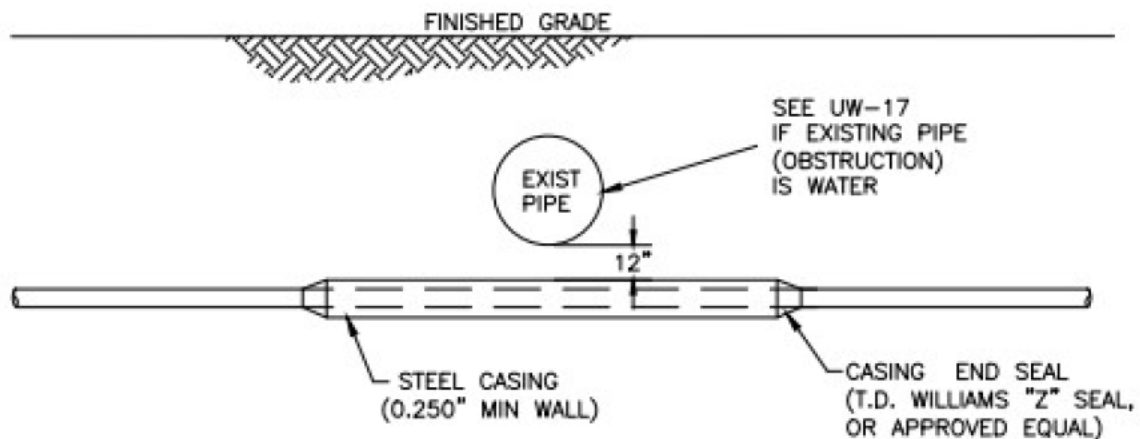
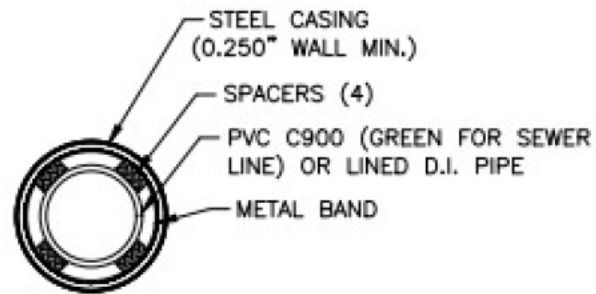
NOTES:

INSERTA TEE® (OR APPROVED EQUAL) TO BE
INSTALLED PER MANUFACTURES SPECIFICATIONS.

TEE CONNECTION SHALL BE IN THE TOP OR
WITHIN 45° OF THE TOP.



S14 - SEWER LINE BORE AND CASE DETAIL N.T.S.



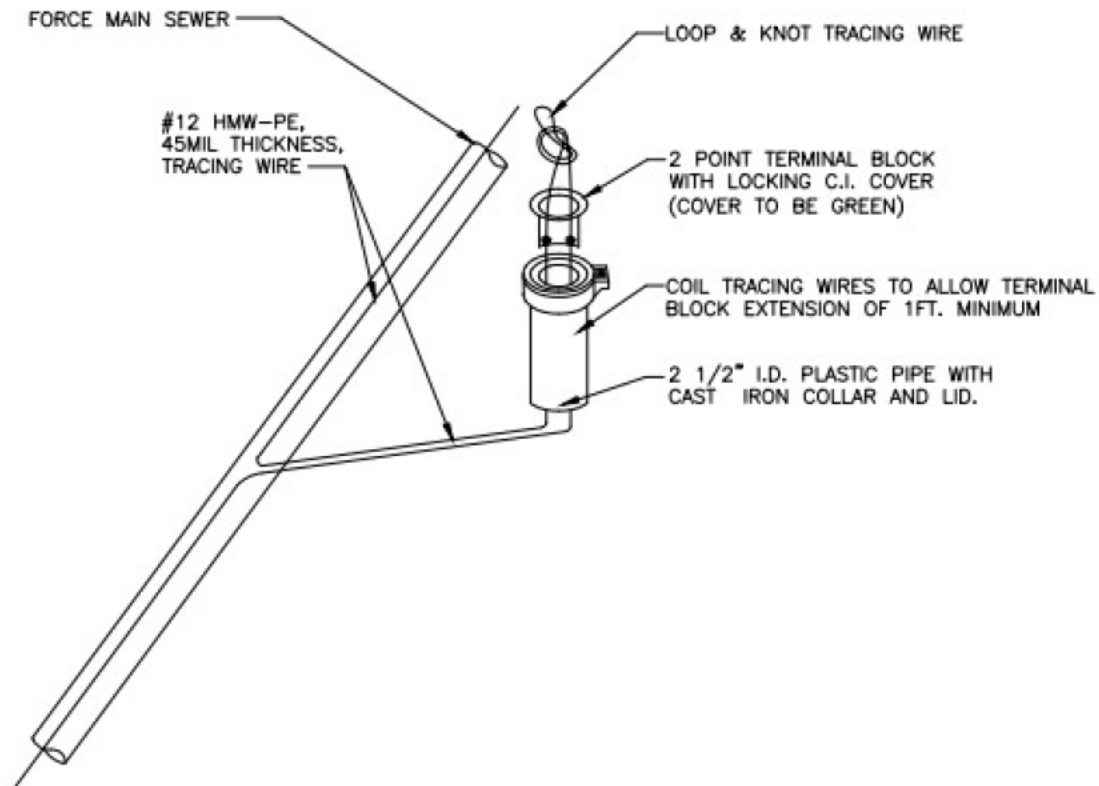
NOTES:

1. PUBLIC WORKS MARKETING, INC. (PWM) "RACI" SPACERS OR APPROVED EQUAL MAY BE SUBSTITUTED AT MANUFACTURERS RECOMMENDED SPACING.
2. PIPE JOINT INSIDE CASING SHALL BE JOINT RESTRAINED.
3. CASING SIZE TO BE SPECIFIED BY DESIGN ENGINEER (DEPENDENT ON LENGTH OF BORE, SERVICE LINE TYPE, ETC.)



S15 - TRACING WIRE TEST BOX

DETAIL N.T.S.

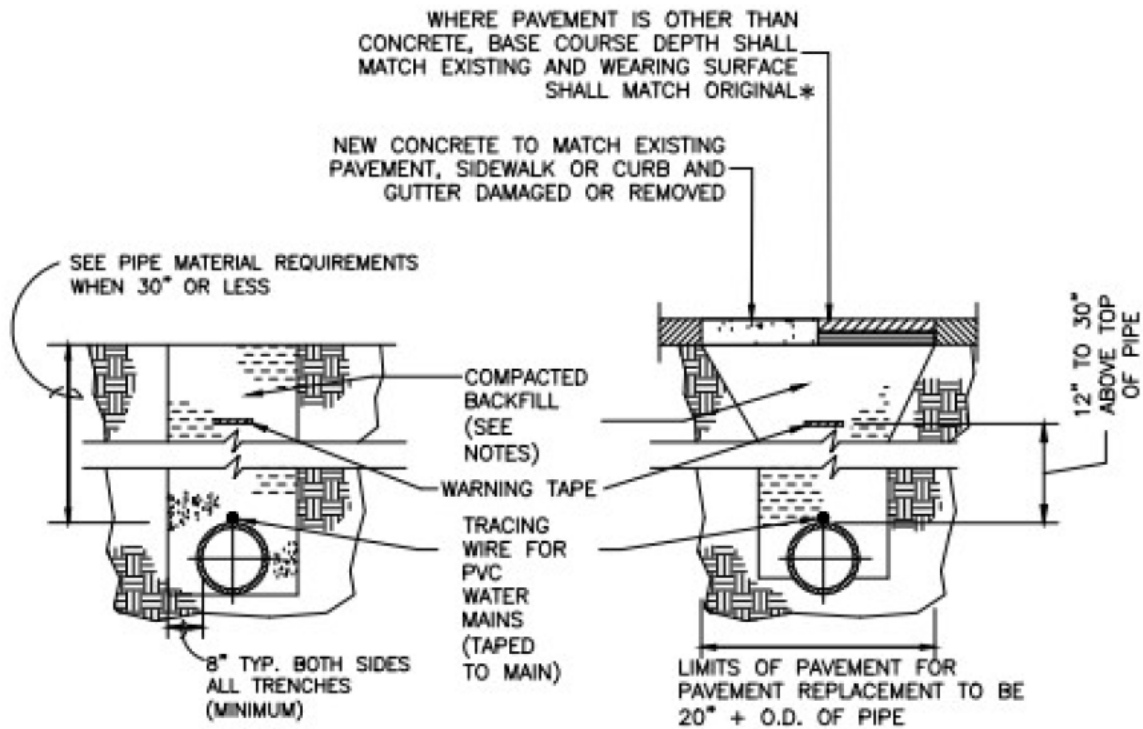


NOTES:

1. SPACING AND LOCATION OF TEST BOXES TO BE DETERMINED BY THE CITY UTILITIES DIVISION.
2. TEST BOX LOCATION MAY VARY, UP TO 50 FT. FROM GAS LINE.
3. REFER TO STANDARDS AND MATERIALS LISTS FOR MATERIALS.
4. TRACING WIRE SHALL EXTEND A MINIMUM OF 12" ABOVE TEST STATION.
5. 24" OCTAGON CONCRETE COLLAR TO BE INSTALLED.



W1 - TYPICAL WATER TRENCHING DETAIL N.T.S.



UNPAVED ROAD TRENCH

NOTES:
BACKFILL IN UNPAVED STREETS, ALLEYS, AND DRIVEWAYS SHALL BE COMPACTED TO 90% COMPACTION AS DETERMINED BY AASHTO T-180 (ASTM D1557) UNLESS OTHERWISE NOTED

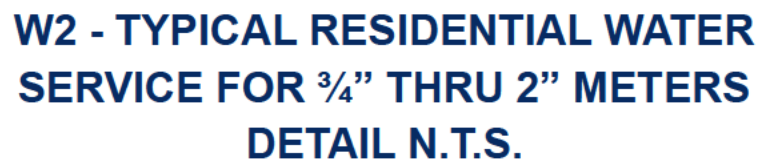
UNDER PAVEMENT

NOTES:
BACKFILL SHALL BE COMPACTED TO 95% COMPACTION AS DETERMINED BY AASHTO T-180 (ASTM D1557)

NOTES:

1. TRACING WIRE REQUIRED TO BE PLACED ABOVE ALL MAINS AND TRANSMISSION LINES.
2. TEST BOXES, CONNECTED INTO TRACING WIRE SYSTEM, SHALL BE REQUIRED WHERE HYDRANTS ARE NOT USED OR WHERE HYDRANT SPACING EXCEEDS 500 FEET.
3. TRENCH WIDTHS, CROSS SECTIONS, SHALL BE IN COMPLIANT TO ALL APPLICABLE SAFETY STANDARDS AND REGULATIONS.

