CITY OF ARTESIA
EDDY COUNTY
NEW MEXICO

ARTESIA BULLDOGS

DESIGN AND CONSTRUCTION STANDARDS FOR INFRASTRUCTURE

CITY OF ARTESIA NEW MEXICO EST. 1905

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FOR INFRASTRUCTURE

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SECTION 1. INTRODUCTION

The policies and standards herein contained are to be adopted by the City of Artesia under a City ordinance. The Standard Specifications for Highway and Bridge Construction, **most current edition** as published by the New Mexico Department of Transportation and the New Mexico Standard Specifications for Public Works Construction, most current edition (hereinafter referred to as Standard Specifications), the City of Artesia Comprehensive Plan, Subdivision Regulations and the Water Master Plan, Sewer Master Plan, Drainage Master Plan, and Transportation Master Plan shall also be incorporated with these standards by reference, with the express exception of the terms, provisions, and sections indicated below. The city adopted fire code also has specific requirements addressing the following: minimum fire flow requirements, hydrant installation specifications, the number of fire hydrants needed for specific development and/or project, minimum clearances around fire hydrants, fire department access road (which include both public and private drives), road widths, turning radii, vertical clearances above fire department access roads, cul-de-sacs, dead end drives, fences/gates, fire lane designation and signage, multi-family and single family residential developments. Although nothing in this document conflicts with the adopted City fire code, contractors and developers should review and become familiar with the city adopted fire code during planning and construction phases of projects within the City of Artesia. Any revisions or updates to these references shall be included as references. When applicable, the technical provisions herein contained shall take precedence over all other specifications to which reference has been made. Standard "Details of Construction" are also provided. However, unique and differing situations will exist. The Design Engineer/Developer may submit different details for review and approval by the City of Artesia.

SECTION 2. DEFINITIONS

For the purposes of the following sections, the following definitions shall apply unless otherwise stated:

AASHTO. American Association of State Highway and Transportation Officials.

Alley. A public right-of-way primarily designed to serve as secondary access to the side or rear of those properties whose principal frontage is on some other street. Alleys are also designed to serve as locations for public utilities (see also "right-of-way")

AWWA. American Water Works Association.

City. City of Artesia. Also individual designated at the discretion of the Mayor or Director of Infrastructure, having the capability, authority, and responsibility for making final decisions that relate to the design and construction of City infrastructure, such as streets, alleys, and utilities.

Bond. Any form of a surety bond in an amount and form satisfactory to the City. All bonds shall be approved by the City Infrastructure Director whenever a bond is required by these regulations (i.e. Assurance Agreement).

Building Inspector. City employee(s) responsible for issuing, granting, and revoking permits

relating to building and infrastructure construction in the City Limits.

Comprehensive Plan. A comprehensive plan for development of the City prepared and adopted by the Planning & Zoning Commission, and the City Council, pursuant to State law, presenting the general plan for land use, transportation, and community facilities and including any part of such plan separately adopted and any amendment to such plan, or parts thereof.

Construction Plan Drawings. The drawings, as prepared by a registered engineer, accompanying a major subdivision plat and showing the specific location and design of improvements to be installed in the subdivision in accordance with the requirements of this Ordinance and other ordinances.

Construction Plans. The drawings, as prepared by a registered engineer in New Mexico, which show the specific location and design of improvements to be installed in the subdivision in accordance with the Public Works Standard Specifications.

Contractor. Person or company licensed in the state of New Mexico to construct or build buildings, utilities, streets,

Controlled Access Highway. A roadway where direct access to the abutting property is prohibited and where access is gained only at designated arterials or collectors intersecting the roadway.

Cul-de-sac. A local street with only one outlet that terminates in a vehicular turnaround.

Curb. A concrete strip adjacent to the edge of a street or parking lot.

Design Engineer. A registered engineer in New Mexico, or his representative, in direct responsible charge of the work to be performed as shown on the construction plans.

Detention Pond. A pond or drainage facility designed to temporarily hold, store, or otherwise detain storm flows with the intent of releasing the storm flows at a controlled rate.

Easement. The right, liberty, advantage or privilege that the City has in the land of another property owner, either expressed or described, with authorization given by the property owner to the City, to use the owner's property for a specified purpose(s). Purpose(s) may include, but are not limited to utility (underground, above ground, and overhead), access, drainage, signage, storage, etc., as defined on a plat of survey or easement deed. No City easement shall be encroached upon, crossed over, under, or through from any property owner, other than by the City for construction, installation or placement of any structure(s), or other improvement(s), either permanent or temporary.

Floodplain. Any land subject to a one (l) percent or greater chance of flooding in any given year as indicated on the most recent maps published by the City of Artesia and the Federal Emergency Management Agency (FEMA). This area is typically called the 100 year flood plain.

Fire Code Official. The fire chief or other designated authority charged with the administration and enforcement of the City Fire Code.

Frontage Road. A roadway constructed parallel to and alongside an arterial or collector street and whose function is to provide access only to those lots abutting the roadway.

Grade. The slope of a road, street, alley, utility, facility, specified in percentage terms.

Infrastructure Director. City employee, or approved designee, responsible for the oversight and supervision of design, construction, installation, modifications, and maintenance of City infrastructure, including, but not limited to streets, alleys, water and sanitary sewer facilities, drainage, solid waste, and parks.

Owner. Any person, group of persons, firm or firms, corporation or corporations, or any other legal entity having legal title to or sufficient proprietary interest in the land sought to be subdivided under these regulations.

Monument. A permanent, physical item used as a survey control point.

Peak Flow. The highest two-hour flow expected under any operational conditions, including times of high rainfall (generally the two-year 24-hour storm is assumed)

Plat. A map, chart, drawing, or survey on which a subdivider's plan is presented and which he submits for approval and intends in final form to record; containing a description of the subdivided land with ties to permanent monuments; and is certified by a licensed, registered land surveyor.

PMBP. Plant Mixed Bituminous Pavement.

Project Manager. A registered engineer, or his representative, in direct responsible charge of the work to be performed.

Private Sanitary Sewer. A closed pipe conveying sanitary sewer flows, which is constructed and maintained by a private property owner, entity, or individual.

Professional Engineer. An engineer properly licensed and registered in the State of New Mexico.

Professional Surveyor. A land surveyor properly licensed and registered in the State of New Mexico.

Public Sanitary Sewer. A closed pipe conveying sanitary sewer flows, which is located in a public right of way or dedicated public easement. A public sanitary sewer system is intended to serve more than one property owner.

Public Storm Sewer. A closed pipe conveying stormwater flows, which is located in a public right of way or dedicated public easement. A public storm sewer system is intended to serve more than one property owner.

Resident Project Inspector. A trained and experienced individual capable of performing

construction observation for all public works projects in accordance with the City's Public Works Standard Specifications. This individual shall be authorized by the City, which may consist of City personnel or an approved independent consultant.

Retention Pond. A pond or drainage facility designed to permanently hold, store, or otherwise retain storm flows without the intent of releasing the storm flows.

Right-of-Way. A strip of land opened, reserved, or dedicated for a street, walk, utility, drainage, alley or other public purpose dedicated to the City as defined on a plat of survey or deed. No City Right-of-Way shall be encroached upon, over, under, or through from any property owner, other than the City, by the construction, installation, or placement of any structure(s), or other improvement(s), either permanent or temporary.

Road. (See Street)

Sanitary Sewer Force Main. A pressure rated pipe that conveys public sanitary sewer from a pump station to a point of discharge.

Sanitary Sewer Interceptor Line. A public sanitary sewer system that captures sanitary sewer flows from sanitary sewer trunk lines and conveys sanitary sewer flows to the wastewater treatment plant.

Sanitary Sewer Lateral Line. A public sanitary sewer system placed within and along a street, alley, or easement, which only receives flow from the abutting properties or lots, such as a residential subdivision or retail center and conveys flows to trunk lines.

Sanitary Sewer Service Line. A closed pipe which branches off a public sanitary sewer system and extends to the limits of the right of way to serve one single-family house or small tract of land. If the service line is designed to serve more than one single-family house, a lateral sewer line shall be installed.

Sanitary Sewer Trunk Line. A public sanitary sewer system known as the main "artery" which is placed within and along a street, alley, or easement, which receives sanitary sewer flows from lateral lines and conveys to an interceptor line.

Sidewalk. Pathway to carry pedestrian traffic, Sidewalk and driveway installation and replacement shall be the responsibility of the adjacent property owner.

Standard Specifications. The standard specifications for construction shall be New Mexico Standard Specification for Public Works Construction (NMSSPWC) latest edition or The Standard Specifications for Highway and Bridge Construction, most current edition as published by the New Mexico Department of Transportation (NMDOT) except as shown herein.

Street. *A* general term used to describe a paved right-of-way, municipally or privately owned, which affords a principal means of vehicular access to abutting properties.

Service Road. (See Frontage Road)

Storm Sewer Interceptor Line. A public storm sewer system placed within and along a street, alley, or easement, which only receives flow from the abutting drop inlets and conveys flows to trunk lines

Storm Sewer Lateral Line. A closed pipe which branches off an interceptor line to one or more drop inlets.

Storm Sewer Trunk Line. A public storm sewer system known as the main "artery" which is placed within and along a street, alley, or easement, which receives storm sewer flows from lateral lines and conveys to storm drain channel.

Street. A general term used to describe a paved right-of-way, municipally or privately owned, which affords a principal means of vehicular access to abutting properties.

Street, classification. Each existing street, highway, road, and right-of-way in the City, and those located on approved and filed plats, have been designated on the City of Artesia Transportation Master Plan and classified therein, for the purpose of providing for the development of the streets, highways, roads, and rights-of-way, and their future improvements, reconstruction, realignment, and necessary widening, including provision for curbs and sidewalks. The classification of each street, highway, road, and right-of-way is based upon its location in the respective zoning districts of the City, its present land use, its estimated future traffic volume, and its relative importance and function as specified in the City of Artesia Transportation Master Plan. The required improvements shall be measured as set forth for each street classification.

Street, collector. A street designed to carry moderate volumes of traffic from local streets to arterial streets or from arterial to arterial as designated on the Functional Street Classification Map in the City's Comprehensive Plan.

Street, local. A street of limited continuity designed to carry low volumes of traffic used primarily for access to abutting properties and the local needs of a neighborhood.

Street, loop. A local street that has only two (2) intersections with a single adjacent street.

Street, major arterial. A street designed to carry large volumes of traffic, has minimal direct land access, and provides for efficient movement for regional traffic in and around the City as designated on the Transportation Circulation Map in the City of Artesia Comprehensive Plan

Street, minor arterial. A limited access road intended to move traffic to and from major arterials, central business districts, regional shopping centers, colleges and/or universities, military installations, major industrial areas, and similar traffic generators; and/or a route for traffic between communities or large areas which carries high volumes of traffic in and around the City as designated on the Transportation Circulation Map in the City of Artesia Comprehensive Plan. Access to minor arterials shall be limited to intersecting local and collector streets and to commercial driveways approved by the City Infrastructure Director.

Street, perimeter. Any existing street which abuts a parcel of land to be subdivided on only one (1) side.

Superpave (SP-I, SP-II and SP- III) Term used to designate hot mix asphalt (HMA) as described in the current NMDOT standards depending on the size of the course aggregate in the mix.

Subdivision. Any land, vacant or improved, which is divided or proposed to be divided into two (2) or more lots, parcels, sites, units, plots, or interests for the purpose of offer, sale, lease, or development, whether immediate or future, either on the installment plan or upon any and all other plans, terms, and conditions. Subdivision includes the division, including resubdivision, or development of residential and non-residential zoned land, whether by deed, metes and bound description, lease, map, plat or other recorded instrument.

Water Lateral Line. A public water system placed within and along a street, alley, or easement, which provides water for the abutting properties or lots, such as a residential subdivision or retail center.

Water Service Line. A closed pipe which branches off a public water system and extends to the limits of the right of way to serve one single-family house or small tract of land. If the service line is designed to serve more than one single-family house, a lateral water line shall be installed.

Water Transmission Line. A public water system, typically of larger diameters, that conveys water from storage tanks to the water system or connects separate water systems.

Modifications to NMDOT Specifications. The Section Numbers are referencing the 2014 Edition of the Specifications. Section Numbers may change with modifications or new publications from the NMDOT.

The following terms, provisions, and sections of Section 101 of the Standard Specifications are modified for these policies and specifications.

101. ABBREVIATION, DEFINITIONS AND TERMS

Sub 101.2 ABBREVIATIONS

Add the following:

City *City of Artesia*

NMDOTNew Mexico Department of Transportation

NMSSPWC *New Mexico Standard Specifications for Public Works Construction*

Sub 101.4 TERMS AND DEFINITIONS

Modify as follows:

Department shall mean the City of Artesia except where such reference is to rules, code, regulations or prequalification of bidders for the New Mexico Department of Transportation.

Cabinet Secretary shall be City Infrastructure Director or his representative.

District Engineer shall mean City Infrastructure Director or his representative.

District Construction Engineer shall mean City Infrastructure Director or his representative.

SECTION 3. GENERAL REQUIREMENTS FOR PUBLIC WORKS

A. Engineering Services - The design of all Public Works projects located within public rights-of-way or dedicated public easements shall be performed under the direct supervision of a Professional Engineer registered in the State of New Mexico. The Professional Engineer shall provide all the engineering information required for such work as stipulated in the sections herein contained. In cases where additional data is required, it shall be provided as requested by the City Infrastructure Director.

B. Construction Services - The construction of all Public Works projects located within public rights-of-way or dedicated public easements shall only be performed by Contractors who are licensed by the State of New Mexico. Contractors shall comply with all specifications regarding the type of work undertaken as contained herein. All construction work shall require the final inspection and approval of the Project Manager and/or City Infrastructure Director before final acceptance is given. All significant changes of design or construction must be noted and approved by the City Infrastructure Director.

C. Construction Inspection Services - Individuals retained to perform construction inspection services for projects within public rights-of-way or dedicated public easements shall comply with the City of Artesia Public Works Specifications. All construction work shall require the final inspection and approval of the Director of Infrastructure and Design Engineer prior to final acceptance. Those items that fall under the city fire code shall be inspected and approved by the fire code official. These include but are not limited to: fire hydrants, road widths, turn radii, street signage, fire lanes, overhead obstructions and fences/gates.

D. Testing Services - Quality control testing shall be performed on all construction operations within public rights-of-way or dedicated public easements. Testing services shall be performed only by City personnel or by certified technicians from an approved independent testing laboratory. Contractors shall be responsible for complying with all testing requirements set forth in these specifications.

E. Pre-Construction Conference - A pre-construction conference shall be held prior to beginning any construction within public rights-of-way or dedicated public easements. Mandatory attendance will be required by the Contractor, Owner, Design Engineer, and authorized City representative. Prior to the pre-construction conference, the Contractor will be responsible for submitting all necessary documents associated with the project requiring review and approval by the Design Engineer, such as Construction Schedule,

Traffic Control Plans and Trench Safety Plans.

F. "Record Drawings" - The Contractor shall maintain one accurate set of "Record Drawings" for all work performed in public rights-of-way (streets, alleys, utilities, etc.) or dedicated public easements. The Contractor shall record all field changes relative to location, depth, size, type of material, or any other pertinent data that differ from the approved construction drawings. These plans shall be kept current within two (2) weeks of ongoing construction, which will be subject to review by the Design Engineer or Project Inspector throughout the project for accuracy and completeness. The Contractor shall provide to the City and Design Engineer one reproducible copy of the "Record Drawings" prior to final acceptance of the project, accompanied by an electronic copy in a format approved by the City. GPS coordinates shall be taken on all pipes before it is covered for the City's GIS system and shown on the record drawings by City. AGIS coordinate points will be shown on the record drawings by the designer.

G. Inspection of Work – Prior to final acceptance, a preliminary inspection of the project shall be performed by the City, Contractor, and Design Engineer. A preliminary punch list should be prepared by the Design Engineer listing all deficiencies related to workmanship or the City's standard public works specifications. Once the Contractor has addressed all items on the preliminary punch list, a final walk-thru will be scheduled with the City, Contractor, and Design Engineer for final inspection of the project. Upon completion of the final walk-thru by all parties, the Contractor will be required to submit all of the items listed on the "Final Acceptance Checklist" prior to issuance of a "Certificate of Final Acceptance."

H. Final Acceptance - A letter signed by the Contractor must be submitted to the Design Engineer certifying completion of all construction performed within public rights-of-way or dedicated public easements. The letter must be accompanied by all items listed on the "Final Acceptance Checklist" and any other information requested by the Design Engineer, which signifies that the work was completed in accordance with the City's standard public works specifications. Upon final review and approval by the Design Engineer, the Director of Infrastructure will issue a "Certificate of Final Acceptance" accepting the public improvements and dedications.

I. FINAL APPROVAL OF DEVELOPMENTS WILL BE THROUGH THE INFRASTRUCTURE DEPARTMENT

J. Inspection of Work - All work performed in public rights-of-way is subject to various and appropriate inspections. At any time, the City Infrastructure Director may require that lab tests and lab reports related to the type of work being done be submitted for review. The City, as owner, reserves the right to reject any and all work that is deficient in regards to these Standard Specifications. The City also reserves the right to conduct, at any time, lab or field tests related to the type of work being inspected. The City (Infrastructure Director and Fire Code Official) reserve the right to make final inspections necessary to determine whether or not a project is to be accepted.

K. Relocation and Protection of Utilities - The Contractor may not interfere with any existing utility without written consent from the owner of the utility. Any relocation of

an existing utility deemed necessary by the Design Engineer is to be done by the utility owner. No utility owned by the City may be moved to accommodate the Contractor, except at his expense and with approval from the Director of Infrastructure. The cost of moving privately owned facilities will also be at the expense of the Contractor, unless otherwise agreed. The Contractor must do everything necessary to support, sustain, and protect all utilities under, over, along, or across said work. In the event said facilities are damaged, the utility owner must be notified immediately. The Contractor is responsible for requesting utility locates a minimum of 48 hours in advance of any work in or near the area of the proposed work.

L. Routing of Traffic - The Contractor must take appropriate measures to maintain traffic conditions during the performance of all work with minimal inconvenience to the general public (both vehicular and pedestrian) and property owners abutting the improvements. A traffic control plan, following the Manual on Uniform Traffic Control Devices (MUTCD), latest edition, will be submitted to the City for approval, prior to beginning any construction.

M. Road Closures - A permit will be required from the Planning Department where partial or complete road closures are necessary no later than 48 hours prior to the closure. Public notice of such closures shall be made in local newspapers or radio stations no later than 48 hours in advance of the closure. If possible, private property owners and business owners shall be notified in writing, in person, door hangers, or by flyers placed in mailboxes. Artesia public safety agencies will be notified directly of road closures. The following information shall be relayed to the Police and Fire Department: date and time when the road will be closed, estimated time the road will be closed, which properties and fire hydrants will be affected, and a brief summary of the extended work. The same public agencies will be notified when the road is re-opened.

N. Protection of Adjoining Property - The Contractor must at all times, at his own expense, preserve and protect from injury any adjoining property by taking suitable measures for this purpose. Where in the protection of such property it is necessary to enter upon private property for the purpose of taking appropriate protective measures, the Contractor must obtain written permission from the owner of such private property. The Contractor must, at its own expense, shore up and protect all buildings, walls, fences, or other property that may be damaged during the progress of any work, and be responsible for all damages to public or private property resulting from failure to properly protect and carry out such work. The Contractor may not remove, even temporarily, any trees or shrubs which exist in any public place without first obtaining the consent of the Director of Infrastructure.

O. Cleanup – The Contractor must thoroughly clean up all rubbish, excess earth, rock, and any other debris resulting from any work activities performed in public rights-of-way or dedicated public easements. All cleanup operations at the location of such work are to be accomplished at the expense of the Contractor.

P. Prompt Completion of Work - After any work is commenced, the Contractor must promptly complete all approved work and restore public facilities to the same or better condition, so as not to obstruct the general public.

Q. Noise, Dust, and Debris – The Contractor must perform all work in such manner as to reduce to the fullest extent possible any inconvenience and annoyance to the public and occupants of the neighboring properties by minimizing noise, dust, and debris.

R. The Contractor shall be responsible for implementing and maintaining a Storm Water Prevention Pollution Plan (SWPPP), which follows the rules and regulations set forth by the U.S. Environmental Protection Agency (EPA), requiring permitting under the National Pollutant Discharge Elimination System (NPDES) program. All new construction, regardless of size or location, requires the monitoring and control of stormwater and sediment runoff during construction activities.

S. For any items not referenced in these construction standards, the New Mexico Standard Specifications for Public Works Construction, latest edition, or The Standard Specifications for Highway and Bridge Construction, most current edition as published by the New Mexico Department of Transportation, shall apply except as modified herein. Where applicable, the technical provisions herein contained shall take precedence over all other specifications to which reference has been made. Standard "Details of Construction" are provided. However, unique and differing situations will exist. The Engineer/Developer may submit different details for approval by the City of Artesia.

T. Clearance of vital structures – All work must be performed and conducted so as not to interfere with access to fire hydrants, fire stations, means of egress, and all other vital structures or equipment.

U. Protection of Traffic - The applicant must maintain a safe crossing of two lanes of vehicle traffic at all street intersections, where possible, and safe crossings for pedestrians at intervals of not more than 300 feet. If any work is across any public street, alley or sidewalk, at least one safe crossing must be maintained when possible for vehicles and pedestrians. If the street is not wide enough to hold the excess materials without using part of the adjacent sidewalk, a passageway of the sidewalk width must be maintained along such sidewalk line.

V. Protection of Water Courses - In all cases the applicant must keep all gutters free and unobstructed for the full depth, or maintain an adequate substitute for conveying runoff.

W. Urgent Work - If, in his judgment, traffic conditions or safety of the traveling public, or the public interest, require that any work be performed speedily, the City Infrastructure Director or may, at the time the permit is granted and as a condition of the permit, order that a crew of men and adequate facilities be employed by the applicant 24 hours a day for the purpose of completing such work as soon as possible.

X. Preservation of Monuments - Any monument set for the purpose of locating or preserving the lines of any street, property, subdivisions, precise survey reference point, or a permanent survey bench mark within the City may not be removed or disturbed, or caused to be removed or disturbed, without first obtaining permission in writing from the City Infrastructure Director or Building Inspector. Permission to remove or disturb

such monuments, reference points, or bench marks will be granted only upon condition that the person applying for such permission pay all expenses incident to the proper replacement of the monument. Monuments shall be replaced only by a registered land surveyor.

SECTION 4. PERMITS

A. Permits for the work to be undertaken in public rights-of-way shall be issued only when the following has been done:

1. The applicant has filed a formal written application obtained from the office of the City Building Inspector for a permit to perform the work described.

2. The application shall be complete and be accompanied by all pertinent information required for the work to be performed. The application must be signed by the person requesting the permit.

3. The City will, prior to the issuance of a permit, require a good and sufficient bond, payable to the City as obligee, in the amount equal to 100% of the estimated material to be furnished and of the labor to be performed on the proposed work, together with an amount equal to one hundred percent (100%) of the estimated value of the proposed work, shall be provided as performance bond to insure completion of the proposed work within a reasonable time.

4. The labor and materials bond shall remain in effect for a period of one year from the date of completion of the work, or for a period of one year from the cessation of work, complete or not.

5. All other provisions of the City of Artesia regarding permits shall be applicable to these policies and specifications.

6. Work crossing State or Federal highways requires permits from the New Mexico Department of Transportation.

7. Work crossing railroads requires permits from the applicable railway company.

B. Permits must be obtained for the following types of work:

1. Street and alley construction, reconstruction or alteration `including excavation, fill, and all concrete and paving work.

2. Utilities construction, reconstruction or alteration including excavation, fill, and backfilling operations.

3. Sidewalk construction where the estimated cost of construction exceeds $400.00 and where sidewalk construction is not included in building permit.

4. Alley reconstruction or alteration.

5. Curb cuts for driveways or any alteration to existing curb and gutter.

6. Digging, ditching (excavation), or boring in any public right-of-way, street, or alley.

7. Monitoring wells.

8. Installation or removal of fire hydrants.

C. Permits are issued for a period of six months. If construction has not commenced within that time period, the applicant shall be required to resubmit the permit for review and approval.

SECTION 5. EXTENSION FEES

G. Extension fees for City sewer and water facilities shall be paid prior to any utility work or building permits being issued. Extension fees for such facilities will be paid by the property owner(s) to the City for extending service by the City. Extension fees will be determined by using the latest version of the RS Means Construction Cost Index. *Sewer and water extension fees may be waived if the developer pays for and properly installs or extends existing sewer and/or water facilities to a development site*.

SECTION 1. GENERAL

1. These specifications will be used in conjunction with the most current edition of the New Mexico Department of Transportation (NMDOT) Standard Specifications for Highway and Bridge Construction, also referred to as NMDOT Standard Specifications, latest edition, and the Mew Mexico Standard Specifications for Public Works Construction (NMSPWC), latest edition. Compliance with Section 1 – General Statement of Policies and Specifications is mandatory.

2. Street Classification and Geometric Design Standards

A. Existing streets are identified and classified on the City of Artesia Transportation Master Plan. Street classifications for new construction within public rights-of-way shall be determined by the City of Artesia. Minimum street rights-of-way widths shall meet the City of Artesia Transportation Master Plan. and/or the City of Artesia Subdivision Regulations.

Minimum street improvement widths (including driving surface and curb and gutter, measured from back-to-back of curb) shall be as shown in Table I.

B. Cul-de-sac Geometric Standards

1. Maximum length of cul-de-sac shall not exceed 600 feet without approval from City Staff, which includes the Fire, Police, Planning, and Infrastructure Departments. Length of the cul-de-sac shall be measured from the back of curb of the perpendicular street to the radius point in the middle of the cul-de-sac. See Section 6 for street lighting.

2. Minimum diameter:
   a. Right-of-way - 100 feet
   b. Pavement (in bulb back-to-back of curb) - 96 feet
   c. Geometry must be approved by the City of Artesia

TABLE I: GEOMETRIC DESIGN STANDARDS

Parameter	Minimum Right of Way Width (Feet)				Minimum Street Width (Feet) (Back-to-back of curb)				Minimum Fillet Radius (Feet) (Back of curb)				Minimum Curve Radii (Feet) (Back of curb)				Minimum Tangent Length Between Curves				Minimum Sight Distance			
Subdivision Type	Local	Collector	Minor Arterial	Major Arterial	Local	Collector	Minor Arterial	Major Arterial	Local	Collector	Minor Arterial	Major Arterial	Local	Collector	Minor Arterial	Major Arterial	Local	Collector	Minor Arterial	Major Arterial	Local	Collector	Minor Arterial	Major Arterial
Commercial	60	80	100	110	40	44	78	90	30	35	40	45	100	100	300	500	150	150	250	350	200	240	275	300
Industrial	60	80	100	110	34	40	78	90	30	35	40	45	100	100	300	500	150	150	250	350	200	240	275	300
Mobile Home	50	60	100	110	34	40	70	82	25	25	30	30	100	100	300	500	150	150	250	350	200	240	275	300
Residential	50	60	100	110	34	40	70	82	20	20	25	30	100	100	300	500	150	150	250	350	200	240	275	300

Minimum Fillet Radii may vary depending on existing right-of-way widths.

Parameters in the table above are minimums. Developer may exceed the minimums or the City may require greater parameters based on the proposed development.

3. Pavement Design Standards

A. Typical sections for street construction in the City of Artesia shall be designed in accordance with the latest edition of the AASHTO "Guide for the Design of Pavement Structures.", or as modified in this section.

B. Laboratory analysis of the subgrade soils underneath the street is first required for pavement design. The rest of the design process can be described as follows:

1. For streets in the City of Artesia, the Pavement Design Parameters shown in Table II have been established for arterial, collector, and local street classifications, respectively. These parameters were used to develop the Structural Numbers (SN) shown in Table III.

2. Laboratory analysis of the subgrade soils at the street location will yield an "R-Value" for the soil. Using this "R-Value" and Table III, a Structural Number (SN) can then be selected for the appropriate classification of street to be designed. A geogrid fabric may be utilized for unstable or low "R-Value" soils. Pavement designs utilizing this method shall be approved by the Infrastructure Director.

3. Trial pavement s can then be analyzed, using the coefficients from Table IV, to meet the minimum SN value required by Table III, as illustrated in the following example:

Pavement Design Example:

Design a Pavement for an arterial street to be constructed in a soil with R-Value of 30:

1. From Table III, for an R-Value of 30, a Structural Number (SN) of 3.20 is required for the typical section.

2. Using the coefficients from Table IV, try the following trial :

4" PMBP (Coeff = 0.50) = 4" x 0.50 = 2.00
8" Untreated Base Course (Coeff = 0.10) = 8" x 0.10 = 0.80
SN = 2.80
< 3.20 (Does not meet specifications.
Try increasing PMBP thickness to 5")

5" PMBP = 5.0" x 0.50 = 2.50
8" Untreated Base Course = 8" x 0.10 = 0.80
SN = 3.30 > 3.20 OK

1. **In no case, however, shall the pavement section be less than 2" PMBP over 6" Base Course.**

2. An engineering report or test results of the soils evaluation and pavement design calculations shall accompany the construction drawings that shall be submitted to the

City for review.

TABLE II: PAVEMENT DESIGN PARAMETERS

Street Type	Traffic Load (ESAL)		Serviceability Index	Regional Factor
	PMBP	Concrete		
Arterial Street	150	120	2.5	1.0
Collector Street	50	40	2.0	1.0
Local Street	10	6	1.5	1.0

TABLE III: STRUCTURAL NUMBER (SN) RELATIVE TO R-VALUE (Plant Mix Bituminous Pavement)

R-Value*	Structural Number		
	Arterial Street	Collector Street	Minor Street
16	3.50	2.80	2.10
18	3.50	2.80	2.10
20	3.45	2.80	2.10
22	3.40	2.75	2.05
24	3.35	2.70	2.00
26	3.30	2.65	1.95
28	3.25	2.60	1.85
30	3.20	2.55	1.80
32	3.15	2.50	1.75
34	3.10	2.45	1.70
36	3.00	2.40	1.65
38	2.90	2.40	1.65
40	2.80	2.35	1.60
42	2.80	2.35	1.60
44	2.80	2.35	1.60
46	2.80	2.35	1.60
48	2.80	2.35	1.60
50	2.80	2.35	1.60
52	2.80	2.35	1.60
54	2.80	2.35	1.60
56	2.80	2.35	1.60
58	2.80	2.35	1.60
60	2.80	2.35	1.60
62	2.80	2.35	1.60
64	2.80	2.35	1.60
66	2.80	2.35	1.60
68	2.80	2.35	1.60
70	2.80	2.35	1.60
72	2.80	2.35	1.60
74	2.80	2.35	1.60
76	2.80	2.35	1.60
78	2.80	2.35	1.60
80	2.80	2.35	1.60

* R-Values are determined per NMSHTD Bulletin No. 102 using the AASHTO soil classification, gradation, and P.I. Values.

** Any soils with an R-value of less than 16 must be removed to a point two (2) feet below top of pavement.

TABLE IV: COEFFICIENTS (C) OF PAVEMENT MATERIALS

MATERIAL	COEFFICIENT
Concrete Pavement	0.60
Plant Mix Bituminous Pavement	0.50
Plant Mix Seal Coat	0
Untreated Base Course	0.10
Bituminous Treated Base Course	0.25
Cement Treated Base Course	0.25
Lime Treated Subgrade	0.10
Cement Treated Subgrade	0.25

Geogrid

4. Engineering Data

A. Grades - The grades of all streets shall be a minimum of 0.30% except where topographical conditions unquestionably justify a departure from the minimum.
Crown slopes shall be a minimum of 2.0%.

Street construction drawings shall be submitted, and shall contain a complete plan and profile exhibiting all existing grades, proposed grades, and elevations and grades of proposed connection to existing streets.

D. Traffic Report – The City, at its discretion, may require traffic impact analysis for subdivisions and commercial developments. For commercial developments requiring more than 49 parking spaces, and for all properties fronting on State of New Mexico highways, the analysis must be performed by a registered engineer. Properties fronting on State highways require separate permits from the NMDOT.

5. Construction Specifications

A. All streets shall be built in accordance with the current revision of the NMDOT Standard Specifications, modified as follows:

1. Subgrade Preparation

a. Delete the second paragraph of Sub 207.3 in its entirety and substitute the following:

The moisture content of the soil at the time of compaction shall not exceed the optimum or be less than the optimum minus five (5) percentage points as determined by AASHTO T99 and AASHTO T224, except that in high volume

change soils the City may require a moisture content in excess of optimum. If subgrade preparation is left over 48 hours without procession of the next phase of construction, subgrade preparation may be rechecked for compaction, moisture and surface tolerance at the discretion of the City.

2. Base Course and Subbase

a. Sub 304.1. replace in its entirety and substitute the following:

304.1 This work shall consist of source acceptance testing, furnishing, hauling, and placing base course or subbase aggregate of the classes as designated in the contract.

b. Sub 304.2.2 Aggregate Acceptance. Delete in its entirety and substitute the following:

304.2.2. Aggregate Acceptance. *Samples will be tested to determine the quality of the aggregate in terms of the standard aggregate laboratory test method known as Los Angeles wear and soundness loss.*

Contractor shall be responsible for testing requirements. The Contractor shall arrange for the testing to be performed by an approved Independent Testing Laboratory (ITL) in accordance with NMDOT procedures. Contractor must seek concurrence of ITL selection from the City Infrastructure Director, prior to testing. Sampling for required testing will be performed under observation of the City or its designee.

(1) Initial Source Approval. Contractor shall be responsible for testing of the aggregates for source approval. If testing indicates the material meets the NMDOT requirements, the Contractor may begin crushing operations from that material source.

For commercial sources, the Contractor may maintain an ongoing approval by submitting samples on a semiannual basis in accordance with procedures established by the NMDOT.

(2) Final Source Acceptance. Contractor shall be responsible for testing of the crushed aggregate to ensure that the crushed product meets the NMDOT quality requirements and specifications. The Contractor shall mine and process the material source in such a manner that the finished product meets the specifications for the project. If the material fails to meet the requirements, it will not be accepted.

For commercial sources, the Contractor may maintain an ongoing approval by submitting samples on a semiannual basis in accordance with procedures established by the NMDOT.

c. Under Sub 304.3.2 add the following paragraphs:

If constructed base course or subbase course is left over 48 hours without procession of next phase of construction, base course or subbase course may be rechecked for compaction, moisture, and surface tolerance at the discretion of the Project Manager. No separate measurement or payment will be made for rehandling or reworking material resulting in need of this recheck and associated work.

If constructed base course or subbase course has been treated with a bituminous material, (prime coat) or other approved treatment, Project Manager reserves the right to have base course or subbase course rechecked for surface tolerance and compaction.

At a minimum, contractor will spray a light application of water and "tight roll" base course prior to asphalt pavement operations or the next phase of operations as per project requirements.

d. Under Sub 304.3.8 add the following to Table 304.3.8:1

Characteristic	*Lower Spec Limit*	*Upper Spec Limit*
Fractured Face	*50%*	*None*

3. Plant Mix Bituminous Pavement (PMBP):
Superpave hot mix asphalt shall be used unless otherwise approved by the City. All of Section 423 shall apply to Superpave mixes.
If asphalt mix is other than Superpave and has been approved by the City Artesia for use, then the following shall apply:

a. Under Sub 423.3.6.2 delete in its entirety and substitute the following:

423.3.6.2 Quality Assurance & Acceptance Testing for PMBP Mix. Acceptance will be based on tests made from representative samples taken after the PMBP has been placed on the roadbed and prior to compacting. After the mix design has been approved, the Contractor shall control the mixture production on the project such that the tolerances of Table 401-B are met. The independent testing laboratory (ITL) will conduct quality acceptance sampling, testing, and monitoring to insure the Contractor provides a mix that meets the tolerances. This testing will be conducted by the ITL in accordance with the NMDOT Minimum Acceptance Testing Requirements. Acceptance test results will be provided to the Contractor's Quality Control Representative or designee by the end of the following work day after the samples are taken. Sampling, testing, and monitoring of streets within new subdivisions shall be the responsibility of the developer, and shall be performed only by an approved independent testing laboratory in accordance with these specifications.

TABLE 401-B
ACCEPTANCE TESTING TOLERANCES

Characteristic	***Lower Spec Limit***	***Upper Spec Limit***
Marshall Stability	*1640 lb.*	*NA*
Marshall Flow	*8*	*16*
Air Voids	*TV -1.5%*	*TV +1.5%*
Asphalt Content(Tank Strap)	*TV -0.2%*	*TV +0.2%*
Hydrated Lime Content	*TV -0.2%*	*TV +0.4%*
Fracture Face	*75%*	*NA*
Sand Equivalent	*45*	*NA*
Retained on #4 Sieve & Larger	*TV -7%*	*TV +7%*
Passing #4 & Retained on the #200 sieves (inc)	*TV -4%*	*TV +4%*
Passing #200 Sieve	*TV -2%*	*TV +2%*

Note: TV = Target Value

Quality Assurance & Acceptance Testing for Compaction. The bituminous pavement structure shall be divided into acceptance sections or lots of approximately 500 tons or one (1) day's production, whichever is less, for the purpose of defining areas represented by each series of acceptance tests. The ITL may use a stratified random sampling plan to enhance the quality of acceptance sampling and testing.

The density of each acceptance section or lot will be evaluated with a portable nuclear density test device, in conformity with ASTM D 2950, performed at randomly selected sites within the test section in accordance with Table V, page 15, Section II. The testing will be done by an ITL designated by the City.

Calibration of the portable nuclear device shall be established by correlation between density readings and cut pavement samples. Density readings will be taken by City personnel or ITL. Cut pavement samples will be provided by the Contractor. No separate measurement or payment will be made for required cut pavement samples. Calibration will be required for each lift or change in material course being paved upon. The density readings of the cut pavement samples shall be determined by the City or ITL in accordance with AASHTO T166 (weight, volume method). The density readings of the pavement shall be determined by the portable nuclear test device in conformity with ASTM D2950. Correlation shall be performed by City or ITL personnel. The Project Manager shall designate number of cut samples required for each correlation.

Neither the City, nor ITL is responsible for quality control during PMBP production. Contractor is responsible for quality control during PMBP production. It is intended that quality control for density be done while the bituminous mixture is hot enough to permit further compaction if necessary. If the density does not meet the specified requirements, the Contractor shall be

responsible for corrective efforts required to meet specifications. Compactive effort will not be allowed when the temperature of the mix is below 200 degrees Fahrenheit. Rolling the paved surface after it has initially cooled will not be allowed. Bituminous mixture which has been over compacted and is displaying pavement distress checking shall be rejected.

The mean density obtained for the compaction tests in each acceptance section or lot shall be at least ninety two percent (92%) of the established voidless density as determined by the Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures – AASHTO T-209-99. In addition, each individual test value obtained within an acceptance section or lot shall be at least ninety percent (90%) and shall not exceed ninety eight percent (98%) of the established voidless density. In the event an individual test result falls below ninety percent (90%), or exceeds ninety eight (98%) of the established voidless density, the City, in consultation with the Project Manager shall determine the disposition of the material represented by the test.

6. Quality Control Tests

Minimum quality control testing on streets and alleys shall be as shown in the following Table V.

TABLE V: MINIMUM TESTING REQUIREMENTS

SUBGRADE	*FREQUENCY*
Proctor ASTM D-1557	1 per Soil Type
In Place Density	1 per 1000 sy (3 minimum)
R-Value	1 per Soil Type
BASE COURSE	
Proctor (ASTM D-1557)	Check Gradation of Annual Proctor
In Place Density	1 per 1000 sy (3 minimum)
CURB & GUTTER (Includes Fillets and Valley Gutter)	
Test (Includes Temp, Slump, % Air and 4 Cylinders)	1 Test / 400 LF of Curb & Gutter or Minimum of 1 Test per Batch
ASPHALT SURFACING	
PMBP	
Laboratory Testing Sample for Design Parameters	+2 Samples per 500 Tons or Minimum of 1 per Batch
In Place Density	1 per 1000 sy per lift or Minimum of 3 per lift
Strap Test	1 per day's run

Note: Additional testing may be required at the discretion of the Design Engineer or City Infrastructure Director.

7. Extended Warranties

Extended warranties for substandard work shall be as shown in Table VI, VII,VIII and IX.

TABLE VI: PMBP ACCEPTANCE PARAMETERS - SUBSTANDARD AVERAGE DENSITY

Average Density (%)	Street Classification		
	Arterial	Collector	Local
Above 97.99	Remove	Remove	3-Year Bond
97 - 97.99	5-Year Bond	3-Year Bond	Accept
96 - 96.99	3-Year Bond	Accept	Accept
95 - 95.99	Accept	Accept	Accept
93 - 94.99	Accept	Accept	Accept
92 - 92.99	Accept	Accept	Accept
91 - 91.99	5-Year Bond	3-Year Bond	Accept
90 - 90.99	10-Year Bond	5-Year Bond	3-Year Bond
Less than 90	Remove	Remove	Remove

The bond shall be in a form approved by the City Infrastructure Director. A letter from the contractor extending the warranty period equal to the bond period may also be accepted upon approval of the City Infrastructure Director.

TABLE VII: PMBP ACCEPTANCE PARAMETERS - SUBSTANDARD AVERAGE DENSITY AND SUBSTANDARD GRADATION

Average Density (%)	Street Classification		
	Arterial	Collector	Local
Above 97.99	Remove	Remove	5-Year Bond
97 - 97.99	5-Year Bond	5-Year Bond	Accept
96 - 96.99	5-Year Bond	Accept	Accept
95 - 95.99	Accept	Accept	Accept
93 - 94.99	Accept	Accept	Accept
92 - 92.99	Accept	Accept	Accept

91 - 91.99	5-Year Bond	5-Year Bond	Accept
90 - 90.99	10-Year Bond	5-Year Bond	5-Year Bond
Less than 90	Remove	Remove	Remove

The bond shall be in a form approved by the City Infrastructure Director. A letter from the contractor extending the warranty period equal to the bond period may also be accepted upon approval of the City Infrastructure Director.

TABLE VIII: PMBP ACCEPTANCE PARAMETERS - SUBSTANDARD AVERAGE DENSITY AND SUBSTANDARD PERCENT ASPHALT

Average Density (%)	Street Classification		
	Arterial	Collector	Local
Above 97.99	Remove	Remove	5-Year Bond
97 - 97.99	5-Year Bond	5-Year Bond	Accept
96 - 96.99	5-Year Bond	Accept	Accept
95 - 95.99	Accept	Accept	Accept
93 - 94.99	Accept	Accept	Accept
92 - 92.99	Accept	Accept	Accept
91 - 91.99	5-Year Bond	5-Year Bond	Accept
90 - 90.99	10-Year Bond	5-Year Bond	5-Year Bond
Less than 90	Remove	Remove	Remove

The bond shall be in a form approved by the City Infrastructure Director. A letter from the contractor extending the warranty period equal to the bond period may also be accepted upon approval of the City Infrastructure Director.

TABLE IX: PMBP ACCEPTANCE PARAMETERS - SUBSTANDARD AVERAGE DENSITY, GRADATION, AND PERCENT ASPHALT

Average Density (%)	Street Classification		
	Arterial	Collector	Local
Above 97.99	Remove	Remove	5-Year Bond
97 - 97.99	Remove	3-Year Bond	3-Year Bond
96 - 96.99	5-Year Bond	Accept	Accept
95 - 95.99	3-Year Bond	Accept	Accept
93 - 94.99	Accept	Accept	Accept

92 - 92.99	3-Year Bond	3-Year Bond	Accept
91 - 91.99	Remove	5-Year Bond	3-Year Bond
90 - 90.99	Remove	Remove	5-Year Bond
Less than 90	Remove	Remove	Remove

The bond shall be in a form approved by the City Infrastructure Director. A letter from the contractor extending the warranty period equal to the bond period may also be accepted upon approval of the City Infrastructure Director.

SECTION 2. CONSTRUCTION OF ALLEYS

1. General

The following specifications shall govern the construction and/or alteration of alleys within the City of Artesia. All definitions and requirements concerning alleys as stipulated in the subdivision regulations and City Codes of the City of Artesia shall apply here.

3. Engineering Data

A. Grade, Drainage, & Utility Report - All stipulations of Section II shall apply to this section. The following requirements shall also apply.

1. Use of inverted crown - Inverted crowns shall be required in all alleys. In cases where inverted crown construction is impossible, a crown will be allowed if approved by the Infrastructure Director. In no instance will drainage be designed to flow onto private property. All grades and drainage shall be designed in such a way as to insure complete drainage from yard to alley and alley to street. Paved alleys with a minimum grade of less than 0.30% shall have a valley gutter.

2. Paving of alleys - In all cases, an alley to be paved shall be paved for its entire block length. In no case will a part or section of an alley be paved where other sections are left unpaved.

3. All alleys in commercial and industrial zoned areas, locations where sole access is by an alley(s), and any alleys used for drainage ways shall be paved.

4. Standard Specifications and Typical Sections for Construction of Alleys

A. Standard specifications for construction of alleys

1. All alleys shall be built in accordance with these Standard Specifications.

2. Alley Entrances - A drive entrance (drive pad) will be required at the entrance or exit of all alleys and shall conform to the typical details as illustrated. Due to difficult or unusual site conditions, the engineer may submit a different detail for approval by the City. If an alley requires a radius, the length must be approved by the City.

3. All alley pads and access across alleys shall meet all ADA accessibility requirements.

B. Typical Sections

Typical sections for alley construction in the City of Artesia shall be as illustrated in the standard drawings shown in this section. Other layouts may be submitted to the City for approval.

SECTION 3. SIDEWALK, FILLET AND DRIVEPAD CONSTRUCTION

1. General

This section shall deal with the placement, replacement and/or removal of sidewalks, fillets and drivepads within the public rights of way of the City of Artesia. Subgrade preparation, placement of sidewalk, fillets and drivepads, location of sidewalks, fillets, and drivepads, and grades for sidewalks, fillets and drivepads shall be as defined below. Compliance with Section I – "Policies and Specifications" of these specifications is mandatory. All construction shall meet American Disabilities Act (ADA) requirements. Sidewalk and driveway installation and replacement shall be the responsibility of the adjacent property owner.

2. Policies Regarding Sidewalk and Drivepad Construction

A. Engineering Requirements - Sidewalk, fillet and drivepad construction shall conform to the construction details contained herein, unless otherwise submitted by plan and approved by the City. The City may require that the plan illustrate existing and proposed grades of the curb and gutter and streets. No permits for construction shall be issued until such information has been provided and approved by the City.

3. Standard Specification for Placement of Sidewalk

A. Location - All sidewalks shall be located as follows:

STREET TYPE	**SIDEWALK LOCATION**
Cul-de-Sac or Loop Street	Both sides and three feet (3') off of curb
Local Street	Both sides and three feet (3') off of curb
Collector Road	Both sides at the property line
Minor Arterial	Both sides at the property line
Major Arterial	Both sides at the property line

B. Width & Section - All sidewalks will be constructed to a minimum 5' width. Sidewalks shall be 4" thick in all areas except when used as a driveway or drive pad.

C. Grades for Sidewalks - All sidewalks shall have a cross slope of 1/4" for each foot of width. The sidewalk shall slope toward the street. This stipulation may be waived by the City in areas where topographical features will not allow for such slopes.

D. If an obstruction is located in the sidewalk, (utility pole, mailbox, etc.) a minimum 4' clearance must be maintained at the obstruction along the sidewalk.

E. All concrete sidewalks, drivepads, fillets, etc. must be protected from freezing for a minimum of four (4) days.

F. Developments on corner lots shall be required to construct or reconstruct existing fillets and sidewalks to comply with ADA requirements at the time the lot is developed or redeveloped.

4. Standard Specifications for Placement of Drivepads

Location - All drivepads shall be located as follows:

Drivepads on interior lots (lots not on a corner) shall be located to allow the maximum slope of 15:1 where the drivepad ties to new or existing sidewalk. Drivepads on corner lots requiring a new building, remodel of existing building, curb cut or driveway permit shall be located as follows:

STREET TYPE	DRIVEPAD LOCATION
Local Street	Minimum 20' from the curb return
Collector Road	Minimum 40' from the curb return
Minor Arterial	Minimum 50' from the curb return
Major Arterial	Minimum 50' from the curb return

Width & Section - All drivepads will be constructed to the back of sidewalk or to the property line, whichever is less. Drivepads shall be 6" thick in all areas. Drivepads shall not be wider than 40' and may not be placed closer than 20' from any curb return. Applicant may submit an alternate drivepad detail for approval by City. All drivepads shall meet all ADA accessibility requirements. All drivepads shall slope 1/4" for each foot of width across the pedestrian travel path.

5. Standard Specification for Placement of Concrete Fillets

Fillets shall be a minimum of 6" in thickness and shall meet all ADA specifications. Developments on corner lots shall be required to construct or reconstruct existing fillets and sidewalks to comply with ADA requirements.

6. Standard Details of Construction.

SECTION 4. CURB CUTS

1. General

This section deals with the removal and replacement of curb and gutter sections as defined below. As previously noted, no work or alteration to existing curbs will be allowed until all the conditions of Section I - Policies and Specifications of these specifications have been met.

2. Engineering Data

A. Improvement Plan - The plan for the proposed curb cuts shall illustrate information regarding all the existing elevations of the existing curb. Additionally, proposed elevations shall be displayed. The grade of the replacement shall be such that it is continuous with the existing section to which it is being tied. Any existing utilities in the area shall be noted on the engineering plan.

3. Standard Specifications for Curb Cuts

A. Curb Removal - The procedures for curb removal shall be as follows:

1. Refer to drivepad placement notes in Section IV for location of drivepads and limits of respective curb removals.
2. The entire section of curb, (i.e. the standup section and gutter section) shall be removed. The breaking off of only the standup section shall not be allowed. The section that is removed shall be properly disposed of by the contractor or owner and shall not be left on the site of the construction or placed in trash bins or receptacles.

B. Replacing Curb and Gutter

1. The section to be replaced shall be in accordance with the Standard Specifications. The replacement section shall conform to the typical section illustrated in these specifications.
2. All concrete curb and gutter must be protected from freezing for a minimum of fourteen (14) days.

4. Standard Details of Construction. Curb and Gutter, Valley Gutter, & Header Curb

Standard details for construction of curb and gutter, valley gutter and header curb in the City of Artesia shall be as illustrated in the standard drawings shown in this section. Other layouts may be submitted to the City for approval.

SECTION 5. EXCAVATION UNDER PAVED STREETS AND ALLEYS

1. General

This section will deal with excavation under and across paved streets and alleys in the City of Artesia. Excavation means a hole, trench, ditch or depression in a public place or right-of-way, resulting from the removal of pavement, dirt, or other material. Compliance with Section 3, 4 and 5 of Chapter 1 – General these specifications is mandatory. A permit from the City is re required before any excavation can begin. Only in the case of an emergency may an excavation be made without a permit. However, the person performing the excavation will have to apply for a permit and pay the appropriate fees on the next working day following the emergency excavation. All excavation and trenching shall meet OSHA requirements.

2. Provisions for Excavation

A. Engineering Data - Prior to the issuance of an excavation permit, the applicant shall provide an illustration showing the exact location of the excavation, the extent of the excavation, and a traffic control plan. The Contractor shall be responsible for locating any underground utilities and for any damage resulting thereto.

3. Specifications for Excavation and Backfill

A. Breaking through Pavement

1. Heavy duty pavement breakers may be prohibited when their use may damage existing structures or other property.

2. Saw cutting or other neat line cutting of the existing pavement is required.

3. Sections of sidewalks are to be removed to the nearest score line or saw cut edge.

4. Unstable pavement must be removed over cave-ins or over-breaks, and the subgrade is to be treated in the same manner as the main excavation.

5. Pavement edges must be trimmed to a vertical face and neatly aligned with the center line of any trench.

6. The applicant is not required to repair damage existing prior to excavation unless his cuts leave small floating sections that may be unstable, in which case the applicant must remove such sections and backfill such area as well as the area of the excavation.

B. Care of Excavated Material - All material excavated and stockpiled adjacent to the excavation or in any public place must be maintained so as not to endanger the public and those working in the excavation, and as to cause as little inconvenience as reasonably possible to vehicle and pedestrian traffic. Excavated material may not be used as a barricade. Excavated material stockpiled within the public right of way shall have traffic control devices to guide traffic around it. The stockpiled material shall kept wet to prevent blowing dust.

C. Backfilling - Any person who trenches or excavates across a public right-of-way or digs a trench less than 24 inches wide in a public right of way for any purpose whatsoever is required to backfill the trench or excavation as follows:

1. "Flow Fill" must be used in all trenches lying below any paved street or alley, whether the street or alley is paved or not. The Flow Fill shall be a 1 to 2 sack mix from a commercial source approved by the City. The City must be notified prior to placement of the Flow Fill. If the City is not present at the time the trench is backfilled, documentation such as delivery tickets, photographs, etc. must be presented to the City showing Flow Fill was placed in the trench.

1. In all trenches or excavations wider than 24", the earth used in backfilling must consist of the original excavated material or other material in a finely divided form, free from large lumps, large stones, rocks, pieces of old concrete or asphalt pavement, or large wet or gummy masses, and must be placed in layers or lifts.

2. When an excavation has been cut through existing pavement, the temporary pavement patch shall provide a level and safe riding surface until the permanent pavement patch can be placed.

3. Backfill and compaction inspection must be made as required by the City. The City is authorized to make or have made backfill moisture density tests for the purpose of determining compliance with the compaction requirements of this section. All costs connected with this testing will be at the expense of the person doing the actual backfill and compaction work.

4. In the event the backfill fails to meet the density requirements of this section when tested, or otherwise fails as evidenced by settlement of the trenches or excavation, the City may order the defective backfill material removed, replaced, and recompacted to the required density specified herein, and order the replacement of all pavement destroyed or damaged as the result of the backfill failure settlement.

5. In the event an applicant fails to comply with the requirements of this section the City may refuse to permit such applicant to thereafter engage in trenching or excavation work in any public place.

D. Restoration of Surface

1. Upon completion of the backfilling of any excavation, and before resurfacing, the permittee must notify the City. Placement and the cost of resurfacing will be borne by the applicant. The applicant must keep each excavation safe for pedestrian and vehicular traffic. Applicant will resurface the trench within 3 days of approval by the City.