* THE THICKNESS OF THE PAVEMENT PATCH SHALL MATCH THE DEPTH OF THE ADJACENT PAVEMENT SURFACES PLUS ONE INCH AND SHALL BE A MINIMUM 3" THICK.

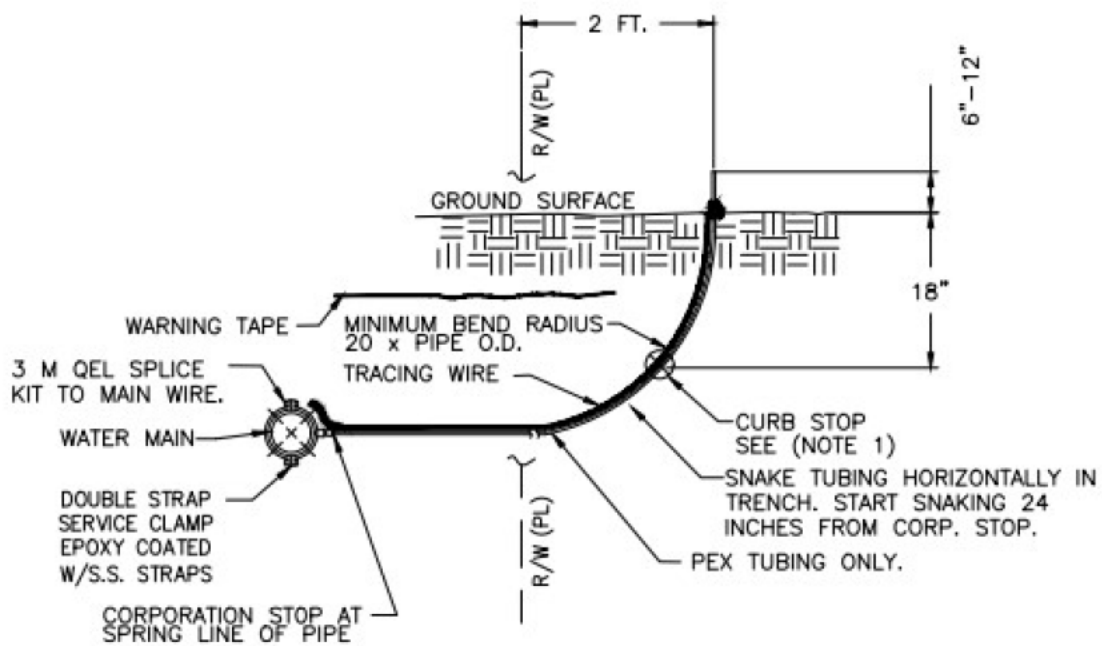


3/4"	SERVICE LINE	2 METERS
1"	SERVICE LINE	3 METERS
2"	SERVICE LINE	6 METERS
4"	SERVICE LINE	12 METERS

1. TUBING MUST BE BEDDED THROUGHOUT ITS LENGTH TO ENSURE THE SERVICE LINE IS NOT STRESSED DURING BACKFILLING. BEDDING MATERIAL MUST EXTEND 4" IN ALL DIRECTIONS FROM TUBING. TAPE TRACING WIRE TO SERVICE LINE EVERY 5FT AND EXTEND TRACING WIRE TO ANGLE VALVE/CURB STOP.
2. ITRON EQUIPMENT (ITRON ERT & LEAK SENSOR) IS SUPPLIED BY CITY WITHIN THE METER BOX.
3. TRACING WIRE SHOULD BE SPLICED (3M QEL SPLICE LAT) TO EXISTING MAIN TRACING WIRE, WHEN THERE IS NOT A MAIN TRACING WIRE, THE WIRE END REQUIRES WIRE CAP.
4. CUSTOMER VALVE INSTALLED BY CITY ARE TIED DURING NEW SERVICE CONNECTION, TO BE MAINTAINED BY CUSTOMER.
5. DURING NEW CONSTRUCTION, THE CONTRACTOR SHALL INSTALL CURB STOP 18" BELOW GRADE AND CONTINUE SERVICE LINE A MINIMUM 6"-12" ABOVE GRADE.



W3 - TYPICAL RESIDENTIAL WATER SERVICE LINE DETAIL N.T.S.

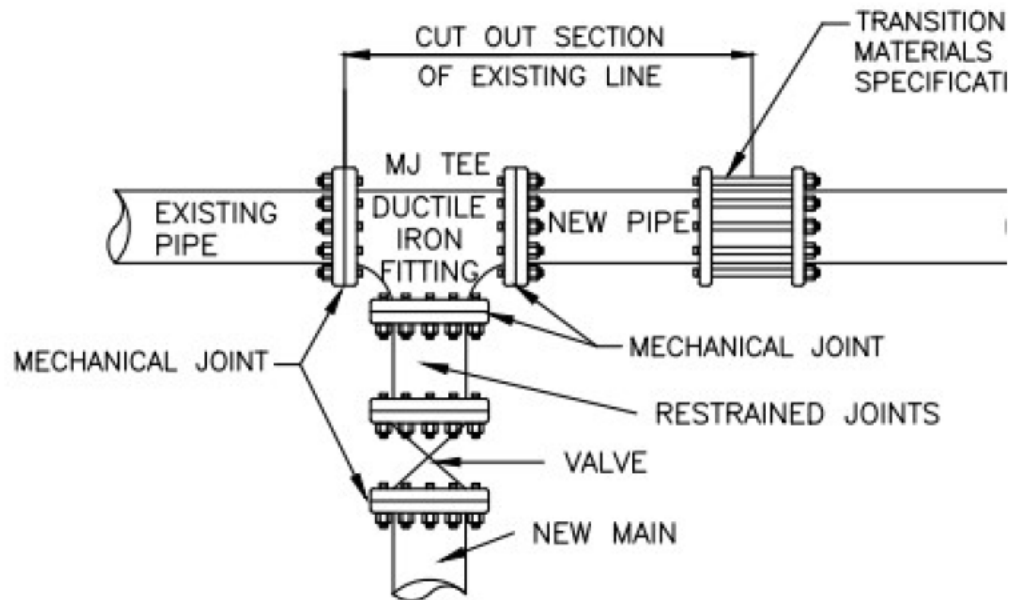


NOTES:

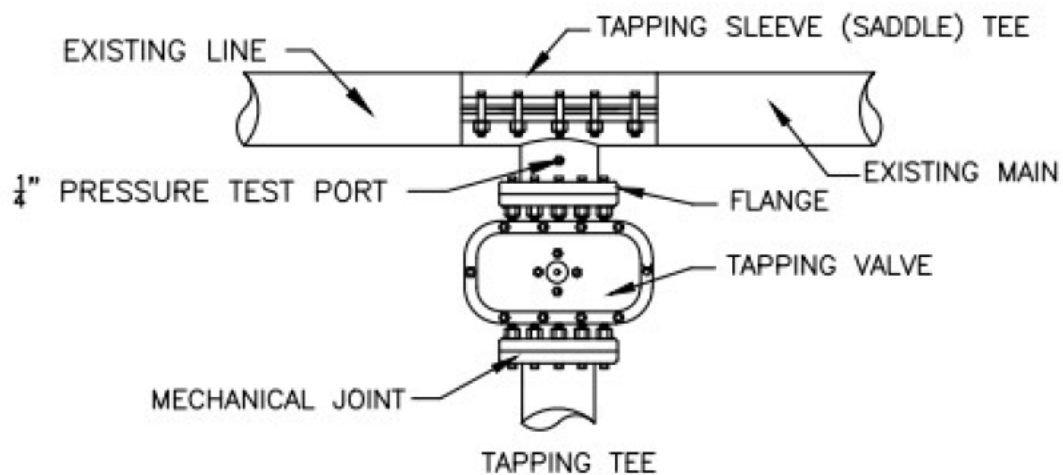
1. DURING NEW CONSTRUCTION, THE CONTRACTOR SHALL INSTALL CURB STOP 18" BELOW GRADE AND CONTINUE SERVICE LINE A MINIMUM 6"-12" ABOVE GRADE.



W4 - TYPICAL WATER CONNECTION DETAIL N.T.S.