2. Acceptance or approval of excavation work or backfilling does not prevent the City from asserting a claim against the applicant for incomplete or defective work if discovered within two year from the completion of the project.

4. Standard Details of Construction.

Standard details for construction of curb and gutter, valley gutter and header curb in the City of Artesia shall be as illustrated in the standard drawings shown in this section. Other layouts may be submitted to the City for approval.

SECTION 6. STREET LIGHTING

1. General

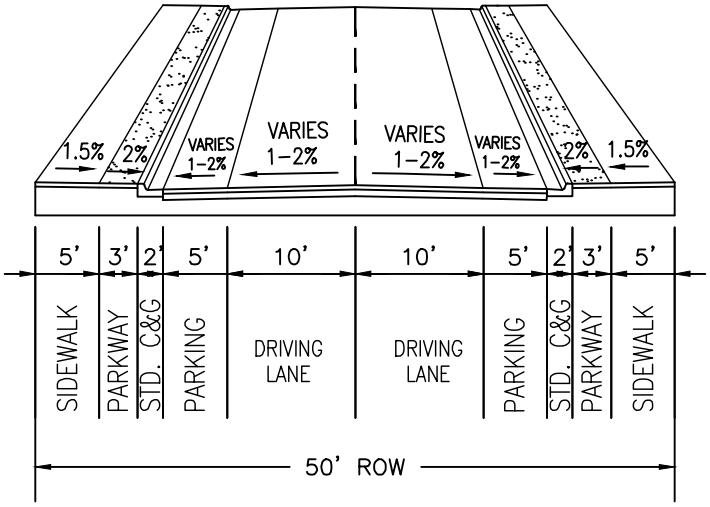
The City will pre-approve and assume monthly electrical service costs of new street lights once installed and energized as described in this section. The installation of street lights and service connection fees will be paid entirely by the developer or owner. The City will allow street lights at the intersection of streets and the end of cul-de-sacs. Additionally, newly developed streets or cul-de-sacs that exceed six hundred feet (600') in length, may have one (1) additional street light approximately one-half the distance between two other street lights. The City will agree to pay for the monthly service charge for each light. Payment in-full must be received by the City before approval of and issuance of any construction permit. The developer or owner shall be responsible for coordinating and supplying any easements on a plat or deed to the local power company or the City.

2. Underground Feed Lighting

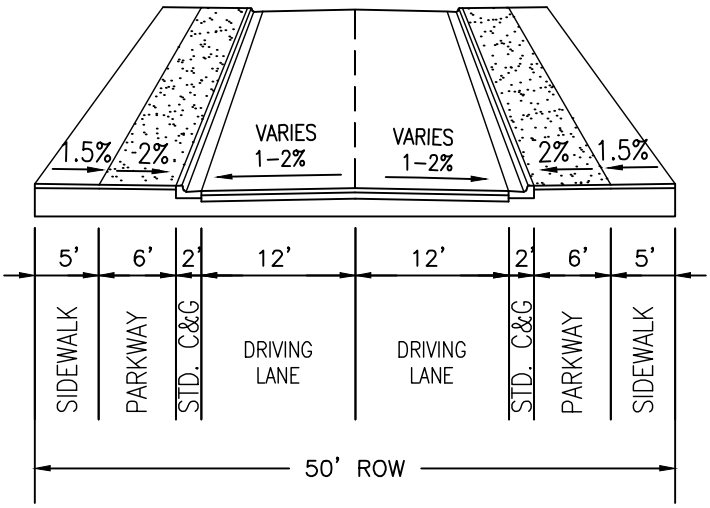
The developer or owner shall provide the trench from the location designated by the power company to the street light location approved by the City. The power company will provide the conduit, wiring, pole, and luminare. No overhead feeds will be allowed.

SECTION 7. STREETS AND ALLEYS STANDARD CONSTRUCTION DETIALS

LOCAL-1
ON-STREET PARKING
WITH CURB & GUTTER



LOCAL-2
NO ON-STREET PARKING
WITH CURB & GUTTER



ARTESIA BULLDOGS

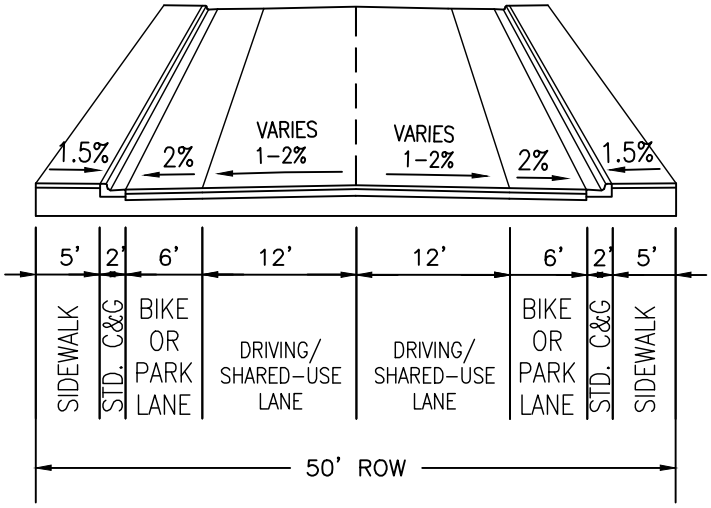
CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

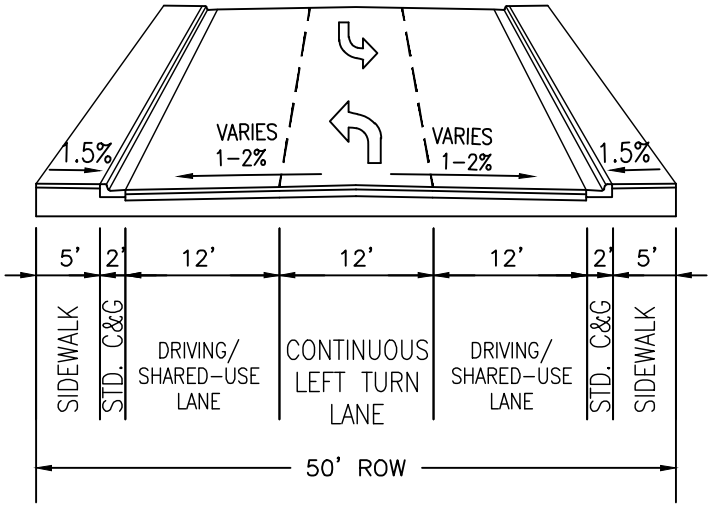
TYPICAL STREET SECTIONS
LOCAL ROADS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-01

EXISTING COLLECTOR
WITH PARKING OR BIKE LANE



EXISTING COLLECTOR
3 LANE WITH NO PARKING



ARTESIA BULLDOGS

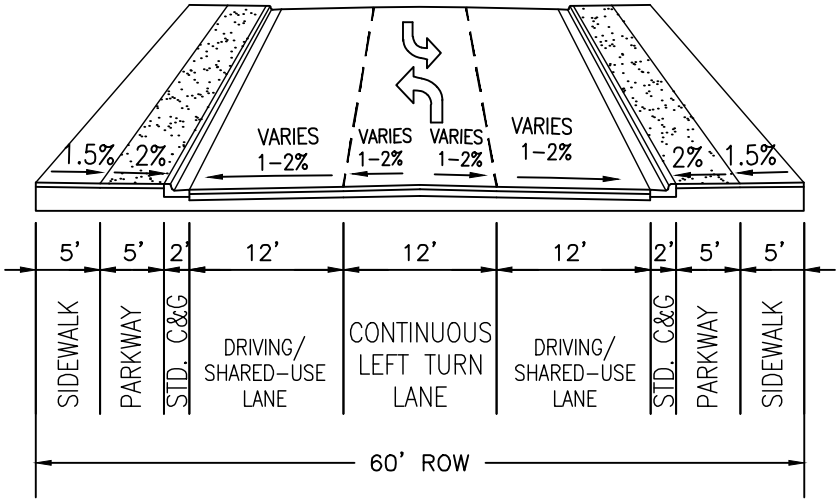
CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

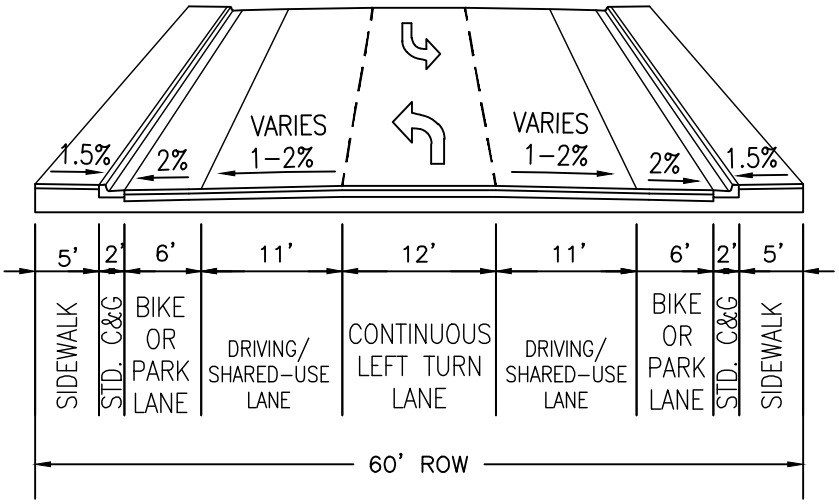
TYPICAL STREET SECTIONS
COLLECTORS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-02

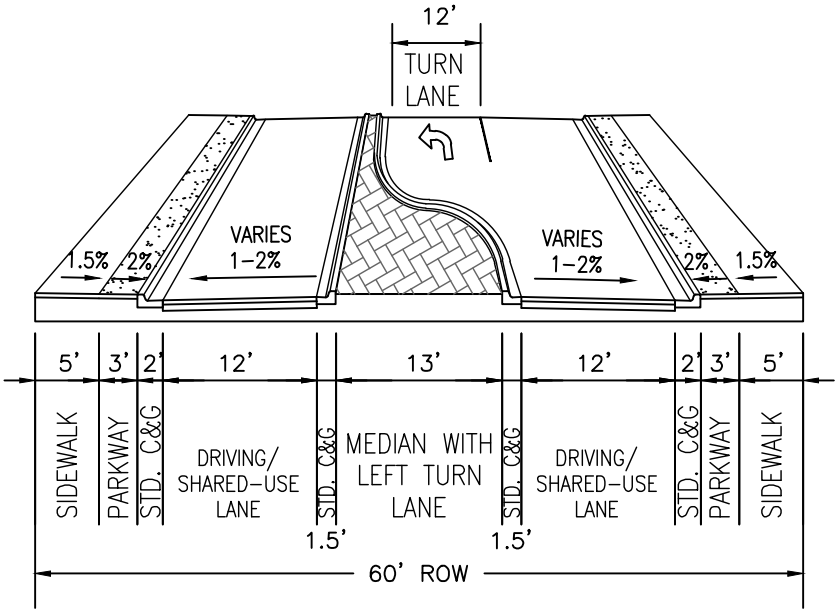
FUTURE COLLECTOR
3 LANE WITH NO PARKING



EXISTING MINOR ARTERIAL WITH PARKING OR BIKE LANE OPTION

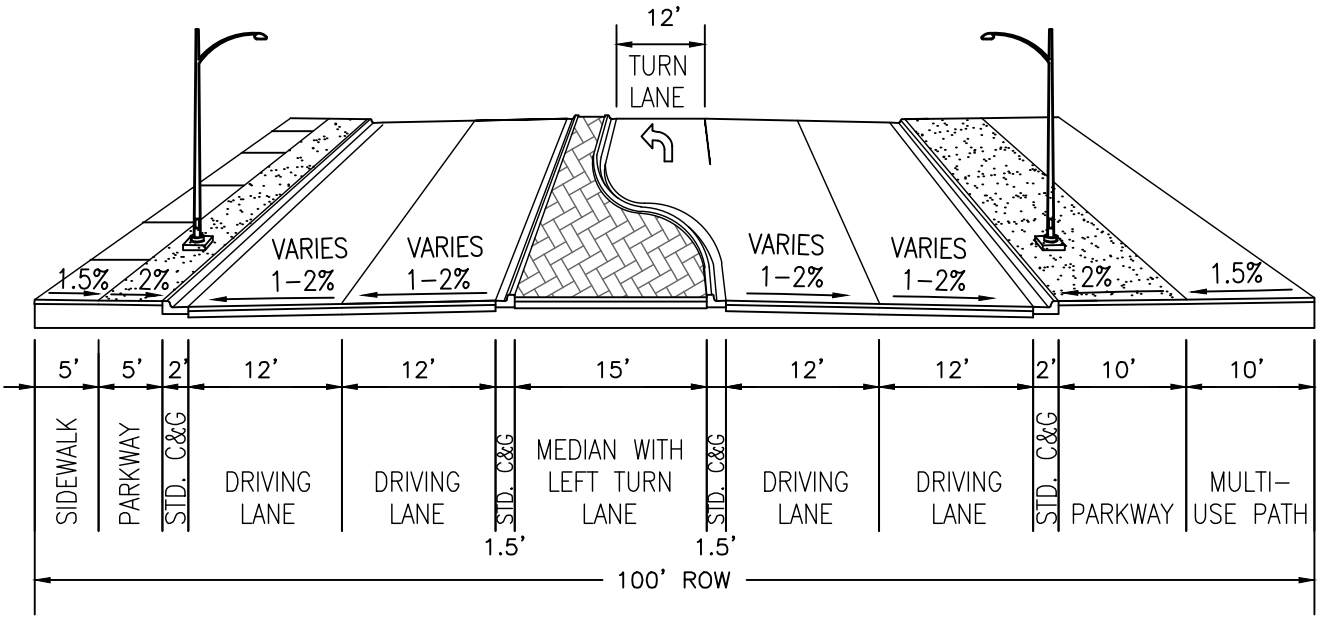


EXISTING MINOR ARTERIAL NO PARKING



NOTE: CONTINUOUS LEFT TURN LANES MAY BE USED FOR BUSINESS ACCESS.

FUTURE MINOR ARTERIAL
MULTI-USE PATH OPTION



ARTESIA BULLDOGS

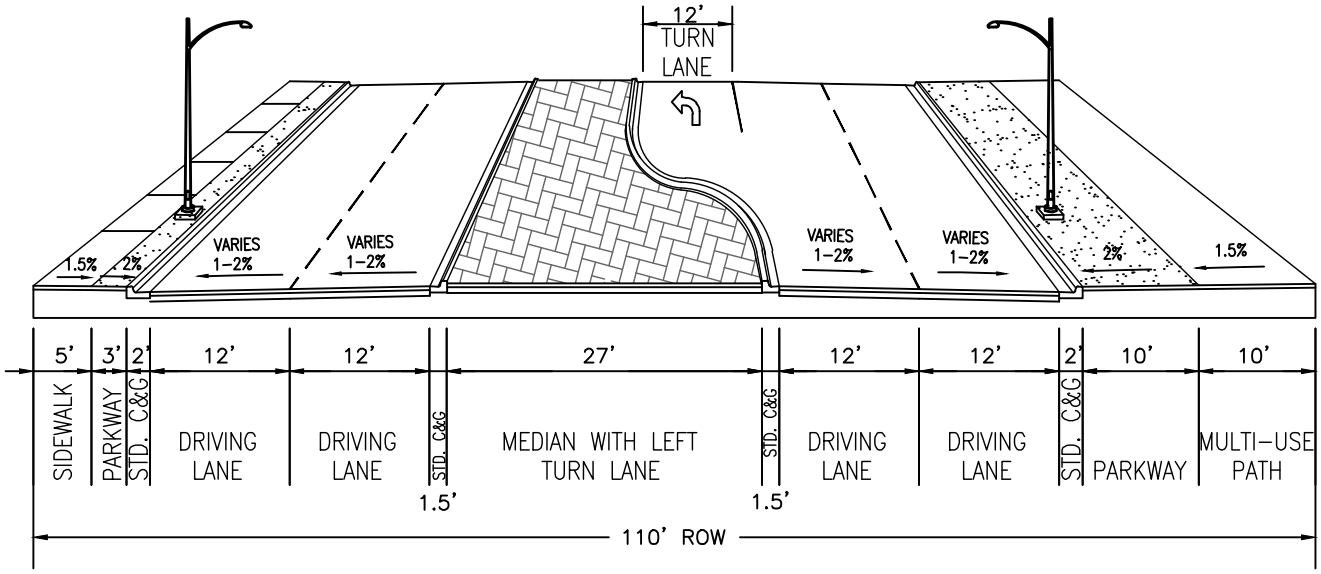
CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

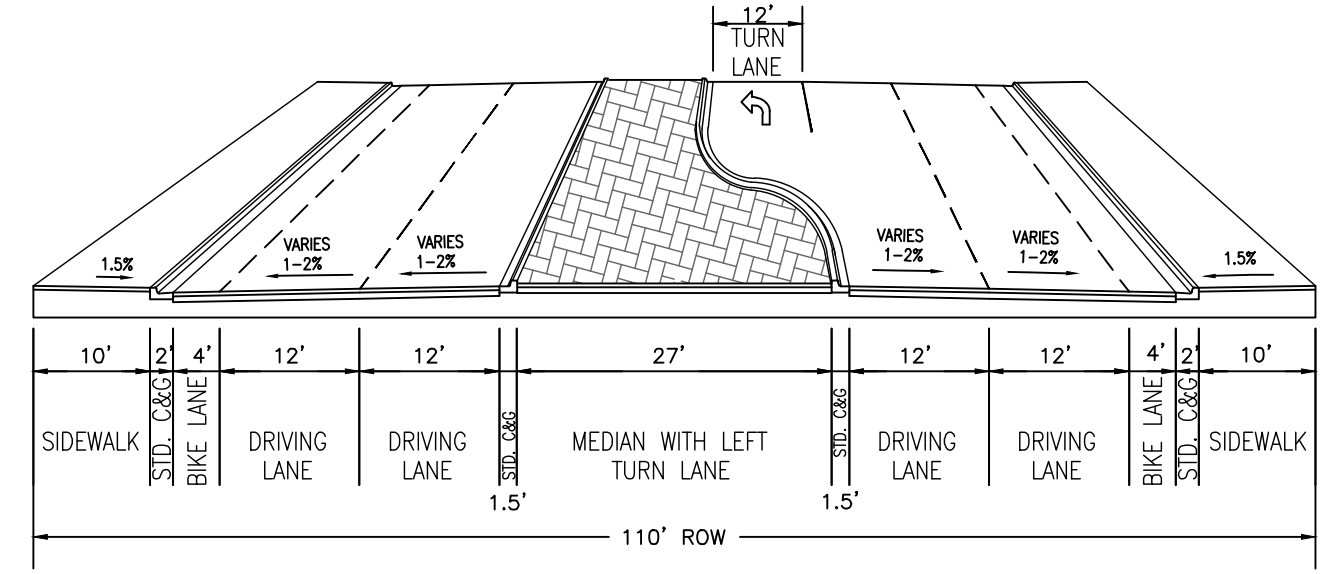
TYPICAL STREET SECTIONS
FUTURE
MINOR ARTERIALS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-05

FUTURE MAJOR ARTERIAL
MULTI-USE PATH OPTION



FUTURE MAJOR ARTERIAL
BUSINESS SECTION WITH
BIKE PATH OPTION



ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL STREET SECTIONS
FUTURE
MAJOR ARTERIAL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-06

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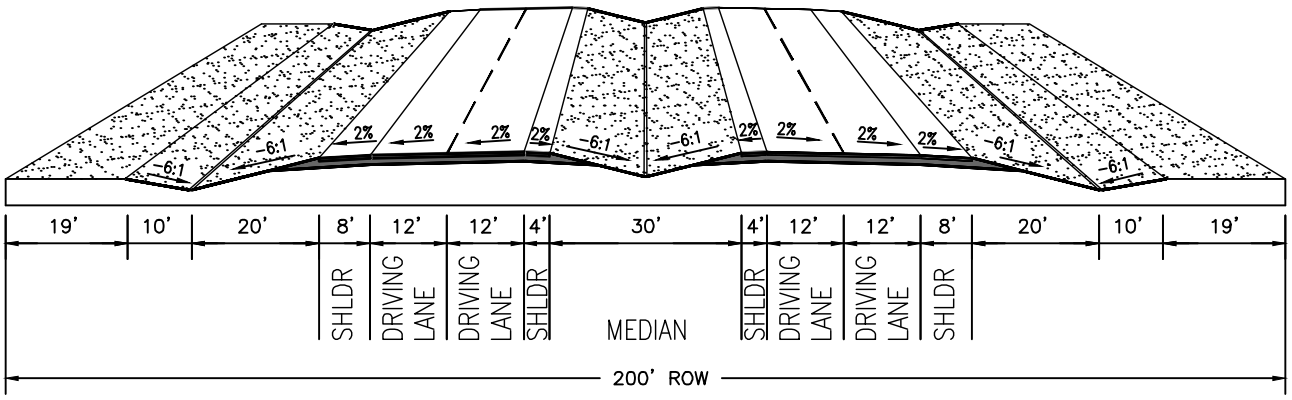
FUTURE CITY
BY-PASS OPTION



ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL STREET SECTIONS
FUTURE
BYPASS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-07

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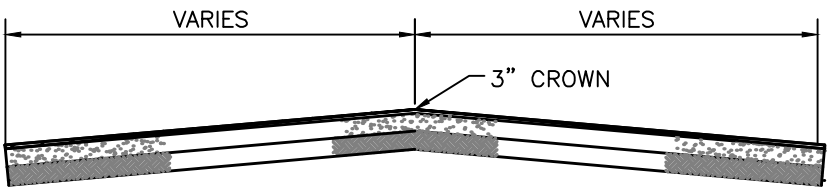
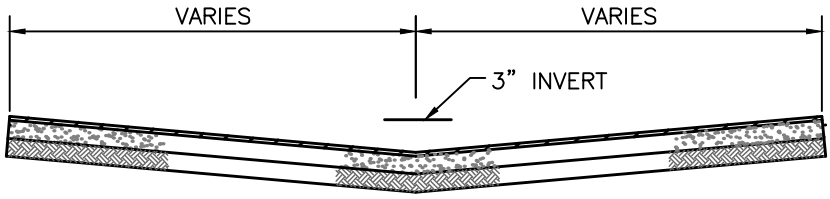
PAVED ALLEY (RAISED CROWN SECTION)



2" P.M.B.P. AT 92%–96% MAX. DENSITY
6" II–B BASE COURSE AT 96% AASHTO T 180 SUBGRADE
PREP. AT 100% AASHTO T 99

PAVED ALLEY (INVERT SECTION)

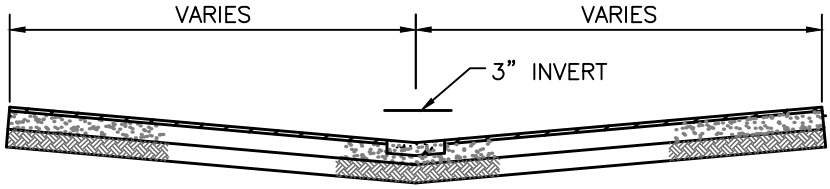
ALLEY SLOPE GREATER THAN 0.30%



2" P.M.B.P. AT 92%–96% MAX. DENSITY
6" II–B BASE COURSE AT 96% AASHTO T 180 SUBGRADE
PREP. AT 100% AASHTO T 99

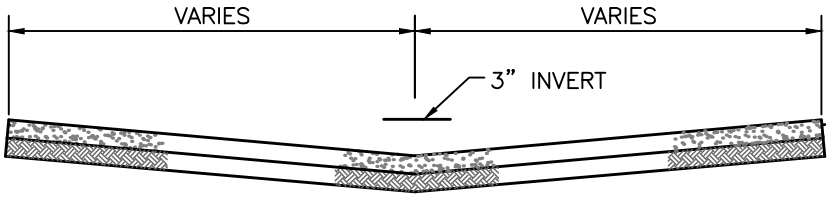
PAVED ALLEY (VALLEY GUTTER SECTION)

ALLEY SLOPE GREATER THAN 0.30%

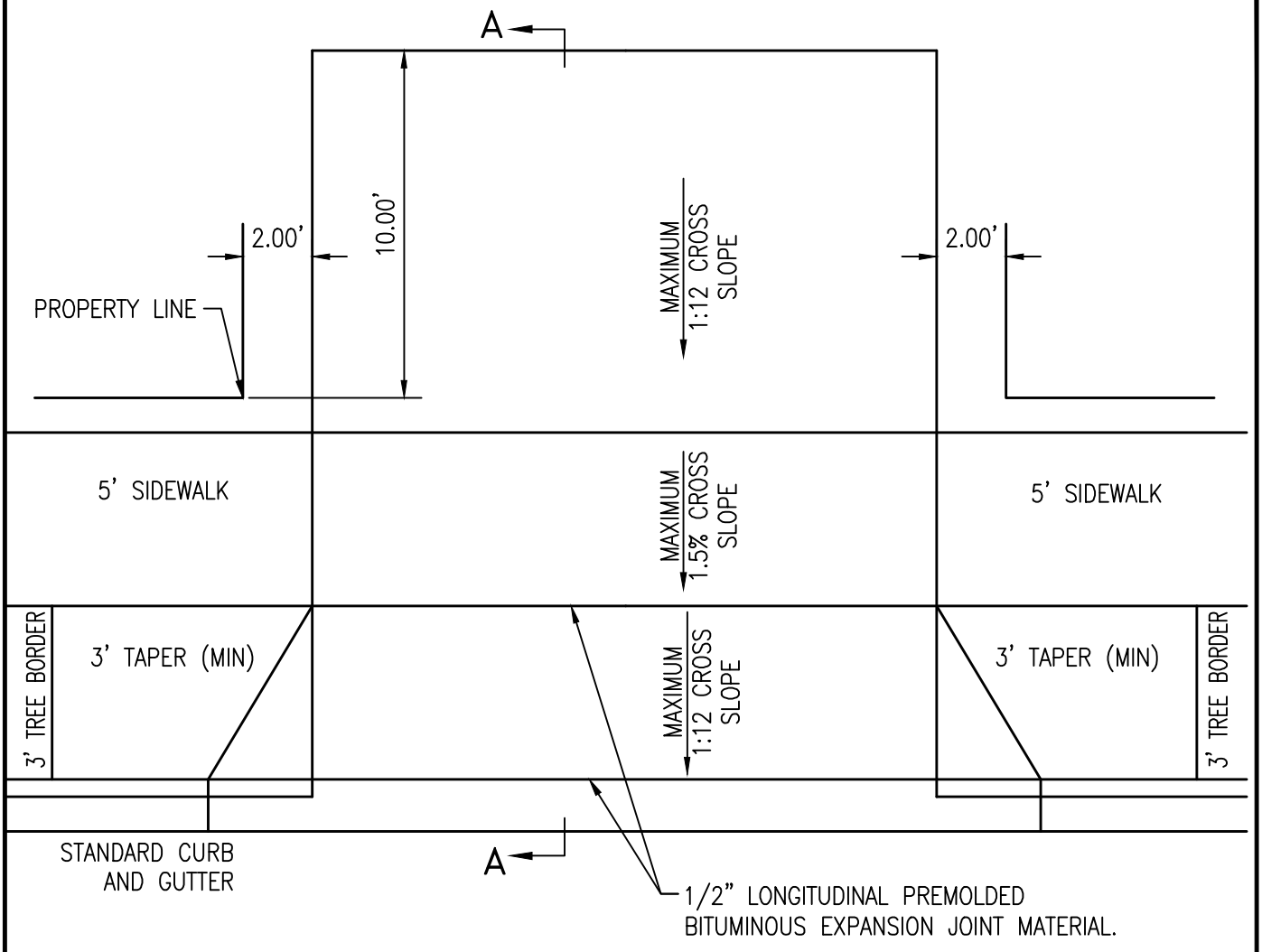


2" P.M.B.P. AT 92%–96% MAX. DENSITY
6" II–B BASE COURSE AT 96% AASHTO T 180 SUBGRADE
PREP. AT 100% AASHTO T 99 6" X 24" VALLEY GUTTER

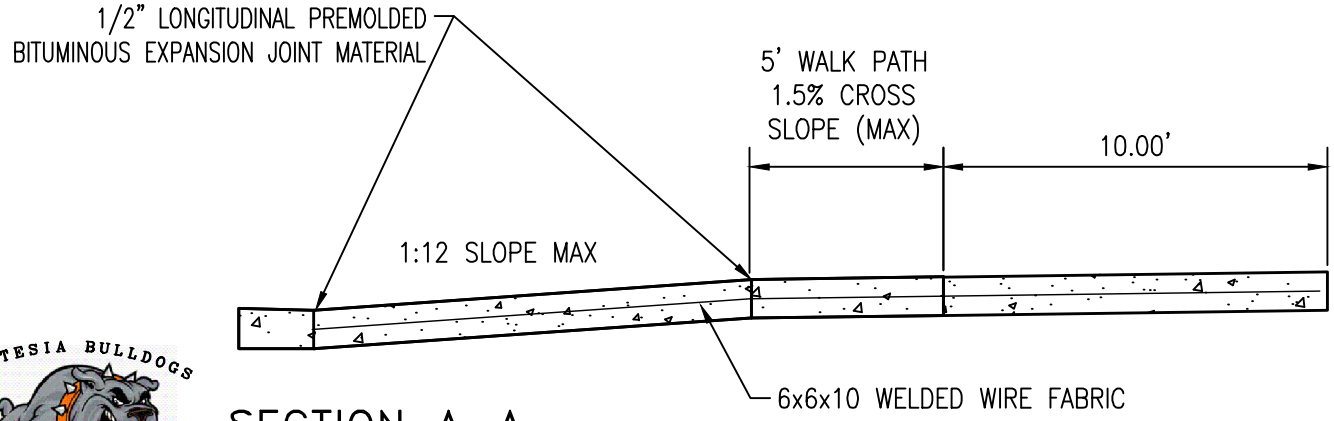
UNPAVED ALLEY



6" II–B BASE COURSE AT 96% AASHTO T 180 SUBGRADE
PREP. AT 100% AASHTO T 99



PLAN VIEW



SECTION A–A

CITY OF ARTESIA NEW MEXICO EST. 1905 — STANDARD CONSTRUCTION DETAILS	ALLEY PAD DETAILS		ORIGINAL DATE: MAY 2009 REVISION DATE: OCTOBER 2014 SHEET NO: R-09

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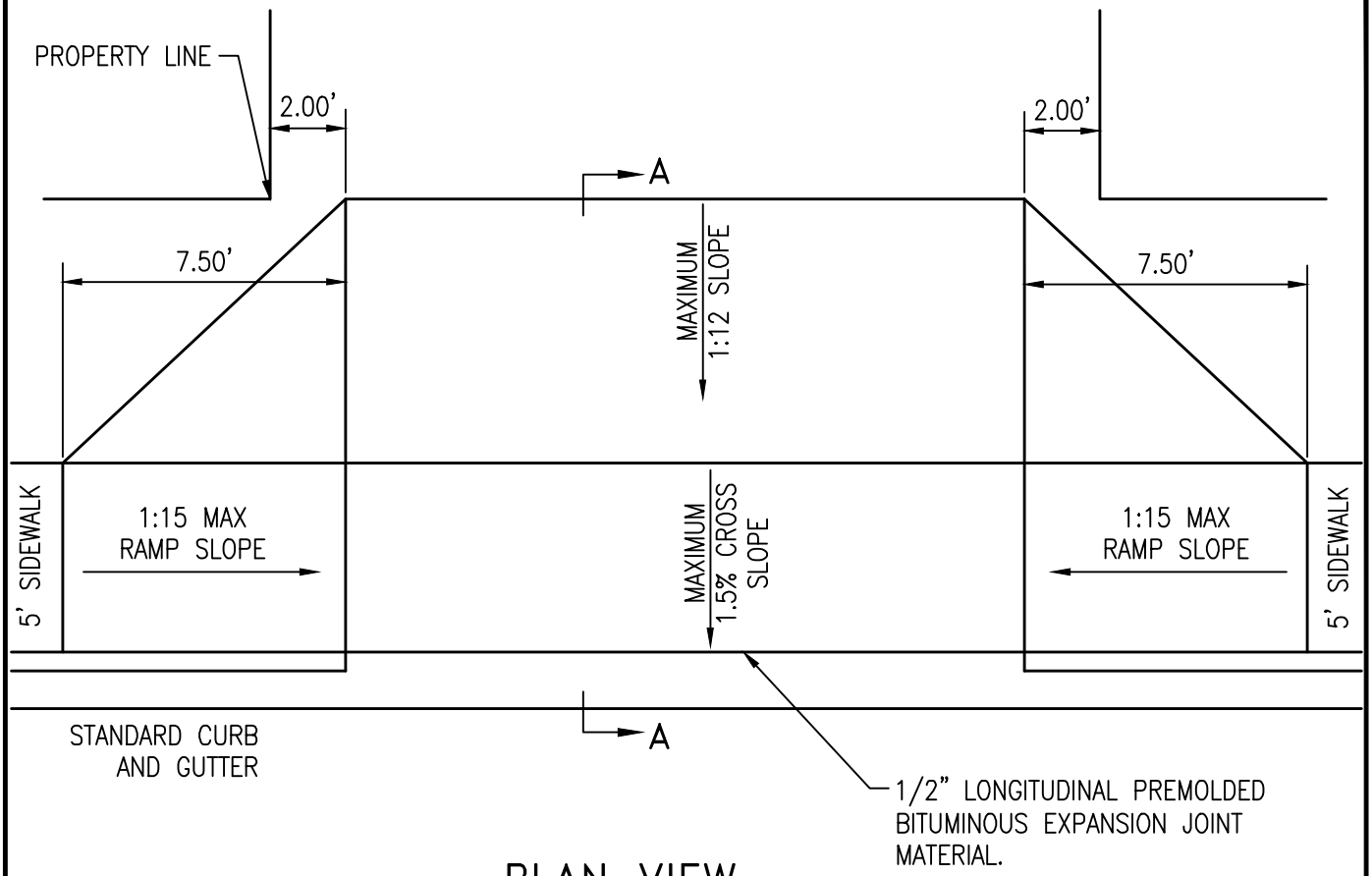
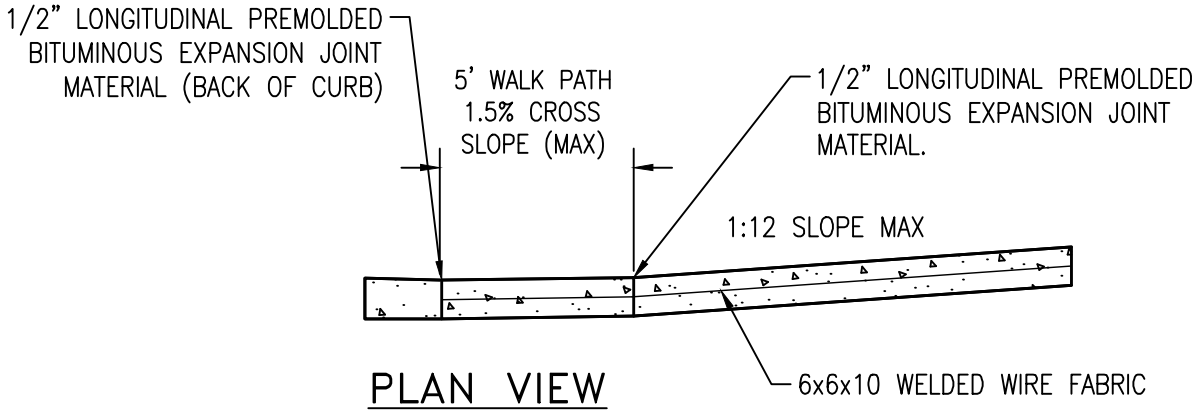


PLAN VIEW



PLAN VIEW

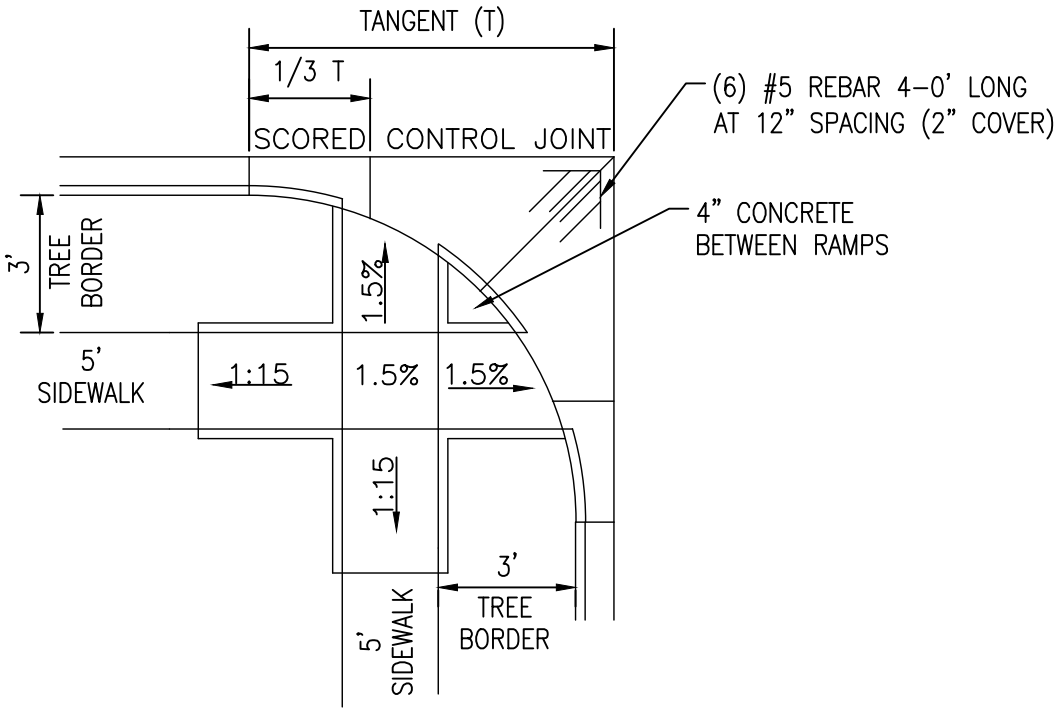
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

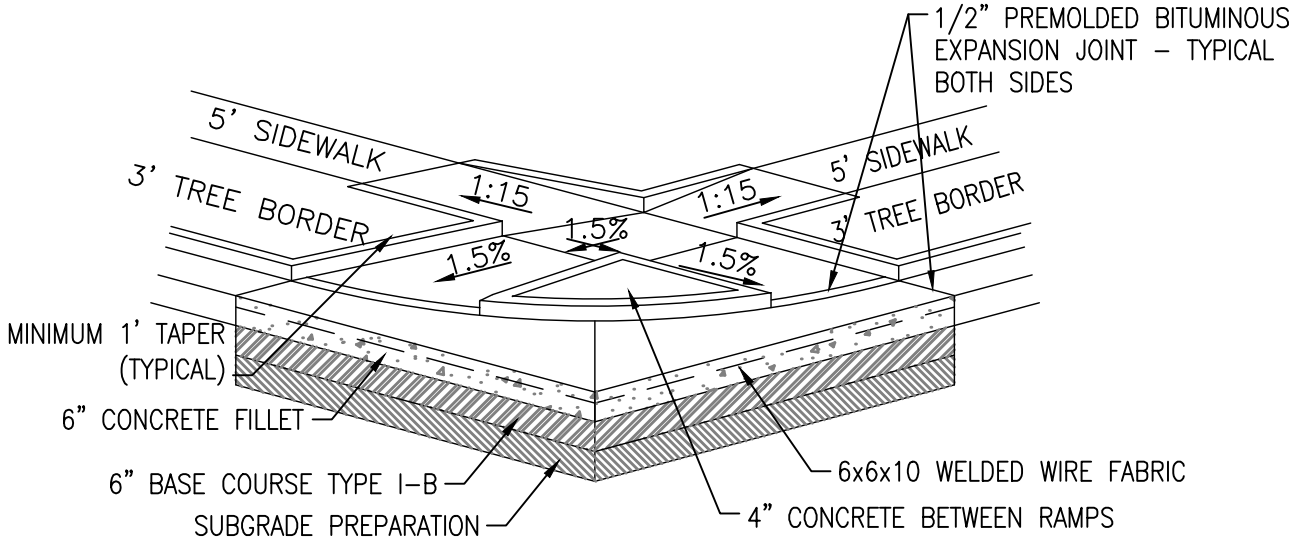
STANDARD CONSTRUCTION DETAILS

ALLEY PAD DETAIL SIDEWALK AT THE BACK OF CURB

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-10



PLAN



SECTION

THIS IS A TYPICAL DETAIL. ENGINEER/ DEVELOPER MAY SUBMIT A SITE SPECIFIC DETAIL.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL CONCRETE FILLET DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-11

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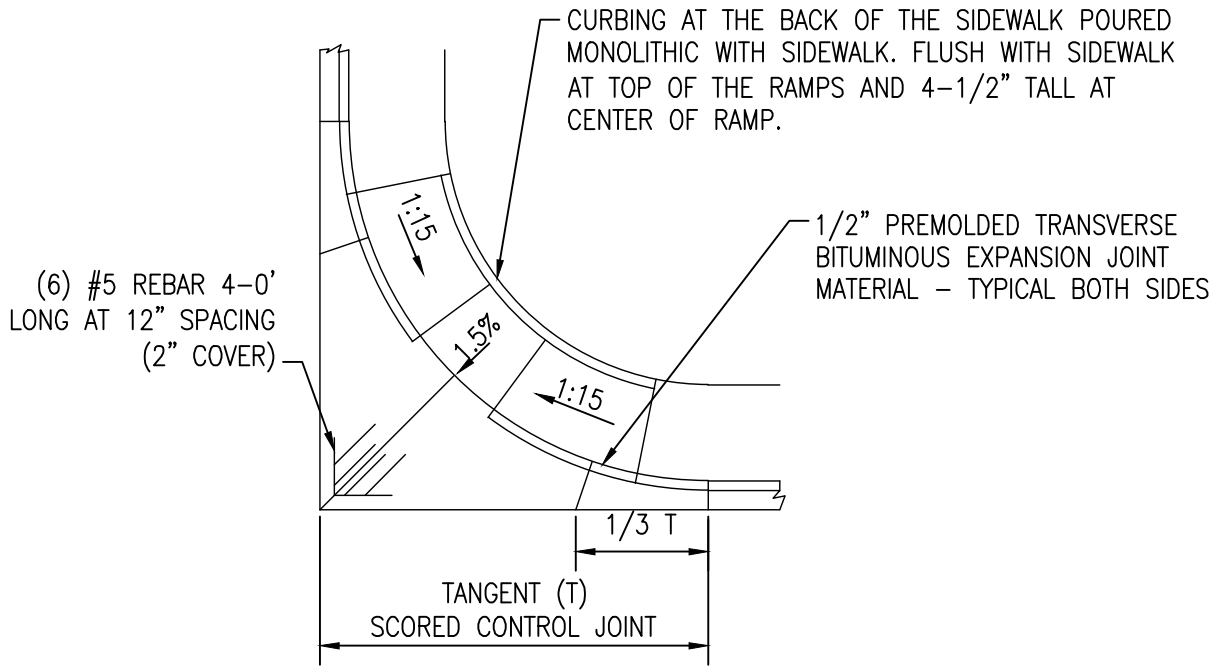
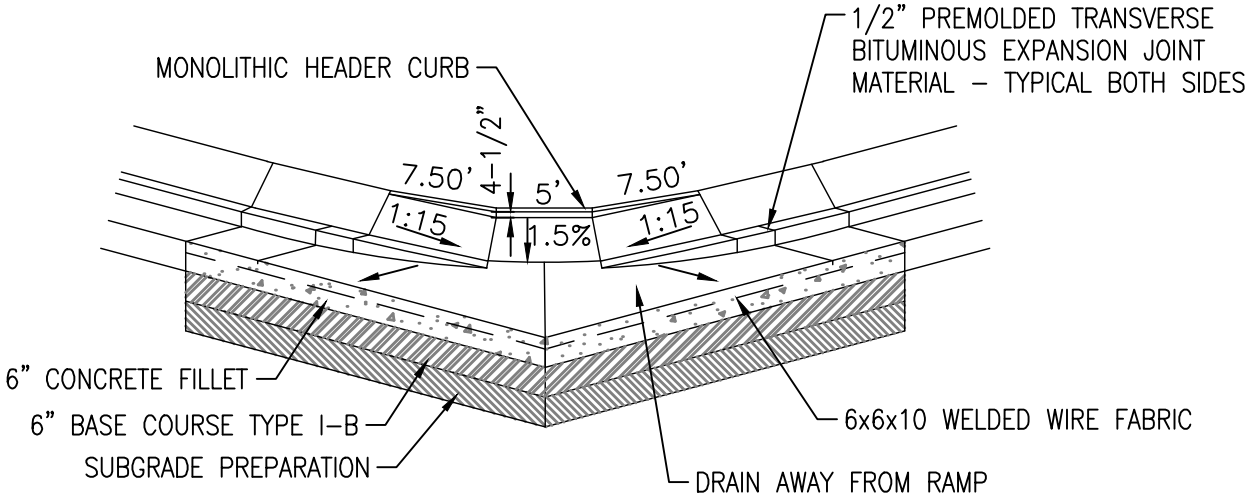


PLAN



SECTION

THIS IS A TYPICAL DETAIL. ENGINEER/ DEVELOPER MAY SUBMIT A SITE SPECIFIC DETAIL.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL CONCRETE FILLET DETAIL SIDEWALK AT THE BACK OF CURB

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-12

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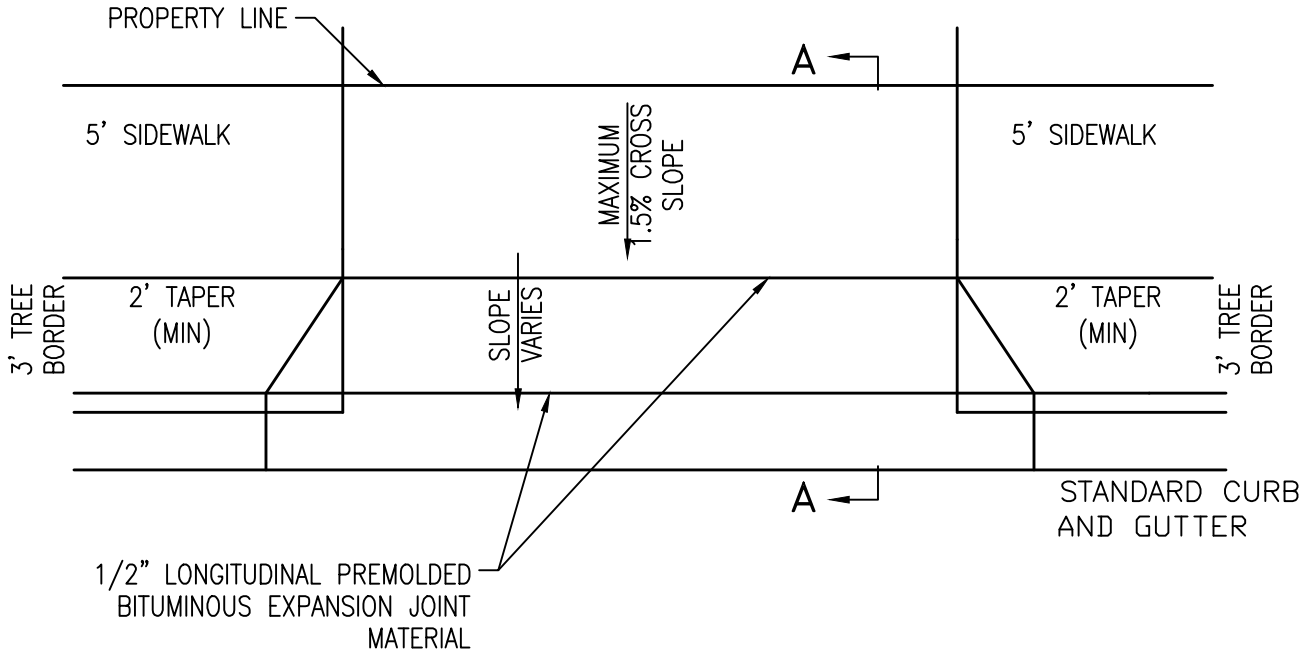
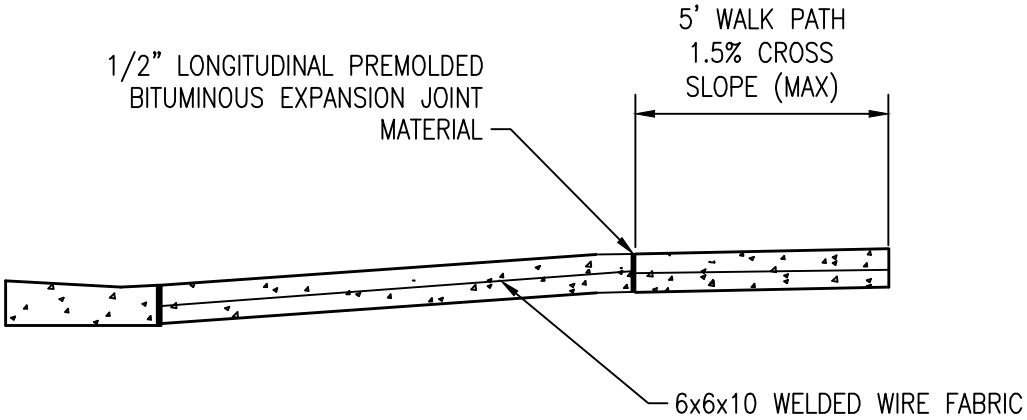


PLAN VIEW



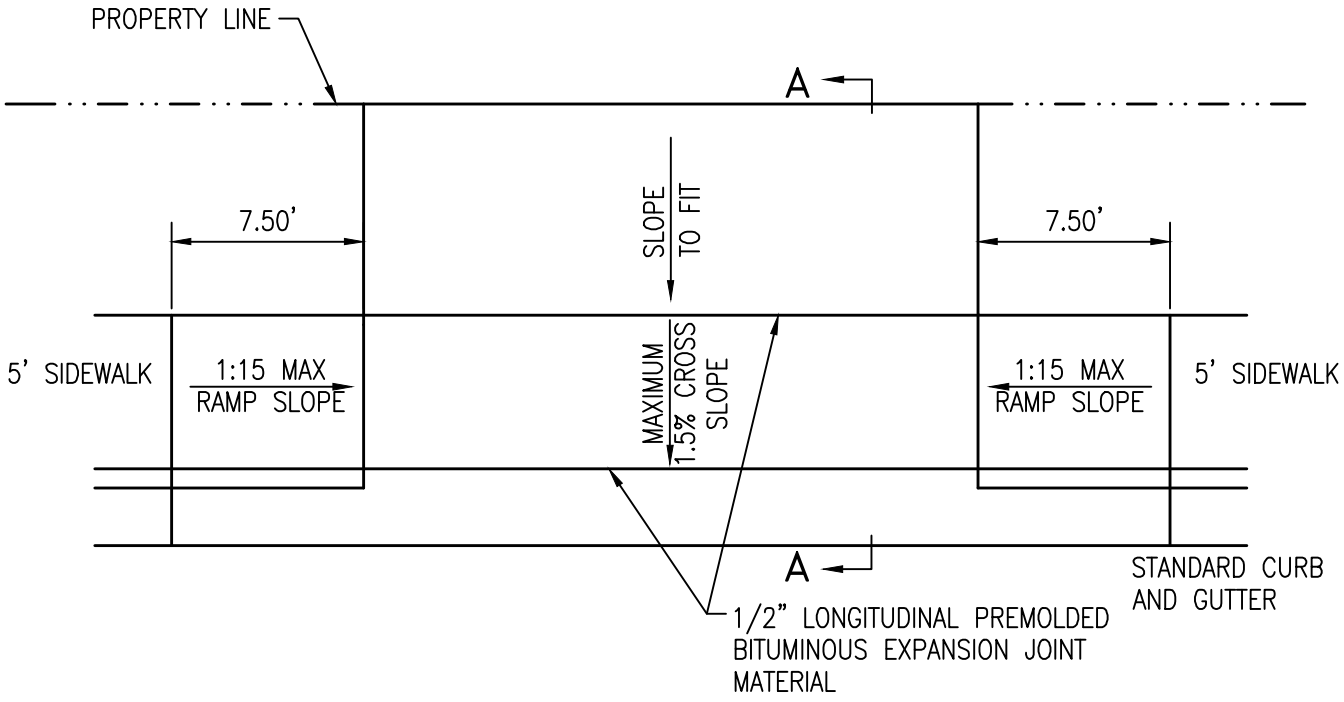
SECTION A–A

CITY OF ARTESIA NEW MEXICO EST. 1905

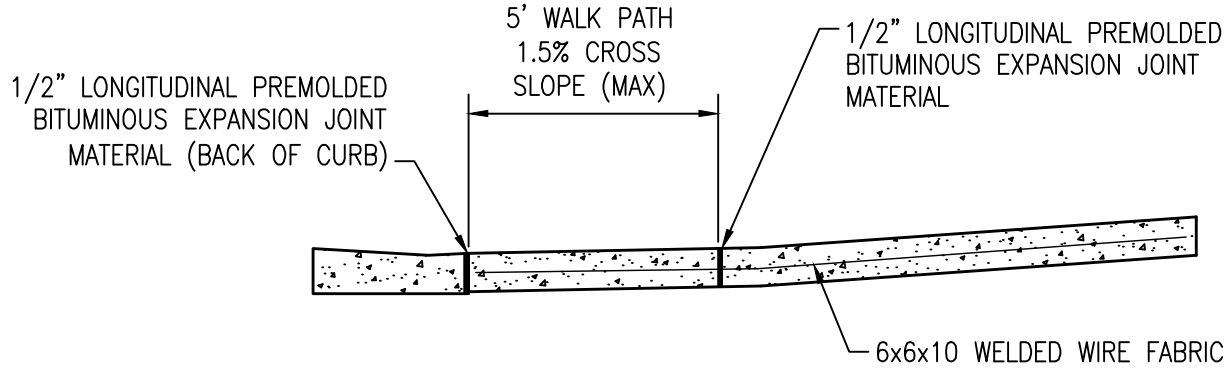
STANDARD CONSTRUCTION DETAILS

DRIVE PAD DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-13



PLAN VIEW



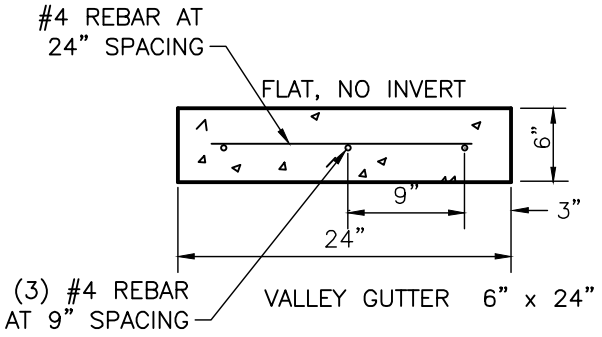
SECTION A–A

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

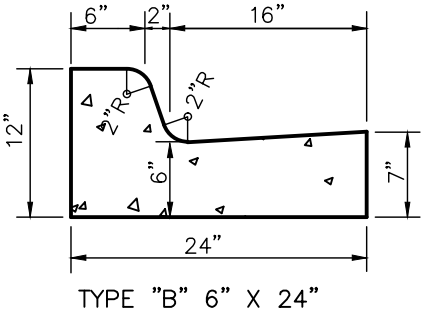
DRIVE PAD DETAIL SIDEWALK AT THE BACK OF CURB

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-14

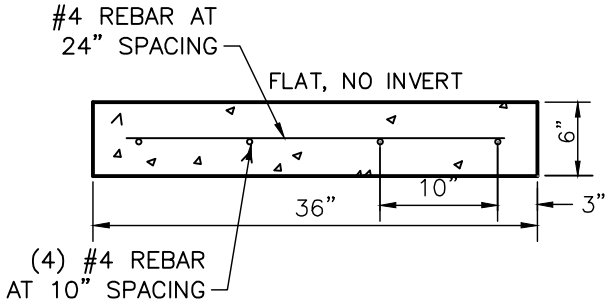


CONCRETE VALLEY GUTTER-24"