WET CONNECTION

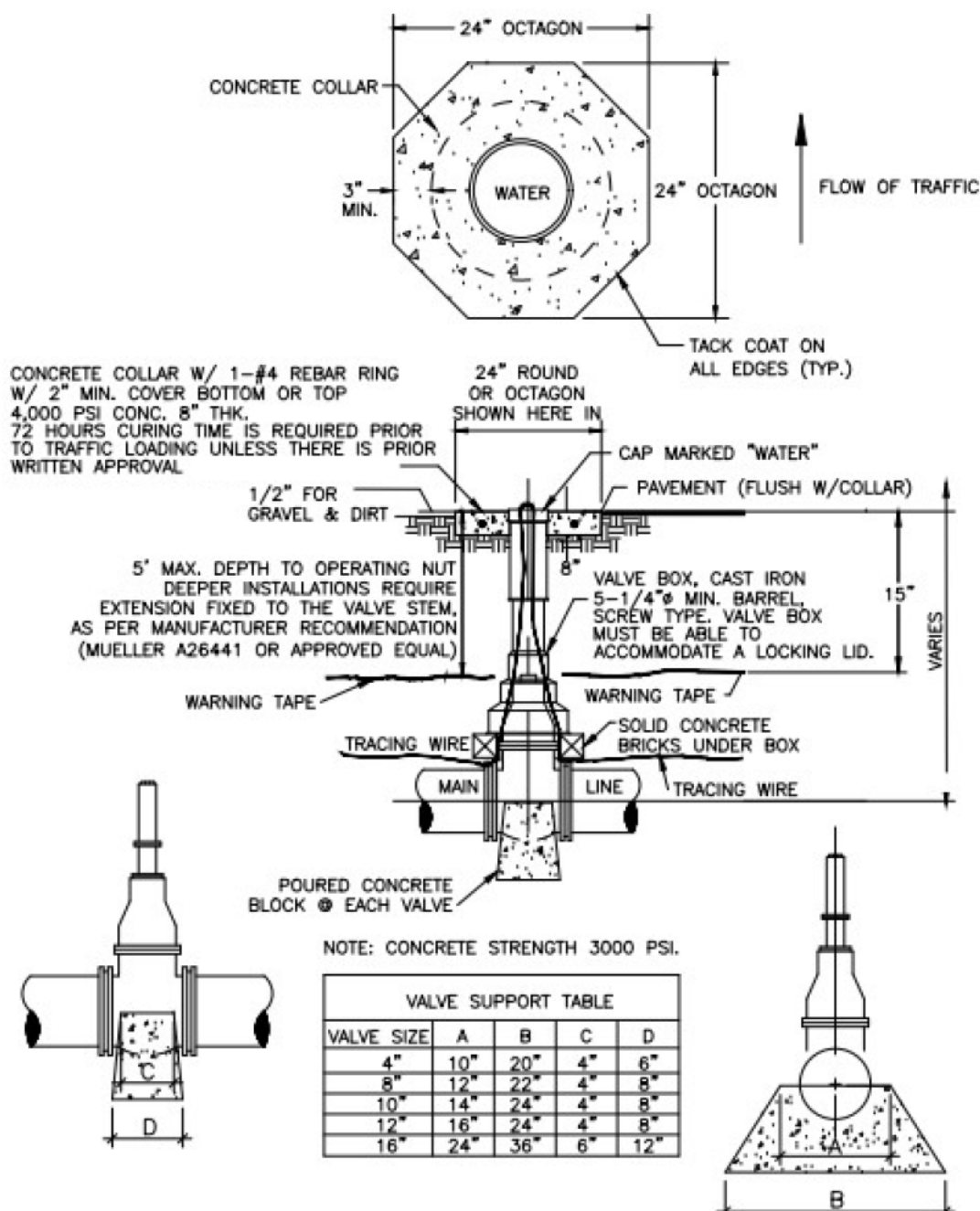


TAPPED CONNECTION



W5 - WATER VALVE DETAIL

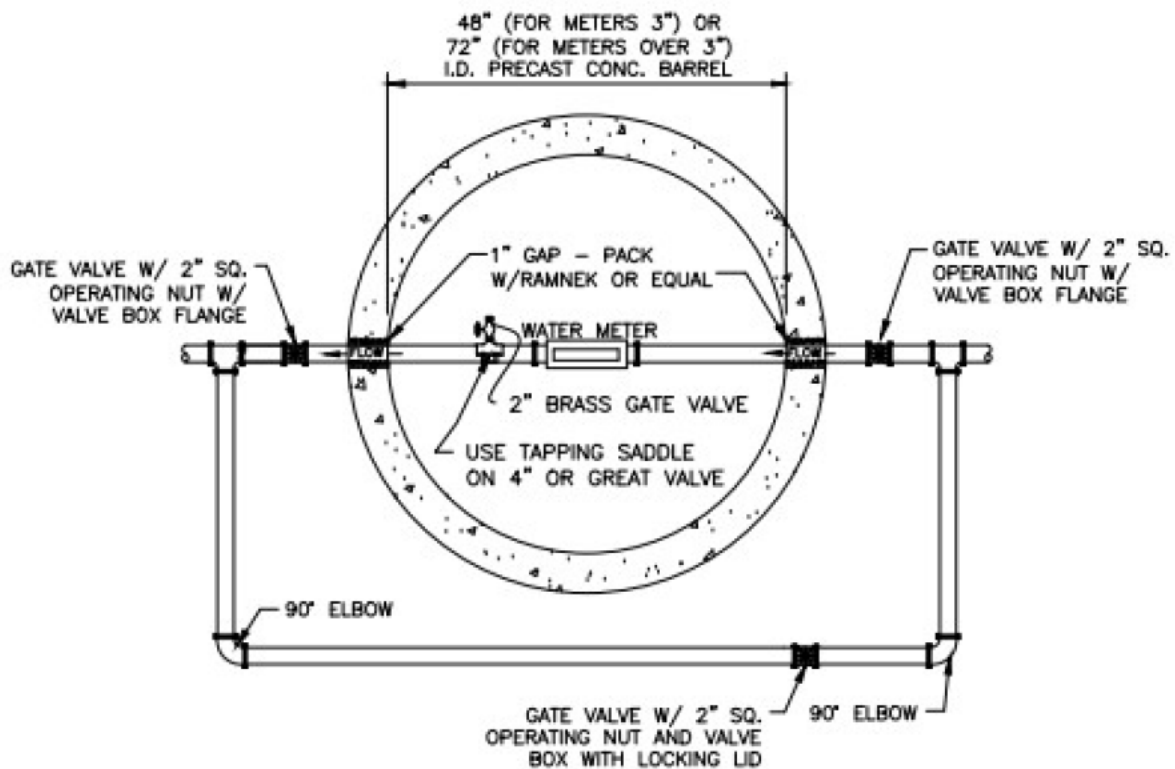
N.T.S.





W6 - TRAFFIC WATER METER VAULT DETAIL

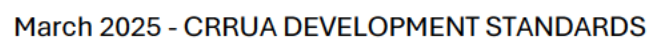
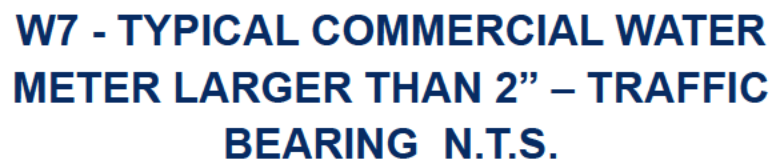
N.T.S.



TOP VIEW

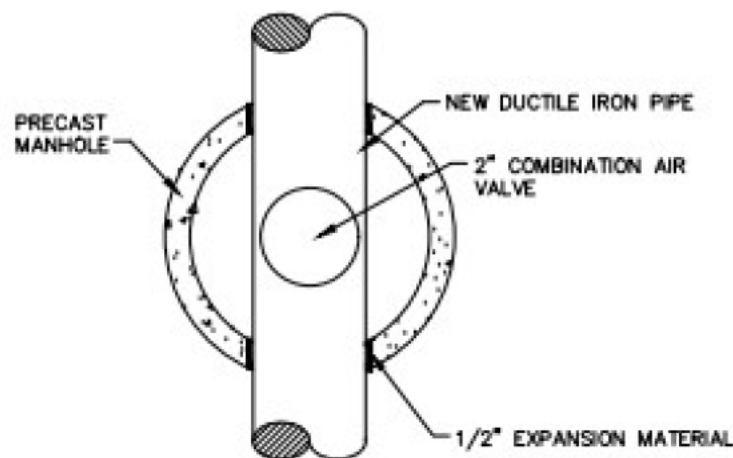
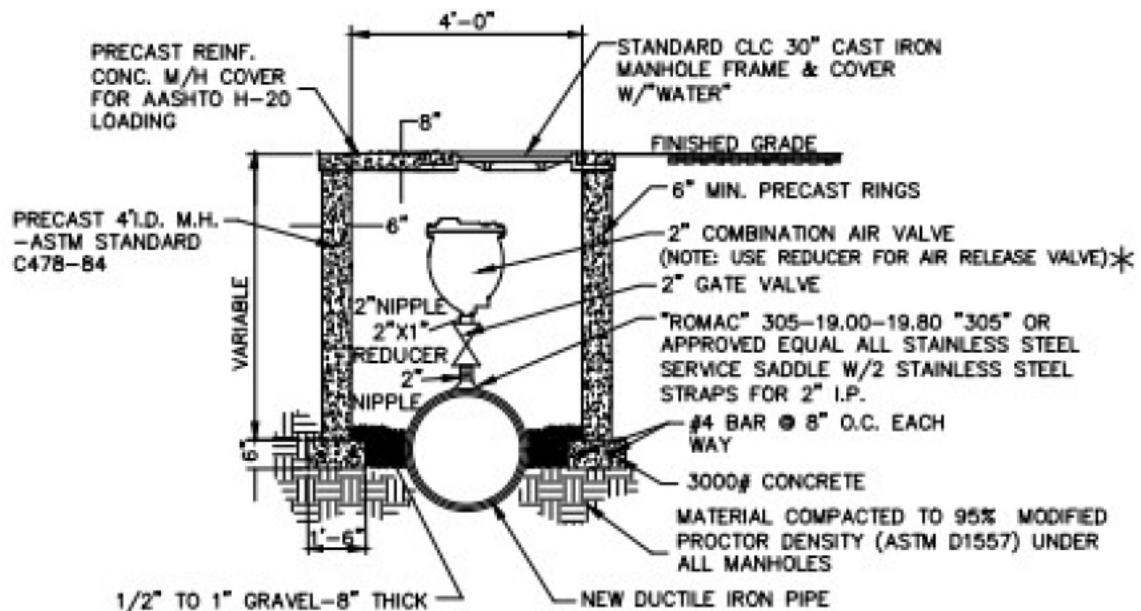
NOTES:

1. C-900 OR DUCTILE IRON PIPE ON 3" OR GREATER
2. MAINTENANCE BY CRRUA UP TO AND INCLUDING THE METER AND THE BY-PASS VALVE.
3. ALL CRRUA WATER PIPING SHALL BE EVEN PIPE SIZES WITH 4" DIA MINIMUM.
4. BY-PASS WATER METER SIZE DETERMED BY CRRUA





W8 - AIR / VACUUM RELIEF VALVE DETAIL N.T.S.