EXPANSION JOINT EVERY 50'
SCORED CONTROL JOINT EVERY 10'

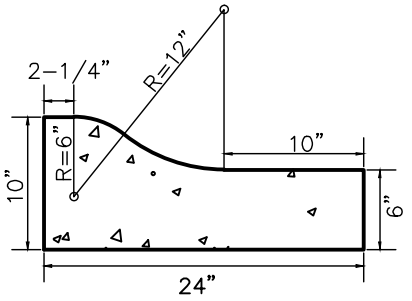


STANDARD CONCRETE CURB AND GUTTER-24"

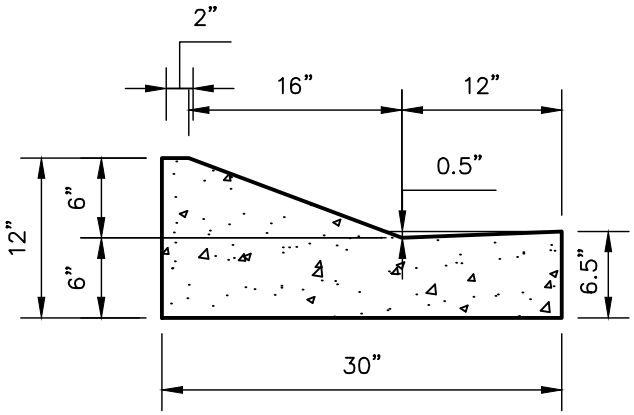


CONCRETE VALLEY GUTTER-36"

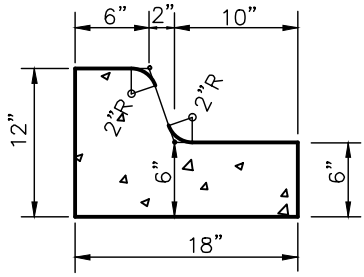
EXPANSION JOINT EVERY 50' SCORED
CONTROL JOINT EVERY 10'



MOUNTABLE CURB AND GUTTER-24"



TYPE "H" DRIVE OVER CURB & GUTTER



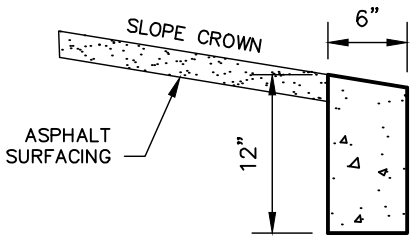
STANDARD CONCRETE MEDIAN CURB AND GUTTER-18"

CITY OF ARTESIA NEW MEXICO EST. 1905

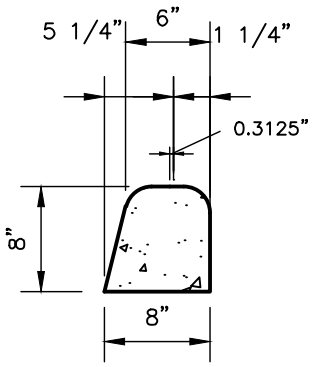
STANDARD CONSTRUCTION DETAILS

TYPICAL CONCRETE CURB DETAILS

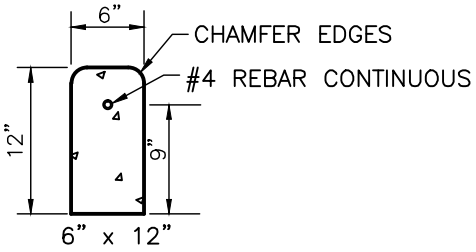
ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-15



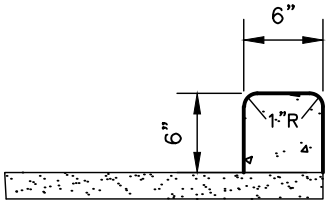
TYPE "J" HEADER CURB



TYPE "O" TEMPORARY ASPHALT CURB



HEADER CURB



TYPE "P" TEMPORARY EXTRUDED CONCRETE MEDIAN CURB

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

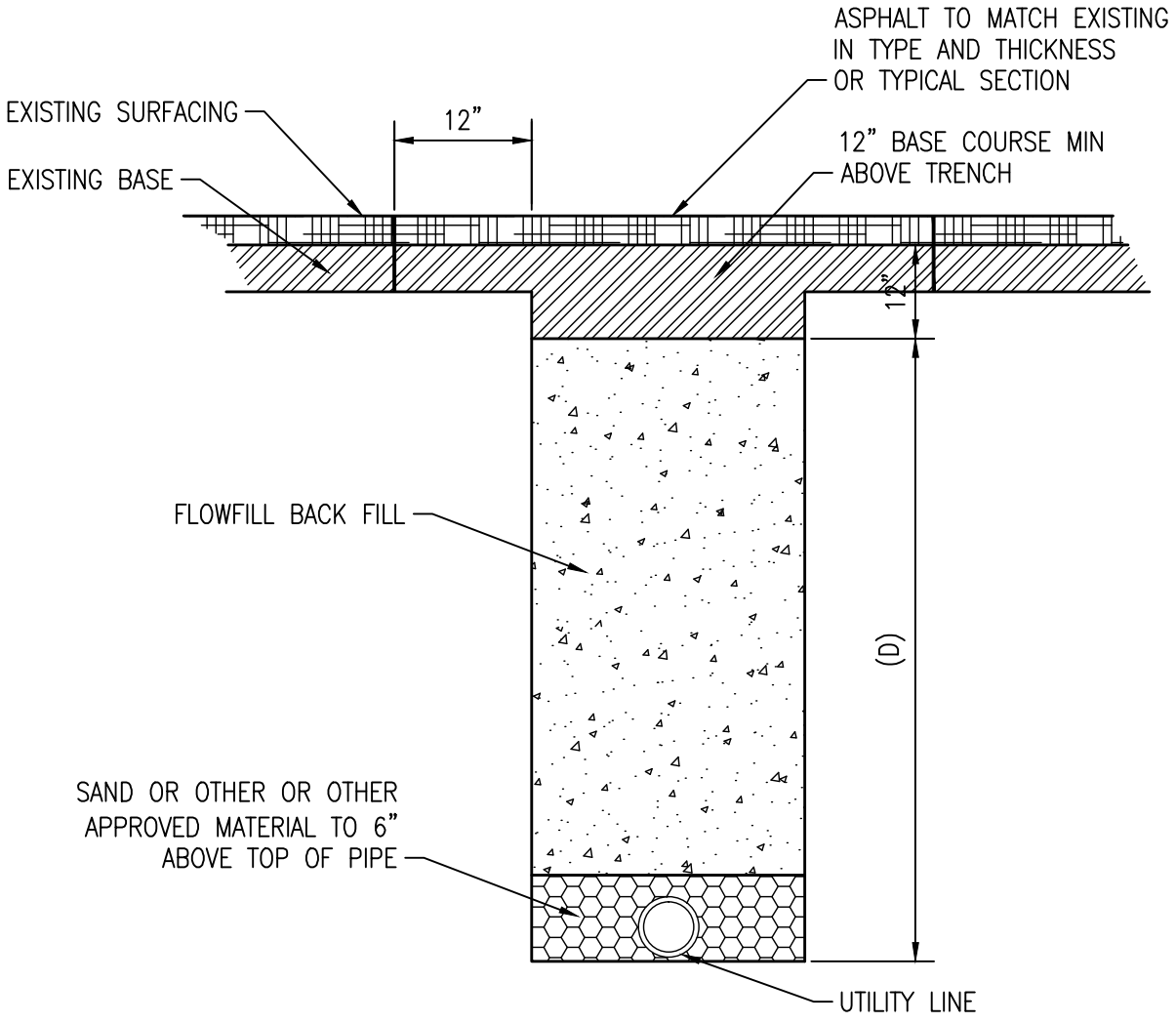
STANDARD CONSTRUCTION DETAILS

TYPICAL CONCRETE CURB DETAILS

ORIGINAL DATE: MAY 2009

REVISION DATE: OCTOBER 2014

SHEET NO: R-16



ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL FLOWFILL TRENCH DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: R-17

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SECTION 1. GENERAL NOTES

A. The Contractor shall coordinate the operation of all existing valves with the City by contacting the Utilities Department.

B. Prior to connection of a new water system to an existing system, hydrostatic and disinfecting, flushing, and bacteria testing shall be performed by the Contractor on all water lines, laterals, dead ends, and service lines as outlined in Sections 801.16 and 801.17 of the New Mexico Standard Specifications for Public Works Construction, latest edition.

C. The Contractor shall furnish a maintenance bond to the City in the amount of 10% based on the final contract price. The maintenance bond will be valid for two (2) years, commencing on the date of City issuance for a "Certificate of Final Acceptance."

SECTION 2. DESIGN CRITERIA FOR WATER SYSTEMS

2.1 GENERAL

A. Design criteria for all water systems shall comply with these City of Artesia Public Works Standard Specifications. Any deviations from these standards shall have prior approval from the Director of Infrastructure. The Design Engineer shall also be responsible for compliance with all governing agencies having jurisdiction over portions of a particular project, including but not limited to:

New Mexico Environmental Department (NMED)
New Mexico Department of Transportation (NMDOT)
Burlington Northern Santa Fe Railroad (BNSF)
Eddy County

B. The City of Artesia recently accepted a 40-Year Water Plan. This water plan briefly discusses water rights, water supply and demand, and water conservation. Improvements to existing infrastructure are not specifically outlined in the report, but generally mentioned, such as replacing water lines less than six-inch (6") diameter and looping the water system. A water system master plan was prepared outlining those upgrades as well as generally recommended line sizes. All new construction will require a model or design calculations to determine fluid flow conditions, line sizes, fire flow requirements, water pressures, and any other design elements required by the City of Artesia Utilities Department. The Director of Infrastructure shall provide final approval based on the recommendations.

C. Railroad, State Highway, and County Road crossings shall be approved by the Director of Infrastructure. Approved permits to agencies other than the City must be submitted through the City.

D. The Design Engineer shall include a summary of quantities on the construction plans for all public works projects that have improvements located within public rights-of-way or dedicated public easements.

E. Plan and profile elevations shall be included in the construction plans for water lines twelve (12) inch in diameter and larger (transmission lines). The minimum pipe size for water lines shall be six (6) inches. Water lines less than six (6) inch diameter will not be allowed by the City.

F. Where applicable, water line sizes shall comply with the latest edition of the Water System Master Plan.

G. Water lines shall be sized, looped, and extended through the limits of a development.

2.2 WATER LINE MATERIALS

A. Water lines: New water lines (transmission, laterals, and services) and fittings shall be High Density Polyethylene (HDPE) solid wall pressure pipe (Driscoplex 4100 - PE3608) material with a cell classification of 345464C, as defined under ASTM D3350 with an established hydrostatic design basis of 1,600 psi at 80° F. Compounds used in manufacturing the pipe and fittings shall conform to AWWA C901, AWWA C906, NSF 14, and NSF 61. The Design Engineer shall properly size HDPE pipe, service lines, and fittings on the basis of the Working Pressure Rating (WPR) needed for the entire water system. The WPR is the maximum continuous pressure allowed assuming recurring and occasional surge allowances per AWWA C906 and AWWA M55 are not exceeded. Minimum pipe size requirements for HDPE water lines in the City of Artesia shall be DR 17 (IPS), with a WPR of 100 psi, which allows for recurring surge pressures of 50 psi and occasional surge pressures of 100 psi, total internal pressures reaching 150 psi and 200 psi, respectively. Based on site conditions, the Design Engineer shall be responsible for specifying the manufacturer's construction methods for installation of HDPE pipe. The following are guidelines regarding trench design, placement, and backfill of HDPE pipe. The Design Engineer shall refer to the PE handbook published by the Plastics Pipe Institute (PPI), Chapter 7, and "Underground Installation of PE Piping," which provides more specific information (Refer to Appendix A).

B. All water lines supplying water based fire protection systems outside of public utility easements and public rights-of-way shall require a Double Check Backflow Preventor (DC), which must be sized accordingly by a New Mexico licensed engineer The fire line, water based fire protection system, and DC shall meet the requirements of the adopted city fire code and be approved by the fire code official.

C. Connections to an existing PVC water line shall be made by installing a tee and valve in the existing water line when the new line is equal to or larger than the existing PVC line. When the new line is smaller than the existing line, the connections shall be made by a tapping sleeve and valve ("HOT TAP"), full bodied stainless steel, epoxy coated, and fully gasketed. Tapping sleeves shall be by PowerSeal Pipeline Products (Model 3490), Mueller, or approved substitute. The tapping sleeve shall provide a flanged end, allowing for connection to a tapping valve that includes a MJ x Flanged ends. Bolts and nuts to be stainless steel, type 304. The tapping sleeve must sustain a minimum operating pressure of 150 psi. Connections to an existing HDPE water line shall be made with an electrofusion branch saddle.

D. Depending on the situation, if a "HOT TAP" is not called for on the construction plans, the City may also allow a tee and valve to be cut-in-place, requiring a portion of the water system to be temporarily shut down. Prior to closing any section of water line, approval will be required by the Director of Infrastructure or authorized City representative.

E. Valves shall be a resilient seated wedge gate valve with a non-rising stem by Clow, M&H, or Mueller. Minimum operating pressure shall be 250 psi.

F. Fire hydrants shall be Clow, M&H, or Mueller and require either one 4 ½" pumper (steamer) nozzle, and two 2 ½" hose nozzle connections or two 4 ½" pumper (streamer) nozzles with National Standard Threads. The type of hydrant shall be determined by the fire code official. All 4 ½" nozzles shall be fitted with a Harrington HPHA, 4 ½" NST female x 5" storz fitting with attached cap. Minimum operating pressure shall be 250 psi.

2.3 WATER LINE SIZING

A. Single Family Residential

1. All water lines shall be designed to provide the minimum fire flow requirements found city fire code. No water line shall exceed one thousand (1,000) feet in length. Structures other than single family homes, such as schools and churches, may have higher fire flow requirements. The design of the water lines shall consider these fire flows.

2. The Director of Infrastructure may require a water model and/or design calculations to support the designed water line sizes. Water lines less than six (6) inch diameter will not be allowed by the City.

3. Dead end water lines will not be allowed, except in cul-de-sacs.

B. Multi-Family Residential

1. All water lines placed for use shall be designed to provide the minimum fire flow requirements found in the city fire code. The Director of Infrastructure may require a water model and/or design calculations to support the water line sizes for supply and fire flows.

2. The water system shall be looped.

3. Six (6) inch fire hydrant leads shall not exceed fifty (50) feet.

4. Water lines less than six (6) inch diameter will not be allowed by the City.

5. Dead end water lines will not be allowed, except in cul-de-sacs, and shall not be more than 600 feet in length.

C. Commercial, Schools, and Industrial

1. . All water lines placed in non-residential subdivisions shall be designed to provide the minimum fire flow requirements found city fire code. The Director of Infrastructure may request. Water model and/or design calculations to support the water line sizes for supply and fire flows.

2. Six (6) inch water lines may be used for fire hydrants located in parking lots not adjacent to buildings, but shall be looped.

3. Six (6) inch fire hydrant leads shall not exceed fifty (50) feet.

4. Water lines less than six (6) inch diameter will not be allowed by the City.

5. Dead end water lines will not be allowed.

2.4 WATER LINE LOCATION

A. In public rights-of-way, water lines shall be installed under the roadway, measured six (6) feet from the back of curb. On dedicated public easements, the water line shall be centered upon the easement. When possible, every effort should be made to keep water lines away from existing and proposed trees and landscaped areas. If an alley or public utility easement is proposed and utilities other than water are to be installed, the placement of each utility shall be as shown in the typical alley layout. Any deviation from these standards will require approval from the Director of Infrastructure.

B. Water lines in commercial centers, shopping malls, and multi-family complexes shall be located a minimum of twenty (20) feet from any structure and preferably in parking areas and driveways, avoiding landscaped areas.

C. No water line shall be located nearer than five (5) feet from any tree.

D. Water lines installed under creeks, ditches, or other similar crossings shall be protected by a six (6) inch concrete encasement, a minimum of ten (10) feet past the embankment slope on each side or otherwise as approved by the Director of Infrastructure or authorized City representative.

E. Water lines crossing over storm drains and sanitary sewer lines shall have a minimum of eighteen inches (18”) vertical clearance. HDPE shall be used for all water applications, however, if the Director of Infrastructure allows PVC pipe, one full length of water pipe should be installed, equally split at the crossing. Where the minimum clearance cannot be achieved, the water line shall be encased in six inches (6”) of concrete, ten feet (10’) either side of the utility crossing. “Flowfill” may also be used, if prior approval is obtained from the Director of Infrastructure. In the event a water line crosses under a sanitary sewer line, eighteen inches (18”) of vertical clearance must be provided with the sewer line being constructed of solid wall pressure pipe, pipe characteristics shall be equal to the water line. The solid wall pressure pipe must extend ten (10) feet either side of the utility crossing.

F. Parallel water lines shall be at least 10 feet horizontally separated from any existing and proposed sanitary sewer line. Both horizontal and vertical clearance distances are to be measured from edge to edge. If maintaining 10 feet of horizontal separation is not possible or impractical, the Director of Infrastructure and Design Engineer will determine an alternate method of construction, such as using pressure rated pipe or concrete encasement for the sewer line.

2.5 VALVES

A. Valves twelve (12) inch and under shall be spaced no more than five hundred (500) feet apart in residential, duplex, and apartment districts and not over three hundred (300) feet apart in all other districts. In addition, valves are to be located in areas that require preferably two (2), but not more than three (3) valves to shut down each water line segment, or as may be required to prevent shutting off more than one (1) fire hydrant. Valves twelve (12) inch and under will be Resilient Seat Wedge Gate Valves (RSGV).

B. The location of valves larger than twelve (12) inches will be approved by the Director of Infrastructure~~.~~

C. Fourteen (14) inch and larger valves shall be Butterfly type or approved substitute, such as Resilient Seat Wedge Gate Valves (RSGV). Approval will be required by the Director of Infrastructure or authorized City representative.

D. On cross-feed water lines without services, a minimum of three (3) valves shall be installed to shut down each water line segment.

E. Valves shall be placed at or near the ends of water lines in such a manner that a shut down can be made for a future water line extension without causing loss of service on the existing water line. A minimum of twenty (20) feet of water line shall be installed past the valve to anchor it and five (5) feet minimum beyond the end of pavement.

F. Where fire lines are connected to City water lines, valves shall be installed on each side of the connection and on the fire line for isolation purposes.

G. Valve boxes shall be provided for buried valves. These boxes shall be three (3) piece, screw-type, cast iron of the extension type and shall be similar to East Jordan Iron Works, Inc. products or approved substitute. The three (3) pieces shall consist of the top section, bottom section, and cover.

H. Valve boxes over four (4) feet deep will require extensions, or otherwise as directed by the Director of Infrastructure or authorized City representative. Valve box extensions shall be cast iron; PVC pipe will not allowed.

I. In order to maintain a manageable parts inventory and working knowledge of valves, only Clow, Mueller or M&H valves are approved.

2.6 DEPTH OF COVER

The minimum cover below the top of pavement or finish grade to top of pipe should be as follows:

A. Twelve (12) inch and smaller water lines shall have a minimum cover of forty-two (42) inches.

B. Water lines larger than fourteen (14) inch diameter shall have a minimum cover of five (5) feet, which is sufficient to allow water, sanitary sewer, and other smaller utilities to cross under the large water line.

C. For water lines to be constructed along County roads built with a low crown and bar ditches, increase the cover as required to allow for future paving grade changes.

2.7 WATER SERVICES

A service line shall be installed from the water line to a point eighteen (18) inches behind the curb line at a minimum depth of twenty-four (24) inches, usually in advance of paving, for all subdivisions. After paving, the Utility contractor shall furnish and install the meter box. The location of the meter box shall be at or near the center of the front of the lot to be served. No meter box shall be installed in a paved area. On multiple apartments, commercial, industrial, and other similar business properties, the desired size and location is usually specified by the owner, developer, or architect. Minimum requirements for water service lines:

A. Water meter boxes shall be approved for each service by the Utilities Department or authorized City representative.

B. Minimum one (1) inch meter and one (1) inch High Density Polyethylene (HDPE-Copper Tubing Sized) services with a minimum Working Pressure Rating (WPR) of 200 psi (SDR 9) are required to serve all residential lots, patio homes, townhomes, and duplexes.

C. The size of apartment, condominium, or multi-family services will depend on the number of units served with a minimum of one (1) meter per building but shall be a minimum 1” line with a 1” meter.

D. Sand embedment shall be used around the HDPE tubing.

E. All service saddles shall be Smith-Blair (Taperseal – Model #317) double strapped, stainless steel with an epoxy coating or an approved substitute and used only with non HDPE water lines. Otherwise, all connections shall be by means of electrofusion branch saddles when the water line is HDPE.

F. Twin meters (bullhead connections) in parallel are not permitted. Generally, a single larger meter shall be selected.

G. Four (4) inch and larger meters are required to be in a concrete vault with access lid. Typical water meter sizes are one (1) inch, two (2) inch, and four (4) inch.

H. A water service line connection will not be allowed on fire hydrant leads.

2.8 FIRE HYDRANTS

All fire hydrant placement and installation shall meet the minimum requirements found in the City's Fire Code. The location, quantity, and type shall be approved by the Fire Code Official and accepted by the Infrastructure Director.

A. Residential and Nonresidential Property Uses:

1. Protected Properties – Fire hydrants required to provide a supplemental water supply for automatic fire protection systems shall be within one hundred (100) feet of the Fire Department Connection (FDC) for such systems. The FDC location and hydrant location shall be approved by the Fire Code Official.

2. In undeveloped areas, fire hydrants shall be spaced every one thousand (1,000) feet or as designated by the Director of Infrastructure Fire Code Official.

B. Restrictions:

1. In order to maintain a manageable parts inventory and working knowledge of fire hydrants, the following hydrants are allowed: Clow, M&H, or Mueller and of the type as described in Section 2.2 "Water Line Materials". The type shall be determined by the Fire Code Official.

2. Fire hydrants leads shall have a minimum bury depth of forty-two (42) inches.

3. Valves shall be placed on all fire hydrant leads, Fire hydrants designed to discharge from one (1) 4 ½" discharge shall have a minimum size of six (6) inch for both the valve and fire hydrant lead. Fire hydrants designed to discharge from two (2) 4 ½" discharges shall have a minimum of an eight (8) inch for both the valve and the fire hydrant lead.

4. Fire hydrants shall be installed so the breakaway point will be no less than two (2) inches, and no greater than six (6) inches above the finish grade elevation.

5. Fire hydrants shall be located a minimum of two (2) feet and a maximum of four (4) feet from a designated fire lane or public roadway, based on the location of the sidewalk, and approved by the Fire Code Official. In any event, a fire hydrant shall not be located in the sidewalk.

6. If required by the Fire Code official fire hydrants shall be adequately protected by a curb stop, bollards, or other methods approved by the Fire Code Official. Fire hydrants shall be located within public water easements or public rights of way.

7. ~~F~~ire hydrants shall be installed with the pumper discharge facing the roadway, or as directed by the Fire Code Official.

8. When practical, fire hydrants placed at intersections or access drives to parking lots, shall be placed so that no part of the fire truck will block the intersection or parking lot access when connections to the fire hydrant are made.

9. Fire hydrants located on private property shall be accessible to the Fire Department at all times and have 36 inches of clearance around the entire fire hydrant.

2.9 WATER EASEMENTS

The following is the minimum width exclusive to water easements and are required when facilities are not located within public rights-of-way.

A. Water lines are to be located within the center of a minimum fifteen (15) foot water easement. If other utilities are required to share the same easement, additional width may be required and the easement shall become a "Utility Easement." A minimum width of twenty (20) feet will be required for all utility easements or as approved by the Director of Infrastructure. When possible, every effort should be made to keep water lines away from existing and proposed trees and landscaped areas. If a public utility easement is proposed and utilities other than water are to be installed, the Design Engineer will determine the placement for each with proper separation.

B. Location of a water line within drainage floodways and any other non-standard passageways will require approval from the Director of Infrastructure.

C. Location and width of transmission line easements shall require approval from the Director of Infrastructure.

D. Parallel easements and water lines adjacent to public rights-of-way require approval by the Director of Infrastructure.

E. In residential developments, water line easements shall lie entirely on a single lot and not cross residential lots unless specifically approved by the Director of Infrastructure.

F. Fire hydrants located outside of public rights-of way shall be encompassed by a ten (10) foot by ten (10) foot water easement (10'x10').

G. Two (2) inch and smaller meters serving multi-family residential and non-residential developments shall be set in a minimum five (5) foot by five (5) foot water easement (5'x5') or in the public right-of-way.

H. Four (4) inch and larger meters shall be in a minimum ten (10) foot by ten (10) foot (10' x 10') water easement and not in the right-of-way.

SECTION 3. WATER SYSTEM CONSTRUCTION

3.1 SCOPE

These specifications for construction of water lines are intended to provide a minimum quality of workmanship acceptable to the City of Artesia and lack of any specifications not listed in this document does not relieve the Contractor of full responsibility for providing a complete project satisfactory for operation.

The Contractor shall furnish and install all materials, labor, and equipment for constructing the work shown on the construction plans, following these specifications and any requirements by other governing agencies.

3.2 MATERIALS

The Contractor shall furnish and install materials meeting the requirements of these specifications and follow the dimensions, locations, and elevations shown on the construction plans. All materials shall be approved by the Design Engineer before being installed and any of these materials placed before they are so approved shall be removed and replaced with approved materials at the expense of the Contractor.

Materials delivered to the site of the work prior to their use shall be stored so as to cause the least inconvenience to the public and in a manner satisfactory to the Design Engineer and City.

A. Testing of Materials

It shall be the sole responsibility of the Contractor to prove to the Design Engineer's satisfaction that materials furnished for the construction of water lines comply with these specifications.

Water pipe shall be tested at the factory to see that the pertinent specifications are satisfied. The manufacturer shall furnish a certificate and test reports for each truckload, showing the conformity of the material with applicable AWWA specifications, and that each and every piece of pipe and fitting has been inspected for visible physical defects and defective pieces rejected. Upon request, the manufacturer will furnish a certificate showing the material meets or exceeds ASTM D3350 and conforms to AWWA C901 or C906.

3.3 PIPE JOINTS

Joints for water pipe shall meet the following:

A. HDPE pipe and force mains joints shall be joined by means of heat fusion. Types of joints include butt fusion, electro fusion, saddle fusion, socket fusion, or flange.

B. Refer to the PE handbook as published by the Plastics Pipe Institute (PPI), Chapter 9, "PE Pipe Joining Procedures" (Appendix B) or Technical Report 33, "Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe (2006)" (Appendix C).

C. The City will require a data logger for each project using HDPE, which tracks and records the fusion of each joint.

D. The contractor shall be certified in heat fusion of pipe joints in accordance with ASTM F2620.

3.4 TRENCHING AND BACKFILL OF HIGH DENSITY POLYETHYLENE (HDPE) PIPE

Based on site conditions, the Design Engineer shall be responsible for implementing the manufacturer's construction methods for installation of HDPE pipe. The following are guidelines regarding trench design, placement, and backfill of HDPE pipe. The Design Engineer shall refer to the PE handbook published by the Plastics Pipe Institute (PPI), Chapter 7, and "Underground Installation of PE Piping," which provides more specific information (Refer to Appendix A).

This work shall include the furnishing of all labor, materials, tools, equipment, and machinery necessary for clearing, stripping, and removing all obstructions, top soil, sod, trees, brush, vegetation, debris, earth, rock, and other materials to be excavated. Furnish, place, and maintain of all sheeting, shoring and bracing necessary to protect ongoing work and adjacent properties, meeting OSHA requirements. Install pump and drain trenches necessary to keep the excavation free of water seepage from sources such as sanitary sewers, storm drains, ditches, and creeks without interrupting the flow of surface waters during the progress of construction. Dispose of excess and unsuitable materials that cannot be used for backfilling, tamping, compacting, and refilling of excavated areas. Restore all streets, alleys, fences, rights-of-way, and any other structures or property relative to the project, whether private or public, that may have been damaged or used by the Contractor, to the condition that existed prior to work. The trenching and backfill shall be as shown on the standard drawings.

A. Classification

Excavation in trenches for water line construction will be unclassified and will not be paid for separately, but shall be included in the unit price bid per linear foot for the various sizes of pipe, unless specific provisions for separate payment is called for in the technical specifications or bid schedule.

B. Construction Methods

Trenching - Trenches shall be excavated by trenching machine, backhoe or dragline, except in locations where hand trenching is required. The banks of trenches shall be vertical, to a point one (1) foot above the top of pipe. When possible, excavation for pipe shall be completed without any support of the trench walls. Regardless of site conditions, the Contractor will be required to submit a trench safety plan to the City prior to start of construction. The trench safety plan shall meet the most current regulations set forth by the Department of Labor's Occupational Safety and Health Administration (OSHA), including any amendments. The Contractor shall be responsible for maintaining all trenches in a safe working condition, protecting both the workers and general public.

As a minimum, trench widths should be twenty-four (24) inches plus the pipe outside diameter. Trench widths may be increased as needed for proper compaction of embedment material. The excavation shall not advance more than three hundred (300) feet ahead of the completed and backfilled pipeline. Pipe shall be laid in all open trenches prior to the end of a day's work, unless the Contractor secures written permission to do otherwise from the City or Design Engineer.

Trench bottoms will be excavated to the lines and grades as shown on the construction plans. Should any field changes be made to the alignment without affecting the amount of material and required trenching, the Contractor may proceed with the revised alignment at the unit bid price with approval from the Director of Infrastructure and Design Engineer.

If the bottom of the trench becomes an unstable foundation for the pipe by neglect of the Contractor to adequately shore or dewater, the Contractor will be required to remove the unstable material and backfill the trench to the proper grade with approved compacted material, with no extra compensation being granted for this material or work. If the undisturbed material encountered at the grade depth proves to be an unstable foundation for the pipe, the Contractor will be required to remove such unstable material and backfill the trench to the proper grade with approved compacted material. Compensation for such work can then be made to the Contractor by a mutually agreed upon cost per cubic yard.

If the trench is excavated deeper than necessary, it shall be backfilled to the proper grade with approved compacted material at the Contractors expense.

During the excavation of all trenches, the Contractor shall protect existing pipe lines and structures and avoid any damages. The Contractor shall give notice to the Owners of any such lines or structures in order that they may have time to take the necessary precautions for protecting their property.

In rock, the trench shall be over excavated six (6) inches below the bottom of the pipe and the trench backfilled with suitable material and properly tamped to finish grade. Separate payment for such work shall be included in the technical specifications and bid schedule.

After inspection of pipelines has been completed on any portion of the work, the trench may then be backfilled. Backfilling shall be accomplished in compliance with the applicable portions of these specifications.

Bedding - If the trench bottom can be cut and graded without difficulty and be relatively smooth, the pipe may be installed directly on the trench bottom. The trench bottom must support the pipe without any lumps, voids, debris, or rocks (rocks may not exceed three-fourths (3/4) inch diameter). If large rock is encountered that may cause a point load, it shall be removed a minimum depth of six (6) inches and replaced with suitable material, such as gravel (Class I) or sand (Class II) with particle sizes averaging three-fourths (3/4) inch or less, with a minimum compaction of 95% of the maximum dry density, in accordance with ASTM D-1557.

Pipe embedment and initial backfill – After the pipe has been laid into the trench, the pipe lines shall be backfilled in accordance with ASTM D-1557 as follows:

Class I embedment (gravel or crushed stone): The particle size shall not exceed three-fourths (3/4) of an inch in diameter. Gravel or crush stone should be carefully placed around the pipe without damaging the pipe in six (6) inch lifts to a minimum six (6) inches above the top of pipe.

Class II embedment (Sand): Sand shall consist of a clean, durable, and organic material, being carefully placed around the pipe in lifts of six (6) inches and then mechanically tamped for compaction, to a minimum of six (6) inches above the top of pipe. Minimum compaction shall be 95% of the maximum dry density, in accordance with ASTM D-1557. When using Class II material for embedding, water jetting may be performed to saturate the material, however, the Contractor shall be careful that soils do not collapse and the pipe does not float or rotate, while still meeting compaction.

Detectable tracing wire (copper) shall be installed, approximately six (6) inches above the top of pipe, centered upon the pipe. Wire shall be a minimum of 12 gage, UL rated, with a minimum of 30 mil PE or PVC sleeve.

Final Backfill – Upon completion of the pipe embedment and initial backfill, final backfill shall consist of native soils, free of debris, and placed uniformly in compacted layers of six (6) inches, mechanically tamped to 95% of the maximum dry density, in accordance with ASTM D-1557. The material should be free of large stones that may cause damage to the pipe, such as concentrated pipe loading. A minimum of six (6) inches of embedment cover should be placed on the top of pipe prior to start of final backfill.

Detectable Warning Tape ("Blue-Caution Buried Water Below" or approved other) shall be installed a maximum of eighteen (18) inches below finish grade prior to completion of final backfill, approximately centered upon the pipe.

C. Sheeting, Shoring, and Bracing

The sides of all excavations shall be sheeted, shored, and braced in accordance with OSHA regulations and installed by the Contractor's "competent person" so as to try to prevent slides, cave-ins, settlement, or movement of the banks and to maintain the excavation clear of obstructions that will in any way hinder or delay the progress of the work. All sheet piling, shoring, and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and maintain the sides of the excavation properly in place and protect all persons or property from injury or damage.

Sheeting, shoring, and bracing shall not be left in place unless otherwise allowed by the City or Design Engineer. The removal of sheeting, shoring, and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private or public properties, and to avoid cave-ins or sliding of the banks.

D. Pumping and Draining

The Contractor shall immediately remove all surface water or seepage from sanitary sewers, storm drains, ditches, and other sources that may accumulate during the excavation and construction work by means of pumping or draining.

All water removed from excavations shall be disposed of in a manner that will not create unsanitary conditions and interfere with the use of streets, private driveways, or entrances.

E. Support of Existing Pipes Across Trench

It shall be the responsibility of the Contractor to protect and support all water, sanitary sewer, gas, and other utility crossings during the excavation or required work to be performed, along with arranging for any temporary removal and replacement. Payment for this work will be included in the price for pipe installation.

F. Disposal of Excavated Materials

Excavated materials shall be stockpiled adjacent to the work and used for backfilling, if suitable. Excavated materials unsuitable for the backfilling or in excess of that required for backfilling shall be disposed of in an approved manner at locations designated on the construction plans or approved by the Design Engineer or City. Suitable top soil or sod shall be carefully stockpiled separately and replaced in its original position, where possible. Excavated materials shall be handled at all times to minimize any inconvenience or damage to the public or private property. In parkways and easements where it is necessary to deposit excavated materials on lawns during the construction process, burlap or canvas shall be placed on the lawn to prevent contact between excavated materials and the lawn, however, the Contractor must first obtain permission from the property owner.

G. Protection of Trees, Plants, Shrubbery, etc.

Where trees, plants, shrubbery, etc., are adjacent to the line of the work and are not to be removed or replaced, the Contractor shall protect such trees, plants, shrubbery, etc., by installing temporary fencing and not permitting machinery or employees to damage tree limbs. If the Design Engineer believes that such trees, plants, shrubbery, etc., would be damaged by machinery, hand excavation may be required.

H. Protection of Buildings

The Contractor shall, at his own expense, shore up and protect any building or other structure which may be endangered during the work and restore all buildings, culverts, fences, walls, or other properties disturbed during construction to the original condition. The Contractor shall be responsible for any injuries to persons and property or damages to any utilities and structures that may occur due to construction.

I. Crossings to be Kept Open

Where street and all other crossings are shown on the construction plans, open cut trenches are to be backfilled as reduce interruption of traffic, whether it be vehicular or pedestrian. Such work shall be considered incidental to the project.

J. Protection of Unfinished Work

Before leaving work for the night, care must be taken to protect and securely close the unfinished end of the pipe so that earth or other materials do not enter into the pipe through any such opening or unplugged end.

K. Traffic Control

The Contractor must provide and maintain adequate traffic control during construction. The Contractor shall provide lights, warning signs, and/or watchmen in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), latest revision, to provide a safe environment for vehicular and pedestrian traffic.

3.5 CONCRETE BLOCKING

Concrete having compressive strength of not less than 3000 psi shall be used as a cradle or backing. Concrete mix designs shall be approved by the Design Engineer. Water system components such as bends of twenty-two and one-half degrees (22-1/2˚) and greater, plugs, valves, tees, crosses, fire hydrants, etc., shall require concrete for thrust blocking and cradling, unless the material throughout is HDPE. Concrete shall be placed between solid ground and the fitting to be anchored, unless the Design Engineer determines otherwise.

3.6 POLYETHLYLENE ENCASEMENT

Water system components such as bends, plugs, tees, valves, crosses, and similar fittings shall be encased with polyethylene film. The film should be wrapped around the fittings without any tears or holes and then held in place with an adhesive tape.

3.7 COVER OVER PIPE

All water lines twelve (12) inch diameter and smaller shall have a minimum cover of forty-two (42) inches. Water lines larger than fourteen (14) inch diameter shall have a minimum cover of five (5) feet, which is sufficient to allow water, sanitary sewer, and other smaller utilities to cross under the large water line.

Where the lines are located in improved streets with curb and gutter, the cover will be measured from the top of pavement to the top of the water pipe. If the water line is located across natural ground, the cover over the pipe shall be measured from natural ground to the top of the pipe. When a profile is shown on the construction plans, the Contractor will be required to lay the line to conform to the grades shown.

3.8 CONNECTION TO EXISTING WATER LINES

When indicated on the construction plans, the Contractor shall connect the new water line to existing water lines. The Contractor shall furnish all labor, materials, equipment, and services required for locating and uncovering the existing line, make any cuts in the existing line, if necessary, remove, relocate, and connect the new water line and any appurtenants to the existing water line in complete condition. The Design Engineer will determine if such

connections to existing water lines with a new water line shall be pressure tested and disinfected at the same time or separately with the new water line.

When the new line is smaller than the existing PVC line, the Connections to an existing PVC water line shall be made by a tapping sleeve and valve ("HOT TAP"), full bodied stainless steel, epoxy coated, and fully gasketed. Tapping sleeves shall be by PowerSeal Pipeline Products (Model 3490), Mueller, or approved substitute. The tapping sleeve shall provide a flanged end, allowing for connection to a tapping valve that includes a MJ x Flanged ends. Bolts and nuts to be stainless steel, type 304. The tapping sleeve must sustain a minimum operating pressure of 150 psi. Connections to an existing HDPE water line shall be made with an electrofusion branch saddle.

When the new line is equal to or larger than the existing PVC line, connections to the existing PVC water line shall be made by installing a tee and valve to be cut-in-place, requiring a portion of the water system to be temporarily shut down. Prior to closing any section of water line, approval will be required by the Director of Infrastructure or authorized City representative.

3.9 VALVES

A. Gate Valves for Distribution Water Systems and Fire Hydrant Leads

All water distribution system valves and fire hydrant lead valves through twelve (12) inches in size shall be non-rising, resilient seated wedge-type gate valves conforming to AWWA C-509, except for changes or additions specifically outlined as follows:

Valves shall have flanged or mechanical joint ends. When valves are connected to HDPE water pipe, both ends shall be either flanged or MJ. Flanged adapters with ductile backing rings or MJ adapters with internal stainless steel stiffeners and ductile iron gland shall be fused to pipe ends.

Gate valves shall be by Clow, Mueller, or M&H. All gate valves shall have an epoxy coated body with resilient seated wedge, opening and closing freely, with a two (2) inch square operating nut. Gate valves shall open by turning counter-clockwise and when fully opened, allow for an unobstructed waterway.

Gate valves shall be tested at a hydrostatic pressure of 500 psi, and shall be guaranteed for an operating pressure of 250 psi. The manufacturer shall furnish to the City certified copies of the hydrostatic tests performed on the valves.

B. Installation of Gate Valves

All valves shall be installed as shown on the construction plans. Each gate valve shall be furnished with a valve box, consisting of a three (3) piece, cast iron, screw type assembly, which includes a top section, bottom section, and cover. Valve boxes over four (4) feet deep will require extensions. Valve boxes shall be manufactured by Mueller or approved substitute.

C. Air Release Valves, Air/Vacuum Valves

Air release valves, when shown on the construction plans or required, shall be the float and lever type, stainless steel, or the air/vacuum type as manufactured by Val-matic or approved substitute. The inlet ends will be screwed for two (2) inch and smaller, and flanged for three (3) inches and larger. Valves shall be equipped with a regulated closure device.

3.10 FIRE HYDRANTS

Fire hydrants shall conform to AWWA Specifications C-502, except for changes or additions specifically outlined as follows:

A. Positive operating drain valves drain plugs, or drain rings shall be provided to drain the hydrant. The seat of the drain valve shall be bronze (or other corrosion-resistant material), fastened securely to the hydrant.

B. All fire hydrants shall open by turning to the left (counter-clockwise).

C. Hydrants shall be of the break-away type, designed to break approximately two (2) inches, but not over six (6) inches above the ground line.

D. "O"-rings shall be furnished in lieu of packing, double "O"-ring type.

E. Each hydrant must have a sealed oil reservoir to provide lubrication of stem threads and bearing surfaces each time the hydrant is operated or shall be provided with a lifetime lubrication system contained in a grease chamber. All hydrants must be equipped with a weather cap to prevent water from entering the bonnet.

F. Fire Hydrants shall be by Clow, Mueller (Super Centurion 250), or M&H.

G. Fire hydrant 4 ½" discharges shall be National Standard Threads and be fitted with a Harrington HPHA, 4 ½"NST female x 5" Storz fitting with an attached cap or approved equal.

3.11 SERVICE CONNECTIONS

Water service connections shall be made by tapping the main water line at specific points as designated by the Design Engineer. Service taps shall be made after the main water lines have been laid. The work shall be done by a tapping machine and tools. A tapping saddle shall be used to connect service lines to PVC water lines. The service pipe shall be placed at a minimum depth of twenty-four (24) inches under finish grade.

The length of the service line shall extend from the main water line to a point eighteen (18) inches behind the back of street curb, at a depth of eighteen (18) inches. If no curb exists, the service line shall be extended to the property line. The service line shall be continuous with no fittings underneath the paving.

A. Service Materials

Minimum one (1) inch meter and one (1) inch High Density Polyethylene (HDPE-Copper Tubing Sized) services with a minimum Working Pressure Rating (WPR) of 200 psi (SDR 9) are required to serve all residential lots and patio homes. For townhomes and duplexes, a minimum two (2) inch meter and service shall be provided to each of the family units.

Double strand stainless steel straps (Smith-Blair Taperseal-Model #317) with an AWWA inlet thread by CTS Corporation Stop will be used for connections to PVC water lines.

Electrofusion branch saddles will be used for HDPE water lines.

Brass ball valve curb stops will be installed at the meter box, prior to the meter.

Sand embedment shall be used around the pipe and saddle tap.

Precast, one piece, plastic with polymer locking lid, water meter boxes shall be furnished and set on each service that is two (2) inches and smaller. Meters three (3) inch and larger will be set in a concrete vault.

Water meters two (2) inch and smaller will be furnished and installed by the City. Sizes three (3) inch and larger will be furnished and installed by the Owner and/or developer.

3.12 FIBERGLASS MARKERS

Where the pipeline travels across open country and is not in public right of way and under pavement, marking posts shall be placed at two hundred and fifty (250) foot intervals, and every change in alignment direction. Marking posts shall be a minimum of four (4) inches wide by sixty (60) inches high, “blue” in color. Each marking post shall read “WARNING WATER PIPELINE.”

3.13 CLEAN-UP

During construction, the Contractor shall be responsible for maintaining all work areas in a clean and presentable manner. Scraps and debris shall not be left scattered, but should be assembled together, if applicable. Non-usable materials shall be moved from the work areas and properly disposed to the satisfaction of the City, Owner, and Design Engineer.

The Contractor shall make a final cleanup of all parts of the work prior to final acceptance by the City or Owner. This cleanup shall include items such as: construction materials, equipment, scraps, pieces of concrete and other debris. Earthwork shall be smooth and graded as shown on the construction plans. Final backfill over all trenches shall be left in a uniform condition.

Disposal is not to be made on adjacent private or public property without written permission. If permission is granted by the property owners or City, the Contractor will be responsible for re-establishing the area to conditions satisfactory to the property owner or City, once work has been completed.

3.14 DISINFECTION OF WATER LINES

During the construction operations workmen shall be required to use utmost care to see that parts of the structures, inside of pipes, fittings, jointing materials, valves, etc., the surface of which come into contact with Owner's water are maintained in a sanitary condition. Every effort must be made to keep the inside of the pipe, fittings, and valves free of all foreign matter, sticks, dirt, rocks, etc. As each joint of pipe is being laid it must be effectively swabbed so that all foreign matter is removed. All fittings and exposed open ends of pipe must be blocked or capped until the line is completed.

A. Prior to connection of a new water system to an existing system, hydrostatic and disinfecting, flushing, and bacteria testing shall be performed by the Contractor on all water lines, laterals, dead ends, and service lines as outlined in Sections 801.16 and 801.17 of the 2006 New Mexico Standard Specifications for Public Works Construction.

3.15 INSPECTION AND TESTS

Tests and inspections shall be made on the entire project by sections to confirm that the water line is installed according to the construction plans and these specifications and is acceptable to the City.

The Resident Project Inspector shall observe the construction of the project on a routine basis. Final acceptance will not be given until the entire project has been completed, including all tests conducted and passed as may be required in these specifications.

A. Inspection –General

During the process of unloading, all pipe and accessories shall be inspected by the Contractor for loss or damage due to transportation.

The Contractor shall be responsible for all materials furnished for the project and shall replace at his own expense all such materials that is found to be defective in manufacturing or that has become damaged in handling after delivery by the manufacturer. The Contractor shall be responsible for the safe storage of material furnished by or to him until it has been incorporated in the completed project.

B. Visual Inspection

During the course of the construction, the Project Inspector will make continuous routine inspection to confirm that the project is being constructed in accordance with the construction plans and specifications and that the materials are of the type and size specified.

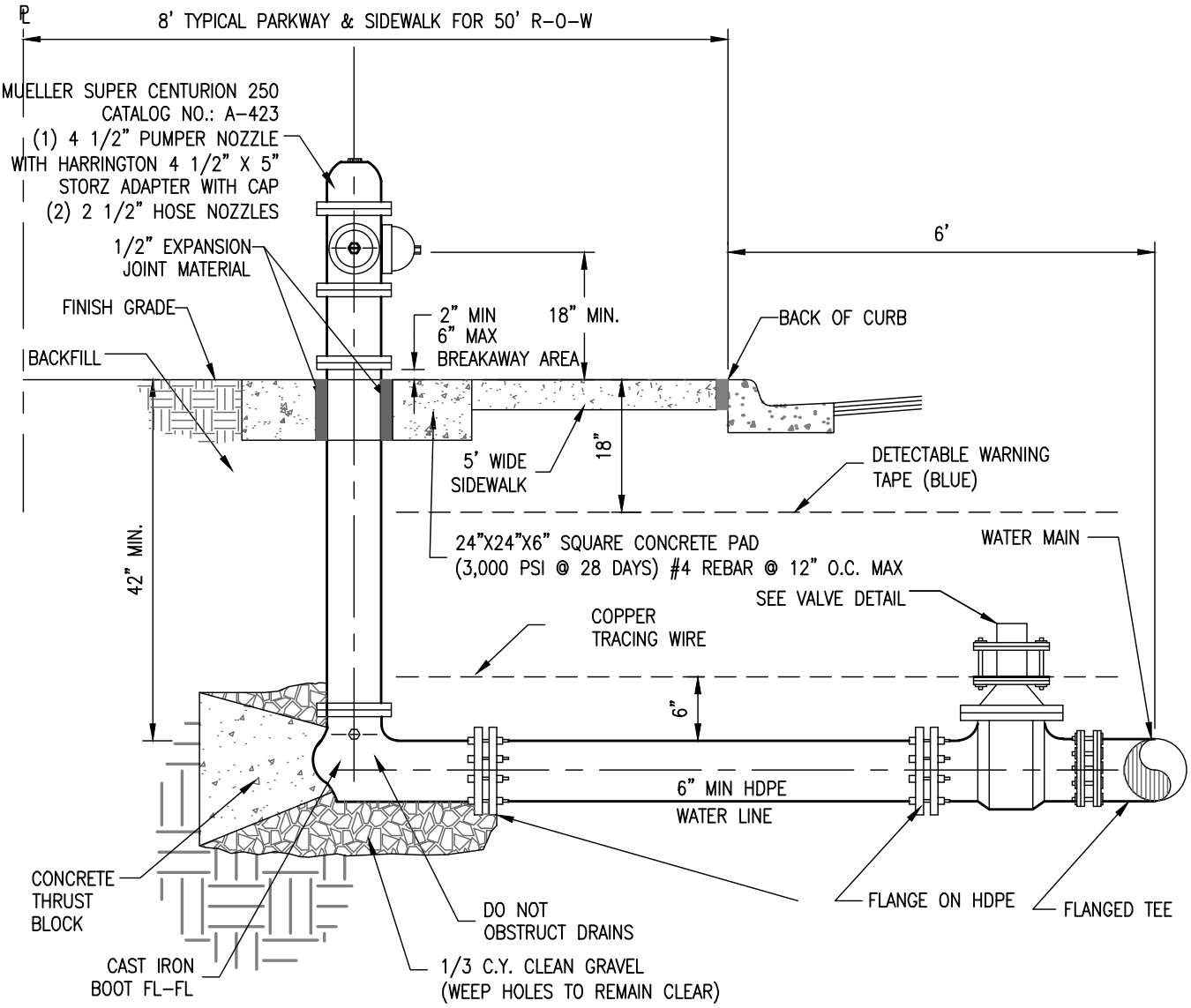
Upon completion of the project, or part of the project, the Design Engineer or his authorized representative (Project Inspector), Director of Infrastructure, Fire Code Official, and Contractor (Job Superintendant) will make a visual inspection of the entire project, or a part of the completed project, using the City's preliminary and final checklists to determine punch list items.

C. Compaction Test

Frequency of tests shall not be less than one (1) for any pipe section and every three hundred (300) linear feet of main pipe per two (2) feet of lift until final grade, starting at two (2) feet above the top pipe but not less than two tests. Water services are to be tested at the rate of one (1) for every six (6) services which cross the proposed right of way or every three hundred (300) linear feet of water service installed. Every other fire hydrant lead that cross the existing or proposed street, alley, or fire lane subgrade shall also receive at least one (1) set of density tests. All ditches shall be mechanically tamped and compacted to a minimum 95% maximum dry density, in accordance with ASTM D-1557. When using Class II material for embedding or backfilling, water jetting may be performed to saturate the material. However, the Contractor shall be careful that soils do not collapse, while still meeting compaction.

If there are any doubts from the Design Engineer or City that compaction requirements have not been met, then the Design Engineer may order such density tests be performed by a soils engineering firm at the expense of the Contractor. If these tests prove that the original backfill is not of sufficient compaction, then the Contractor will be required to remove and replace the backfill for proper compaction until densities are met under these specifications.