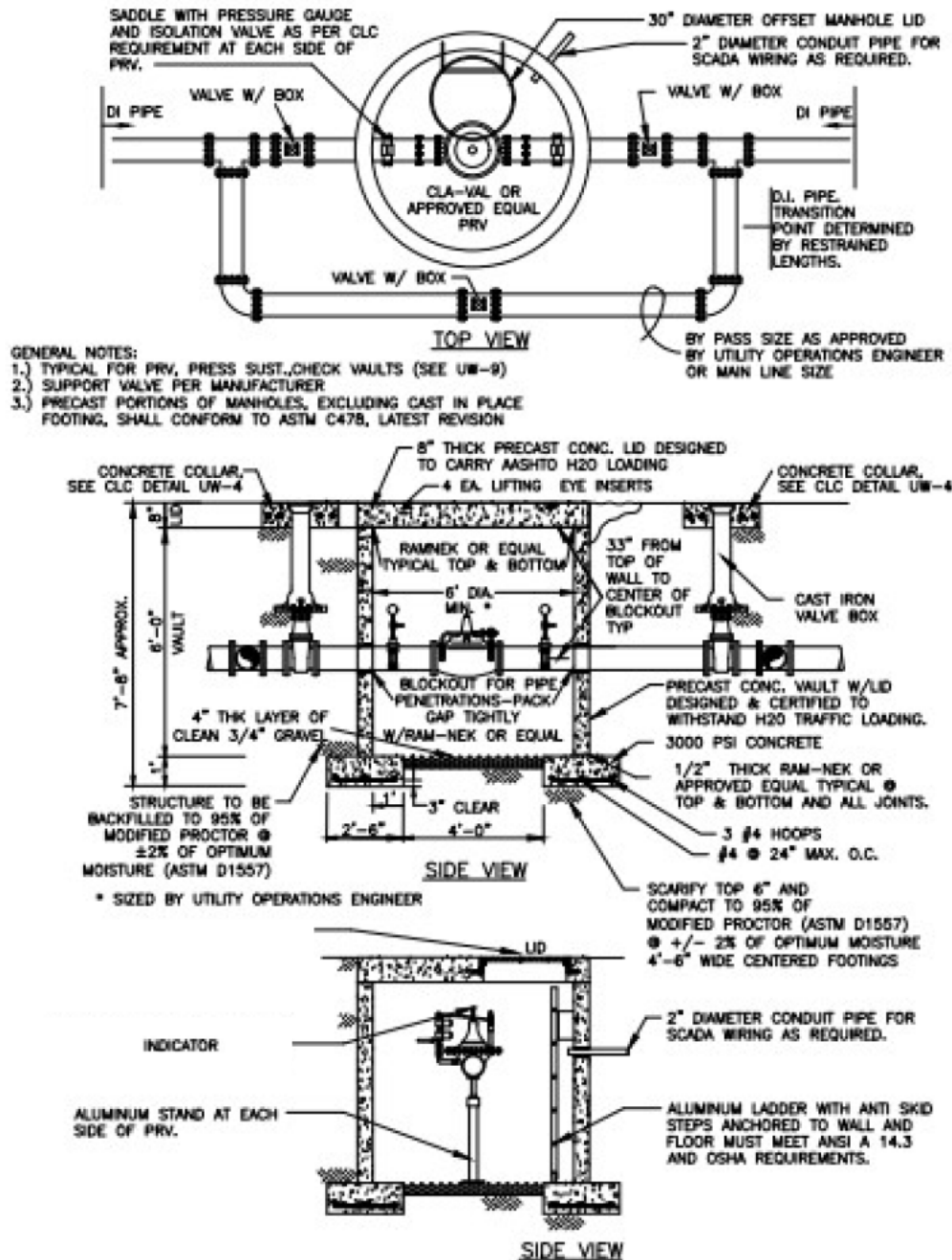


* AIR VALVES LARGER THAN 2" WILL REQUIRE A 6' ID MANHOLE AND INCREASED PIPE COVER



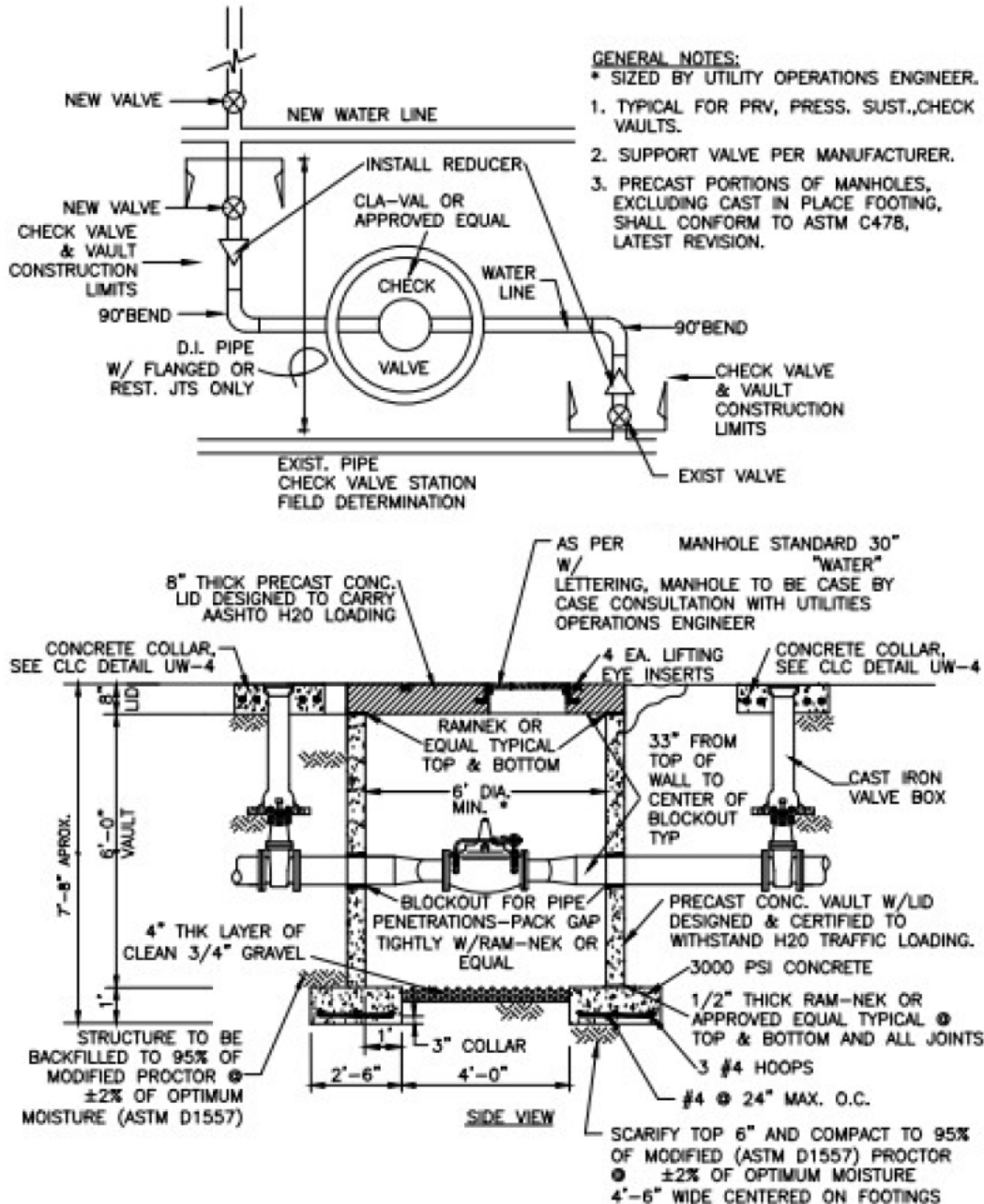
W9 - TYPICAL PRV VALVE DETAIL

N.T.S.



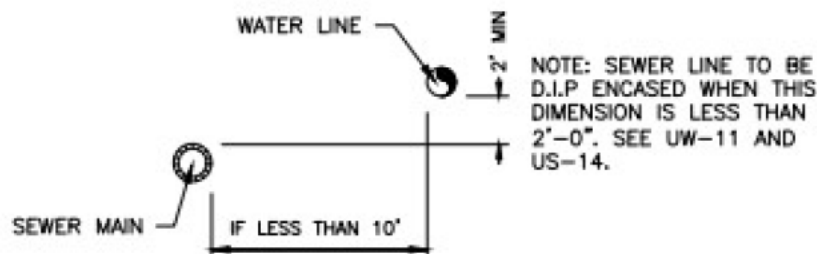


W10 - CHECK VALVE AND VAULT GENERAL DETAIL N.T.S.

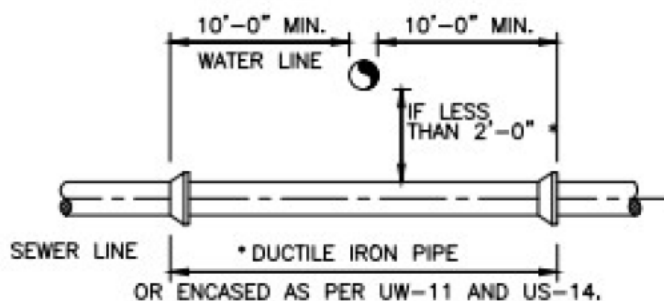




W11 - PARALLEL AND CROSSED LINE DETAIL N.T.S.



PARALLEL LINES



CROSSED LINES

EITHER THE WATER MAIN OF THE SEWER LINE SHALL BE ENCASED IN A WATERTIGHT CARRIER PIPE WHICH EXTENDS 10 FEET (3M) ON BOTH SIDES OF THE CROSSING, MEASURED PERPENDICULAR TO THE WATER MAIN. THE CARRIER PIPE SHALL BE OF MATERIALS APPROVED BY THE REGULATORY AGENCY FOR USE IN WATER MAIN CONSTRUCTION.

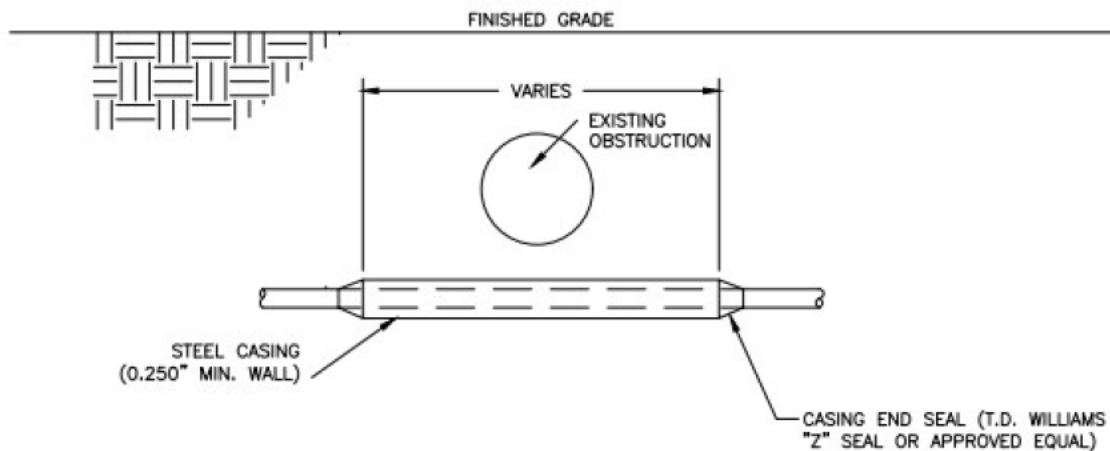
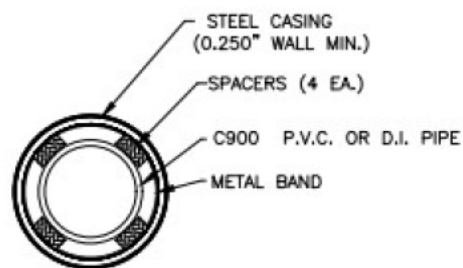
NOTES ADDED AT REQUEST OF STATE HEALTH DEPARTMENT

PROXIMITY OF WATER AND SEWER LINES

WHENEVER POSSIBLE, IT IS DESIRABLE TO LAY PARALLEL WATER AND SEWER LINES AT LEAST 10 FEET APART HORIZONTALLY, AND THE WATER LINE SHOULD BE AT A HIGHER ELEVATION THAN THE SEWER. IF THIS IS NOT POSSIBLE, SEPARATE TRENCHES SHALL BE REQUIRED IN ALL CASES (THIS SHALL BE EFFECTIVE EVEN THOUGH ONE LINE HAS BEEN INSTALLED PRIOR TO THE OTHER) AND THE WATER LINE SHALL BE AT LEAST TWO (2) FEET ABOVE THE SEWER. WHEN WATER AND SEWER LINES CROSS EACH OTHER, THE WATER LINE SHALL BE AT LEAST TWO (2) FEET ABOVE THE SEWER; OTHERWISE, THE SEWER SHALL BE OF DUCTILE PIPE, OR EQUIVALENT, FOR 10 FEET EACH SIDE OF THE WATER LINE.



W12 - WATER LINE BORE AND CASE DETAIL N.T.S.

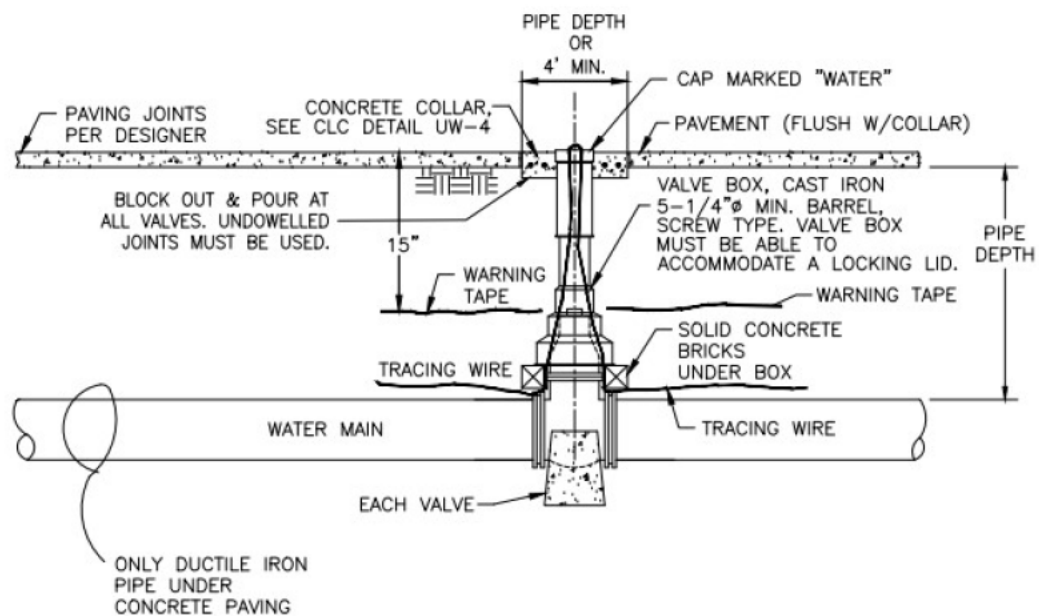


NOTES:

1. PUBLIC WORKS MARKETING, INC. (PWM) "RACI" SPACERS OR APPROVED EQUAL MAY BE SUBSTITUTED AT MANUFACTURERS RECOMMENDED SPACING.
2. PIPE JOINT INSIDE CASING SHALL BE JOINT RESTRAINED.



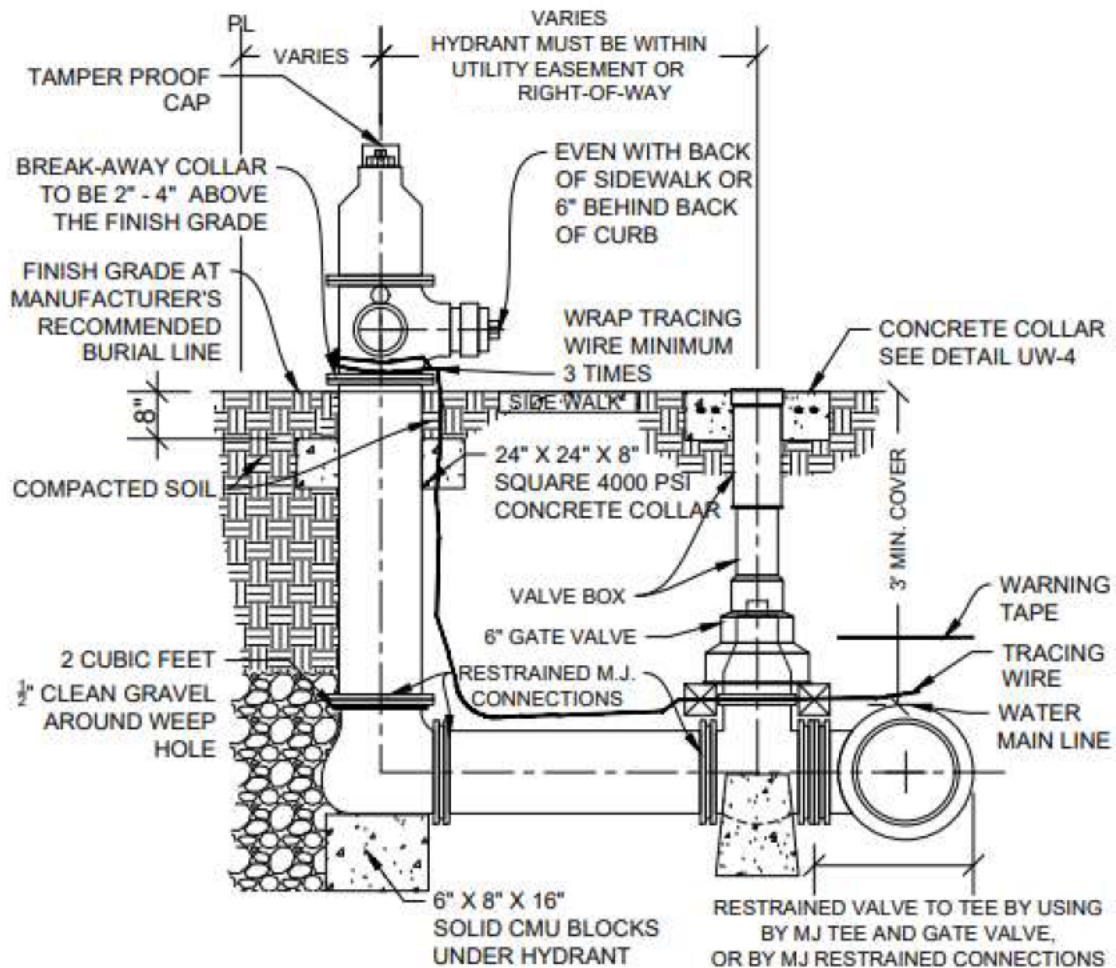
W13 - WATER MAIN UNDER RIGID PAVEMENT DETAIL N.T.S.





W14 - FIRE HYDRANT DETAIL

N.T.S.



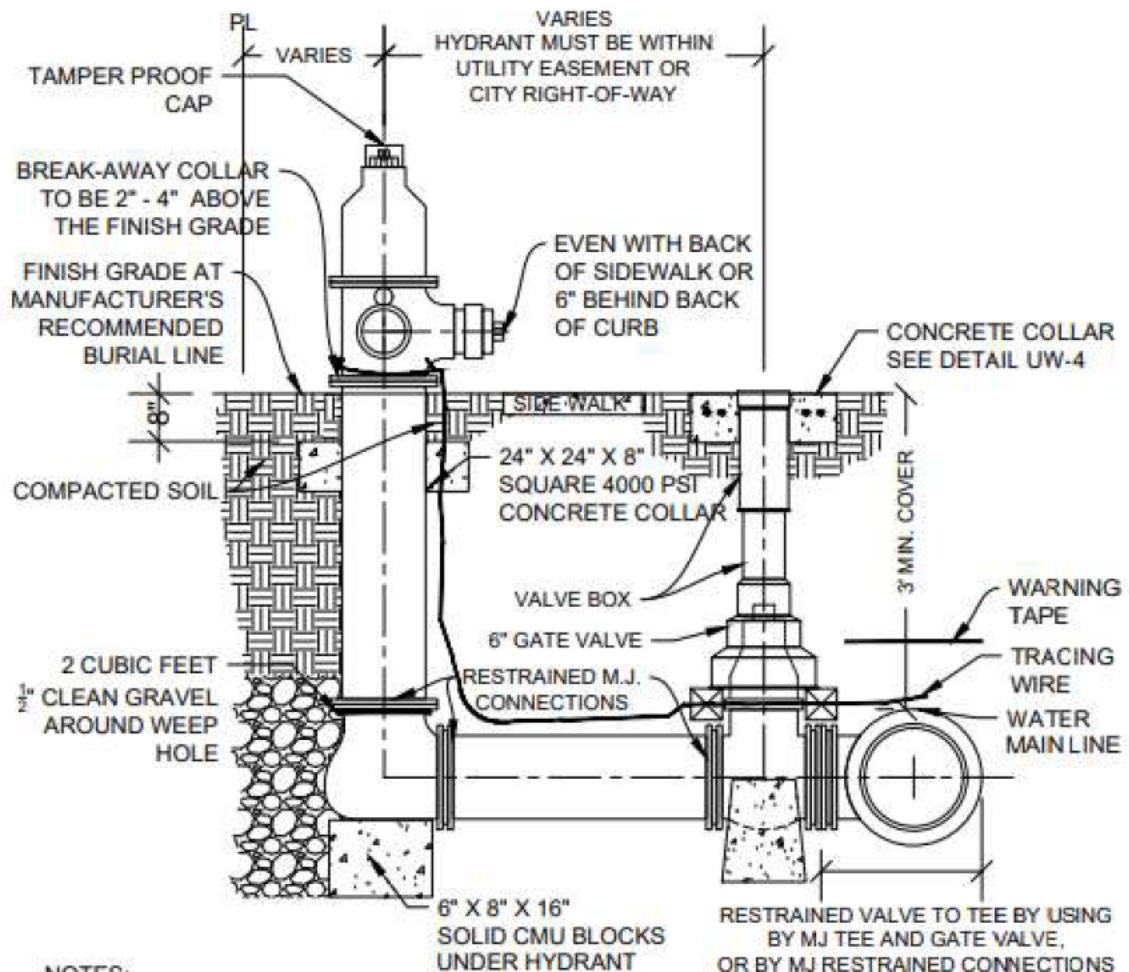
NOTES:

1. LOCATE FIRE HYDRANT IN PARKWAY BEHIND CURB & GUTTER IF AVAILABLE, OTHERWISE PLACE FIRE HYDRANT AT DIRECTION OF UTILITY INSPECTOR.
2. FOR FIRE HYDRANTS ON LONG DEAD-END LINES OUTSIDE THE R.O.W., A SECOND VALVE MAY BE REQUIRED APPROXIMATELY 10 FEET FROM THE HYDRANT.
3. TEST BOXES, CONNECTED INTO TRACING WIRE SYSTEM, SHALL BE REQUIRED WHERE HYDRANTS ARE NOT USED OR WHERE HYDRANT SPACING EXCEEDS 500 FEET.