SECTION 4. WATER SYSTEMS STANDARD CONSTRUCTION DETIALS



NOTES:

1. NO OBSTRUCTIONS WILL BE PERMITTED WITHIN 3'0" OF FIRE HYDRANT.
2. FIRE HYDRANTS SHALL NOT BE LOCATED IN SIDEWALKS OR PAVEMENT, PARKWAYS ARE PREFERRED.
3. PUMPER NOZZLE SHOULD ALWAYS FACE ROADWAY OR TRAVEL PATH FOLLOWED BY FIRE DEPARTMENT.
4. FIRE HYDRANTS SHALL NOT BE LOCATED IN CURB RETURN AREAS FROM P.C. TO P.T.
5. FIRE HYDRANTS LOCATED IN THE MID-BLOCK OF A SUBDIVISION SHOULD BE LOCATED AT A COMMON LOT LINE.
6. FIRE HYDRANTS SHOULD BE PLACED A MINIMUM OF 5' FROM A PC OR PT.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

FIRE HYDRANT INSTALLATION SIDEWALK AT BACK OF CURB

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-01

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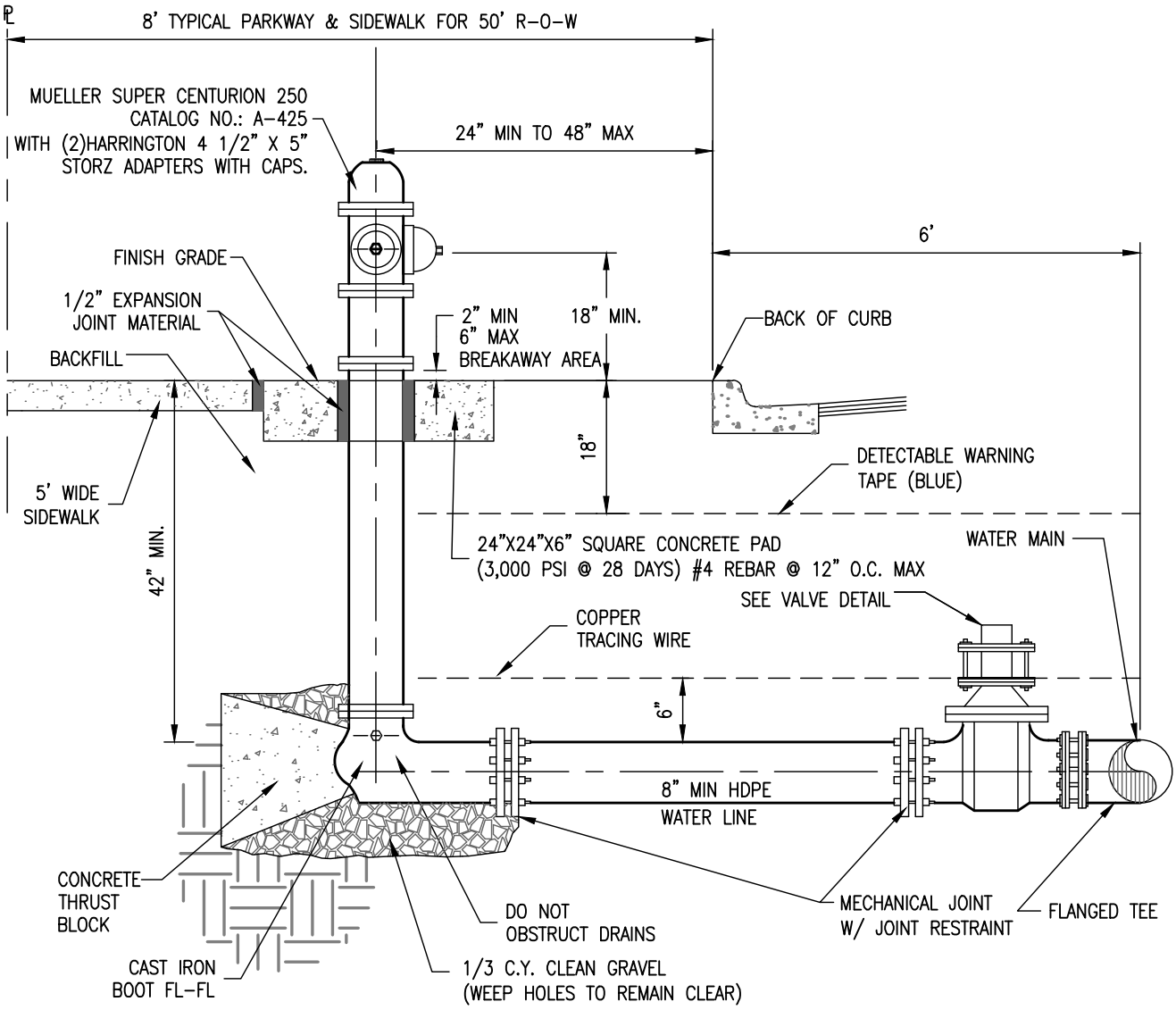

NOTES:

1. NO OBSTRUCTIONS WILL BE PERMITTED WITHIN 3'0" OF FIRE HYDRANT.
2. FIRE HYDRANTS SHALL NOT BE LOCATED IN SIDEWALKS OR PAVEMENT, PARKWAYS ARE PREFERRED.
3. PUMPER NOZZLE SHOULD ALWAYS FACE ROADWAY OR TRAVEL PATH FOLLOWED BY FIRE DEPARTMENT.
4. FIRE HYDRANTS SHALL NOT BE LOCATED IN CURB RETURN AREAS FROM P.C. TO P.T.
5. FIRE HYDRANTS LOCATED IN THE MID-BLOCK OF A SUBDIVISION SHOULD BE LOCATED AT A COMMON LOT LINE.
6. FIRE HYDRANTS SHOULD BE PLACED A MINIMUM OF 5' FROM A PC OR PT.

ARTESIA BULLDOGS

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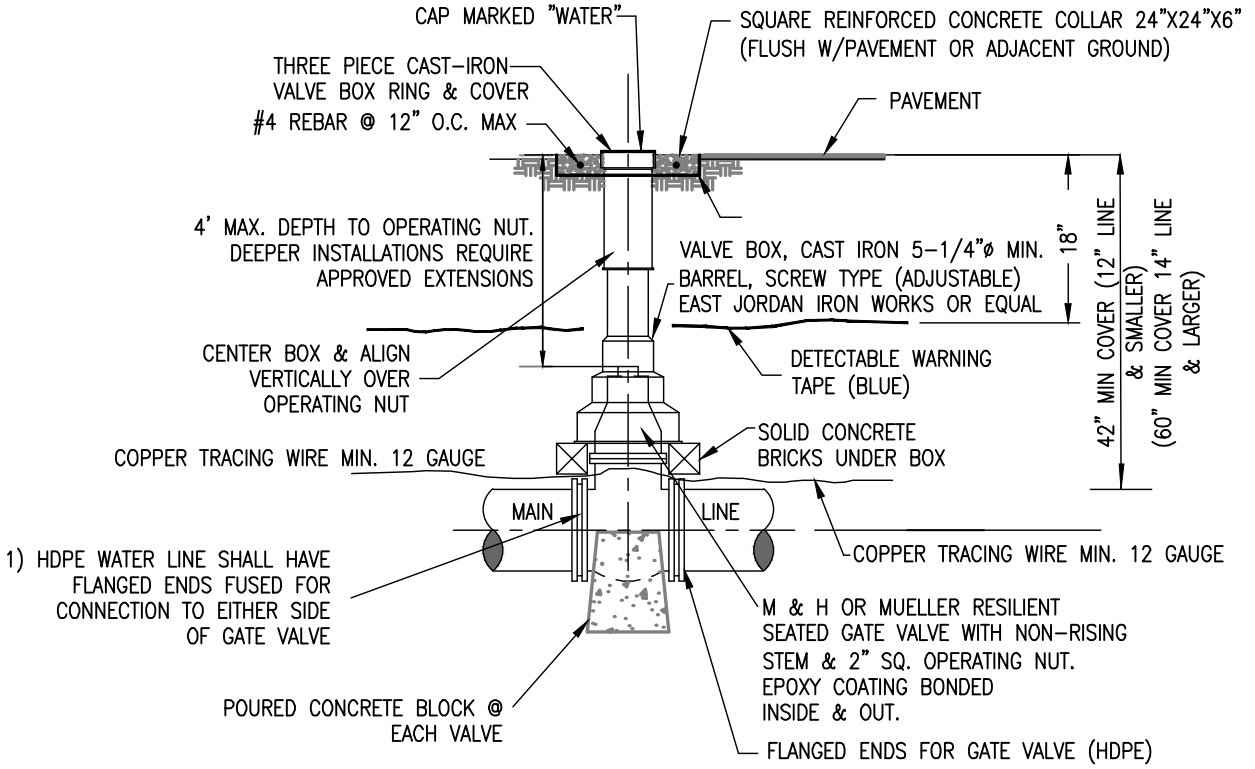
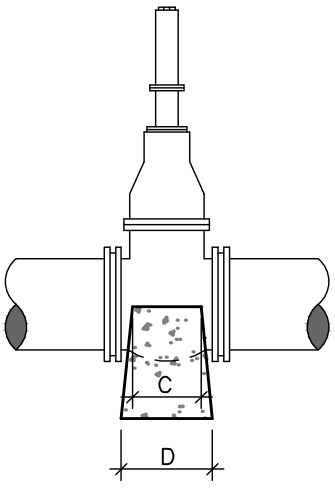
STANDARD CONSTRUCTION DETAILS

DOUBLE PUMPER FIRE HYDRANT INSTALLATION

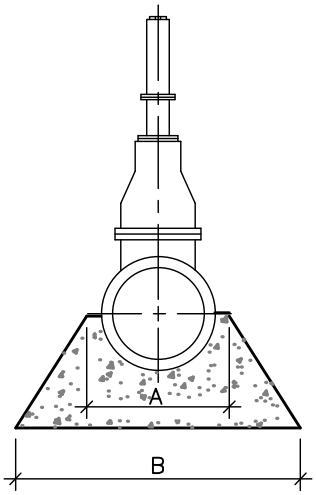
ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-02





VALVE SUPPORT TABLE

VALVE SIZE	A	B	C	D
4"	10"	20"	4"	6"
6"	12"	22"	4"	8"
8"	12"	22"	4"	8"
10"	14"	24"	4"	8"
12"	16"	24"	4"	8"
14"	20"	30"	6"	10"
16"	24"	36"	6"	12"
18"	30"	42"	8"	18"



NOTE:
1. CONCRETE STRENGTH 3000 PSI.

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STANDARD CONSTRUCTION DETAILS

TYPICAL VALVE & SUPPORT DETAILS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-03

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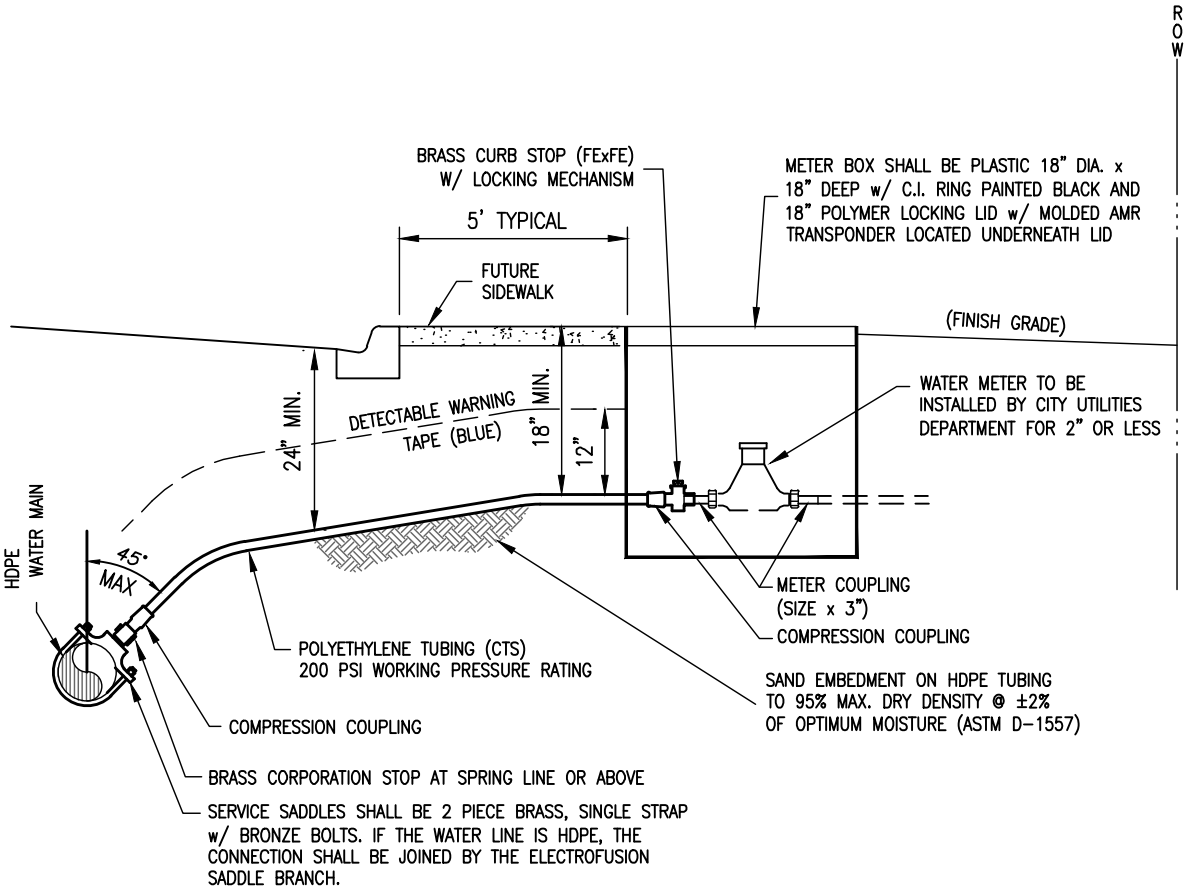

NOTES:

1. WATER CONNECTIONS TO CONSIST OF A MINIMUM 1" HIGH DENSITY POLYETHYLENE (HDPE).
2. RECORD EACH WELD ON HDPE.
3. METER BOXES SHALL NOT BE LOCATED IN SIDEWALKS, PREFERABLY IN PARKWAYS OR BEHIND SIDEWALKS.
4. FITTINGS SHALL BE AS APPROVED BY THE CITY OF ARTESIA.

TYPICAL WATER SERVICE

NOT TO SCALE

ARTESIA BULLDOGS

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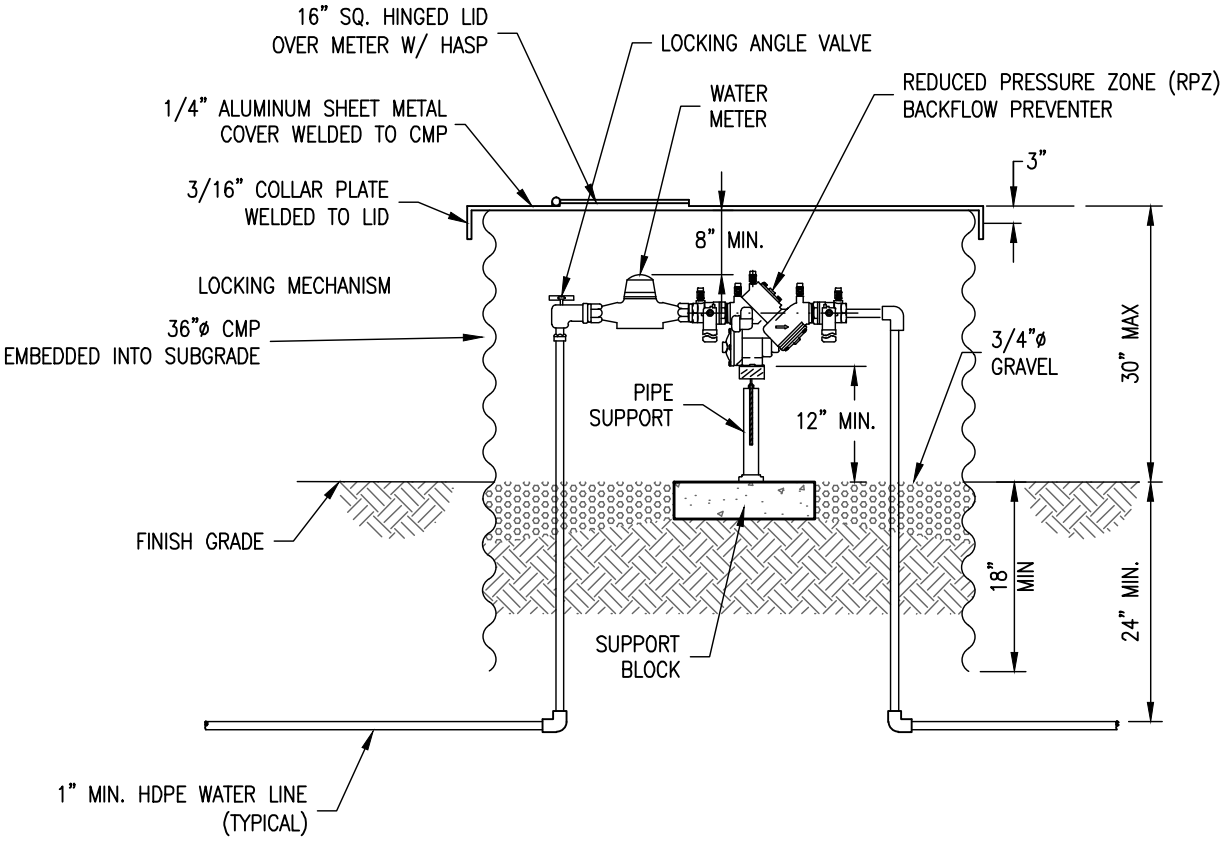
STANDARD CONSTRUCTION DETAILS

TYPICAL WATER SERVICE LATERAL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-04



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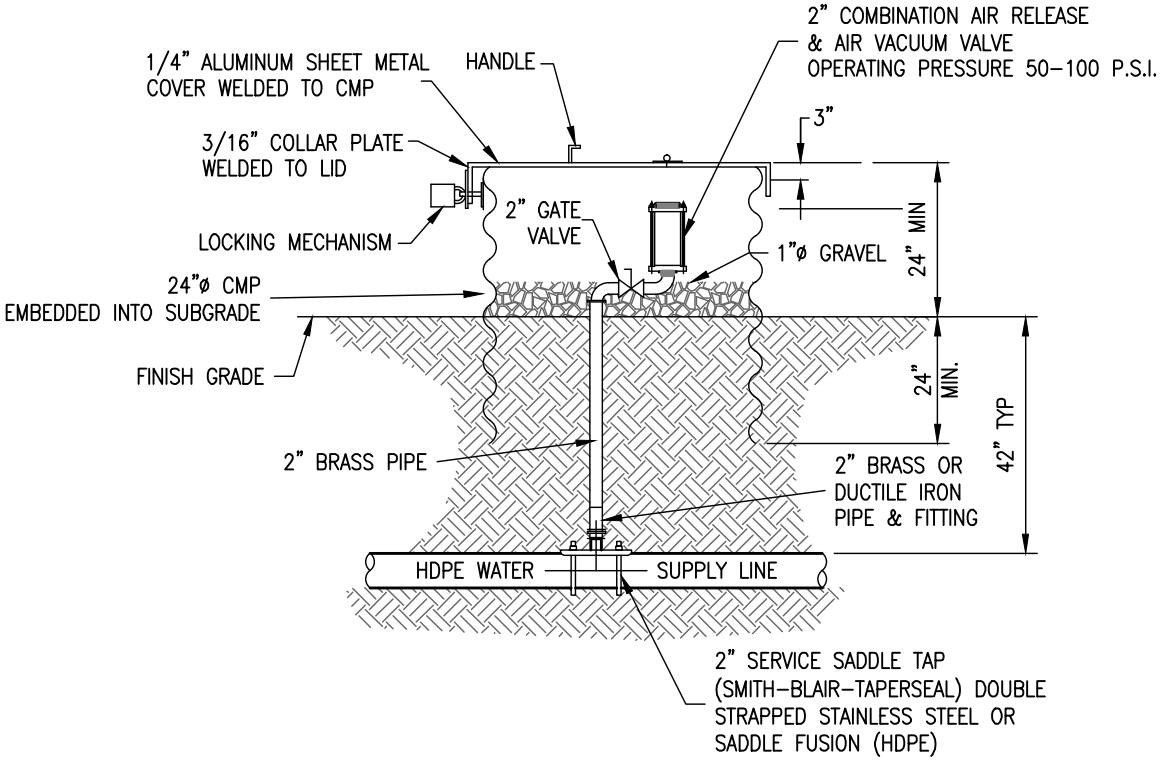
STANDARD CONSTRUCTION DETAILS

IRRIGATION WATER METER BACKFLOW PREVENTER

ORIGINAL DATE: MAY 2009

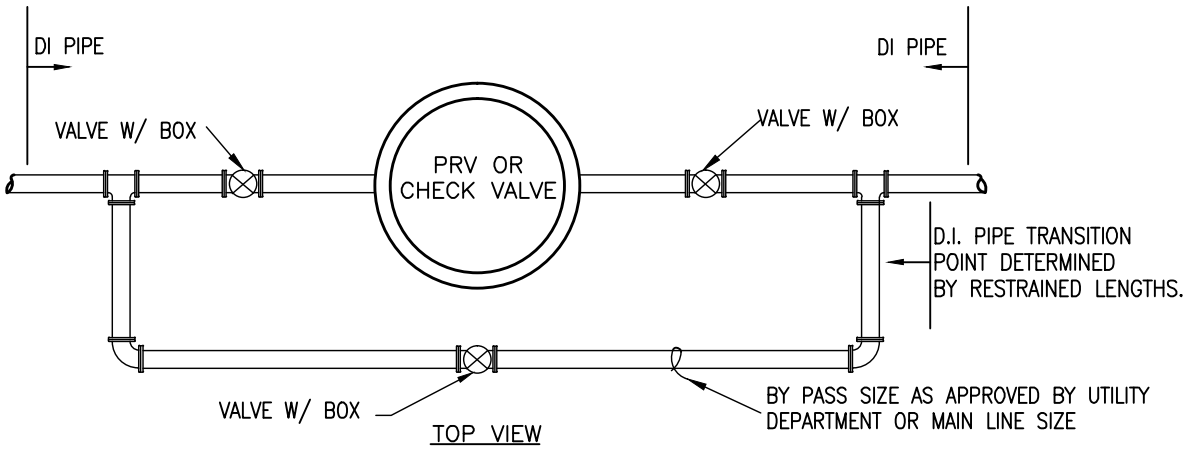
REVISION DATE: OCTOBER 2014

SHEET NO: W-05



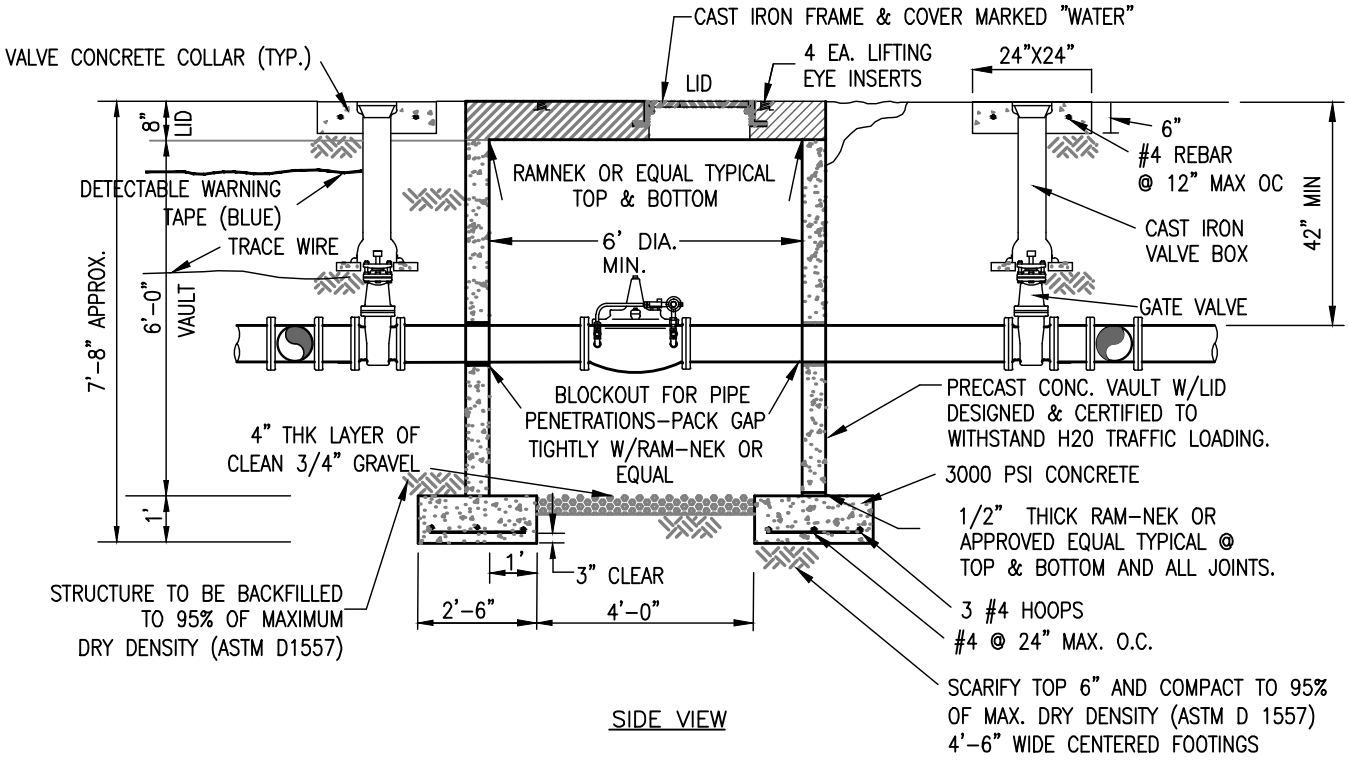
NOTES:
1. ALL PIPING AND FITTINGS SHALL BE BRASS OR DUCTILE IRON.
2. LID INSIDE DIAMETER TO MATCH OUTSIDE DIAMETER OF CMP.

OPEN AREA



TOP VIEW

NOTES:
1. TYPICAL FOR PRV AND PRESSURE SUSTAINING CHECK VAULTS
2. SUPPORT ALL VALVES PER MANUFACTURER
3. PRECAST PORTIONS OF MANHOLES, EXCLUDING CAST IN PLACE FOOTING, SHALL CONFORM TO ASTM C478, LATEST REVISION



SIDE VIEW

NOTE:
1. FLANGED CONNECTIONS UNLESS OTHERWISE APPROVED BY THE DIRECTOR OF INFRASTRUCTURE OR AN AUTHORIZED CITY REPRESENTATIVE.

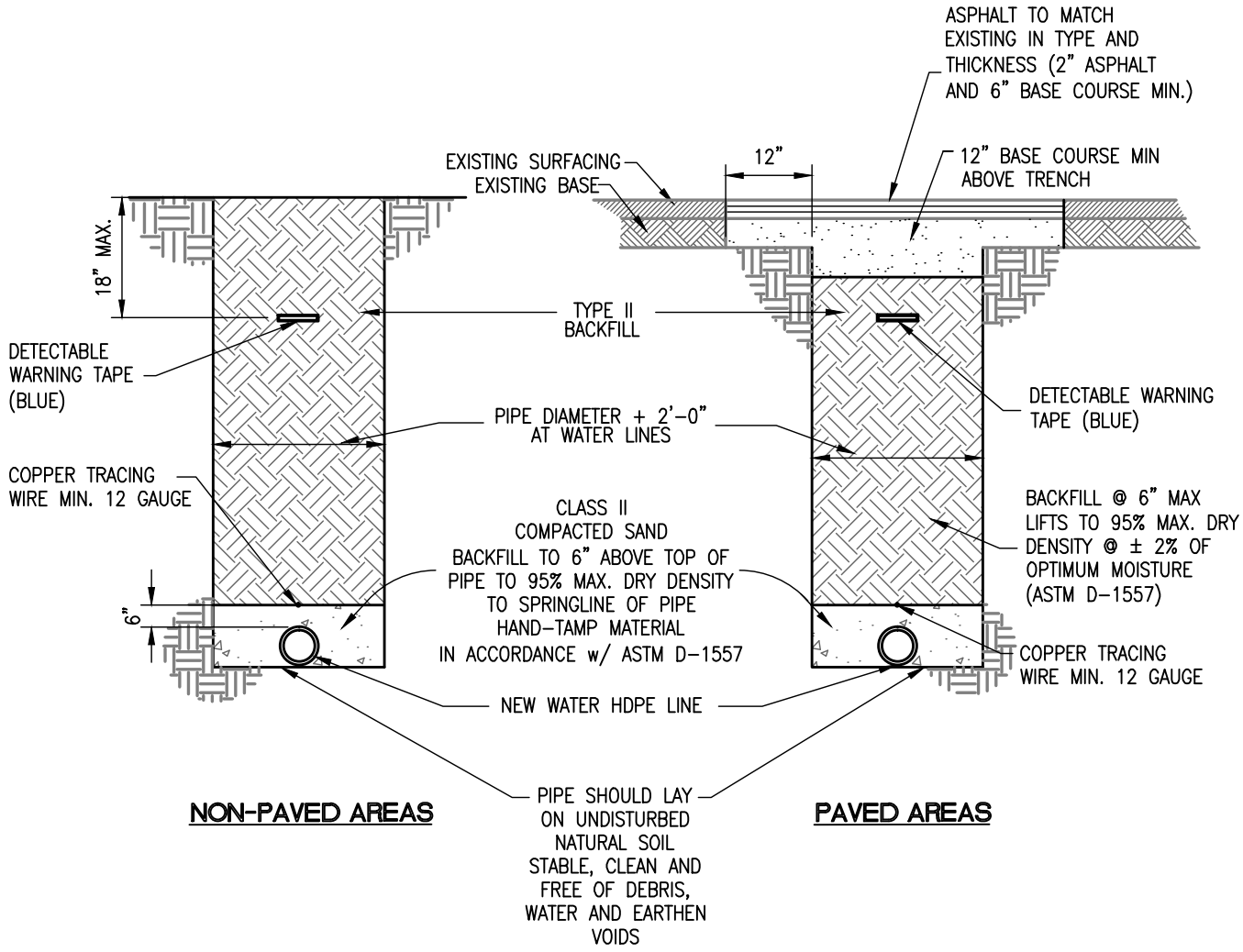
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

PRV OR CHECK VALVE VAULT DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-07



NOTES:
1. DESIGN ENGINEER TO DETERMINE IF BEDDING MATERIAL IS REQUIRED, BASED ON SOIL CONDITIONS.

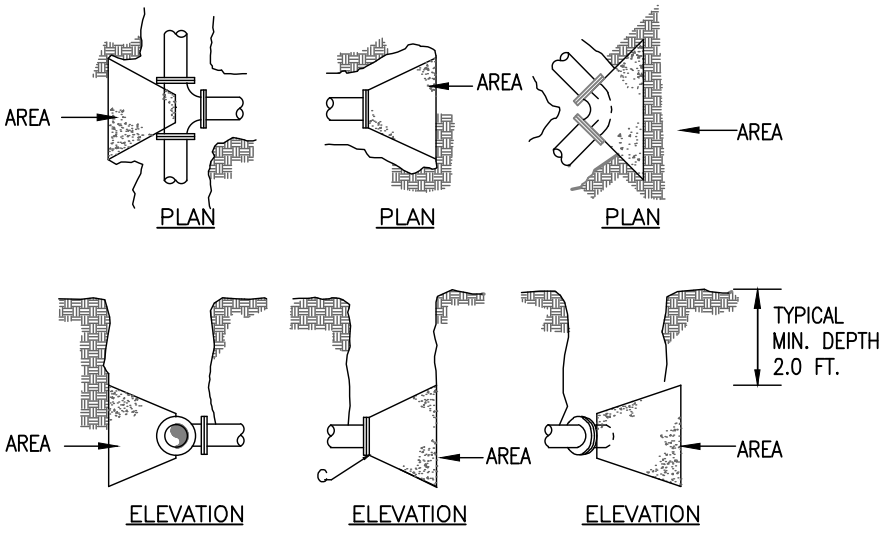
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL WATERLINE TRENCH SECTION

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-08



*CONCRETE BLOCKING WILL ONLY BE REQUIRED FOR PVC PIPE, HDPE PIPE WILL NOT REQUIRE CONCRETE BLOCKING, UNLESS DESIGN ENGINEER DETERMINES OTHERWISE.

TABLE I

MINIMUM BEARING SURFACE AREA (IN SQUARE FEET)					
PIPE SIZE	BENDS				TEE OR DEAD END
	11 1/4	22 1/2	45	90	
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
14"	3	7	13	24.5	17.0

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 1 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.

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STANDARD CONSTRUCTION DETAILS

CONCRETE BLOCKING DETAILS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-09

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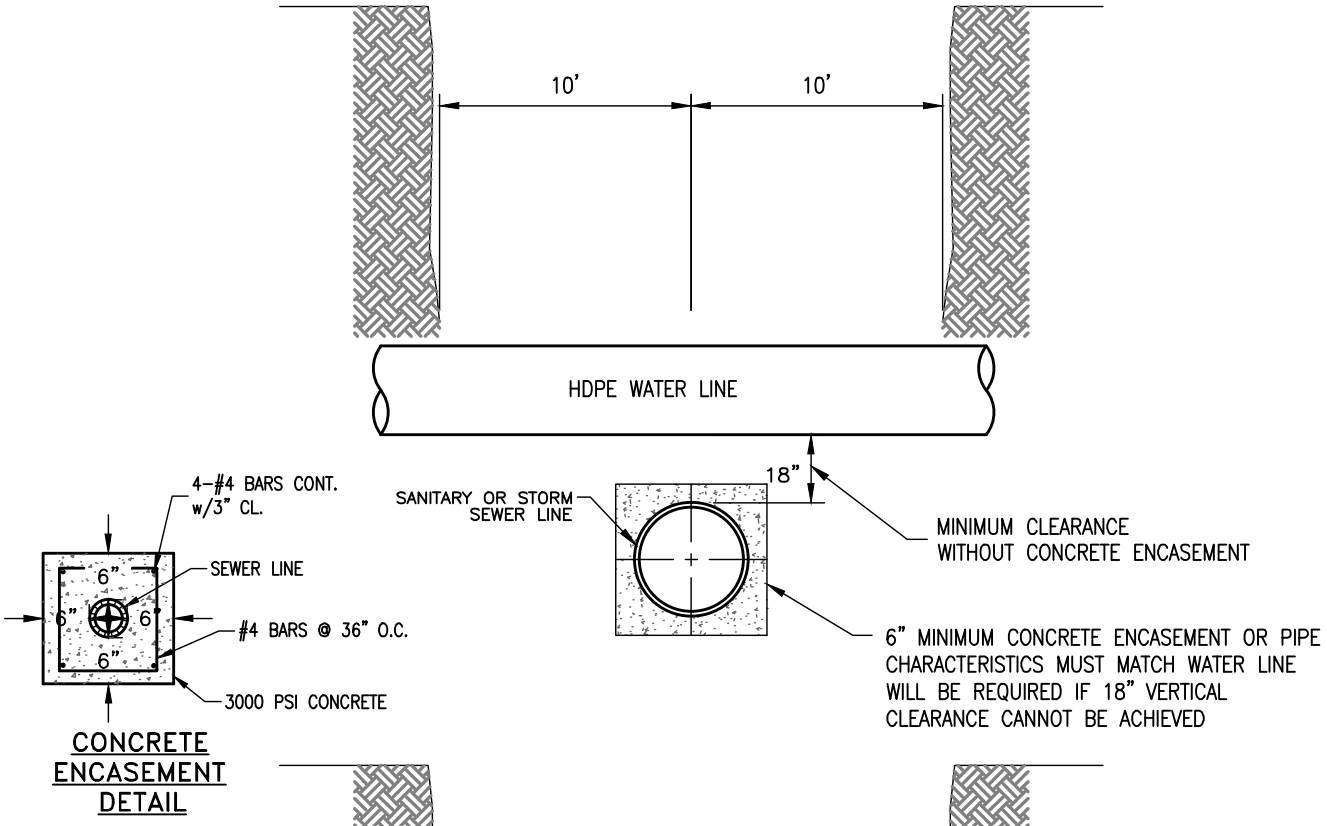
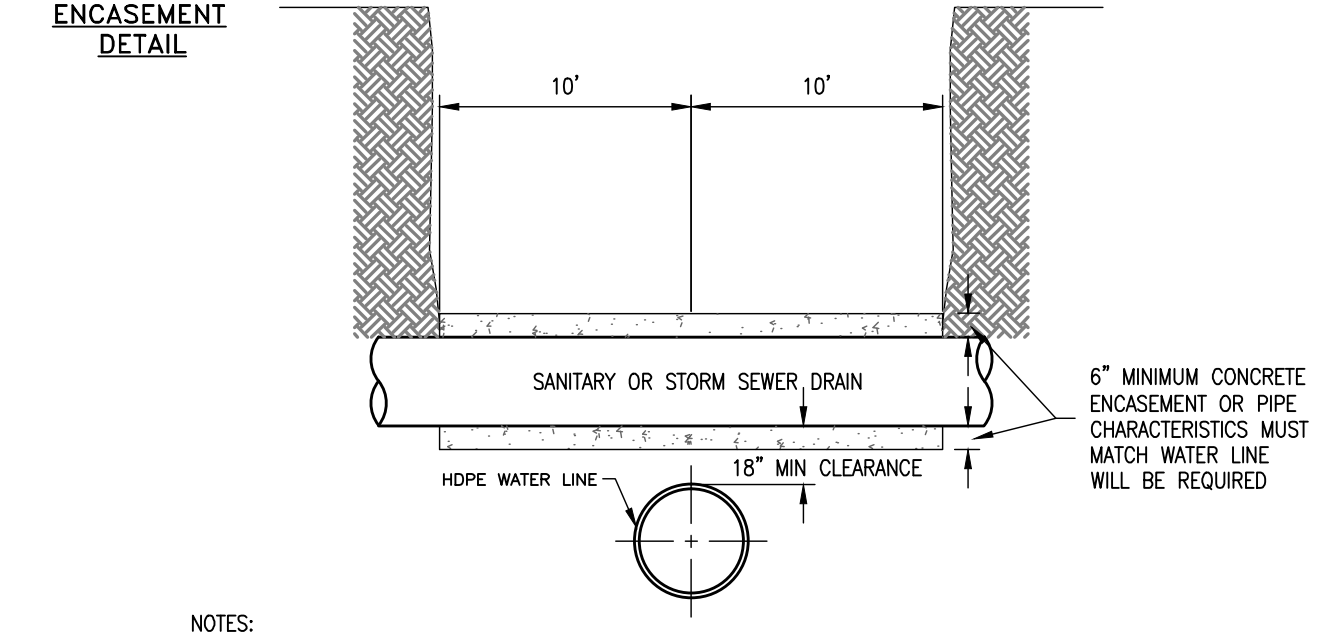


CONCRETE ENCASEMENT DETAIL



NOTES:

1. WATER LINES CROSSING OVER STORM DRAINS AND SANITARY SEWER LINES SHALL HAVE A MINIMUM OF EIGHTEEN INCHES (18") VERTICAL CLEARANCE. HDPE SHALL BE USED FOR ALL WATER APPLICATIONS, HOWEVER, IF THE DIRECTOR OF INFRASTRUCTURE ALLOW PVC PIPE, ONE FULL LENGTH OF WATER PIPE SHOULD BE INSTALLED, EQUALLY SPLIT AT THE CROSSING. WHERE THE MINIMUM CLEARANCE CANNOT BE ACHIEVED, THE WATER LINE SHALL BE ENCASED IN SIX INCHES (6") OF CONCRETE, TEN FEET (10') EITHER SIDE OF THE UTILITY CROSSING. "FLOWFILL" MAY ALSO BE USED, IF PRIOR APPROVAL IS OBTAINED FROM THE DIRECTOR OF INFRASTRUCTURE. IN THE EVENT A WATER LINE CROSSES UNDER A SANITARY SEWER LINE. EIGHTEEN INCHES (18") OF VERTICAL CLEARANCE MUST BE PROVIDED WITH THE SEWER LINE BEING CONSTRUCTED OF PRESSURE PIPE, PIPE CHARACTERISTICS SHALL BE EQUAL TO THE WATER LINE. THE PRESSURE PIPE WILL REQUIRE ONE FULL LENGTH OF PIPE, EQUALLY SPLIT OF THE CROSSING.

ARTESIA BULLDOGS

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STANDARD CONSTRUCTION DETAILS

WATER MAIN CROSSING DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-10

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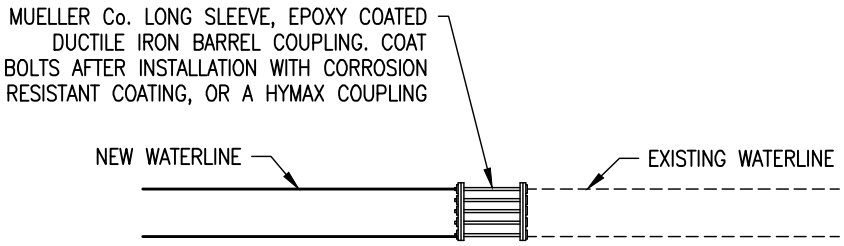
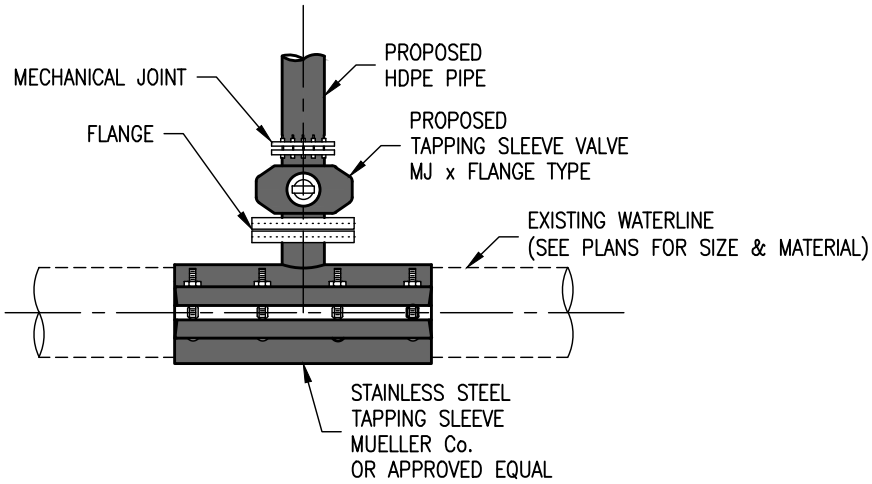
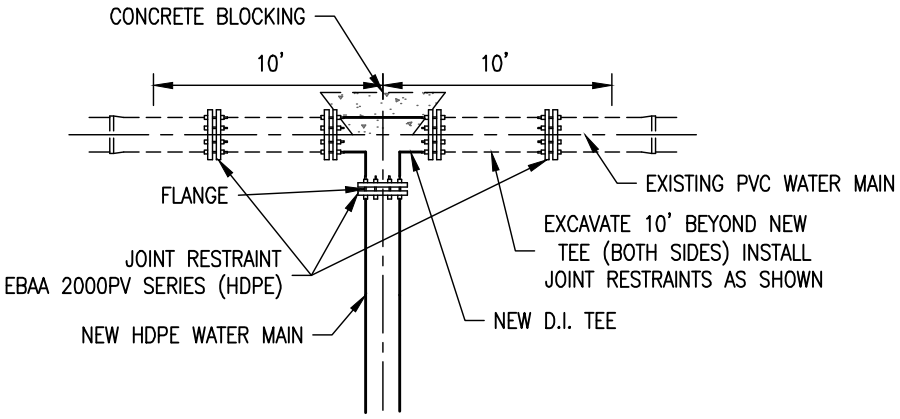


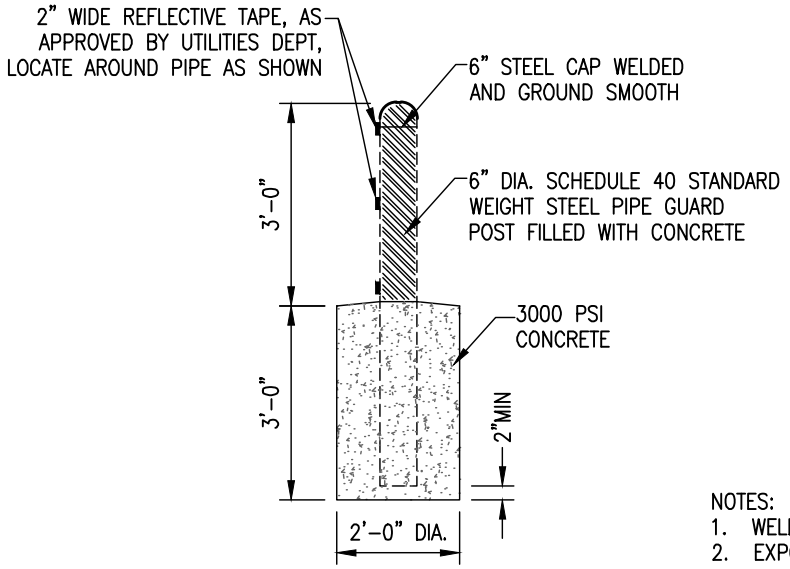
TIE-IN DETAIL



TYPICAL EXISTING WATERLINE TAP

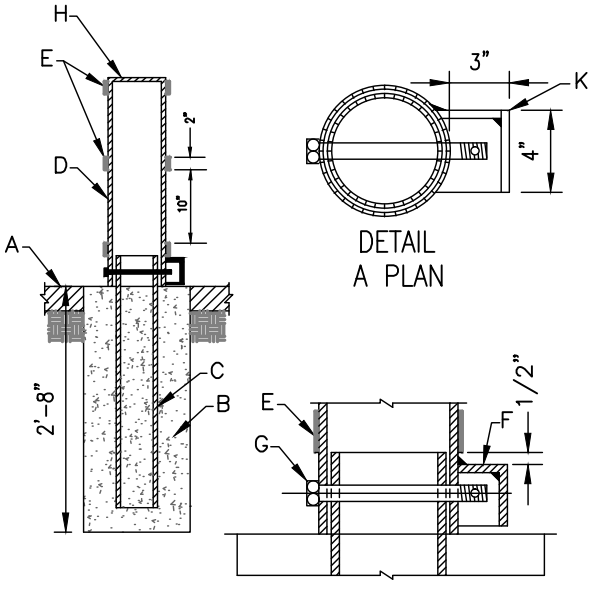


JOINT RESTRAINTS (PVC TO HDPE)



NOTES:
1. WELDS ARE TO BE GROUND SMOOTH.
2. EXPOSED STEEL AND SLEEVE TO BE PAINTED WITH AN OIL BASE ALKYD PRIMER AND AN OIL BASE ALKYD ENAMEL TOP COAT. COLOR TO BE BRIGHT YELLOW.

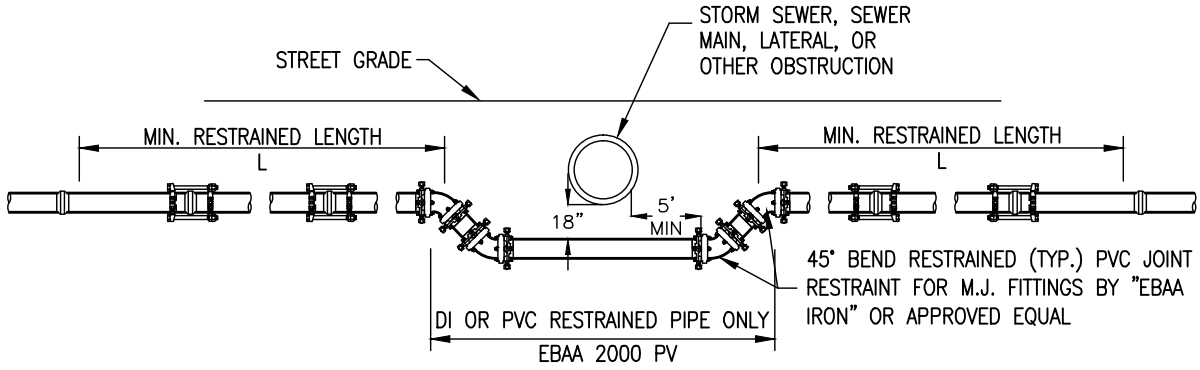
BOLLARD DETAIL



NOTES:
A. PAVEMENT OR FINISHED GRADE.
B. CONC. COLLAR, 3000 PSI AT 28 DAYS, W/SMOOTH OR BROOM FINISH WHERE PAVEMENT IS ADJACENT.
C. 5" NOMINAL DIA. SCHEDULE 40 STEEL PIPE, 3'- 0" TO BE FILLED W/CONC. TO LEVEL SHOWN.
D. 6" NOMINAL DIA. SCHEDULE 40 STEEL PIPE, 2'- 8" PAINT PIPE BRIGHT YELLOW (REMOVABLE).
E. 2" WIDE REFLECTIVE TAPE, AS APPROVED BY UTILITIES DEPARTMENT, LOCATE AROUND PIPE AS SHOWN.
F. 1/4" THICK STEEL SAFETY GUARD BOX. OPEN ON ONE SIDE & BOTTOM. WELD ALL SEAMS.
G. 3/4" X 8" GALV. HEX. BOLT W/A 3/8" DIA. HOLE FOR PADLOCK. (PADLOCK FURNISHED BY CITY).
H. 1/4" X 6 5/8" DIA. GALV. STEEL PLATE COVER, WELDED TO PIPE.
I. PLACEMENT OF POSTS SHOULD BE WELL AWAY FROM TRAFFIC ON MAJOR ROADWAYS & PREFERABLY AT THE R.O.W. LINE. THE DIRECTOR OF INFRASTRUCTURE OR AUTHORIZED CITY REPRESENTATIVE SHOULD BE CONSULTED ON LOCATION WHEN NEAR TRAFFIC.

REMOVABLE BOLLARD DETAIL

PVC AND DUCTILE IRON RESTRAINED JOINTS BY "EBBA" IRON, ROMAC INDUSTRIES" OR APPROVED EQUAL



RESTRAINED LENGTH (L) IN FEET

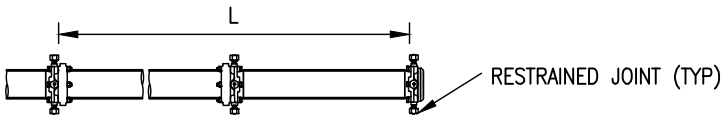
PIPE SIZE	D.I.	PVC
4"	12'	22'
6"	17'	30'
8"	22'	40'
10"	26'	48'
12"	30'	56'

LENGTHS BASED ON: EBAA IRON RESTRAINT DESIGN SOFTWARE

NOTE:

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

DEAD END



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

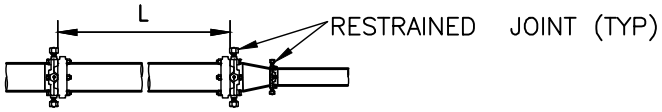
DEAD END RESTRAINED LENGTH (L) IN FEET

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

NOTES:

1. RESTRAINT LENGTH CALCULATION BASED ON COMPACTED TYPE 4 TRENCH WITH 42" 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
3. IF HDPE FUSION WELDED; NO RESTRAINTS ARE NEEDED

REDUCER

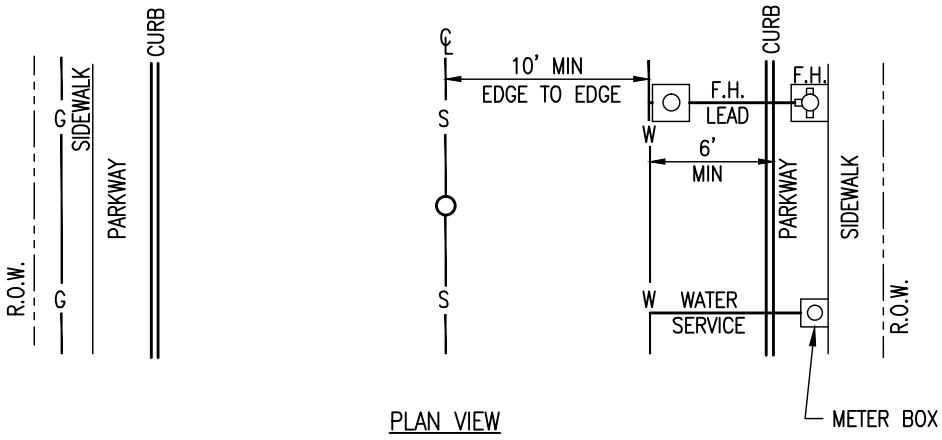


REDUCERS REQUIRE RESTRAINT OF ALL JOINT WITHIN THE CALCULATION LENGTH (L) EXTENDING FROM THE FITTING ON THE SIDE OF THE LARGER PIPE, RESTRAINING THE SMALL SIDE OF THE FITTING IS OPTIONAL

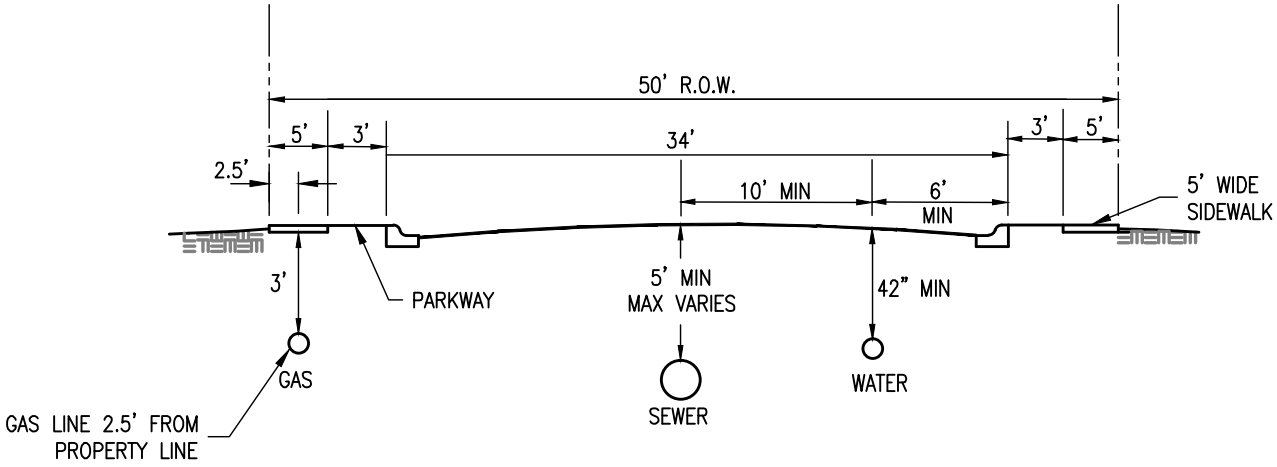
REDUCER RESTRAINED LENGTH (L) IN FEET

PIPE SIZE	D.I.	PVC
12"X6"	53'	99'
12"X8"	39'	72'
12X10"	36'	67'
10"X4"	51'	94'
10x6"	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



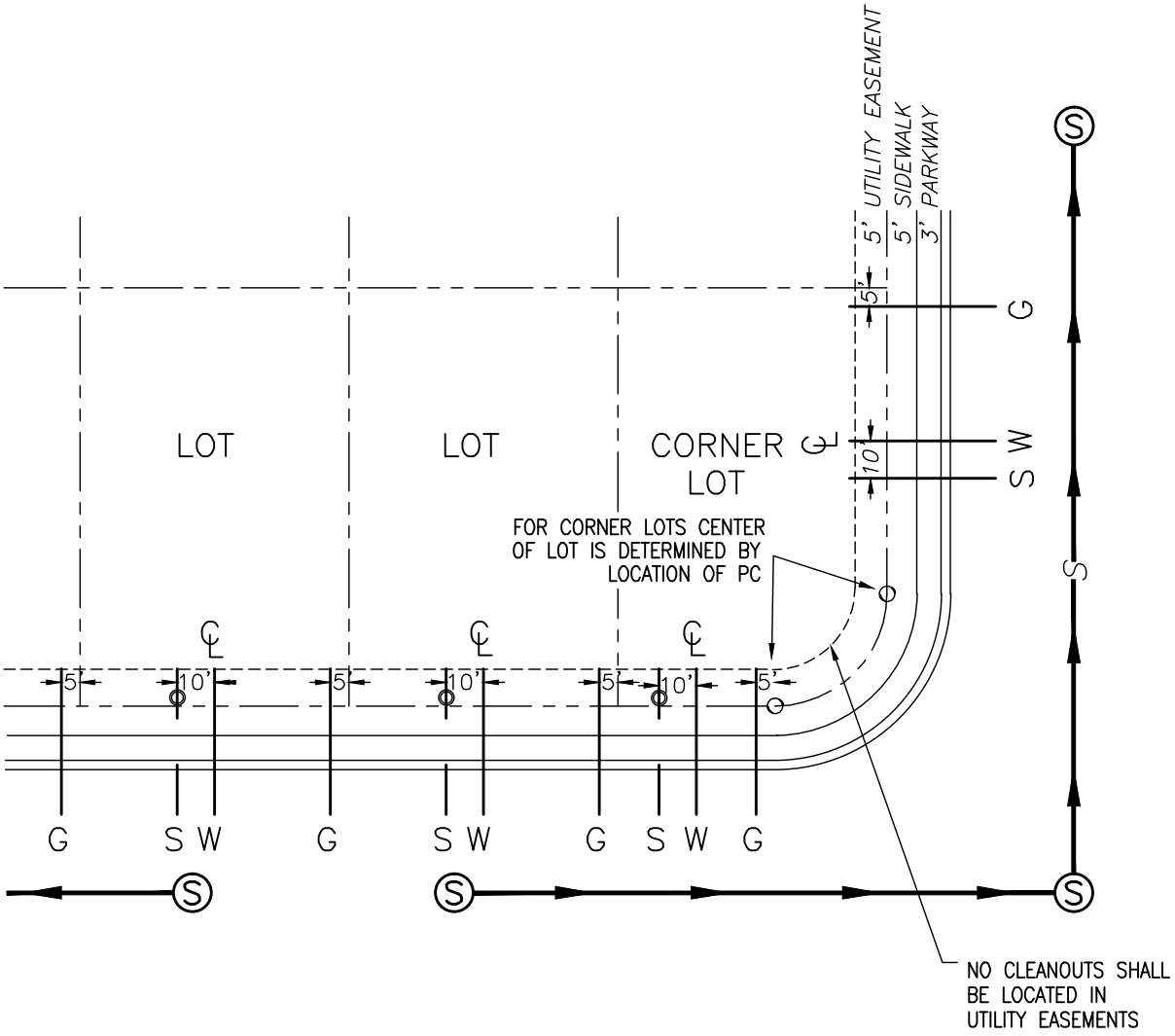
PLAN VIEW



SECTION VIEW

NOTES:

1. GAS MAIN ON SOUTH OR WEST SIDE OF STREET, 2.5' FROM PROPERTY LINE UNDERNEATH SIDEWALK.
2. WATER LINE ON NORTH OR EAST HALF OF THE STREET, 6' FROM BACK OF CURB.
3. 12" AND SMALLER WATER LINES SHALL HAVE A MINIMUM COVER OF 42".
4. 14" AND LARGER WATER LINES SHALL HAVE A MINIMUM COVER OF 5'.
5. SANITARY SEWER WILL BE LOCATED IN CENTER OF ROADWAY.
6. NONSTANDARD LOCATIONS REQUIRE THE APPROVAL OF THE DIRECTOR OF INFRASTRUCTURE OR AUTHORIZED CITY REPRESENTATIVE.
7. UTILITY EASEMENTS WILL BE AT THE DISCRETION OF THE DIRECTOR OF INFRASTRUCTURE.



NOTES:

1. THE WATER SERVICE WILL ENTER AT THE CENTER OF THE LOT FRONTAGE. THE SEWER SERVICE WILL ENTER 10' DOWNSTREAM OF THE WATER SERVICE. GAS WILL ENTER 5' LEFT OF RIGHT LOT LINE, AS VIEWED FROM THE STREET.
2. FOR CORNER LOTS UTILITY STANDARD LOCATIONS AS SHOWN.
3. UTILITY EASEMENTS WILL BE AT THE DISCRETION OF THE DIRECTOR OF INFRASTRUCTURE.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

NEW CONSTRUCTION TYPICAL LOT UTILITY LOCATIONS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: W-16

SECTION 1. GENERAL NOTES FOR SANITARY SEWER SYSTEMS

A. Sanitary sewer lines and service laterals shall be Polyvinyl chloride (PVC), four (4) inch diameter (Sch. 40) to eight (8) inch diameter (SDR 35), meeting ASTM D1785 and D3034, and "white" or "green" in color. The City will accept High Density Polyethylene (HDPE) solid wall pipe as an alternate material.

B. Sanitary sewer lines ten (10) inch diameter and larger shall be High Density Polyethylene (HDPE) solid wall pipe, PVC will not be allowed. The Design Engineer shall be responsible for properly sizing HDPE pipe, service lines, and fittings on the basis of the Working Pressure Rating (WPR) needed for the entire sanitary sewer system.

B. Sanitary sewer lines, except for service laterals, shall be a minimum diameter of eight (8) inches and shall maintain a minimum flow velocity of two and a half (2.5) feet per second, unless otherwise noted in these specifications.

C. TV camera inspections (in color), low pressure air testing, water exfiltration or vacuum testing of the manholes, and deflection testing are required on all sanitary sewer lines prior to paving, unless the Director of Infrastructure or authorized City representative determines otherwise. All residential sanitary sewer services shall have TV inspections.

D. All manholes shall be Glass-Fiber Reinforced Polyester (FRP) or High Density Polyethylene (HDPE) structures, with a minimum diameter of four (4) feet.

E. Parallel sanitary sewer lines shall be at least 10 feet horizontally separated from any existing and proposed water line. Both horizontal and vertical clearance distances are to be measured from edge to edge. If maintaining ten (10) feet of horizontal separation is not possible or impractical, the Director of Infrastructure or authorized City representative and Design Engineer will determine an alternate method of construction, such as using concrete encasement.

F. Water lines crossing over storm drains and sanitary sewer lines shall have a minimum of eighteen (18) inches vertical clearance. HDPE shall be used for all water applications, however, if the Director of Infrastructure or authorized City representative allow PVC pipe, one full length of water pipe should be installed, equally split at the crossing. Where the minimum clearance cannot be achieved, the water line shall be encased in six (6) inches of concrete, extended ten (10) feet either side of the utility crossing. "Flowfill" may also be used, if prior approval is obtained from the Director of Infrastructure or authorized City representative. In the event a water line crosses under a sanitary sewer line, eighteen (18) inches of vertical clearance must be provided. In addition, the sanitary sewer line must be constructed of solid wall pressure pipe with characteristics equal to the water line. The solid wall pressure pipe must extend ten (10) feet either side of the utility crossing.

G. In public rights-of-way, sanitary sewer lines shall be centered and installed under the roadway. On dedicated public sanitary sewer easements, the line shall be centered upon the easement. When possible, every effort should be made to keep sanitary sewer lines away from existing and proposed trees and landscaped areas. If a public

utility easement is proposed and utilities other than sanitary sewer are to be installed, the Design Engineer will determine the placement for each with proper separation.

H. Precast or cast-in-place concrete manholes shall only be installed where conditions require otherwise, with approval from the Director of Infrastructure or authorized City representative. An interior coating will be required, consisting of an epoxy resin-type material, which shall be capable of protecting the concrete from deterioration caused by poisonous gases.

I. The Contractor shall furnish a maintenance bond to the City in the amount of 10% based on the final contract price. The maintenance bond will be valid for two (2) years, commencing on the date of City issuance for a “Certificate of Final Acceptance.”

SECTION 2. DESIGN CRITERIA FOR SANITARY SEWER SYSTEMS

2.1 GENERAL

A. Design criteria for all sanitary sewer systems shall comply with these City of Artesia Public Works Standard Specifications. Any deviations from these standards shall have prior approval from the Director of Infrastructure or authorized City representative. The Design Engineer shall be responsible for compliance with all governing agencies having jurisdiction over portions of a particular project, including but not limited to:

New Mexico Environmental Department (NMED)
New Mexico Department of Transportation (NMDOT)
Burlington Northern Santa Fe Railroad (BNSF)
Eddy County

B. Sanitary sewer lines, except for service laterals, shall be a minimum diameter of eight (8) inches and shall maintain a minimum flow velocity of two and a half (2.5) feet per second, unless otherwise noted in these specifications.

C. Railroad, State Highway, and County Road crossings shall be approved by the Director of Infrastructure or authorized City representative. Permits to agencies other than the City must be submitted through the City.

D. The Design Engineer shall include a summary of quantities on the construction plans for all public works projects that have improvements located within public rights-of-way or dedicated public easements.

E. All grades shall be shown to the nearest one-hundredth (0.01) of a foot.

F. Parallel sanitary sewer lines shall be at least 10 feet horizontally separated from any existing proposed water line. Both horizontal and vertical clearance distances are to be measured from edge to edge. If maintaining ten (10) feet of horizontal separation is not possible or impractical, the Director of Infrastructure or authorized City representative and Design Engineer will determine an alternate method of construction, such as using concrete encasement or use of HDPE for both lines.

G. Water lines crossing over storm drains and sanitary sewer lines shall have a minimum of eighteen (18) inches vertical clearance. HDPE shall be used for all water applications, however, if the Director of Infrastructure or authorized City representative allow PVC pipe, one full length of water pipe should be installed, equally split at the crossing. Where the minimum clearance cannot be achieved, the water line shall be encased in six (6) inches of concrete, extended ten (10) feet either side of the utility crossing. “Flowfill” may also be used, if prior approval is obtained from the Director of Infrastructure or authorized City representative. In the event a water line crosses under a sanitary sewer line, eighteen (18) inches of vertical clearance must be provided. In addition, the sanitary sewer line must be constructed of solid wall pressure pipe with characteristics equal to the water line. The solid wall pressure pipe must extend ten (10) feet either side of the utility crossing.

H. In public rights-of-way, sanitary sewer lines shall be centered and installed under the roadway. On dedicated public sanitary sewer easements, the line shall be centered upon the easement or as directed by the Infrastructure Director. When possible, every effort should be made to keep sanitary sewer lines away from existing and proposed trees and landscaped areas. If a public utility easement is proposed and utilities other than sanitary sewer are to be installed, the Design Engineer will determine the placement for each with proper separation.

I. Where applicable, line sizes shall comply with the Sanitary Sewer Layout Master Plan or subsequent revisions.

J. Construction Staking - Line and grade stakes for construction of all sanitary sewer lines and services shall be furnished by the developer's Surveyor or an independent Surveyor. Property lines and corners must be properly staked to ensure correct alignment. The City will not be liable for improper alignment or delay of any kind caused by improper or inadequate surveys by the developer or by interference of other utilities.

2.2 SANITARY SEWER LINE MATERIALS

The material used for sanitary sewer shall be designed for a minimum structural life cycle of fifty (50) years. If the pipe material will deteriorate when subjected to corrosive conditions, the Design Engineer shall provide an acceptable corrosion resistant liner or provide calculations and data that demonstrate that the design and operational characteristics will provide for the minimum life cycle. At minimum, the following conditions will apply:

A. Vitrified clay pipe will not be allowed in the City of Artesia.

2.3 CALCULATING FLOWS AND CAPACITY FOR SANITARY SEWER LINES

Sewage flows shall be computed in accordance with Table 2.1 shown below.

Section 2 - TABLE 2.1: Sanitary Sewer Daily Flow Calculations (Design for Peak Flow)

Land Use	Design	Calculation
Apartment	• 100 gallons per person per day • 20 units per acre • 3 persons per unit	(100*20*3* daily peak factor) = (100*20*3*3.0) = 18,000 gallons per acre per day
Residential	• 80 gallons per person per day • 2.5 units per acre • 3.0 persons per unit	(80*2.5*3.0* daily peak factor) = (80*2.5*3.0*3.0) = 1,800 gallons per acre per day
Patio Home	• 80 gallons per person per day • 5 units per acre • 3.0 persons per unit	(80*5*3.0* daily peak factor) = (80*5*3.0*3.0) = 3,600 gallons per acre per day
Town Home	• 80 gallons per person per day • 10 units per acre • 3.5 persons per unit	(80*10*3.5* daily peak factor) = (80*10*3.5*3.0) = 8,400 gallons per acre per day

Hospital/Hotel	• 200 beds • 75 gallons per day per bed	(200*75) = (200*75) = 15,000 gallons per day
Nursing Home	• 150 beds • 125 gallons per day per bed	(150*125) = (150*125) = 18,750 gallons per day
Commercial/ Industrial/ Office	• 1,000 parking spaces per 25 acres • 1 person per parking space • 25 gallons per person per day	1,000/25 acres = 40 persons per acre (40*25) = (40*25) = 1,000 gallons per acre per day

Note: Infiltration was excluded from the above calculations, which is expected to be negligible. The daily peak factor shall be 3.0. Any deviations from Table 2.1 require approval from the Director of Infrastructure or authorized City representative.

A. The minimum acceptable "n" factor for use in design of sanitary sewers shall be 0.010. Pipes should be placed on such a grade that the velocity is not less than two and a half (2.0) fps or more than fifteen (15) fps. Minimum grades based on n = 0.010 shall be as follows:

Section 2 - TABLE 2.2:
Minimum and Maximum Grades for Sanitary Sewer Lines

Size of Pipe (Inches)	Minimum Slope in (Percent)	Maximum Slope in (Percent)
8	0.40	11.00
10	0.28	8.10
12	0.22	6.30
15	0.15	4.70
18	0.12	3.70
21	0.10	3.00
24	0.08	2.50

Note: For lines larger than twenty-four (24) inches in diameter, the slope shall be determined using the following equation to maintain a minimum velocity of two and a half (2.5) feet per second and a maximum velocity of fifteen (15) feet per second.

$$V = (1.486/n)*(R^{2/3})*(S^{1/2})$$

Where:
- V = Velocity of flow in pipe, feet per second
- n = Roughness coefficient of the pipe, dimensionless
- R = Hydraulic radius of the pipe in feet, which is the area of the flow divided by the wetted perimeter (R=A/P)
- S = Slope of the hydraulic gradient in foot per foot

2.4 SANITARY SEWER LINE LOCATION

A. Sanitary sewer lines shall be placed in streets under paving, located in the center of the street, typical of single-family subdivisions. This requirement may not apply to all projects, such as commercial development. The Design Engineer will be responsible for alternate locations, with final approval from the Director of Infrastructure or authorized City representative.

B. All sanitary sewer lines crossing under an existing City roadway shall be installed by jack and bore or as approved by the Director of Infrastructure steel casing minimum one-fourth (1/4) inch thick shall be used with Raci patented casing spacers, PE molded casing spacers, or approved substitute. Crossings under a State roadway shall meet NMDOT standards and require proper permitting.

C. No public sanitary sewer line shall be located nearer than ten (10) feet from any existing or proposed tree.

D. Sanitary sewer lines shall not be located in alleys, unless approved by the Director of Infrastructure.

2.5 CURVED SANITARY SEWER LINE ALIGNMENTS

No curved sanitary sewer lines shall be allowed.

2.6 DEPTH OF COVER

A. Minimum cover for a sanitary sewer line shall be five (5) feet, measured from the top of pipe to finish grade.

B. In general, the minimum depth for sanitary sewer lateral to serve single-family residential property with a four (4) inch service lateral shall be four (4) feet plus 2% times the length of the service lateral (the distance from the sewer line centered within the street to the center of the house). Thus, for a house sixty (60) feet from the sanitary sewer main, the depth would be four (4) feet plus 2% multiplied by sixty (60) feet = 4.0 + 1.2 = five and two tenths feet (5.20'). The depth of the flow line of the sanitary sewer line should then be at least five and two-tenths feet (5.2') below the elevation of the finish grade at the point where the service lateral enters the house.

C. The Director of Infrastructure shall authorize any exceptions, such as concrete protection that may be required for crossing water lines or other utilities.

2.7 SANITARY SEWER SERVICE LATERALS

The sizes and locations of sanitary sewer service laterals shall be designated as follows unless otherwise stated by the Director of Infrastructure or authorized City representative:

A. For single-family dwellings, the service lateral size shall be a four (4) inch minimum. House service laterals shall be installed ten (10) feet downstream from the center of the lot and shall have a ten (10) foot separation from the water service. All residential sanitary sewer services shall be extended to a point five (5) feet inside of the front property line at a maximum depth of five (5) feet. The service shall then be extended at a forty-five degree (45˚) angle to three (3) feet above the finish grade and capped. If the main sewer line is HDPE, service laterals shall be the same type of material. Minimum pipe slopes for single-family residential lots shall be 2 % (1/4" per linear foot).

B. For multiple units, apartments, retail sites, and commercial, a six (6) inch minimum sanitary sewer line will be required with a minimum pipe slope of 1% (1/8" per linear foot).

C. Manufacturing and industrial zones will require an eight (8) inch minimum sanitary sewer line or larger, if required, with a minimum pipe slope of 1% (1/8" per linear foot).

D. Manholes will be required on six (6) inch and larger laterals at the connection to the main sanitary sewer line.

E. Fittings are not permitted on service laterals between the sanitary sewer line (wye connection) and property line, continuous pipe segments shall be installed.

F. A minimum of one (1) service lateral per dwelling shall be required for single-family residential subdivisions. Duplexes, townhomes, and apartments shall require one (1) service lateral for each building. Commercial and industrial buildings will require a minimum of one (1) service lateral, depending on site layout, more than one (1) may be required.

2.8 MANHOLES AND CLEANOUTS

The sizes and locations of manholes, wyes, bends, cleanouts, etc., shall be approved by the Director of Infrastructure or authorized City representative. In general, manholes shall be placed at all three (3) way connections and four (4) way connections, changes in grade and direction, and maximum spacing being five hundred (500) feet along the sanitary sewer line.

A. In order to provide for cleaning of sanitary sewer lines, manholes and/or cleanouts shall be located so that two hundred fifty (250) feet of sanitary sewer rod can reach any point in the line. Spacing between a manhole and an upstream cleanout shall be limited to three hundred (300) feet.

B. Manhole frame and covers shall be heavy duty, approximate total weight of four hundred (400) pounds, withstanding an H-20 load rating.

C. Drop manholes shall be required when the inflow elevation is more than twenty-four (24) inches above the outflow elevation. Drop connections can be either inside or outside of the manhole, with the drop connection invert located just above the manhole bottom, in between the centerline and top of the main sewer line.

D. The diameter of a manhole constructed over the center of a sanitary sewer line should vary with the size of the sanitary sewer line. Typically:

Eight (8) inch, ten (10) inch, and twelve (12) inch diameter lines will require an inner manhole diameter of four (4) feet.

Fifteen (15) inch, eighteen (18) inch, and twenty-one (21) inch diameter lines will require an inner manhole diameter of five (5) feet.

Twenty-four (24) inch diameter lines and larger will require an inner manhole diameter of six (6) feet.

Manholes deeper than fifteen (15) feet shall be a minimum of five (5) feet inner diameter.

Ultimately, the Design Engineer will be responsible for properly sizing all manholes based on the project requirements, yet still meet the manufacturer's recommendations.

E. In Flood Plains, sealed manholes "Type S" shall be used to prevent the entrance of storm water in all areas subject to carrying drainage flow, such as ditches, creeks, arroyos, earth channels, etc. Where more than three manholes in sequence are to be bolted and gasketed, every third manhole shall be vented three (3) feet above the one hundred (100) year floodplain elevation or five (5) feet above the adjacent ground line, whichever is higher. The Design Engineer shall provide the elevation of the one hundred (100) year flood on the construction plans.

F. Where a sanitary sewer line passes through a manhole in a straight line, a drop between the incoming and outgoing inverts will not be required. If a horizontal deflection in the sanitary sewer alignment is proposed at the manhole, a minimum of one-tenth (0.10) of a foot between inverts will be required when the angle is between 0 ˚and 45˚f the angle of deflection is greater than 45˚ a minimum of two-tenths (0.20) of a foot shall be held between incoming and outgoing inverts, such as 90˚ bends. Tee intersections will require all incoming lines to be a minimum of two-tenths (0.20) of a foot above outgoing lines.

G. All manholes, regardless of type, shall have inflow protection inserts (Rain Guard Model LFM-SV) or approved substitute. The insert shall include a lift strap and gas relief valve.

2.9 SANITARY SEWER LIFT STATIONS

The Design Engineer shall make every effort to allow sanitary sewer lines to function as gravity flow lines for residential and non-residential subdivisions. When this is not possible, the use of sanitary sewer lift stations will be allowed with approval from the Director of Infrastructure. At a minimum, dual pumps (Flygt pumps only) will be required for each lift station design, which are to be set in a Fiberglass or HDPE wet well. The lift station must also be connected to the City's Systems Control and Data Acquisition (SCADA) System. The Owner or developer will be responsible for paying all costs associated with the SCADA system, such as labor, equipment, materials, and programming of the City's computer and testing.

2.10 SANITARY SEWER EASEMENTS

When facilities are not located within public rights-of-way, the following criteria shall be followed for minimum width of sanitary sewer easements:

A. Sanitary sewer lines up to ten (10) feet deep are to be located within the center of a fifteen (15) foot sanitary sewer easement.

B. In residential developments, sanitary sewer lines shall not cross residential lots unless approved by the Director of Infrastructure, in which case the easement shall be located within a single lot. If this is the case, an access gate shall be provided by the private property owner at each end of the easement and no walls or fences parallel to the water main will be allowed within seven and one-half (7.5) feet of the centerline. The Owner or Developer must submit a request to the City for any installation of gates or walls across or within a dedicated easement. An authorized City representative will review the request and determine if a permit or letter of permission will be issued for such improvements.

C. For sanitary sewer lines deeper than ten (10) feet, the easement width shall be equal to 1.5 times the depth (measured to the invert) of the line rounded up to the nearest five (5) feet. Thus, for a sanitary sewer line twelve (12) feet deep, the sanitary sewer easement would be one and a half multiplied by twelve (12) feet = (1.5) * (12) = eighteen (18) feet, rounded up to the nearest five (5) feet = twenty (20) feet.

SECTION 3. SANITARY SEWER CONSTRUCTION

3.1 SCOPE

These specifications for construction of sanitary sewer lines are intended to provide a minimum quality of workmanship acceptable to the City of Artesia and lack of any specifications not listed in this document does not relieve the Contractor of full responsibility for providing a complete project satisfactory for operation.

The Contractor shall furnish and install all materials, labor, and equipment for constructing the work shown on the construction plans, following these specifications and any requirements by other governing agencies.

Construction of all sanitary sewer systems shall also comply with New Mexico Environmental Department (NMED) regulations.

3.2 MATERIALS

The Contractor shall furnish and install materials meeting the requirements of these specifications and follow the dimensions, locations, and elevations shown on the construction plans. All materials shall be approved by the Design Engineer before being installed and any of these materials placed before they are so approved shall be removed and replaced with approved materials at the expense of the Contractor.

Materials delivered to the site of the work prior to their use shall be stored so as to cause the least inconvenience to the public and in a manner satisfactory to the Design Engineer and City.

A. Sanitary sewer lines and service laterals shall be Polyvinyl chloride (PVC), four (4) inch diameter (Sch. 40) to eight (8) inch diameter (SDR 35), meeting ASTM D1785

and D3034, and "white" or "green" in color. The City will accept High Density Polyethylene (HDPE) solid wall pipe as an alternate material.

B. All sanitary sewer lines ten (10) inch diameter and larger shall be High Density Polyethylene (HDPE) solid wall pipe (Driscoplex 4600 – PE3608) material with a cell classification of 345464C, as defined under ASTM D3350 with an established hydrostatic design basis of 1,600 psi at 73° F, PVC will not be allowed. Compounds used in manufacturing the pipe and fittings shall conform to AWWA C906 and NSF 61. Regardless of the application, the Design Engineer shall be required to properly size HDPE sanitary sewer lines, service laterals, and fittings on the basis of the Working Pressure Rating (WPR) needed for the sanitary sewer system. At minimum, the pipe size requirements for HDPE sanitary sewer lines in the City of Artesia shall be DR 21 (IPS), with a WPR of 80 psi and Pipe Stiffness (PS) of 61 psi, and "grey" in color.

C. TV camera inspections (in color), low pressure air testing, water exfiltration or vacuum testing of the manholes, and deflection testing are required on all sanitary sewer lines prior to paving, unless the Director of Infrastructure or authorized City representative determines otherwise. All residential sanitary sewer services shall have TV inspections.

D. Testing of Materials

It shall be the sole responsibility of the Contractor to prove to the Design Engineer's satisfaction that materials furnished for the construction of sanitary sewer lines comply with these specifications.

Sewer pipe shall be tested at the factory to see that the pertinent specifications are satisfied. The manufacturer shall furnish a certificate and test reports for each truckload, showing the conformity of the material with the specifications herein, and that each and every piece of pipe and fitting has been inspected for visible physical defects and defective pieces rejected.

3.3 TRENCHING AND BACKFILL FOR POLYVINYL CHLORIDE (PVC) AND HIGH DENSITY POLYETHYLENE (HDPE) PIPE

Based on site conditions, the Design Engineer shall be responsible for establishing the construction methods required for installation of PVC and HDPE pipe. The following are guidelines regarding trench design, placement, and backfill. In addition, the Design Engineer may refer to the PE handbook published by the Plastics Pipe Institute (PPI), Chapter 7, "Underground Installation of PE Piping," which may provide additional information (Refer to Appendix A).

This work shall include the furnishing of all labor, materials, tools, equipment, and machinery necessary for clearing, stripping, and removing all obstructions, top soil, sod, trees, brush, vegetation, debris, earth, rock, and other materials to be excavated. Furnish, place, and maintain of all sheeting, shoring and bracing necessary to protect ongoing work and adjacent properties, meeting OSHA requirements. Install pump and drain trenches necessary to keep the excavation free of water seepage from sources such as sanitary sewers, storm drains, ditches, and creeks without interrupting the flow of surface waters during the progress of construction. Dispose of excess and unsuitable materials that cannot

be used for backfilling, tamping, compacting, and refilling of excavated areas. Restore all streets, alleys, fences, rights-of-way, and any other structures or property relative to the project, whether private or public, that may have been damaged or used by the Contractor, to the condition that existed prior to work.

A. Classification

Excavation in trenches for sanitary sewer line construction will be unclassified and will not be paid for separately, but shall be included in the unit price bid per linear foot for the various sizes of pipe, unless specific provisions for separate payment is called for in the technical specifications or bid schedule.

B. Construction Methods

Trenching - Trenches shall be excavated by trenching machine, backhoe or dragline, except in locations where hand trenching is required. The banks of trenches shall be vertical, to a point one (1) foot above the top of pipe. When possible, excavation for pipe shall be completed without any support of the trench walls. Regardless of site conditions, the Contractor will be required to submit a trench safety plan to the City prior to start of construction. The trench safety plan shall meet the most current regulations set forth by the Department of Labor's Occupational Safety and Health Administration (OSHA), including any amendments. The Contractor shall be responsible for maintaining all trenches in a safe working condition, protecting both the workers and general public.

At a minimum, trench widths should be twenty-four (24) inches plus the pipe outside diameter, which may apply for all pipe size diameters varying from four (4) inches to twenty-four (24) inches or larger. Trench widths may be increased as needed for proper compaction of embedment material. The excavation shall not advance more than three hundred (300) feet ahead of the completed and backfilled pipeline. Pipe shall be laid in all open trenches prior to the end of a day's work, unless the Contractor secures written permission to do otherwise from the City or Design Engineer.

Trench bottoms will be excavated to the lines and grades as shown on the construction plans. Should any field changes be made to the alignment without affecting the amount of material and required trenching, the Contractor may proceed with the revised alignment at the unit price bid with approval from the Director of Infrastructure and Design Engineer.

If the bottom of the trench becomes an unstable foundation for the pipe by neglect of the Contractor to adequately shore or dewater, the Contractor will be required to remove the unstable material and backfill the trench to the proper grade with approved compacted material, with no extra compensation being granted for this material or work. However, if the undisturbed material encountered at the grade depth proves to be an unstable foundation for the pipe, the Contractor will be required to remove such unstable material and backfill the trench to the proper grade with approved compacted material.

If the trench is excavated deeper than necessary, it shall be backfilled to the proper grade with approved compacted material at the Contractors expense.

During the excavation of all trenches, the Contractor shall protect existing pipe lines and obstructions and avoid any damages. The Contractor shall give notice to the Owners of any such lines or obstructions in order that they may have time to take the necessary precautions for protecting their property.

In rock, excavation shall be carried six (6) inches below the bottom of the pipe and then backfill the trench with suitable material and properly tamped to finish grade.

After inspection of pipelines has been completed on any portion of the work, the trench may then be backfilled. Backfilling shall be accomplished in compliance with the applicable portions of these specifications.

Bedding - If the trench bottom can be cut and graded without difficulty and be relatively smooth, the pipe may be installed directly on the trench bottom. The trench bottom must support the pipe without any lumps, voids, debris, or rocks (rocks may not exceed three-fourths (3/4) inch diameter). If large rock is encountered that may cause a point load, it shall be removed a minimum depth of six (6) inches and replaced with suitable material, such as gravel (Class I) or sand(Class II) with particle sizes averaging three-fourths (3/4) inch or less, with a minimum compaction of 95% of the maximum dry density, in accordance with ASTM D-1557.

Pipe embedment and initial backfill – After the pipe has been laid into the trench, the pipe lines shall be backfilled in accordance with ASTM D-1557 as follows:

Class I embedment (gravel or crushed stone): The particle size shall not exceed three-fourths (3/4) of an inch in diameter. Gravel or crush stone should be carefully placed around the pipe without damaging the pipe in six (6) inch lifts to a minimum six (6) inches above the top of pipe. Minimum compaction shall be 95% of the maximum dry density, in accordance with ASTM D-1557.

Class II embedment (Sand): Sand shall consist of a clean, durable, and organic material, being carefully placed around the pipe in lifts of six (6) inches and then mechanically tamped for compaction, to a minimum of six (6) inches above the top of pipe. Minimum compaction shall be 95% of the maximum dry density, in accordance with ASTM D-1557. When using Class II material for embedding, water jetting may be performed to saturate the material, however, the Contractor shall be careful that soils do not collapse and the pipe does not float or rotate, while still meeting compaction.

Detectable tracing wire (copper) shall be installed immediately upon completion of first six (6) inch lift of embedment material, approximately six (6) inches above the top of pipe, centered upon the pipe. Wire shall be a minimum of 12 gauge, UL rated, with a minimum of 30 mil PE or PVC sleeve.

Final Backfill – Upon completion of the pipe embedment and initial backfill, final backfill shall consist of native soils, free of debris, and placed uniformly in compacted layers of six (6) inches, mechanically tamped to 95% of the maximum dry density, in accordance with ASTM D-1557. The material should be free of large stones that may cause damage to the pipe, such as concentrated pipe loading.

Detectable Warning Tape ("Green-Caution Buried Sewer Below" or approved other) shall be installed a maximum of eighteen (18) inches below finish grade prior to completion of final backfill, approximately centered upon the pipe.

C. Sheathing, Shoring, and Bracing

When required, the sides of all excavations shall be sheeted, shored, and braced in accordance with OSHA regulations and installed by the Contractor's "competent person" so as to try to prevent slides, cave-ins, settlement, or movement of the banks and to maintain the excavation clear of obstructions that will in any way hinder or delay the progress of the work. All sheet piling, shoring, and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and maintain the sides of the excavation properly in place and protect all persons or property from injury or damage.

Sheeting, shoring, and bracing shall not be left in place unless otherwise allowed by the City or Design Engineer. The removal of sheeting, shoring, and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private of public properties, and to avoid cave-ins or sliding of the banks.

Sheeting, shoring, and bracing shall not be left in place unless otherwise provided for in the contract or authorized by the Engineer. The removal of sheeting, shoring, and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private of public properties, and so as to avoid cave-ins or sliding of the banks. All holes or voids left by the removal of the sheeting, shoring, and bracing shall immediately and completely filled and compacted with suitable materials.

D. Pumping and Draining

The Contractor shall immediately remove all surface or seepage from water lines, drains, ditches, and any other sources which may accumulate during the excavation and construction work by means of pumping or draining.

All water removed from excavations shall be disposed of in a manner that will not create unsanitary conditions or interfere with the use of streets, private driveways, or entrances.

E. Support of Existing Pipes Across Trench

It shall be the responsibility of the Contractor to protect and support all water, sanitary sewer, gas, and other utility crossings during the excavation or required work to be performed, along with arranging for any temporary removal and replacement.

F. Disposal of Excavated Materials

Excavated materials shall be piled adjacent to the work and used for backfilling, if suitable. Excavated materials unsuitable for the backfilling or in excess of that required for backfilling shall be disposed of in an approved manner at locations designated on the construction plans or approved by the Design Engineer or City. Suitable top soil or sod shall be carefully piled separately and replaced in its original position, where possible. Excavated materials shall be handled at all times to minimize any inconvenience to the public or private property. In parkways and easements where it is necessary to deposit excavated materials on lawns during the construction process, burlap or canvas shall be placed on the lawn to prevent contact between excavated materials and the lawn, however, the Contractor must first obtain permission.

G. Protection of Trees, Plants, Shrubbery, etc.

Where trees, plants, shrubbery, etc., are adjacent to the line of the work and are not to be removed or replaced, the Contractor shall protect such trees, plants, shrubbery, etc., by installing temporary fencing and not permitting machinery or workers to damage tree limbs. If the Design Engineer believes that such trees, plants, shrubbery, etc., would be damaged by machinery, hand excavation may be required.

H. Jacking or Boring

This specification shall govern for the provision of the required opening for the installation of utilities by the methods of jacking or boring as shown on the construction plans and in conformity with this specification.

1. Where encasements or carrier pipe is required to be installed under railroad embankments or under highways, streets, or other facilities by jacking or boring methods, construction shall be made in a manner that will not interfere with the operation of the railroad, highway or other facility, and will not weaken or damage any embankment or structure. During construction operations, barricades and lights to safeguard traffic and pedestrians shall be furnished and maintained, as directed by the Design Engineer. Regardless of the method, the Contractor must obtain approval from the Design Engineer.

2. Construction by Jacking

If the grade of the pipe at the jacking end is below the ground surface, suitable pits or trenches shall be excavated for the purpose of conducting the jacking operations and for placing end joints of the pipe. This excavation shall not be carried to a greater depth than is required for placing of the guide and jacking machine.

At the other end of the pipe, an approach trench shall be excavated accurately to grade. All open trenches and pits shall be braced and shored in such a manner as will adequately prevent caving or sliding of the walls into the open trench or pit.

Heavy-duty jacks suitable for forcing the pipe through the embankment shall be provided. In operating jacks, even pressure shall be applied to all jacks and pipes so that uniform pressure will be applied to the pipe. The jacking head shall be of such weight and dimensions that it will not bend of deflect when full pressure is applied at the jack. A suitable jacking assembly shall be provided. The pipe to be jacked shall be set on guides which are straight and securely braced together in such a manner to support the section of the pipe and to direct it in the proper line and grade.

The distance that the excavation shall be extended beyond the end of the pipe depends on the characteristics of the material, but it shall not exceed two (2) feet in any case. The pipe shall be jacked from the low or downstream end, unless conditions prove otherwise. Lateral or vertical variation in the final position of the pipe from the line and grade established by the construction plans will be permitted only to the extent of one-sixteenth (1/16) inch per ten (10) feet, however, final approval will be required by the Design Engineer.

When jacking of pipes is once begun, the operation shall be carried on without interruption, in order to prevent the pipe from becoming firmly set in the embankment.

Any pipe damaged in jacking operations shall be repaired or removed and replaced by the Contractor at his entire expense, unless a separate pay item is included in the technical specifications and bid schedule. The pits or trenches excavated to facilitate the jacking operation shall be filled immediately after the jacking of the pipe has been completed, unless an encasement only has been installed; in which case, the trenches and pits shall be left open until the carrier pipe has been installed. The pits or trenches will then be backfilled in accordance with the location and conditions as defined in the technical specifications.

3. Construction by Boring

The hole shall be bored mechanically with a suitable boring assembly designed to produce a smooth, straight shaft and operated so that the completed shaft will be at the established line and grade. The size of the bored hole shall be of such diameter to provide ample clearance for bells or other joints. Separate payment will be included for such work under the technical specifications and bid schedule.

I. Protection of Buildings

The Contractor shall, at his own expense, shore up and protect any building or other structure which may be endangered during the work and restore all buildings, culverts, fences, walls, or other properties disturbed during construction to the original condition. The Contractor shall be responsible for any injuries to persons and property or damages to any pipe, sanitary sewer, or other utilities or structures that may occur due to construction.

J. Crossings to be Kept Open

Where street, railroad, and all other crossings are shown on the construction plans, open cut trenches are to be filled in such a manner as to prevent any serious interruption of traffic, whether it be vehicular or pedestrian. Such work shall be considered incidental to the project.

K. Protection of Unfinished Work

Before leaving work for the night, care must be taken to protect and securely close the unfinished end of the pipe so that earth or other materials do not enter into the pipe through any such opening or unplugged end.

L. Traffic Control

The Contractor must provide and maintain adequate detours during construction. The Contractor shall provide lights, warning signs, and/or watchmen in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), latest revision, to provide a safe environment for vehicular and pedestrian traffic.

3.4 SANITARY SEWER PIPE

Sanitary sewer pipe shall be as specified on the construction plans, technical specifications, and bid schedule.

Sanitary sewer pipe shall conform to all the requirements specified below.

A. Polyvinyl Chloride (PVC) Pipe

All sanitary sewer lines shall be Polyvinyl chloride (PVC), four (4) inch diameter (Sch. 40) to eight (8) inch diameter (SDR 35), meeting ASTM D1785 and ASTM D3034, and “white” or “green” in color. Minimum pipe stiffness shall be 46 PSI. The City will accept High Density Polyethylene (HDPE) solid wall profile pipe as an alternate material.

The pipe and fittings shall be uniform throughout and free of any defects, such as cracks, holes, etc.

Joints for PVC pipe and fittings shall be integral, rubber gasketed, bell and spigot, push-on type joints conforming to the material and performance requirements of ASTM D-3212 and F-477.

B. Solid Wall High Density Polyethylene Pipe (HDPE)

The material used for sanitary sewer shall be designed for a minimum structural life cycle of fifty (50) years. If the pipe material will deteriorate when subjected to corrosive conditions, the Design Engineer shall provide an acceptable corrosion resistant liner or provide calculations and data that demonstrate that the design and operational characteristics will provide for the minimum life cycle. At minimum, the following conditions will apply:

All sanitary sewer lines ten (10) inch and larger nominal size shall be High Density Polyethylene (HDPE) solid wall pipe (Driscoplex 4600 – PE3608) material with a cell classification of 345464C, as defined under ASTM D3350 with an established hydrostatic design basis of 1,600 psi at 73° F. Compounds used in manufacturing the pipe and fittings shall conform to AWWA C906 and NSF 61. Regardless of the application, the Design Engineer shall be required to properly size HDPE pipe, service laterals, and fittings on the basis of the Working Pressure Rating (WPR) needed for the sanitary sewer system. At minimum, the pipe size requirements for HDPE sanitary sewer lines in the City of Artesia shall be DR 21 (IPS), with a WPR of 80 psi and Pipe Stiffness (PS) of 61 psi, and "grey" in color.

Vitrified clay pipe will not be allowed in the City of Artesia.

High Density Polyethylene (HDPE) solid wall pipe shall be used for all sizes of force mains, Driscoplex 4600 (IPS), "grey" in color, or approved substitute by the Director of Infrastructure or authorized City representative.

3.5 PVC AND HDPE PIPE LAYING

This part shall include the furnishing of all labor and materials including pipe which shall meet the requirement of these specifications and follow the dimensions, locations, and elevations shown on the construction plans.

The construction of all sanitary sewer lines shall begin at the outlet or lower end, unless otherwise directed by the Design Engineer or City.

Appurtenances shall be constructed as soon as the sanitary sewer reaches the intended locations. If requested by the Contractor, the Design Engineer may permit postponement of the construction of manholes on sanitary sewer lines and without any additional cost to the City or Owner, lay the pipe continuously through the manhole location.

The construction of appurtenances in advance of the construction of the sanitary sewer line will not be permitted. The appurtenances to sanitary sewers shall be constructed in accordance with the construction plans and these specifications.

The grade line shown on the profile is the elevation of the invert or flow line of the sanitary sewer pipe. The Contractor shall establish a grade line in the trench as shown on the construction plans. Pipe shall be laid in the trench in a straight line with no kinks between manholes. The bottom of the trench shall be graded such that the pipe will be uniformly and continuously supported without voids.

When construction is stopped temporarily and/or a scheduled work day has ended, the Contractor shall make adequate provisions to cover or plug the ends of all pipes and structures, to prevent the entrance of trash or debris into the pipe.

3.6 PIPE JOINTS

Joints for sanitary sewer pipe shall meet the following:

A. PVC pipe for gravity sanitary sewers shall be joined with an integral bell and spigot, rubber gasketed joint, push-on type. Each bell and spigot joint with gasket shall meet the requirements of ASTM D-3212.

B. HDPE pipe and force mains joints shall be joined by means of heat fusion. Types of joints include butt fusion, electro fusion, saddle fusion, socket fusion, or flange.

C. Refer to the PE handbook as published by the Plastics Pipe Institute (PPI), Chapter 9, "PE Pipe Joining Procedures" (Appendix B) or Technical Report 33, "Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe(2006)" (Appendix C).

D. The City will require a data logger for each project using HDPE, which tracks and records the fusion of each joint.

3.7 FIBERGLASS MARKERS

Where the pipeline travels across open country and is not under pavement, marking posts shall be placed at two hundred and fifty (250) foot intervals, including every change in alignment direction. Marking posts shall be a minimum of four (4) inches wide by sixty (60) inches high, "green" in color. Each marking post shall read "WARNING SEWER PIPELINE."

3.8 MANHOLES

Manholes for sanitary sewer shall be constructed of either Glass-Fiber Reinforced Polyester (FRP) or High Density Polyethylene (HDPE), constructed in accordance with the construction plans, appurtenance sheets, and these specifications. Either type may be brought to grade with grade rings to a maximum height adjustment of eighteen (18) inches.

A. Glass-Fiber Reinforced Polyester (FRP)

Fiberglass reinforced manholes used for sanitary sewer systems shall consist of commercial grade polyester resin and meet or exceed ASTM D-3753. Manholes shall be manufactured by L.F. Manufacturing, Inc. or approved substitute. The inner surface shall consist of a resin layer capable of resisting corrosive conditions, such as exposure to hydrogen sulfides. Each manhole shall be designed for an H-20 load rating, being water-tight and including a solid FRP anti-flotation bottom and fully enclosed fiberglass bench and invert area.

Certification – The manufacturer shall furnish a certificate of conformance stating that each manhole was been sampled, tested, and inspected in accordance with these specifications.

Installation – Crushed stone or Class I material shall be used for a stable foundation. The minimum thickness for the foundation shall be eight (8) inches. Depending on soil conditions and groundwater, the Design Engineer may require a reinforced concrete foundation.

Backfilling – The embedment surrounding the manhole shall extend three and a half (3.5) feet beyond the wall exterior. Embedment shall be placed in twelve (12) inch lifts from the invert to the top of manhole, consisting of Class II or "Flow Fill" material, compacted to at least 95% of the maximum dry density, in accordance with ASTM D-1557.

Concrete anchors should be installed to prevent flotation of the manhole when groundwater is encountered.

Cast iron frames and covers shall be set on each manhole. Reinforced concrete collars will be required for all manholes, being round in shape.

No steps shall be placed in any manhole.

Stubs shall be a part of the manhole, with length, size, slope, and inverts determined by the Design Engineer.

B. High Density Polyethylene (HDPE) Manholes

HDPE manholes used for sanitary sewer systems shall be of solid wall construction consisting of a standard riser shaft, welded flat top and bottom, and stubout pipes that meet the requirements of ASTM D-3350 and ASTM F-1759. Manholes shall be fabricated by Ferguson Industrial Plastics and have a yellow interior for visual inspection or black as specified by the Design Engineer. Manholes will have flow-through inverts with "benching" to prevent sewage accumulation.

Certification – The manufacturer shall furnish a certificate of conformance stating that each manhole was been sampled, tested, and inspected in accordance with these specifications.

Installation – Crushed stone or Class I material shall be used for a stable foundation. The minimum thickness for the foundation shall be eight (8) inches. Depending on soil conditions and groundwater, the Design Engineer may require a reinforced concrete foundation.

Backfilling – The embedment surrounding the manhole shall extend three and a half (3.5) feet beyond the wall exterior. Embedment shall be placed in twelve (12) inch lifts from the invert to the top of manhole, consisting of Class II or "Flow Fill" material, compacted to at least 95% of the maximum dry density, in accordance with ASTM D-1557.

Concrete anchors should be installed to prevent flotation of the manhole when groundwater is encountered.

Cast iron frames and covers shall be set on each manhole. Concrete blockouts will be required for all manholes, being round in shape.

No steps shall be placed in any manhole.

Stubs shall be a part of the manhole, with length, size, slope, and inverts determined by the Design Engineer

C. Precast or cast-in-place concrete manholes may be installed where conditions require and, with approval from the Director of Infrastructure. An interior coating will be required, consisting of an epoxy resin-type material, which shall be capable of protecting the concrete from deterioration caused by poisonous gases.

3.9 CLEANOUTS

Cleanouts shall consist of a cast-iron frame and cover and boot as manufactured by the Western Iron Works Company or approved substitute and installed as shown on the construction plans. After installation of the boot, a square concrete block twenty-four (24) inches by twenty-four (24) inches by six (6) inches thick shall be poured level with the top of the boot, reinforced with #3 bars on ten (10) inch center each way and 3,000 PSI concrete. The price bid for a cleanout shall include the bend or wye in the main sewer line, all pipe up to finish grade, the cast-iron frame, cover, and boot, and concrete block out.

3.10 CONCRETE

Concrete for the construction of sanitary sewer appurtenances shall be of the strength required by these specifications and/or the construction plans. Where no strength is specified a minimum of 3000 PSI at twenty-eight (28) days shall be required.

3.11 CLEANUP

During construction the Contractor shall responsible for maintaining all work areas in a clean and presentable manner. Scraps and debris shall not be left scattered, but should be assembled together, if applicable. Non-usable materials shall be moved from the work areas and properly disposed to the satisfaction of the City, Owner, and Design Engineer.

The Contractor shall make a final cleanup of all parts of the work prior to final acceptance by the City or Owner. This cleanup shall include items such as: construction materials, equipment, scraps, pieces of concrete, and other debris. Earthwork shall be smooth and graded as shown on the construction plans. Final backfill over all trenches shall be left in a uniform condition.

Disposal is not to be made on adjacent private or public property without written permission. If permission is granted by the property owners or City, the Contractor will be responsible for re-establishing the disturbed area to conditions satisfactory to the property owner or City, once work has been completed.

3.12 MAINTENANCE

All sanitary sewers systems and structures shall be thoroughly cleaned and maintained in a workable condition until final acceptance.

3.13 INSPECTION AND TESTS

Tests and inspection shall be made on the entire project by sections designed by the Design Engineer to confirm that the sanitary sewer line is in an acceptable condition to perform.

The Project Inspector shall observe the construction of the project on a routine basis. Final acceptance will not be given until the entire project has been completed, including all tests conducted and passed as may be required.

A. Inspection – General

During the process of unloading, all pipe and accessories shall be inspected by the Contractor for loss or damage due to transportation.

The Contractor shall be responsible for all material furnished for the project and shall replace at his own expense all such material that is found to be defective in manufacturing or that has become damaged in handling after delivery by the manufacturer. The Contractor shall be responsible for the safe storage of material furnished by or to him until it has been incorporated in the completed project.

B. Visual Inspection

During the course of the construction, the Project Inspector will make continuous routine inspection to confirm that the project is being constructed in accordance with the construction plans and specifications and that the materials are of the type and size specified.

Upon completion of the project, or part of the project, the Design Engineer or his authorized representative (Project Inspector), City, and Contractor (Job Superintendant) will make a visual inspection of the entire project, or a part of the completed project, using the City's preliminary and final checklists to determine punchlist items.

C. Television Camera Inspection Test:

TV camera inspections (in color), low pressure air testing, water exfiltration or vacuum testing of the manholes, and deflection testing are required on all sanitary sewer lines prior to paving, unless the Director of Infrastructure determines otherwise.

Any line or service lateral found to be defective will be corrected at the Contractor's expense.

D. Low Pressure Air Test

The Contractor shall conduct low pressure air tests on all completed sections of sanitary sewer lines, prior to backfilling the trench and the line becoming live. Testing shall be in

accordance with Section 901.7 as outlined in the 2006 New Mexico Standard Specifications for Public Works Construction and ASTM F1417.

E. Mandrel Deflection test

The Contractor shall conduct a mandrel deflection test on all completed sections of sanitary sewer lines, prior to backfilling the trench and the line becoming live. Testing shall be in accordance with Section 901.5.2.4 as outlined in the 2006 New Mexico Standard Specifications for Public Works Construction.

F. Sanitary sewer service laterals shall be included with the testing of sanitary sewer lines, which may include video camera inspections(color), low pressure air testing, and mandrel testing, unless the Director of Infrastructure decides otherwise. At minimum, residential sanitary sewer services will require video camera inspections (color). All testing shall be completed, reviewed, and approved by the Director of Infrastructure prior to any initiation of street subgrade work.

G. Vacuum Testing of Manholes

The Contractor shall conduct a water exfiltration or vacuum test on all completed manholes, prior to backfilling around the manhole and placement of the manhole frame and cover. Testing shall be in accordance with Section 920.5 as outlined in the 2006 New Mexico Standard Specifications for Public Works Construction. Failed manholes shall be repaired and retested until they pass.

H. Compaction Test

Frequency tests shall not be less than one (1) for any pipe section and every three hundred linear feet (300') of main pipe per two feet (2') of lift until final grade, starting at two feet (2') above top of pipe but not less than two tests. Sanitary sewer service laterals are to be tested at a rate of one (1) for every six (6) services staggered or every three hundred (300) linear feet of sanitary sewer service installed.

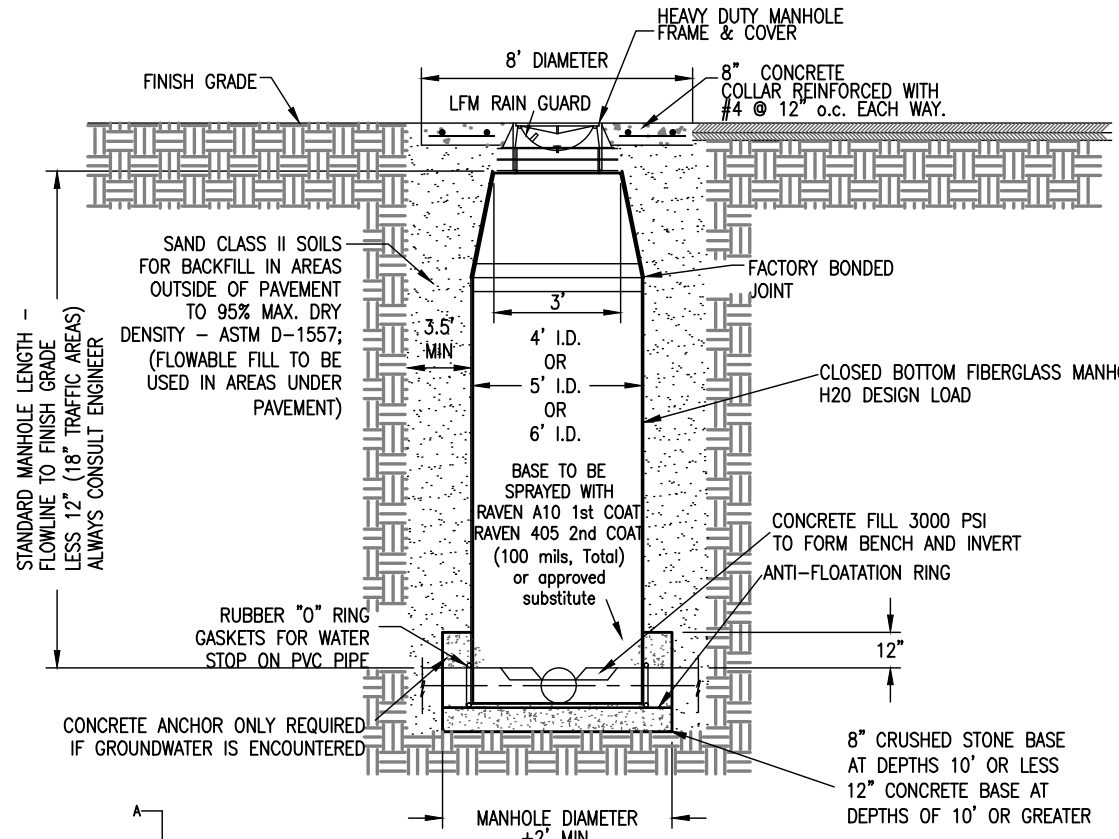
Each sanitary sewer manhole will receive a density test every two (2) feet of lift until final grade, alternating around all quadrants. Every other main and stubout that crosses the existing or proposed street or alley shall also receive at least one set of density tests. All ditches shall be mechanically tamped and compacted to a minimum 95% of the maximum dry density, in accordance with ASTM D-1557. When using Class II material for embedding or backfilling, water jetting may be performed to saturate the material, however, the Contractor shall be careful that soils do not collapse, while still meeting compaction.