W15 - ALT FIRE HYDRAN DETAIL

N.T.S.



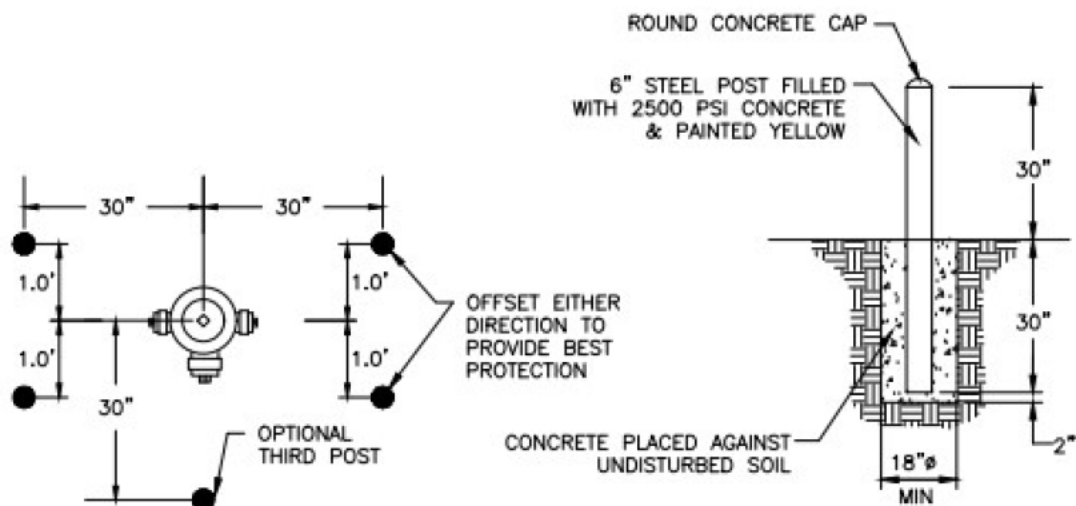
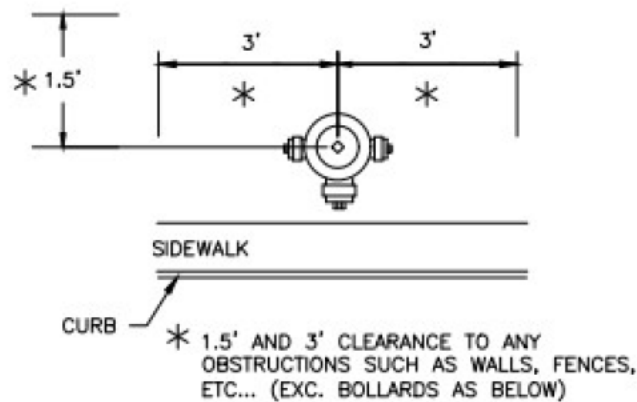
NOTES:

1. LOCATE FIRE HYDRANT IN PARKWAY BEHIND CURB & GUTTER IF AVAILABLE, OTHERWISE PLACE FIRE HYDRANT AT DIRECTION OF UTILITY INSPECTOR.
2. FOR FIRE HYDRANTS ON LONG DEAD-END LINES OUTSIDE THE R.O.W., A SECOND VALVE MAY BE REQUIRED APPROXIMATELY 10 FEET FROM THE HYDRANT.
3. TEST BOXES, CONNECTED INTO TRACING WIRE SYSTEM, SHALL BE REQUIRED WHERE HYDRANTS ARE NOT USED OR WHERE HYDRANT SPACING EXCEEDS 500 FEET.



W16 - FIRE HYDRANT BOLLARDS

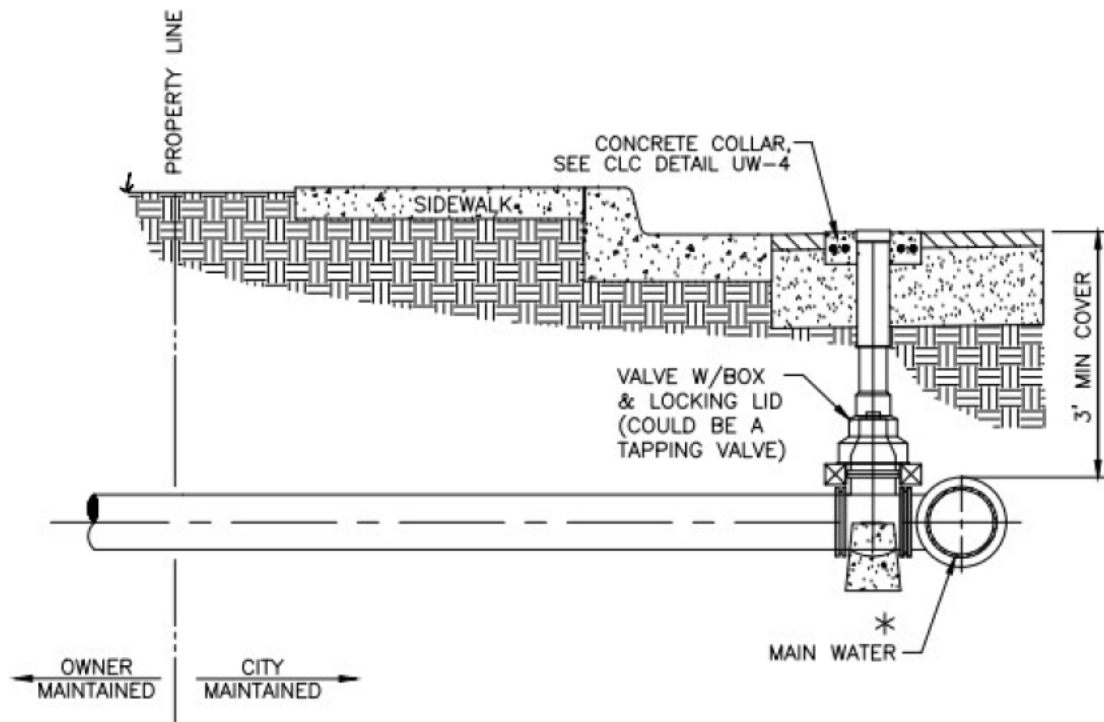
DETAIL N.T.S.





W17 - FIRE LINE DETAIL

N.T.S.



*CRRUA WILL BE RESPONSIBLE TO THE PROPERTY LINE AND THE
OWNER WILL BE RESPONSIBLE FOR MAINTENANCE FROM THE
PROPERTY LINE TO THE BUILDING



W18 - CONCRETE BLOCKING DETAIL

N.T.S.

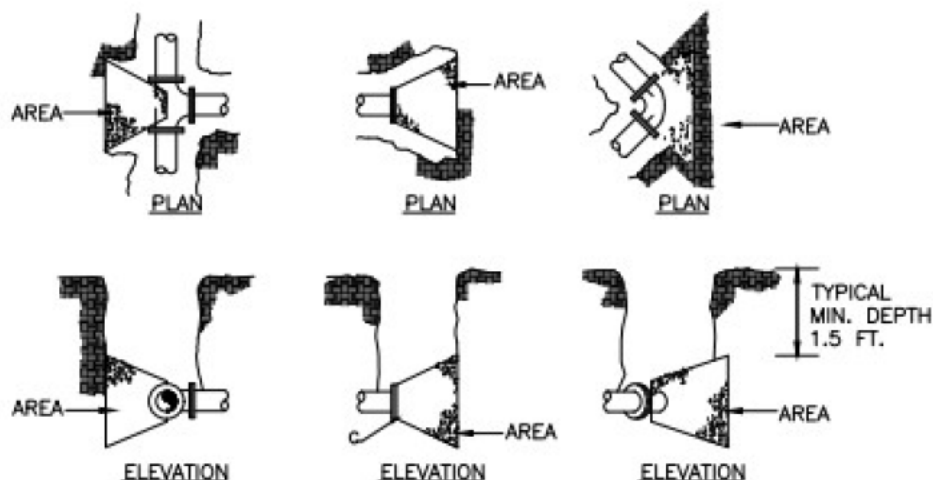


TABLE I

MINIMUM BEARING SURFACE AREA (IN SQUARE FEET)					
PIPE SIZE	BENDS				TEE OR DEAD END
	11 ¹ / ₄	22 ¹ / ₂	45	90	
4"	1	1	1	2	1.5
6"	1	1.5	2.5	4.5	3.5
8"	1.5	2.5	4.5	8	6
10"	2	3.5	7	12.5	9
12"	2.5	5	10	18	13.0

TABLE II

SOIL TYPE	MAX. ALLOWABLE SOIL BEARING VALUES	FACTOR FOR INCREASING AREAS IN TABLE I
LOOSE SAND	500 PSF	4
SOFT SANDY CLAY	1000 PSF	2
ADOBE	1000 PSF	2
COMPACT FINE SAND	2000 PSF	1
COMPACT COARSE SAND	2000 PSF	1
MEDIUM STIFF CLAY	2000 PSF	1