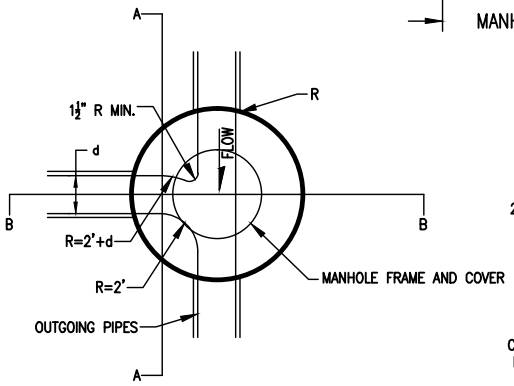
If there are any doubts from the Design Engineer that the compaction requirements have not been met, then the Design Engineer may order such density tests be performed by a soils engineering firm at the expense of the Contractor. If these tests prove that the original backfill is not of sufficient compaction, then the Contractor will

be required to remove and replace the backfill for proper compaction until densities are met under these specifications.

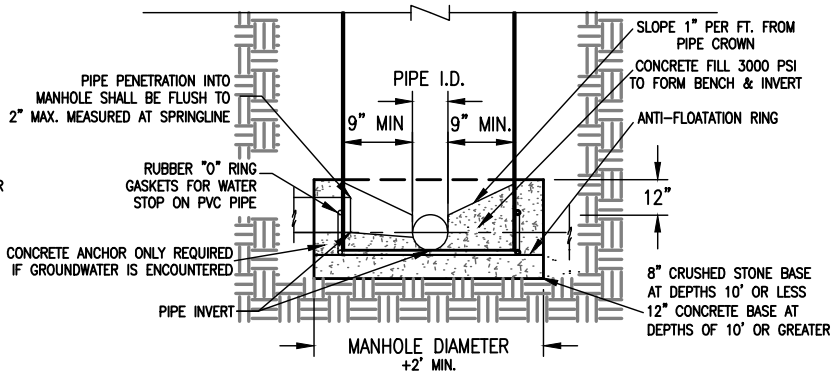
J. The Contractor shall furnish a maintenance bond to the City in the amount of 10% based on the final contract price. The maintenance bond will be valid for two (2) years, commencing on the date of City issuance for a “Certificate of Final Acceptance.”

SECTION 4. SANITARY SEWER SYSTEMS STANDARD CONSTRUCTION DETIALS





FIBERGLASS MANHOLE DETAIL – PLAN VIEW



SECTION B–B
BENCH AND INVERT DETAIL
FOR MULTIPLE PIPES

NOTES:

1. CONCRETE ANCHOR WILL BE REQUIRED ONLY IF GROUNDWATER IS ENCOUNTERED.
2. WHERE A SANITARY SEWER LINE ENTERS AND EXITS A MANHOLE IN A STRAIGHT LINE AND GRADE DOES NOT CHANGE, A DROP BETWEEN THE INCOMING AND OUTGOING INVERTS WILL NOT BE REQUIRED. IF A DEFLECTION IN THE SANITARY SEWER ALIGNMENT IS PROPOSED AT THE MANHOLE, A MINIMUM OF ONE-TENTH (0.10) OF A FOOT BETWEEN INVERTS WILL BE REQUIRED WHEN THE ANGLE IS BETWEEN 0 AND 45. IF THE ANGLE OF DEFLECTION IS GREATER THAN 45, A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT SHALL BE HELD BETWEEN INCOMING AND OUTGOING INVERTS, SUCH AS 90 BENDS. TEE INTERSECTIONS WILL REQUIRE ALL INCOMING LINES TO BE A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT ABOVE OUTGOING LINES.
3. WATER TIGHT FIBERGLASS (CLOSED BOTTOM) MANHOLES ARE MANUFACTURED WITH A PRE-BUILT FIBERGLASS BENCH AND INVERT. THE DESIGN ENGINEER WILL NEED TO CONFIRM PROJECT REQUIREMENTS PRIOR TO MANUFACTURING OF MANHOLES.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

CLOSED BOTTOM WATERTIGHT FIBERGLASS MANHOLE DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-01

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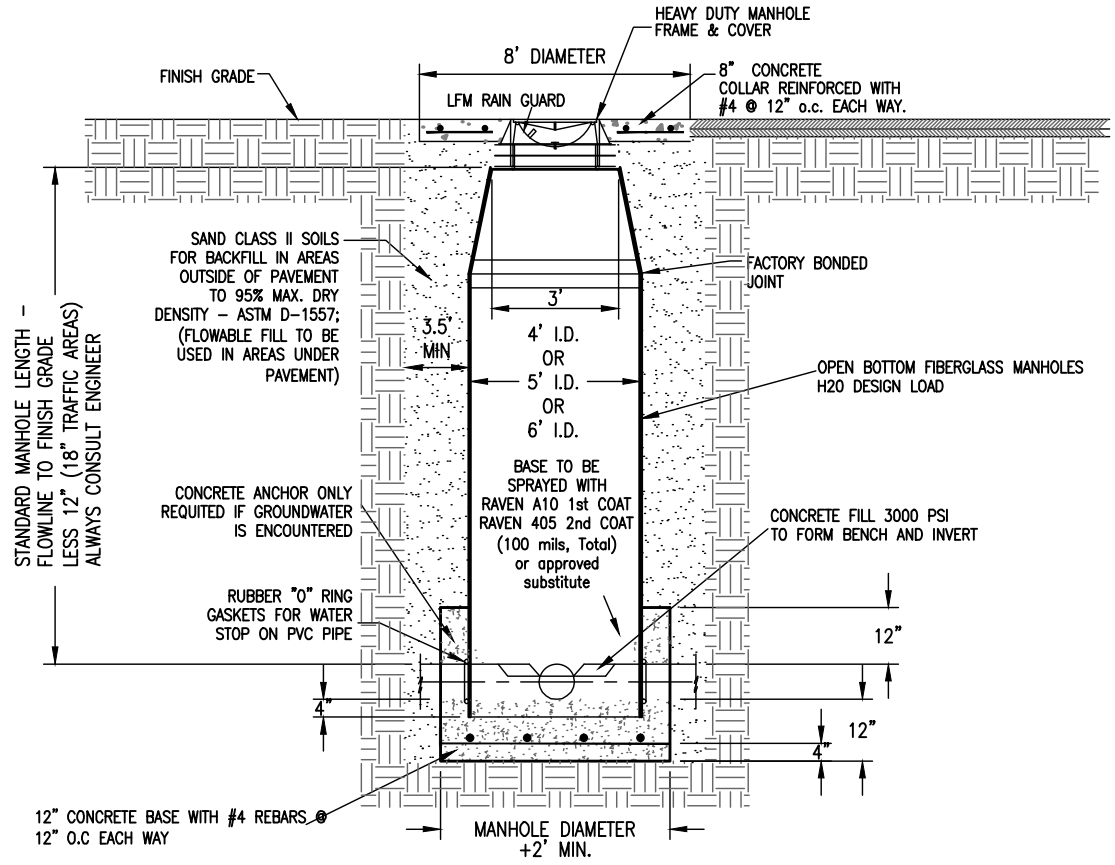
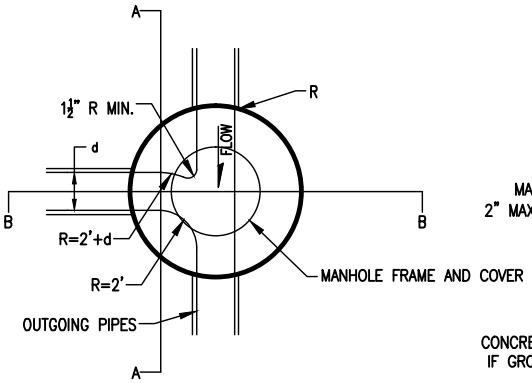
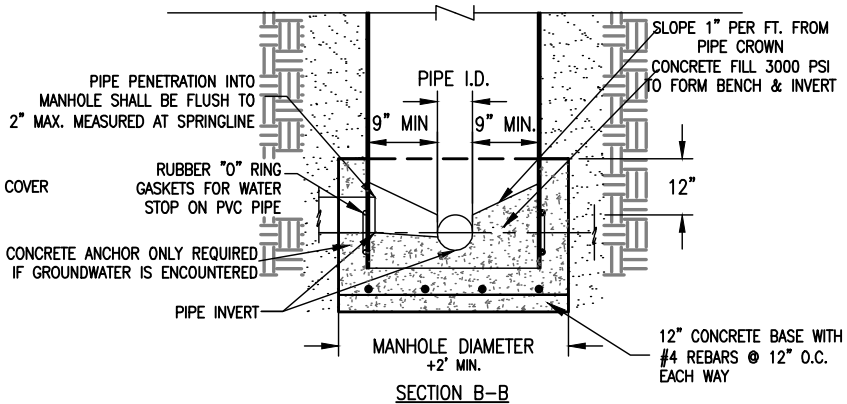




FIBERGLASS MANHOLE DETAIL – PLAN VIEW



SECTION B-B
BENCH AND INVERT DETAIL
FOR MULTIPLE PIPES

NOTES:

1. CONCRETE ANCHOR WILL BE REQUIRED ONLY IF GROUNDWATER IS ENCOUNTERED.
2. WHERE A SANITARY SEWER LINE ENTERS AND EXITS A MANHOLE IN A STRAIGHT LINE AND GRADE DOES NOT CHANGE, A DROP BETWEEN THE INCOMING AND OUTGOING INVERTS WILL NOT BE REQUIRED. IF A DEFLECTION IN THE SANITARY SEWER ALIGNMENT IS PROPOSED AT THE MANHOLE, A MINIMUM OF ONE-TENTH (0.10) OF A FOOT BETWEEN INVERTS WILL BE REQUIRED WHEN THE ANGLE IS BETWEEN 0 AND 45. IF THE ANGLE OF DEFLECTION IS GREATER THAN 45, A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT SHALL BE HELD BETWEEN INCOMING AND OUTGOING INVERTS, SUCH AS 90 BENDS. TEE INTERSECTIONS WILL REQUIRE ALL INCOMING LINES TO BE A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT ABOVE OUTGOING LINES.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

OPEN BOTTOM WATERTIGHT FIBERGLASS MANHOLE DETAIL

ORIGINAL DATE: MAY 2009
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SHEET NO: S-02

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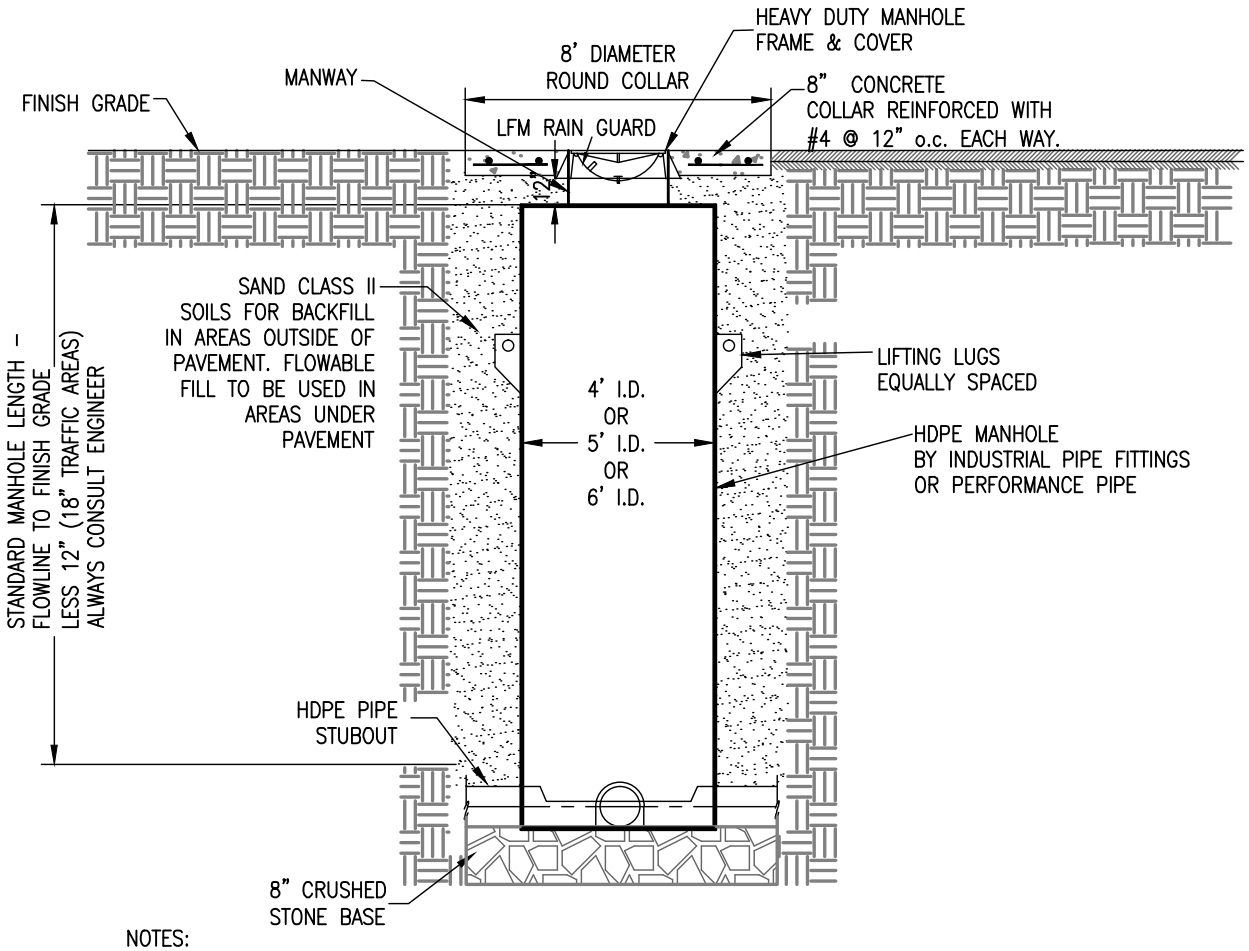

NOTES:

1. EMBEDMENT SHOULD BE PLACED AROUND THE MANHOLE RISER FOR THE FULL HEIGHT OF THE MANHOLE.
2. EMBEDMENT SHALL EXTEND A MINIMUM OF 3.5 FEET FROM THE RISER OR TO THE TRENCH WALL; WHICHEVER IS THE GREATER DISTANCE.
3. EMBEDMENT AROUND MANHOLE RISER IS REQUIRED TO BE CLASS I OR II MATERIAL PER ATSM D2321, COMPACTED TO A MINIMUM OF 95% MAXIMUM DRY DENSITY PER ASTM D-1557.
4. MANHOLES SHALL BE INSTALLED IN A DRY TRENCH WITH A STABLE FOUNDATION. THE FOUNDATION SHOULD CONSIST OF A MINIMUM OF 8" OF CLASS I MATERIAL COMPACTED TO A MINIMUM OF 95% MAXIMUM DRY DENSITY PER ASTM D-1557.
5. ALL POLYETHYLENE TO POLYETHYLENE SURFACES SHOWN MUST BE FULL PENETRATION WELDS UNLESS OTHERWISE SPECIFIED.
6. WHERE A SANITARY SEWER LINE ENTERS AND EXITS A MANHOLE IN A STRAIGHT LINE AND GRADE DOES NOT CHANGE, A DROP BETWEEN THE INCOMING AND OUTGOING INVERTS WILL NOT BE REQUIRED. IF A DEFLECTION IN THE SANITARY SEWER ALIGNMENT IS PROPOSED AT THE MANHOLE, A MINIMUM OF ONE-TENTH (0.10) OF A FOOT BETWEEN INVERTS WILL BE REQUIRED WHEN THE ANGLE IS BETWEEN 0 AND 45. IF THE ANGLE OF DEFLECTION IS GREATER THAN 45, A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT SHALL BE HELD BETWEEN INCOMING AND OUTGOING INVERTS, SUCH AS 90 BENDS. TEE INTERSECTIONS WILL REQUIRE ALL INCOMING LINES TO BE A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT ABOVE OUTGOING LINES.
7. THE FOLLOWING PARAMETERS ARE TO BE ASSUMED:
   A) MAXIMUM SOIL DENSITY OF 120 LB/FT
   B) GROUNDWATER NOT TO EXCEED TOP OF THE MANHOLE. FLOTATION OF MANHOLE MAY NEED TO BE ADDRESSED. WHEN A POLYETHYLENE ANCHOR CONNECTION RING IS INCLUDED, IT MUST BE USED IN CONJUNCTION WITH A CONCRETE ANCHOR BY OTHERS. THE PE ANCHOR CONNECTION IS NOT DESIGNED TO HOLD THE STRUCTURE ALONE.
   C) AMBIENT (73.4 F) OPERATING TEMPERATURE.
   D) STRUCTURAL LOADS APPLIED TO HDPE MANHOLE NOT TO EXCEED 1000 LBS. LOAD TO BE EQUALLY DISTRIBUTED ABOUT CIRCUMFERENCE OF MANHOLE.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

HDPE MANHOLE DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-03

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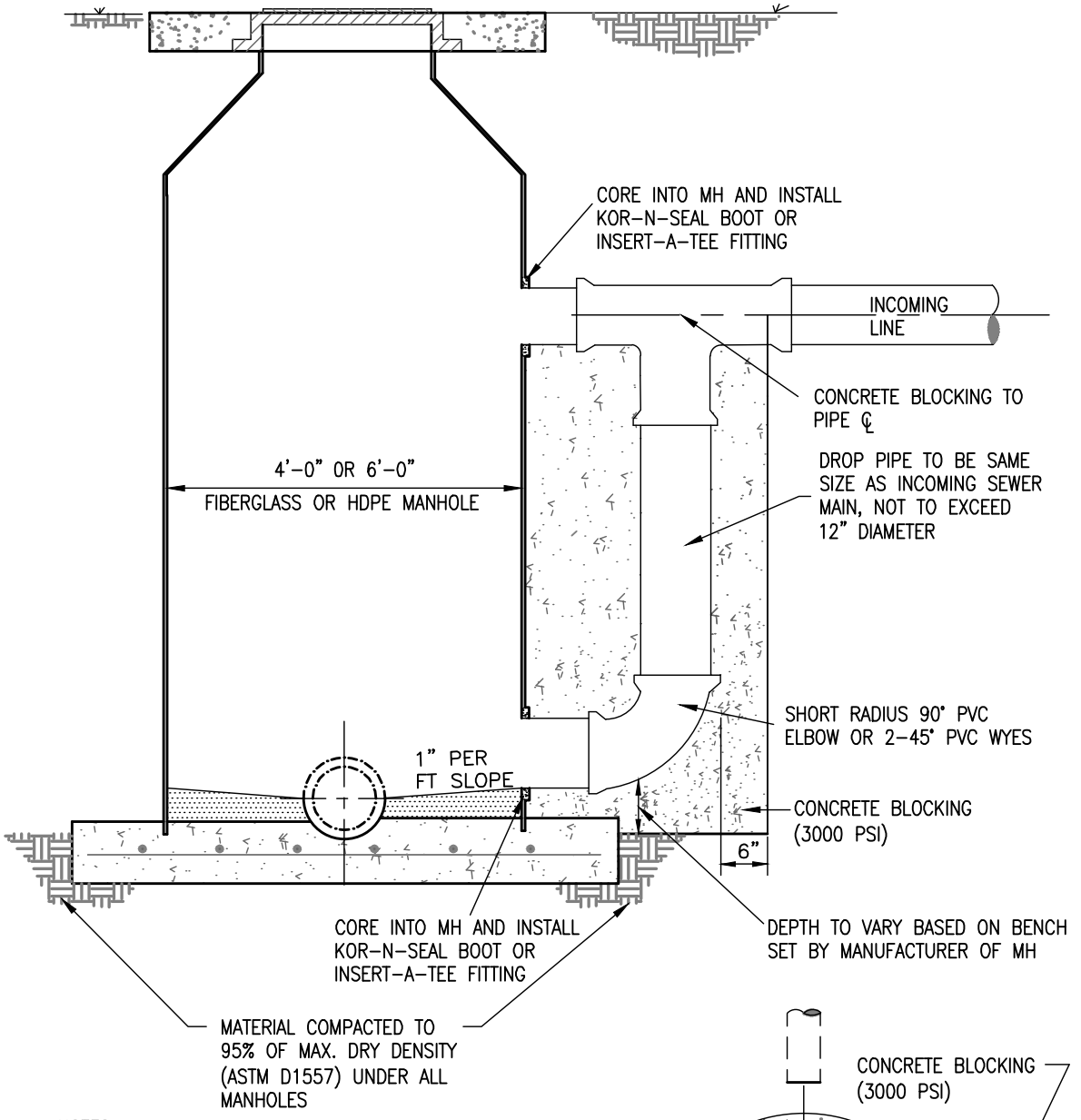
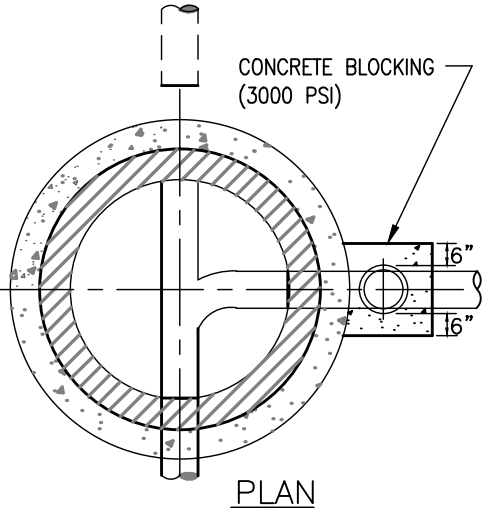




PLAN

NOTES:

1. FLOWLINE OF DROP SHALL BE LOCATED BETWEEN CENTERLINE AND TOP OF SEWER MAIN.
2. WHERE A SANITARY SEWER LINE ENTERS AND EXITS A MANHOLE IN A STRAIGHT LINE AND GRADE DOES NOT CHANGE, A DROP BETWEEN THE INCOMING AND OUTGOING INVERTS WILL NOT BE REQUIRED. IF A DEFLECTION IN THE SANITARY SEWER ALIGNMENT IS PROPOSED AT THE MANHOLE, A MINIMUM OF ONE-TENTH (0.10) OF A FOOT BETWEEN INVERTS WILL BE REQUIRED WHEN THE ANGLE IS BETWEEN 0 AND 45. IF THE ANGLE OF DEFLECTION IS GREATER THAN 45, A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT SHALL BE HELD BETWEEN INCOMING AND OUTGOING INVERTS, SUCH AS 90 BENDS. TEE INTERSECTIONS WILL REQUIRE ALL INCOMING LINES TO BE A MINIMUM OF TWO-TENTHS (0.20) OF A FOOT ABOVE OUTGOING LINES.
3. WATER STOP GASKETS REQUIRED ON ALL PIPES ENTERING THE MANHOLE.

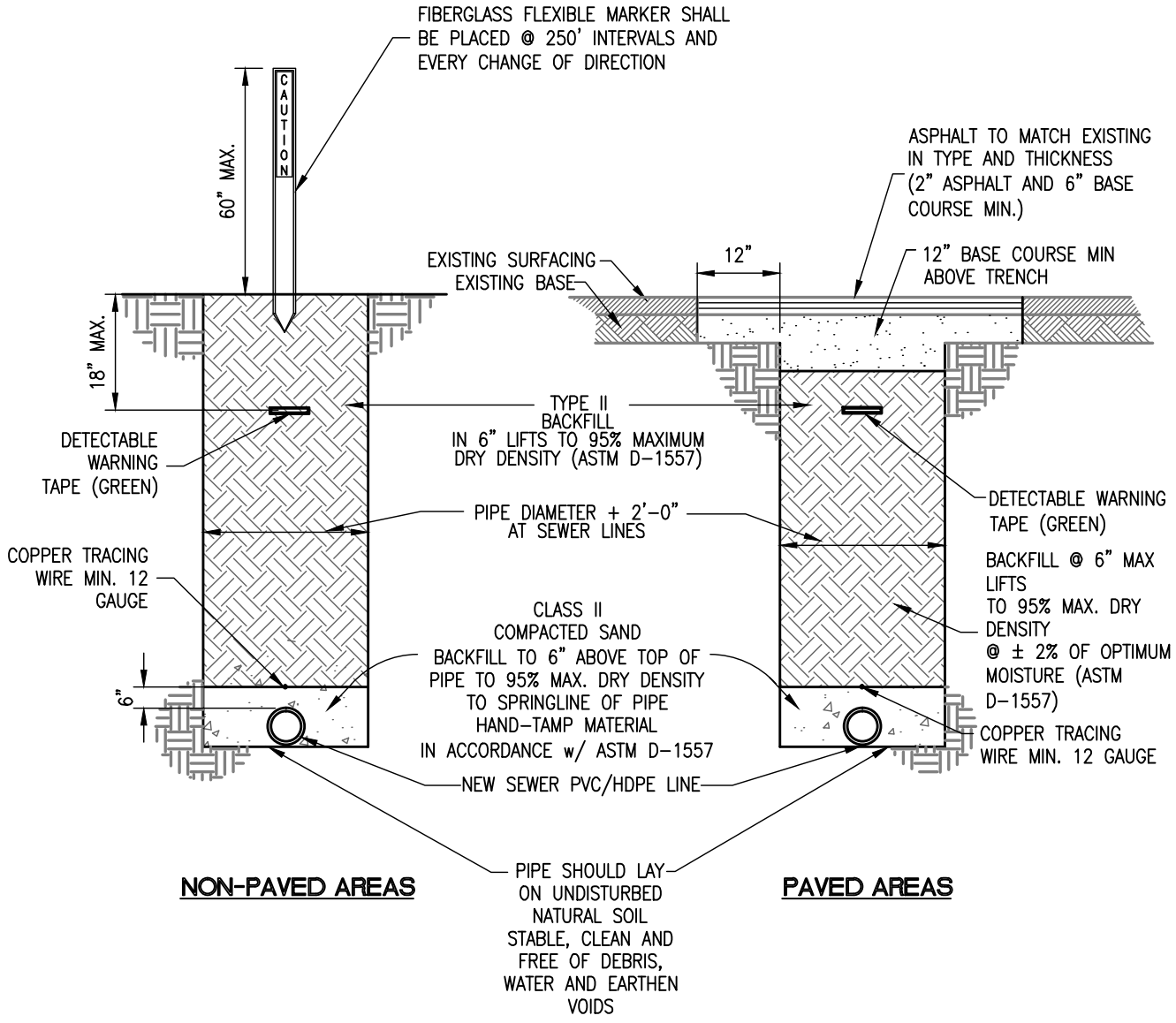
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

DROP MANHOLE DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-04



NOTES:
1. DESIGN ENGINEER TO DETERMINE IF BEDDING MATERIAL IS REQUIRED, BASED ON SOIL CONDITIONS.

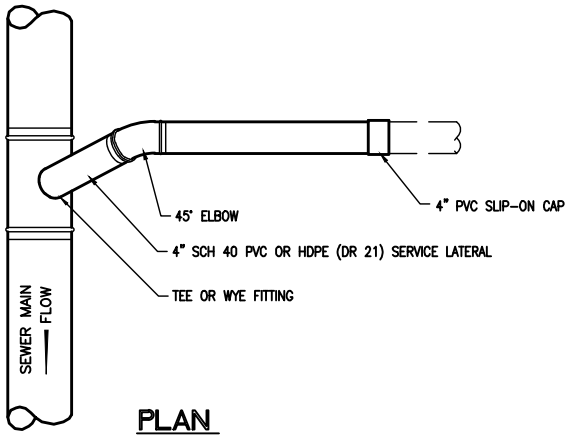
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

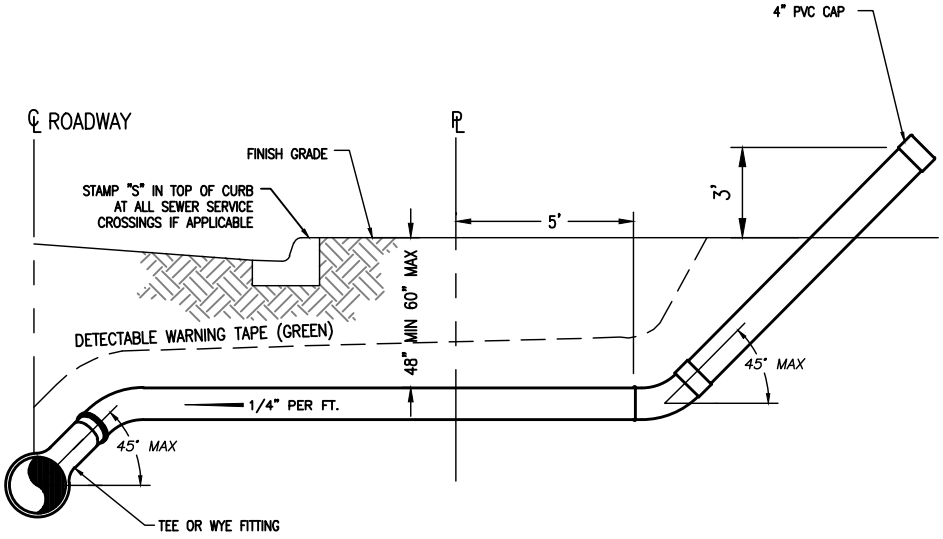
STANDARD CONSTRUCTION DETAILS

TYPICAL TRENCH DETAILS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-05



PLAN



SECTION

NOTES:
1. SEWER SERVICE LATERALS TO BE SCH 40 PVC OR HDPE (DR 21)

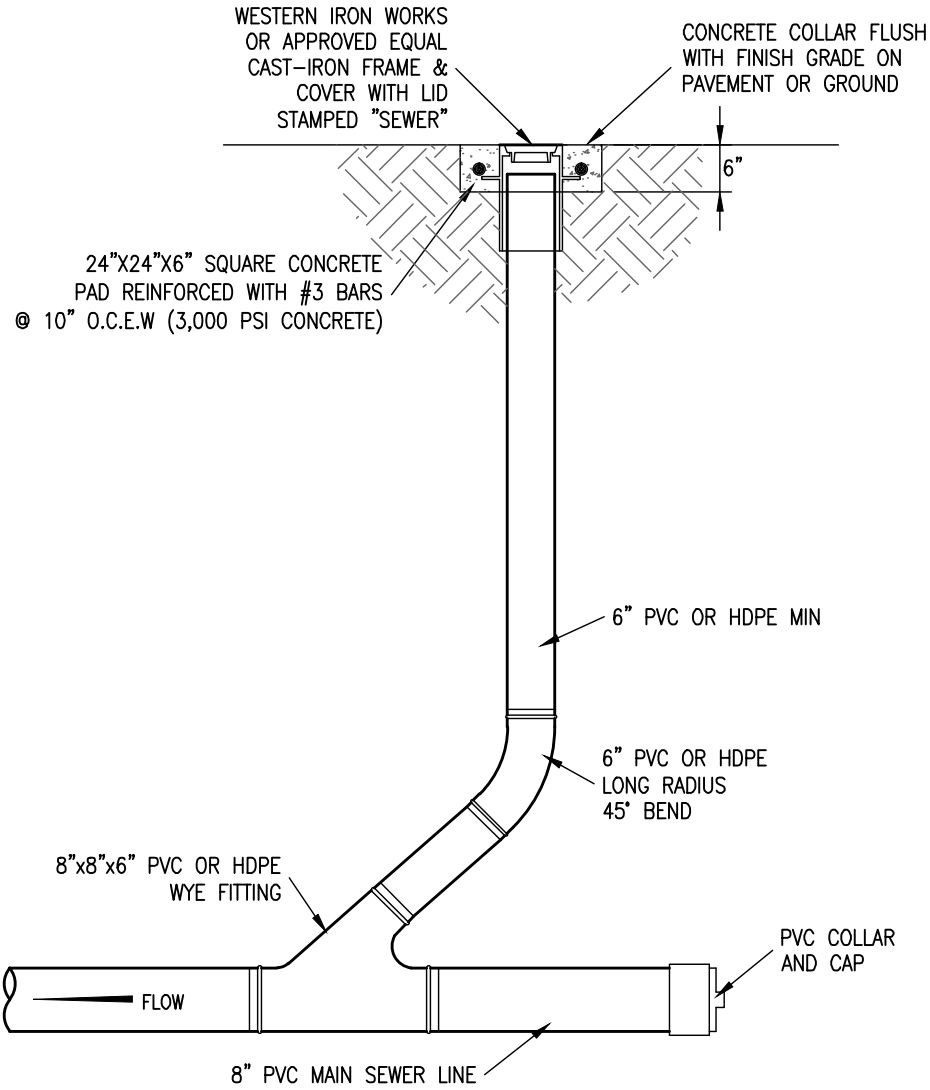
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL 4" PVC SEWER SERVICE

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-06



NOTES:

1. DEPENDING ON SIZE OF THE MAIN SANITARY SEWER LINE, THE CLEANOUT MATERIAL MAY CONSIST OF PVC OR HDPE, MINIMUM 6" DIAMETER.

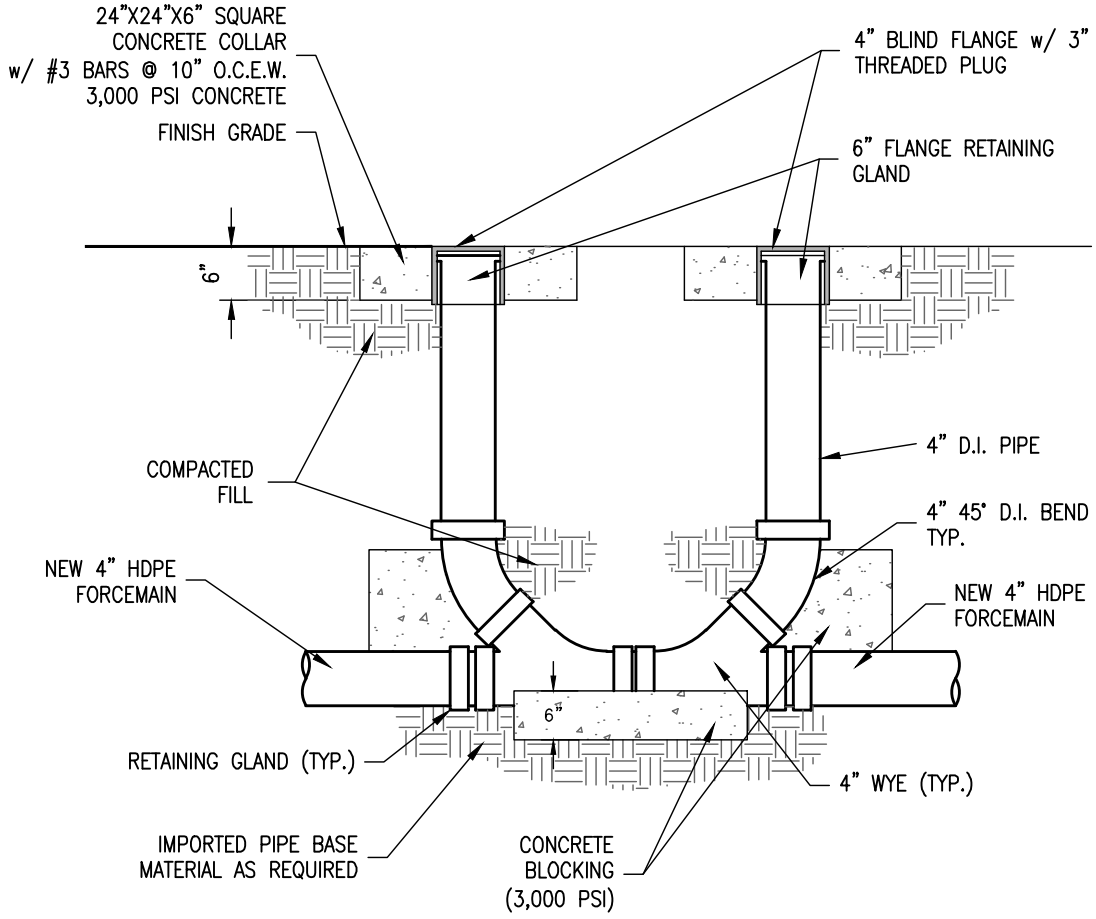
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

SANITARY SEWER MAIN CLEANOUT

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-07



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CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

FORCEMAIN DOUBLE CLEANOUT

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-08

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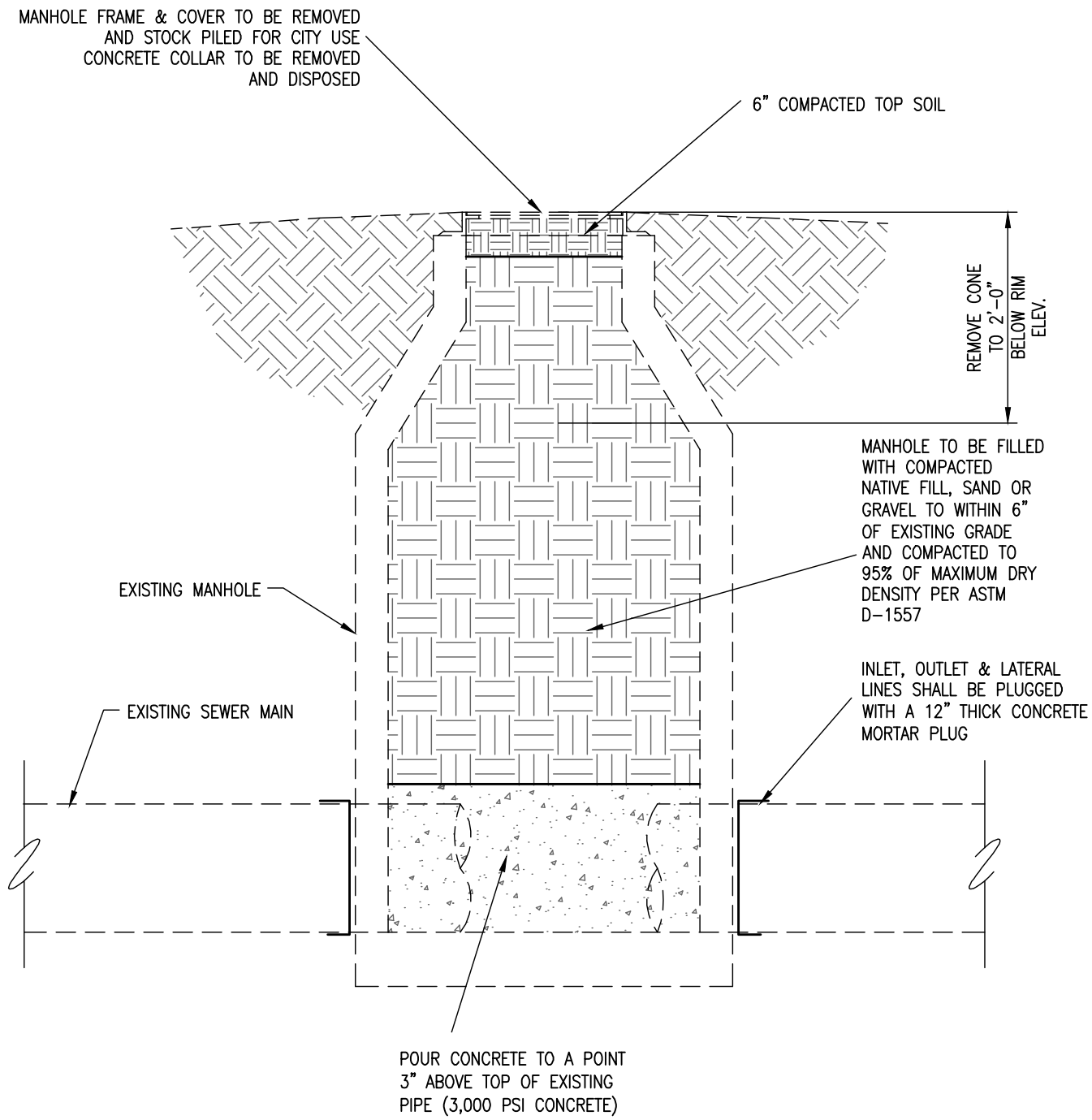

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CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

SEWER MANHOLE ABANDONMENT (OPEN AREAS)

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-09

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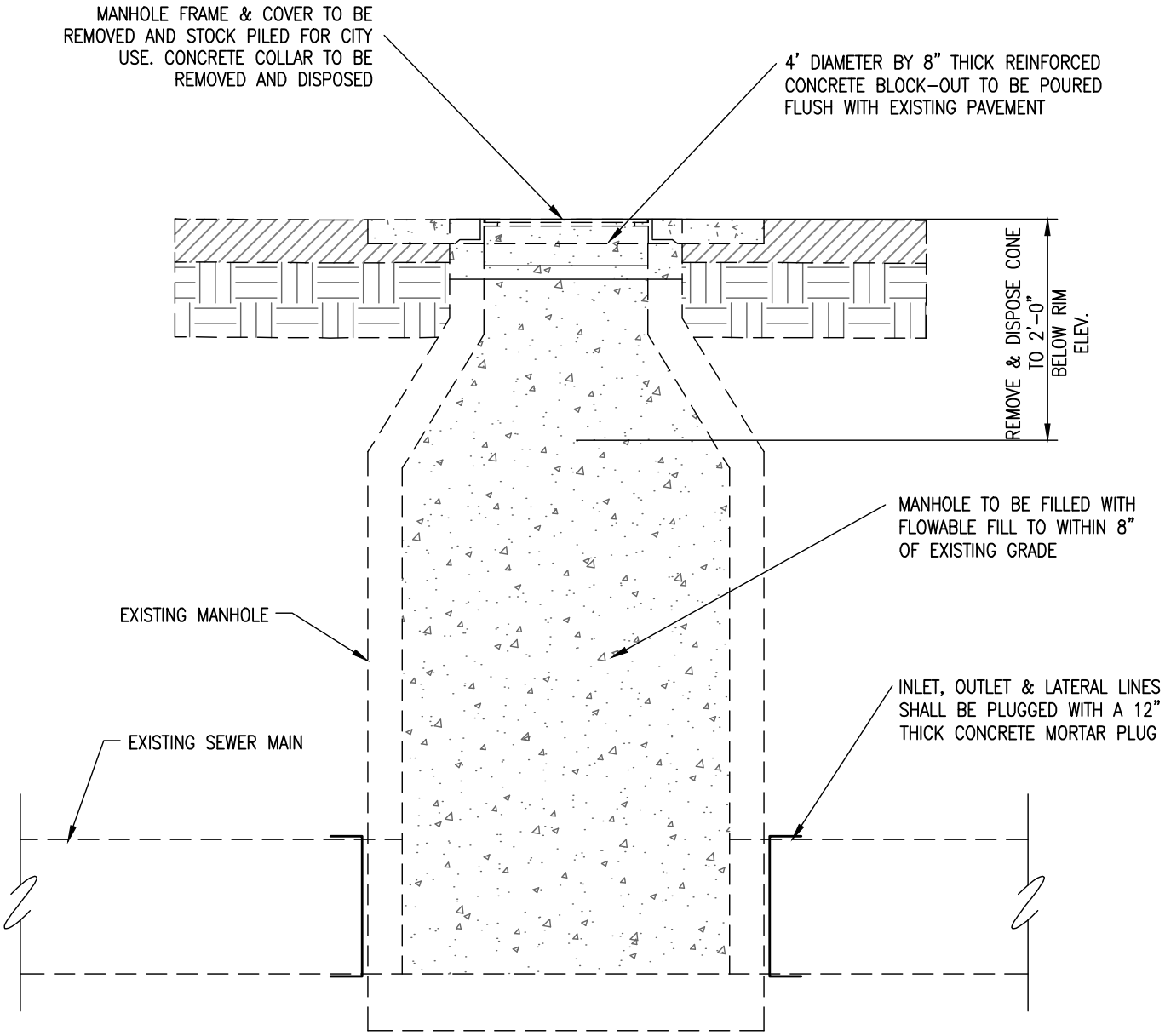

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STANDARD CONSTRUCTION DETAILS

SEWER MANHOLE ABANDONMENT (PAVED AREAS)

ORIGINAL DATE: MAY 2009

REVISION DATE: OCTOBER 2014

SHEET NO: S-10

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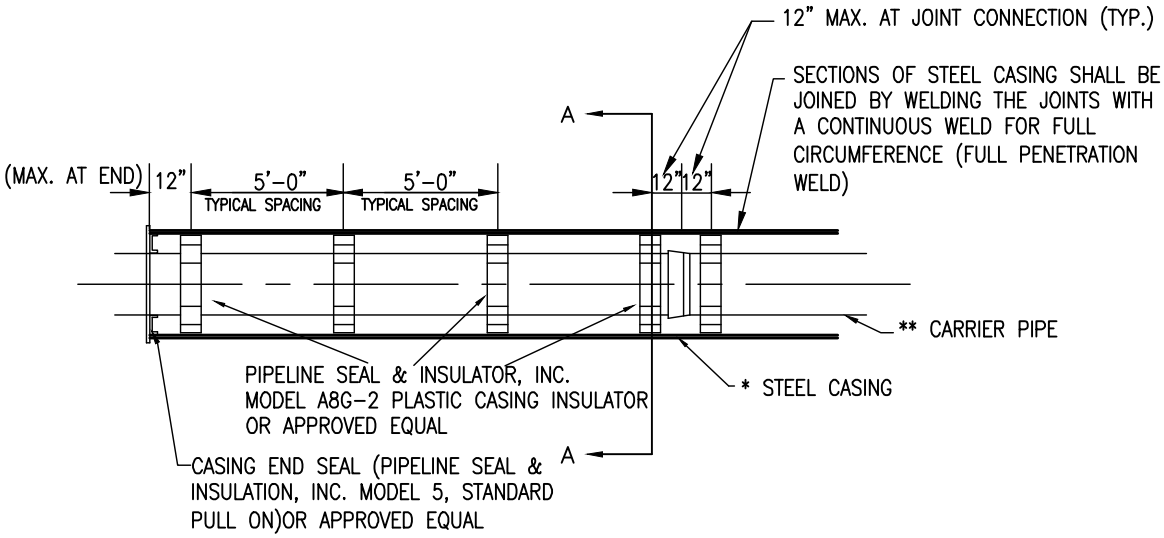

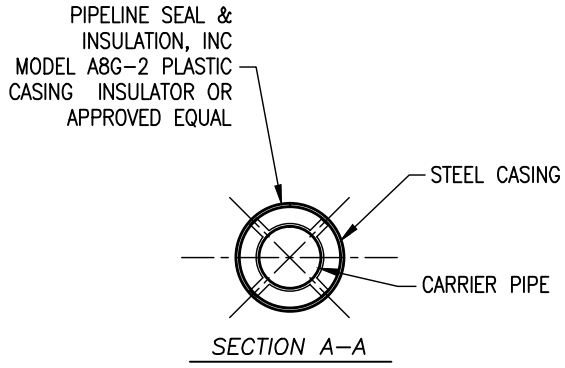

NOTES:
1. SANITARY SEWER MAINS 8" AND SMALLER SHALL BE PVC, SEWER SIZES 10" AND LARGER SHALL BE HDPE.

* PROPOSED PIPE CASING SHALL BE STEEL AS SHOWN IN TABLE WITH A MINIMUM WALL THICKNESS OF 0.375". THE CONTRACTOR SHALL SUBMIT PROPOSED BORING PLAN INCLUDING MATERIALS CERTIFICATION, EQUIPMENT, EXCAVATION, BRACING, SHORING, SPACER MATERIALS, SPACING OF SPACERS, PROPOSED GRADES, ELEVATIONS, CONTROL AND OTHER RELATED ITEMS TO THE ENGINEER FOR APPROVAL TWO WEEKS PRIOR TO COMMENCING SUCH WORK. THIS SHALL BE CONSIDERED INCIDENTAL TO REQUIRED WORK.

** BORE & JACK UNDER RAILROAD, NMDOT, AND COUNTY ROADS SHALL MEET THE APPLICABLE STANDARD.

*** PROPOSED SEWER LINE PIPE SHALL BE AS SHOWN IN TABLE, AND SHALL MEET OR EXCEED NEW MEXICO STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (NMSSPWC) LATEST EDITION, WHEN SEWER LINE PIPE IS CARRIER PIPE.

TYPICAL CASING SIZE

CARRIER PIPE				CASING	
APWA	NOM. DIA.	DR	CLASS	MIN. DIA.	THICKNESS
PVC	8"	35		15"	0.188"
HDPE	8"	21		16"	0.188"
HDPE	10"	21		18"	0.188"
HDPE	12"	21		20"	0.188"
HDPE	14"	21		24"	0.188"
HDPE	16"	21		26"	0.281"
HDPE	18"	21		30"	0.312"

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

BORE & JACK CASING DETAIL

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-11

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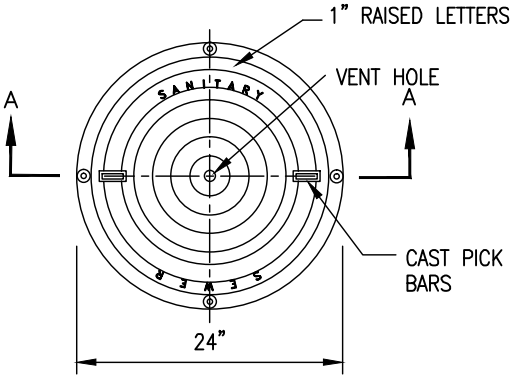
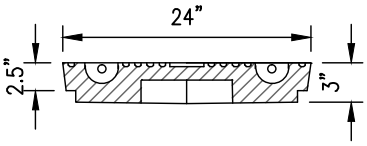
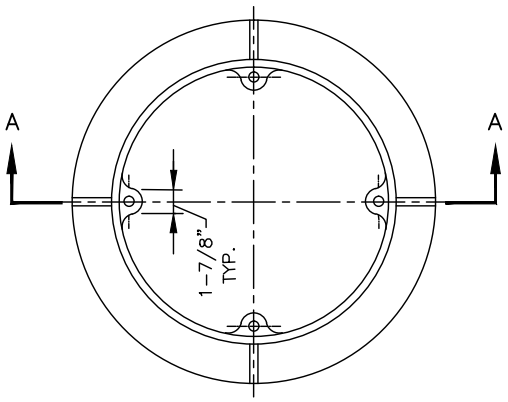
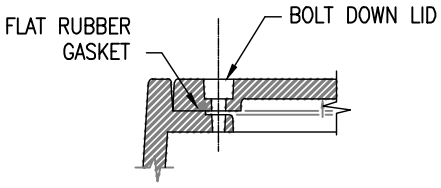




SECTION A–A



PLAN



BOLT–DOWN DETAIL

NOTES:
1. MANHOLE LID SHALL BE SOLID AND BE PROVIDED WITH PICK SLOTS.
2. TWENTY–FOUR (24) INCH HEAVY DUTY MANHOLE FRAME & COVER.
3. MANHOLE RAINGUARD WITH VALVE/INSERT TO BE PROVIDED ON ALL MANHOLES (LFM RAINGAURD OR APPROVED SUBSTITUTE.
4. MINIMUM WEIGHTS FOR THE MANHOLE FRAME AND COVER (SHALL MEET AASHTO H–20 LOADING):
   TOTAL – 382 LBS
   COVER – 176 LBS
   FRAME – 206 LBS
5. "SEWER" OR "SANITARY SEWER" LETTERING TO BE PLACED ON MANHOLE COVER.