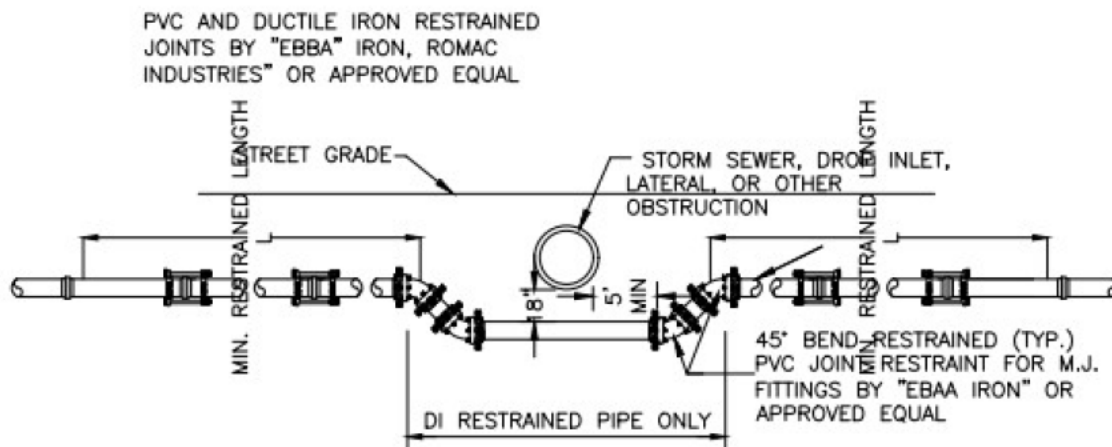
NOTES:

1. BEARING VALUES SHOWN IN TABLE I ARE BASED ON 150 P.S.I. TEST PRESSURE, AT 1.5 TO 1 SAFETY FACTOR AND 2000 P.S.F. SOIL BEARING VALUE.
2. THE DESIGN ENGINEER SHALL DETERMINE THE SAFE BEARING VALUES FOR EACH PROJECT AND THE FACTORS AS SHOWN IN TABLE II FOR INCREASING AREAS IN TABLE I SHALL BE UTILIZED BY THE CONTRACTOR WHERE APPLICABLE.
3. BEARING SURFACE AREAS ARE TO BE ON UNDISTURBED SOIL.
4. UTILITY SYSTEM PIPING THRUST IS TO BE RESTRAINED BY THE USE OF RESTRAINED JOINT FITTINGS



W19 - WATER LINE LOWERING DETAIL

N.T.S.



RESTRAINED LENGTH (L) IN FEET

PIPE SIZE	D.I.	PVC
4"	12'	22'
6"	17'	30'
8"	22'	40'
10"	26'	48'
12"	30'	56'

LENGTHS BASED ON: EBAA IRON
RESTRAINT DESIGN SOFTWARE

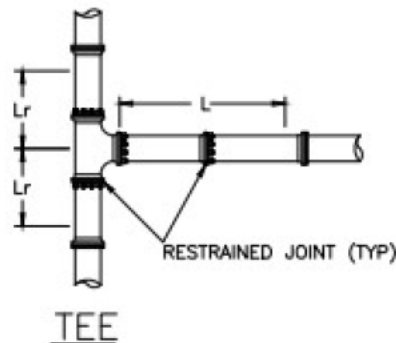
NOTES:

1. THIS TABLE OF RESTRAINED LENGTHS IS PROVIDED BASED ON ML (UNIFIED CLASSIFICATION) SOIL TYPES. THESE LENGTHS MAY ALSO BE USED FOR GP, GM, SM, SP, AND CL SOIL TYPES. THE USE OF OTHER RESTRAINED LENGTHS BASED ON OTHER SOIL CONDITIONS OR OTHER DESIGN PARAMETERS OR PIPE SIZES LARGER THAN 12 INCH SHALL BE DESIGNED AND SUBMITTED FOR APPROVAL.
2. RESTRAINT LENGTH CALCULATION BASED ON COMPACTED TYPE 4 TRENCH WITH 3' OF COVER. A TEST PRESSURE OF 150 PSI & A 1.5 TO 1 SAFETY FACTOR
3. POLYETHYLENE WRAPPED D.I. PIPE WILL REQUIRE SEPARATE CALCULATIONS



W20 - RESTRAINED TEE DETAIL

N.T.S.



NOTES:

1. RESTRAINED LENGTH CALCULATION BASED ON COMPACTED TYPE 4 TRENCH WITH 3' OF COVER. A TEST PRESSURE OF 150 PSI & A 1.5 TO 1 SAFETY FACTOR.
2. THIS TABLE OF RESTRAINED LENGTHS IS PROVIDED BASED ON ML (UNIFIED CLASSIFICATION) SOIL TYPES. THESE LENGTHS MAY ALSO BE USED FOR GP, GM, SP, AND CL SOIL TYPES. THE USE OF OTHER RESTRAINED LENGTHS BASED ON OTHER SOIL CONDITIONS OR OTHER DESIGN PARAMETERS OR PIPE SIZES LARGER THAN 12 INCH SHALL BE DESIGNED AND SUBMITTED FOR APPROVAL.
3. POLYETHYLENE WRAPPED D.I. PIPE WILL REQUIRE SEPARATE CALCULATIONS.
4. TEE FITTINGS REQUIRE THE RESTRAINT OF ALL JOINTS WITHIN A CALCULATED LENGTH ALONG THE BRANCH PIPE. THE RESTRAINED DESIGN ALSO REQUIRES THE SELECTION OF A LENGTH OF PIPE ALONG THE RUN (Lr) TO BE FREE OF JOINTS.

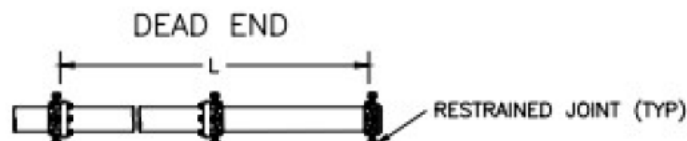
PIPE SIZE	LR= 5' MIN.		LR= 10' MIN.	
	D.I.	L(PVC)	D.I.	L(PVC)
12"x4"	1'	1'	1'	1'
12"x6"	6'	10'	1'	1'
12"x8"	27'	48'	1'	2'
12"x10"	42'	74'	21'	38'
12"x12"	56'	100'	39'	69'
10"x4"	1'	1'	1'	1'
10"x6"	12'	21'	1'	1'
10"x8"	32'	56'	10'	18'
10"x10"	45'	80'	28'	50'
8"x4"	1'	1'	1'	1'
8"x6"	18'	32'	1'	1'
8"x8"	36'	64'	19'	34'
6"x4"	4'	7'	1'	1'
6"x6"	23'	41'	7'	12'
4"x4"	12'	21'	1'	1'

LENGTHS BASED ON: EBAA IRON RESTRAINT DESIGN SOFTWARE



W21 - RESTRAINED DEAD END AND REDUCER DETAIL

N.T.S.



DEAD END REQUIRE RESTRAINT OF ALL JOINT WITHIN THE CALCULATION LENGTH (L) EXTENDING FROM CAP

DEAD END RESTRAINED LENGTH (L) IN FEET

PIPE SIZE	D.I.	PVC
4"	28'	52'
6"	40'	74'
8"	52'	96'
10"	62'	115'
12"	73'	136'

NOTES:

1. RESTRAINT LENGTH CALCULATION BASED ON COMPACTED TYPE 4 TRENCH WITH 3' OF COVER. A TEST PRESSURE OF 150 PSI & A 1.5 TO 1 SAFETY FACTOR.
2. THIS TABLE OF RESTRAINED LENGTHS IS PROVIDED BASED ON ML (UNIFIED CLASSIFICATION) SOIL TYPES. THESE LENGTHS MAY ALSO BE USED FOR GP, GM, SP, AND CL SOIL TYPES. THE USE OF OTHER RESTRAINED LENGTHS BASED ON OTHER SOIL CONDITIONS OR OTHER DESIGN PARAMETERS OF PIPE SIZES LARGER THAN 12 INCH SHALL BE DESIGNED AND SUBMITTED FOR APPROVAL. POLYETHYLENE WRAPPED D.I. PIPE WILL REQUIRE SEPARATE CALCULATIONS.

REDUCER



REDUCERS REQUIRE RESTRAINT OF ALL JOINT WITHIN THE CALCULATION LENGTH (L) EXTENDING FROM THE FITTING ON THE SIDE OF THE LARGER PIPE, RESTRAINING THE SMALL SIDE OF THE FITTING IS OPTIONAL

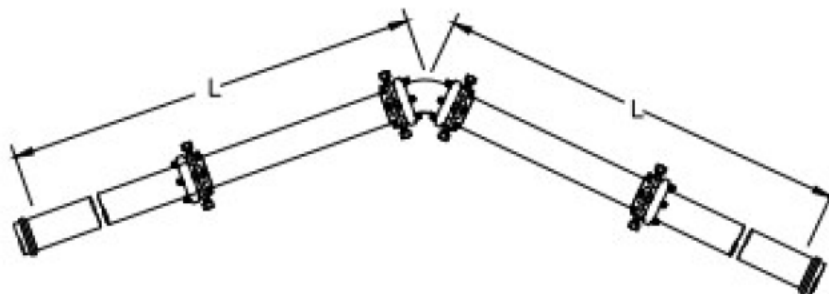
REDUCER RESTRAINED LENGTH (L) IN FEET

PIPE SIZE	D.I.	PVC
12"x4"	64'	118'
12"x6"	53'	99'
12"x8"	39'	72'
12"x10"	36'	67'
10"x4"	51'	94'
10"x6"	38'	71'
10"x8"	21'	39'
8"x4"	38'	69'
8"x6"	22'	40'
6"x4"	21'	38'

LENGTHS BASED ON: EBAA IRON RESTRAINT DESIGN SOFTWARE



W22 - RESTRAINED HORIZONTAL BEND DETAIL N.T.S.