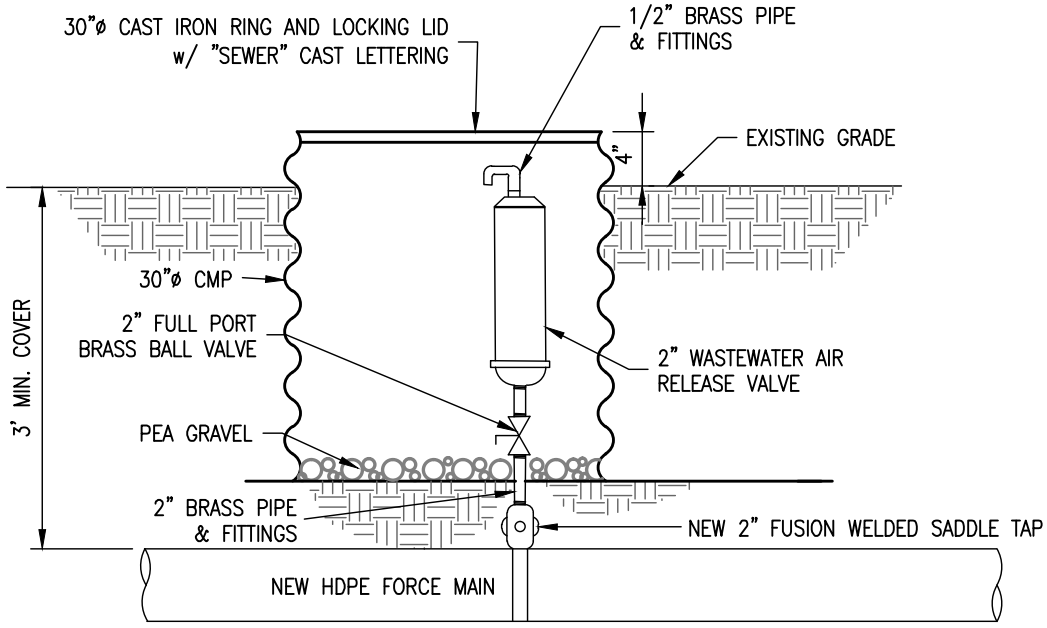
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

PRESSURE MANHOLE FRAME & COVER

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-12



ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

WASTEWATER AIR RELEASE VALVE

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-13

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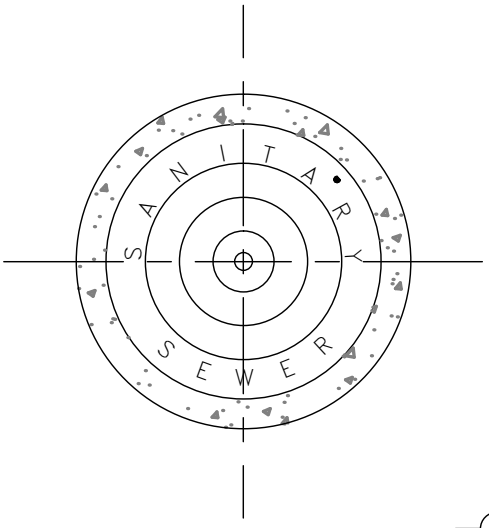
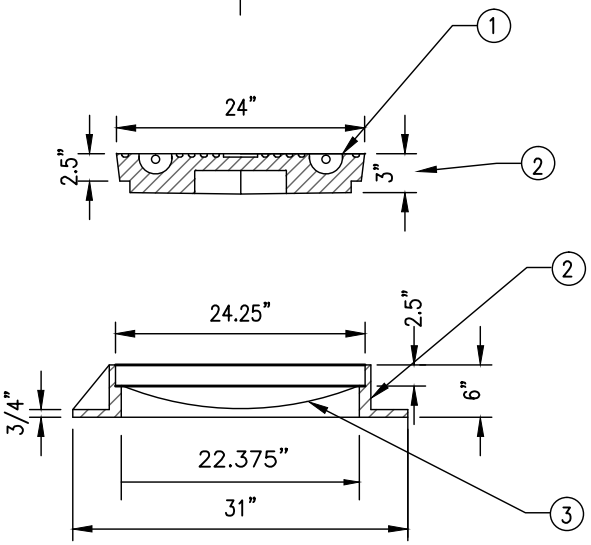




NOTES:

1. MANHOLE LID SHALL BE SOLID AND BE PROVIDED WITH DUAL PICK SLOTS.
2. TWENTY–FOUR (24) INCH HEAVY DUTY MANHOLE FRAME & COVER.
3. MANHOLE RAINGUARD WITH VALVE/INSERT TO BE PROVIDED ON ALL MANHOLES (LFM RAINGAURD OR APPROVED SUBSTITUTE).
4. MINIMUM WEIGHTS FOR THE MANHOLE FRAME AND COVER (SHALL MEET AASHTO H–20 LOADING):
   - TOTAL – 382 LBS
   - COVER – 176 LBS
   - FRAME – 206 LBS
5. "SEWER" OR "SANITARY SEWER" LETTERING TO BE PLACED ON MANHOLE COVER.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

MANHOLE FRAME & COVER

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: S-14

SECTION 1. GENERAL

A. Design criteria for all drainage systems shall comply with the following City of Artesia Public Works Standard Specifications. Any deviation from these standards shall have prior approval from the City. These standards include guidelines for basis of calculations, drainage, retention-detention facilities, channels, storm drains, culverts and streets.
The Design Engineer shall also be responsible for compliance with all governing agencies having jurisdiction over portions of a particular project, including but not limited to:

New Mexico Environmental Department (NMED)
New Mexico Department of Transportation (NMDOT)
Burlington Northern Santa Fe Railroad (BNSF)
Eddy County
United States Army Corps of Engineers (USACE)
New Mexico Office of the State Engineer (OSE)
NPDES/EPA Region 6
Federal Emergency Management Agency (FEMA)

B. Grading, drainage facilities, channels and other improvements to control storm water shall be deigned to:

1. Limit post-development peak discharges from a project and in impacted conveyance systems at a pre-development peak discharge rates
2. Minimize erosion by providing erosion and sedimentation control systems as required to prevent erosion, scour and sedimentation
3. Be compatible with existing improvements and drainage patterns.

1.01 METHODS OF DETERMINING RUN OFF

Table 1.01.1 Methods for Determining Run-off

Peak Discharge (CFS)		Volume	
Private Development	Public Works	Private Development	Public Works
General Coefficients (1)(6)	SCS/Unit Hydrograph Method (2)(4)(5)	General Coefficients (1)(6)	SCS/Unit Hydrograph Method (2,4,5)
Rational Method (1)(3)(5)		SCS/Unit Hydrograph Method (2)(4)(5)	
SCS/Unit Hydrograph Method (2)(4)(5)			

Table 1.01.1 contains a matrix of acceptable runoff analyses methods to be used by the design engineer within the limits of the city.

(1) No drainage study required. Basic calculations to be shown in the grading and drainage plans.
(2) Drainage study required as per guidelines set forth on section 1.16.
(3) To be used on projects of less than 200 acres of land
(4) Design Storm. The design storm for all drainage facilities, including detention ponds, shall be the 100-yr return period rainfall event with 24-hour duration. Retention ponds shall be avoided and will be authorized by the city case by case. If authorized by the city the design storm event shall be 500-yr (24 hr). The 10-year (24-hour storm) shall be computed to assist in street and storm drain requirements. The 2-year (24-hour storm) shall be computed to assist in SWPPP preparation.
(5) Rainfall Data. Rainfall depth-duration frequency data and intensity-duration-frequency data are presented in Tables 1.03.2 and 1.03.3 respectively. This data was obtained from N.O.A.A. Atlas 14 National Weather Service and is applicable for the City of Artesia Municipal Limits. Figure 1.03.1 is a graph of the rainfall-intensity-duration frequency data.
(6) This method may be used in the design of the detention facilities for housing subdivisions

TABLE 1.02.2 INSERT RAINFALL DEPTH-DURATION-FREQUENCY DATA

TABLE 1.02.2

RAINFALL DEPTH – DURATION - FREQUENCY DATA (a)
City of Artesia

Duration		Rainfall Intensity (inches / hour) per Storm Return Period (year)						
		2-yr.	5-yr.	10-yr.	25-yr.	50-yr.	100-yr.	500-yr.
5	Min	0.38	0.50	0.60	0.73	0.84	0.95	1.22
10	Min	0.57	0.77	0.92	1.12	1.28	1.44	1.85
15	Min	0.71	0.95	1.14	1.39	1.58	1.79	2.29
30	Min	0.96	1.28	1.53	1.87	2.13	2.41	3.09
60	Min	1.19	1.58	1.89	2.31	2.64	2.98	3.82
120	Min	1.37	1.86	2.24	2.77	3.19	3.63	4.73
3	Hour	1.45	1.96	2.36	2.92	3.36	3.83	5.01
6	Hour	1.62	2.17	2.60	3.21	3.70	4.22	5.55
12	Hour	1.80	2.39	2.86	3.53	4.06	4.63	6.06
24	Hour	2.07	2.77	3.32	4.10	4.73	5.40	7.10
48	Hour	2.32	3.12	3.77	4.71	5.48	6.32	8.51
4	Day	2.61	3.52	4.27	5.33	6.21	7.15	9.62
10	Day	3.16	4.22	5.07	6.27	7.23	8.25	10.86

(a) Obtained from NOAA Atlas 14 for center of the City of Artesia

TABLE 1.02.3

RAINFALL INTENSITY – DURATION - FREQUENCY DATA (a)
City of Artesia

Duration		Rainfall Intensity (inches / hour) per Storm Return Period (year)						
		2-yr.	5-yr.	10-yr.	25-yr.	50-yr.	100-yr.	500-yr.
5	Min	4.56	6.00	7.20	8.76	10.08	11.40	14.64
10	Min	3.42	4.62	5.52	6.72	7.68	8.64	11.10
15	Min	2.84	3.80	4.56	5.56	6.32	7.16	9.16
30	Min	1.92	2.56	3.06	3.74	4.26	4.82	6.18

60	Min	1.19	1.58	1.89	2.31	2.64	2.98	3.82
120	Min	0.69	0.93	1.12	1.39	1.60	1.82	2.37
3	Hour	0.48	0.65	0.79	0.97	1.12	1.28	1.67
6	Hour	0.27	0.36	0.43	0.54	0.62	0.70	0.93
12	Hour	0.15	0.20	0.24	0.29	0.34	0.39	0.51
24	Hour	0.09	0.12	0.14	0.17	0.20	0.23	0.30
48	Hour	0.05	0.07	0.08	0.10	0.11	0.13	0.18
4	Day	0.03	0.04	0.04	0.06	0.06	0.07	0.10
10	Day	0.01	0.02	0.02	0.03	0.03	0.03	0.05

September 15, 2009

Figure 1.02.4

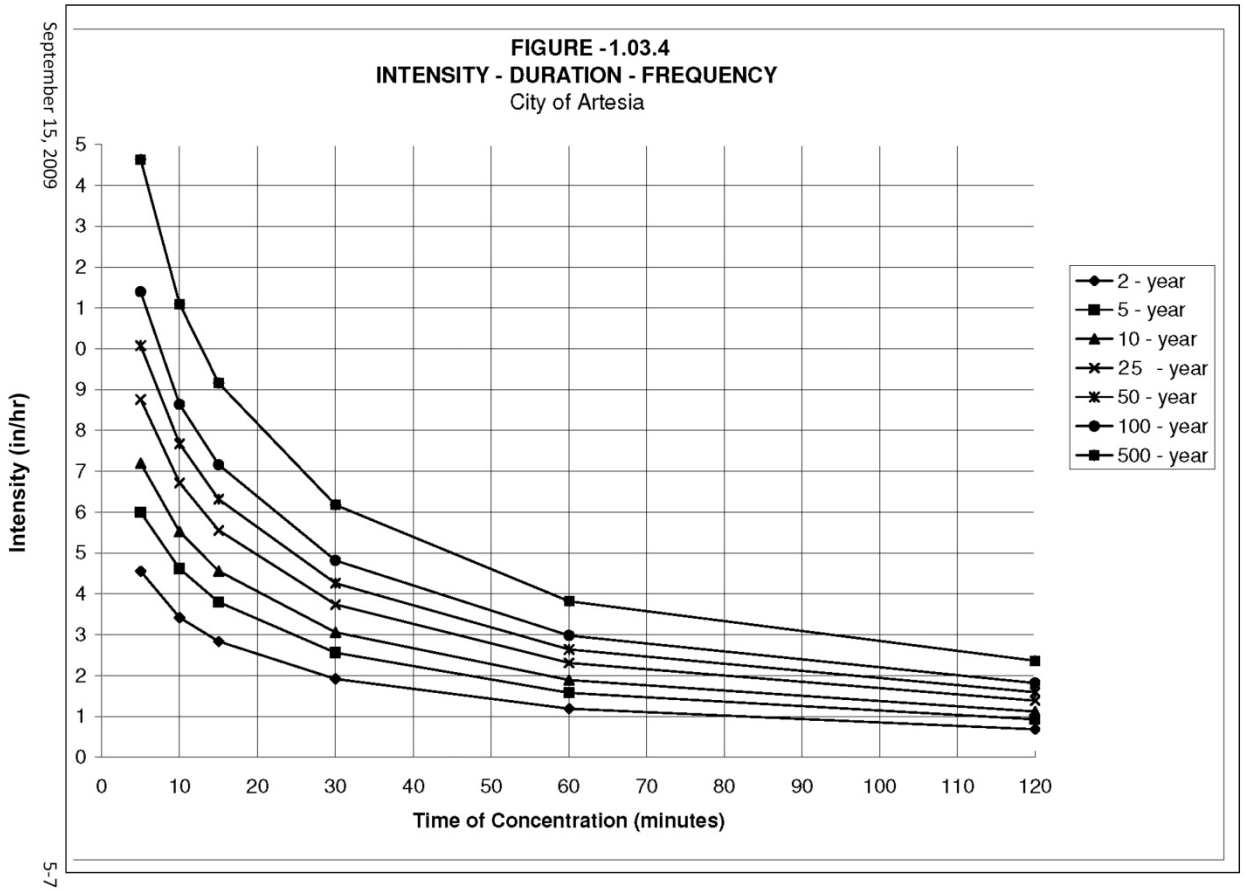


Table 1.02.5 City of Artesia Runoff Coefficients

LAND USE (ZONING)	RUNOFF COEFFICIENT "C"
APARTMENTS	0.70
RESIDENTIAL	0.50
PATIO HOME/TOWN HOME	0.60
HOSPITAL/HOTEL	0.90
NURSING HOME	0.80
COMMERCIAL/OFFICE	0.85
INDUSTRIAL	0.70
PARKS/CEMETERIES	0.20
UNIMPROVED AREAS	0.20
PAVEMENT (asphalt/concrete)	0.90
ROOFS	0.90

A. GENERAL COEFFICIENTS

Runoff analysis for private developments can be based on general runoff coefficients. The runoff coefficient is a value that is used to approximate the amount of runoff that a developer or home builder will need to retain on site to maintain existing drainage characteristics. ***Any site with a channelized flow crossing the site must use the SCS method. Developments within the 100-year flood plain must comply with FEMA Regulations. Specific requirements shall be as follows:***

Runoff and flow coefficients:

Runoff = 3.63 inches.

Flow coefficient =1.6 cfs/acre-in.

1- PEAK DISCHARGE (Peak Flow Rate)

A*Fc*Rc = Q = Peak flow rate
Impervious Area(acre)*Flow Coefficient (CFS/acre-in)*Runoff Coefficient (in) = Peak Flow Rate (CFS)

Calculate impervious area of land to be developed. Impervious area includes the building, sidewalks, asphalt paving, etc. (Places where water cannot penetrate into the ground) Calculate area in square feet (square meters).

2- VOLUME

Find required storage volume by multiplying the impervious area (square feet) by the runoff coefficient (inches) and a conversion factor one foot/12 inches.

A*CR*CF = SV = Storage Volume
Area(FT^2)*Runoff Coefficient (in)*Conversion factor (1ft/12in) = Required Storage Volume (FT^3)

B. RATIONAL METHOD – This formula shall be used for computing storm water runoff peak discharges for hydraulic design of facilities serving a drainage area less than two hundred (200) acres

1. The Rational Formula for computing peak runoff rates is as follows:

Q = Cf*C*I*A

Where Q = Runoff rate in cubic feet per second.
C = Runoff use coefficient, dimensionless.
I = Rainfall intensity in inches per hour.
A = Drainage area in acres.

2. All runoff calculations shall be based upon a fully developed watershed and ultimate land use as shown on the City of Artesia Comprehensive Plan or Zoning Regulations as defined in the City Code, whichever is greater. Larger coefficients shall be used if considered by the City to be appropriate for the project.

3. Calculations for Time of Concentration (Tc) should include time for initial time (five minutes), sheet flow, shallow concentrated flow, gutter and/or channel flow. Time of concentration used shall be a calculated value or six minutes whichever is greater.

C. SCS-UNIT HYDROGRAPH METHOD

1. The use of a unit hydrograph calculation will be based upon standard and accepted engineering principles normally used in the profession subject to the approval of the City. Acceptable methods include the National Resources Conservation Service, NRCS, (SCS), Type II, 24-Hour storm event. The Technical Release 55 (TR 55) method shall be used to compute the Time of Concentration (Tc). If applicable, the United States Army Corps of Engineers HEC-1 or HEC-HMS modeling software will also be allowed for drainage areas of two hundred (200) acres or greater.

2. The post development unit hydrograph method shall be based upon fully developed watershed conditions. The unit hydrograph method shall take into account any detention facilities with proper routing.

3. Circumstances that may require the use of a unit hydrograph method include open channels, reclaiming floodplains, creating lakes, regional detention/retention facilities or building other types of drainage related facilities on major drainage courses. Design Engineers should consider

these types of facilities and be aware that designing for fully developed watershed conditions will require calculations for fully developed flows instead of flows used from the Federal Emergency Management Agency's (FEMA) flood insurance studies for the City of Artesia. FEMA's flows cannot be used because the flows are based upon existing watershed conditions.

For CN numbers associated with City of Artesia see: RUNOFF CURVE NUMBER FOR URBAN AREAS AND AGRICULTURAL LANDS NRCS (SCS) CN METHOD. Source: NRCS (SCS) TR-55, Second Edition, June 1986

SECTION 2. STREET CAPACITY

A. Hydraulic Design Criteria

The hydraulic procedures in this section are intended to provide hydraulic design criteria, analysis and design guidance.

- Manning's roughness coefficient = 0.017
- Depth shall not exceed 0.2 feet above the curb in the event of the 100-year design discharge and shall be contained within the street right-of way.
- Flow depths in the event of the 10-year design discharge shall not exceed 0.5 feet in any local, collector or arterial street. One twelve (12) foot driving lane free of flowing or standing water in each driving direction must be preserved on arterial streets.
- Equal flow distribution between gutters on undivided street and between street sections on divided street may be assumed where is validity can be demonstrated.

B. Straight Crown Streets:

1. All straight crown street capacities shall be hydraulically designed using Manning's equation:

$$Q = (1.486/n)*A*(R^{2/3})*(S^{1/2})$$

Where: Q = Gutter flow in cubic feet per second.
n = Roughness coefficient, (0.0175 for concrete streets).
A = Cross section flow area in square feet.
R = Hydraulic radius of the conduit in feet, which is the area of the flow divided by the wetted perimeter (R=A/P).
P = Wetted perimeter in feet.
S = Slope of the hydraulic gradient in feet per feet.

C. Street capacities shall be designed based on simplified equations shown in Table 1.03.1

Table 2.03.1 City of Artesia Street Capacities

Street Capacities (Back to Back)					
Type of Street	Crown Slope (2% Typical)	Width Back to Back (Feet)	Street Capacity (Cubic Feet per Second) STD Curb and Gutter	Street Capacity (Cubic Feet per Second) Rollover Curb and Gutter	Depth in Gutter (Inches)
Local	2%	34	$Q=377.13*(S^{1/2})$	$Q=191.12*(S^{1/2})$	6", 4"
Collector	2%	40	$Q=373.33*(S^{1/2})$	N/A	6"
Minor Arterial	2%	48	$Q=350.63*(S^{1/2})$	N/A	6"
Major Arterial	2%	48	$Q=350.63*(S^{1/2})$	N/A	6"

SECTION 3. ALLEY CAPACITY

A. All alley capacities shall be hydraulically designed using Manning's equation as shown in Table 1.04.1.

B. In residential areas where the standard alley section capacity is exceeded, storm sewer systems with inlets shall be provided.

C. Alleys shall be designed as set forth in the 2009 Streets and Alleys Public Works Specifications.

Table 1.04.1 City of Artesia Alley Capacities

Alley Capacities				
Type of Alley	Crown/Invert Height	Typical Width (Feet) Edge to Edge	Alley Capacity (CFS)	Depth in Flow (Inches)
Paved Alley - 4" Crown	4"	16	None	N/A
Paved Alley - 3" Invert	(-)3"	16	$Q=46.55*(S^{1/2})$	3"
Unpaved Alley - 3" Crown	3"	16	None	N/A

SECTION 4. VALLEY GUTTERS

A. The use of valley gutters to convey storm water across a street intersection is subject to the following criteria:

1. At any intersection, perpendicular valley gutters will not be permitted; and parallel valley gutters may cross only the lower classified street.

SECTION 5. INLET SIZE, LOCATION, AND CAPACITY:

A. Curb inlets shall be placed to ensure that the fifty (50) year flow for a major arterial street and a ten (10) year flow for a collector or minor arterial does not exceed the top-of-curb elevation.

B. The following is a list of guidelines for curb inlet placement:

1. Typical inlet sizes will be four feet, (4') six, feet (6'), eight feet (8'), and ten feet (10').

2. Placing several curb inlets at a single location is only permitted in areas with steep grades (4% or greater) in order to prevent flooding and avoid exceeding street capacity in flatter reaches downstream.

3. To minimize water draining through an intersection, curb inlets should be placed upgrade from the intersection, avoiding placement in the curb returns.

4. Curb inlets shall not be located at the PC and or PT of a curve.

5. Design of sag inlets shall include a check for inlet control at the entrance to the lateral.

6. On-grade curb inlets require a minimum of four feet (4’), six feet (6’) opening and shall have a minimum eighteen inch (18”) lateral.

7. Curb inlets at sag points require a minimum ten foot (10’) opening and shall have a minimum twenty-one inch (21”) lateral.

8. The end of the curb inlet box shall be at least ten feet (10’) on the uphill side and five feet (5’) on the downhill side from a curb return or driveway wing and the curb inlet shall be located to minimize interference with the use of adjacent property. Curb inlets shall not be located across from median openings where a driveway may be added.

9. Curb inlets shall not be located directly above storm drain lines.

10. Data shown for each curb inlet shall include paving or storm sewer stationing at centerline of curb inlet, size of curb inlet, type of curb inlet, top-of-curb elevation and flow line elevation of curb inlet. Flow to curb inlet and bypass flow, if applicable, shall be shown to each inlet on storm sewer plan.

11. Multiple sag inlets shall be located no closer than three-hundred feet (300’).

12. In situations where only the lower portion of an enclosed storm sewer system is being built, stub-outs for future connections must be included. In this case, it is not necessary to capture all the street flow at the stub-out. As a minimum, there must be enough inlets to capture an amount equal to the total street flow capacity at the stub-out.

13. Inlet capacity shall be computed with FlowMaster Computer Program or equivalent.

14. Types of Inlets: Standard Curb Inlet, Grate Inlet, Combination Grate/Curb Inlet, Drop Inlet and Median Inlet.

15. Standard Curb and Grate combination inlets shall be located in streets upgrade from an intersection and where necessary to prevent water from entering intersections in amounts exceeding allowed street capacity.

SECTION 6. DESIGN OF ENCLOSED STORM SEWER SYSTEM:

A. Runoff from paved areas being discharged into natural creeks or channels shall be conveyed through enclosed storm sewer systems.

B. All enclosed systems shall be hydraulically designed. The hydraulic gradient and full-flow velocity shall be calculated using the design flow, appropriate pipe size, and Manning's equation:

$$Q = (1.486/n)*A*(R^{2/3})*(S^{1/2})$$

Where: Q = Runoff rate in cubic feet per second.

A = Cross sectional area of the conduit in square feet.
n = Roughness coefficient, (0.013 for concrete pipe and box culverts).
R = Hydraulic radius of the conduit in feet, which is the area of the flow divided by the wetted perimeter (R=A/P).
S = Slope of the hydraulic gradient in feet per feet.

C. Starting Hydraulic Gradient:

1. After computing the runoff rate to each inlet as discussed in Section 1.06, the size and gradient of pipe required to convey the design storm must be determined. The City of Artesia requires that all hydraulic gradient calculations begin at the outfall of the system. The following are criteria for the starting elevation of the hydraulic gradient:

   a. Starting hydraulic grade at an outfall into a creek or channel should be the one hundred (100) year fully developed water surface elevation, unless an approved flood hydrograph is available to provide a coincidental flow elevation for the system's peak.

   b. When a proposed storm sewer is to connect to an undersized existing storm sewer system, calculation of the hydraulic gradient for the proposed storm sewer shall start at the outfall of the existing storm sewer system.

D. Lateral Design:

1. The hydraulic grade line shall be calculated for all proposed laterals and inlets, and for the existing laterals being connected into a proposed drainage system.

2. Laterals shall intersect the storm drain at a sixty degree (60°) angle. Connecting more than one lateral into a storm drain at the same joint localizes head losses; however, a manhole or junction structure must be provided. An exception to this rule may be considered when the diameter of the main line is more than twice as great as the diameter of the largest adjoining lateral.

E. Storm Sewer:

1. Alignments of proposed storm sewer systems should utilize existing easements and rights-of-way. If located within an easement, the storm sewer shall be centered within the easement. If located under paving within rights-of-way, the centerline of the storm sewer shall be located

under paving seven feet (7') from the outside back of curb, opposite the water line unless otherwise approved by the City.

2. Vertical and horizontal curves will not be allowed.

3. Enclosed Storm Sewer System shall be designed as if flowing full. Design flow depth of less than full to get a lesser wetted perimeter is not acceptable.

4. End-to-end connections of different size pipes shall match at the crown of the pipes unless a utility clearance dictates otherwise.

5. Minimum pipe slopes shall be as follows:

Table 6.07.1 Minimum Storm Sewer Pipe Slopes

Pipe Diameter (Inches)	Slope (Feet/100 Feet)	Pipe Diameter (Inches)	Slope (Feet/100 Feet)
18"	0.110	48"	0.031
21"	0.100	54"	0.027
24"	0.080	60"	0.024
27"	0.070	66"	0.020
30"	0.058	72"	0.018
36"	0.045	78"	0.016
42"	0.037	84"	0.015

Note: The minimum slopes presented in this table represent the slope required to maintain a velocity of 2 fps while flowing full, and a roughness coefficient of n=0.013.

6. Only standard sizes will be used for mains. Pipe sizes shall not be decreased in the downstream direction unless approved by the City.

7. Storm sewer systems shall be extended to offsite area(s) that naturally drain across the property being developed.

F. Pipe Materials:

1. Reinforced Concrete pipe (RCP), Class III, ASTM C76 (Mandated in public rights of way or public easements).

2. Reinforced Concrete box (RCB) – ASTM 1433 (Mandated in public rights of way or public easements).

3. HDPE, soil tight, outer wall corrugated, inner smooth wall interior (Allowed in private property or private easements).

4. Galvanized Corrugated Metal Pipe (GCMP), 16 gage with Polymeric coating

5. Life Expectancy for all pipes shall be a minimum as shown below:

RCP 50 years	HDPE 50 years
RCB 50 years	GCMP 35 years

G. Manhole Placement:

1. The following is a list of guidelines governing the placement of storm sewer manholes to ensure adequate accessibility of storm drainage system:

   a. Storm sewer lines forty-eight inches (48”) in diameter or less shall have points of access no more than five hundred feet (500’) apart. A manhole shall be provided where this condition is not met.

   b. Storm sewer lines fifty-four inches (54”) in diameter or larger shall have points of access no more than one thousand feet (1,000’) apart.

   c. A manhole may be required where two or more pipes connect into a main at the same joint. The exception to this rule would be the case in which the diameter of the main line is at least twice as large as the diameter of the largest adjoining pipe. A construction detail may be necessary at such locations.

   d. When selecting a location for a manhole, pipe size changes and junctions are preferred. This will localize and minimize head losses.

   e. Manholes are required when bends exceed forty-five degrees (45°).

H. Outfall Design:

1. Each outfall situation shall be considered individually. The following are examples of conditions to be considered when determining the need for energy dissipation:

   a. Elevation of rock.

   b. Normal water surface elevation.

   c. Channel lining.

   d. Alignment of pipe to channel.

   e. Erosive potential of channel.

2. Creative approaches to engineering design are encouraged in order to produce the most cost effective and environmentally acceptable system as determined by the City. As an example, if

there is stable rock in a creek bottom, the system could outfall at the rock line or if there is concrete channel lining, the pipe could be brought to the concrete at a reasonable grade so long as it outfalls below the one hundred (100) year water surface in the channel.

3. Discharge flow lines of storm sewers shall be a minimum of two feet (2') above the flow line of creeks and channels unless channel lining is present.

4. The last ten feet (10') of the storm sewer pipe is to be laid on a maximum one percent (1%) grade.

5. Energy dissipation shall be provided when the outfall velocity exceeds six feet per second (6ft/sec).

6. Submerged or partially submerged outlets are allowed provided a dry manhole is constructed upstream of the outlet.

SECTION 7. HYDRAULIC DESIGN OF CULVERTS:

A. All culverts, headwalls, wingwalls, and aprons shall be designed in conformity with the City of Artesia Standard Construction Details or the New Mexico Department of Transportation Details and Standards in the event the City of Artesia does not have a standard construction detail.

B. In sizing culverts, the Design Engineer shall keep head losses and velocities within general acceptable engineering practices while selecting the most economical structure. This normally requires selecting a structure which creates a slight headwater (<1.2d) condition and has a flow velocity at or below the allowed maximum. Velocities in culverts are normally limited to the maximum allowed in the downstream channel unless there is some form of energy dissipation at the outfall.

C. In the hydraulic design of culverts, an investigation must be made into the type of flow condition through the culvert. The flow will be controlled, or limited, either at the culvert entrance or the outlet, and is designated either inlet or outlet control, respectively.

   1. Inlet Control - Exists when the barrel capacity exceeds the culvert inlet capacity, and the tailwater depth and entrance geometry at the inlet will control the amount of water entering the barrel. The roughness, length of culvert barrel, and outlet conditions do not affect capacity for culverts with inlet control.

   2. Outlet Control - Exists when the culvert inlet capacity exceeds the barrel capacity or the tailwater elevation causes a backwater effect through the culvert. In this case, the tailwater elevation, slope, length and roughness of the culvert barrel will determine the hydraulic capacity of the culvert even though the entrance conditions are such that a larger flow could be conveyed.

D. Freeboard, the vertical clearance between the design water surface and the top-of-curb, is included as a safety factor in the event of clogging of the culvert. Two feet (2') of freeboard above the one hundred year (100) water surface elevation is required.

E. Culverts should always be aligned to follow the natural stream channel. Survey information of the stream channel should be provided for one hundred feet (100') upstream and downstream from the proposed culverts so that the channel alignment is evident.

F. In residential developments, no more than four-barrel box culverts will be permitted for stream crossings, unless otherwise approved by the.

G. To minimize the undesirable backwater effects and erosive conditions produced where the total width of box culverts exceeds the bottom width of the channel, a transition upstream and downstream of the culverts must be provided. The transition should have a minimum bottom width transition of 2 to 1 and include warping of side slopes as required. The 2 to 1 transition is 2 along the centerline of the channel and 1 perpendicular to the centerline.

H. Headwalls and Entrance Conditions:

1. Headwalls and endwalls refer to the entrances and exits of structures, respectively, and are usually formed of cast-in-place concrete and located at either end of the drainage system. Wingwalls are vertical walls, which project out from the sides of a headwall or endwall. The purpose of these structures are:

    a. To retain the fill material and reduce erosion of embankment slopes.

    b. To improve hydraulic efficiency.

    c. To provide structural stability to the culvert ends and serve as a counterweight to offset buoyant or uplift forces.

2. Headwalls, with or without wing walls and aprons, shall be designed to fit the conditions of the site. The following are general guidelines governing the use of various types of headwalls:

    a. Straight headwalls (Type A) should be used where the approach velocity in the channel is below six (6) feet per second.

    b. Headwalls with wing walls and aprons (Type B) shall be used where the approach velocity is from six (6) to twelve (12) feet per second and downstream channel protection is recommended.

    c. Special headwall and wing walls configurations will be required where approach velocities exceed twelve (12) feet per second, and where the flow must be redirected in order to enter the culvert more efficiently.

    d. Design of headwalls shall include a check for inlet control.

3. In the following formula, the values of the entrance coefficient Ke represent a combination of the effects of entrance and approach conditions. Losses shall be completed using the following formula:

$$He = Ke*[V^2/(2*g)]$$

Where: He = Entrance head loss, feet.
Ke = Entrance loss coefficient.
V = Velocity of flow in culvert, feet per second.
g = Gravity constant (32.2 feet per second^2).

7.01 OPEN CHANNEL DESIGN:

A. Preservation of creeks and tributaries in their natural condition is preferred with the exceptions that all undesirable brush is removed and the channel sides are stabilized to minimize erosion as approved by the City.

B. Excavated open channels may be used to convey storm waters where the construction cost and/or long-term maintenance cost involved with a closed storm sewer system is not justified economically.

Open channels shall be designed to convey the full design discharge. Unpaved gabion channel bottoms shall not be allowed.

C. Supercritical flow shall not be allowed in channels except at drop structures and other energy dissipaters.

D. At transitions in channel characteristics, velocities must be reduced. Velocities must be reduced before the flow reaches the natural channel using either energy dissipaters and/or wider less steep channel. Unlined unvegetated swales are not allowed.

E. Channel armoring for erosion control shall be provided where deemed necessary by the City.

F. If the channel cannot be maintained from the top of the bank, a maintenance access ramp shall be provided and included within the drainage easement.

G. Open channels with narrow bottom widths are characterized by high velocities, difficult maintenance, and should be avoided. Minimum channel bottom widths are recommended to be equal to twice the depth. Any permanent open channel with a rock bottom shall have a minimum bottom width of five feet (5').

H. All open channels require a minimum freeboard of one foot (1') above the one-hundred (100) year water surface elevation or below top of bank, whichever is greater.

I. The minimum slope for an improved channel is three-tenths of a percent (0.3%).

J. Flumes shall not be permitted except for emergency overflow at sag inlets.

K. Pilot channels are permitted in public improvements.

L. Any channel modification must meet the applicable requirements of all State and Federal Regulatory Agencies.

M. If a natural channel is not modified, an erosion hazard setback shall be included within the Drainage and Floodway Easement for the channel. The purpose of this setback is to reduce the potential for any damage to a private lot or street right-of-way caused by the erosion of the bank. The erosion hazard setback shall be determined as follows:

1. For stream banks composed of material other than rock, locate the toe of the natural stream bank. Construct a 4:1 line sloping away from the bank until it intersects finished grade. From this intersection add fifteen feet (15') away from the bank. This shall be the limit of the erosion hazard setback.

2. For stream banks composed partially or entirely of rock, locate the interface of the bank with the top of the un-weathered rock strata with the assistance of a geotechnical engineer or geologist. Construct a 3:1 line sloping away from this point until it intersects finished grade. From this intersection add fifteen feet (15') away from the bank. This shall be the limit of the erosion hazard setback.

SECTION 8. MISCELLANEOUS DRAINAGE:

A. Lot Drainage:

1. Lot to lot surface drainage is not allowed in a residential subdivision.

2. There will not be any drainage allowed to flow from a non-residential lot to a residential lot.

3. Residential lots shall be graded to provide a minimum slope of five percent (5%) in the first five feet (5') from the foundation.

B. The minimum finished floor elevation for any lot adjacent to a drainage channel shall be one foot the adjacent one hundred (100) year fully developed water surface elevation and shall be shown on the final plat.

C. Curbs shall be placed along the edge of any alley that is adjacent to a waterway.

D. No portion of any residential lot will be allowed in the fully developed one hundred (100) year floodplain.

8.01 ENERGY DISSIPATERS:

A. Energy dissipaters are used to eliminate erosive velocities. Effective energy dissipaters must be designed to retard the flow of fast moving water without damaging the structure or the channel below the structure.

B. All energy dissipaters should be designed to facilitate future maintenance. The design of outlet structures in or near parks or residential areas must give special consideration to appearance and shall be approved by the City.

8.02 RETAINING WALL IN WATERWAYS:

A. All retaining structures/walls located within a one hundred (100) year floodplain in the City of Artesia shall be constructed of reinforced concrete or other materials approved by the City, and shall be designed for the specific onsite conditions by a Registered Professional Engineer in the State of New Mexico. Structural designs shall be submitted with supporting calculations.

B. Retaining walls shall be designed to achieve a minimum factor of safety of two (2) against overturning and one and a half (1.5) against sliding.

8.03 DETENTION DESIGN

A. The design storm for detention ponds shall be the 100-yr return period rainfall event with 24-hour duration. Retention ponds shall be avoided and will be authorized by the city case by case. If authorized by the city the design storm event shall be 500-yr (24 hr). In addition the greatest of one foot of freeboard or 10% additional basin capacity shall be provided in the facility.

B. Maximum side slopes shall be four to one unless authorized by the city

C. Maximum basin depth shall not exceed four feet, and minimum depth shall be eighteen inches (18”) unless approved otherwise by the city

D. Off-site runoff entering the development may occur in the drainage basin. If this is the case, the analysis of the detention facility must take these flows into account. Off-site flows may be routed around the detention facility. Entrance and exit points of storm runoff shall not be altered nor shall the post development peak flow exceed the historic peak flow.

E. An acceptable method of transporting water from the streets into the basin shall be provided so as to preserve the integrity of the facility

F. Each facility shall be designed so that the storm water will not stand for more than 24 hours after termination of the storm. Drainage shall be accomplished by infiltration or by controlled flow into and existing facility suitable to receive, transport and convey the water.

G. If infiltration is the mean method of drainage a soils report shall be included in the construction documents. Sufficient and representative soil borings and tests shall be required to illustrate suitability for intended purpose and percolation characteristics.

H. All detention facilities must be landscaped as per City of Artesia landscaping ordinances.

I. Fencing/railing will be required when hazard exists to those using the property. Materials for fencing/railing will be including in the construction drawings and approved by City.

8.04 EROSION AND SEDIMENTATION CONTROL:

A. All projects shall be designed so that erosion is minimized during construction as well as after the construction is completed. The volume, rate, and quality of storm water runoff originating from development must be controlled to prevent soil erosion. Specific efforts shall be made to keep sediment out of street and watercourses.

B. All projects requiring grading , disturbance or clearing of more than one (1) acre must comply with the requirements of National Pollutant Discharge Elimination System (General Permit for Discharges from Construction Activities) and submit an Erosion and Sedimentation Control Plan to City of Artesia as per the requirements of NPDES CGP.

8.05 DRAINAGE EASEMENTS:

A. The following minimum width, exclusively for drainage easements, is required when facilities are not located within public rights-of-way.

1. Storm sewers are to be located within the center of a fifteen foot (15') drainage easement or 1.5 times the depth plus the width of the structure rounded up to the nearest five feet (5'), whichever is greater.

2. Overflow flumes are to be located with the edge being a minimum of one foot (1') off the property line within a ten-foot (10') drainage easement.

3. In residential developments, storm sewer easements shall lie entirely on a single lot unless specifically approved by the City.

4. Easements for channels will be the width of the channel at the top of the bank plus ten feet (10') feet on each side for access if the channel side slope is less than 3:1 and fifteen feet (15') if it is steeper than 3:1.

5. Drainage easements shall be dedicated to the City of Artesia when the drainage system crosses a property line.

6. Drainage and Floodway Easements shall be dedicated for all floodplains and shall include an erosion hazard setback to reduce the potential for damage due to erosion of the bank.

7. Drainage and Detention Easements shall be dedicated for all detention facilities.

8. All easements shall be dedicated by plat or replat. Separate instrument easements shall only be allowed on property that is not part of the proposed development and has not been previously platted.

SECTION 9. DRAINAGE REPORT REQUIREMENTS:

A. A Drainage Report shall be prepared, by a Registered Professional Engineer, for every project. These reports shall be laid out as outlined below, and address each of these as a minimum. These reports shall be submitted to the City of Artesia.

1. Introduction

    a. Project Name and Address if known
    b. Location and Topography
    c. Purpose
    d. Regional Drainage Plan/Characteristics
    e. Site Location Relative to Known FEMA Flood Hazard Zones

2. Hydrologic Analysis

    a. Off-Site Hydrology

        i. Impact(s) to Proposed Project Site
        ii. Development of Off-Site Peak Discharges
        iii. Conveyance of Off-Site Discharge
        iv. Existing Land Use

b. On-Site Hydrology

i. Methodology and Criteria
ii. Existing Conditions Discharges
iii. Proposed Conditions Discharges
iv. Future Land Use

3. Proposed Drainage Infrastructure

a. Conveyance of Runoff Through the Project Site

i. Street Conveyance
ii. Proposed Channel Conveyance
iii. Proposed Storm Drain Conveyance
iv. Inlet Sizing

b. Onsite Retention/Detention Requirements

i. Proposed Basin Geometry and Freeboard
ii. Required Retention/Detention Volume
iii. Provided Retention/Detention Volume

4. Special Issues, Considerations, or Site Features

5. Summary and Conclusion

6. References

7. Appendices/Figures/Exhibits

B. Each of the elements listed above is briefly described below. Note that although the following descriptions may be brief, the actual sections within the report may require an extensive explanation and discussion including design calculations. Each of the items above may not apply to each report. In this case, the Design Engineer shall provide the item heading within the report and then a sentence explaining why it is not pertinent to the report.

1. Introduction – Every drainage report must include an introductory section describing the general area where the site is located, expected land use, and other site characteristics which may be laid out in more detail later in the report.
2. Project Location – This section shall include a specific project site location, vicinity/area map, topographic map to delineate the project area, reference to past studies that have been completed, reference to known FEMA flood zones, and address features or drainage facilities (such as storm drains, canals, Railroad, and other site features which may promote/discourage drainage flow patterns).

3. Project Name and Address (if known) – The project name and address shall be stated, if known.

4. Location and Topography – A relatively brief description of the hydrologic character (natural desert, mountain, alluvial fan, valley, etc.) of the project site as well as the intended land use. This section should also identify major flood control channels and arroyos within or adjacent to the site.

5. Purpose – A brief statement justifying the need for this report, and what site requirements warrant the improvements laid out within the drainage report.

6. Site Location Relative to Known FEMA Flood Hazard Zones – A FEMA Flood Insurance Rate Map (FIRM) should be included to depict the site area and its respective flood zone. The map or portion thereof shall also include the Panel Number and effective date. A brief explanation of the flood zone and its characteristics shall be included. This information shall provide insight in factors that may require mitigation of known hazards through site improvements that could require a CLOMR/LOMR process.

7. Hydrologic Analysis – This section shall contain a detailed description of the existing and proposed hydrology for the site. This includes detailed calculations, descriptions of the methods for calculation, criteria and relevant assumptions.

8. Off-Site Hydrology – This section shall address areas which discharge into the project site. The report shall provide a table referencing each contributing basin with its volume and other corresponding factors. A Drainage Map or Exhibit shall be provided (either within the report or included within the appendices) to support the table. All calculations referenced within the report shall be included within the appendices.

9. Impact(s) to Proposed Project Site – This section shall address the nature and extent of the impacts to the site from the offsite discharges. If no off-site discharge contacts the subject site an explanation shall be supplied in lieu of the impacts listed above.

10. Development of Off-Site Peak Discharges - The methods, criteria, and assumptions used to determine the peak discharge shall be included (these may include an Intensity Duration Frequency Chart, Rainfall Intensity Storm Event Table, etc). If the off-site discharge volumes were previously established the respective source shall be referenced and documented.

11. Conveyance of Off-Site Discharge – The method(s) of off-site discharge conveyance shall be provided within this section.

12. Existing Land Use – This section shall provide insight into the existing land use/type for the existing contributing basin(s). This shall include ground cover, structures, and other pertinent information.

13. On-Site Hydrology – This section of the report shall explain the land usage of the proposed development; provide weighted “c” values (as required in the Drainage Section of these Public Works Specifications), roughness coefficients, areas with their respective characteristics within the site, and other site features contributing/limiting the conveyance of site discharge.

14. Methodology and Criteria – This portion of the report shall abide to the methods and criteria established by the City of Artesia. The software or methods for the generation of discharge flow rates and assumptions used shall be shown.

15. Existing Conditions Discharges – This section shall provide a tabular representation of the discharge rates for direct comparison to the developed discharge values.

16. Proposed Conditions Discharges – This portion of the report shall lay out, in detail, the proposed discharge conditions. A table shall be provided referencing each sub-basin within the development and the respective discharge for the 10, 50, and 100-year storm event.

17. Future Land Use – Characteristics for discharge shall be laid out to illustrate future site improvements which may affect or alter the improvements and recommendations established within the report.

18. Proposed Drainage Infrastructure – This section shall include a detailed summary of the planned drainage system infrastructure systems and methods to be employed for the project. These may include (but not limited to) storm sewers, retention/detention ponds, or open channels.

19. Conveyance of Off-Site Runoff through the Project Site – This section shall provide, either by way of a written description or a drainage map, methods for conveyance of off-site discharge through the project site.

20. Street Conveyance – This section shall provide a tabulation including all streets and alleys listing their respective slopes, crown/invert slopes, capacity, and cross section expected to carry runoff. Again, all calculations and support information is to be included within the appendices.

21. Proposed Channel Conveyance – If a channel is to be employed to convey discharge its hydraulic characteristics and flow attributes show be described in detail.

22. Proposed Storm Drain Conveyance – If a storm sewer system is expected to convey the site discharge is to be used the design criteria and assumptions shall be provided. This shall include materials, slopes, capacities, inlet sizes, and must adhere to the specifications laid out in the previous sections of these Public Works Specifications.

23. Inlet Sizing – Inlets shall be sized as shown previously within this specification. A table should be included referencing inlet type, size, design discharge, inlet capacity, and their respective elevations. These shall be labeled adequately to cross reference the inlets to the design plans included with the report.

24. Onsite Retention/Detention Requirements – If onsite retention/detention ponding is to be used general information shall be provided. This information includes (not limited to) freeboard, side slopes, basic geometry, depth, and mean for maintenance and pond draining. Equations or software reports shall be provided to support the criteria listed above.

25. Provided Retention/Detention Volume – This section should provide insight into the provided volumes for the retention/detention volumes for direct comparison to the retention/detention requirements.

26. Special Issues, Considerations, and Site Features – This section shall address issues requiring special considerations and not outlined in the previous sections of the report. This may include but are not limited to:

    a. 401/404 Permit Requirements

    b. National Pollutant Discharge Elimination System – Construction General Permit (NPDES – CGP)

    c. Downstream effects of proposed improvements.

    d. Upstream effects of proposed improvements.

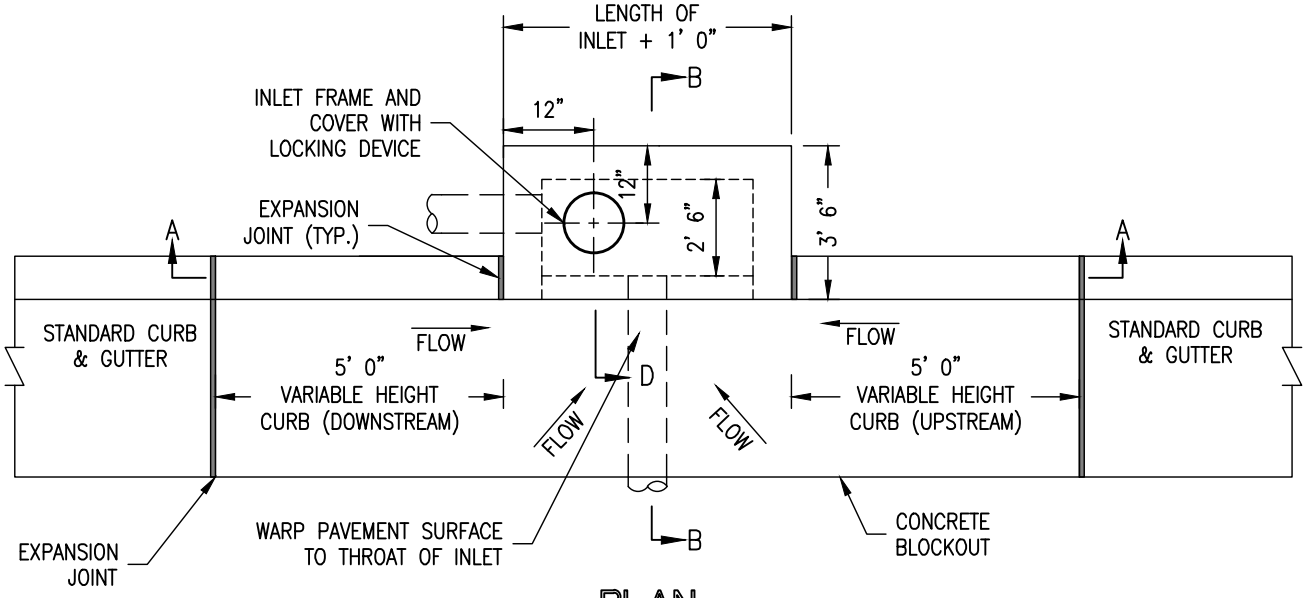
    e. Agency Requirements such as New Mexico Environment Department (NMED), New Mexico Department of Transportation (NMDOT) the Environmental Protection Agency (EPA) and the Office of the State Engineer.

27. Conclusion – This section shall reiterate the findings and proposed improvements for the project site.

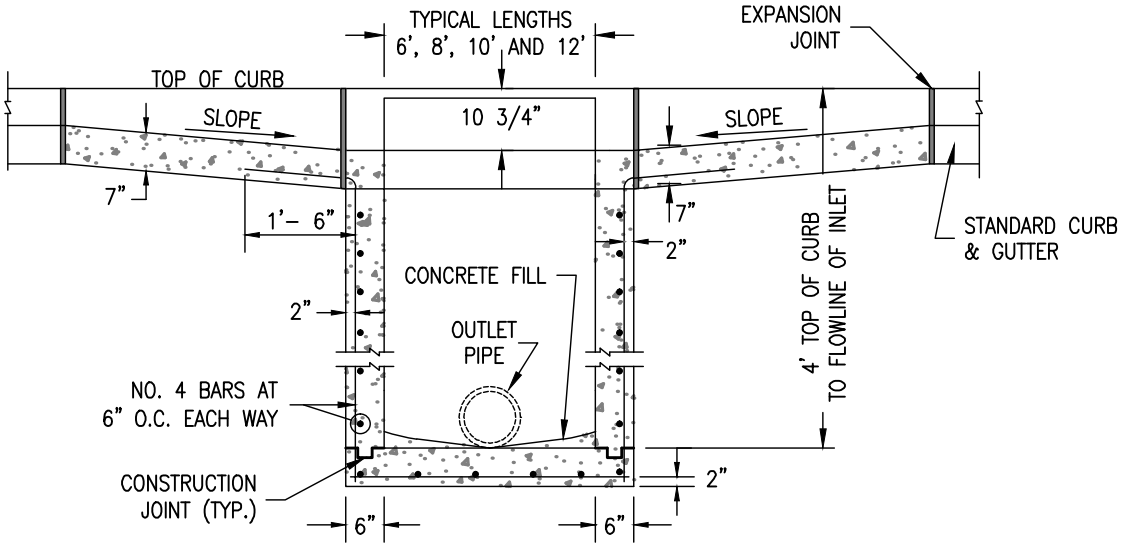
28. References – This section shall include all materials reference within the report or used for support information.

29. Appendices – This section shall contain all information reference within the text of the report, design calculations, and other accompanying materials.

SECTION 10. DRAINAGE SYSTEMS STANDARD CONSTRUCTION DETIALS



PLAN



SECTION A-A

GENERAL NOTES:

1. STANDARD INLET LENGTHS WILL BE 6', 8', 10',& 12'.
2. CONCRETE STRENGTH TO BE A MINIMUM OF 3,500 PSI.
3. PIPE CONNECTIONS TO INLETS WILL ONLY BE ALLOWED AT SIDES AND ENDS. CONNECTIONS WILL NOT BE ALLOWED AT CORNERS OR BOTTOMS.
4. ALL INLETS WILL HAVE A FRAME AND COVER WITH LOCKING DEVICE.
5. MINIMUM COVER OF REBAR SHALL BE 2"

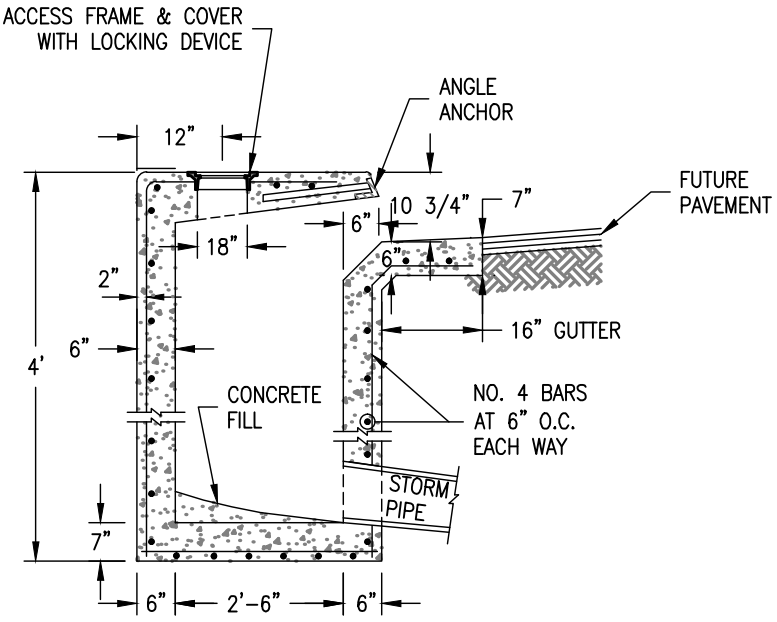
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

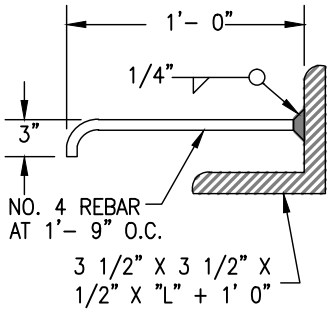
STANDARD CONSTRUCTION DETAILS

STANDARD CURB INLET TYPE "A" PLAN AND SECTION A-A

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-01



SECTION B-B



ANCHOR DETAIL

GENERAL NOTES:

1. SEE DWG. D-01 FOR PLAN AND SECTION A-A.
2. STANDARD INLET LENGTHS WILL BE 6', 8', 10',& 12'.
3. CONCRETE STRENGTH TO BE A MINIMUM OF 3,500 PSI.
4. PIPE CONNECTIONS TO INLETS WILL ONLY BE ALLOWED AT SIDES AND ENDS. CONNECTIONS WILL NOT BE ALLOWED AT CORNERS OR BOTTOMS.
5. ALL INLETS WILL HAVE A FRAME AND COVER WITH LOCKING DEVICE.
6. MINIMUM COVER OF REBAR SHALL BE 2"

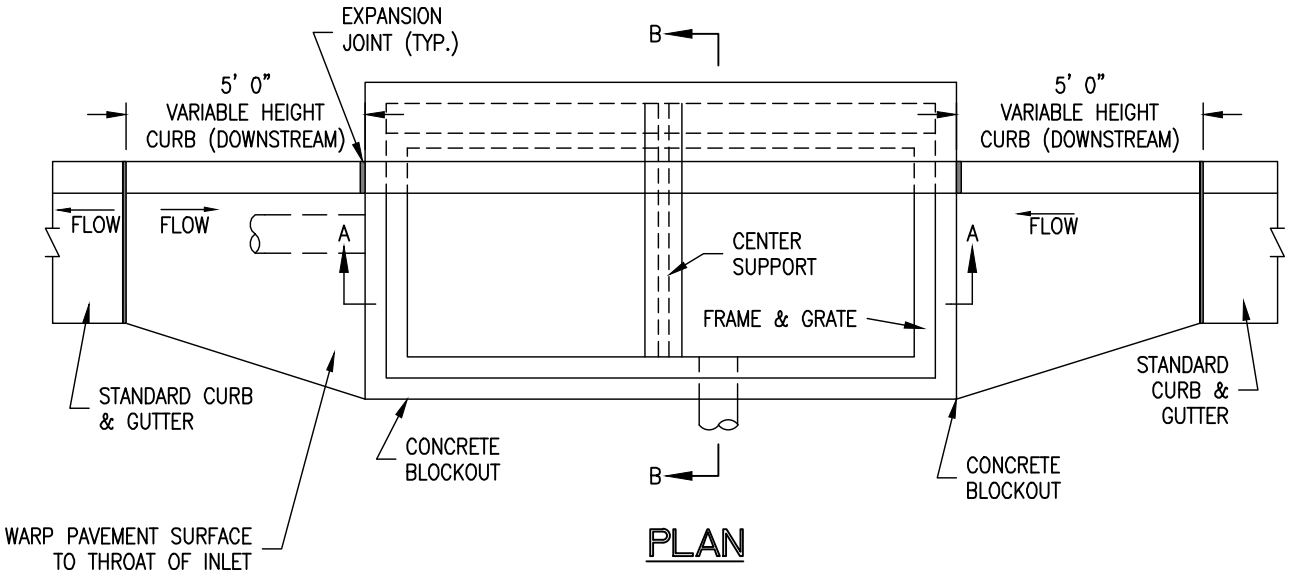
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

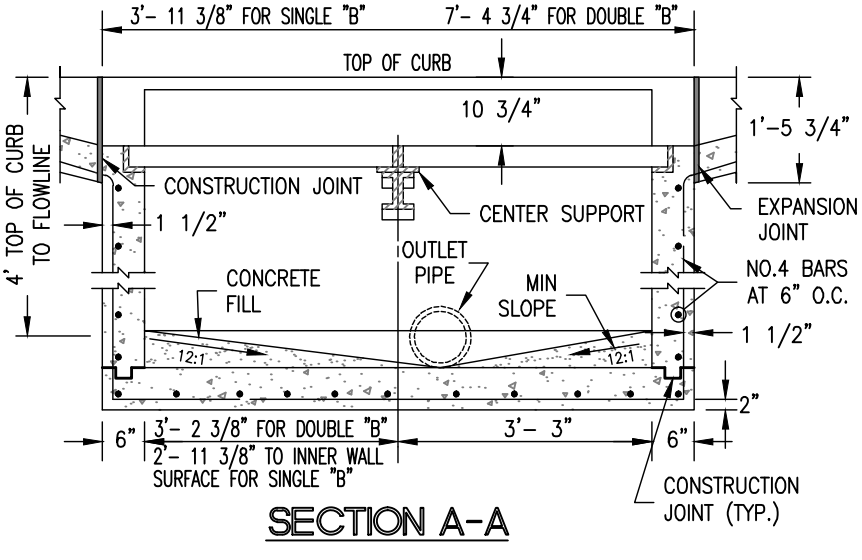
STANDARD CONSTRUCTION DETAILS

STANDARD CURB INLET TYPE "A" SECTION B-B & ANCHOR DETAIL

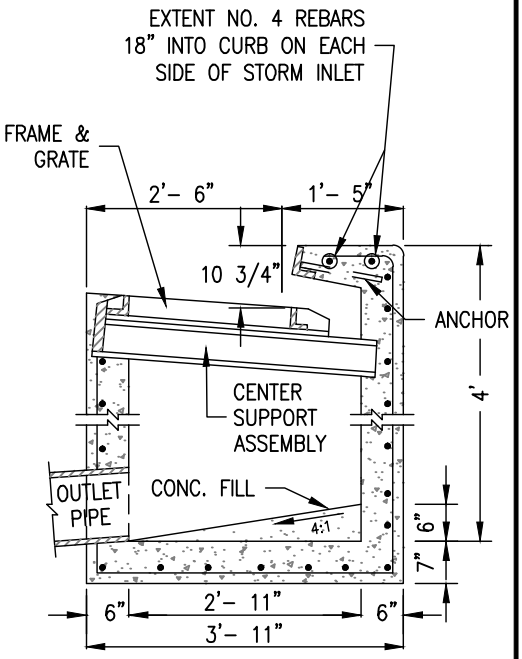
ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-02



PLAN



SECTION A-A



SECTION B-B

GENERAL NOTES :

1. FOR SINGLE GRATE TYPE STORM INLET DELETE CENTER SUPPORT AND MOVE ONE END WALL TO FORM NEW SINGLE GRATE INLET.
2. OUTLET PIPE SIZE, PER DESIGN REQUIREMENT.
3. FOR FRAME & GRATING, SEE DETAILS D-06 AND D-07.
4. FOR ANCHOR DETAIL, SEE DWG. D-02
5. FOR CENTER SUPPORT ASSEMBLY, SEE DETAIL SHEET D-05.

ARTESIA BULLDOGS

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STANDARD CONSTRUCTION DETAILS

STORM INLET TYPE DOUBLE "C" (COMBINATION INLET)

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-03

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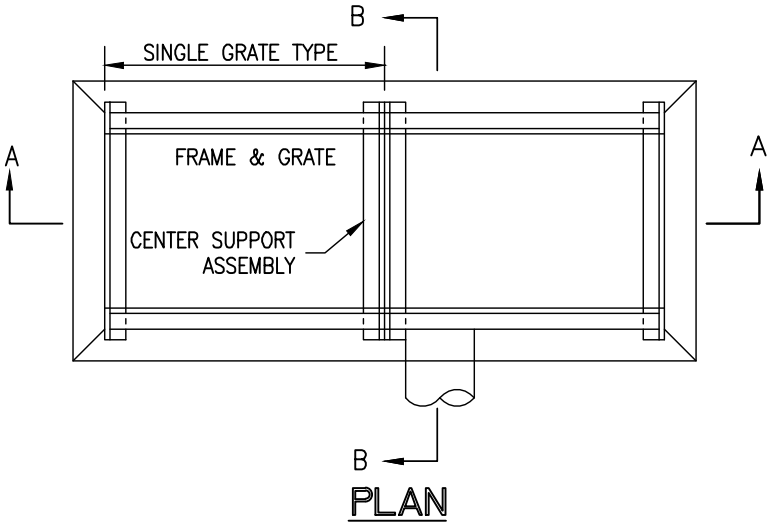

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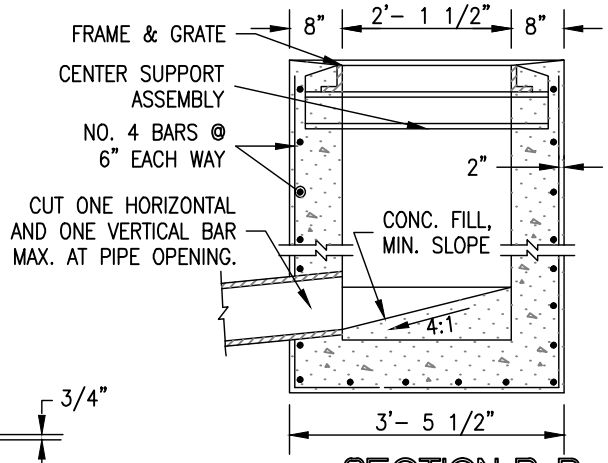
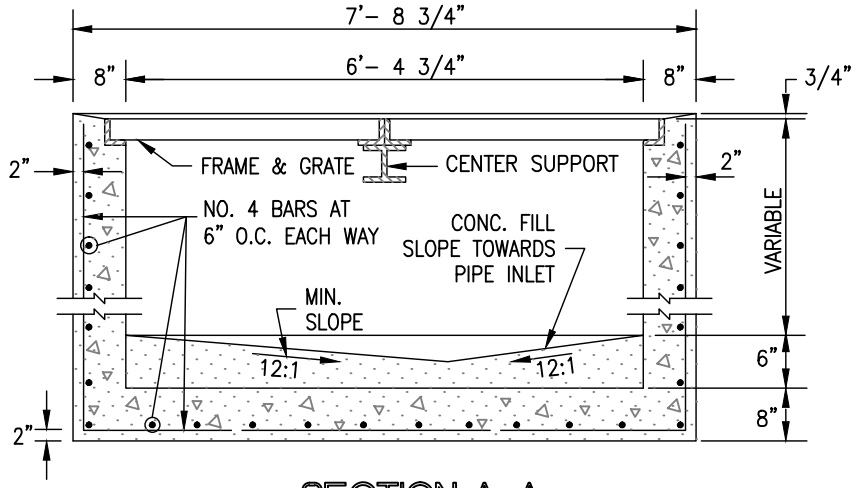


SECTION B-B



SECTION A-A

GENERAL NOTES:

1. FOR SINGLE GRATE TYPE STORM INLET, DELETE CENTER SUPPORT AND MOVE ONE END WALL TO FORM NEW SINGLE GRATE INLET.
2. OUTLET PIPE SIZE, PER DESIGN REQUIREMENT.
3. FOR FRAME & GRATING, SEE DETAILS SHEET D-06 AND D-07.
4. FOR CENTER SUPPORT ASSEMBLY, SEE DETAIL SHEET D-05.

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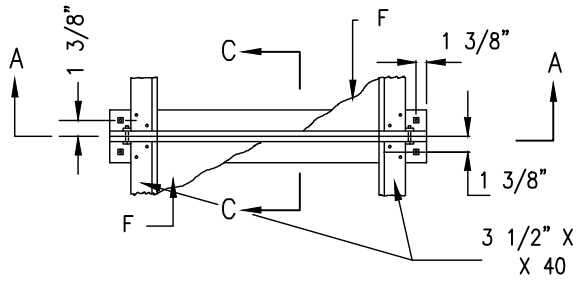
STANDARD CONSTRUCTION DETAILS

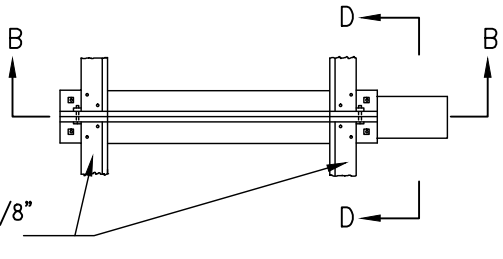
STORM INLET TYPE DOUBLE "D" (DROP INLET)

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-04



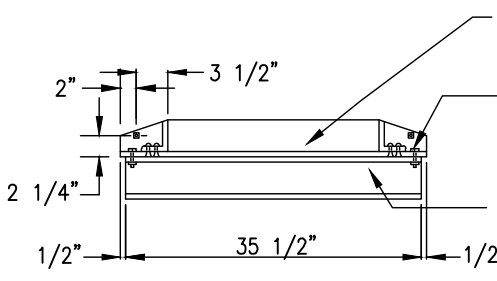
PLAN

ASSEMBLY FOR TYPE "C" INLET (DROP INLET)

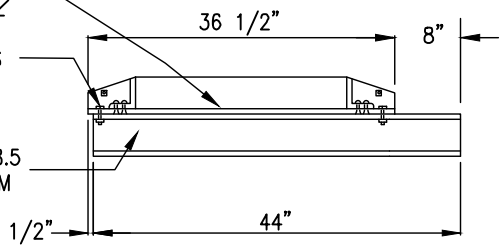


PLAN

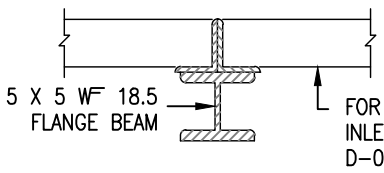
ASSEMBLY FOR TYPE "B" INLET (COMBINATION INLET)



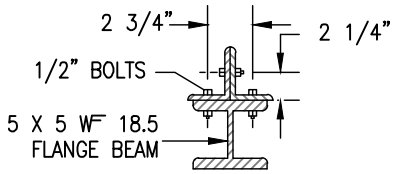
SECTION A-A



SECTION B-B



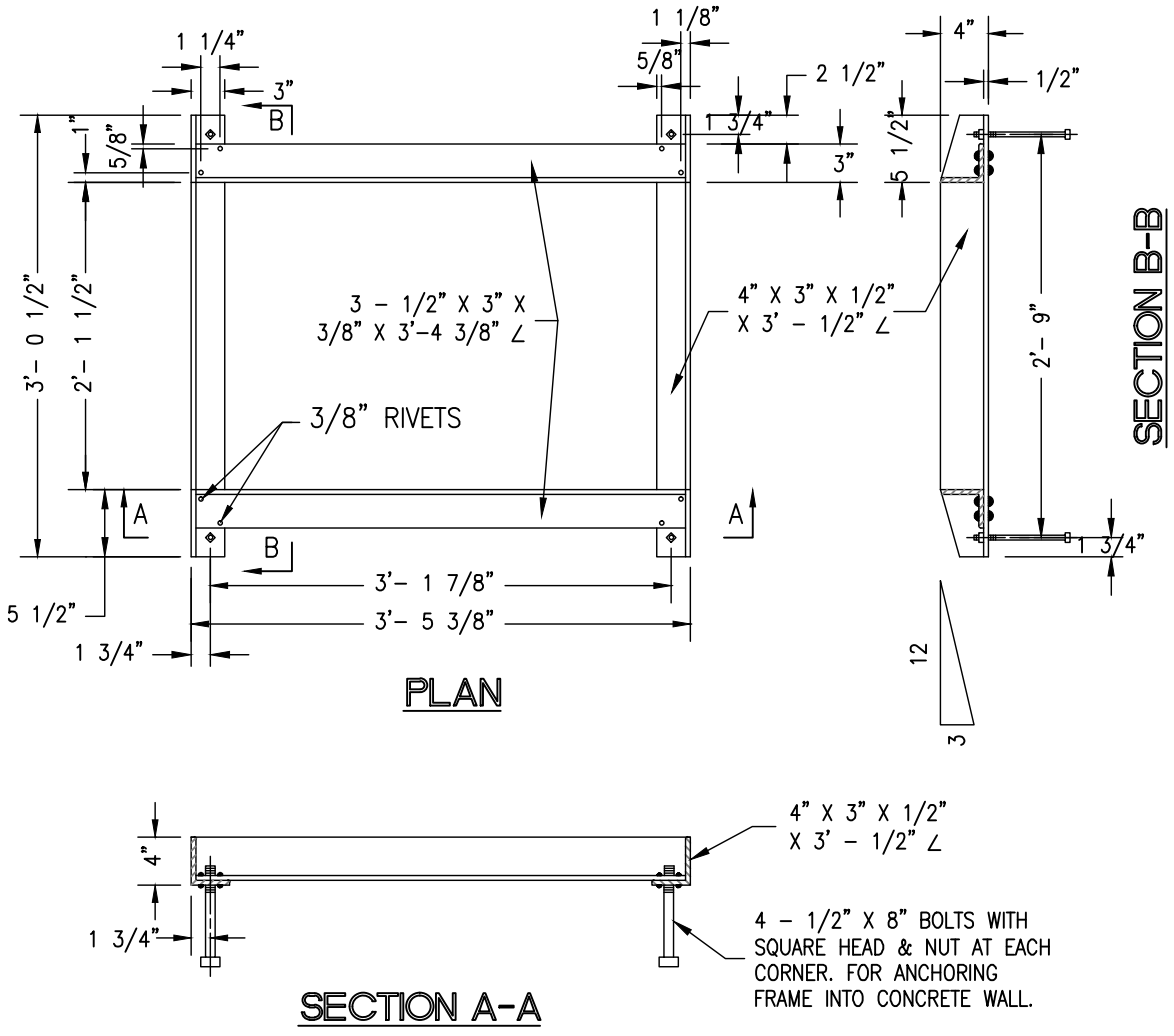
SECTION C-C



SECTION D-D

GENERAL NOTES:

1. ALL BOLTS USED IN CENTER SUPPORT ASSEMBLY SHALL BE 1/2".
2. FRAME MAY BE RIVETED OR WELDED.
3. BOLTS (NOT RIVETS OR WELDS) SHALL BE USED TO JOIN TWO OR MORE FRAMES TOGETHER AND TO THE WF BEAM.
4. AFTER CLEANING SURFACE OF SCALE, RUST, ETC., GRATING, FRAME AND CENTER SUPPORT SHALL BE PAINTED WITH ONE SHOP COAT RED OXIDE, TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).
5. FOR SINGLE TYPE CATCH BASIN, MOVE ONE END WALL TO FORM NEW SINGLE GRATE CATCH BASIN.



GENERAL NOTES:

1. ALL EXPOSED METAL PARTS SHALL BE PAINTED PRIOR TO ASSEMBLY. WELDING, MACHINING AND DRILLING SHALL BE DONE PRIOR TO PAINTING. ALL DIMENSIONS ARE FINISH DIMENSIONS.
2. ALL PARTS SHALL BE OF STRUCTURAL STEEL, GRADE 36.
3. AFTER CLEANING SURFACE OF SCALE, RUST, ETC., GRATING, FRAME AND CENTER SUPPORT SHALL BE PAINTED WITH ONE SHOP COAT RED OXIDE, TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).
4. FRAME MAY BE WELDED OR RIVETED.

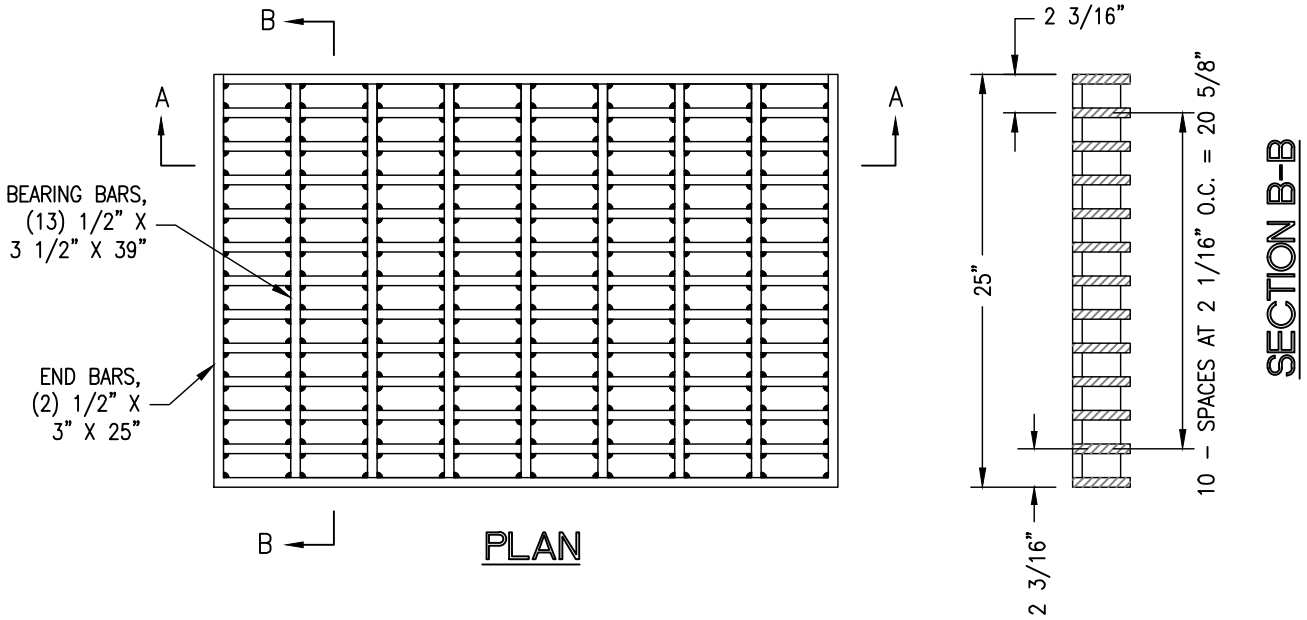
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

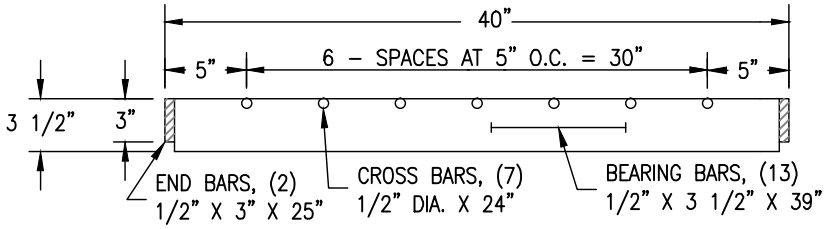
STORM INLET FRAME

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-06



PLAN

SECTION B-B



SECTION A-A

GENERAL NOTES:

1. ALL BARS SHALL BE STRUCTURAL GRADE STEEL, GRADE A36.
2. THE GRATE SHALL BE WELDED WITH 1/8" FILLET WELD AROUND BOTH SIDES OF CROSS BARS, 1/4". FILLET WELD BOTH SIDES OF BEARING BARS TO END BARS.
3. AFTER CLEANING SURFACE OF SCALE, RUST, OILS, ETC., PAINT GRATE WITH ONE SHOP COAT RED OXIDE, TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).
4. TOP OF CROSS BARS SHALL BE FLUSH WITH TOP OF GRATE.
5. GRIND WELDS FLUSH WITH BEARING BARS.
6. WHEN INSTALLED IN FRAME, PUSH TIGHT TO ONE SIDE, OTHER SIDE SHALL HAVE 1/2" MAX. OPENING. SPACERS WELDED TO FRAME MAY BE USED IF REQUIRED TO KEEP 1/2" SPACE OR LESS.

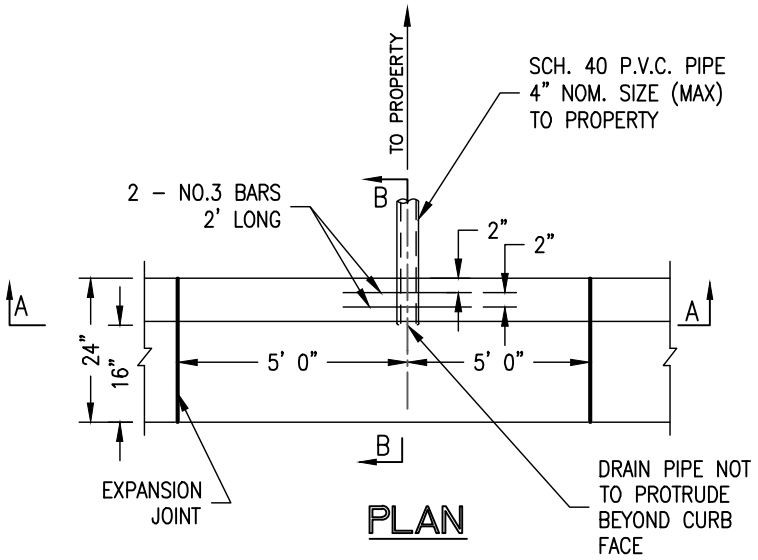
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

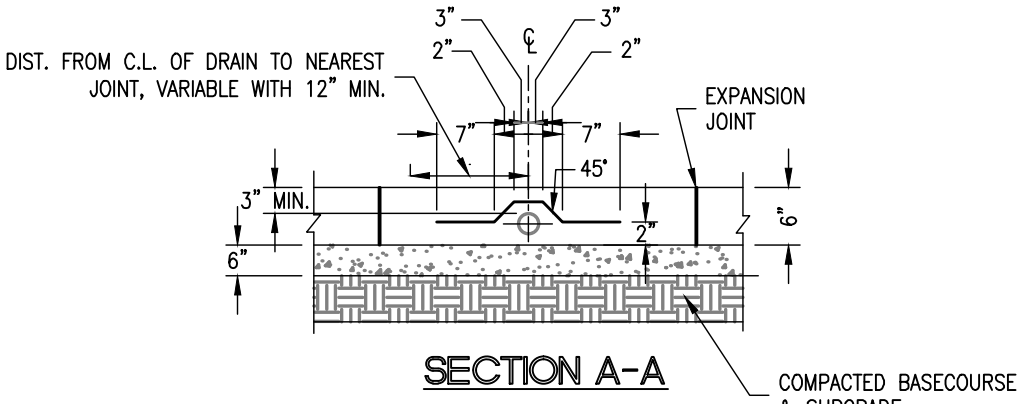
STANDARD CONSTRUCTION DETAILS

STORM INLET GRATE

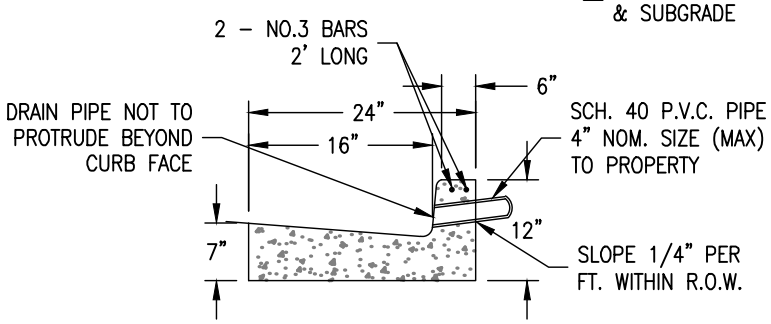
ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-07



PLAN



SECTION A-A



SECTION B-B

GENERAL NOTES:

1. WHEN PLACING THE DRAIN PIPE THROUGH A CURB, REMOVE AND REPLACE ENTIRE CURB AND GUTTER SECTION AND REPOUR AS SHOWN ABOVE.

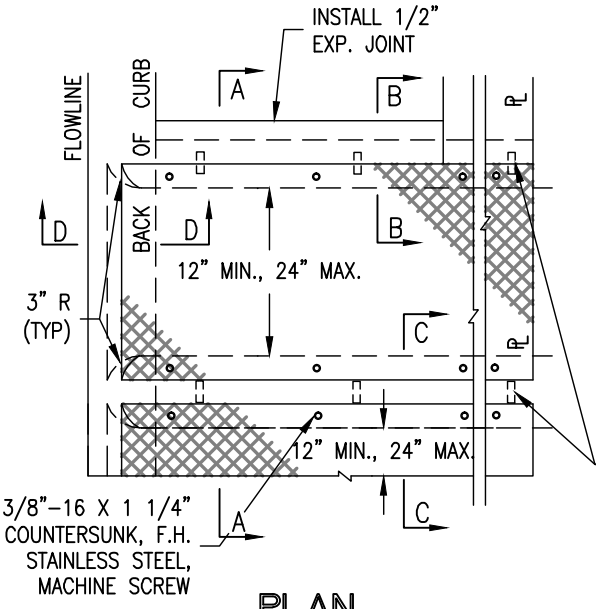
2. THE CITY DOES NOT ACCEPT RESPONSIBILITY FOR MAINTENANCE OF ANY DRAIN LINES INSTALLED BY OR FOR PRIVATE PROPERTY OWNERS.

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

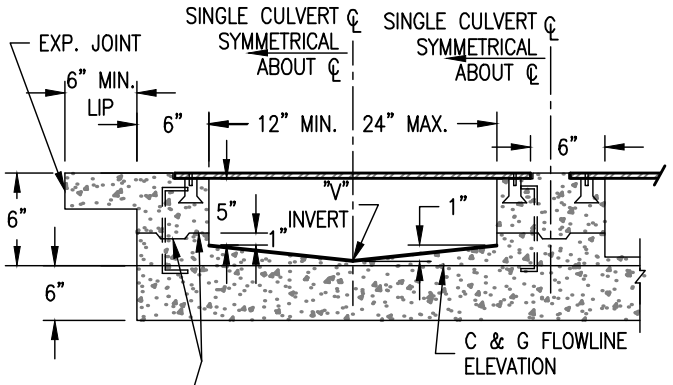
DRAIN LINE THROUGH CURB

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-08



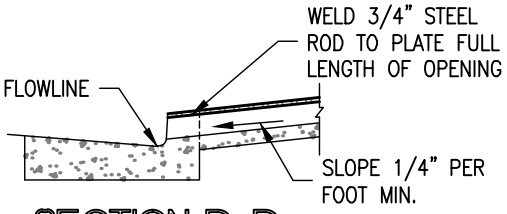
PLAN

SINGLE AND OR MULTIPLE CULVERT

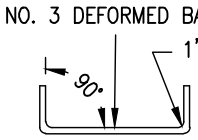


SECTION A-A

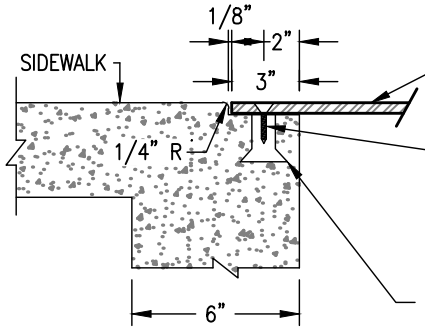
CONS. JOINT OPT. IF USED SPACE DOWELS 18" O.C. MAX., 1 1/2" MIN. FROM FACE OF CONC.



SECTION D-D



DOWEL DETAIL

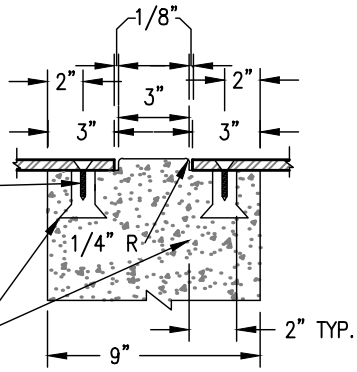


SECTION B-B

3/8" CHECKERED STEEL PLATE

3/8" - 16 X 1 1/4" COUNTERSUNK, F.H., STAINLESS STEEL, MACHINE SCREW

FOR SECURING PLATE USE 1" X 5" S.S. ROD ANCHOR, APPROVED EQUAL. INSTALL PER MANUFACTURER'S INSTRUC. AT MAX. 24" O.C., A MIN OF 2 PER SIDE AND ONE WITHIN 6" OF EACH END



SECTION C-C

SIDEWALK CULVERT NOTES:

1. PLACEMENT OF DRAIN PIPE THRU EXIST. SIDEWALK AND CURB & GUTTER REQUIRES THAT ENTIRE SIDEWALK AND C & G BE REMOVED AND REPLACED AS SHOWN ABOVE.
2. BOTTOM SLAB OF CULVERT SHALL BE POURED MONOLITHICALLY.
3. THE INVERT SHALL BE TROWELED TO PRODUCE A HARD POLISHED SURFACE OF MAX. DENSITY AND SMOOTHNESS. INVERT SHALL BE V-SHAPED TO WITHIN 3" OF OUTLET, THEN WARPED TO PARALLEL FLOWLINE AT OUTLET, UNLESS OTHERWISE SHOWN.
4. ALL EXPOSED CONC. SURFACE SHALL MATCH GRADE, COLOR, FINISH AND SCORING OF ADJACENT CURB AND SIDEWALK.
5. SIDEWALK REPLACED DURING CONSTRUCTION SHALL BE POURED MONOLITHICALLY WITH CULVERT WALLS.
6. IF ROD ANCHORS ARE USED, DRILL & TAP FOR F.H. MACHINE SCREW. ATTACH ANCHORS TO PLATE AND SECURE PLATE IN PLACE PRIOR TO POURING OF WALLS.
7. LENGTH OF EACH PLATE SHALL BE SUCH THAT THE WEIGHT WILL NOT EXCEED 300 LBS. AND SHALL BE STRESS RELIEVED AFTER FABRICATION. CLEAN SURFACE OF PLATE AND FRAMING MEMBERS AND PAINT W/ ONE SHOP COAT RED OXIDE AND TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

SIDEWALK CULVERT WITH STEEL PLATE TOP

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-09

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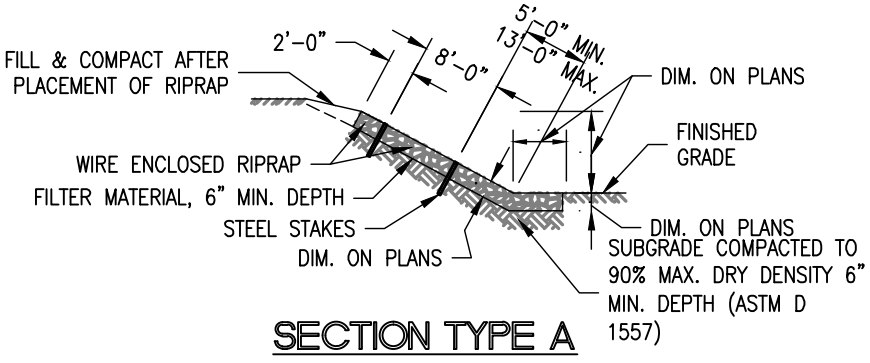
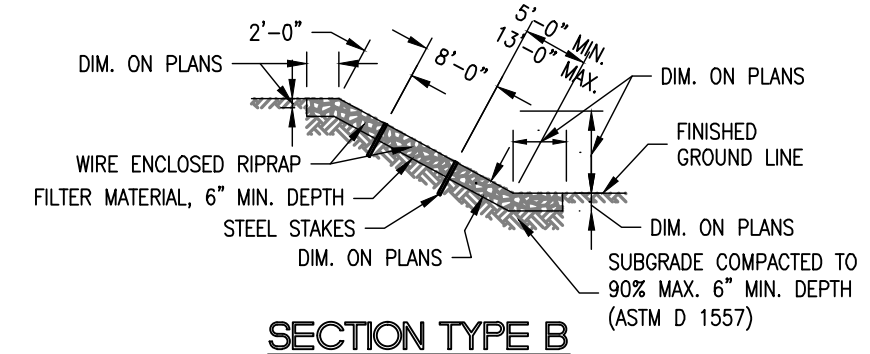


SECTION TYPE A

SECTION TYPE A

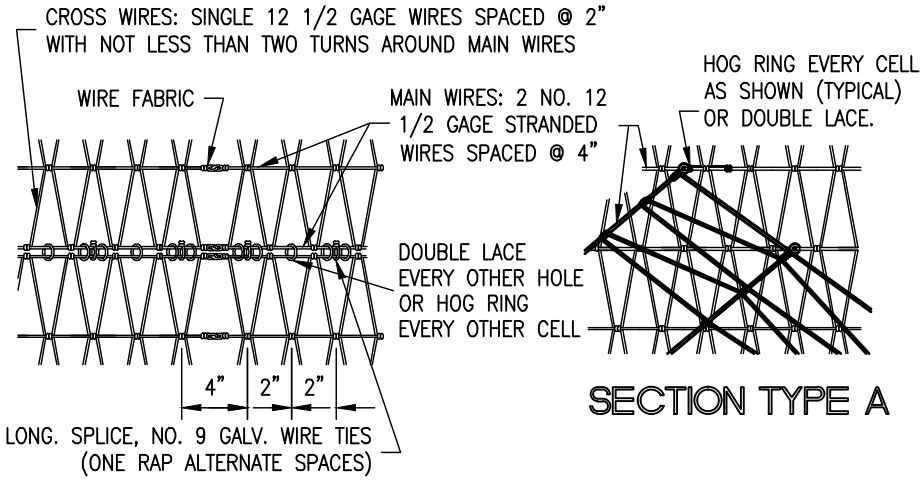
SLOPE	RIPRAP CU. YDS.
1 1/2:1	C/27(B+1.803D+0.303C)
1 3/4:1	C/27(B+2.01D+0.266C)
2:1	C/27(B+2.236D+0.236C)
3:1	C/27(B+3.162D+0.162C)
4:1	C/27(B+4.123D+0.123C)



SECTION TYPE B

SECTION TYPE B

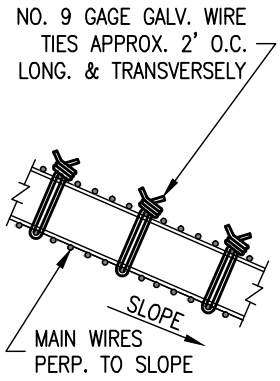
SLOPE	RIPRAP CU. YDS.
1:1	C/27(A+B+1.414D)
1 1/2:1	C/27(A+B+1.803D)
1 3/4:1	C/27(A+B+2.016D)
2:1	C/27(A+B+2.236D)
3:1	C/27(A+B+3.162D)
4:1	C/27(A+B+4.123D)



DETAIL OF WIRE FABRIC AND NORMAL SPLICE

"V" MESH

SECTION TYPE A



TYPICAL SECTION

GENERAL NOTES:

1. WIRE FABRIC IS TO BE GALV. V-MESH, APPROX. WEIGHT: 48 LBS. PER 100 SQ. FT.

2. STEEL STAKES MAY BE RAILROAD RAILS NOT LESS THAN 30 LBS. PER FT., 4"O.D. STANDARD STRENGTH GALV. ST. PIPE OR 4x4x3/8 STEEL ANGLES. STEEL STAKES SHALL BE 5' LONG AND 8' O.C. AND SHALL BE RECESSED TO A MAX. OF 3", BELOW TOP OF RIPRAP. STEEL STAKES ARE CONSIDERED INCIDENTAL TO THE COMPLETION OF THE WORK & NO DIRECT MEASUREMENT OR PAYMENT WILL BE MADE THEREFOR.

3. IF LENGTH OF SLOPE IS 15' OR LESS ONLY ONE ROW OF STEEL STAKES 2' FROM THE TOP EDGE OF THE RIPRAP WILL BE REQUIRED UNLESS OTHERWISE NOTED ON PLANS.

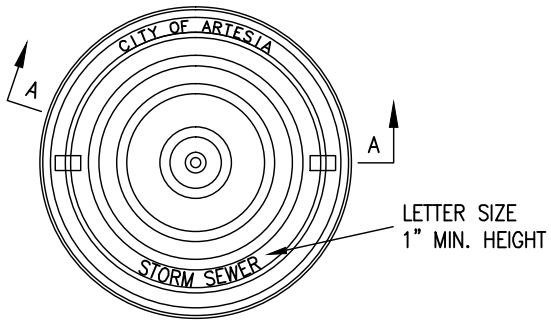
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

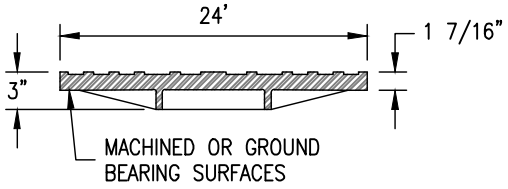
DRAINAGE WIRE ENCLOSED RIPRAP

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-10

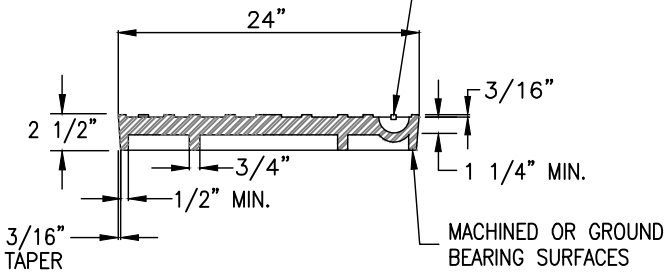


COVER - PLAN

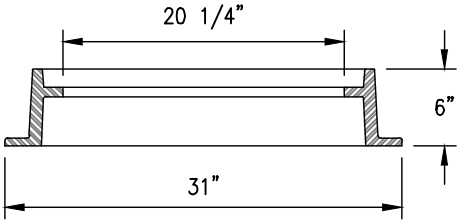
MONOLITHIC CAST IRON OR STEEL ROD INSERTS AT MANUFACTURER'S OPTION. IF INSERT IS PROVIDED IT MUST HAVE 3/16" MIN. COVER AND 3/4" END EMBEDMENT IN CASTING.



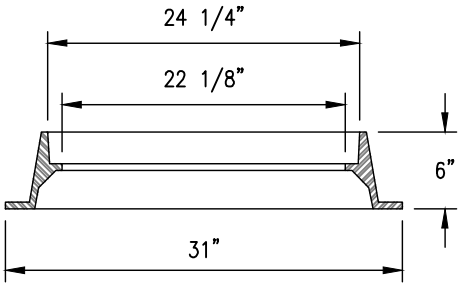
SECTION A-A
WATERTIGHT



SECTION A-A



SECTION VIEW
WATERTIGHT FRAME



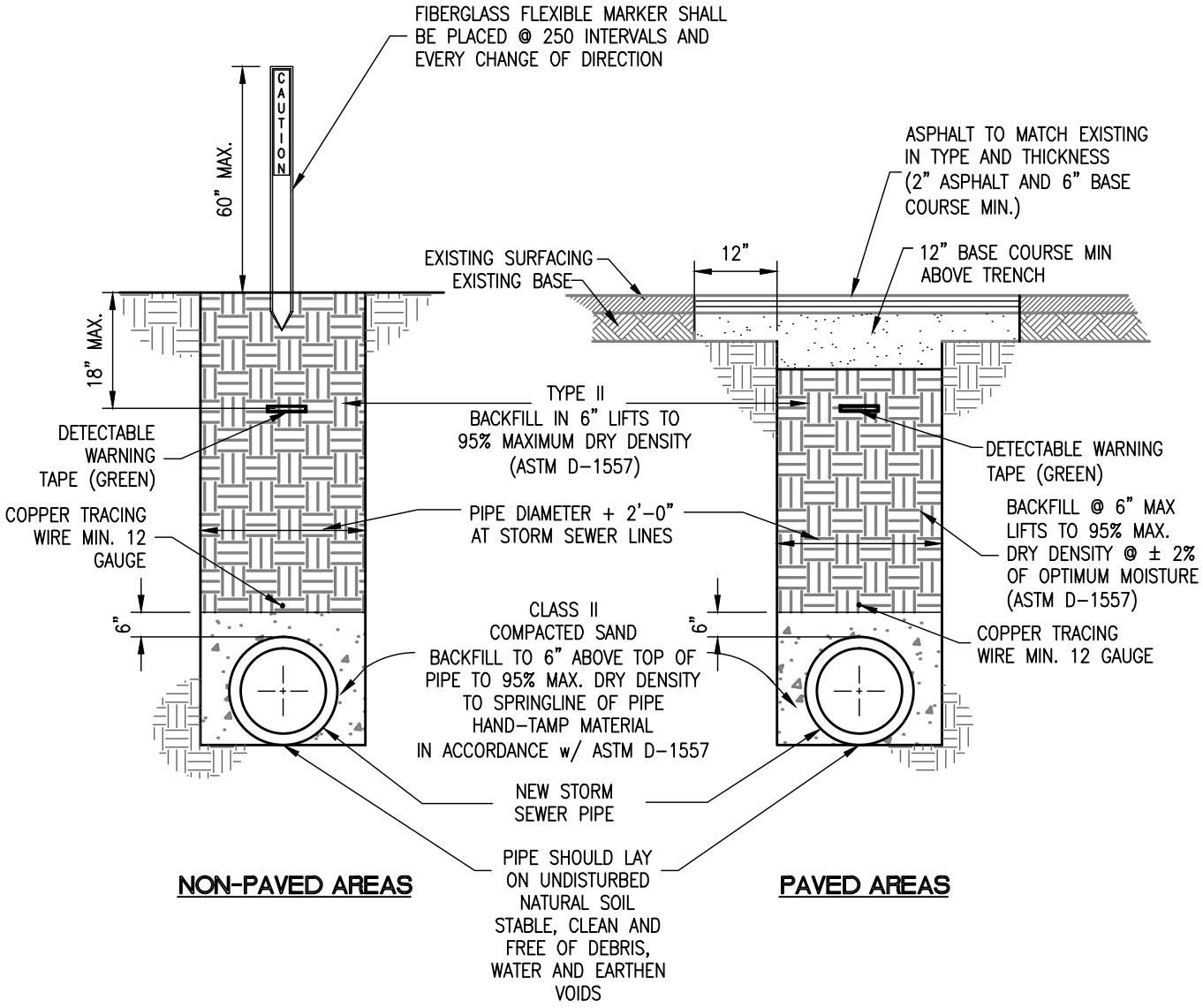
FRAME
SECTION VIEW

GENERAL NOTES:

1. STANDARD CAST IRON M.H. FRAME AND COVER.
WEIGHTS:
COVER = 180 LBS.
FRAME = 145 LBS.
TOTAL = 325 LBS. (TOLERANCE = ±5%)

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905 STANDARD CONSTRUCTION DETAILS	TYPICAL MANHOLE FRAME AND COVERS HEAVY DUTY		ORIGINAL DATE: MAY 2009 REVISION DATE: OCTOBER 2014 SHEET NO: D-11



NOTES:
1. DESIGN ENGINEER TO DETERMINE IF BEDDING MATERIAL IS REQUIRED, BASED ON SOIL CONDITIONS.

ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

TYPICAL TRENCH DETAILS

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-12

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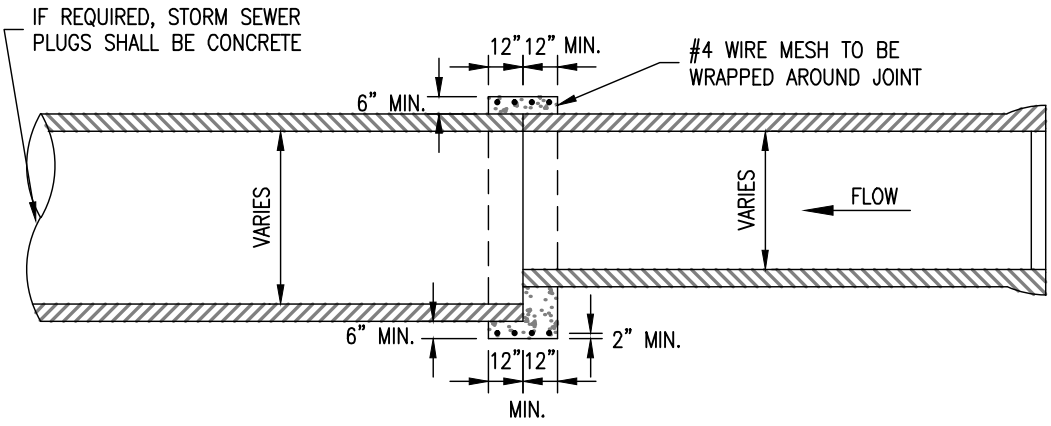


ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

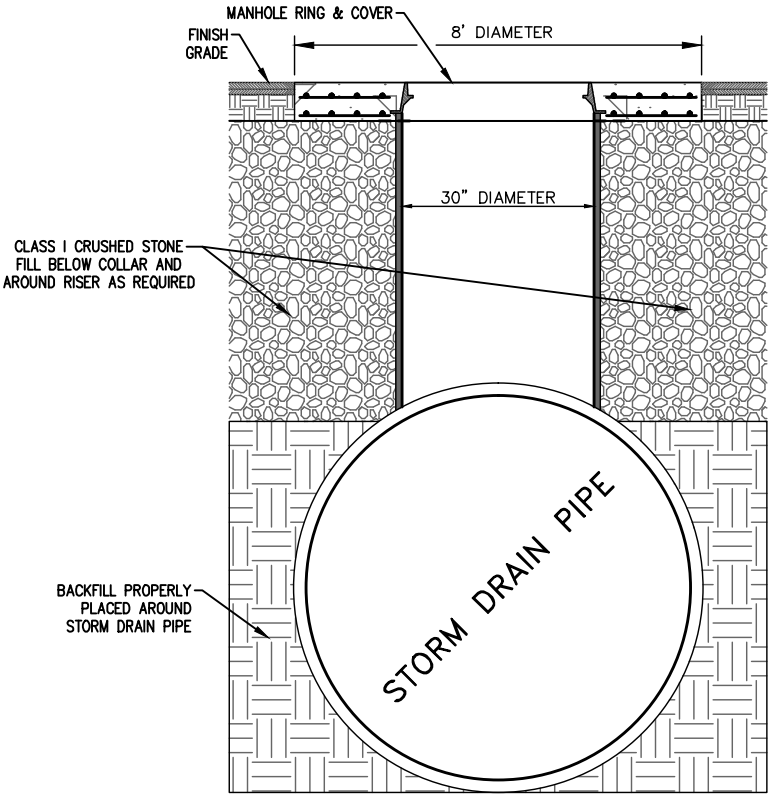
STANDARD CONSTRUCTION DETAILS

CONCRETE PIPE COLLAR

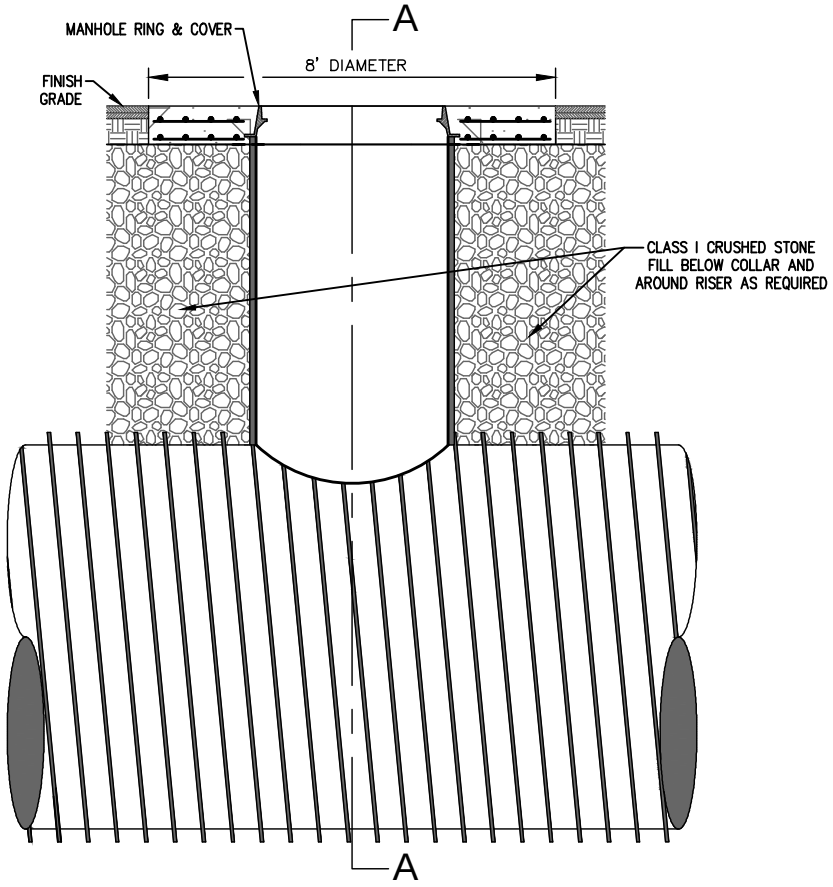
ORIGINAL DATE: MAY 2009

REVISION DATE: OCTOBER 2014

SHEET NO: D-13



SECTION A–A



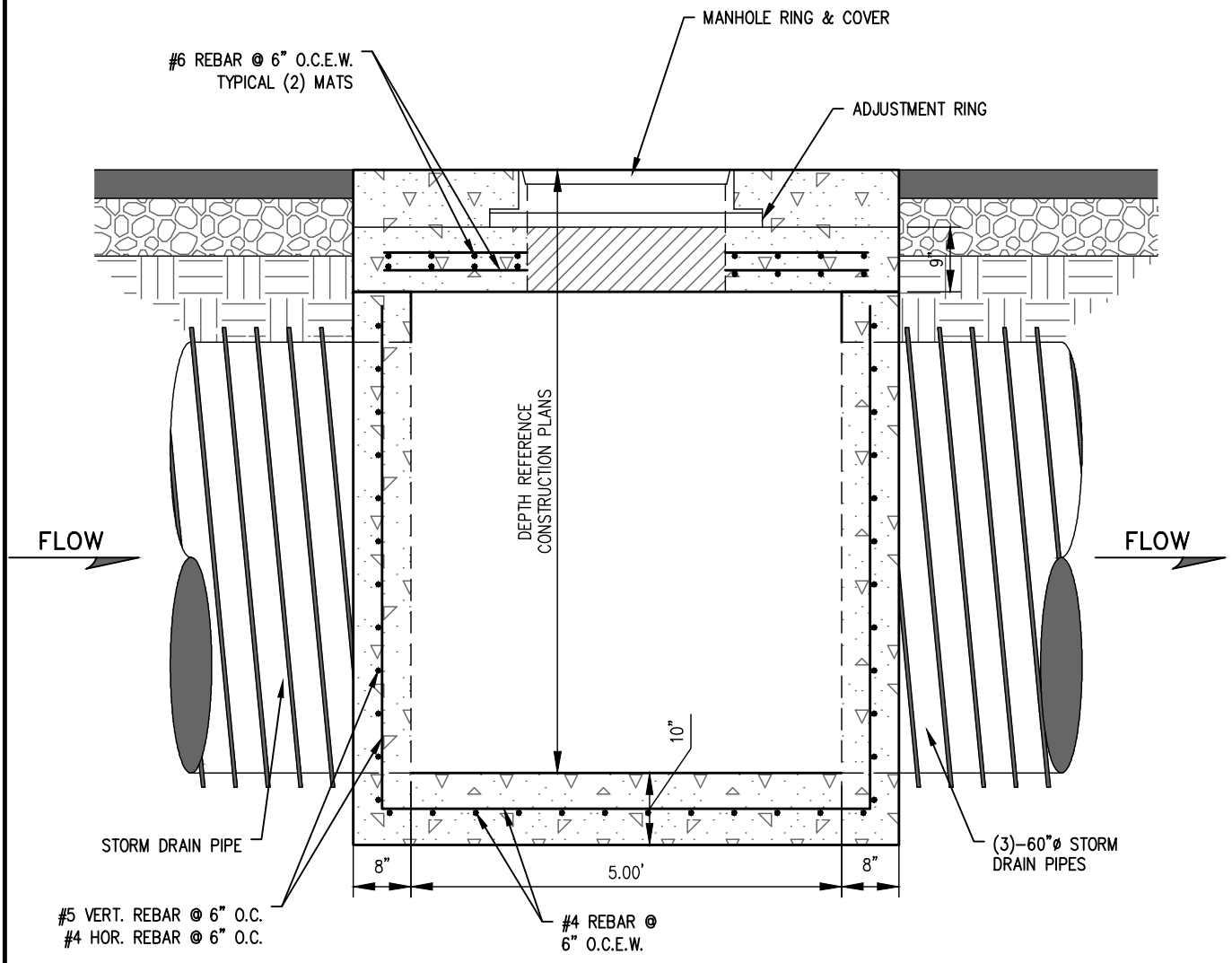
ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

STORM SEWER TYPE "I" MANHOLE

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-14



ARTESIA BULLDOGS

CITY OF ARTESIA NEW MEXICO EST. 1905

STANDARD CONSTRUCTION DETAILS

STORM SEWER TYPE "2" MANHOLE

ORIGINAL DATE: MAY 2009
REVISION DATE: OCTOBER 2014
SHEET NO: D-15

CITY OF ARTESIA
DESIGN AND CONSTRUCTION STANDARDS
FOR INFRASTRUCTURE

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CHAPTER 4

CHAPTER 5