RESTRAINED LENGTH (FT) FOR DUCTILE IRON PIPE

PIPE SIZE	11 1/2°BEND	22 1/2°BEND	45°BEND	90°BEND
4"	1	3	6	14
6"	2	4	8	19
8"	2	5	10	25
10"	3	6	12	29
12"	3	7	14	34

RESTRAINED LENGTH (FT) FOR P.V.C. PIPE

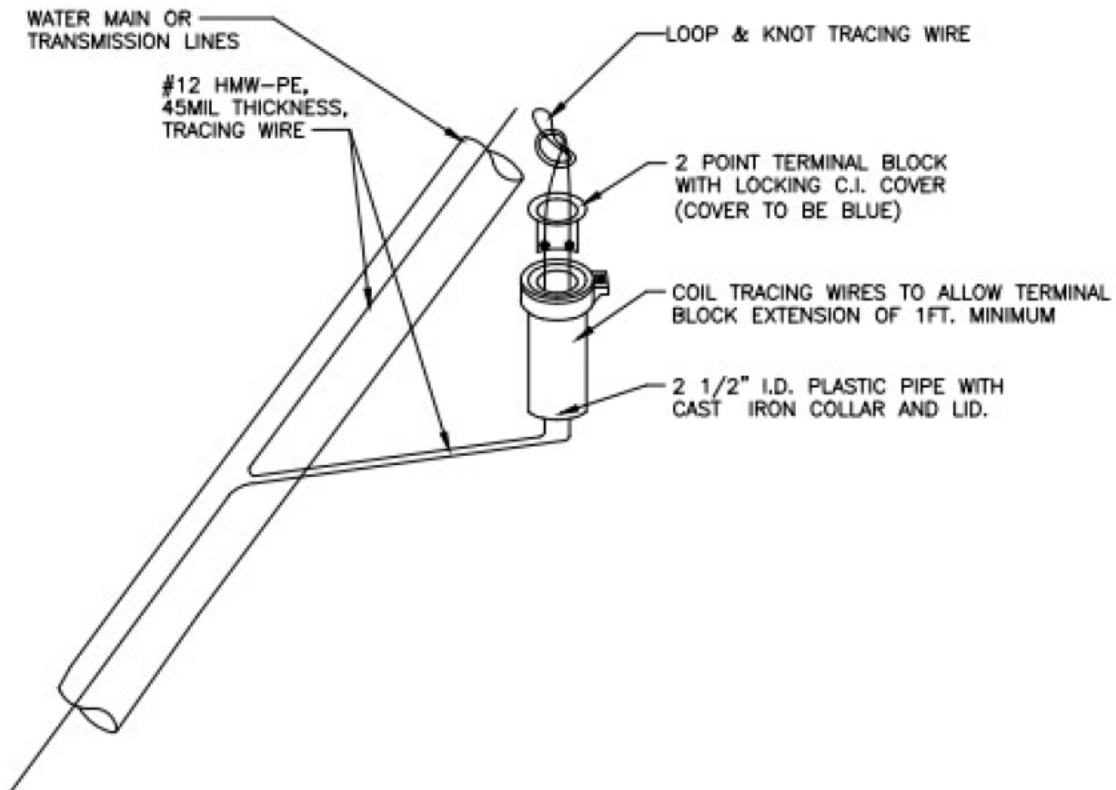
PIPE SIZE	11 1/2°BEND	22 1/2°BEND	45°BEND	90°BEND
4"	2	3	7	17
6"	2	5	10	24
8"	3	6	13	31
10"	4	7	15	37
12"	4	9	18	44

NOTES:

1. THIS TABLE OF RESTRAINED LENGTHS IS PROVIDED BASED ON ML (UNIFIED CLASSIFICATION) SOIL TYPES. THESE LENGTHS MAY ALSO BE USED FOR GP, GM, SM, SP, AND CL SOIL TYPES. THE USE OF OTHER RESTRAINED LENGTHS BASED ON OTHER SOIL CONDITIONS OR OTHER DESIGN PARAMETERS OR PIPE SIZES LARGER THAN 12 INCH SHALL BE DESIGNED AND SUBMITTED FOR APPROVAL.
2. RESTRAINED LENGTH CALCULATION BASED ON COMPACTED TYPE 4 TRENCH WITH 3' OF COVER A TEST PRESSURE OF 150 PSI & A 1.5 TO 1 SAFETY FACTOR.
3. POLYETHYLENE WRAPPED D.I. PIPE WILL REQUIRE SEPARATE CALCULATIONS.
4. LENGTH BASED ON EBAA IRON RESTRAINT SOFTWARE.



W23 - TRACING WIRE TEST BOX DETAIL N.T.S.

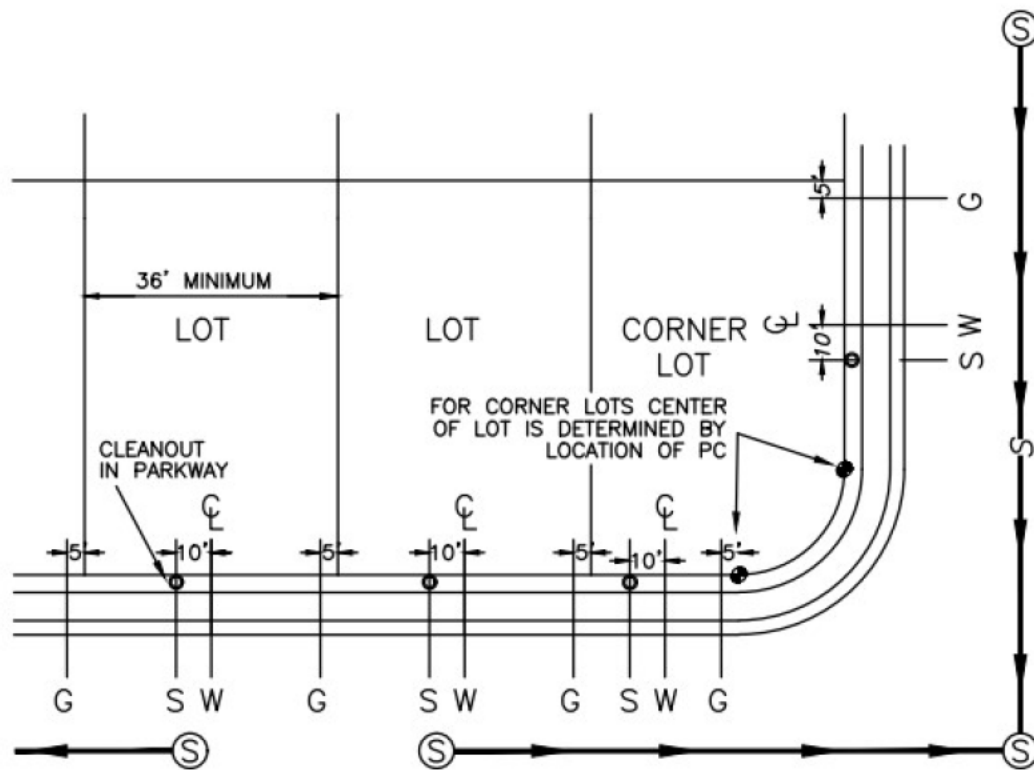


NOTES:

1. TEST BOXES, CONNECTED INTO TRACING WIRE SYSTEM, SHALL BE REQUIRED WHERE HYDRANTS ARE NOT USED OR WHERE HYDRANT SPACING EXCEEDS 500 FEET.
2. SPACING AND LOCATION OF TEST BOXES TO BE DETERMINED BY THE UTILITIES DIVISION. TEST BOX LOCATION MAY VARY, UP TO 50 FT. FROM WATER MAIN LINE.
3. REFER TO STANDARDS AND MATERIALS LISTS FOR MATERIALS.
4. TRACING WIRE SHALL EXTEND A MINIMUM OF 12" ABOVE TEST STATION.
5. 24" OCTAGON CONCRETE COLLAR TO BE INSTALLED.



G1 - STANDARD UTILITY SERVICE LOCATION DETAIL N.T.S.



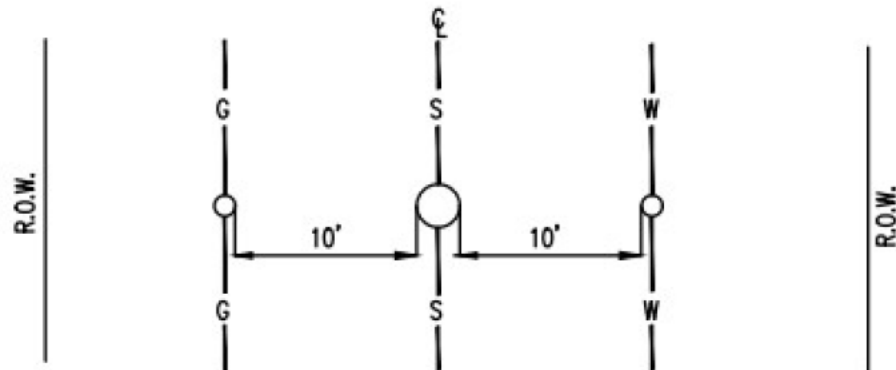
NOTES:

1. THE WATER LINE WILL ENTER AT THE CENTER OF THE LOT FRONTAGE THE SEWER LINE WILL ENTER 10' TO THE LEFT OF THE WATER ENTRY GAS WILL ENTER 5' LEFT OF RIGHT LOT LINE, AS VIEWED FROM THE STREET.
2. FOR CORNER LOTS UTILIZE STANDARD LOCATIONS AS NEEDED. FOR NONSTANDARD LOT ENTRY LOCATIONS, SEE 802.2.
3. ANY DEVIATION TO THE UTILITY SERVICE LOCATION NEEDS PRIOR APPROVAL BY OPERATIONS ENGINEER WITH A VARIANCE REQUEST.



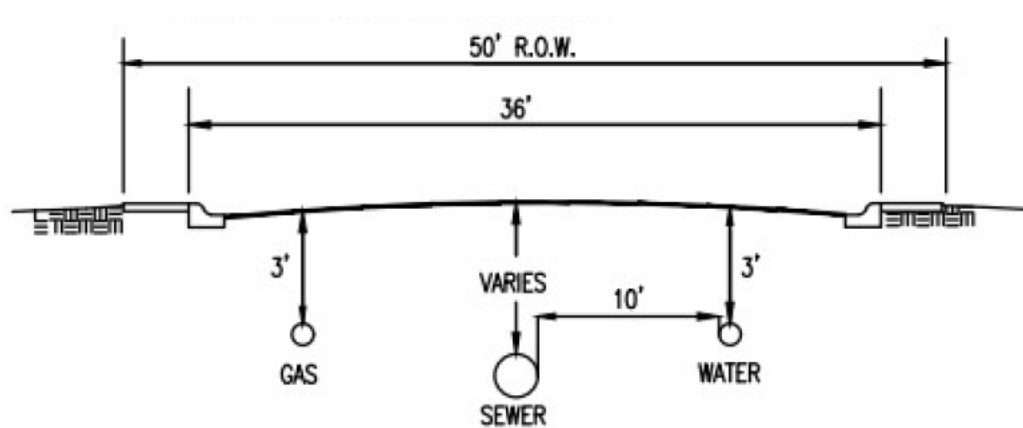
G2 - NEW CONSTRUCTION TYPICAL UTILITY MAIN LOCATIONS

N.T.S.



GAS MAIN ON SOUTH OR WEST SIDE OF STREET

WATER MAIN ON NORTH OR EAST SIDE OF STREET



10' DIMENSION FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE