Report

Sewer System Management Plan

Prepared for

City of Colusa

425 Webster Street
Colusa, CA 95932

May 2023

NEXGEN Utility Management

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1. Sewer System Management Plan Goal and Introduction

D.1.(i) The goal of the Sewer System Management Plan (Plan) is to provide a plan and schedule to: (1) properly manage, operate, and maintain all parts of the Enrollee's sanitary sewer system(s), (2) reduce and prevent spills, and (3) contain and mitigate spills that do occur.

1.1 Regulatory Context

The City of Colusa (City) is required to comply with the State Water Resources Control Board Order No. 2006-0003-DWQ adopted May 2, 2006, entitled Statewide General Waste Discharge Requirements for Sanitary Sewer Systems. Order WQ 2022-0103-DWQ-Statewide Waste Discharge Requirements-General Order for Sanitary Sewer Systems (General Order) was adopted on December 6, 2022 and will become effective on June 5, 2023, superseding the previous Order. This document will meet the requirements for the updated General Order.

The purpose of this order is to prevent Sanitary Sewer Overflows (SSOs) or sewer spills by establishing a statewide Monitoring and Reporting Program (MRP) and requiring each local or regional sewer agency to create and implement their own Sewer System Management Plan (SSMP) based in the mandatory requirements of the Order. All public agencies that own or operate a sanitary sewer system that is comprised of more than one mile of pipes or sewer lines which conveys wastewater to a publicly owned treatment facility must apply for coverage under the Sanitary Sewer Systems General Order.

The following sections include the information below per the updated General Order:

- General description of the local Sewer System Management Plan (Plan) and Sewer System Management Plan implementation and updates.
- A schedule for the City to update the Plan, including the schedule for conducting internal audits.
- A description of the City-owned assets and service area. This section also includes and provides reference to the City's map of the sanitary sewer system.

1.2 General Description of SSMP and Implementation

The Department of Public utilizes preventative maintenance practices in their efforts to properly maintain and operate the sanitary sewer collection system. The Sewer Maintenance Program works in tandem with the Contract City Engineer to improve the condition of and extend the life of collection system assets. The Department of Public Works has developed this SSMP to achieve the collection system management goals and objectives listed below. These goals and objectives have been adopted into the budget.

- Proper maintenance, operations, and management all parts of the wastewater collection system.
- Provision of adequate capacity in the collection system to convey peak flows.
- Minimize the frequency of sanitary sewer overflows (SSOs).
- Mitigate the impact of SSOs.

This SSMP document will be adopted by the City Council on May 16, 2023 and will be uploaded to CIWQS by June 4, 2023 per the updated General Order. Once adopted by the City Council, this document will be posted on the City's web site and the link will be added here:

_____

1.3 Sewer System Management Plan Update Schedule

The Plan Introduction section must include a schedule for the Enrollee to update the Plan, including the schedule for conducting internal audits. The schedule must include milestones for incorporation of activities addressing prevention of sewer spills.

Based on the General Order requirements, the SSMP shall be updated every 6 years from when it was last certified, and internal audits will be scheduled on a 3-year basis. Table 1-1 shows required milestones and anticipated completion dates below.

Table 1-1: SSMP Milestones and Anticipated Completion Dates

Milestone	Anticipated Date of Completion
Adoption of this SSMP document by City Council	May 16, 2023
Colusa's LRO to certify Continuation of Existing Coverage in CIWQS	June 4, 2023
First Internal Audit	May 2025
Second Internal Audit	May 2028
Adoption of updated SSMP document by City Council	May 2029

1.4 Sewer System Asset Overview

This section includes a description of the City's wastewater collection system demographics, assets, and service area. This information is summarized below.

The City of Colusa is located in Colusa County. The existing wastewater collection system assets are shown in Figure 1-1. According to City records, the City's wastewater facilities serve a population of approximately 6,345. About 90% of connections are residential and 10% are commercial or industrial.

The City maintains an electronic map of their sewer system in AutoCAD. The map displays sewer features including pipe size, material, slope and depth. The City's 2009 Sewer Master Plan created a GIS database of sewer attributes, which was used as a basis for the hydraulic model of sewer capacity.

Section 15A-2 in the City's Municipal Code defines the "collection system" as:

> *"…portions of the public sewer consisting of all pipes, sewers and conveyance systems conveying wastewater to the publicly-owned treatment works excluding privately owned sewer lateral line connections."*

The City owns and operates all parts of the wastewater collection system, except the private laterals, which are defined as the lateral between the house/building and the connection with the public sewer line. The City Engineer uses a spreadsheet to track hot spots and maintenance requirements for the sewer system. A summary of sewer system attributes, including existing pipe lengths and stations, is shown in Table 1-2. Lift station data can be found in Table 4-1.

Table 1-2
Summary of Existing Sewer System Components

Component	Amount
Force Mains	2 Miles
Gravity Mainlines	28.5 Miles
Laterals	11.5 Miles
Lift Stations	7

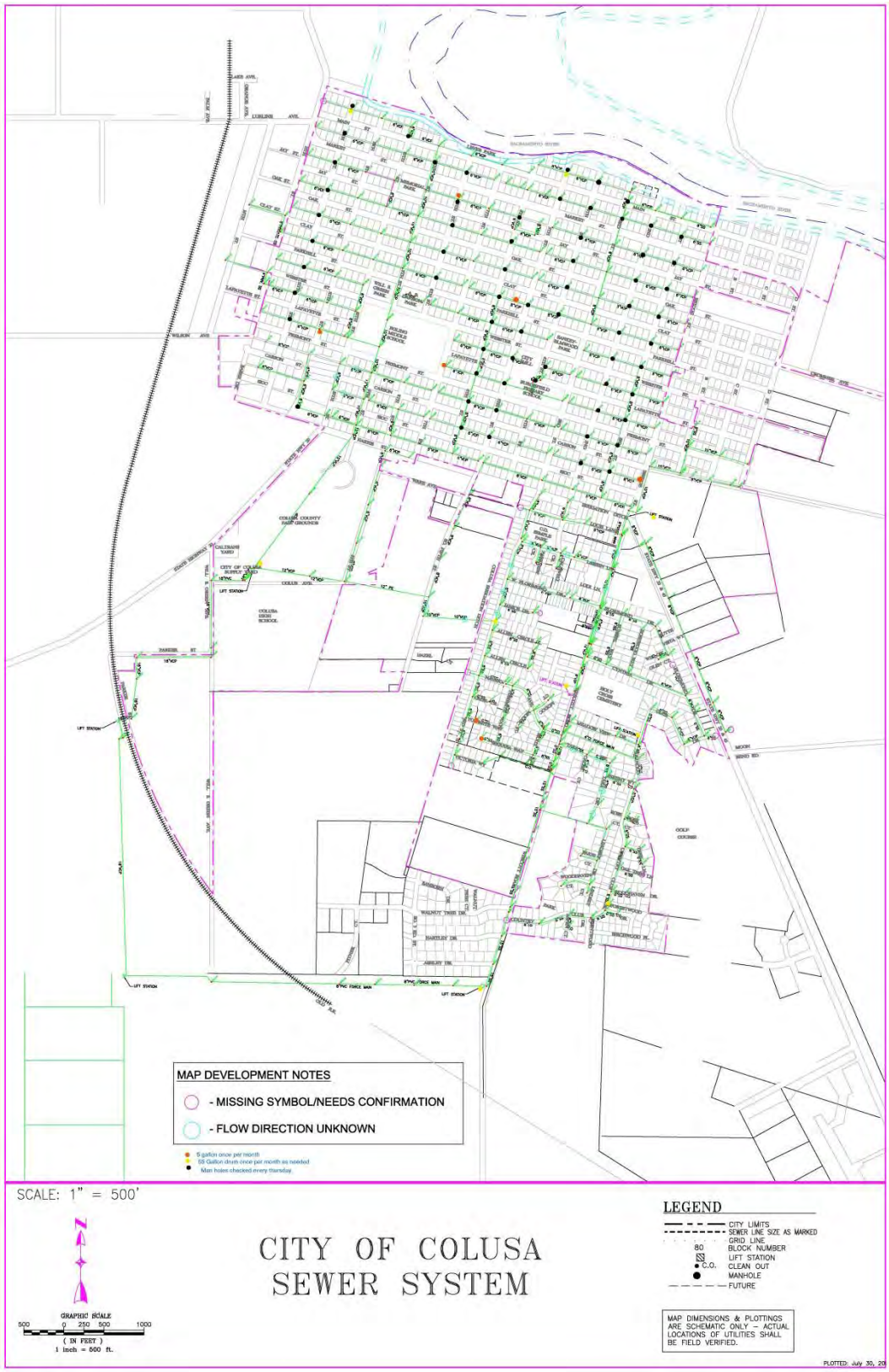


Figure 1-1: Updated City of Colusa Sewer System Map

2. Organization

D.2. (ii) The Plan must identify organizational staffing responsible and integral for implementing the local Sewer System Management Plan through an organization chart or similar narrative documentation that includes: (1) The name of the Legally Responsible Official as required in section 5.1 (Designation of a Legally Responsible Official) of this General Order; (2) The position titles, telephone numbers, and email addresses for management, administrative, and maintenance positions responsible for implementing specific Sewer System Management Plan elements; (3) Organizational lines of authority; and (4) Chain of communication for reporting spills from receipt of complaint or other information, including the person responsible for reporting spills to the State and Regional Water Boards and other agencies, as applicable. (For example, county health officer, county environmental health agency, and State Office of Emergency Services.)

2.1 Legally Responsible Official (LRO)

The City has identified the Public Works Administrator as the LRO. A summary of titles and positions can be found in Table 2-1.

2.2 Administrative and Maintenance Information and Contact Info

The City has identified and outlined a list of those responsible for implementing specific Sewer System Management Plan elements. These representatives and their contact information are summarized in Table 2-1.

2.3 Organizational Structure

The following organizational chart (Figure 2-1) shows the key positions for sewer collection system management, operations, and maintenance as of March 2023.

Figure 2-1: Organizational Chart for the Sewer System

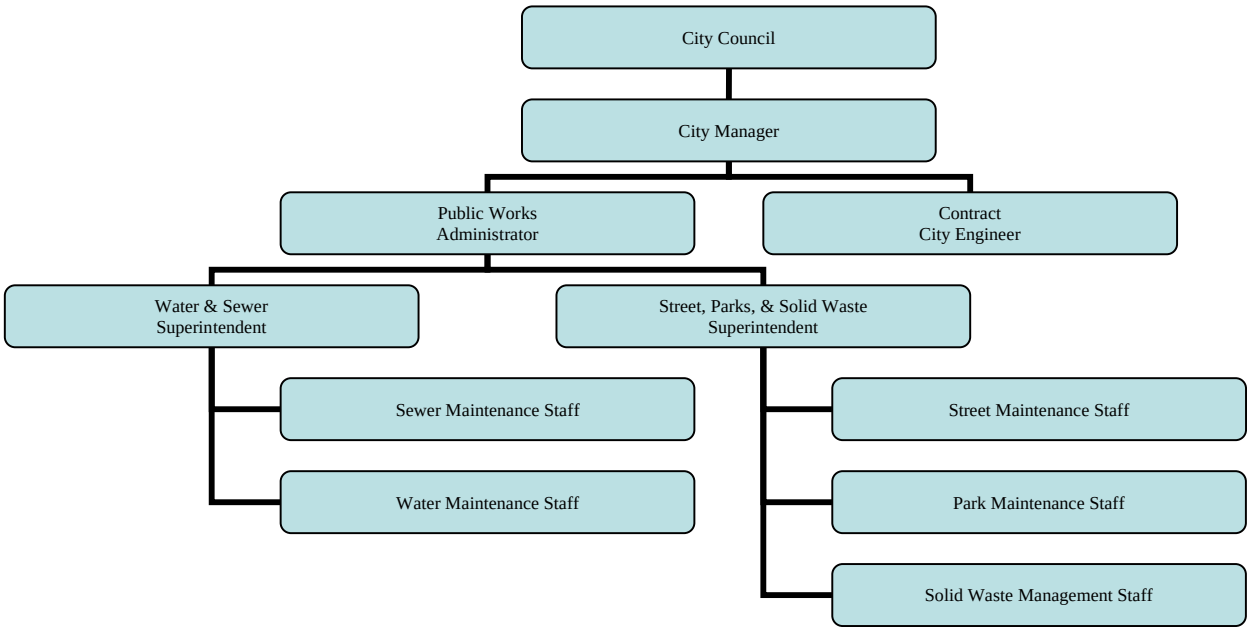


Table 2-1: Organizational Roles and Responsibilities (2023)

Roles and Responsibilities	Name	E-mail Address	Phone Number
<u>City Council:</u> Establish policy	Greg Ponciano Ryan Codorniz Julie Garofalo Denise Conrado Daniel Vaca Shelly Kittle	gponciano@cityofcolusa.com rcodorniz@cityofcolusa.com jgarofalo@cityofcolusa.com dconrado@cityofcolusa.com dvaca@cityofcolusa.com cityclerk@cityofcolusa.com	(530) 681-7442 (530) 635-2198 (916) 752-2167 (530) 908-7479 (530) 682-1342 (530) 458-4740
<u>City Manager:</u>	Jesse Cain	citymanager@cityofcolusa.com	(530) 458-4941
Appointed by the City Council and is the chief administrative officer of the City of Colusa. Oversees operations and services and enforces the laws and policies as adopted by the City Council.			

Table 2-1 *(Cont.)*: Organizational Roles and Responsibilities (2023)

Roles and Responsibilities	Name	E-mail Address	Phone Number
Public Works Administrator:	Jesse Cain (***Legally Responsible Official***)	citymanager@cityofcolusa.com	(530) 458-3320
Plans, directs, and reviews the activities, operations, and programs of the Public Works Department, including those related to the sewer system. Oversees the sewer system and performs system analyses, special studies, and manages capital improvement projects to ensure public works department compliance with federal, state, and local environmental regulations. Coordinates and confers with operation and maintenance, consultants, and contractors on utility services and complex capital improvement projects. Prepares reports on sanitary sewer system and communicates utility services to the public, commissions, and city council. Plans, coordinates, supervises, and participates in the performance of professional engineering activities of a complex nature involving engineering planning and design, construction project management. Manages city utility maps and record drawings. Legally Responsible Official (LRO) for the SSMP.			
City Engineer	David Swartz	swartz@ceusa.net	(530) 682-9832
Assists the LRO with planning, reviews of the activities, operations, and programs of the Public Works Department, including those related to the sewer system. Assists in the delivery of capital improvements projects to ensure public works department compliance with federal, state, and local environmental regulations. Coordinates and confers with operation and maintenance division, consultants, and contractors on utility services and complex capital improvements projects. Assists with the preparation of reports on sanitary sewer system and communicates utility services to the public, commissions, and city council. Plans, coordinates, supervises, and participates in the performance of professional engineering activities of a complex nature involving engineering planning and design, construction project management. Manages city utility maps and record drawings.			
Wastewater & Sewer Superintendent	Jeremy Cain	wastewater@cityofcolus.com	(530) 458-3320
Oversees the City's collection system operations and maintenance. Also responsible for managing the wastewater treatment plant operations and maintenance.			
Lead Utility Systems Operator Sr. Utility Operator Utility Operator Utility Operator	Jessie Cain Frank Garofalo Dale Nokes Glen Strudevant	citymanager@cityofcolusa.com N/A N/A N/A	530-458-3320 530-458-3320 530-458-3320 530-458-3320
Manage the wastewater treatment plant operations and maintenance.			

2.4 Chain of Communication for Reporting SSOs

To facilitate consistent reporting procedures for the public, the Department of Public Works (DPW) has implemented a one-stop call center. Emergency sewer calls, including SSOs, are

directly dispatched to the sewer maintenance crew during regular business hours. In off-hours, there are two phone numbers listed on the City's web site for emergencies: 1) the official Utilities phone number (530-458-3244) will go to the on-call staff at the WWTP and 2) the number listed for Public Works emergencies (530-458-7721) is routed to the City Fire Department and from there to the on-call WWTP staff.

The DPW has a process for receiving, responding to and reporting SSOs. The on-call staff member is responsible for directing the crew through the entire SSO event from response, to mitigation, to cause removal and clean-up. The on-call staff member is also responsible for ensuring photographs are taken and all necessary paperwork is completed in full. After the SSO event, the on call staff member is responsible for communicating the details of the event to management, timely reporting to appropriate agencies, as well as developing a plan to increase or change preventative maintenance activities to prevent future spills. Refer to Table 2-2 for the chain of communication for reporting SSOs.

- The DPW customer service phone line (530 458-4941) is staffed Monday through Thursday 7am to 5pm, excepting holidays, to receive all incoming calls. After normal business hours, all emergency calls are forwarded through the City Fire Department who then notify on-call staff of the emergency.

- Once a report of an SSO is received (or internal staff witness an SSO), the on-call staff member is contacted immediately via pager and/or cell phone. If the spill is a Category 1 SSO, the on call staff contacts both the Water & Sewer Superintendent and Public Works Administrator immediately.

- On call staff will dispatch additional personnel and/or pump equipment contractors if necessary for assistance with mitigation, blockage clearing and clean-up. Colusa County Environmental Health Department is notified as necessary for water samples.

- Water & Sewer Superintendent completes SSO reporting forms and ensures photos are taken of the spill.

- Wastewater then contacts appropriate agencies, completes appropriate forms, submits online reports, and compiles all information and photos into SSO logs.

- On call staff reviews information with the Water & Sewer Superintendent and Public Works Administrator and a plan is developed for preventative maintenance activities at the spill location as necessary.

- Copies of SSO logs are shared with office staff for input and training.

Table 2-2: Chain of Communication for Reporting SSOs (a)

Step	Contact Name	Title/Role	Phone Number
1a	During Business Hours: WWTP Operators	WWTP Operators	530-458-3320
1b	After Business Hours and Weekends: Police Dispatch – contacts whoever is on call at the WWTP	Police Dispatch	(530) 458-7777
2	Field Crew	Field Crew	N/A (contacted by WWTP staff)
3	Jessie Cane	Lead Utility Systems Operator	530-458-3320
4 (b)	Colusa County Department of Environmental Health	Colusa County Department of Environmental Health	(530) 458-0888
5 (b)	California Office of Emergency Services	California Office of Emergency Services	(800) 852-7550

(a) All spill categories must be certified in CIWQS.

(b) These entities are only contacted if there is a Category 1 spill (1,000 gallons or more reach a water of the State.

3 Legal Authority

D.1 (iii) The Plan must include copies or an electronic link to the Enrollee's current sewer system use ordinances, service agreements and/or other legally binding procedures to demonstrate the Enrollee possesses the necessary legal authority to: (1) Prevent illicit discharges into its sanitary sewer system from inflow and infiltration (I&I); unauthorized stormwater; chemical dumping; unauthorized debris; roots; fats, oils, and grease; and trash, including rags and other debris that may cause blockages; (2) Collaborate with storm sewer agencies to coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross connections of sanitary sewer infrastructure to storm sewer infrastructure; (3) Require that sewer system components and connections be properly designed and constructed; (4) Ensure access for maintenance, inspection, and/or repairs for portions of the service lateral owned and/or operated by the Enrollee; (5) Enforce any violation of its sewer ordinances, service agreements, or other legally binding procedures; and (6) Obtain easement accessibility agreements for locations requiring sewer system operations and maintenance, as applicable.

The City's Municipal Code provides the legal authority for the City to require and enforce various measures for ensuring proper and efficient operation, management, and maintenance of the City's wastewater collection system. Table 3-1 shows the code section for the required legal authority.

The City's Municipal Code can be viewed here:

(https://library.municode.com/ca/colusa/codes/code_of_ordinances?nodeId=THCOCOCA)

Table 3-1: City of Colusa Municipal Code Provisions Containing Sewer Use Ordinances

Legal Authority	City of Colusa Ordinance(s)
Prevent illicit discharges into its sanitary sewer system from inflow and infiltration (I&I); unauthorized stormwater; chemical dumping; unauthorized debris; roots; fats, oils, and grease; and trash, including rags and other debris that may cause blockages.	Section 15-5, 15-6, and 15-7
Obtain easement accessibility agreements for locations requiring sewer system operations and maintenance, as applicable.	N/A

Table 3-1 *(Cont.)*: City of Colusa Municipal Code Provisions Containing Sewer Use Ordinances

Legal Authority	City of Colusa Ordinance(s)
Ensure access for maintenance, inspection, and/or repairs for portions of the service lateral owned and/or operated by the Enrollee.	15-11, and 15A-52 (FSEs) (a)
Require that sewer system components and connections be properly designed and constructed.	City of Colusa Public Works Department Improvement Standards (November 2007 - included in Appendix A) 15-10 (industrial waste)
Enforce any violation of its sewer ordinances, service agreements, or other legally binding procedures.	15-2.2, 15-3, and 15-4 15A-60 through 15A64 (FSEs)
Collaborate with storm sewer agencies to coordinate emergency spill responses, ensure access to storm sewer systems during spill events, and prevent unintentional cross connections of sanitary sewer infrastructure to storm sewer infrastructure.	City of Colusa Public Works Department Improvement Standards (November 2007 - included in Appendix A) 15A-52 (FSEs)

(a) Food Services Establishments (FSEs)

4. Operation and Maintenance Program

D.1 (iv) The Plan must include the items listed below that are appropriate and applicable to the Enrollee's system.

(a) An up-to-date map(s) of the sanitary sewer system, and procedures for maintaining and providing State and Regional Water Board staff access to the map(s). The map(s) must show gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities within the sewer system service area boundaries.

(b) A scheduling system and a data collection system for preventive operation and maintenance activities conducted by staff and contractors.

- *The scheduling system must include: Inspection and maintenance activities;*
- *Higher-frequency inspections and maintenance of known problem areas, including areas with tree root problems;*
- *Regular visual and closed-circuit television (CCTV) inspections of manholes and sewer pipes.*
- *The data collection system must document data from system inspection and maintenance activities, including system areas/components prone to root-intrusion potentially resulting in system backup and/or failure.*

(c) In-house and external training provided on a regular basis for sanitary sewer system operations and maintenance staff and contractors. The training must cover:

- *The requirements of this General Order;*
- *The Enrollee's Spill Emergency Response Plan Procedures and practice drills;*
- *Skilled estimation of spill volume for field operators; and Electronic CIWQS reporting procedures for staff submitting data.*

(d) An inventory of sewer system equipment, including the identification of critical replacement and spare parts.

4.1 Updated Map of Sanitary Sewer System

A map of the existing gravity lines, manholes, pumping facilities, and force mains are shown in Figure 1-1. This map is maintained in AutoCAD by the City Engineer.

4.1.1 Existing Pipes

The City-owned wastewater collection system serves residences and businesses within the City Limits. The City Limits contain over 28.5 miles of wastewater collection lines and 7 lift stations.

The City's collection system is composed primarily of gravity sewers ranging from 8 inches to 15 inches in diameter. Portions of the system, mostly in the historic downtown area, are over 100 years old.

4.1.2 Existing Lift Stations

The City owns and operates 6 lift stations within the collection system. Table 4-1 below provides a summary of lift station information. The City is planning to abandon two lift stations (Primary and Screens) due to age and lack of capacity and replace them with the Will S. Green Lift Station. Design for this project will be completed in summer 2023 and construction will begin in summer 2024. The South Westcott Lift Station will also be upgraded. Both lift stations will be sized to accommodate future growth as described in *Technical Memorandum: City of Colusa Sewer Collection System and Sewer Pump Station Upgrades* (NEXGEN, October 2022), which is included in Appendix B.

Table 4-1: Lift Station Summary

Lift Station	Number of Pumps	Pump Type and Vendor	Horsepower
Indian Oaks	2	Submersible, Flygt	3.2 HP
Primary	2	Centrifugal, Fairbanks	10 HP
Ross	2	Vacuum, Ecodyne	7.5 HP
South Wescott	2	Submersible, Flygt	10 HP
Screens	2	Centrifugal, Fairbanks	10 HP
Wye	2	Submersible, Flygt	3.2 HP

4.2 Preventive O&M Activities

The City Engineer maintains a spreadsheet of inspection and maintenance activities for the City's sewer system. Known FOG problem areas (FOG hot spots) are prioritized and inspected and maintained at a higher frequency. The City Engineer regularly updates the spreadsheet to include new data on the system about where inspection and maintenance should be focused.

Sewer mains with repeat non-scheduled maintenance are sent to the City Engineer for evaluation and integrated into the program. The program also includes scheduling of routine inspection and maintenance for other areas of the sewer system. Areas of known root intrusion may be treated with chemicals on an as-needed basis.

Areas of the system are targeted for rehabilitation based on the results of CCTV inspection, review of spill records, and line cleaning maintenance records. Lines may also be prioritized and replaced in selected "targeted work zones" where City Public Works has planned pavement rehabilitation and improvement work scheduled. The City performs annual preventative maintenance hydro-cleaning and power-rod cleaning of identified sewer mainline target areas.

Table 4-2 below summarizes the City's cleaning and inspection schedule objectives.

Table 4-2: City of Colusa Sewer Cleaning and Inspection Schedule

Maintenance Area	Minimum Cleaning and Inspection Objectives
FOG Manhole Hot Spots	Weekly Inspection + 5 or 55 gallons of degreaser added monthly (dependent upon severity)
All other manholes	Yearly Inspection
Pump Stations	Monthly Inspection and Annual Cleaning
Sewer Line Cleaning (a)	Hot Spots: Weekly Cleaning All Other Lines: Annually
CCTV Inspection of Entire System	Every 3-5 years (b)

(a) Lines with a history of significant root intrusion, or in areas that are not readily accessible such as parks or easements, may be treated with chemicals to control root growth on an as needed basis.
(b) The City's objective is to CCTV all parts of the sewer system within a 3-5 year cycle.

4.3 Training

Training includes City-specific issues, such as operation of its key pieces of equipment, as well as general safety and operational issues, the SSMP and Spill Emergency Response Plan (SERP). The City uses both contracted and in-house training services and requires training or certification of conformance of training of contractors on its SERP and spill response procedures.

Wastewater Operators receive annual training on the following topics: volume estimation, storm water pollution prevention, confined space entry, biological and chemical hazards, Vactor

safety, underground construction, application of overflow control materials, back injury prevention, overflow reporting and field documentation, and the content and procedures of the SSMP. In the next year, the City is looking to incorporate NASSCO P/M/LACP training (or equivalent) for a key individual to review CCTV data.

Individual training records are documented and maintained by the City.

4.4 Equipment Inventory

The City maintains a list of critical equipment used for sewer maintenance and in the event of an SSO in a spreadsheet maintained by the City Engineer.

The City's current equipment list includes:

- Vacon truck (vacuum and jetter) and O'Brien trailer jetter
- Case backhoe
- Snap cutter
- Jackhammer
- Fernco couplers
- Clay pipe and plastic pipe
- Manhole lids and manhole risers
- Lamp hole lids
- Conseal concrete sealer
- Sewer plugs

5. Design and Performance Provisions

D.1 (v) The Plan must include the following items as appropriate and applicable to the Enrollee's system:

(a) Updated design criteria, and construction standards and specifications, for the construction, installation, repair, and rehabilitation of existing and proposed system infrastructure components, including but not limited to pipelines, pump stations, and other system appurtenances. If existing design criteria and construction standards are deficient to address the necessary component-specific hydraulic capacity as specified in section 8 (System Evaluation, Capacity Assurance and Capital Improvements) of this Attachment, the procedures must include component-specific evaluation of the design criteria.

(b) Procedures, and standards for the inspection and testing of newly constructed, newly installed, repaired, and rehabilitated system pipelines, pumps, and other equipment and appurtenances.

5.1 Design Criteria and Construction Standards and Specifications

In November 2007, the City Council adopted the *Public Works Department – Improvement Standards* which specify improvement standards and construction specifications for all public works projects in the City. The portions of this document relevant to the SSMP are included in Appendix A.

5.2 Procedures and Standards for Inspection and Testing of New Construction

Inspection requirements for new construction are described in Section 2-18 of the *Improvement Standards* and are included in Appendix A.

6. Spill Emergency Response Plan

D.1.(vi) The Plan must include an up to date Spill Emergency Response Plan to ensure prompt detection and response to spills to reduce spill volumes and collect information for prevention of future spills. The Spill Emergency Response Plan must include procedures to:

(a) Notify primary responders, appropriate local officials, and appropriate regulatory agencies of a spill in a timely manner;

(b) Notify other potentially affected entities (for example, health agencies, water suppliers, etc.) of spills that potentially affect public health or reach waters of the State;

(c) Comply with the notification, monitoring and reporting requirements of this General Order, State law and regulations, and applicable Regional Water Board Orders;

(d) Ensure that appropriate staff and contractors implement the Spill Emergency Response Plan and are appropriately trained;

(e) Address emergency system operations, traffic control and other necessary response activities;

(f) Contain a spill and prevent/minimize discharge to waters of the State or any drainage conveyance system;

(g) Minimize and remediate public health impacts and adverse impacts on beneficial uses of waters of the State;

(h) Remove sewage from the drainage conveyance system;

(i) Clean the spill area and drainage conveyance system in a manner that does not inadvertently impact beneficial uses in the receiving waters;

(j) Implement technologies, practices, equipment, and interagency coordination to expedite spill containment and recovery;

(k) Implement pre-planned coordination and collaboration with storm drain agencies and other utility agencies/departments prior, during, and after a spill event;

(l) Conduct post-spill assessments of spill response activities;

(m) Document and report spill events as required in this General Order; and

(n) Annually, review and assess effectiveness of the Spill Emergency Response Plan, and update the Plan as needed.

The City's spill emergency response plan (SERP) and SSO reporting requirements are included in Appendix C. The SERP will be reviewed annually as part of the SSMP audit.

7. Sewer Pipe and Blockage Control Program

D.1.(vii) The Sewer System Management Plan must include procedures for the evaluation of the Enrollee's service area to determine whether a sewer pipe blockage control program is needed to control fats, oils, grease, rags and debris. If the Enrollee determines that a program is not needed, the Enrollee shall provide justification in its Plan for why a program is not needed. The procedures must include, at minimum:

(a) An implementation plan and schedule for a public education and outreach program that promotes proper disposal of pipe-blocking substances;

(b) A plan and schedule for the disposal of pipe-blocking substances generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of substances generated within a sanitary sewer system service area;

(c) The legal authority to prohibit discharges to the system and identify measures to prevent spills and blockages;

(d) Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, best management practices requirements, recordkeeping and reporting requirements;

(e) Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the fats, oils, and grease ordinance;

(f) An identification of sanitary sewer system sections subject to fats, oils, and grease blockages and establishment of a cleaning schedule for each section; and

(g) Implementation of source control measures for all sources of fats, oils, and grease reaching the sanitary sewer system for each section identified above.

7.1 FOG Program Goals

The main goal of the City's FOG program is to reduce the number of FOG blockages occurring in the City's sewer system by regulating FOG-producing entities, namely, food service establishments (FSEs). Reducing FOG blockages will reduce the risk for the occurrence of SSOs.

7.2 FOG Outreach

The City periodically includes mailers with FOG disposal information with the utilities bills. The City's web site is in the process of being updated to include important information about the FOG program and the proper disposal of FOG.

7.3 FOG Disposal

FOG can be disposed of at the Maxwell Transfer Station located at 3852 Co Rd 99W in Maxwell, CA. This facility is operated by Recology.

7.4 Legal Authority

The City has established the legal authority in the municipal code (Section 15A) to require a FOG waste discharge permit (WDP) for every FSE that wants to connect to the City's sewer system. Section 15A also includes the following regulations for FSEs:

- FOG discharge limitations: FSEs may not cause an SSO, "exceed a concentration level of one hundred parts per million by weight of fats, oil or grease", or cause FOG to accumulate and contribute to a blockage in the sewer.
- Responsibility for FOG SSO or sewer blockage: SSOs or blockages caused by an FSE (or FSEs) are the responsibility of the FSE(s) and the responsible party(ies) must pay the City back for dealing with the results of the SSO or blockage.
- Best Management Practices (BMPs): FSEs must follow BMPs as outlined in their WDP and any imposed by the City Manager. Grease control devices must also follow BMPs.
- Prohibitions: The Code establishes a list of prohibited actions for FSEs that would negatively impact the sewer system.
- FOG Pretreatment: The Code requires FSEs to install a grease interceptor in accordance with the Code and maintain and inspect them periodically.

The Municipal Code also establishes right-of-entry authority for the City to inspect grease interceptors and sample any wastewater discharges. The inspections must be carried out during normal business hours. In the event of an SSO emergency, the City has the authority to enter the premises to "prevent or remediate the actual or imminent SSO".

The City has the authority to implement fees to run the FOG program and lays out an enforcement plan in the event of any violations of the Code regulations.

7.5 Inspections

The City has the authority to inspect grease interceptors and sample any wastewater discharges at any time during regular business hours. The City's objective is for every FSE to be inspected by City staff once per year.

7.6 Source Control Measures (Pretreatment)

The City requires every FSE to have a grease interceptor installed and in working condition, unless they obtain a waiver from the City Manager. Routine maintenance and inspection is required. The City also has the authority to inspect grease interceptors and sample any wastewater discharges at any time during regular business hours.

8. System Evaluation and Capacity Assurance Plan (SECAP) and Capital Improvements

D.1.(viii) The Plan must include procedures and activities for:

(a) Routine evaluation and assessment of system conditions;

(b) Capacity assessment and design criteria;

(c) Prioritization of corrective actions;

(d) A capital improvement plan.

8.1 System Evaluation and Condition Assessment

In 2018 PG&E completed a system-wide CCTV inspection of most City sewers as part of a gas line investigation project. The City has video records of this effort, but a ranking of sewer defects and condition has not yet been completed. In the next year, the City plans to review these videos to complete a condition assessment of the sewer. Coding defects in the pipes will be done in accordance with NASSCO's P/M/LACP programs (or equivalent).

Table 8-1 provides an overview NASSCO's PACP numerical grading system defining the severity of pipe defects. Any defects with a severity of 5 will be immediately referred to the City Engineer for follow up rehabilitation and/or replacement.

Table 8-1: NASSCO Pipe Defect Severity Numerical Grading System

Severity Grade	Description	Estimated Time Until Failure
1	Minor defects	Unlikely in the foreseeable future
2	Minor defects that have not begun to deteriorate	20 or more years
3	Moderate defects that will continue to deteriorate	10 to 20 years
4	Severe defects	5 to 10 years
5	Has failed or is likely to fail	Now to within the next 5 years

The City's objective is to complete a CCTV assessment of all sewer assets within a 3-5 year cycle. All data from the CCTV inspections and subsequent condition assessments will be

incorporated into the prioritized maintenance schedule that is kept updated by the City Engineer.

8.2 Capacity Assessment and Design Criteria

This section contains an analysis of recent (within the last 10 years) storm events that have occurred in the City and where the sewer system may have shown areas of hydraulic deficiency and/or limited capacity.

8.2.1 Rainfall Data

Rainfall data from a rain gauge on the Sacramento River at Moulton Weir (MLW) operated by the California Department of Water Resources (DWR)-North Regional Office was used for the capacity evaluation. The data was downloaded from the California Data Exchange Center (CDEC), operated by DWR (http://cdec.water.ca.gov/). Statistical development of the depth-duration-frequency (DDF) curves for the MLW rainfall data was downloaded from DWR's Flood Emergency Response Information Exchange (https://ferix.water.ca.gov/webapp/precipitation/).

The February 17-22, 2017 storm was the largest storm event that occurred in the last 10 years. This storm is evaluated in the sections below to determine its relative magnitude and frequency of occurrence and appropriateness as a wet weather event for the SECAP hydraulic evaluation.

8.2.2 Rainfall Analysis

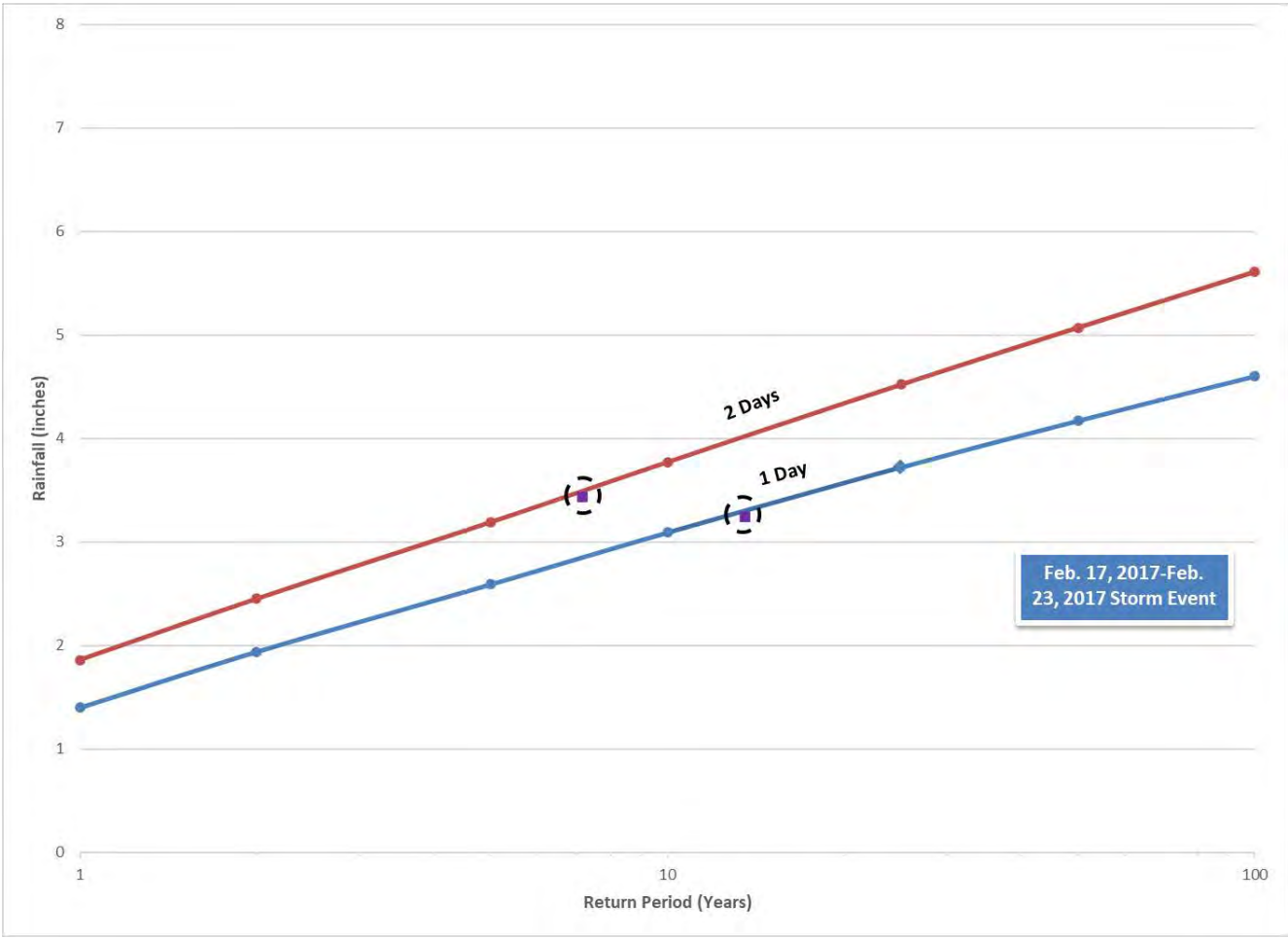
The largest rainfall event in the data analyzed (from January 2017 to March 2023) occurred in February 2017. From February 17-22, 2017, the City and surrounding Northern California communities experienced heavy precipitation. Despite the large influx of water, the City did not experience any SSOs.

The City received 3.8 inches of rain over a 3-day period, including a one day maximum of 3.24 inches of rain. No sanitary sewer overflows were observed or reported and the WWTP did not experience excessive amounts of infiltration and inflow (I&I).

Depth-duration-frequency (DDF) curves are developed from statistical analysis of local precipitation records. They serve to classify storms of different durations by return period (probability of the frequency of occurrence) so storms from different years, but of the same duration, can be compared directly. The DDF curves for 1- and 2-day events for the MLW rainfall gauge are shown in Figure 8-1.

The curves below show that the return periods of the storm event in February 2017 were almost 14 and 7 years (for 1- and 2-day durations, respectively). The largest return period of 14 years was for a 1-day duration storm event (when it rained 3.24 inches).

Figure 8-1: DDF Curves for MLW Rain Gauge with February 2017 Storm Event



8.2.3 Sewer Pipe Capacity

Neighboring municipalities, such as South Placer Municipal Utility District (SPMUD) and Placer County, have been utilizing a 10-year return period storm events as a standard for hydraulic analyses of their sewer systems. Rather than establishing a 10-year return period design storm, the 1-day, 14-year storm event in February 2017 was used in the evaluation of the City's hydraulic capacity.

The City's system did not have any SSOs during the 14-year event and has not experienced any capacity related SSOs since the implementation of the SSMP program. Therefore, further analysis of hydraulic capacity is not necessary at this time. This evaluation will be updated as more large storms occur, the system ages, and as growth occurs.

8.2.4 Pump Station Capacity

The City is planning to abandon two lift stations (Primary and Screens) due to age and lack of capacity and replace them with the Will S. Green Lift Station. Design for this project will be completed in summer 2023 and construction will begin in summer 2024. The South Westcott Lift Station will also be upgraded. Both lift stations will be sized to accommodate future growth as described in *Technical Memorandum: City of Colusa Sewer Collection System and Sewer Pump Station Upgrades* (NEXGEN, October 2022), which is included in Appendix B.

The Will S. Green Lift Station is being designed with the following features, which include important redundancy in pumping and storage capacity:

- Two 65-HP submersible pumps (1 duty, 1 standby)
- Two 10-foot diameter wet wells
- Dual force main (8" and 10")
- 400 kW diesel emergency generator

8.3 Prioritization of Corrective Action

All data collected during the CCTV review and any data observed during routine maintenance of the sewer system, will be incorporated into the prioritized list of maintenance, rehabilitation, and replacement activities that is maintained by the City Engineer.

8.4 Capital Improvement Plan

Appendix D includes the CIP list for City sewer projects. This appendix will be updated as the CIP is updated.

9. Monitoring, Measurement and Program Modifications

D.1. (viii) The Plan must include an Adaptive Management section that addresses Plan- implementation effectiveness and the steps for necessary Plan improvement, including:

(a) Maintaining relevant information, including audit findings, to establish and prioritize appropriate Plan activities;

(b) Monitoring the implementation and measuring the effectiveness of each Plan Element;

(c) Assessing the success of the preventive operation and maintenance activities;

(d) Updating Plan procedures and activities, as appropriate, based on results of monitoring and performance evaluations; and

(e) Identifying and illustrating spill trends, including spill frequency, locations and estimated volumes.

9.1 Maintain Relevant Information

Relevant information for maintaining the wastewater collection system, such as hot spots and hydroflushing, root sawing, and CCTV scheduling, is maintained by the City Engineer using spreadsheets that are updated regularly. Audits will be kept on the City's network and hard copies will be stored in a binder at City Hall. Audits will be performed on a 3-year cycle (the audit form is included in Appendix E).

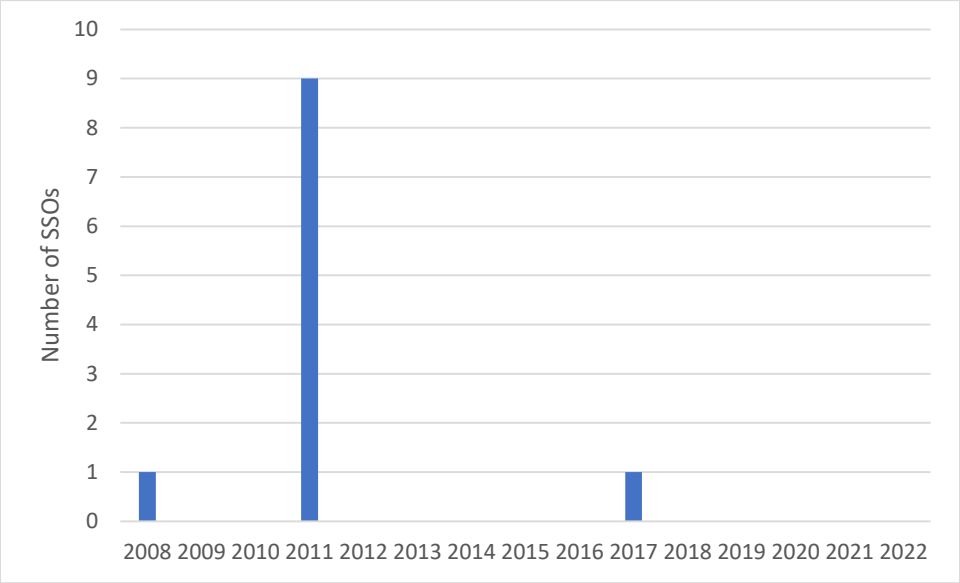
9.2 Monitor and Measure the Effectiveness of the Plan

In most years, the City has no SSOs (see Figure 9-1). As a part of increasing the effectiveness of preventative maintenance, the City's objective is to CCTV all portions of the sewer on a 3-5 year cycle and to increase the frequency of inspections of FSEs. Recent CCTV files will be reviewed and assessed to measure the current state of the pipelines, despite low spill rates. Plan procedures and O&M activities will be updated if spill percentages increase.

9.3 SSO Trends

The City generally does not experience SSOs (see Figure 9-1 below). In 2011, a number of spills occurred due to previously unknown grease issues. In just one day, grease caused 6 spills in one area. The areas that spilled in 2011 have been targeted by the City's FOG program and along with regular cleaning, the result has been one spill due to grease (in 2017) since 2011.

Figure 9-1: Total Number of SSOs from 2008 to 2022



10. SSMP Program Audits

D.1.(x) The Plan shall include internal audit procedures, appropriate to the size and performance of the system, for the Enrollee to comply with section 5.4 (Sewer System Management Plan Audits) of this General Order.

Program audits are required every three years in the updated General Order and consist of the evaluation in Section 9 and completion of the audit form included in Appendix E. Table 10-1 shows required dates for audit submissions.

Table 10-1: Required Dates for Audit Submissions

Milestone	Anticipated Date of Completion
First Internal Audit	May 2025
Second Internal Audit	May 2028
Adoption of updated SSMP document by City Council	May 2029

11. Communications Program

D.1.(xi) The Plan must include procedures for the Enrollee to communicate with:

The public for:

- *Spills and discharges resulting in closures of public areas, or that enter a source of drinking water, and*
- *The development, implementation, and update of its Plan, including opportunities for public input to Plan implementation and updates.*

Owners/operations of systems that connect into the Enrollee's system, including satellite systems, for:

- *System operation, maintenance, and capital improvement-related activities.*

Communication program activities include the following:

1. Communication with stakeholders through regular updates to City staff and Council
2. Public outreach via mailers included in utilities bills.

The City allows for public comment on the SSMP document when it is brought to the City Council for adoption.

Spills and discharges resulting in closures of public areas are communicated via signage at the site of the closure. For spills and discharges that enter a source of drinking water, in person or telephone communication will be used for those affected.

Appendix A

City of Colusa Public Works Department Improvement Standards (November 2007)

Public Works Department

Improvement Standards

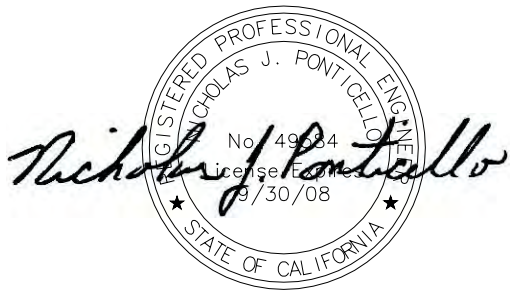
November 2007

Volume 1 of 2 Volumes

Public Works Department

Improvement Standards

November 2007



Nicholas Ponticello, PE
City Engineer

Special Notes
&
City Adopting Resolution

Special Notes:

The City of Colusa has used the Improvement Standards published by the County of Sacramento as the foundation of its own Improvement Standards and has hereby adopted the Technical Provisions (Sections 11 through 50) of the 2004 County of Sacramento Construction Specifications, **with the exception of the changes noted in Section A-1 of the City of Colusa Construction Specifications, which shall supersede any and all conflicting provisions**. Any variance from the Technical Provisions as modified by these changes noted in said Section A-1 requires prior written approval by the City Engineer or the Public Works Administrator.
The County of Sacramento Construction Specifications, Sections 11 – 50, can be purchased from the County of Sacramento Technical Resources Division, 827 Seventh Street, Room 105, Sacramento, California or obtained via a no-fee download from the county's website at http://www.saccountyspecs.net/.

Notable exceptions applicable to these Improvement Standards are as follows:

1) **Section 7 – Sanitary Sewer Design**
    a. **All sewer mains and laterals shall be VCP within City right-of-ways and easements unless otherwise approved by the City Engineer or Public Works Administrator**
2) **Section 8 – Water System Design**
    a. **All water mains and 3" or larger laterals shall be DIP within City right-of-ways and easements unless otherwise approved by the City Engineer or Public Works Administrator.**
    b. **All laterals smaller than 3" shall be polyethylene pressure pipe. Type "K" copper shall not be allowed.**
    c. **Copper and Brass (Copper/Zinc Alloy) fittings or other such components shall NOT be used in any application unless approved.**

RESOLUTION NO. 07-38

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF COLUSA ADOPTING IMPROVEMENT STANDARDS AND CONSTRUCTION SPECIFICATIONS

WHEREAS, the City desires to protect the health, welfare and safety of its citizens by adopting improvement and construction standards for the public infra-structure; and

WHEREAS, these standards will ensure uniformity and consistent quality of the public infra-structure and this consistent quality will benefit the community by allowing a higher quality of life and economical management and maintenance of the public infra-structure; and

WHEREAS, these standards will apply with equal authority to private developments constructing any portion of the public infra-structure and to publicly funded and managed projects to rehabilitate or expand the public infra-structure.

NOW, THEREFORE BE IT RESOLVED by the City Council of the City of Colusa that

1) The documents titled City of Colusa, Public Works Department, Improvement Standards and City of Colusa, Public Works Department, Construction Specifications, are adopted by the City of Colusa; and
2) The standards may be amended from time to time by resolution of the City Council; and
3) The City Engineer shall determine the manner in which these adopted standards, as amended, shall be met on publicly and privately managed projects. The City Engineer shall have the sole authority to approve materials or methods not contained in the standards which will result in the project meeting the intended function, quality, durability and safety requirements as contained in these standards. The City Engineer shall also have the sole authority to disapprove or reject any materials or methods which will not result in the project meeting the intended requirements.

ADOPTED as a resolution of the City Council of the City of Colusa at a meeting duly held on the 20th day of November, 2007 by the following vote:

AYES: Critchfield, Hosmer, Rogers, Reische, MacKaben
NOES: None
ABSTAIN: None
ABSENT: None

Robert J. MacKaben, Mayor

ATTEST:

Pete Rodda, City Clerk

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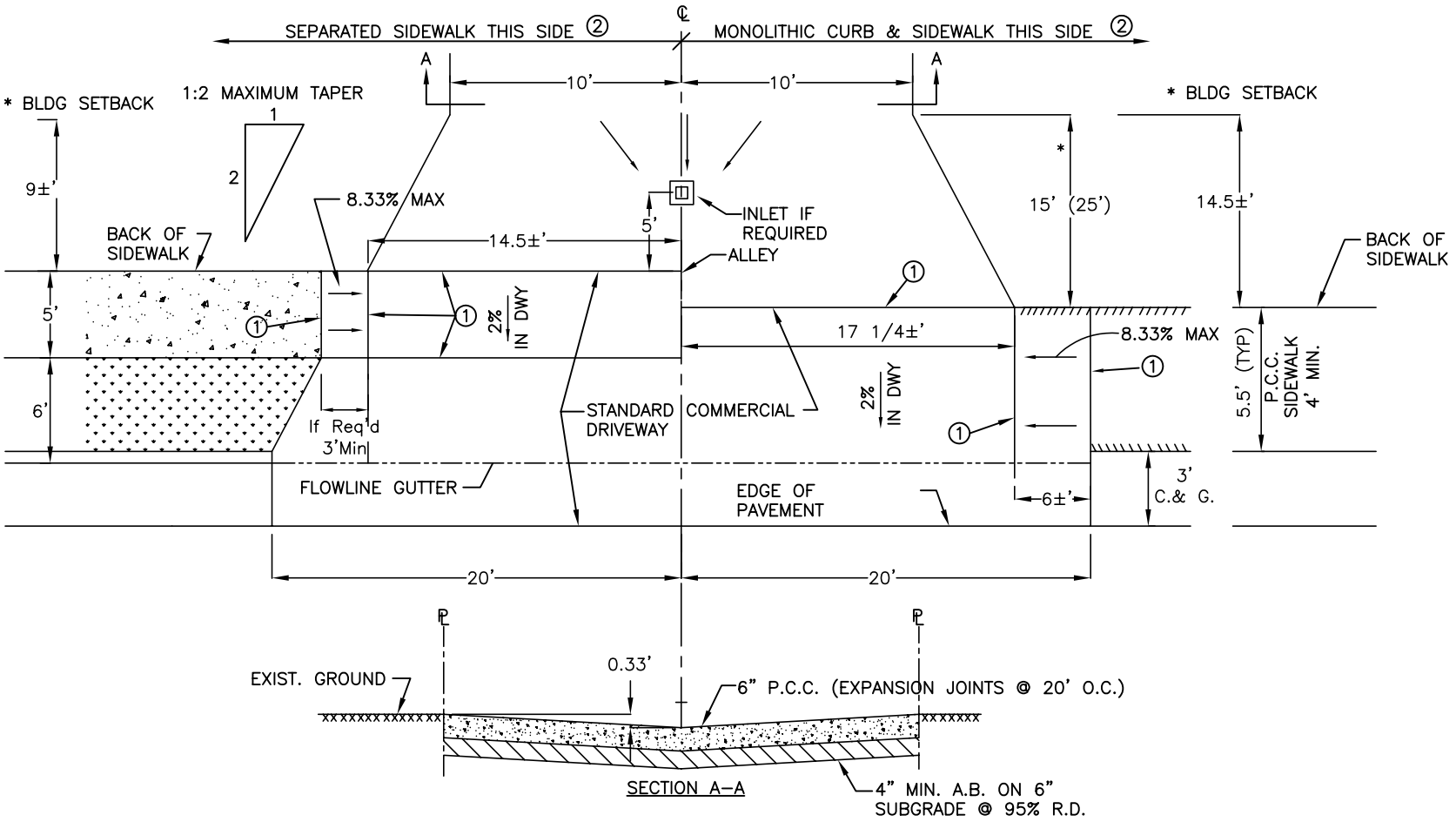


* DISTANCE MAY BE REDUCED FOR RETROFIT SITUATIONS SUBJECT TO APPROVAL OF THE CITY ENGINEER

① BREAK LINES SHALL BE PERPENDICULAR TO SIDEWALK EDGES

② SYMMETRICAL ABOUT CENTERLINE

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS J. PONTICELLO
No. 49584
License Expires 9/30/08
CIVIL
STATE OF CALIFORNIA

City of Colusa
PUBLIC WORKS DEPARTMENT

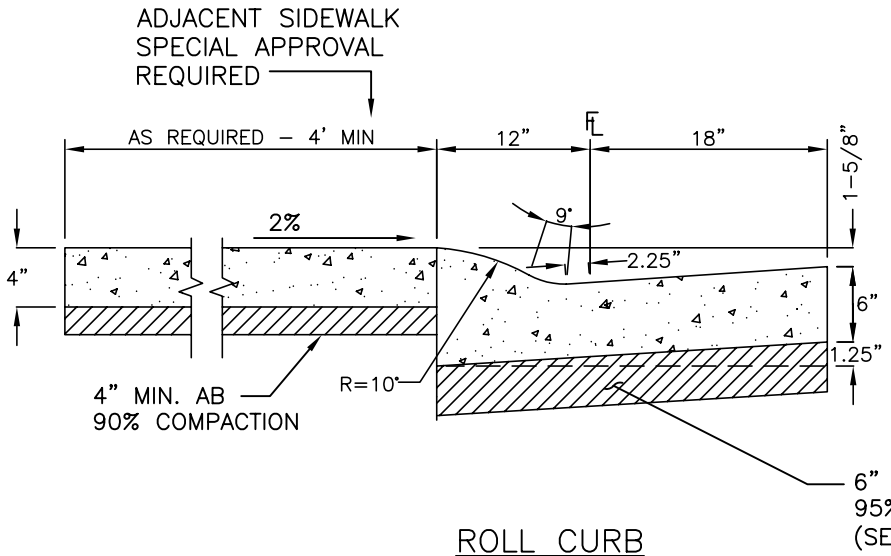
ALLEY DETAILS AND DRIVEWAY TRANSITIONS 35–FOOT (45–FOOT) DRIVEWAY

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

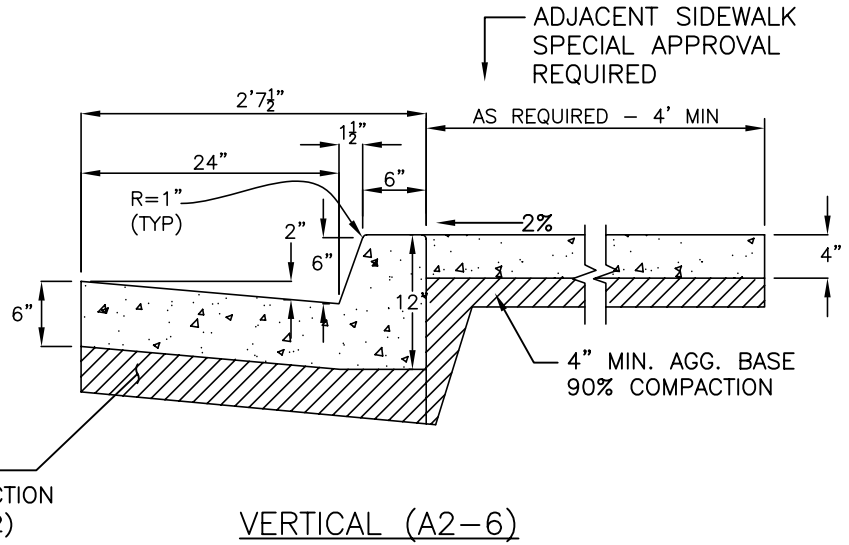
DATE: NOV 2007

SHEET # 1 OF 1

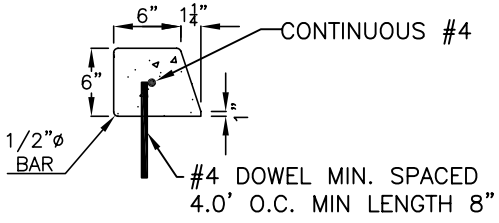
DRAWING #: 4–1



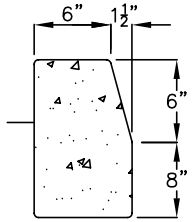
ROLL CURB
(REQUIRES SPECIAL APPROVAL)



VERTICAL (A2–6)
(STANDARD)



MEDIAN CURB (A3–6)
(RETROFIT ONLY)



MEDIAN CURB (A1–6)

NOTES:

1. LOCATE 1/2" TRANSVERSE EXPANSION JOINTS OF ASPHALT IMPREGNATED CELOTEX IN SIDEWALK, CURB AND GUTTER AT 20' INTERVALS. ALL CONCRETE SHALL BE CLASS "B" PER CONSTRUCTION STANDARDS OR CLASS 3, 1" MAX PER CALTRANS STANDARD SPECIFICATION SECTION 90.
2. CONTINUE TOTAL REQUIRED ROAD SECTION DEPTH OF AB OR ASB TO BACK OF CURB
3. DEEP TOOL JOINTS SHALL BE 1" DEEP OR ¼ OF SECTION DEPTH, WHICHEVER IS GREATER.
4. SCORE LINES SHALL BE ¼" DEEP AND FORM A SQUARE PATTERN, PERPENDICULAR TO EDGES.
5. ALL EDGES SHALL HAVE ½" RADIUS.

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NICHOLAS J. PONTICELLO
No. 49584
License Expires
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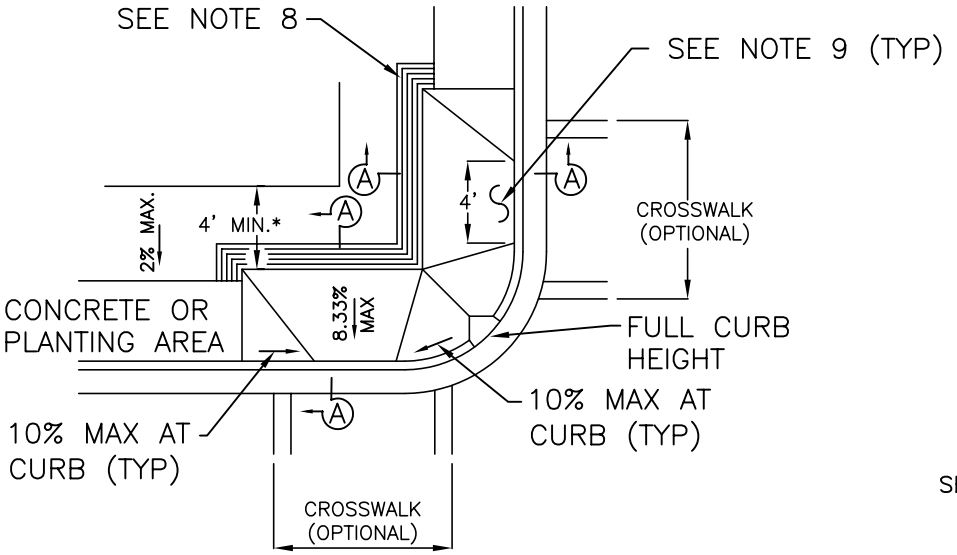
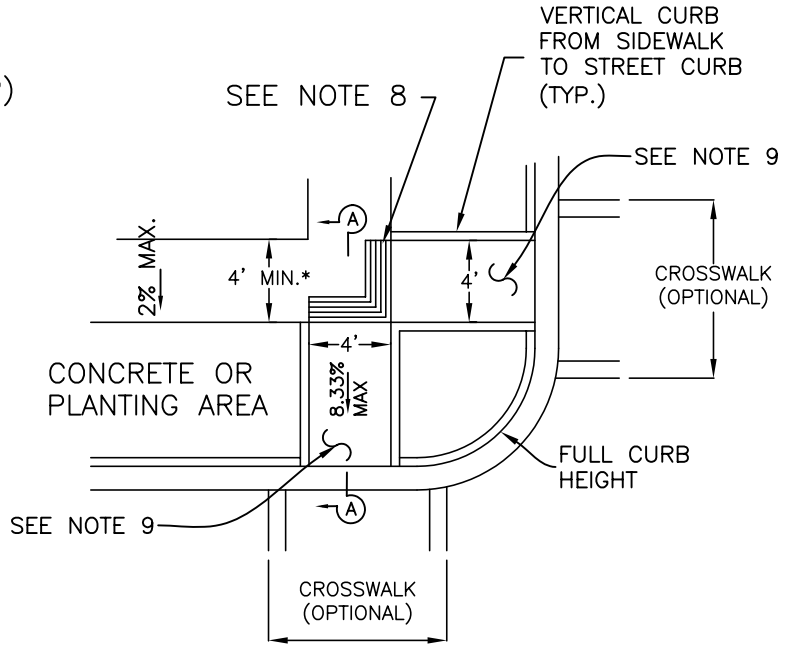
STATE OF CALIFORNIA

City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
CURB, GUTTER & SIDEWALK	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–2

SEE CALTRANS STD PLANS A88A & A88B FOR CASE A–G AND REFERENCED NOTES & SECTIONS. DETECTABLE WARNING PATTERN SHALL BE INSTALLED IN ALL RAMPS PER STD PLAN A88A.



CASE H



CASE I

*SEE TYPICAL SECTIONS FOR STANDARD SIDEWALK WIDTHS

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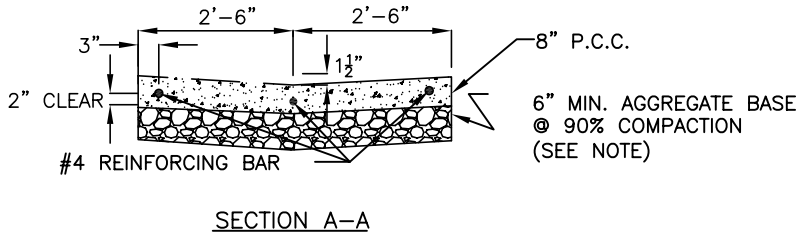
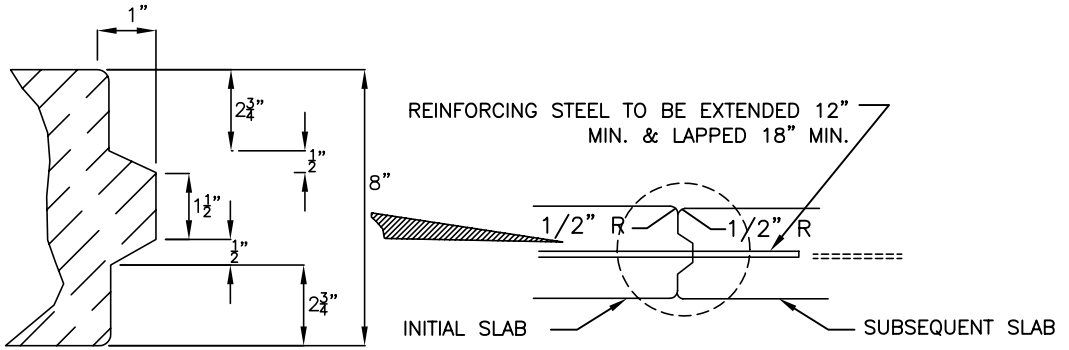
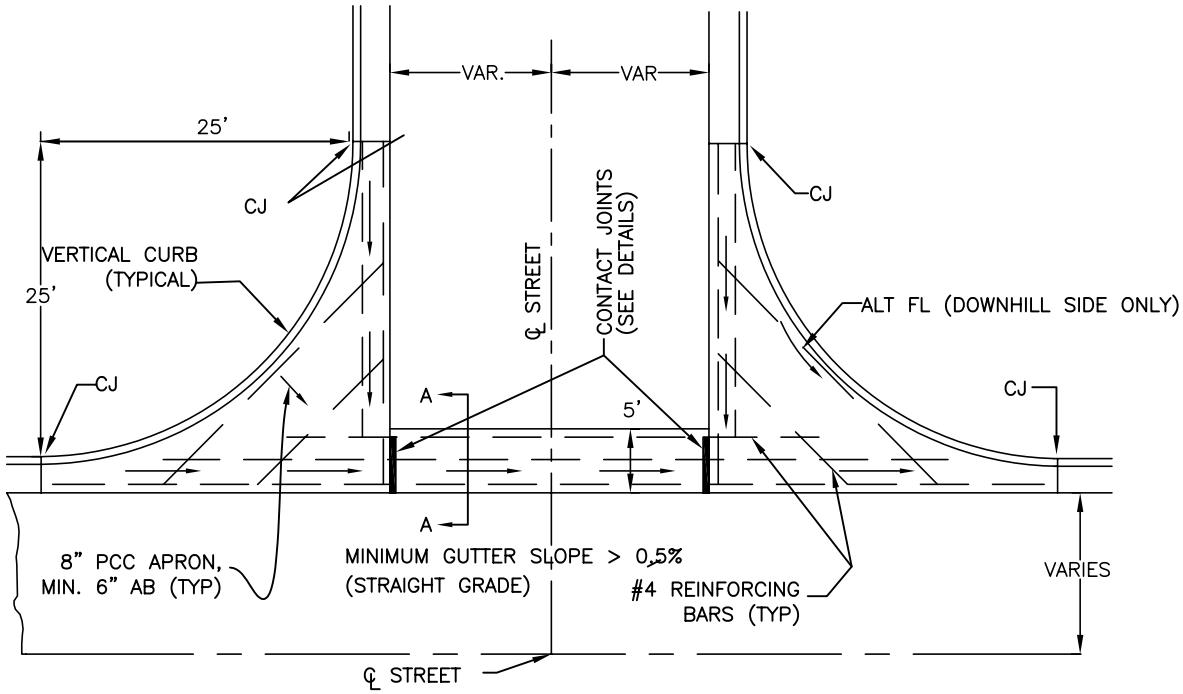
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
CURB RAMPS	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–3



SECTION A–A



CONTACT JOINT DETAILS



NOTES:

6" MIN. AB TO BE PLACED WITH LIMITS OF CROSS GUTTER. AB SHALL EXTEND TO SUBGRADE OF DEEPER ADJACENT STREET SECTION. SIDEWALK AND RAMPS NOT SHOWN.

CJ – DENOTES CONSTRUCTION JOINT LOCATIONS

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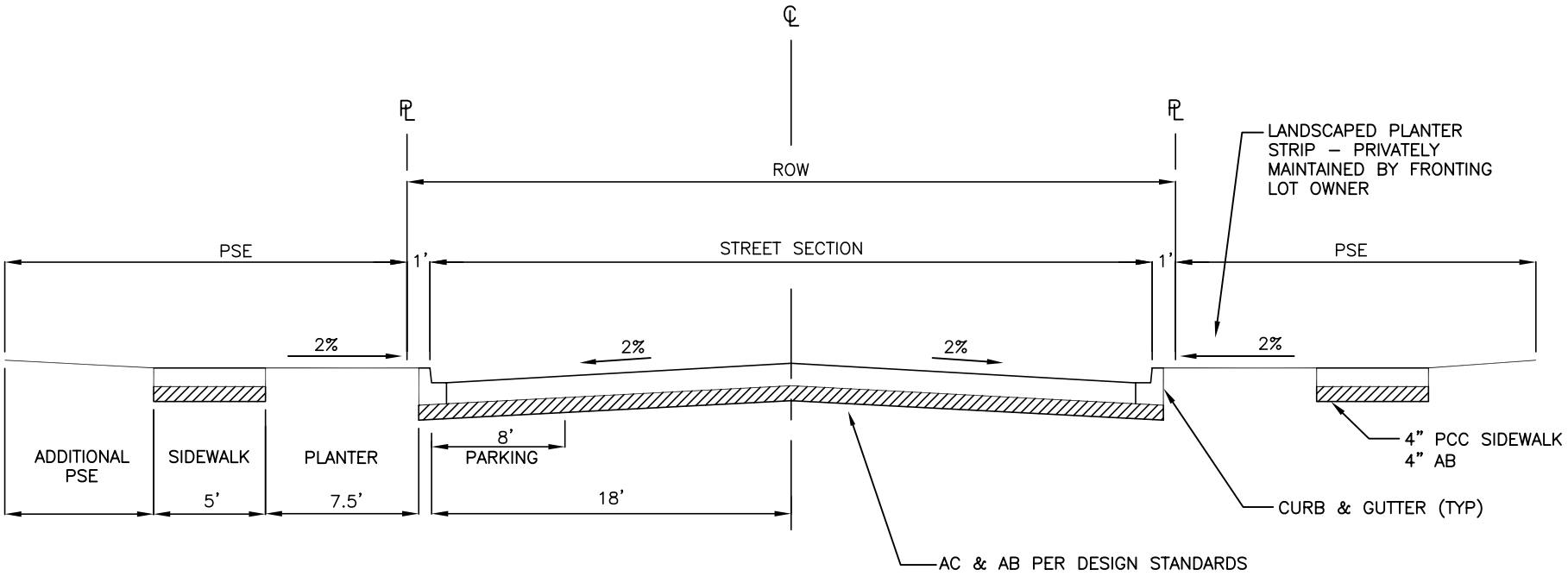
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
CROSS GUTTER	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–4



LOCAL RESIDENTIAL AND CUL–DE–SAC

T.I. = 5.0 (LOCAL)
6.5 (CUL–DE–SAC)

NOTE:
TREES IN LANDSCAPE MEDIANS AND STREETSIDE LANDSCAPING SHALL BE OF MAJESTIC STREET TREE SPECIES THAT CREATE LARGE CANOPIES MEETING CITY STANDARDS.

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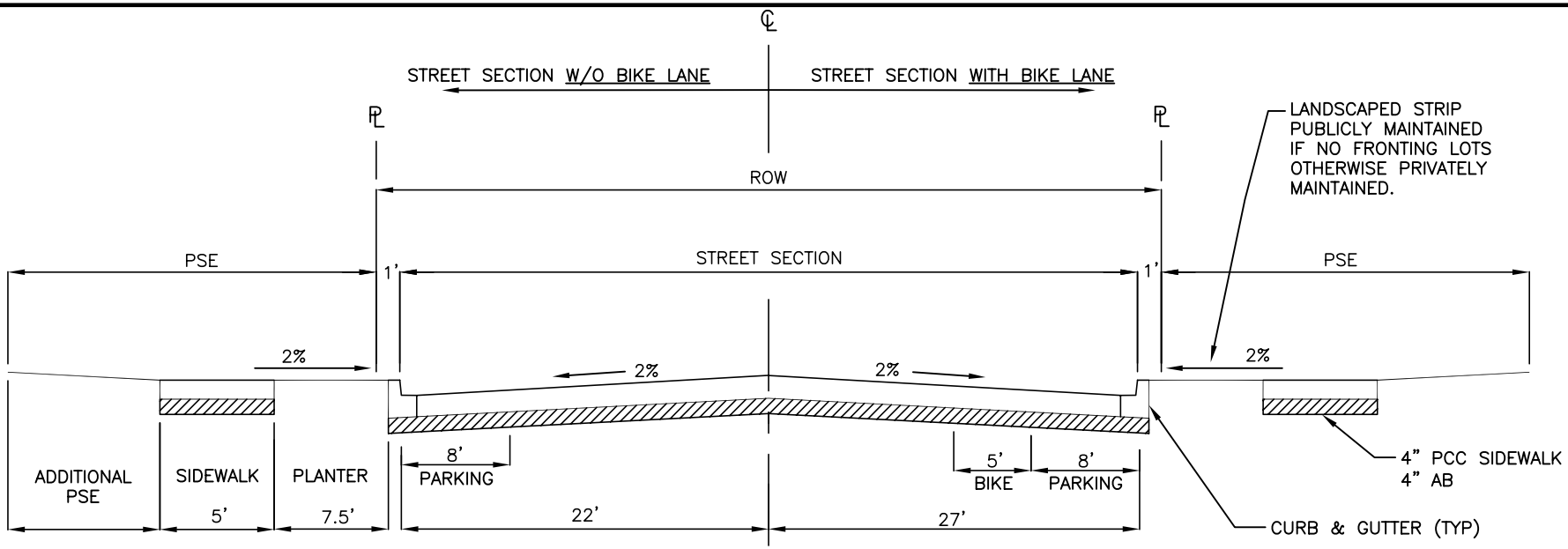
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
LOCAL RESIDENTIAL & CUL–DE–SAC	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–5



SECONDARY COLLECTOR

T.I. = 6.0
6.5 (CUL–DE–SACS)
7.0 (BUS ROUTES)

NOTE:
1. TREES IN LANDSCAPE MEDIANS AND STREETSIDE LANDSCAPING SHALL BE OF MAJESTIC STREET TREE SPECIES THAT CREATE LARGE CANOPIES MEETING CITY STANDARDS.
2. AN ADDITIONAL 10 FEET OF STREET SECTION IS REQUIRED WHEN STREET BIKE LANES ARE REQUIRED.

REGISTERED PROFESSIONAL ENGINEER
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No. 49584
License Expires
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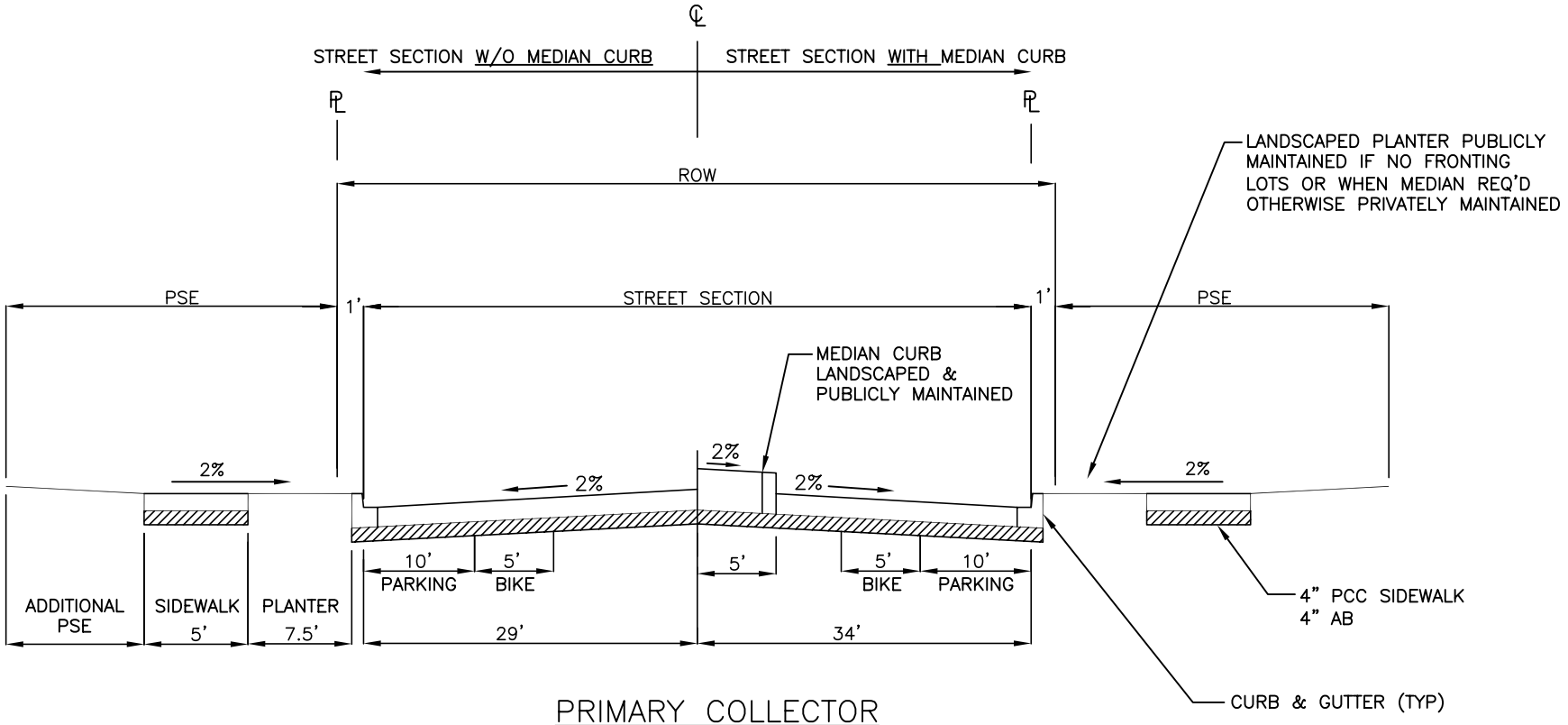
STATE OF CALIFORNIA

City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
SECONDARY COLLECTOR	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–6



PRIMARY COLLECTOR

T.I. = 7.0

NOTE:

1. TREES IN LANDSCAPE MEDIANS AND STREETSIDE LANDSCAPING SHALL BE OF MAJESTIC STREET TREE SPECIES THAT CREATE LARGE CANOPIES MEETING CITY STANDARDS.
2. AN ADDITIONAL 12 FEET OF STREET SECTION IS REQUIRED WHEN A MEDIAN IS REQUIRED.

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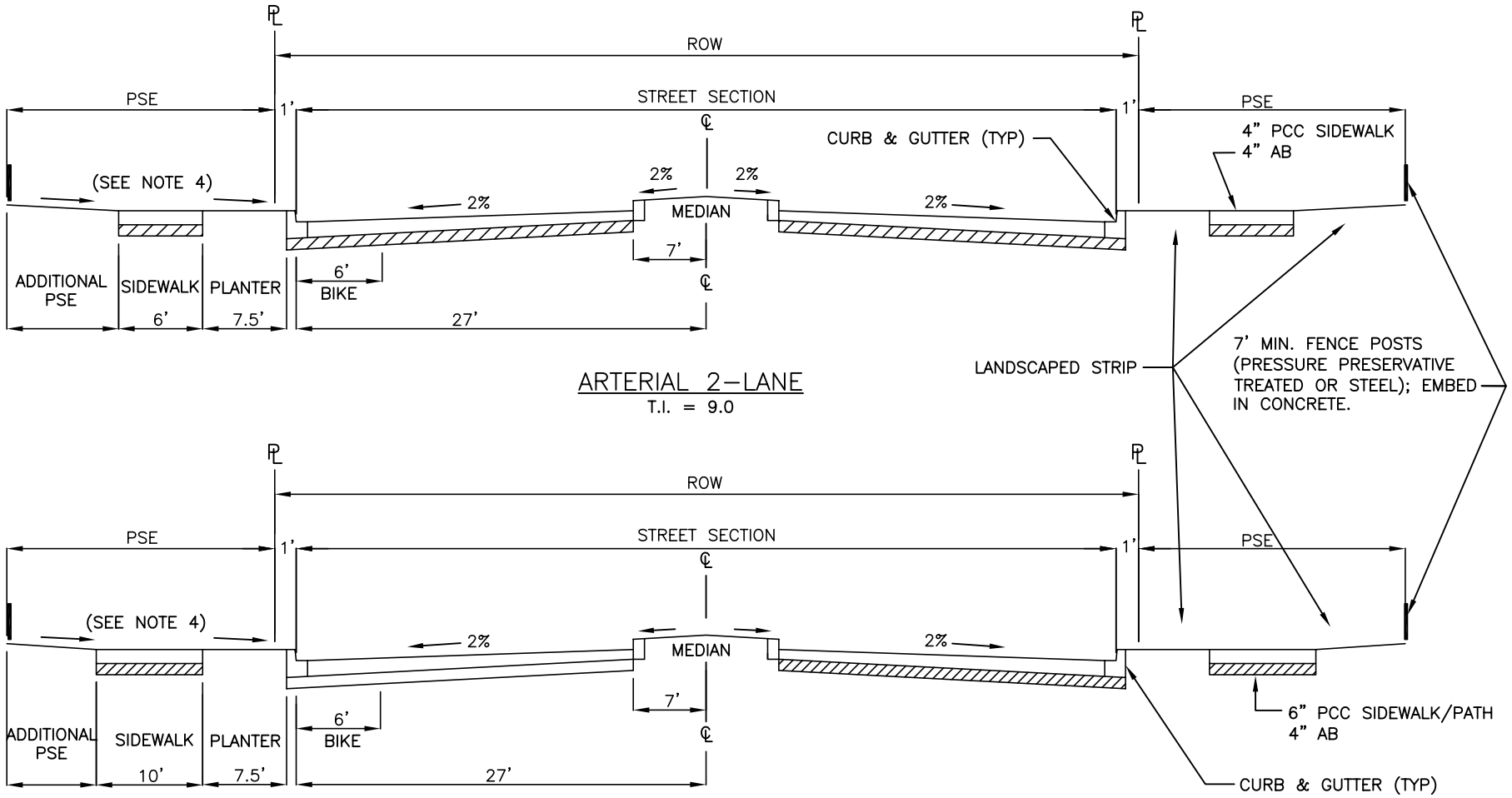
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
PRIMARY COLLECTOR	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–7



TYPICAL ARTERIAL 2-LANE WITH OFF-STREET PATHS

NOTE:

1. TREES IN LANDSCAPE MEDIANS AND STREETSIDE LANDSCAPING SHALL BE OF MAJESTIC STREET TREE SPECIES THAT CREATE LARGE CANOPIES MEETING CITY STANDARDS.
2. ALL LANDSCAPING PUBLICLY MAINTAINED.
3. SEE STANDARD DRAWING 4-24 FOR BIKE PATH DETAILS.
4. PROVIDE POSITIVE DRAINAGE SLOPE (2% MIN) FROM BACK OF PSE TO CURB OR PROVIDE LANDSCAPE DRAINAGE COLLECTION SYSTEM CONNECTED TO STREET STORM DRAINAGE SYSTEM.

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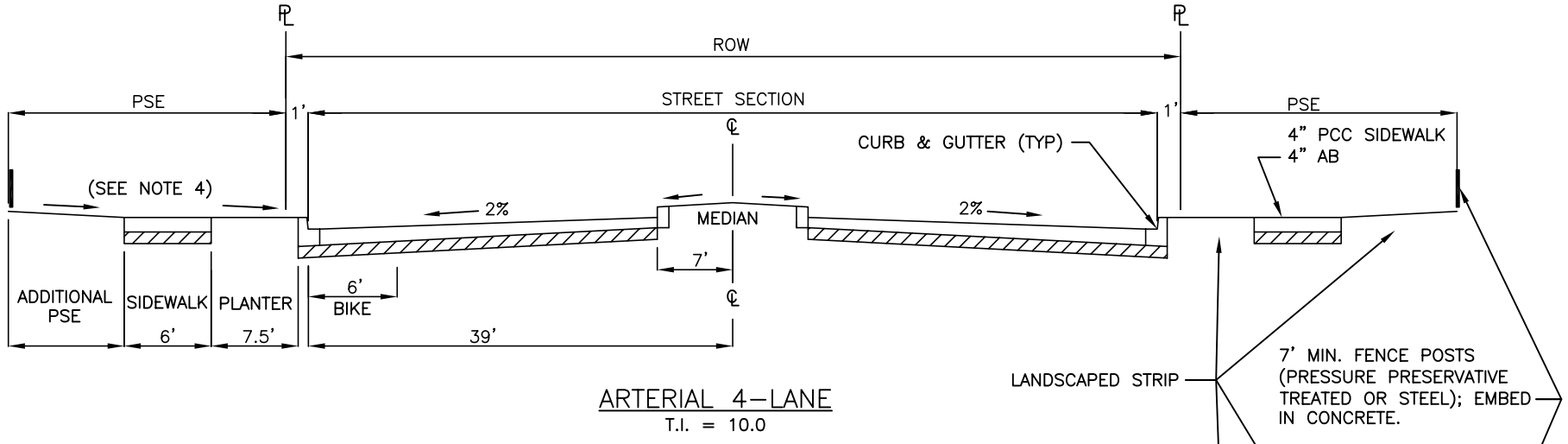
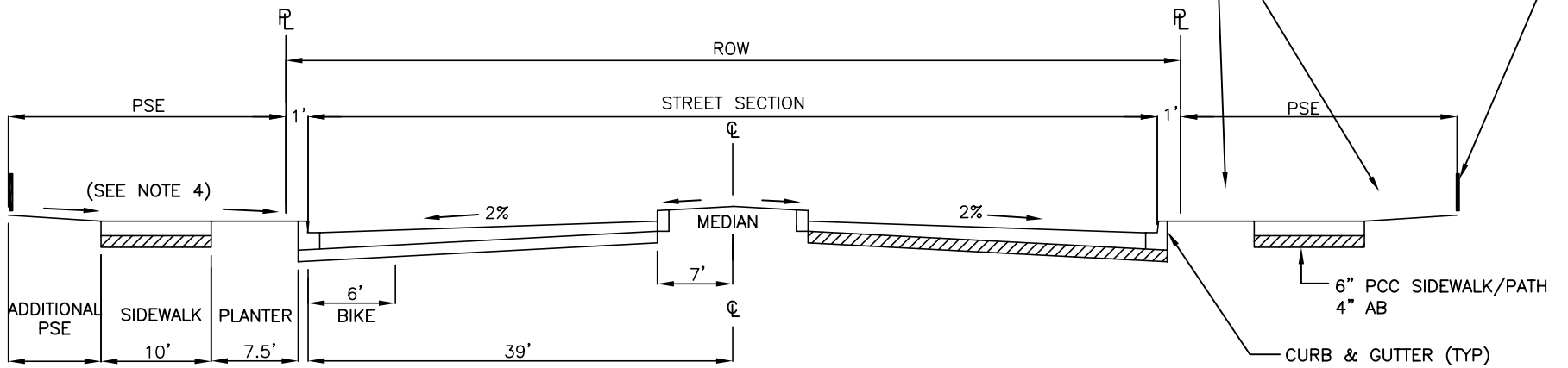
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
ARTERIAL 2-LANE ARTERIAL 2-LANE W/OFF STREET PATHS	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4-8



ARTERIAL 4–LANE

T.I. = 10.0



LANDSCAPED STRIP

7' MIN. FENCE POSTS (PRESSURE PRESERVATIVE TREATED OR STEEL); EMBED IN CONCRETE.

TYPICAL ARTERIAL 4–LANE WITH OFF–STREET PATHS

NOTE:

1. TREES IN LANDSCAPE MEDIANS AND STREETSIDE LANDSCAPING SHALL BE OF MAJESTIC STREET TREE SPECIES THAT CREATE LARGE CANOPIES MEETING CITY STANDARDS.
2. ALL LANDSCAPING PUBLICLY MAINTAINED.
3. SEE STANDARD DRAWING 4–24 FOR BIKE PATH DETAILS.
4. PROVIDE POSITIVE DRAINAGE SLOPE (2% MIN) FROM BACK OF PSE TO CURB OR PROVIDE LANDSCAPE DRAINAGE COLLECTION SYSTEM CONNECTED TO STREET STORM DRAINAGE SYSTEM.

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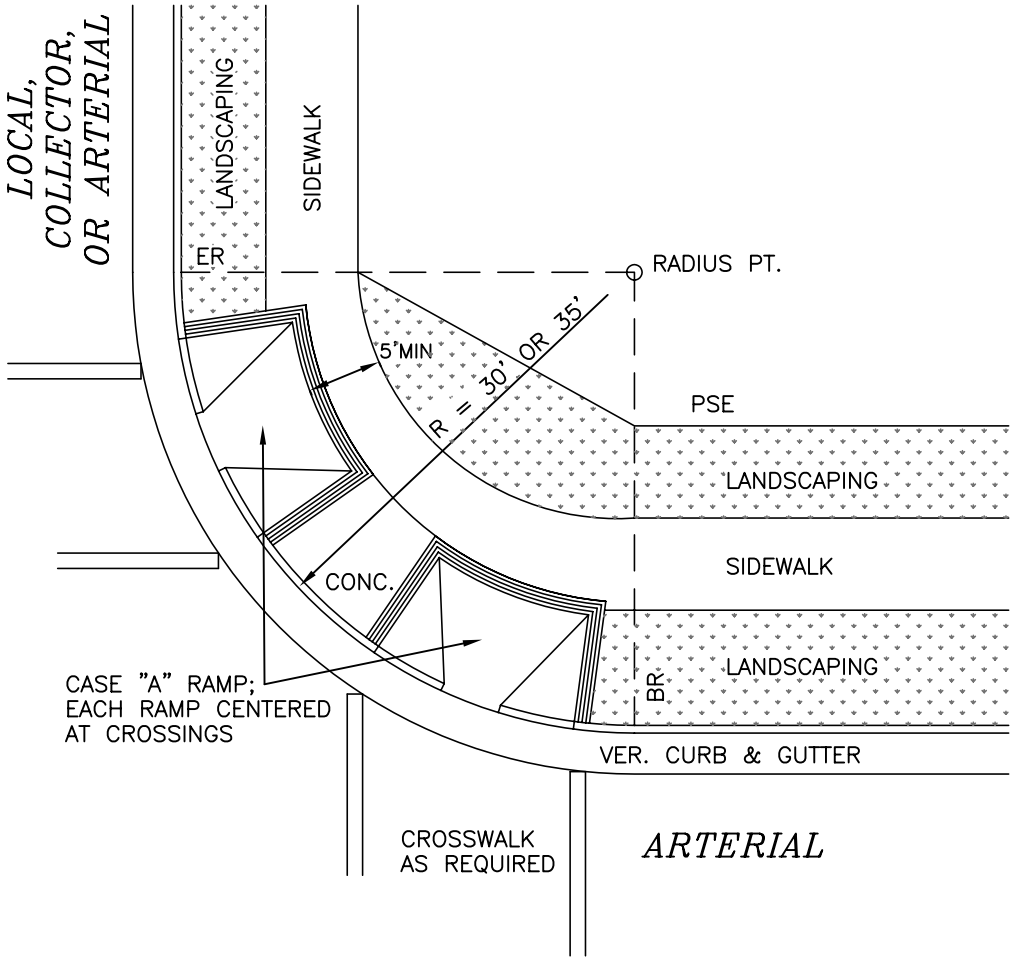
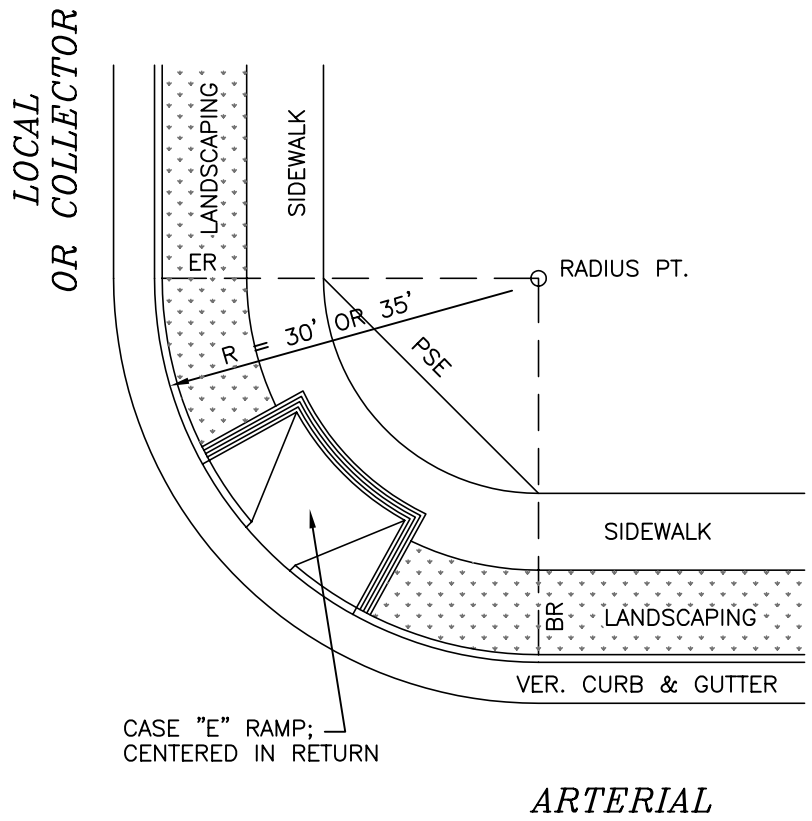
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
ARTERIAL 4–LANE ARTERIAL 4–LANE W/OFF STREET PATHS	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–9





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City of Colusa
PUBLIC WORKS DEPARTMENT

DATE: NOV 2007

ARTERIAL INTERSECTIONS
CORNER LAYOUT

SHEET # 1 OF 1

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 4–10

STANDARD DRIVEWAY DETAILS

DRIVEWAY TYPES

DRIVEWAY	USAGE
LIGHT	RESIDENTIAL (1 – 3 HOUSES)
MEDIUM	COMMERCIAL OR MULTI–FAMILY (4 OR MORE)
HEAVY	INDUSTRIAL, MAJOR SHOPPING CENTERS

DESIGN STANDARDS

1. CONCRETE SHALL BE CLASS "A" PER CONSTRUCTION SPECIFICATIONS OR CLASS 3, 1" MAX GRADATION PER SECT 90 OF STANDARD SPECS; 7 DAY MINIMUM CURE REQUIRED PRIOR TO OPENING FOR TRAFFIC.

2. REINFORCEMENT
   LIGHT: NONE
   MEDIUM & HEAVY: #4, 12" OC EACH WAY

3. CONCRETE THICKNESS:
   LIGHT: 6 INCHES MINIMUM
   MEDIUM & HEAVY: 8 INCHES MINIMUM

4. DEEP TOOL JOINTS SHALL BE 1" DEEP OR $\frac{1}{4}$ OF SECTION DEPTH, WHICHEVER IS GREATER.

5. SCORE LINES SHALL BE ¼" DEEP AND FORM A SQUARE PATTERN, PERPENDICULAR TO EDGES.

6. ALL EDGES SHALL HAVE ½" RADIUS.

7. SIDEWALK AND DRIVEWAY SHALL HAVE A A LIGHT BROOM FINISH PERPENDICULAR TO STREET. CURB AND GUTTER SHALL HAVE A LIGHT BROOM FINISH PARALLEL TO STREET.

8. LOCATE DRIVEWAYS SUCH THAT THEY ARE A MINIMUM OF 5' FROM FEATURES SUCH AS FIRE HYDRANTS, UTILITY POLES, RAINAGE INLETS, CROSSWALKS, CURB RETURNS, ETC.

9. DRIVEWAY SLOPE MAY NEED TO BE FLATTENED FOR HIGH CROWN STREETS TO AVOID BOTTOMING OR SCRAPING OF THE VEHICLES UNDERCARRIAGE.

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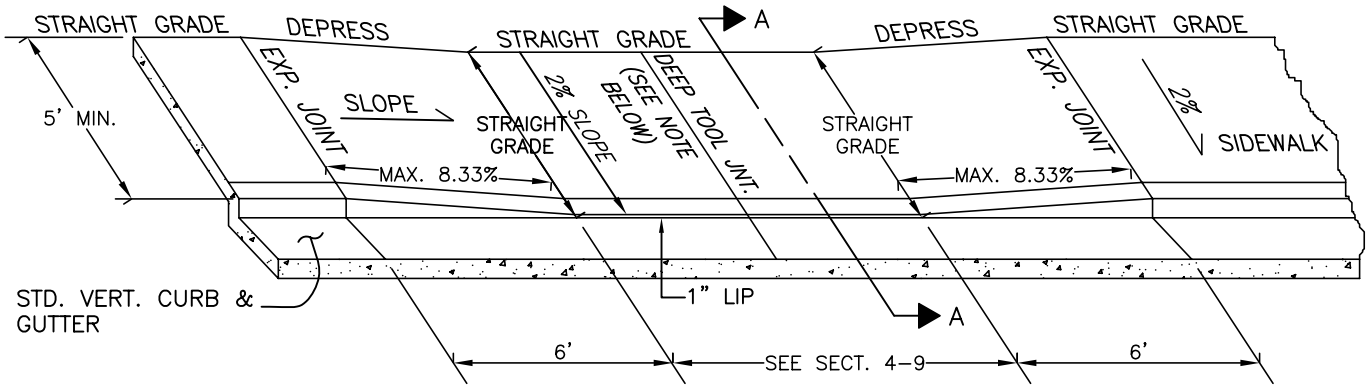
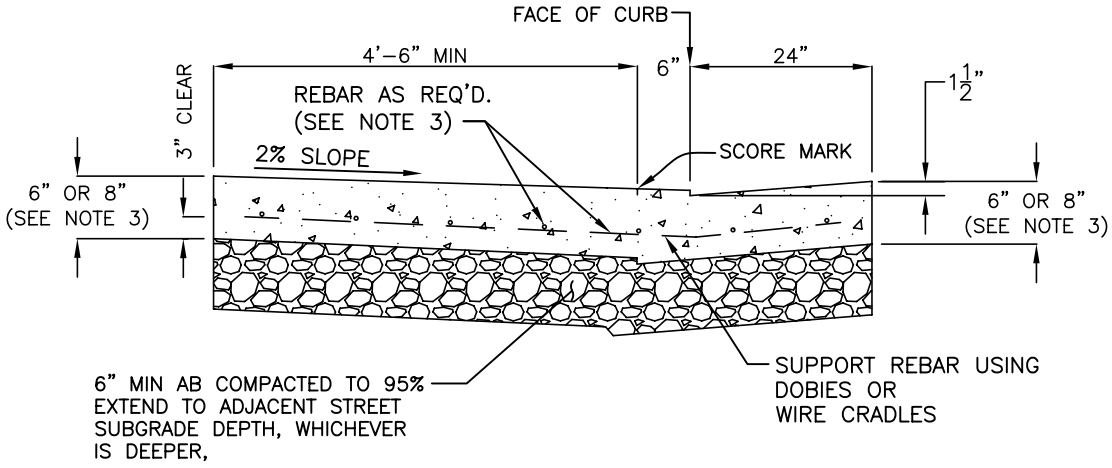
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
STANDARD DRIVEWAY DETAILS	SHEET # 1 OF 4
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–11



ALTERNATE TO DEPRESSING SIDEWALK:
ROUTE SIDEWALK AROUND DRIVEWAY & DEDICATE AN EASEMENT.

PERSPECTIVE



SECTION A-A

NOTES:
1. SCORE LINES SHALL BE 1/4" DEEP AND FORM A SQUARE PATTERN PERPENDICULAR TO EDGES.
2. LIP OF GUTTER SHALL HAVE A 1-1/2" BATTER.
3. SEE SHEET 1 DESIGN STANDARDS FOR REINFORCEMENT AND CONCRETE THICKNESSES FOR DRIVEWAY TYPES

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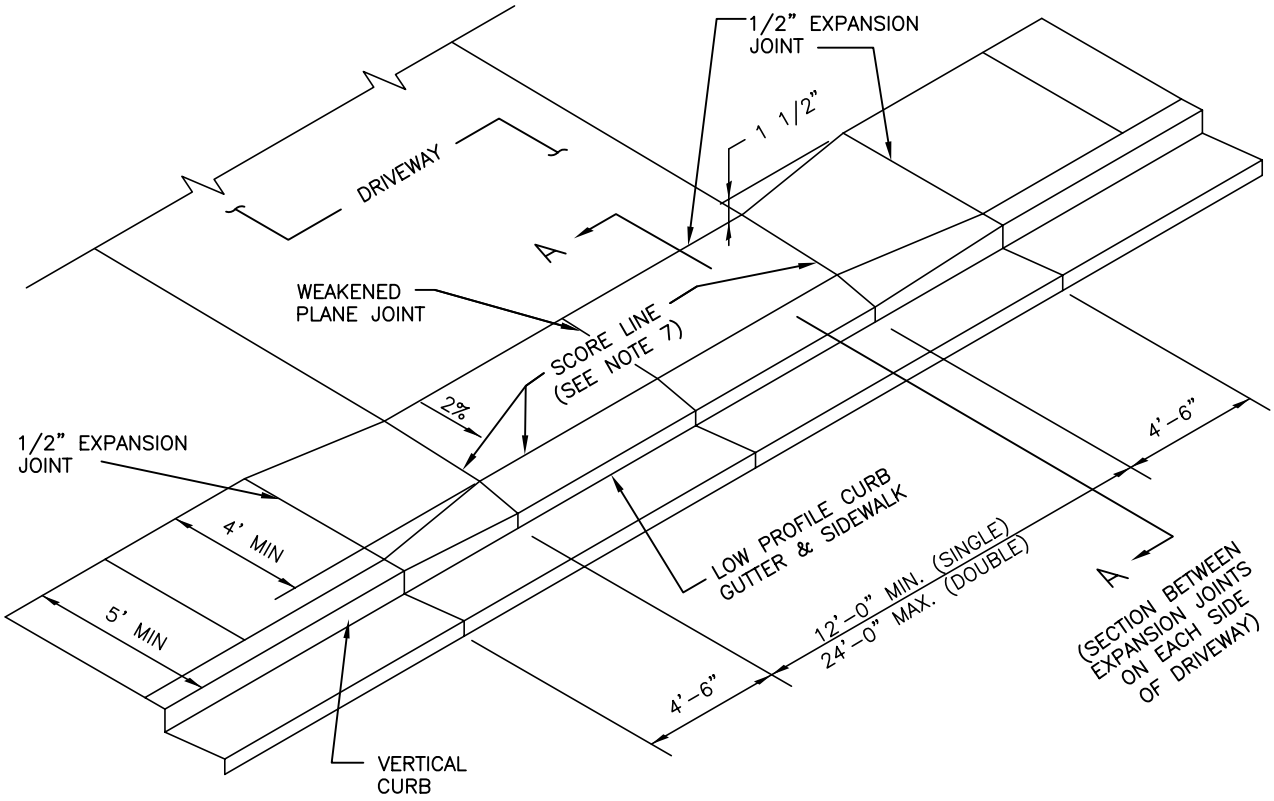
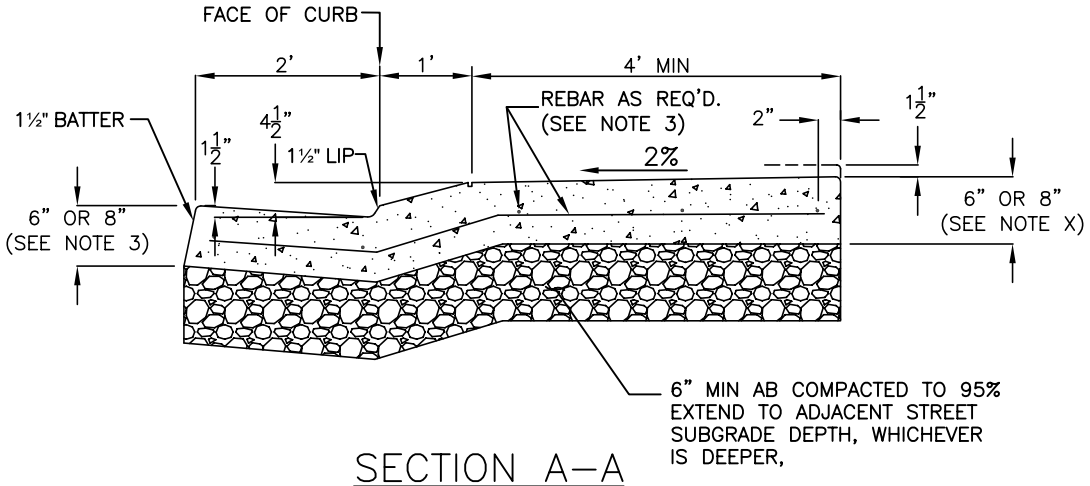
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
STANDARD DRIVEWAY DETAILS ADJACENT SIDEWALK	SHEET # 2 OF 4
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4-11



PERSPECTIVE



SECTION A–A

NOTES:

1. SCORE LINES SHALL BE 1/4" DEEP AND FORM A SQUARE PATTERN PERPENDICULAR TO EDGES.
2. LIP OF GUTTER SHALL HAVE A 1–1/2" BATTER.
3. SEE SHEET 1 DESIGN STANDARDS FOR REINFORCEMENT AND CONCRETE THICKNESSES FOR DRIVEWAY TYPES.

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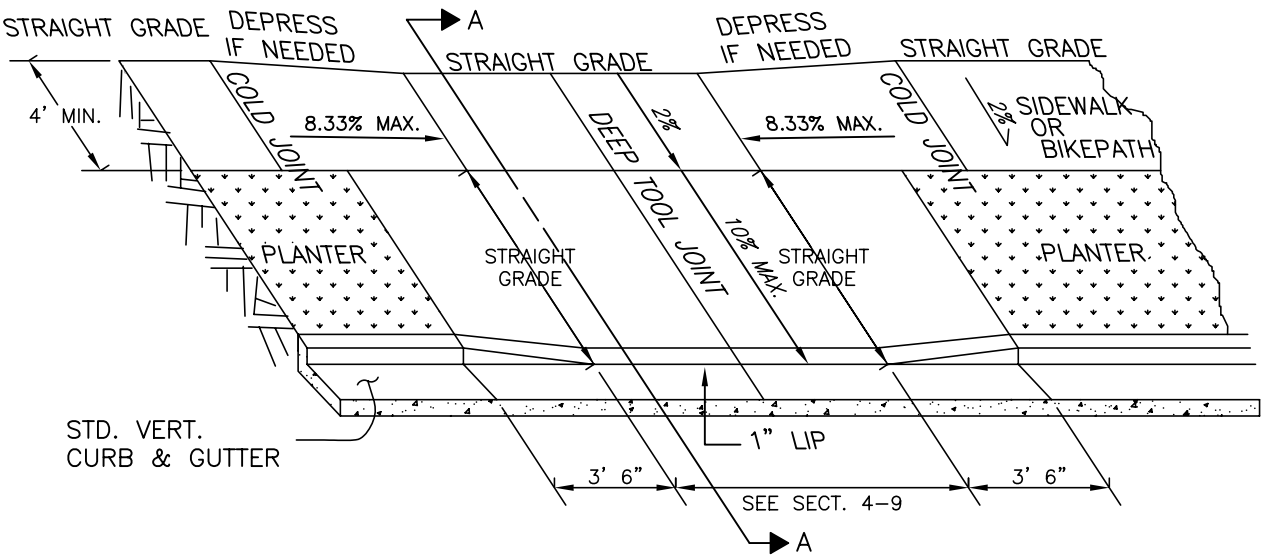
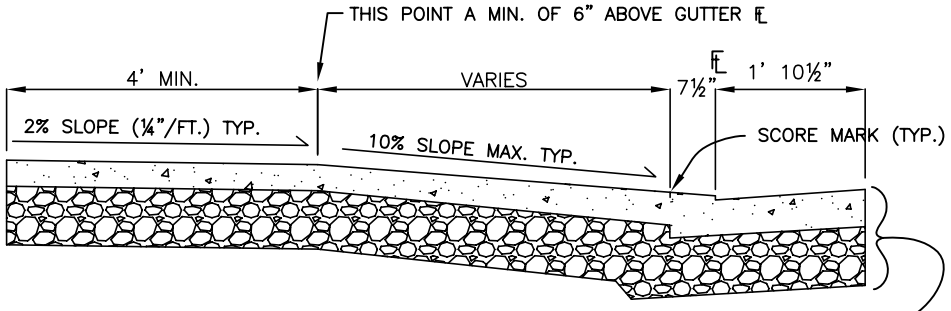
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
LOW PROFILE DRIVEWAY ADJACENT SIDEWALK	SHEET # 3 OF 4
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–11



PERSPECTIVE



SECTION A-A

SEE SHEET 2 FOR MATERIAL, THICKNESS, COMPACTION, AND REBAR REQUIREMENTS

NOTES:

1. SCORE LINES SHALL BE 1/4" DEEP AND FORM A SQUARE PATTERN PERPENDICULAR TO EDGES.
2. LIP OF GUTTER SHALL HAVE A 1-1/2" BATTER.
3. SEE SHEET 1 DESIGN STANDARDS FOR REINFORCEMENT AND CONCRETE THICKNESSES FOR DRIVEWAY TYPES

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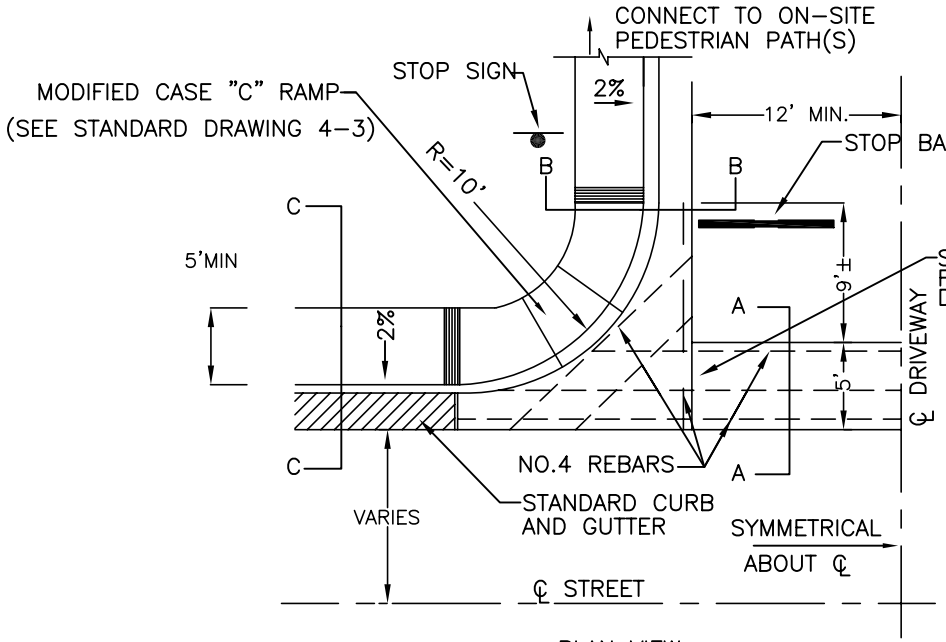
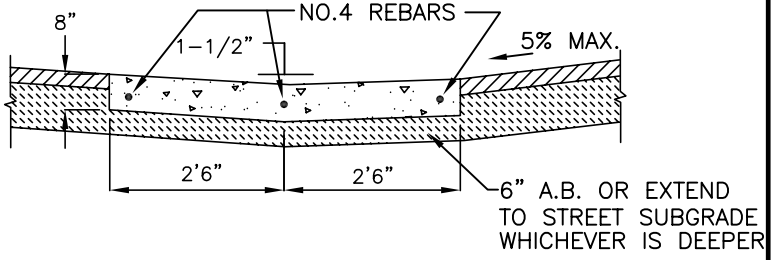
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
STANDARD DRIVEWAY DETAILS SEPERATED SIDEWALK	SHEET # 4 OF 4
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4-11

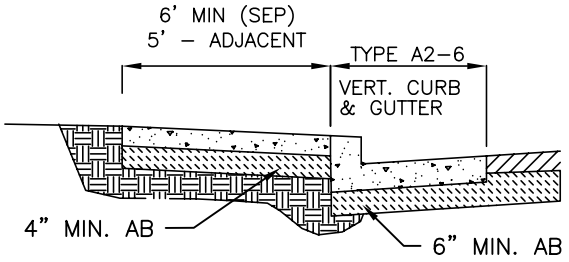


PLAN VIEW
(ADJACENT SIDEWALK)

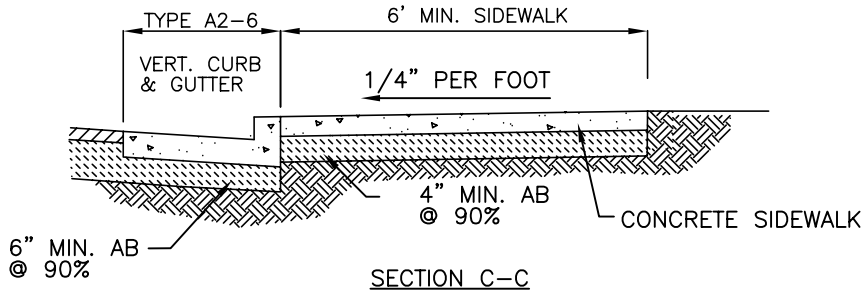


SECTION A-A

DRIVEWAY SLOPE NOT TO EXCEED 5% FOR A MINIMUM OF 20' FROM EDGE OF PAVEMENT.



SECTION B-B



SECTION C-C
(ADJACENT SIDEWALK)

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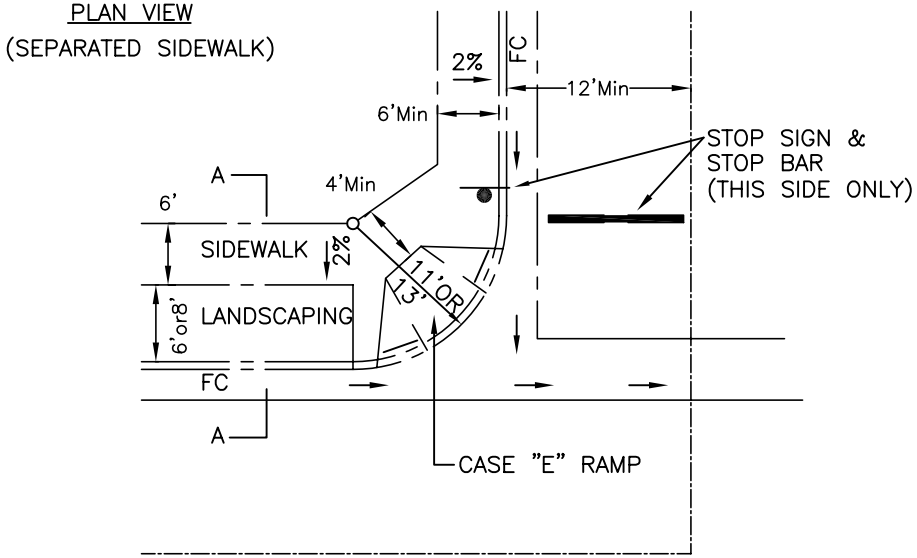
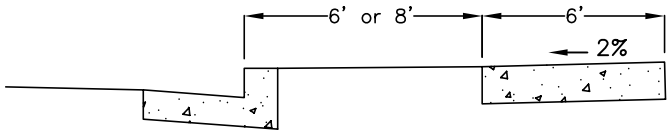
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
SPECIAL COMMERCIAL FRONTAGE ENTRANCE	SHEET # 1 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4-12

PLAN VIEW
(SEPARATED SIDEWALK)





SECTION A–A
(SEPARATED SIDEWALK)

REGISTERED PROFESSIONAL ENGINEER
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City of Colusa
PUBLIC WORKS DEPARTMENT

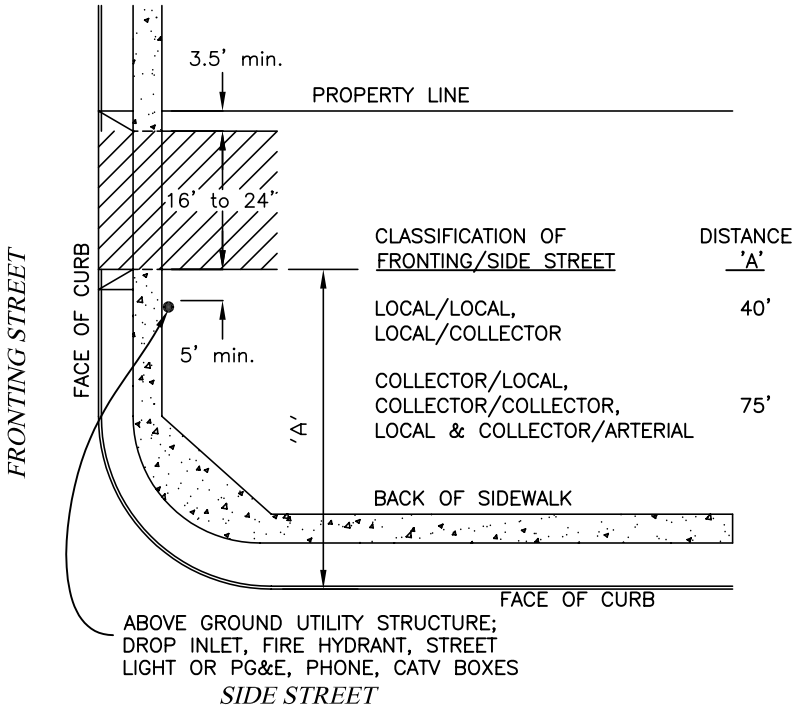
SPECIAL COMMERCIAL
FRONTAGE ENTRANCE

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

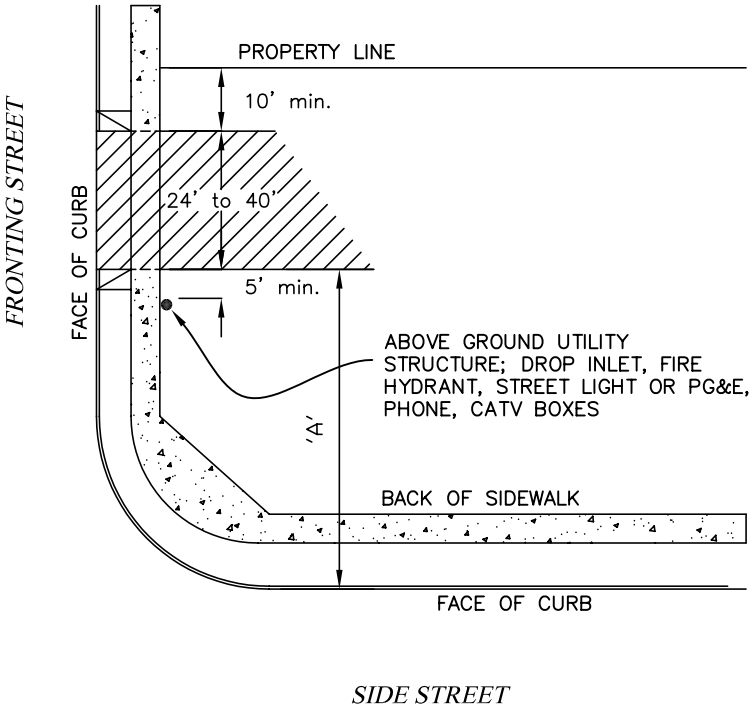
DATE: NOV 2007

SHEET # 2 OF 2

DRAWING #: 4–12



SINGLE FAMILY OR DUPLEX RESIDENTIAL



COMMERCIAL, MULTI–FAMILY, INDUSTRIAL

NOTES:

1. SEE WRITTEN TEXT (SECTION 4–9) FOR ADDITIONAL REQUIREMENTS.
2. MAXIMUM OF 2 DRIVEWAYS PER SINGLE FAMILY OR DUPLEX RESIDENTIAL TYPE UNITS.
3. DRIVEWAYS ON ARTERIAL STREETS AND COMMERCIAL, MULTI–FAMILY AND INDUSTRIAL DRIVEWAYS SUBJECT TO REVIEW AND APPROVAL OF THE CITY ENGINEER.
4. INDUSTRIAL DRIVEWAY WIDTHS MAY BE WIDER BASED ON TYPES AND QUANTITIES OF VEHICLES.
5. REQUIRED CURB RAMPS AT CORNERS NOT SHOWN.

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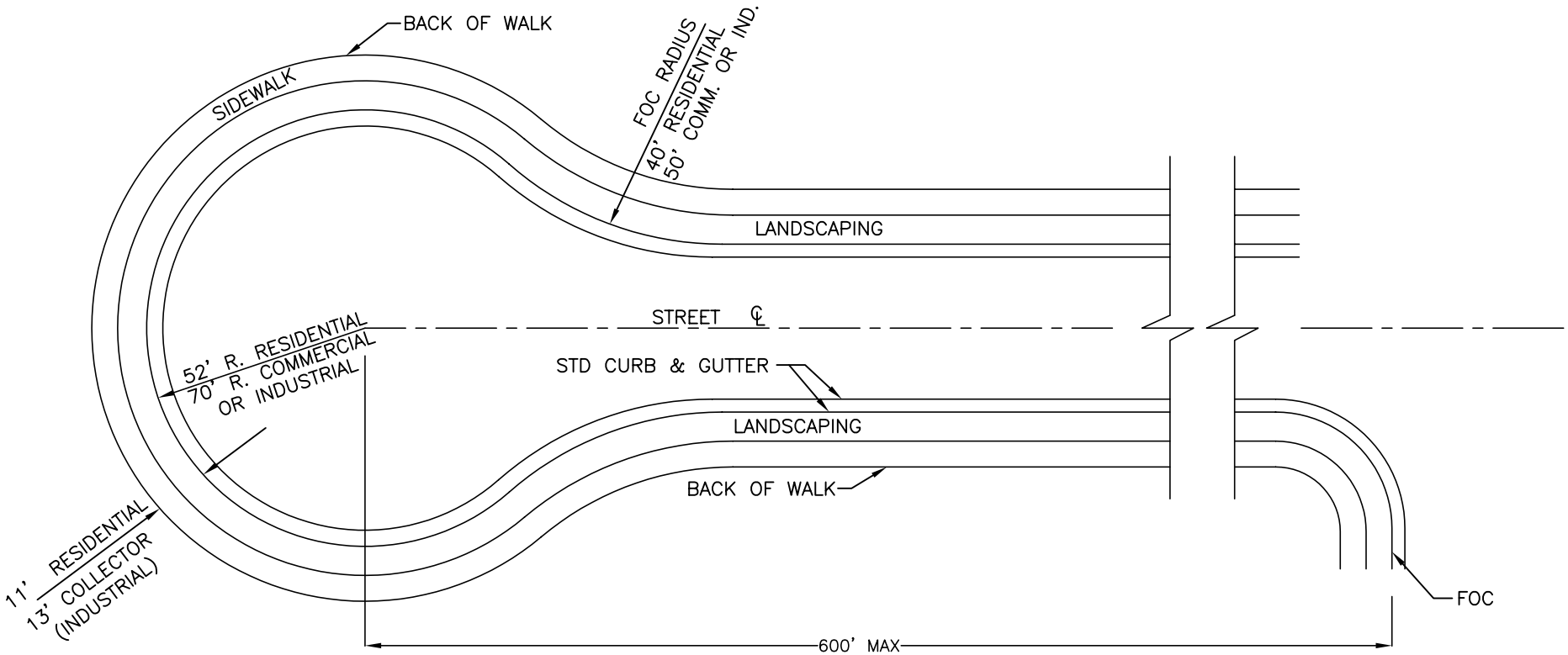
City of Colusa PUBLIC WORKS DEPARTMENT	DATE: NOV 2007
DRIVEWAY REQUIREMENTS AT CORNERS	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–13



NOTES:

1. INCREASED STRUCTURAL SECTION REQUIRED IN CUL–DE–SAC BULB.

2. A STANDARD CODE W53 (NOT A THROUGH STREET) SIGN MAY BE REQUIRED AT THE ENTRANCE TO THE CUL–DE–SAC (SEE SECTION 4–25).

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CUL–DE–SAC TYPICAL DIMENSIONS

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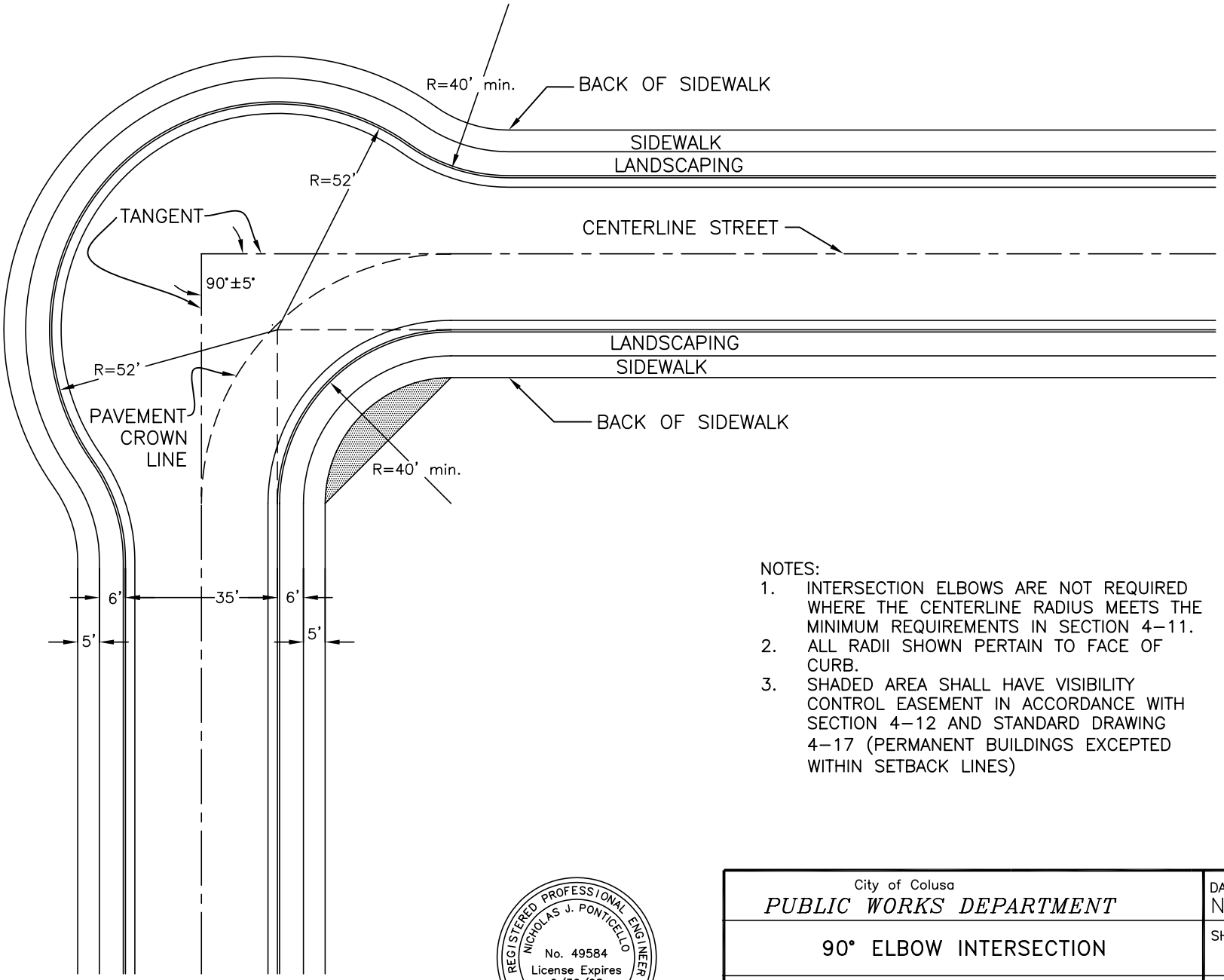
DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 4–14



NOTES:

1. INTERSECTION ELBOWS ARE NOT REQUIRED WHERE THE CENTERLINE RADIUS MEETS THE MINIMUM REQUIREMENTS IN SECTION 4–11.
2. ALL RADII SHOWN PERTAIN TO FACE OF CURB.
3. SHADED AREA SHALL HAVE VISIBILITY CONTROL EASEMENT IN ACCORDANCE WITH SECTION 4–12 AND STANDARD DRAWING 4–17 (PERMANENT BUILDINGS EXCEPTED WITHIN SETBACK LINES)

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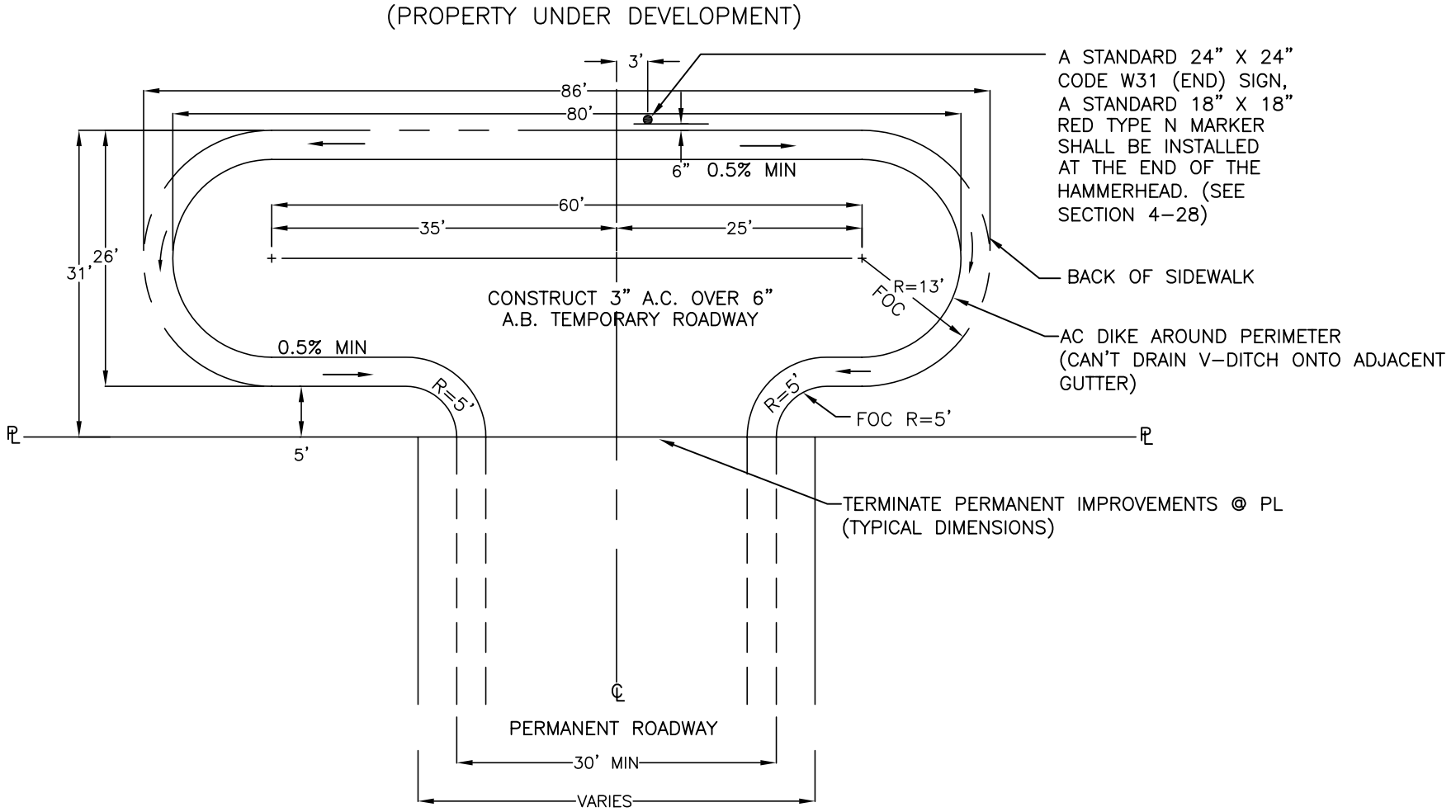
90° ELBOW INTERSECTION

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 4–15



NOTES:

NO ACCESS ALLOWED OFF HAMMER-HEAD

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HAMMER-HEAD DESIGN

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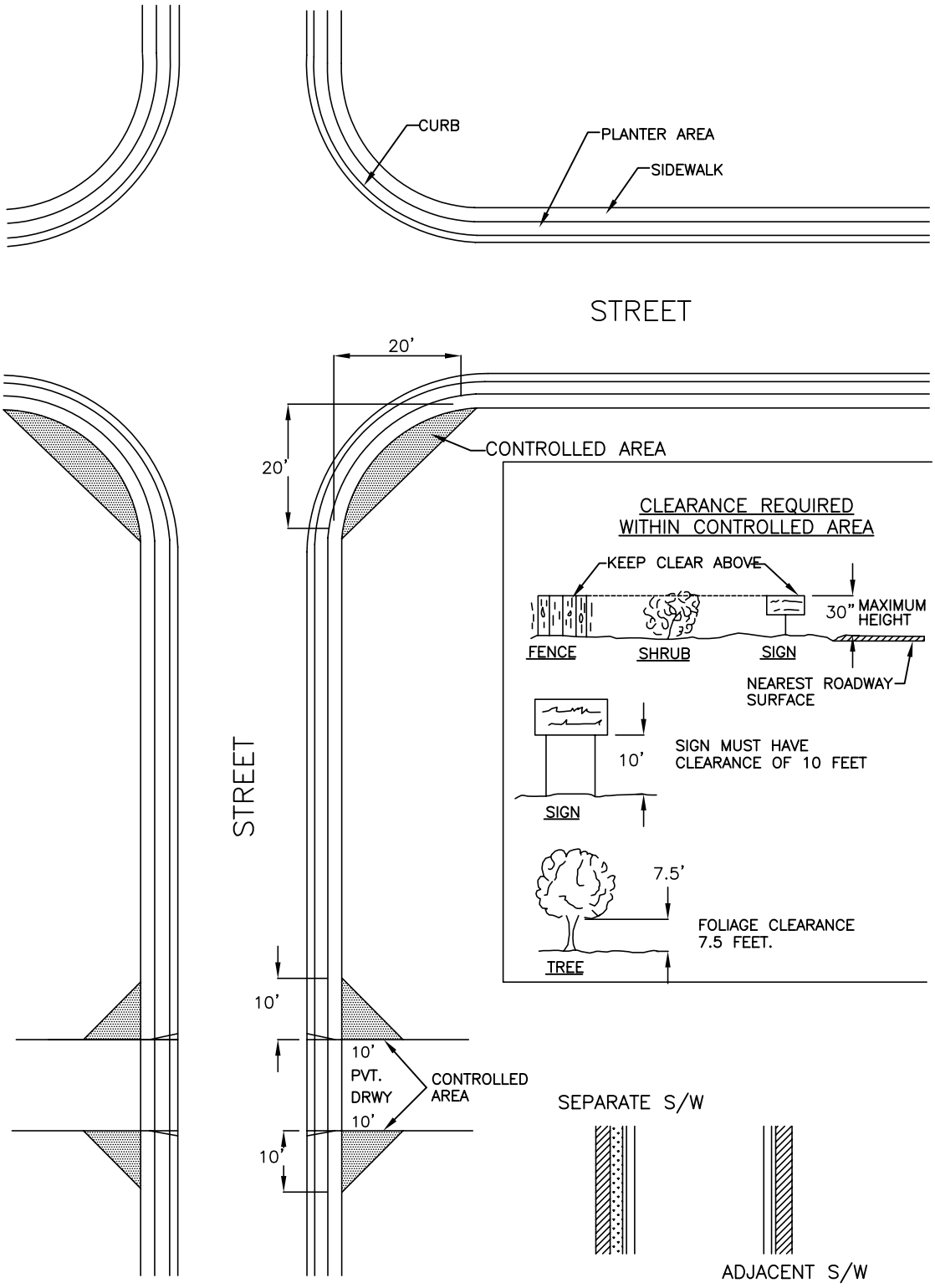
DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 4-16



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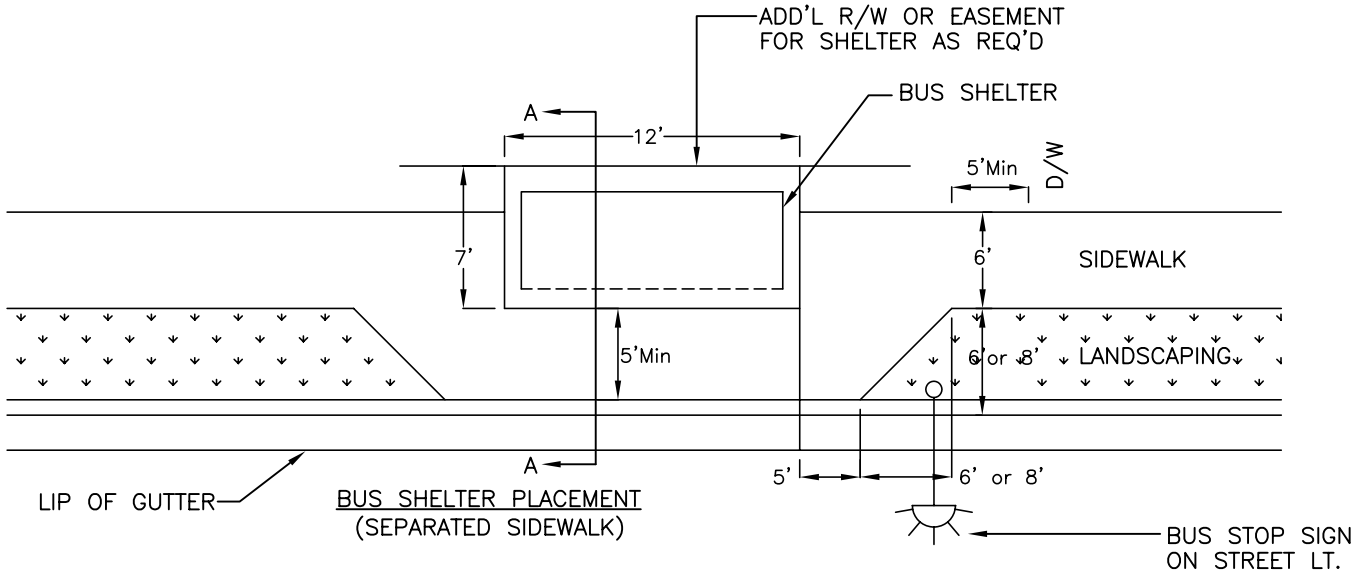
VISIBILITY REQUIREMENT AT INTERSECTIONS AND DRIVEWAYS

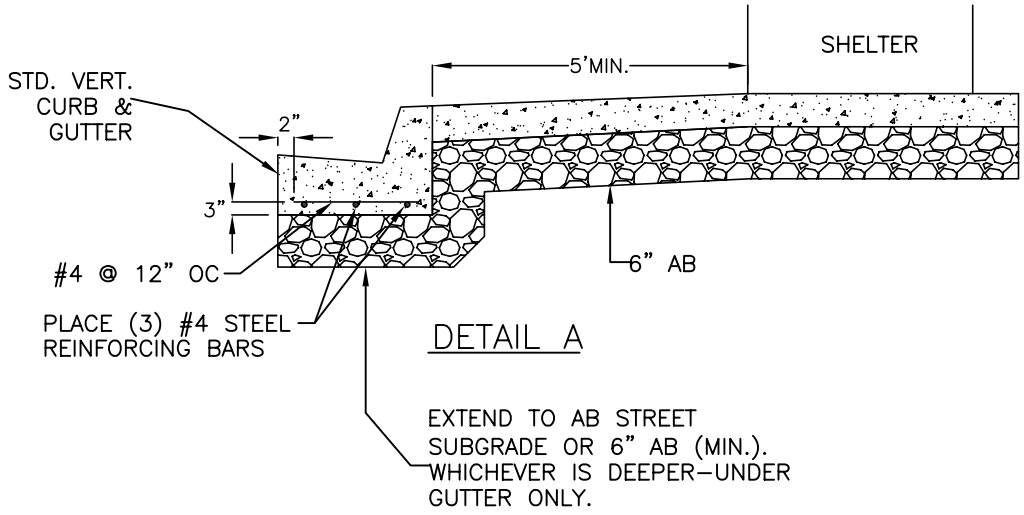
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 4-17





NOTES:

DETAIL 'A' SECTION SHALL BE USED FOR THE GUTTER 50 FT. EACH SIDE OF BUS STOPS WITHOUT TURNOUTS. THE REBAR SHALL BE CONTINUED ACROSS ANY DRIVEWAYS WITHIN THE 50 FT. DISTANCE FROM THE BUS STOP.

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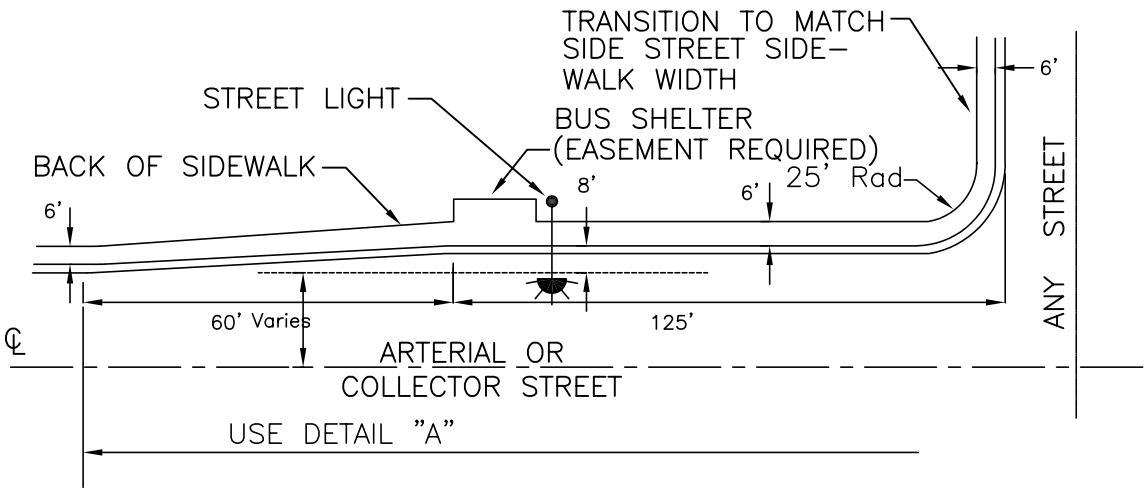
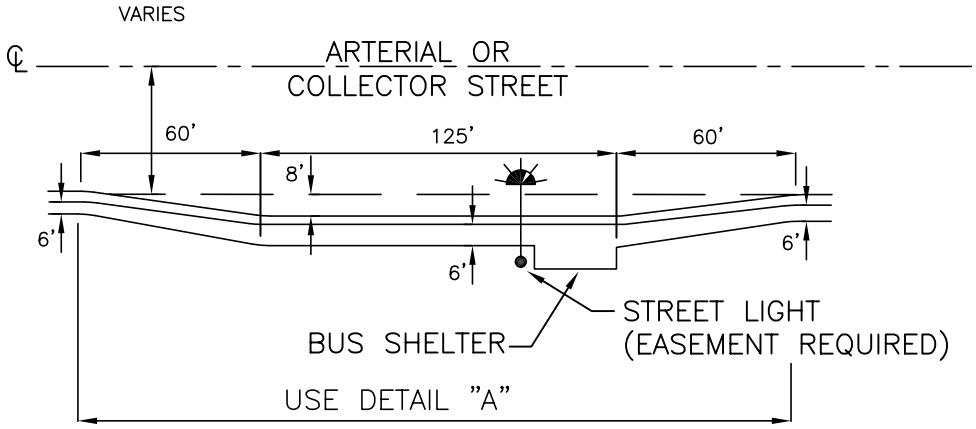
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
BUS STOP	SHEET # 1 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–18

BUS TURNOUT AT CORNER



TYPICAL MID-BLOCK BUS TURNOUT



NOTES:

1. THE DIMENSIONS SHOWN ARE MINIMUM STANDARDS. THE DIRECTOR MAY DETERMINE LONGER WIDENING TO BE NECESSARY.

2. SIDEWALKS MAY BE ADJACENT TO CURB IN RETROFIT SITUATIONS ONLY. ALL NEW CONSTRUCTION REQUIRES SEPARATED SIDEWALKS PER STANDARDS.

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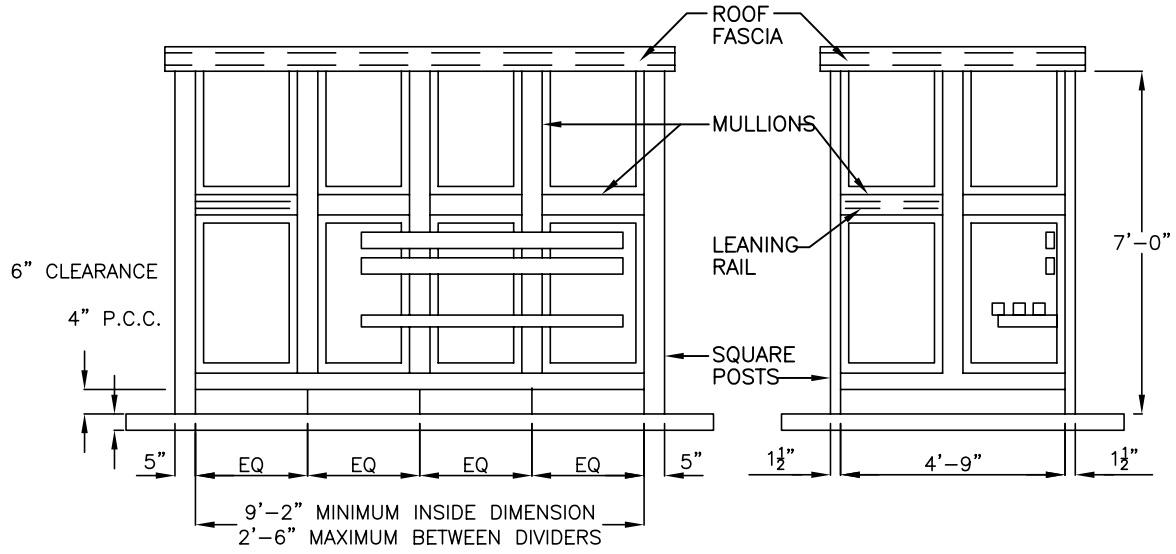
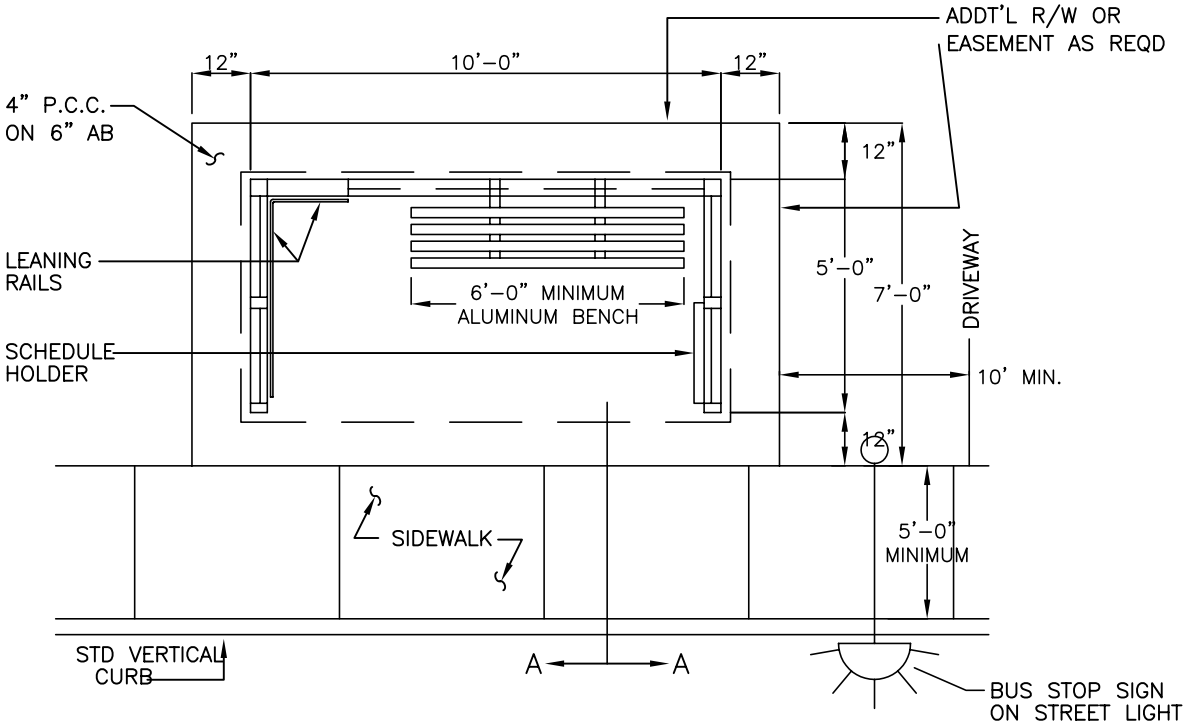
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
BUS TURNOUT	SHEET # 2 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4-18



BUS SHELTER DESIGN



BUS SHELTER PLACEMENT
(ADJACENT SIDEWALK)

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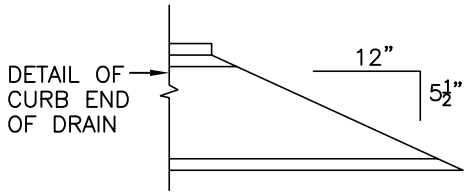
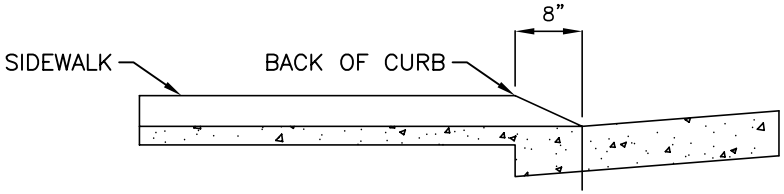
BUS SHELTER
DESIGN AND PLACEMENT

SHEET # 3 OF 3

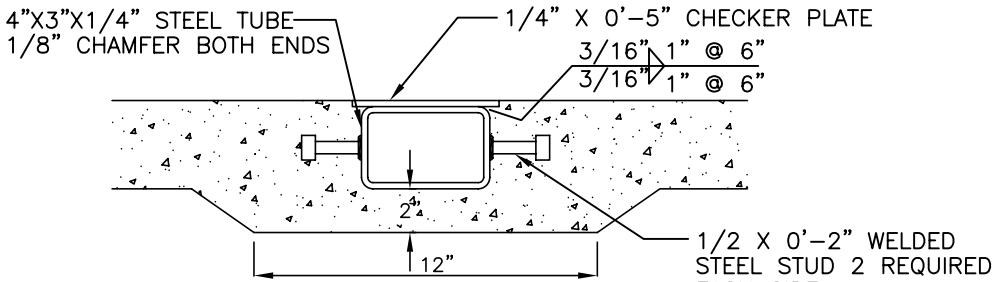
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 4–18

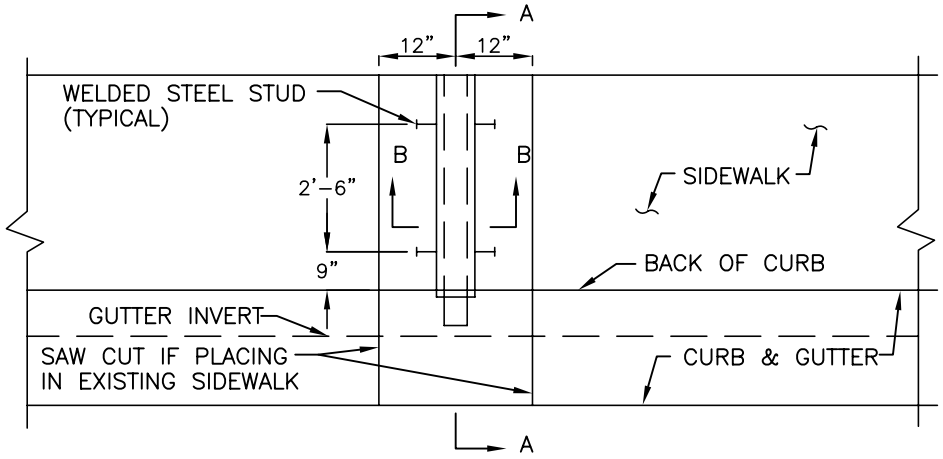




SECTION A–A
(FOR TYPE1 OR 1A CURB)



SECTION B–B



PLAN VIEW OF CURB, GUTTER & SIDEWALK

NOTES:
GALVANIZE AFTER FABRICATION

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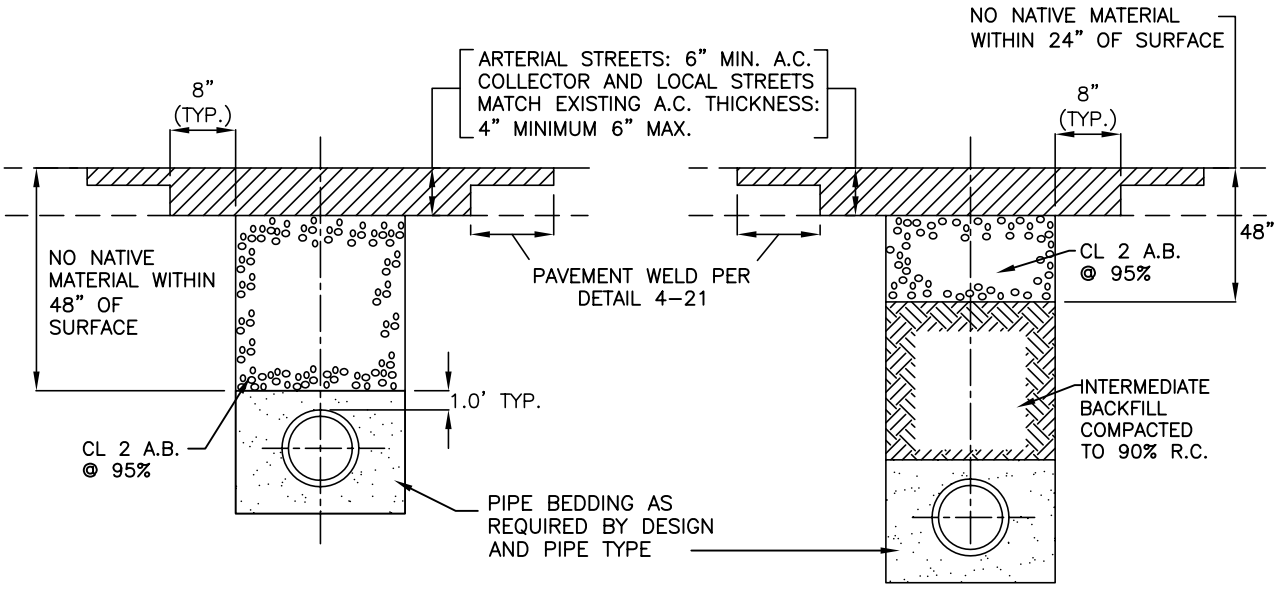
UNDER SIDEWALK DRAIN

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

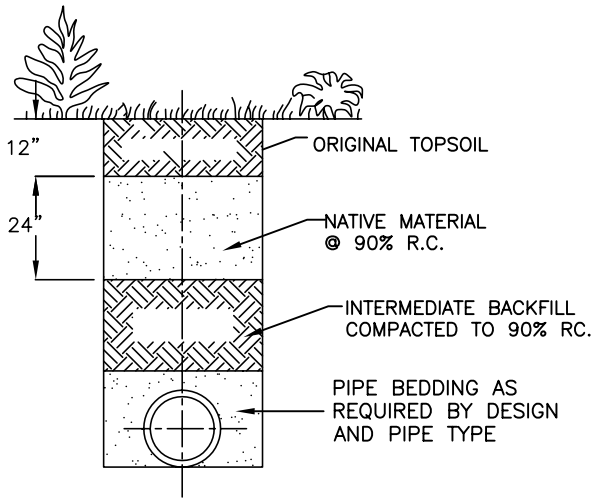
SHEET # 1 OF 1

DRAWING #: 4–19

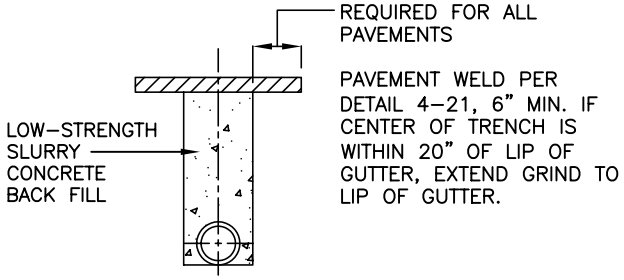


SHALLOW TRENCH (LESS THAN 4 FEET COVER) IN EXISTING %%UPAVEMENT

DEEP TRENCH (4 FEET OR MORE COVER) IN EXISTING PAVED AREAS AND OTHER TRENCHING



HORTICULTURE LAWN, OR CULTIVATED AREAS



ROCK SAW TRENCH SECTION

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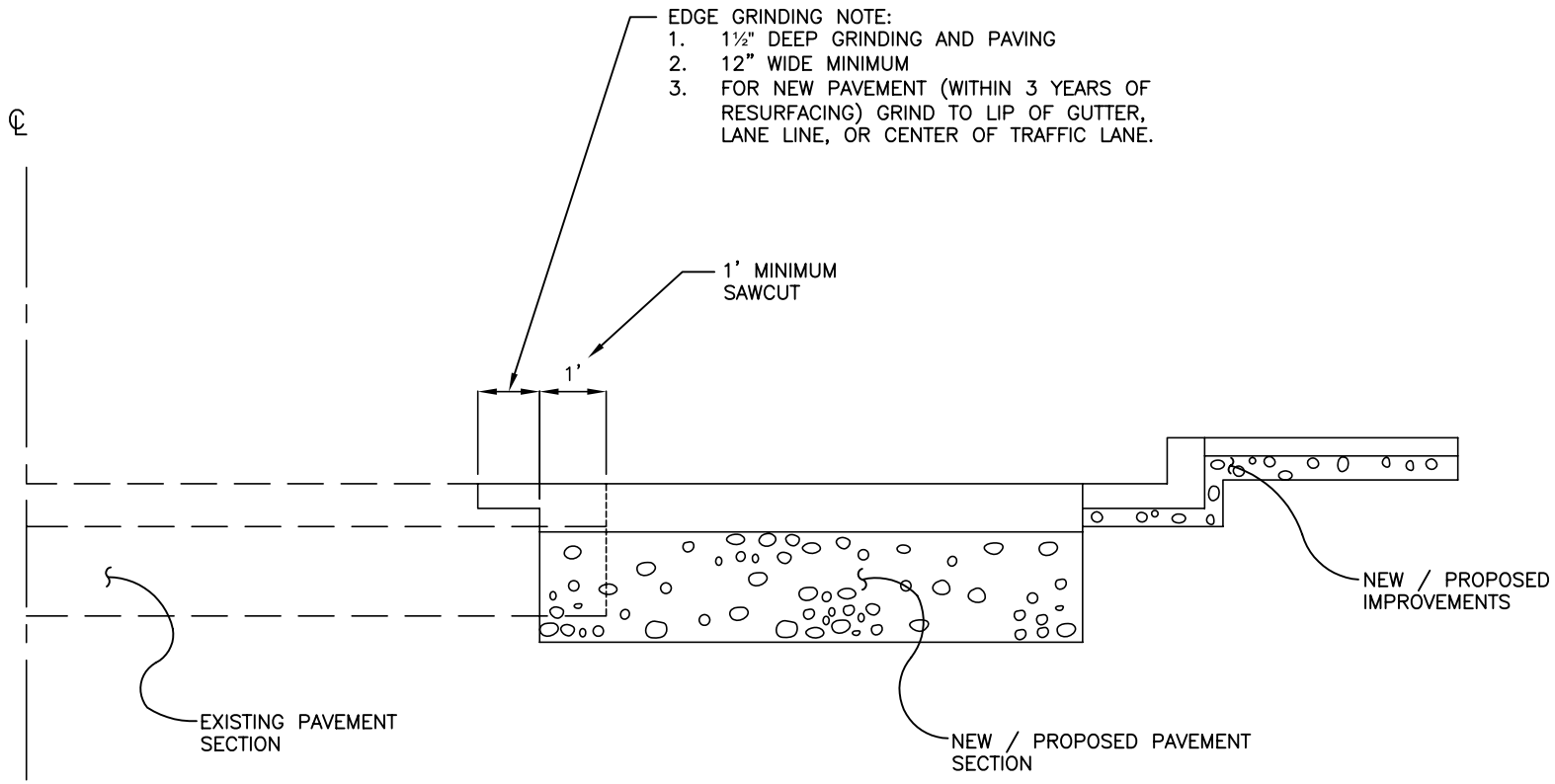
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
TRENCH SECTIONS IN IMPROVED AREAS	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4-20



NOTES:

1. PAVEMENT WELDING BY REHEATING & BLENDING USING INDIRECT HEAT SOURCES SUCH AS INFRARED RADIANT HEATERS, MAY BE USED IN LIEU OF GRINDING PROCESS UPON APPROVAL OF EQUIPMENT BY ENGINEER.

2. GRIND TO LIP OF GUTTER, LANE LINE, OR CENTER OF TRAFFIC LANE, BUT 12" MINIMUM

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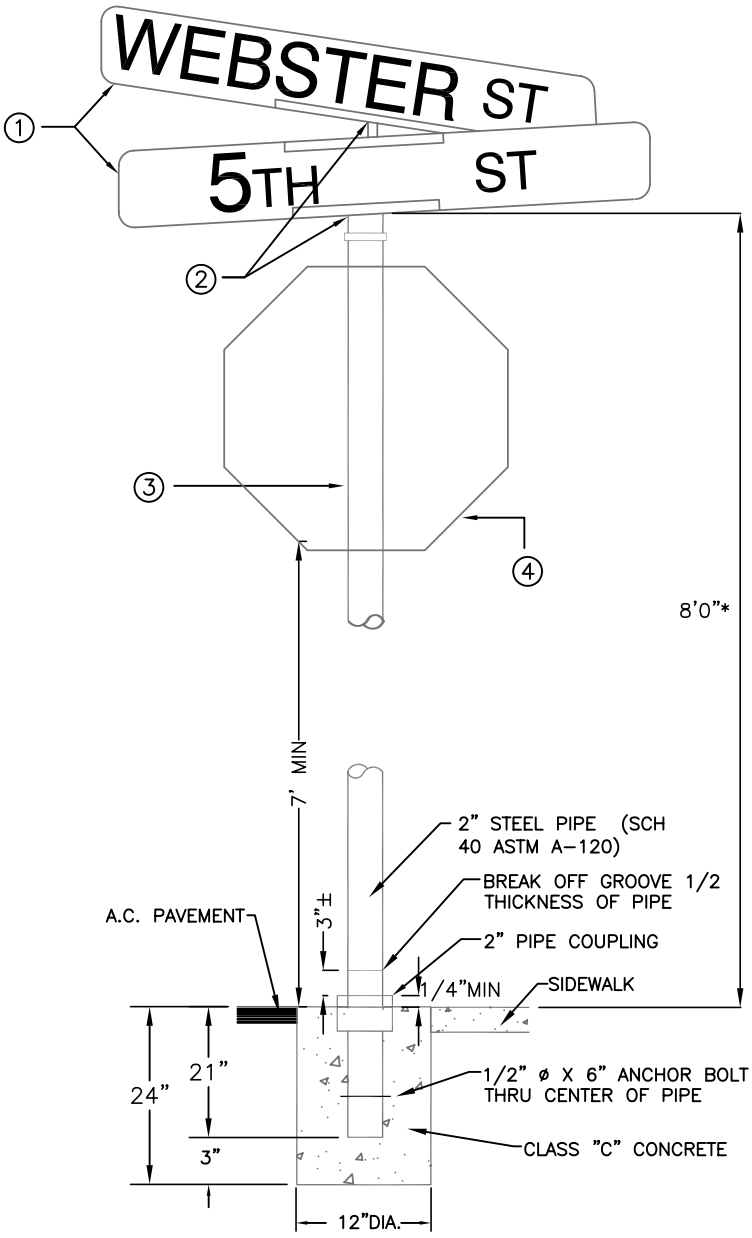
PAVEMENT WELDING DETAIL

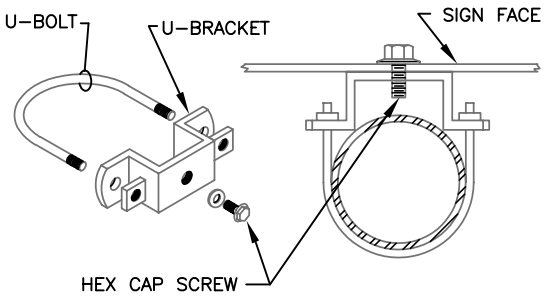
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

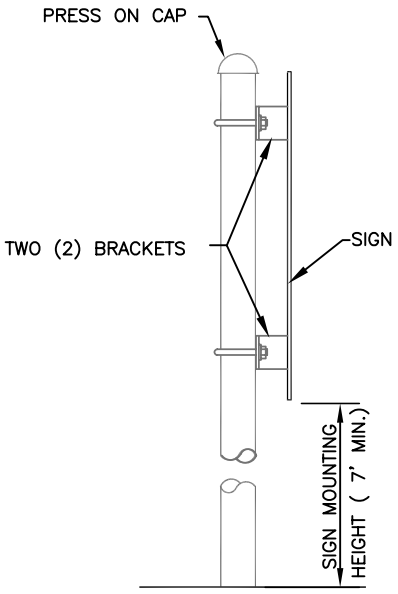
SHEET # 1 OF 1

DRAWING #: 4–21





SIGN MOUNTING BRACKET
(HAWKINS MODEL M2G-C2B)



MOUNTING DETAIL

NOTES:
1. HAWKINS F.B. 118 SIGN.
2. HAWKINS, "POSITIVE LOCK" BRACKET SYSTEM V14
3. ROUND OR SQUARE POST PER TRAFFIC SIGN DETAILS
4. STOP SIGN AS REQUIRED. INCREASE POST HEIGHT TO PROVIDE INDICATED CLEARANCE.
5. ALL SIGNS AND MOUNTINGS SHALL CONFORM TO THE 2003 CALIFORNIA SUPPLEMENT TO THE M.U.T.C.D.

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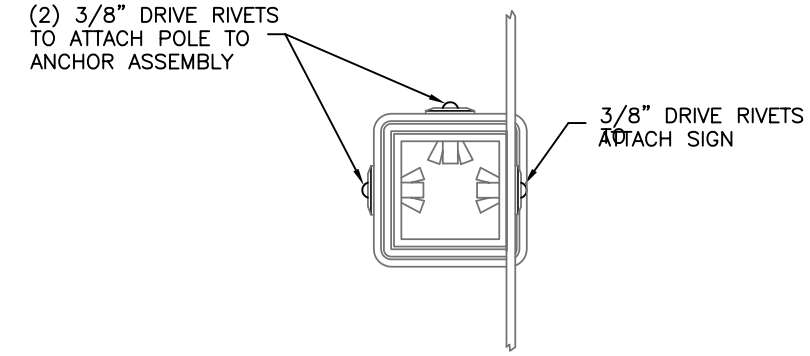
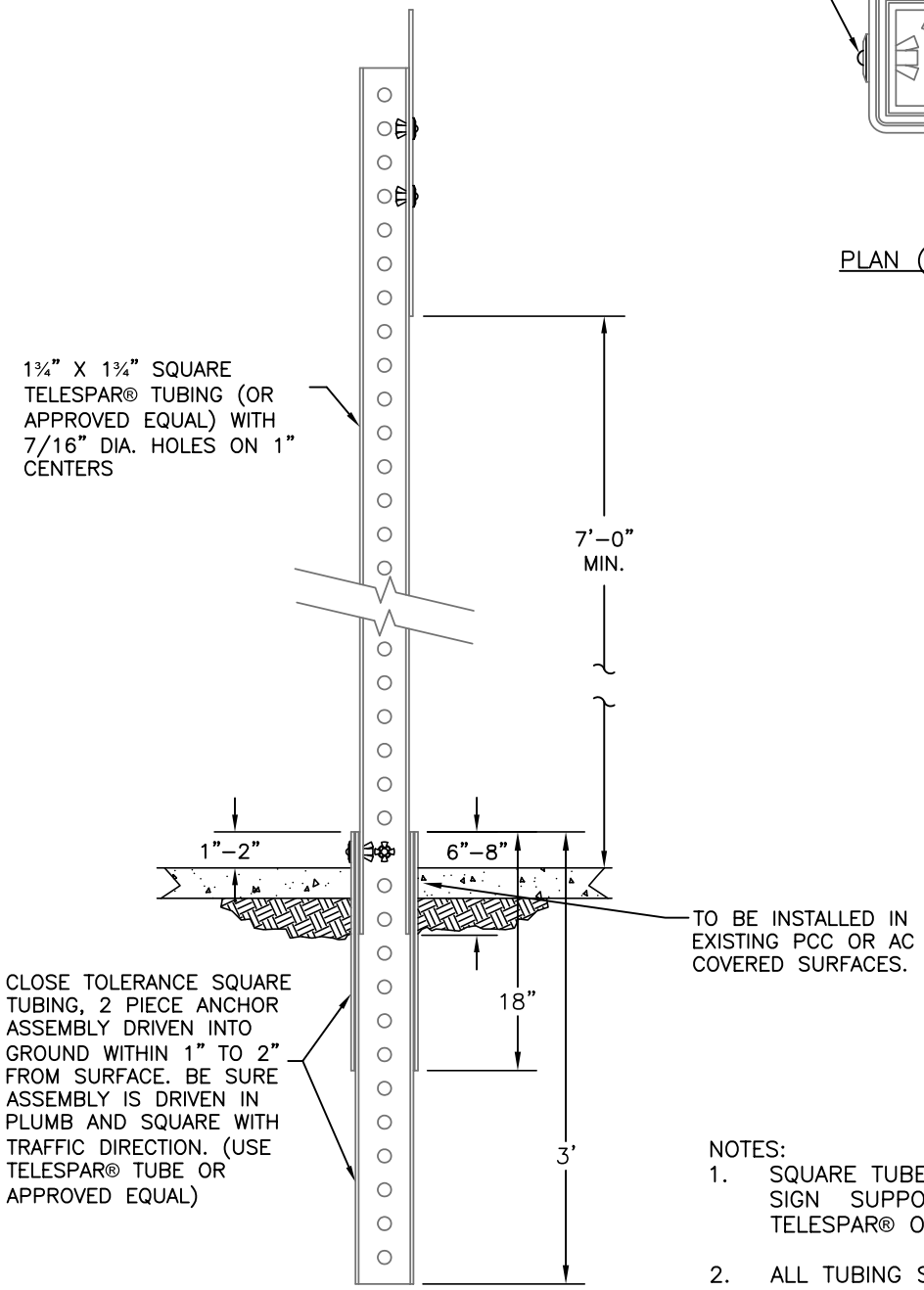
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
STREET SIGNAGE (STEEL PIPE MOUNT)	SHEET # 1 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4-22



PLAN (TOP) VIEW



ELEVATION VIEW

NOTES:

1. SQUARE TUBE YIELDING BREAKAWAY SIGN SUPPORT SYSTEM TO BE TELESPAR® OR APPROVED EQUAL.
2. ALL TUBING SHALL BE CLEANED AND PHOSPHATED THEN COATED WITH AN ACRYLIC PAINT BY ELECTRODE DEPOSITION AND BAKED.
3. COLOR IS "PERMA–GREEN" PER FEDERAL STANDARD 595–A COLOR #14109, DARK LIMIT V–)

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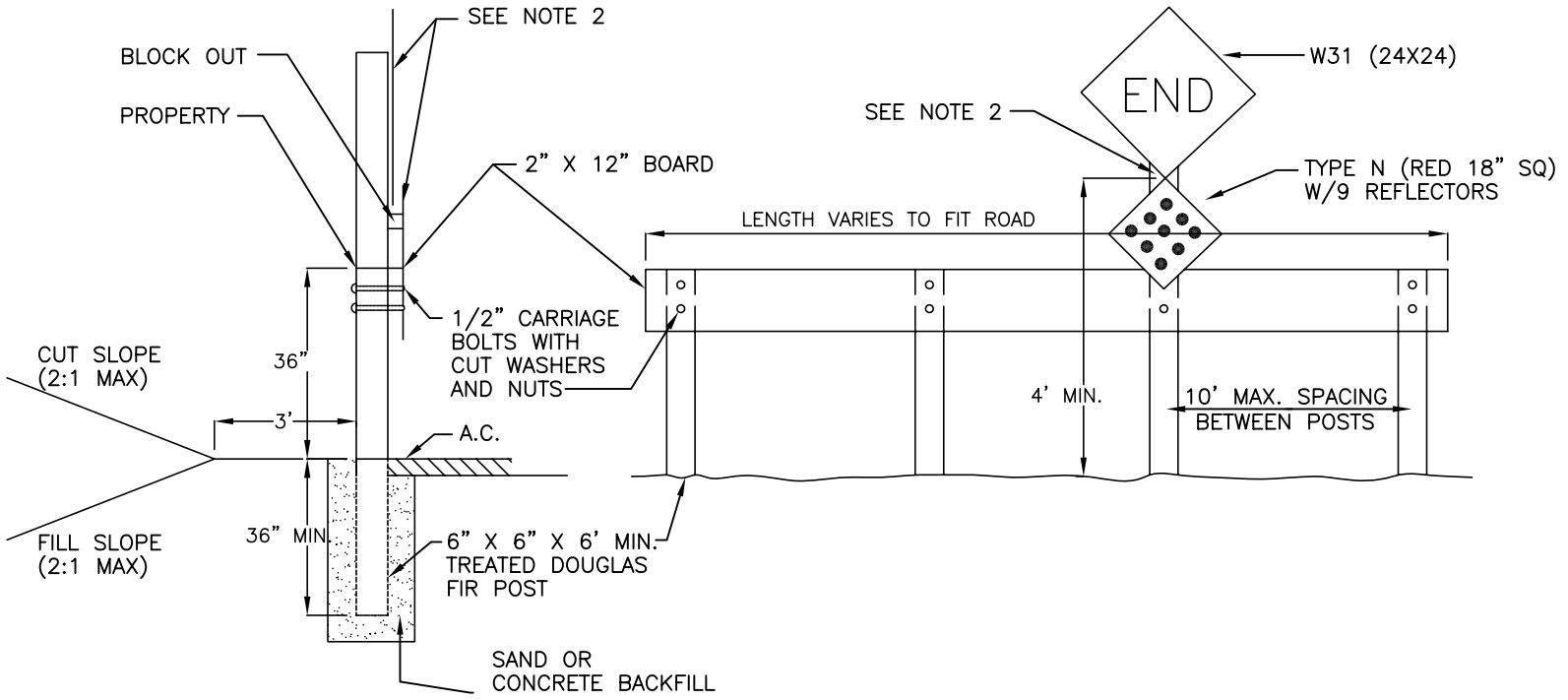
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
STREET SIGNAGE (SQUARE TUBE MOUNT)	SHEET # 2 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–22



NOTES:

1. ALL EXPOSED SURFACES SHALL BE PAINTED WITH 2 COATS OF WHITE PAINT CONFORMING TO STATE STANDARD SPEC. 91–3.
2. POST AT CENTER OR NEAREST TO CENTER ON RIGHT HAND SIDE TO BE EXTENDED TO PROVIDE MOUNTING FOR SIGNS. 3. POST SHALL BE PRESSURE PRESERVATIVE TREATED PER STANDARD SPEC. 58–1.02

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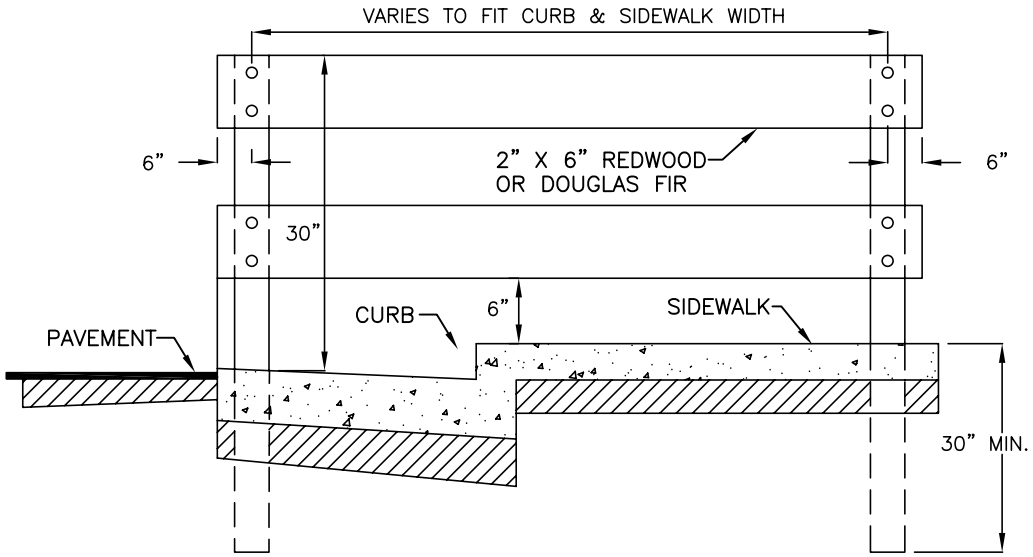
SIGNS AND BARRICADES AT END OF PAVEMENT WIDENING

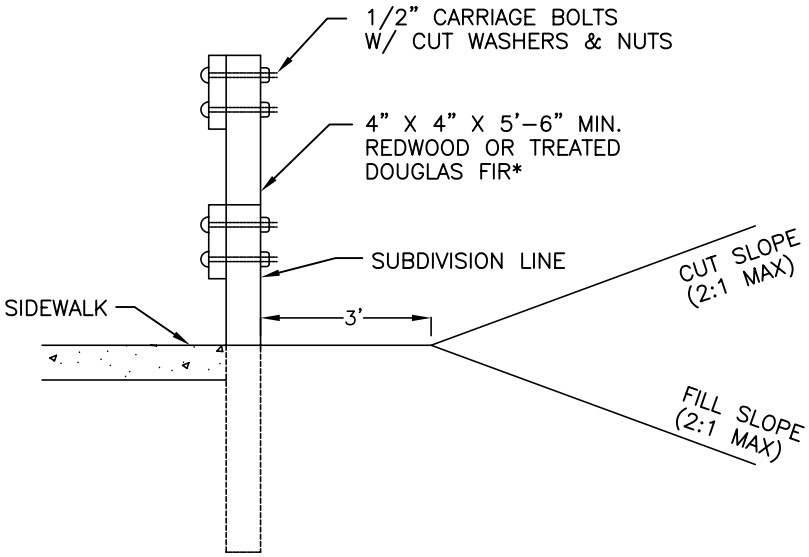
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 1 OF 2

DRAWING #: 4–23





NOTES:

1. SIDEWALK BARRICADES TO BE ERECTED AT EACH LOCATION WHERE SATISFACTORY PROVISION CAN NOT BE MADE FOR PEDESTRIAN TO CONTINUE BEYOND THE TERMINUS OF A SIDEWALK.
2. ALL EXPOSED SURFACES TO BE PAINTED WITH TWO (2) COATS OF WHITE PAINT CONFORMING TO SECTION 91-3.02 OF STATE SPECIFICATIONS.

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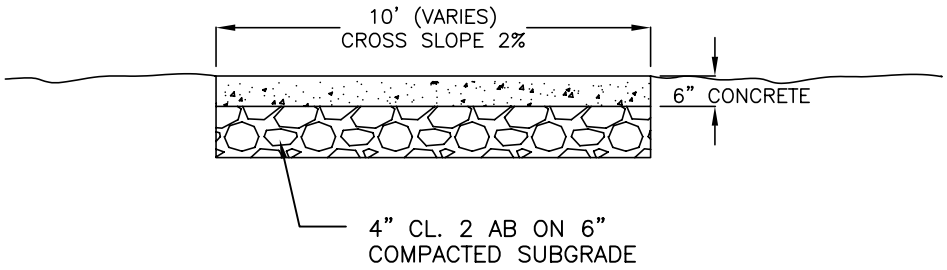
SIDEWALK BARRICADE

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

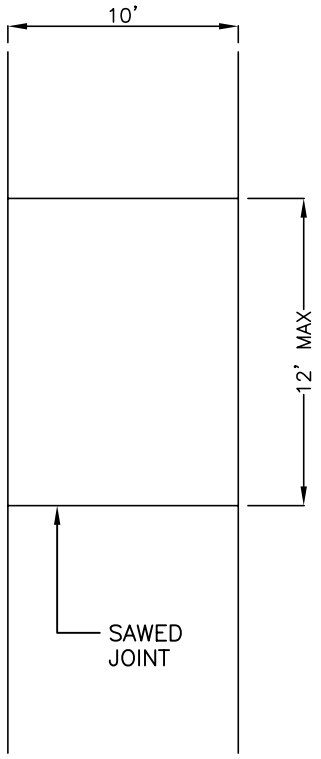
DATE: NOV 2007

SHEET # 2 OF 2

DRAWING #: 4-23



CROSS SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

NOTES:
1. CONCRETE SHALL BE CLASS "A".
2. PROVIDE SAWED TRANSVERSE JOINTS, 1" DEEP AT 12' SPACING.
3. SURFACE FINISH SHALL BE TRANSVERSE MEDIUM BROOM FINISH.
4. APPLY CURING COMPOUND PER THE STANDARD SPECIFICATIONS.

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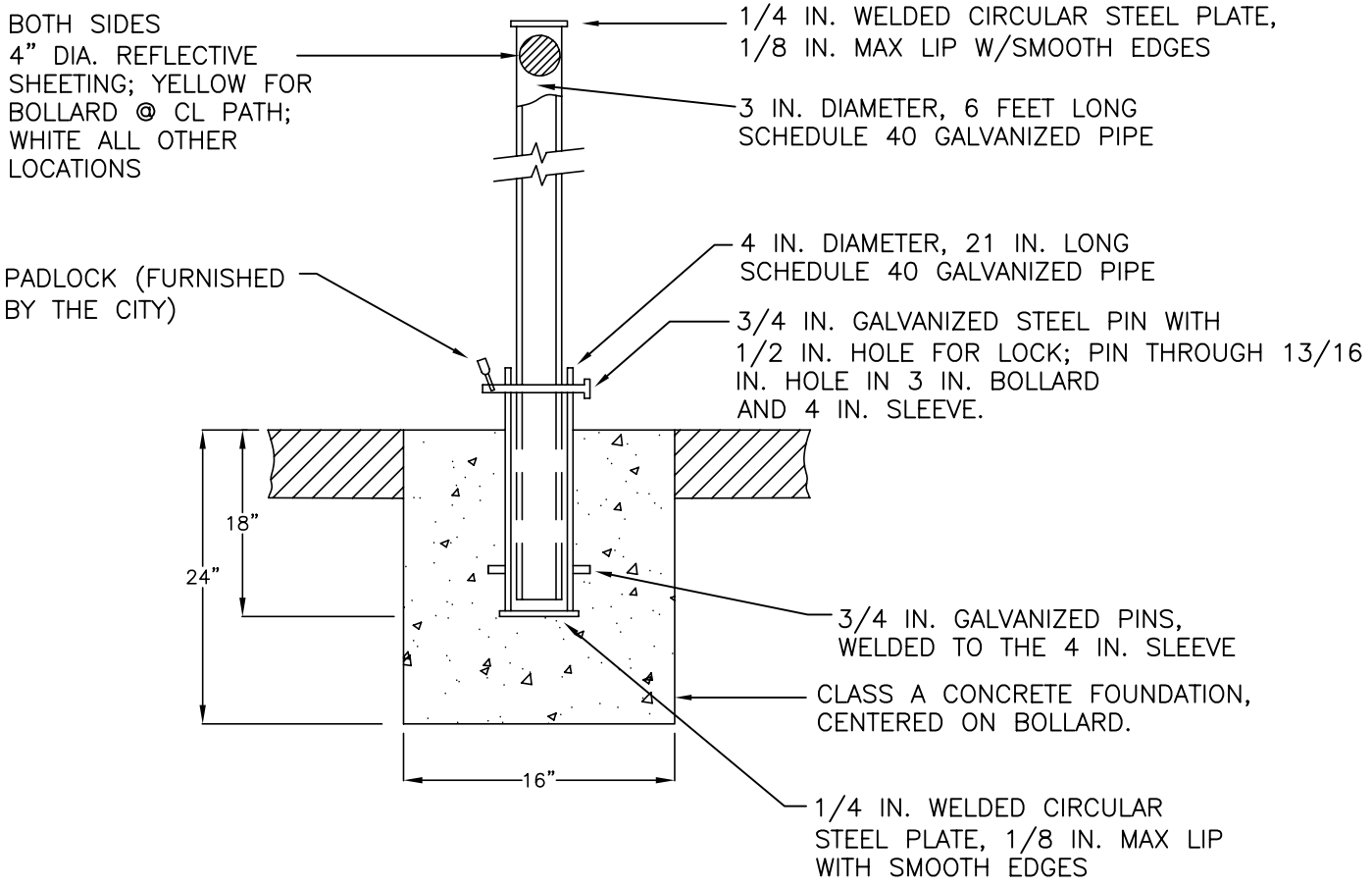
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
BIKE PATH – OFF STREET	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–24



NOTES

1. BOLLARD AND SLEEVE SHALL BE SPRAY PAINTED WITH 2 COATS OF HIGH GLOSS WHITE RUST INHIBITIVE PAINT ON TOP OF 1 COAT OF PRIMER.

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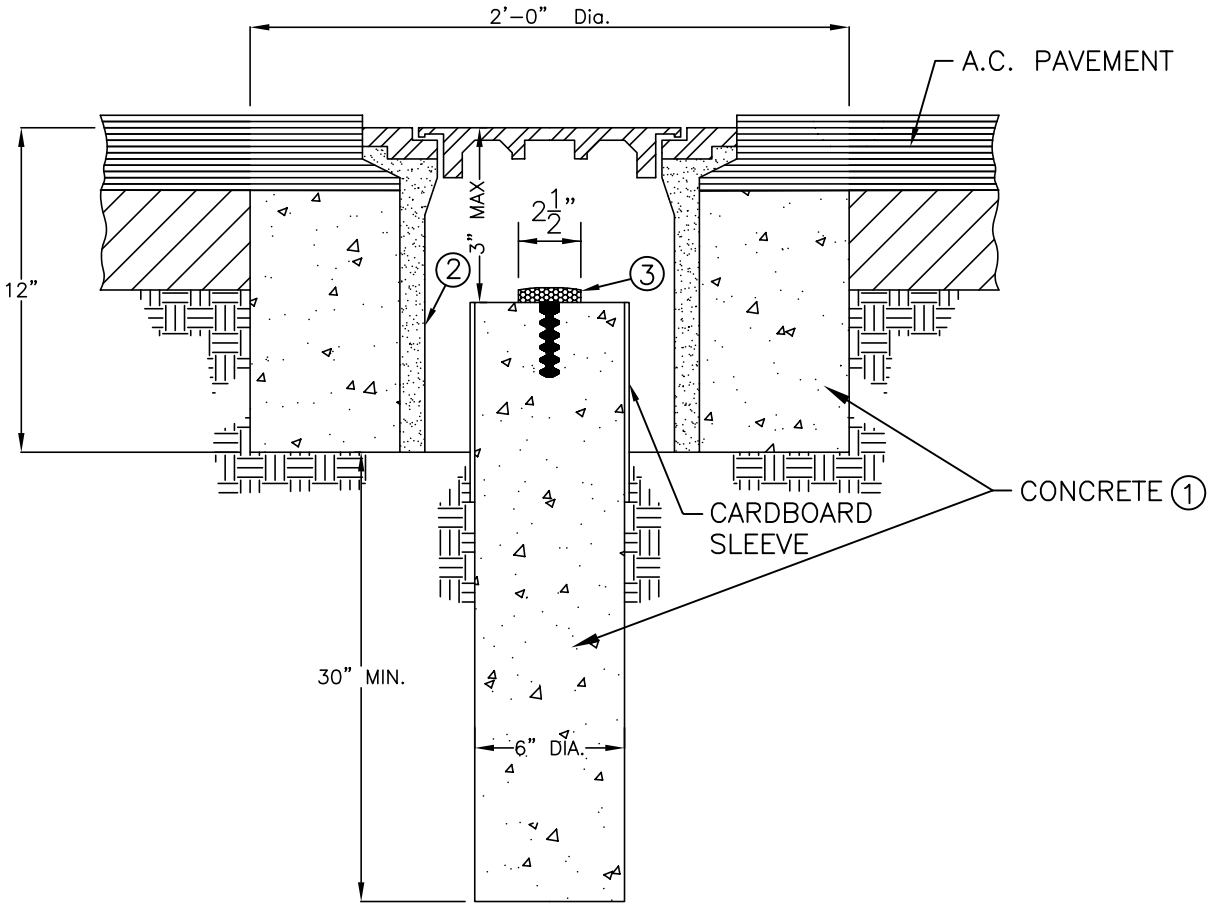
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
REMOVABLE BOLLARD	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–25



MONUMENT CROSS SECTION

NOTES:

1. CONCRETE SHALL CONFORM TO CLASS "A" PER CONSTRUCTION SPECIFICATIONS.
2. MONUMENT FRAME & COVER SHALL BE CHRISTY G5 TRAFFIC VALVE BOX OR APPROVED EQUAL. LID TO BE MARKED "MONUMENT".
3. SURVEY MARKER SHALL BE LIETZ 8134–16, SERVICE CO. 287–C OR APPROVED EQUAL.
4. THE C.E. OR L.S. NUMBER MUST APPEAR ON THE SURVEY MARKER.
5. MARK REFERENCE POINT WITH A "+" CLEARLY SCORED TO A DEPTH OF 1MM±.

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City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
MONUMENT IN BOX	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 4–26

SECTION 7.

SANITARY SEWER DESIGN

7-1 DESIGN CRITERIA

These Improvement Standards are minimum design criteria. The Actual design parameters must be established by the designer based on site-specific conditions. These Improvement Standards shall also apply to any privately owned and maintained system serving 4 or more residential units or any commercial or industrial uses. Each property owner is responsible for the installation of a collector sewer across their property and/or frontage that will serve all upstream uses within an upstream service area. All connections shall comply with the City of Colusa Municipal Code regarding fees and other requirements. All new sewer systems shall also comply with the City of Colusa Wastewater System Master Plan.

7-2 FLOW DETERMINATION

Flow determination shall be based upon the approved zoning, existing land uses or General Plan land use designations, whichever produces the greatest flow. The minimum population density used shall be based on the latest US Census Tract data for single family residential housing. Design flows shall be calculated using the following data:

Land Use	Unit	Population Density	Flow Generation	Minimum Average Daily Flow	Peaking Factors[1]
		# per unit	Gallons per day	Gallons per acre-day	
Single Family Residential	Residence	3.5	90 per person	-	3
Multi-Family Residential	Residence	3.0	90 per person	-	3
Commercial, Office	Acre			2,500[2]	2-4[2]
Central Business District	Acre			3,500	3
Light Industrial	Acre[2]			2,000[2]	2-4[2]
Heavy Industrial	Acre[2]			3,000 – 5,000[2]	2-4[2]
Recreation and Parks	Acre			200	
Elementary School	Student		50 gal per student day	(25,000 gpd)	3
Middle School	Student		50 gal per student day	(30,000 gpd)	3
High School	Student		60 gal per student day	(45,000 gpd)	3

1: Peaking Factors may be increased or decreased based on flow peaking studies for trunk mains and pumping stations.
2: Subject to review and confirmation of intended uses and waste generation rates. Industrial uses may require private pre-treatment and/or peak reduction facilities.

7-3 DESIGN FLOW CRITERIA

Design flow shall be calculated using the average flow for the upstream service area, as described above and used in the design flow equation. The following formula will be used along with the above tabular values for calculating the average flow design flows unless more current design criteria is available through Master Plan updates:

Design Flow = [Average Daily Flow X Peaking Factor = (PDWF)]

+ Infiltration/Inflow (I/I) allowance (600 gallon per acre-day minimum)

= Peak Wet Weather Flow (PWWF)

7-4 PIPE CAPACITY, SLOPE, VELOCITY, SIZE, DEPTH AND MATERIAL:

A. **Size** - The minimum size collector sewer shall be eight inches in diameter unless otherwise approved by the City Engineer.

B. **Slope and Velocity** - Manning's formula shall be used to determine the relation of slope, design flow, velocity, diameter, and "n" value. The "n" value shall be 0.013 for all pipe materials.

1. The following is a table of minimum slopes and maximum design flow capacities for various pipe diameters. Pipe slopes that are less than those listed in this table shall not be used without the approval of the City Engineer. The slopes indicated are based on a velocity of two feet per second with the pipe flowing half full. The design capacity represents the flow rate with the pipe flowing full at the corresponding minimum slope. The Contract Engineer shall utilize these parameters to properly size the system.

Inside Diameter (Inches)	Minimum Slope	Design Capacity (mgd)
8”	0.0035	0.46
10”	0.0025	0.71
12”	0.0020	1.0
15”	0.0015	1.6

2. Mains larger than 12-inches in inside diameter may be designed to flow full unless direct service sewer connections are planned; in which case the 0.7 diameter maximum depth shall govern.

C. **Capacity** - Pipe capacity, in all cases, shall be adequate to carry the design flow from the entire tributary area, even though said area is not within the project boundaries.

D. **Depth** - In the design of a system, one of the controlling conditions shall be that the collector system is to be at sufficient depth to provide a minimum slope for the service sewer of 1/4 inch per foot (or 2%), at the same time maintaining a minimum cover of 12 inches at any buildable location within the properties to be served, and a minimum of four feet (4’) of cover at the right of way line, except that the depth shall be increased to five feet (5’) when a water main is installed behind the curb.

Minimum depth of new sewer collectors or mains shall be 6 feet from finish grade to top

of pipe. Minimum depth for sewer services or laterals shall be 5 feet from top of curb to invert of pipe at the curb line. The minimum depths may be reduced if it can be shown that on the basis of total life cycle costs it is in the best interests of the City, subject to review and approval by the City Engineer. In reduced cover situations, design of the pipe trench section and selection of pipe materials shall be as approved by the City Engineer.

E. **Material** - Pipe material shall be as approved by the City Engineer, and shall conform to the requirements of the City of Colusa Standard Construction Specifications. Pipe materials, which will normally be considered, are as follows:

1. Vitrified Clay, Bell and Spigot Pipe conforming to the provisions the City of Colusa Standard Construction Specifications.
2. Ductile Iron Pipe conforming to the provisions of the City of Colusa Standard Construction Specifications for pipelines 12 inches in diameter and less.
3. PVC lined Reinforced Concrete Pipe (18" diameter and larger only) conforming to the provisions of the City of Colusa Standard Construction Specifications.
4. Polyvinyl Chloride (PVC) C900 DR 14 conforming to ASTM D1784 or Polyvinyl Chloride Pipe (PVC) SDR 26 conforming to ASTM 3034 and 679. The Developer and/or design engineer shall request the use of this pipe material in writing. The requests shall be accompanied by either soil testing information or a letter from a Soils Engineer stating that the native soils on the project site within the area of the pipe zone will have a minimum soils reaction modulus (E') of 150 psi. Pipe deflection calculations shall also be submitted. This type pipe, when allowed, will be permitted in residential subdivisions only.
5. Other fiber reinforced polymer pipe materials may be required for pipes 18" diameter or larger.

7-5 GROUNDWATER REQUIREMENTS

A Geotechnical Investigation Report with groundwater handling or design recommendations shall be required for all plans installing public sewer facilities or private sewer systems constructed within seasonal or year round groundwater tables.

7-6 SEWER LOCATIONS AND ALIGNMENT REQUIREMENTS

A. **General** - All public sanitary sewers shall be placed within rights of way dedicated for public streets unless the use of easements is specifically approved by the City Engineer. In some streets, dual collectors may be required.

There shall be a minimum horizontal clearance of ten feet between parallel water and sanitary sewer mains and the water main shall be higher than the sewer. On crossings, the water main shall be at least 12 inches above the sewer main. If a sanitary sewer force main must cross a water main, the requirements of Section 8-14.B shall apply.

B. **Location in New Subdivision** - In new subdivisions, sewers shall be located six feet south or east of street centerlines within minor and primary streets. If a street loops 180 degrees or more it is not necessary for the collector sewer to cross to the other side of the street to meet this requirement.

C. **Location in Existing Streets** - When sanitary sewers are to be installed in an existing street, factors such as curbs, gutters, sidewalks, traffic conditions, traffic lane conditions,

pavement conditions, future street improvements plans, and existing utilities shall all be accommodated in the design.

D. **Easements** - Easement necessary for the construction of sewer facilities shall be constructed in accordance with Section 9.5.E.1 of this Improvement Standard.

Temporary working easements of adequate dimensions shall be provided to allow the construction within the permanent easement to be completed in a safe and reasonable manner.

E. **Water Well Clearance** - No sanitary sewer interceptor, trunk main, collector, or service shall be placed nearer than 100 feet to any water well, public or private, unless the well has been abandoned in full accord with the Colusa County Environmental Health Department requirements, or the location otherwise approved, in writing, by the appropriate regulatory (State and/or County) agencies. If a clearance of less than 100 feet is approved, all pipes within that distance from the well shall be of material approved by the City Engineer. In no case shall a clearance of less than 50 feet be allowed.

F. **Alignment** - Alignment of all sewer pipe and structures shall be designed to provide a minimum one foot clearance from all other utilities and/or improvements, unless otherwise approved by the City Engineer.

1. Horizontal alignment shall be parallel to the street centerline wherever possible. Minimum radius for sanitary sewers 8 inches through 12 inches in diameter shall be 200 feet. A larger radius shall be used wherever practicable or where necessary to avoid joint deflection in excess of 80% of the pipe manufacturers' recommended maximum. Only factory joints will be allowed. Curve information shown on the plans shall include pipe radius (if not concentric with street centerline), sub-tended angle, length, and if needed, maximum pipe lengths.
2. Vertical alignment shall provide a constant slope between manholes. If a change in grade is necessary, construction of a manhole shall be required unless the City Engineer approves the use of a vertical curve. In such case, elevations shall be shown at ten-foot intervals throughout the length of the vertical curve. Joint deflections in excess of 80% of the pipe manufacturers' recommended maximum will not be allowed. Only factory joints will be allowed.

7-7 TRENCH LOADING CONDITIONS AND PIPE DESIGN

A. **Rigid Conduit Loading** - On rigid conduits, Marston's formula shall be used to determine the load placed on the pipe by backfill. The procedure for rigid pipe is described in the ASCE Manual and Report of Engineering Practice 60, the Clay Pipe Engineering Manual, and in similar handbooks. In the absence of specific soils data, as determined by a Geotechnical Engineer, a soil weight of 120 p.c.f. and a kμ factor of 0.110 shall be used.

B. **Safety Factor** - On rigid conduits, a safety factor of 1.25 shall be used for reinforced concrete pipe, and 1.5 for all other rigid pipe. Only the three edge bearing strength, per ASTM test methods C 76 “Reinforced Concrete Culvert, Storm Drain and Sewer Pipe” and C655 “Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe”, of the pipe shall be used in the computations for rigid pipe.

C. **Flexible Conduit Loading** - On flexible conduits, Marston's formula for flexible conduits as shown in the ASCE Manual and Report of Engineering Practice No. 60 and in other similar handbooks shall be used to determine the load placed on the pipe by the

backfill. The maximum load allowable shall be determined by pipe deflections computed by the Iowa Deflection Formula (or Spangler's Formula). The soils reaction modulus (E') shall be estimated using a method acceptable to the City Engineer, and shall consider the modulus values of both the native and the bedding materials (ATV method). The bedding soils reaction modulus (E') used in the deflection calculation shall be 1,000 psi for Type II and Type IIA bedding, utilizing imported material to twelve inches above the top of the pipe. Deflection lag factor shall be 1.5. In the absence of specific soil data, as determined by a Soils Engineer, a soil weight of 120 p.c.f., a kμ factor of 0.110, and a bedding constant of 0.110 shall be used. Placement of flexible conduit within soils equivalent to Class V and types MH and CH of Class IV ASTM D2321 material will not be permitted unless approved by the City Engineer.

D. **Allowable Deflection** - On flexible conduits, the maximum allowable designed deflection shall be 3% of the nominal inside diameter. Maximum in place deflection as measured no less than 30 days after installation shall be 5%. Deflection shall be measured by passing a certified mandrel the length of the installed pipe after completion of all backfill and compaction operations, including testing. Computations shall be submitted showing the ability of the conduit to withstand local buckling unless the design conforms to these standards.

E. **Bedding and Initial Backfill** - Bedding types and factors shall conform to Standard Drawing 7-4. Bedding and initial backfill type shall be as necessitated by height of cover over the pipe, trench width, pipe strength, and other factors used to determine safe pipe loading.

Special attention shall be given to backfill requirements for pipe located in State rights-of-way and for pipe placed in areas where trench width is excessive, such as in the vicinity of bore pits. See Section 7-13 regarding this condition. Any special backfill requirements shall be noted on the plans.

Unless otherwise noted on the plans, bedding and initial backfill for all pipe sizes shall be Type II, with trench widths subject to limitations set forth in Standard Drawing 7-4 and in the Standard Specifications. The minimum trench width for all rigid pipes shall be pipe O.D. plus 12 inches.

Bedding and initial backfill for flexible conduit shall be Type II Alternate utilizing imported material to twelve inches above the top of the pipe. Placement of native material, between springline and twelve inches above the top of pipe will not be permitted. The minimum trench width for flexible pipe shall be pipe O.D. plus 24 inches.

Type III and IV bedding and initial backfill are intended primarily for emergency field conditions. Their use shall normally not be specified on the plans and shall require specific written approval of the City Engineer before use. Type III and IV bedding and initial backfill shall not be used with flexible pipe materials.

F. **Special Pipe Strength Requirements** - Ductile iron, or other high-strength pipe approved by the City Engineer, shall be used whenever cover is greater than 25 feet, or extra support strength is required (such as to resist traffic loading). Ductile iron pipe, Class 200 (DR-14) PVC pipe conforming to the requirements of AWWA C900, or other high-strength pipe approved by the City Engineer, shall be used whenever cover is less than four feet, or insufficient clearance exists between the sewer pipe and rigid or load transmitting structures.

G. **Design Guide** - Tables which relate cover, pipe diameter, trench width, bedding and initial backfill type for vitrified clay pipe according to the procedures contained in these Standards, are provided on Standard Drawing 7-4.

7-8 MANHOLE CRITERIA

A. **General** - Manholes shall be placed at all intersections of sanitary sewer mains, at the end of any main terminating in a cul-de-sac, at the end of all permanent mains 120 feet or more in length, and at the end of any temporary main more than 200 feet in length. All manholes from which sewer main extensions are anticipated shall have a pipe stub installed at the grade and in the direction of the anticipated extension. Summit manholes connecting two sewer collectors are not acceptable. Manholes in PVC collector systems shall be located to reduce or eliminate the need to curve the collector pipes.

B. **Spacing** - Maximum spacing of manholes shall be 400 feet for all straight mains of ten-inch diameter or less. A main with a radius greater than 400 feet shall be considered as straight for purposes of this section. Manhole spacing on mains, which are on a continuous curve of 200-foot radius (minimum allowable) shall be 200 feet. Manhole spacing on curved mains of radius between 200 and 400 feet, or where only a portion of the main is curved, shall be adjusted proportionately. Reverse curves require a manhole at the point of tangency between the curves. A manhole shall be required at any change in slope (vertical alignment), unless the use of a vertical curve is approved by the City Engineer. A manhole shall be placed at any angular or abrupt change in horizontal alignment.

C. **Elevation Criteria** - When two mains of the same size enter a manhole such that the flow of one must change direction more than 20 degrees, or if flow in a single main must change direction more than that amount, the invert grade at the exit must be at least 0.10′ below that of the entrance pipe or, as a maximum, the crown of the exit pipe shall match the invert of the entrance pipe. If the pipes entering and exiting any manhole are not of the same size, the minimum invert elevation differential shall be based on pipes matched crown to crown. The maximum invert elevation differential shall be based on the invert of the entering pipe matching the crown of the exit pipe. Drop connections are not governed by the above elevation requirements.

D. **Construction Requirements** - Manhole construction shall conform to the provisions of Standard Drawings 7-1 to 7-3.

   If the distance from the crown of the pipe to the top of the rim is less than 6.9′ but greater than 5.7’, an 18-inch high cone shall be used. Manholes shall use flat slab tops that have through mains and less than 5.7′ from the crown of the pipe to the rim. The plans shall note that the frame on manholes located in unimproved areas shall be set 1.0′ above existing ground level.

   Manholes for flexible conduit shall be designed such that flexing of the pipe does not result in infiltration or exfiltration at the interface between manhole and pipe. The City Engineer may require specially designed flexible boots or integrally cast bells. Pipe material, which does not provide adequate bonding between pipe and manhole, may similarly require special designs.

E. **Vacuum Testing** - shall be performed per ASTM C 1244 on all manholes.

7-9 DROP CONNECTION CRITERIA

Drop connections shall be avoided when possible. Drops will be required when adjacent parallel sewer pipes tie into the same manhole. Drop connections shall conform to Standard Drawing 7-3. The inside drop connection shall be used for four-inch through ten-inch diameter collectors, and services. There shall be only one inside drop connection of nominal diameter no greater than 6" into a four-foot diameter manhole. Larger diameter manholes may be required. Whenever possible, the slope of the incoming main shall be increased to eliminate the need for the drop.

7-10 FLUSHING BRANCH CRITERIA

A flushing branch may only be used at the end of a collector less than 200 feet in length if the collector extends to a subdivision boundary and if there are definite plans for its extension. If a collector extends to a subdivision boundary, is planned for definite extension, and has no service sewer connections, it may be capped. Flushing branches shall conform to Standard Drawing 7-8.

7-11 SERVICE SEWER DESIGN

A. **General** - Service sewers shall conform to Standard Drawing 7-7 and shall be constructed normal to or at right angles to the lateral unless otherwise approved by the City Engineer. The service sewer shall extend from the collector sewer to the edge of public right of way or edge of easement. Service sewers shall extend one foot beyond the edge of the pavement of any private road and easements of adequate width to accommodate the services shall be obtained. A plan and profile of any service sewer shall be supplied to the City Engineer upon request. Construction of the cleanout to grade for all sewer services is required. Construction of the top 1 foot of the cleanout riser may be delayed until the installation of the building sewer at the option of the developer, except where other utilities are to be installed at the back of the sidewalk (refer to Note 10: Standard Drawing 7-7). If construction of the top 1 foot of the riser is delayed, the location shall be accurately staked with a 4"x 4" post.

   The location of all sanitary sewer services shall be permanently marked with an "S" impressed in the top of concrete curb.

B. **Sizing** - Normal service sewer size is four inches for residential and six inches for multi-family or commercial. Six-inch or larger service sewers shall serve schools and other developments expected to contribute high sewage flows. In addition, service sewers shall be sized according to requirements of the Uniform Plumbing Code, and as determined by the design engineer. If the service sewer and collector are of the same size, a manhole must be constructed. If the collector is larger than the service sewer, a factory fitting at the connection is satisfactory. Service sewer connections to trunk pipelines will not be allowed.

C. **Connection Limitations** - Service sewers shall not directly connect to sewer mains designed to flow full or to mains more than 16 feet in depth without the approval of the City Engineer.

D. **Material** - Tees, wyes and services shall be of the same material as the collector to which it connects.

E. **Location** - When sanitary sewers are constructed as part of new subdivision improvements, a service sewer shall be constructed to each lot. In new subdivisions or developed areas, unless specifically requested otherwise in writing by the property owner or Consulting Engineer, service sewers shall be placed on the low side of any subdivision lot or similar parcel with two percent or greater slope across the front. Otherwise, the

sewer service shall be placed in the center of said lot or parcel. Consideration shall be given to trees, improvements, proposed driveways etc., so as to minimize interference when the service sewer is extended to service the house. If the property is located such that service is available both to a main located in an easement and also in right of way, service shall be to the latter location unless otherwise approved by the City Engineer. No service sewer shall be place in locations where future on site construction will result in the main being in proximity to a water well, water main or service that could violate applicable health standards.

F. **Depth** - The Consulting Engineer shall verify the adequacy of the normal service sewer depth at the edge of easement or right of way to serve the intended parcel. A depth of six feet to crown of pipe, measured from existing ground surface or edge of adjacent roadway, whichever is lower, shall be considered normal service sewer depth, except under conditions on Standard Drawing 7-7. Whenever greater depth is required, the Consulting Engineer shall designate the invert elevation of the service sewer at the edge of the right of way or easement on the construction plans. If a joint trench is being utilized for other utilities, the Consulting Engineer shall indicate on the plans that a Joint trench will exist and shall adjust service elevations as necessary. It shall be the responsibility of the Consulting Engineer to arrange for coordination of the grade of utilities located in the joint trench and the service sewers.

G. **Service Requirements in Developed Areas** - In developed areas, a service sewer shall be provided to each legal parcel containing a source of sewage and having a property line less than 200 feet from a collector. A property owner's request for service location shall be honored whenever practicable. Parcels, which have two or more sources of sewage, must have an independent service sewer provided to each sewage source. A service sewer shall be provided to each subdivision lot or lot similar as to size and possible development. At an early stage of design, the Consulting Engineer shall send every property owner affected by the proposed work a questionnaire requesting, in writing, the owner's preferred service sewer location. In absence of a response to this questionnaire, the Consulting Engineer shall provide a service sewer as required by this Section. In addition, when service sewers are staked prior to construction, each property owner shall be notified that they should give consideration to the staked location of his service sewer and, if not satisfactory, immediately notify the Consulting Engineer. The date of notification, nature of change, and other pertinent information shall be recorded. Compilation of this information shall be the responsibility of the Consulting Engineer and the information shall be furnished to the City Engineer upon request.

7-12 CREEK CROSSING DESIGN

Advance approval of the City Engineer and of other appropriate agencies is necessary prior to initiating design. Copies of required permits shall be provided to the City Engineer prior to approval of the plans.

A. **General** - In all cases, the proposed future creek bed elevation shall be used for design purposes. Crossing details of pipe, piers, anchorage, transition couplings, etc., shall be shown upon a detail sheet of the plans in large scale.

B. **Design** - Calculations shall be submitted which clearly indicate the design of the pipe and supports regarding impact, horizontal and vertical forces, overturning, pier and anchorage reactions, etc.

C. **Construction and Material** - For collector sizes twelve inches (12”) and smaller, ductile iron pipe or other pipe material as approved by the City Engineer shall be used under the

full creek width, plus ten feet each side, unless the pipe is four feet or more below the creek bed elevation. For main sizes twelve inches and larger, pipe used shall be as directed by the City Engineer. Special care shall be taken to provide a firm base for the pipe bedding. The plans shall specify that all soft or organic material within the creek banks shall be replaced with select imported backfill. In addition, the pipe shall be encased in concrete or soil cement shall be used to protect the pipe for the full width of the creek. Unless otherwise directed a clay soil plug shall be required at the top of the pipe at the downstream side of the crossing. The plug shall be a minimum of four feet in length, shall extend the full width of the trench, and shall extend twelve inches above and below the pipe or as approved by the City Engineer.

If the pipe must cross above the creek bed, ductile iron or welded steel pipe shall be used. Steel pipe may be cement lined and coated, fusion epoxy lined and coated, or glass lined; the City Engineer shall specify or approve the type of coating and lining specified, and the gauge, class, or thickness of the pipe.

Reinforced concrete piers of adequate depth shall be located as necessary for adequate support of the pipe. The pipe shall be held in cylindrical cradles, formed in the pier tops, by galvanized steel straps, with galvanized anchor bolts of adequate size. Cushion material shall be placed between the pipe, clamps, and support. The invert elevation at the point of maximum deflection of the suspended pipe shall be invert of the pipe at its downstream support. Seismic forces and response shall be accounted for in the support structure and pipeline design.

7-13 BORING AND JACKING REQUIREMENTS

Where use of conductor casing is specified, the casing shall be corrugated steel pipe, reinforced concrete pipe, or welded steel pipe. The casing shall be of sufficient diameter to allow dry sand to be blown into the void between the carrier and the conductor and to allow adjustment of the carrier pipe to grade. Normally, an inside diameter of at least eight inches greater than the outside diameter of the couplings of the carrier pipe is appropriate. Welded steel conductor pipe shall have a minimum wall thickness of ¼ inch for sizes up to and including 24 inches in diameter and 5/16 inch for sizes 27 inches to 36 inches in diameter. Every R.C.P. conductor must be designed for the loading condition and, if jacked, the additional loading imposed by the jacking operation.

Direct dry boring of reinforced concrete pipe and of the portion of sewers and service sewers, which pass beneath curbs and gutter, sidewalks, and other obstructions, up to a maximum length of 15 feet, is permissible. Six-inch and smaller pipelines may be installed by wet boring where approved by the City Engineer. Pipe material used in the small size dry and wet bores shall be ductile iron pipe, or Class 200 (DR-14) PVC pipe conforming to the requirements of AWWA C900. Installation and other material specifications shall conform to the requirements of the Standard Specifications.

Backfill in bore pits shall be given special attention with respect to preventing structural failure of the pipe entering or exiting the conductor, and adequate bedding and initial backfill shall be specified.

7-14 PUMP STATION AND FORCE MAIN REQUIREMENTS

Every phase of pump station design, including force mains, shall be closely coordinated with and shall be under the direction of the City Engineer. Pump station features shall include, but not be limited to, buried non-corrosive wet well, duplex (fully redundant) submersible pumps & motors, above ground weather proof enclosure for automated controls, telemetry, power supply, backup

generator, all weather access, sulfide related corrosion control or reduction, life cycle cost analysis of proposed features, etc. Force Main features shall include, but not be limited to, non-corrosive pipe materials, pipe routing, exit manhole sulfide related corrosion control or reduction, life cycle cost analysis of proposed features, etc. For purposes of life cycle analysis cost, the minimum service life of facilities shall be 50 years.

7-15 SEWER IMPROVEMENT PLAN REQUIREMENTS

Plans for the construction of sanitary sewers whether in conjunction with other improvements or for a sewer project only, shall conform to the following standards, as well as other standards contained in the General and Plan Sheet Requirements of these Improvement Standards.

D. **General Requirements** - All information, which, in the opinion of the City Engineer, is necessary for the satisfactory design, review, construction, and maintenance of a project shall be provided and, where applicable, shall be shown on the plans.

   A parcel or area which benefits from and financially participates in a sewer construction project, but is not included within the project boundaries, shall have a note to this effect placed on the layout map and on the plan and profile sheet if the parcel appears thereon. Parcels, which make use of those facilities, may be subject to additional fees at the time of connection, if the participation has not been so noted.

E. **Plan and Profile Sheets** - Sewers shall be shown on the Project Street Improvements Plan and Profile sheets. The following standards, with respect to drafting and the information to be included on the plan and profile sheets, generally apply to projects in developed areas. In new subdivisions, only the requirements that are applicable shall apply.

   1. Sewer mains to be constructed shall be indicated on the profile by parallel lines spaced by one pipe diameter. Manholes shall also be indicated by parallel lines spaced according to scale. Slope shall be printed immediately on half inch above and preferably parallel to, the pipeline, or between the parallel lines. The length, size, and type of pipe material between each manhole shall be printed parallel to the horizontal grid lines between manholes. All pipe-inverts at manholes and other structures shall be indicated on the profile. All manholes, manholes with drop connections, flushing branches, or other appurtenances shall be noted on the plan and profile with stationing. Cone heights other than standard, shall be clearly labeled for those manholes requiring the shorter cones due to lack of available depth. Existing facilities shall be shown in profile using dashed lines or shaded lines.

   2. In improved areas, the location of each service sewer proposed to be constructed shall be indicated on the plans by stationing, or by reference to a permanent, well-defined structure, if available. In new subdivisions, the service sewers shall be located by stationing unless the situation exists, such as at the end of a cul-de-sac, where stationing is not an adequate description of location. In such cases a dimension to a lot line may be used. The invert elevation of the service sewer at its upstream end shall be shown on the plans whenever the service is not at standard depth. Standard depth shall conform to the conditions set forth on Standard Drawing 7-7.

      Improvements or lots shown on a plan sheet but served to a main shown on

another plan sheet shall have the direction of service shown by a small triangle and letter "S".

3. Permanent and working (temporary construction) easements shall be shown to scale on the plans. Easement dimensions shall be given and each easement shall be tied to the property line and the sewer main. Each permanent easement shown on the plans shall be identified by a box or table, on the same plan sheet, which gives the property owner's name and the book and page number in which the easement is recorded. The Consulting Engineer shall provide the book and page number.
4. Proposed sewer mains shall be adequately dimensioned from street centerline. If the sewer is to be located outside of the right of way, sufficient dimensions and bearings from an approved horizontal control shall be shown on the plans to locate the main in the field.
5. Indicate the limiting maximum trench width, as measured at the top of the pipe, on the plans between well-defined points of application, the pipe material and class, if more than one class is available; and the bedding-backfill type. If more than one combination of pipe material or class, maximum limiting trench width, or bedding type is available, a practical range of such combinations shall be shown on the plans.
6. Any other existing or proposed gas, electric, water, storm drain, etc., shall be determined and accurately shown on the plans. The location of any utility line which is parallel to and within five feet of the sewer main or which crosses the sewer main at an angle of 30 degrees or less shall be determined with an accuracy of 1.0± foot and the clearance shown on the plans.
7. Trees, aerial utilities and other objects within 10 feet of construction centerline shall have their correct location shown on the plans and the clearance from construction centerline shown. The diameter of tree trunks and interfering heavy tree branches shall be noted. Removal of a tree or object, or other special handling shall be noted on the plans. The Consulting Engineer shall assume full responsibility for such notes as it is assumed that he has made all necessary arrangements with the owner of the object to be handled. Written documentation of any special arrangements regarding preservation of property made between property owners and the Consulting Engineer shall be supplied to the City Engineer if no easement document is involved. If an easement is negotiated, all special arrangements are to be included in the easement document. The City Engineer must approve tree removal within public rights-of-way or easements.
8. Culverts shall be shown on both plan and profile when crossed by the construction or when parallel and within 20 feet of the construction line. The size and type of all such culverts shall be indicated and when the culvert crosses or is perpendicular or nearly so and within 20 feet of the construction line, the invert of the culvert end nearest the construction line shall be shown.
9. Addresses of buildings shall be shown on the plan view, within the outline of the building. Only the front line and indication of sidelines of buildings need be shown.

F. **Detail Drawings** - Items of a special nature should be shown with detail drawings, either on the plan sheets, or on a separate detail sheet.

G. **Connection to existing facilities where bypassing or stoppage of existing flow will be required** - When improvement plans require connection to an existing facility which will require bypassing or stoppage of existing flows, a note shall be placed on the plans which provides an estimate of the existing flow to be bypassed (in gpm), or the times between which the flow may be stopped. Contact the Public Works Director to determine the needed bypass flow requirement. A note on the plans shall require the contractor to contact the City Maintenance crews at least one week in advance to schedule the bypass/stoppage operation so that the temporary facilities and equipment can be evaluated for adequacy. Where the operation will be accomplished on a major trunk or interceptor, submittal of a work plan for review will be required prior to initiation of the operation.

7-16 DESIGN OF ON-SITE SEWER SYSTEMS FOR PRIVATE MULTIPLE OWNERSHIP RESIDENTIAL DEVELOPMENTS

The following design requirements shall apply to that portion of the sanitary sewer system within a privately owned multiple ownership development that is "on-site" and is not an outfall sewer for an upstream area, thereby being considered a private system and not subject to maintenance by Agency forces.

A. **Planned Unit Developments and Townhouses** - Residential developments where separate lots and structures are sold. These differ from usual subdivisions in that adjacent land is owned in common and a homeowner's association performs maintenance.

1. General - Sanitary sewers shall meet all requirements for public sewers contained in these Improvement Standards, except as specified below.
2. Manhole spacing - Maximum spacing of manholes on collectors shall be 300 feet for all straight runs of pipe.
3. Wyes - Wyes shall be used for all service sewers connecting to the "on-site" collectors. Tees as shown on Standard Drawing 7-7 are not allowed.
4. Minimum Depth - All collectors located within vehicular traffic areas shall have a minimum cover of five feet to finish grade. Additionally, if the cover over the pipe at any location may be less than two feet at any time after the pipe is installed, ductile iron pipe or Class 200 (DR-14) PVC pipe conforming to the requirements of AWWA C900 shall be installed.
5. Plan and Profile Sheets - "On-site" improvement plans may be prepared without the sanitary sewer profile that is required by these Improvement Standards, unless otherwise instructed by the City Engineer. However, the final "on-site" grades and drainage facilities must be shown on the plans on the same sheet as the plan view of the sanitary sewers. Pipe dimensions shall be shown adjacent to the corresponding pipe section. The use of charts shall not be permitted for pipe dimensioning purposes. Plan sheet sizes shall be as specified in Section 3-2 of these Improvement Standards.
6. Location - Wherever possible, collectors shall be located in areas to be paved.
7. Review and Approval - Plans must be reviewed and approved by the City Engineer.

B. **Condominiums or Cooperative Developments** - Attached residential homes where shares of the total development are sold.

The "on-site" sanitary sewers may be constructed as required by the most current edition of the Uniform Plumbing Code (UPC). These plans will require the approval of the City Engineer.

7-17 MULTI-STRUCTURAL COMMERCIAL AND INDUSTRIAL DEVELOPMENTS

The "on-site" sanitary sewers for all new commercial and industrial developments containing more than one structure shall be designed in accordance with the requirements contained in Section 7-16A of these standards unless otherwise specified by the City Engineer. Any separate building within a multi-building commercial or industrial development shall have its own separate connection to a sewer system designed to public standards.

7-18 SEWER SYSTEM MASTER PLAN (SSMP) FOR A SPECIFIC AREA

Submission of a Sewer System Master Plan (SSMP) for a specific area is required prior to review of the sewer design if there is a possibility that upstream or adjacent areas might require service through the subject property. The plan will fully describe the area to be served by the local collection facilities and the facilities necessary to provide that service.

A. **General Requirements** - In order to develop a SSMP the following information must be accumulated:

   1. Regional Setting
   2. Topographic map of the area to be served
   3. Any specific projects that precipitated the study
   4. Relevant assumptions or special conditions
   5. Existing and proposed development
   6. Ultimate development within the SSMP area
   7. Hydraulic grade line at point of discharge into major facilities

   The flows generated within each sub-service area of the sub-area plan will be calculated in accordance with the procedures contained in these Standards unless otherwise specified by the City Engineer.

B. **Study Map** - The method of providing sewer service to the entire service area, including pipe sizes and slopes, shall be shown to the extent necessary to determine the requirements within the subject property.

C. **Report Preparation**: - In order to insure that all SSMPs are compatible and understandable; they will all be published in the following format.

   1. Section Headings - Each SSMP shall be written with the following sections entitled as follows:

      a. Executive Summary - A concise description of the recommended sewer system, the impacts upon the Regional system, and any special design criteria necessary due to unusual local conditions.

      b. Introduction - A thorough background description of the sewer shed, any specific project(s) which precipitated the study, any special conditions, a vicinity map and a topographic map of the study area

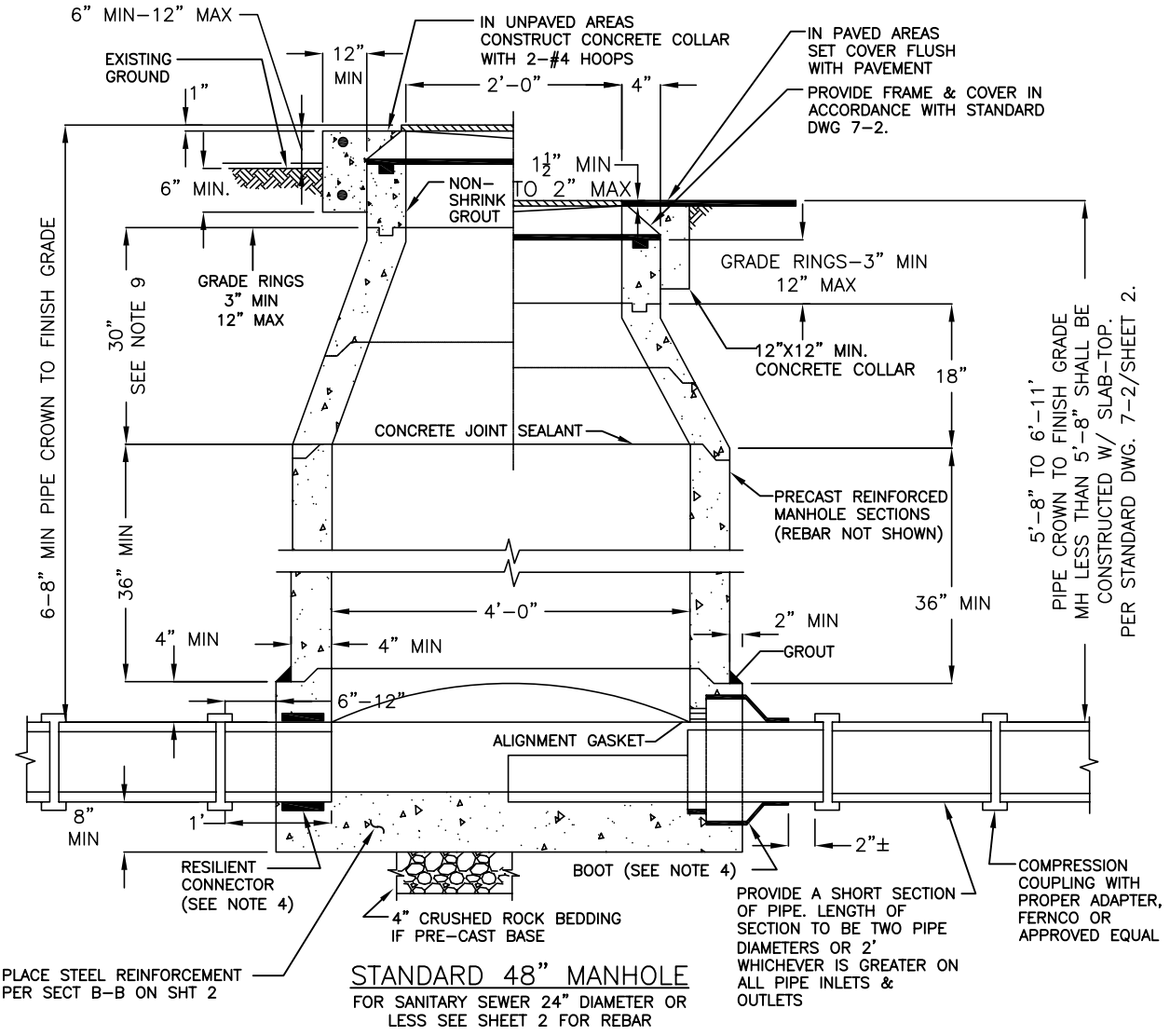
      c. Criteria and Data - All of the information upon which the plan was based shall be delineated in this section in an easily readable manner.

d. Plan description - A map showing the service area, the needed sewer facilities (pipes, slopes, flowlines, depths, and service areas), a spread sheet summary, and verbiage describing the collection system shall be included in this section

e. Appendices - All of the backup information shall be included in an appropriate number of appendices

2. Report Format - The SSMP shall be bound as a single document with appropriate dividers between each section and pockets for all the required maps. The approval block shall be in a highly visible location at the end of the Executive Summary.

Standard Drawings Section 7 – Sanitary Sewer Design		
Drawing	**Sheets**	**Description**
7-1	1 of 3	Standard 48" Sewer Manhole
7-1	2 of 3	Manhole Base, Camera Channel Detail
7-1	3 of 3	Manhole Base, Camera Channel Detail
7-2	1 of 2	Unused
7-2	2 of 2	Ductile Iron Manhole Frame and Cover
7-3	1	Drop Connections
7-4	1 of 2	Sewer Pipe Bedding and Initial Backfill
7-4	2 of 2	Maximum Trench Width for Extra Strength VCP
7-5	1 of 2	Utility Crossing
7-5	2 of 2	Sewer Service Replacement/Repair
7-6	1	Sampling Vault
7-7	1 of 3	Sewer Services
7-7	2 of 3	VCP, ABS or PVC Cleanout to Grade
7-7	3 of 3	VCP, ABS or PVC Cleanout Bedding & Backfill
7-8	1	Flushing Branch
7-9	1	Jacked Casing Detail
7-10	1	Concrete Dam Detail

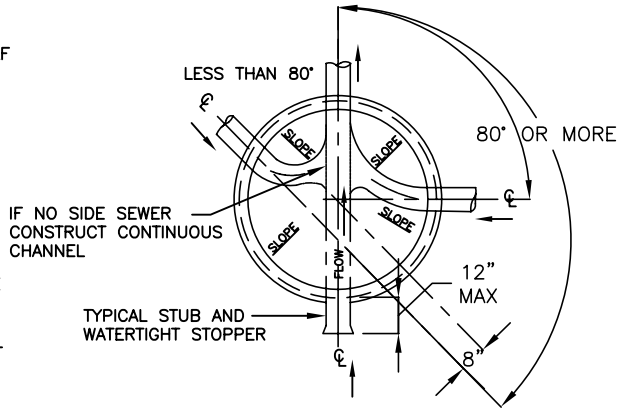


STANDARD 48" MANHOLE

FOR SANITARY SEWER 24" DIAMETER OR LESS SEE SHEET 2 FOR REBAR

NOTES:

1. CLASS A CONCRETE TO BE USED FOR MANHOLE BASES.
2. PIPE SHALL STOP AT INSIDE FACE OF MANHOLE OR SHALL BE CONTINUOUS THROUGH MANHOLE. IF PIPE IS LAID CONTINUOUS, TOP HALF SHALL BE REMOVED BY SAWCUTTING AFTER BASE IS POURED.
3. JOINTS FOR THE BARREL SECTION SHALL BE TONGUE AND GROOVE. ALL LIFTING HOLES SHALL BE SEALED WITH NON METALLIC NON–SHRINK GROUT.
4. FOR PRECAST MANHOLE BASES, CONNECTION OF THE PIPE TO THE MANHOLE SHALL USE A RESILIENT CONNECTOR CONFORMING TO ASTM STANDARD C923 SUCH AS KOR–N–SEAL, A–LOK OR EQUAL.
5. ANY SERVICE SEWER ENTERING A MANHOLE SHALL BE INSTALLED WITH THE INVERT ELEVATION OF THE SERVICE PIPE MATCHING THE CROWN ELEVATION OF THE EXIT SEWER EXCEPT WHEN AN INTERNAL DROP CONNECTION IS USED. IF THE MANHOLE AT THE END OF A CUL–DE–SAC IS CONSTRUCTED WITH A PRE CAST BASE. THE INVERT OF ANY SERVICE STUBS SHALL BE A MINIMUM OF ONE INCH ABOVE THE INVERT OF THE EXIT PIPE.
6. BEDDING FOR PRE CAST MANHOLE SHALL BE SELECT IMPORTED MATERIAL ½" OR ¾" CRUSHED ROCK (4" MIN).
7. THE STANDARD CONE MAY BE PROVIDED AS TWO PRE CAST SECTIONS.
8. FOR ASPHALT CONCRETE OVERLAYS ONLY, MANHOLE WITH DEPTHS OF 8' AND GREATER SPAN (MEASURED FROM THE FLOW LINE TO THE TOP OF CASING) THE MAXIMUM THROAT DEPTH IS 24 INCHES.
9. CUL–DE–SAC MANHOLES OR END OF LINE MANHOLES WITH A DEPTH FROM CROWN OF PIPE TO TOP OF RIM LESS THAN 6.9' BUT GREATER THAN 5.7' SHALL USE 18" HEIGHT CONES.
10. MANHOLES CONTAINING THROUGH MAINS WITH DEPTH LESS THAT 5.7' FROM CROWN OF PIPE TO TOP OF RIM SHALL USE FLAT SLAB TOPS.



PLAN VIEW

48" MANHOLE SHOWING INTERSECTING SEWERS

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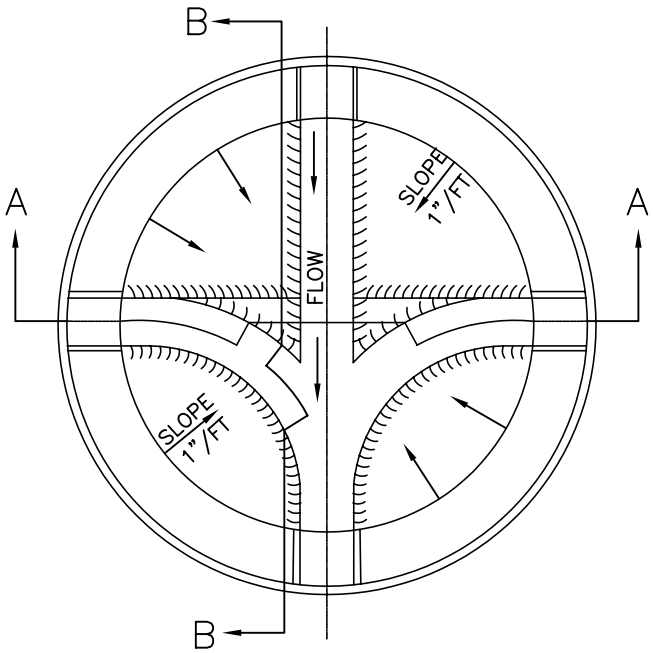
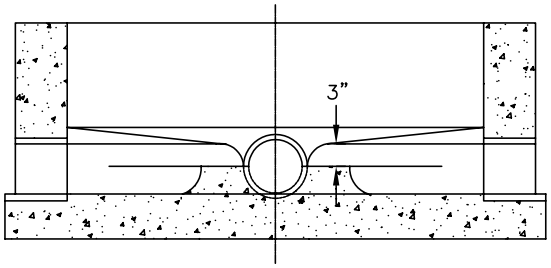
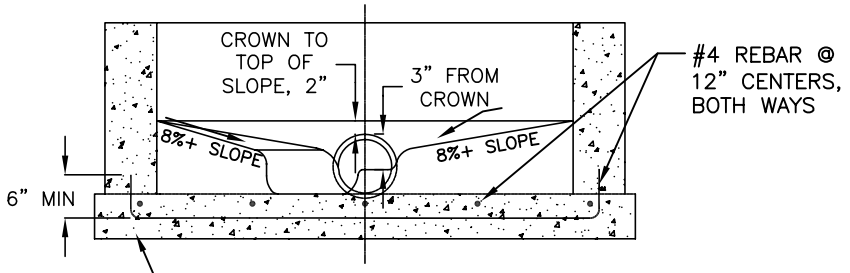
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
STANDARD 48" SEWER MANHOLES	SHEET # 1 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7–1

CAMERA CHANNEL REQUIRED FOR
ALL 8" AND 10" LINES (SEE SHT 3, THIS DETAIL)





SECTION A–A



SECTION B–B

CONCRETE BASE MAY BE CAST–IN–PLACE AND POURED AGAINST UNDISTURBED MATERIAL OR PRE CAST AND PLACED ON 4" MIN OF CRUSHED ROCK PLACED OVER UNDISTURBED MATERIAL

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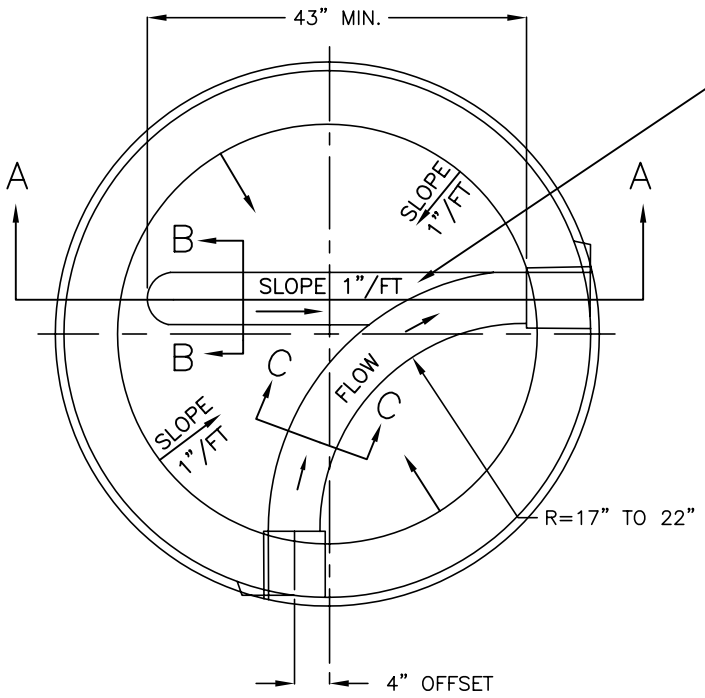
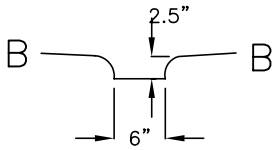
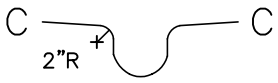
MANHOLE BASE CAMERA CHANNEL DETAIL	SHEET # 2 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7–1



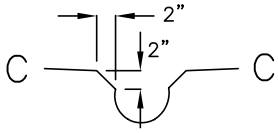
CONSTRUCT CAMERA CHANNEL FOR ALL 8" AND 10" LINES

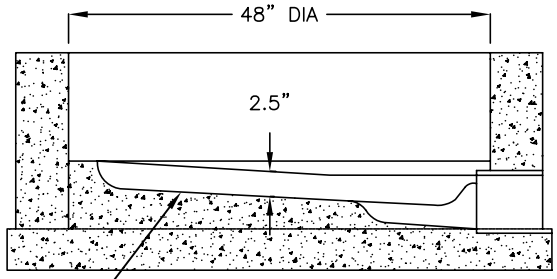
FOR 8" LINE ONLY
FOR 10" USE SECT C–C





OR





CAMERA CHANNEL

SECTION A–A

REBAR PATTERN PER SHT 2 OF 7–1, SECTION B–B

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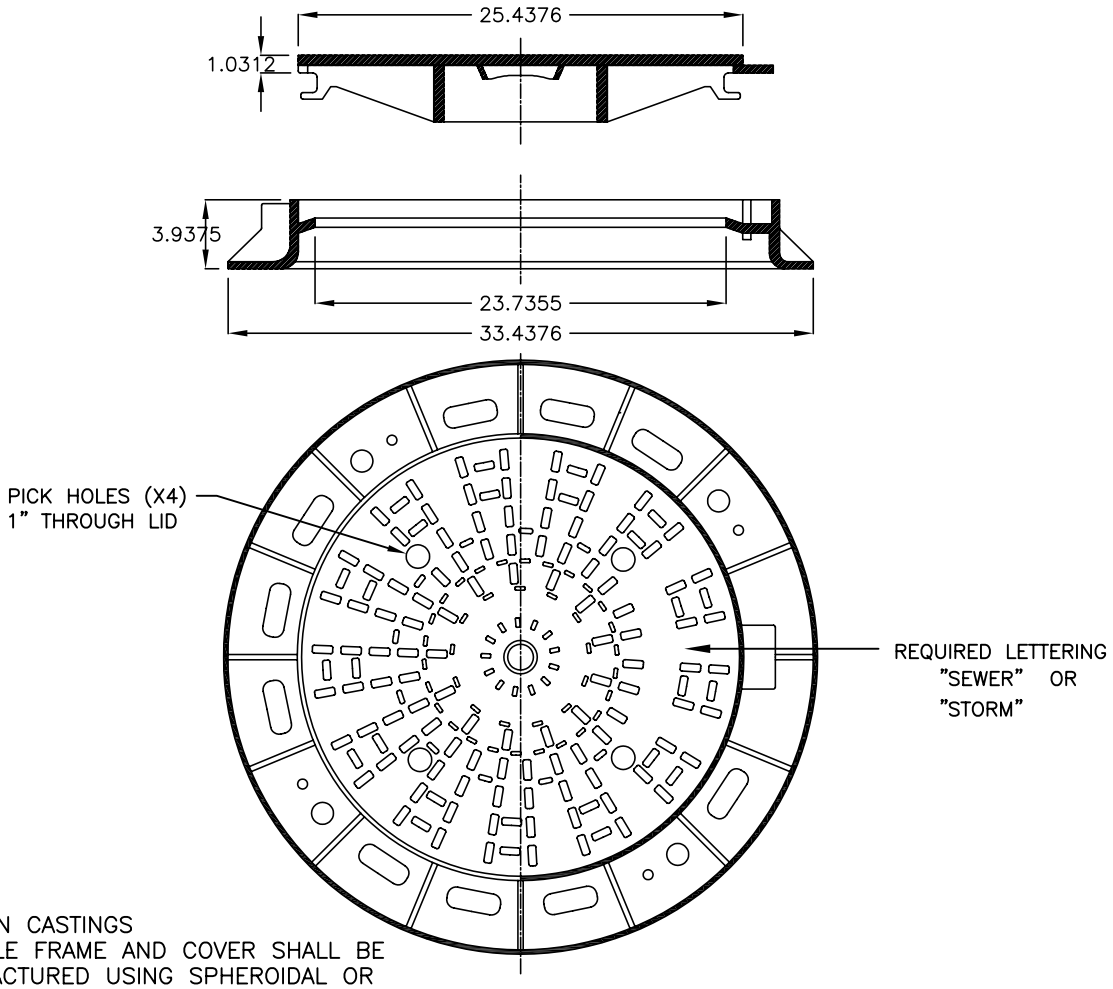
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
MANHOLE BASE CAMERA CHANNEL DETAIL	SHEET # 3 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7–1



DUCTILE IRON CASTINGS

1. MANHOLE FRAME AND COVER SHALL BE MANUFACTURED USING SPHEROIDAL OR NODULAR GRAPHITE IRON (DUCTILE IRON) COMPLYING WITH THE REQUIREMENTS SPECIFIED IN ASTM A536–80.
2. ALL CASTINGS SHALL MEET OR EXCEED THE HS–20 LOAD REQUIREMENT.
3. ALL CASTINGS WILL BE SUPPLIED WITH A COATING OF BITUMINOUS MATERIAL AND BE FREE FROM CRACKS, HOLES, FOREIGN INCLUSIONS, SCALE, LUMPS, BLISTERS, SANDHOLES, AND OTHER INJURIOUS DEFECTS.
4. THE FRAME SHALL HAVE A MINIMUM OF FOUR BOLT HOLES TO ANCHOR TO THE MANHOLE CASTING (NOT SHOWN) AND FOUR 1" PICK HOLES EXTENDING THROUGH LID.
5. THE FRAME SHALL BE DESIGNED TO ACCEPT LEVELING INSERTS THAT WILL ALLOW RAISING OF THE COVER WITHOUT EXCAVATION. THE LEVELING INSERTS SHALL BE LOCKED INTO PLACE USING CADMIUM–PLATED STEEL BOLTS.
6. AN ANTI–THEFT LOCKING KEY SHALL BE INSTALLED. THE BOLT SHALL BE STAINLESS STEEL WITH A PENTAGON HEAD DESIGN MEASURING 7/8" POINT TO FLAT.
7. THE FRAME AND COVER SHALL BE MODEL GTS CLASS 400 MANUFACTURED BY PAM/LBI, LONG BEACH, CALIFORNIA, 800–628–1093 OR EQUAL.

LEVELING INSERT

1. TWO HEIGHTS OF LOCKED LEVELING INSERTS CAN BE USED TO RAISE THE LEVEL OF THE COVER WITHOUT REMOVING THE FRAME.
2. INSERTS SHALL BE LOCKED ON THE FRAME WITH TWO CADMIUM–PLATED STEEL BOLTS.
3. INSERTS SHALL BE MADE FROM DUCTILE IRON AND FITTED WITH A POLYETHYLENE SOUND DAMPENING RING.
4. COVER SHALL BE SEATED, BOLTED, AND LOCKED INTO THE INSERT IN THE SAME MANNER AS IN THE ORIGINAL FRAME.
5. SEVERAL INSERTS CAN BE USED ON THE SAME MANHOLE TO GET REQUIRED HEIGHT (NOT TO EXCEED MAXIMUM THROAT HEIGHTS PER 7–1 OR 7–2.)
6. LEVELING INSERTS SHALL BE REFERENCE NO. RE85R7MD OR RE85R7ND OR EQUAL.

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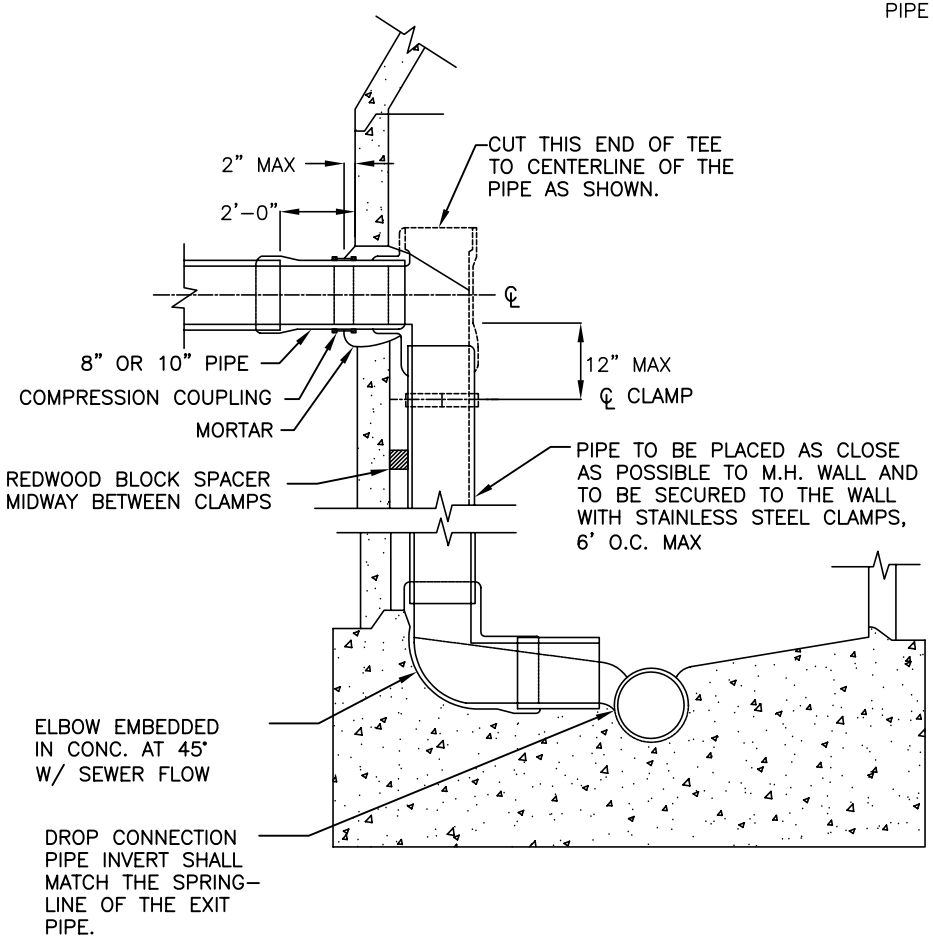
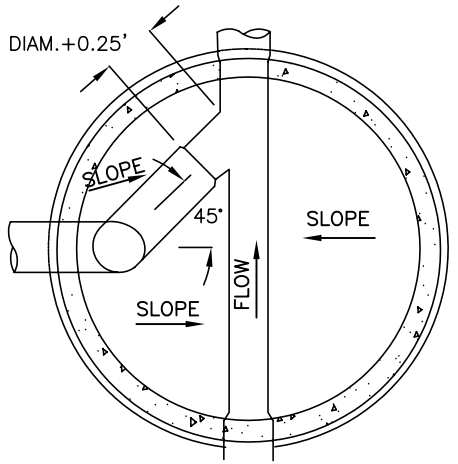
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
DUCTILE IRON STANDARD MANHOLE FRAME & COVER	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7–2



INSIDE DROP CONNECTION



INSIDE DROP – PLAN

NOTES:
1. ALL INSIDE DROP PIPING TO BE A.B.S. OR PVC SDR-26.
2. CEMENT ALL JOINTS.
3. DROP CONNECTION PIPE AND FITTINGS TO BE SAME SIZE AS ENTERING PIPE.
4. CLAMPS TO BE 1-1/2" X 12 GA STAINLESS STEEL. ANCHORED TO M.H. WALL WITH 2-1/2" CADMIUM PLATED BOLTS.
5. ONLY INSIDE DROPS ARE ALLOWED.
6. MANHOLE BARREL SIZE MAY NEED TO BE INCREASED TO ACCOMMODATE INSIDE DROP.

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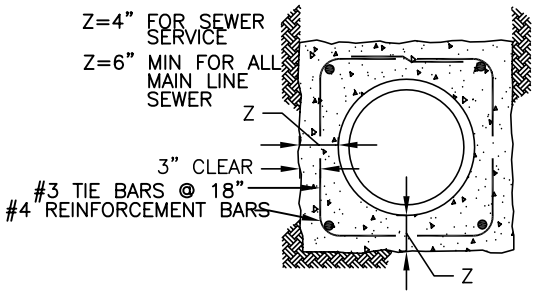
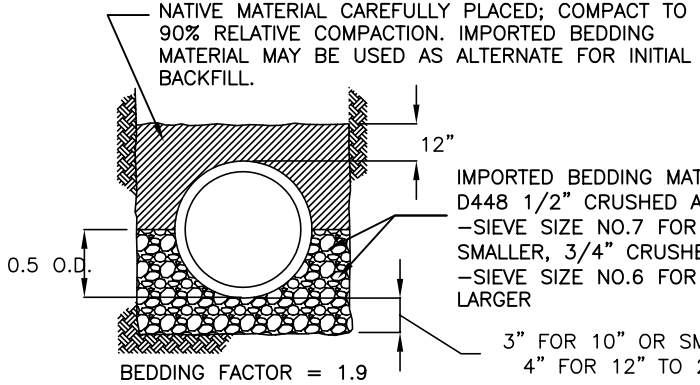
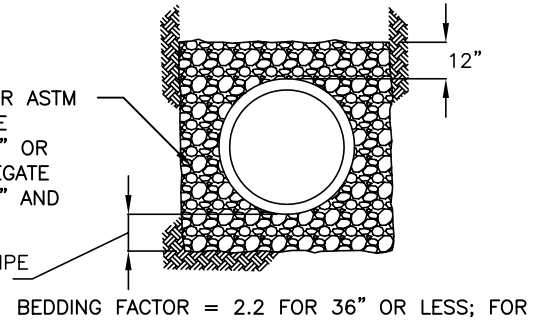
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
DROP CONNECTIONS	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7-3



CONCRETE ENCASEMENT



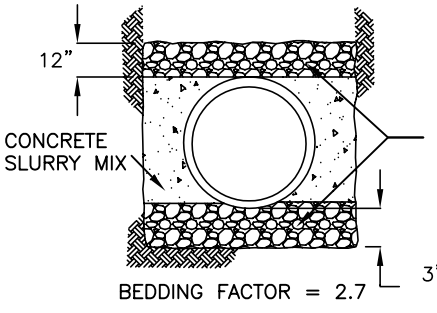
TYPE II
(SEE NOTE 6)



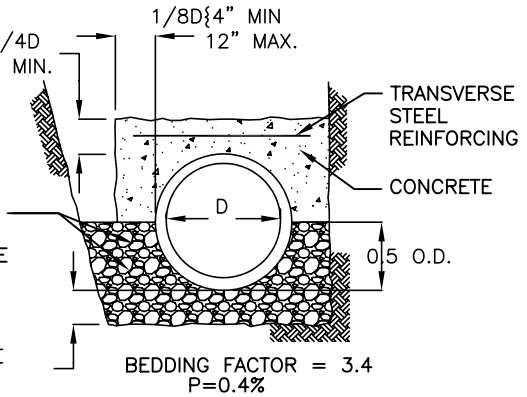
TYPE II ALTERNATE

GENERAL NOTES:

1. SEE SECTION 7–7 FOR BACKFILL LIMITS.
2. MINIMUM DEPTH OF BEDDING AND MATERIAL UNDER PIPE BELLS SHALL BE 1 1/2 INCHES.
3. DESIGN METHOD NO.38 AS PUBLISHED BY THE AMERICAN CONCRETE PIPE ASSOCIATION SHALL BE THE BASIS FOR THE CALCULATIONS MAXIMUM ALLOWABLE BEDDING FACTORS WHERE VARIANCE IS NEEDED.
4. TYPE III AND IV MAY BE USED ONLY WHEN CONSTRUCTION CONDITIONS ENCOUNTERED IN THE FIELD HAVE RESULTED IN THE ALLOWABLE TRENCH WIDTH FOR TYPE II AND TYPE II ALTERNATE BEING EXCEEDED. WRITTEN APPROVAL OF THE ENGINEER IS NECESSARY.
5. FOR REINFORCED CONCRETE, P IS THE PERCENTAGE OF THE AREA OF TRANSVERSE STEEL TO THE AREA OF CONCRETE ABOVE THE TOP OF THE PIPE BARREL. USE WIRE MESH OR UNIFORMLY DISTRIBUTED SMALL DIAMETER REBAR.
6. FOR ALL FLEXIBLE (NON–RIGID) PIPE, IMPORTED MATERIAL MUST BE USED FOR BEDDING AND INITIAL BACKFILL TO 12 INCHES OVER PIPE BELL.



TYPE III
(SEE NOTE 4)



TYPE IV
(SEE NOTES 4 & 5)

(CONCRETE MUST EXTEND FROM PIPE TO THE TRENCH WALLS. TYPE III NOT ALLOWED WHERE SOILS ARE EXPANSIVE)

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DATE: NOV 2007

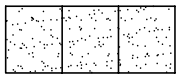
SEWER PIPE BEDDING AND INITIAL BACKFILL

SHEET # 1 OF 2

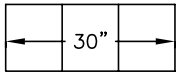
DRAWING #: 7–4

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

SIZE	BEDDING	DEPTH OF COVER (FEET)
8"	TYPE II	30" from 17 to 20; 27" from 20 to 25
	TYPE II ALTERNATE	30" from 20 to 25
10"	TYPE II	30" from 15 to 18; 30" from 18 to 25
	TYPE II ALTERNATE	33" from 18 to 25
12"	TYPE II	36" from 14 to 16; 33" from 16 to 25
	TYPE II ALTERNATE	36" from 16 to 25



NO LIMIT ON TRENCH WIDTH



MAXIMUM TRENCH WIDTH MEASURED AT THE TOP OF THE PIPE.

NOTE:
CALCULATIONS BASED IN SOIL WT.=120 LB/FT^3
SATURATED CLAY (KU' = 0.110)

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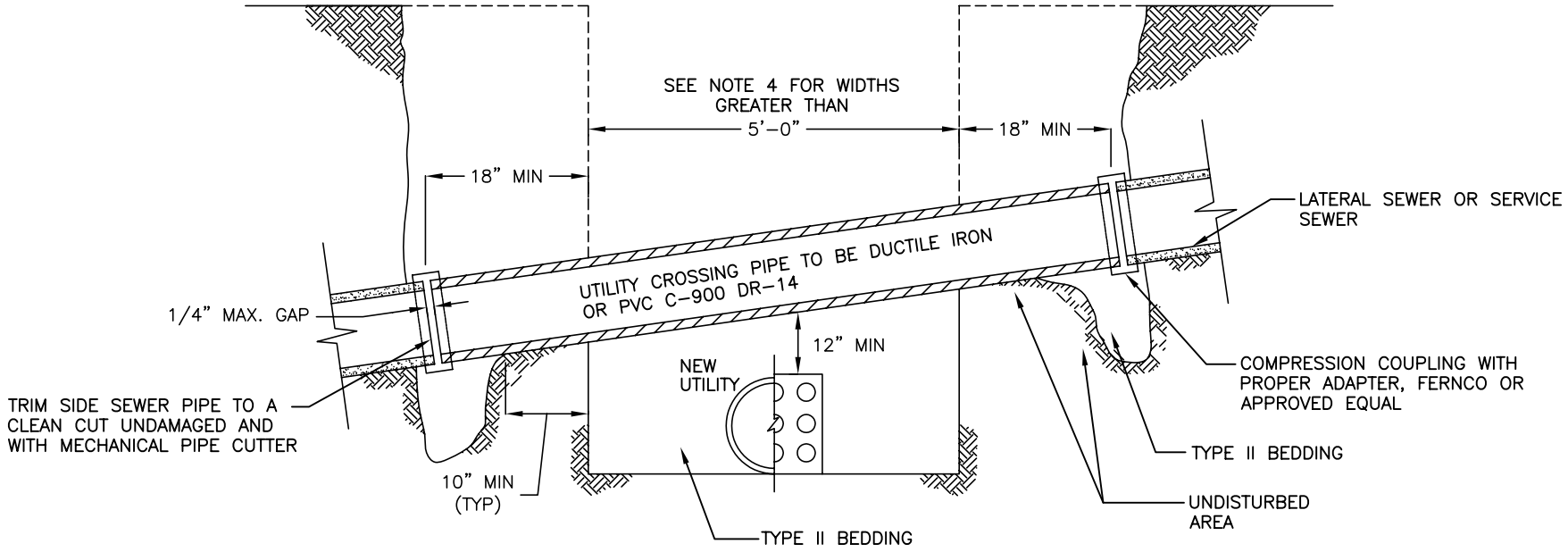
MAXIMUM TRENCH WIDTH
FOR EXTRA STRENGTH VCP

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 2 OF 2

DRAWING #: 7-4



NOTES:

1. ALL LINES ARE TO BE PROTECTED IN PLACE. THIS DETAIL SHALL APPLY WHENEVER THE MAIN COLLECTOR OR LATERAL SEWER SERVICE IS CUT OR DAMAGED WHEN NEW CONSTRUCTION POSSES BENEATH THESE LINES, AND MAY ONLY BE USED WHEN DIRECTED TO DO SO BY THE CITY ENGINEER.
2. INSIDE DIAMETER OF UTILITY CROSSING PIPE TO BE THE SAME AS THE PIPE TO WHICH IT CONNECTS.
3. ALTERATION OF SEWER GRADES WILL BE PERMITTED ONLY AFTER WRITTEN PERMISSION HAS BEEN RECEIVED FROM THE CITY ENGINEER AND SHALL COMPLY WITH SHEET 2.
4. WHENEVER THE SPAN, WHETHER CAUSED BY TRENCH WIDTH OR CROSSING ANGLE OF THE UTILITY CROSSING PIPE EXCEEDS 5'-0" PLACE TYPE II ALTERNATE BEDDING TO 12" ABOVE THE NEW UTILITY AND 18" EACH SIDE OF ITS CENTER LINE.
5. ANY NEW UTILITY WITH 6" OR LESS CLEARANCE SHALL PLACE A COMPRESSIBLE MATERIAL (STYROFOAM OR EQUIVALENT) BETWEEN THE LINES.

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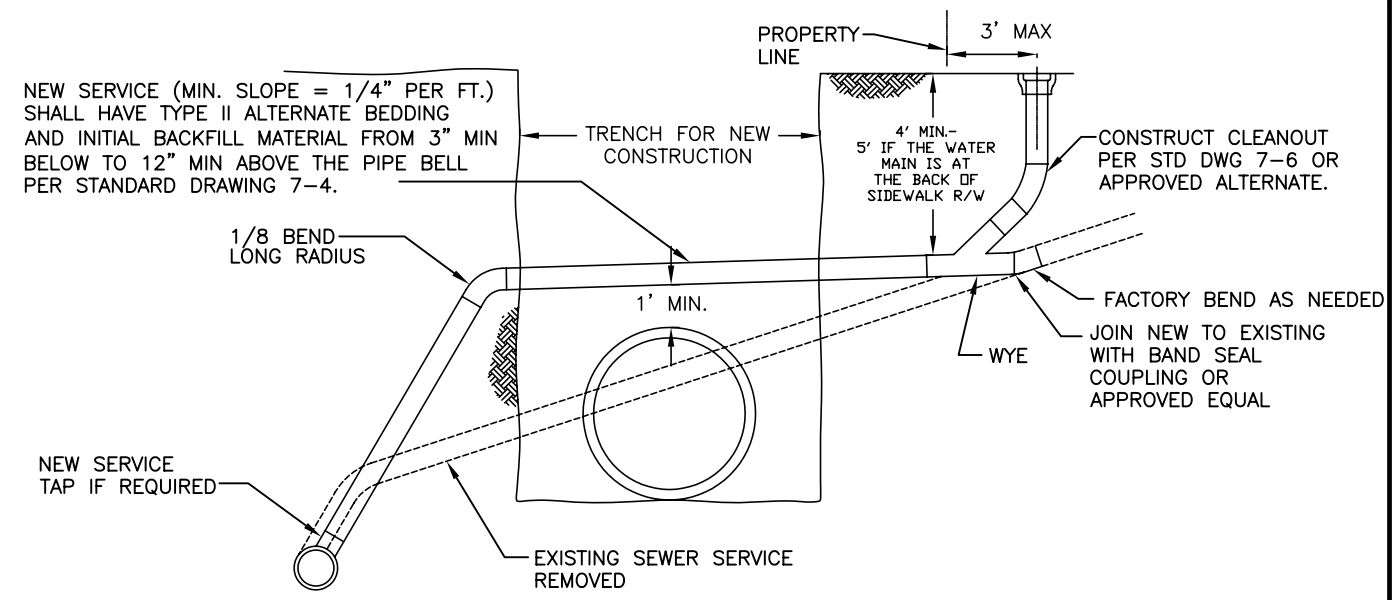
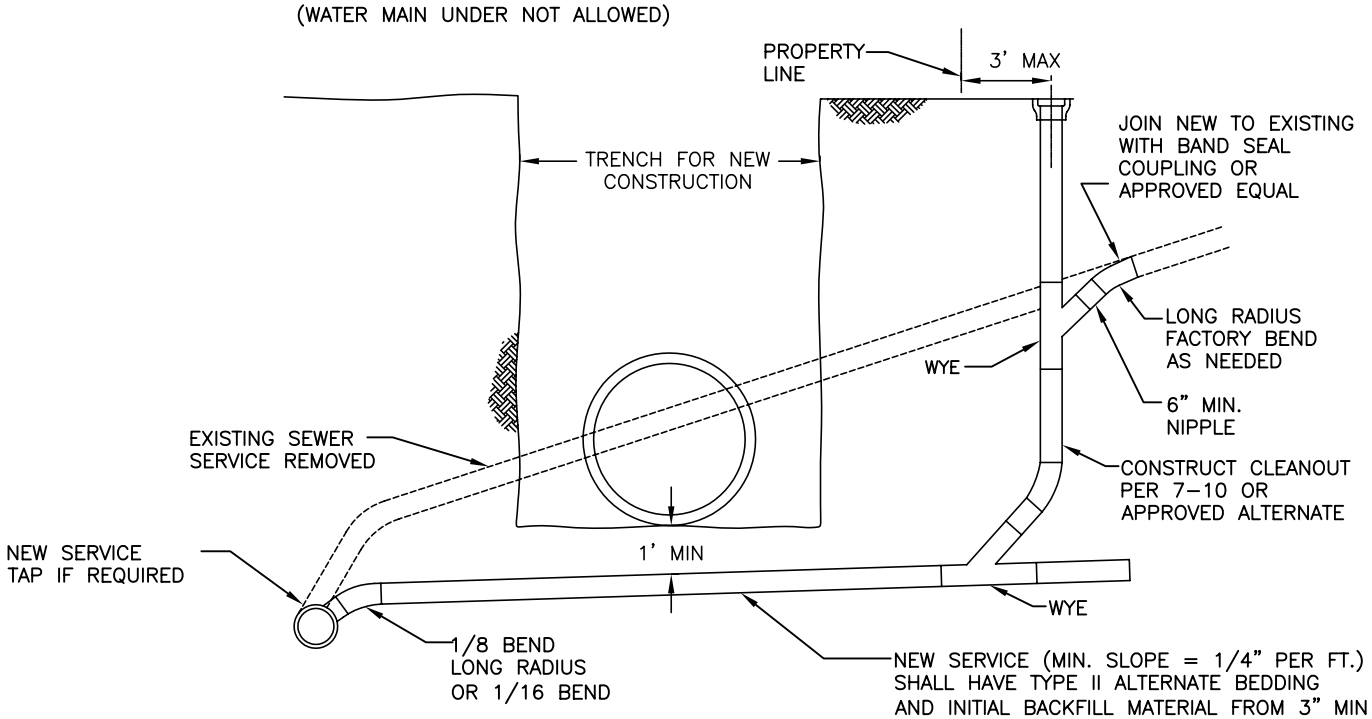
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
UTILITY CROSSING	SHEET # 1 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7-5



SEWER SERVICE RELOCATION OPTION OVER NEW CONSTRUCTION

(WATER MAIN UNDER NOT ALLOWED)



SEWER SERVICE RELOCATION OPTION UNDER NEW CONSTRUCTION

(WATER MAIN OVER SEWER SERVICE)

NOTE:

IF NEITHER OF THESE OPTIONS IS AVAILABLE, THE ELEVATION OF THE NEW FACILITY WILL NEED TO BE ADJUSTED TO ACCOMMODATE ONE OF THESE OPTIONS.

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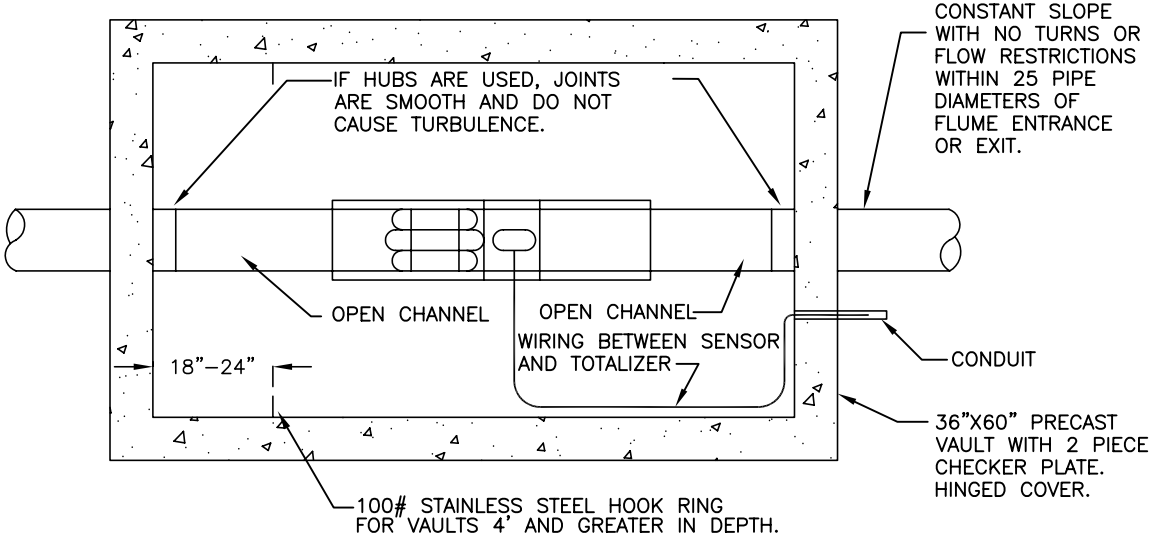
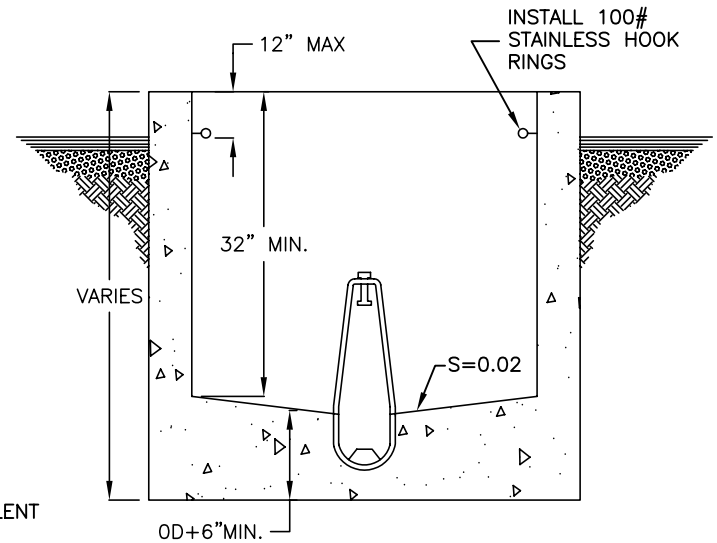
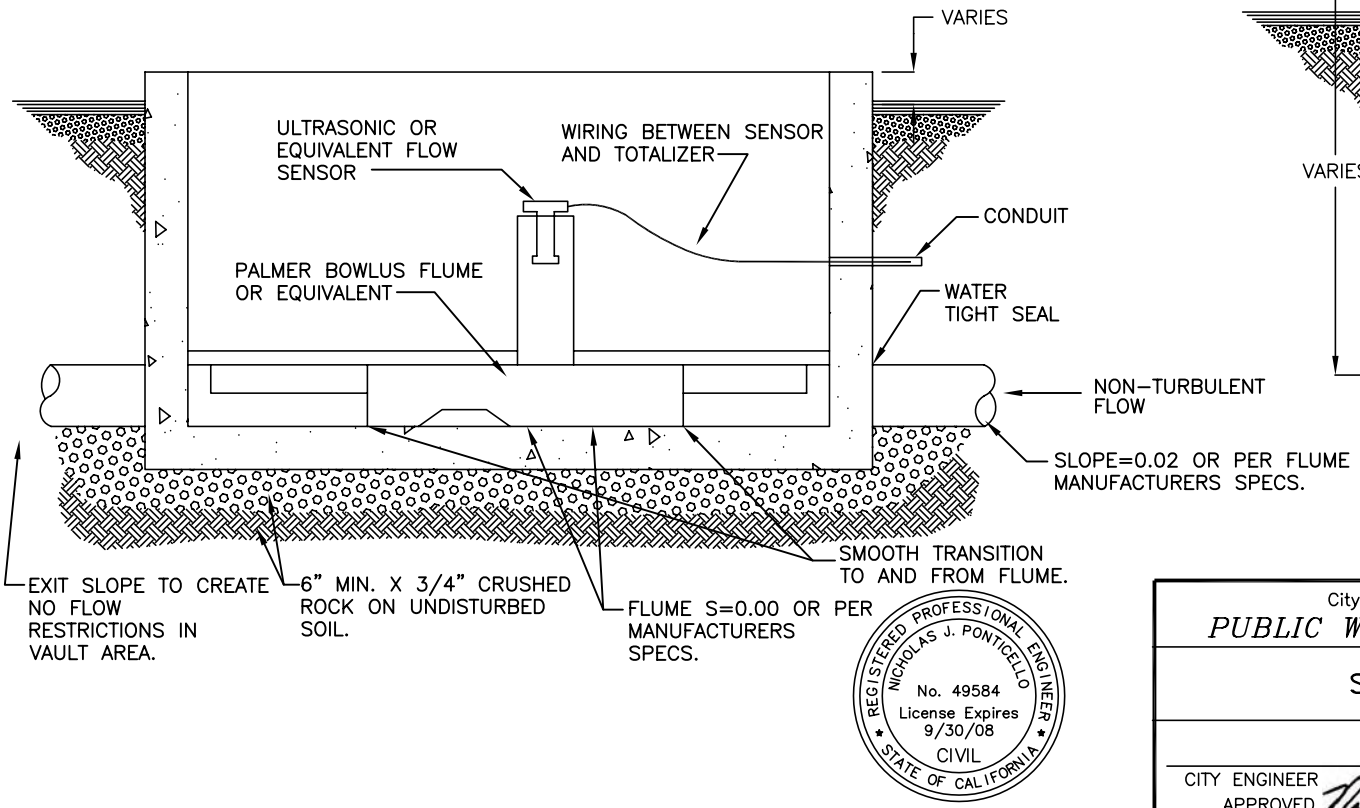
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
SEWER SERVICE REPLACEMENT/REPAIR	SHEET # 2 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7-5



NOTES:

1. LOCATE VAULT AS CLOSE AS PRACTICAL TO THE SOURCE STRUCTURE. IF LOCATED IN A PARKING LOT, THE VAULT IS TO BE PROTECTED FROM TRAFFIC WITH STEEL POSTS OR INSTALLED FLUSH WITH TRAFFIC RATED H–20 OR BETTER LID MARKED "NO PARKING".
2. LID TO BE SEALED STYLE.
3. VAULT SIZE TO BE INCREASED FOR 10" AND ABOVE PIPES.
4. IF FLOW PACED SAMPLING, A CABLE FOR CITY USE (TO ALSO DO FLOW PACED SAMPLING) SHALL BE PROVIDED. CONNECTORS SHOULD BE PROTECTED FROM ENVIRONMENT IF NECESSARY (CAPS FOR PREVENTING CORROSION).





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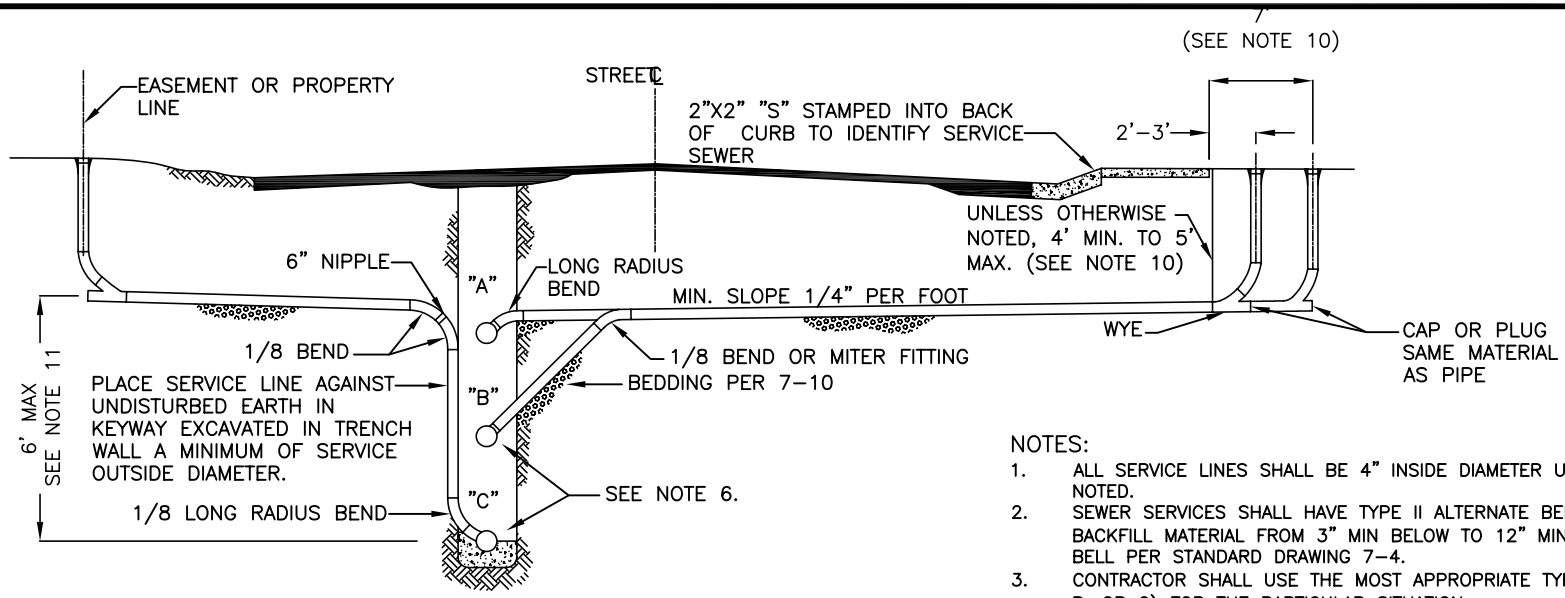
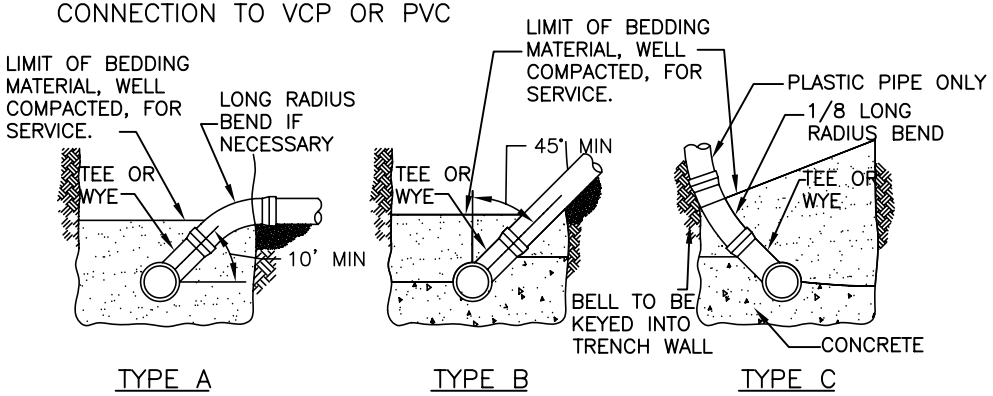
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
SAMPLING VAULT	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7–6



ELEVATIONS

ALTERNATE ABS SERVICE SEWER CONNECTION TO VCP OR PVC



TYPE A TYPE B TYPE C

CONNECTION DETAILS

NOTES:

1. ALL SERVICE LINES SHALL BE 4" INSIDE DIAMETER UNLESS OTHERWISE NOTED.
2. SEWER SERVICES SHALL HAVE TYPE II ALTERNATE BEDDING AND INITIAL BACKFILL MATERIAL FROM 3" MIN BELOW TO 12" MIN ABOVE THE PIPE BELL PER STANDARD DRAWING 7-4.
3. CONTRACTOR SHALL USE THE MOST APPROPRIATE TYPE CONNECTION (A, B, OR C) FOR THE PARTICULAR SITUATION.
4. SERVICE SEWER SHALL HAVE 4' MINIMUM 5' MAXIMUM COVER AT PROPERTY LINE EXCEPT AS REQUIRED IN NOTES 5 AND 10, BELOW.
5. WHEN THE COLLECTOR SEWER DEPTH IS SUCH THAT MINIMUM COVER AT PROPERTY LINE CANNOT BE MET, THE MINIMUM SLOPE OF 1/4" PER FOOT SHALL GOVERN THE COVER.
6. FOR TYPE B AND C CONNECTIONS, PLACE CONCRETE SADDLE FULL WIDTH OF TRENCH AND 12" LONG UNDER THE TEE OR WYE, THE FITTING, AND UNSUPPORTED PIPE.
7. MINIMUM SPECIFIED COVER AT THE PROPERTY LINE SHALL BE MEASURED FROM FINISHED GROUND SURFACE OR EDGE OF ADJACENT ROADWAY, WHICHEVER IS LOWER.
8. A SPECIFIC ELEVATION AT THE PROPERTY LINE, WHEN SHOWN ON THE PLANS OR DESIGNATED BY THE ENGINEER, SHALL GOVERN.
9. MITER BENDS SHALL NOT EXCEED 45°.
10. MINIMUM DEPTH OF COVER TO BE 5'-0" AND MAXIMUM 6'-0" WHERE JOINT TRENCH (UTILITY, PHONE, CATV) IS TO BE INSTALLED AT BACK OF SIDEWALK AS PART OF THE SUB-DIVISION IMPROVEMENTS. IN SUCH CASES, SERVICE IS TO BE EXTENDED TO 7' BACK OF SIDEWALK; CLEANOUT TO GRADE TO REMAIN 2' BACK OF SIDEWALK AND A SECOND CLEANOUT TO BE INSTALLED ON END OF EXTENSION FOR TEMPORARY USE UNTIL HOUSE CONNECTION IS MADE.
11. FOR VERTICAL RISE OF GREATER THAN 6', EITHER CONSTRUCT A CASE II CHIMNEY AT THE MAIN PER STD PLAN 220-2 OR A TYPE B CHIMNEY AT THE PROPERTY LINE.PER APWA "GREENBOOK" STD PLAN 222-1 FOR DEPTHS OVER 6 FT.

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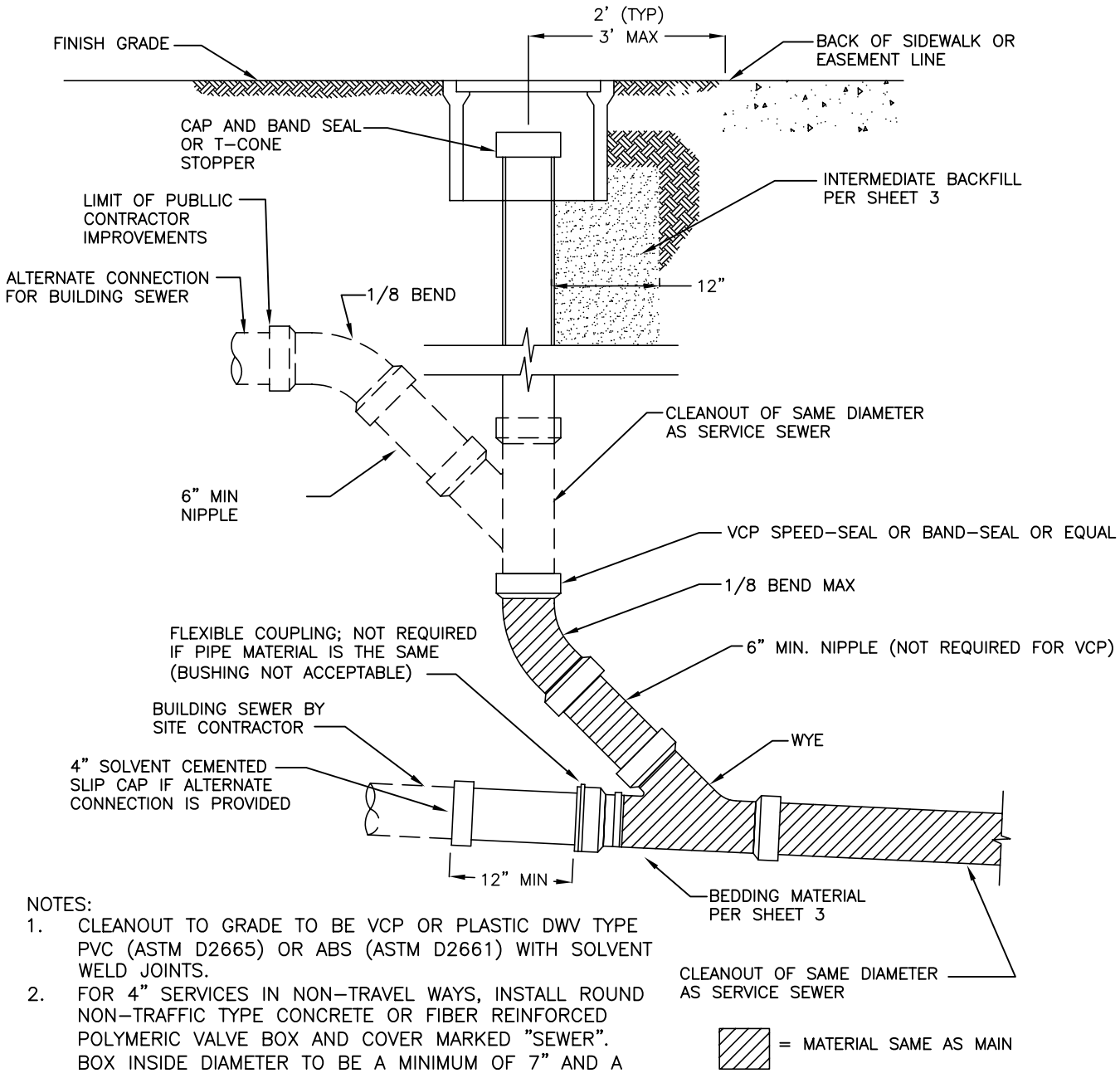
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
SEWER SERVICES	SHEET # 1 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7-7



NOTES:

1. CLEANOUT TO GRADE TO BE VCP OR PLASTIC DWV TYPE PVC (ASTM D2665) OR ABS (ASTM D2661) WITH SOLVENT WELD JOINTS.
2. FOR 4" SERVICES IN NON-TRAVEL WAYS, INSTALL ROUND NON-TRAFFIC TYPE CONCRETE OR FIBER REINFORCED POLYMERIC VALVE BOX AND COVER MARKED "SEWER". BOX INSIDE DIAMETER TO BE A MINIMUM OF 7" AND A MAXIMUM OF 10".
3. FOR SERVICES 4" AND 6" OR LARGER IN CONCRETE OR TRAVEL WAYS, INSTALL ROUND CONCRETE TRAFFIC TYPE VALVE BOX WITH CAST IRON COVER AND A CONCRETE COLLAR CONFORMING TO THE REQUIREMENTS OF STD DWG 7-8. COVER TO BE MARKED "SEWER".
4. IF A JOINT TRENCH IS TO BE INSTALLED AT THE BACK OF SIDEWALK, EXTEND SERVICE TO 7' BACK OF SIDEWALK; CLEANOUT TO GRADE TO REMAIN 2' TO 3' FROM BACK OF SIDEWALK AND A SECOND CLEANOUT TO BE INSTALLED ON THE END OF THE EXTENSION 7' BACK OF SIDEWALK.
5. SEWER SERVICE COMPLETE WITH CLEANOUT AS SHOWN SHALL BE CONSTRUCTED WITH THE PUBLIC IMPROVEMENTS.

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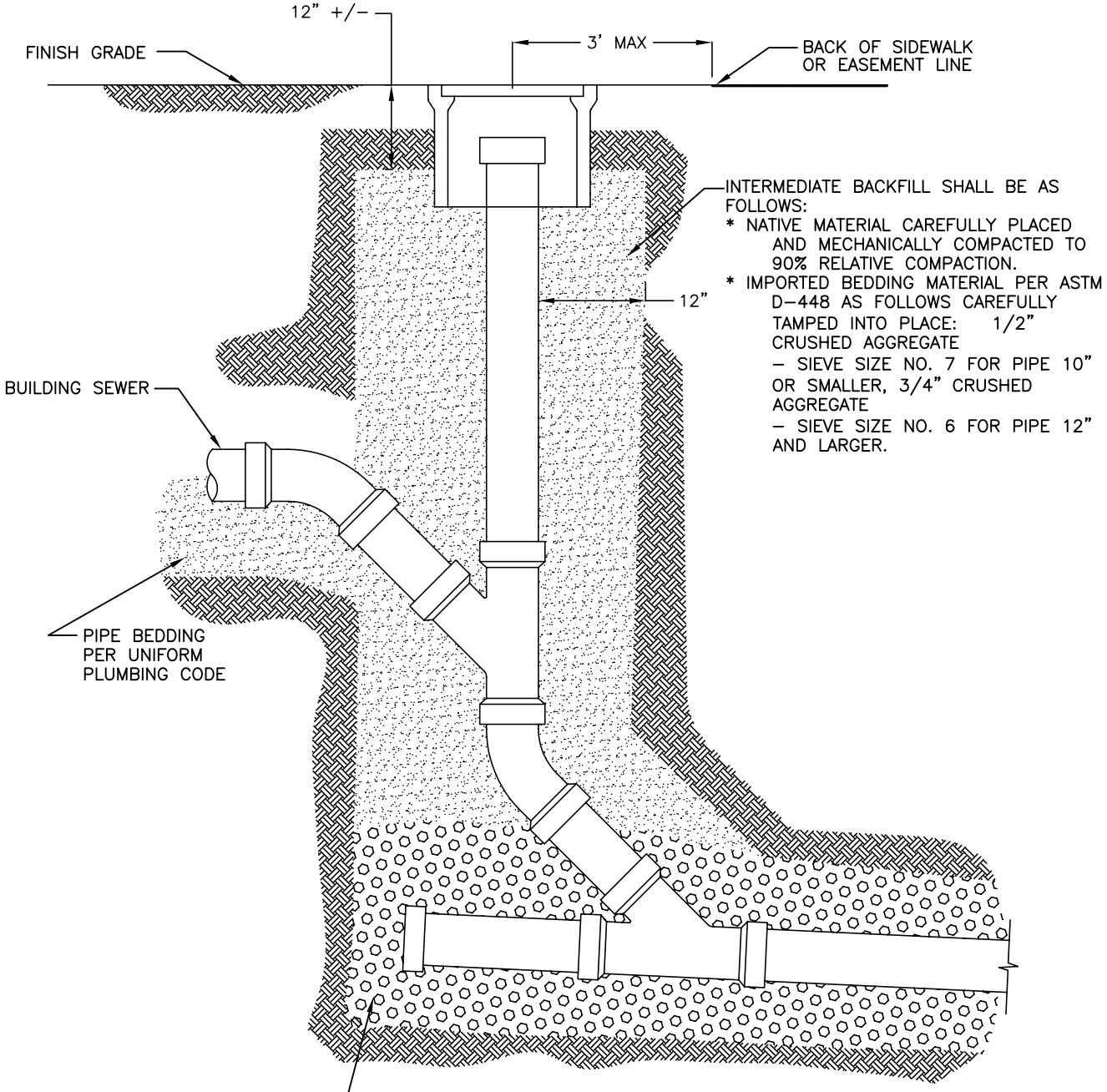
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
VCP, ABS OR PVC SERVICE CLEANOUT TO GRADE	SHEET # 2 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7-7



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PUBLIC WORKS DEPARTMENT

DATE: NOV 2007

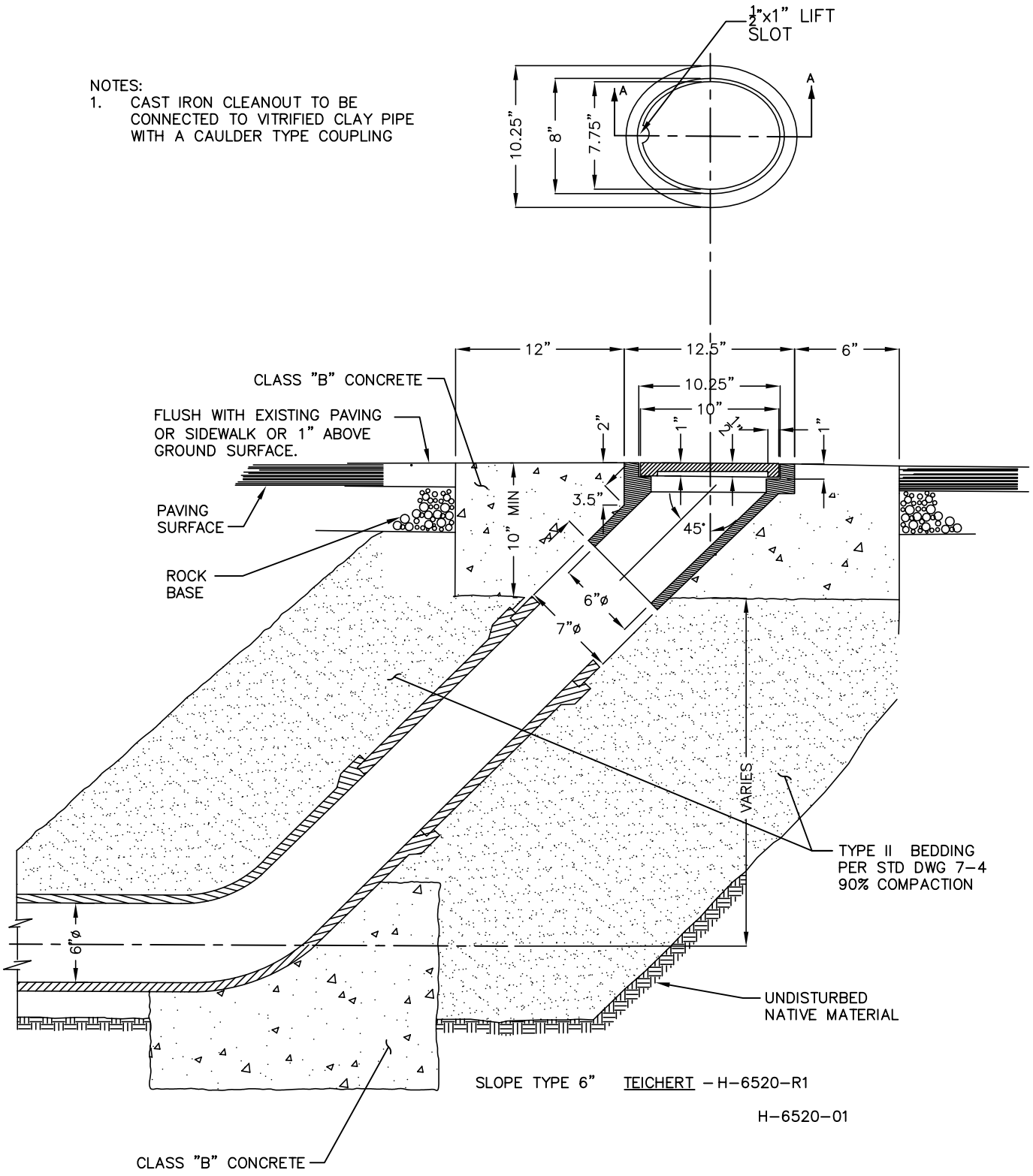
VCP, ABS OR PVC
SERVICE CLEANOUT BEDDING & BACKFILL

SHEET # 3 OF 3

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 7-7

NOTES:
1. CAST IRON CLEANOUT TO BE CONNECTED TO VITRIFIED CLAY PIPE WITH A CAULDER TYPE COUPLING



SECTION A–A

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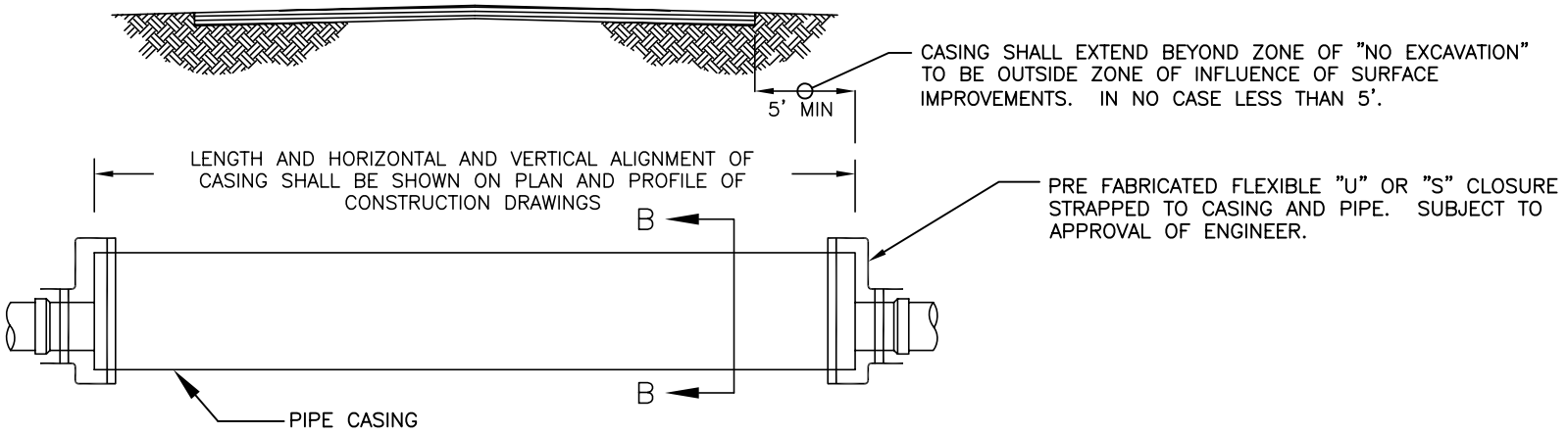
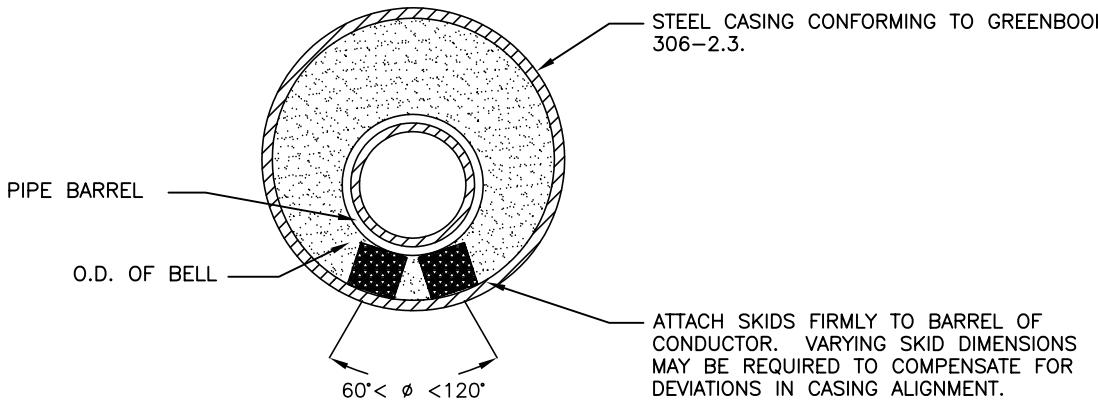
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
FLUSHING BRANCH	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7–8



PROFILE



SECTION B–B

NOTES:
1. JACKING OPERATIONS AND MATERIALS SHALL CONFORM TO GREENBOOK SECTION 306–2.
2. CASING DIAMETER AND WALL THICKNESS PER CONTRACT SPECIFICATIONS. IN NO CASE SHALL WALL THICKNESS BE LESS THAN 3/8".
3. CASING DIAMETER SHALL BE AT LEAST 9" GREATER THAN THE O.D. OF THE CONDUCTOR PIPE.

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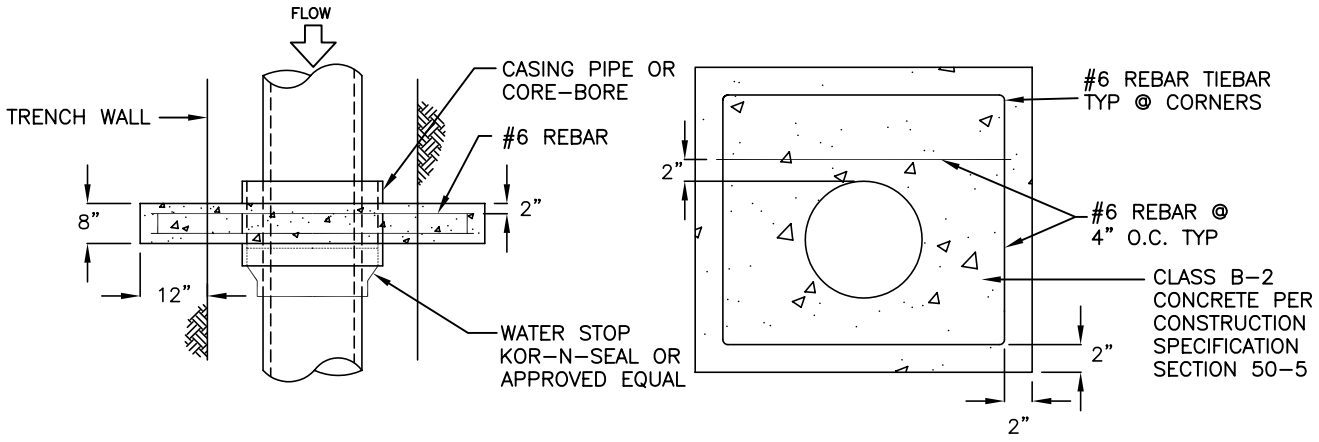
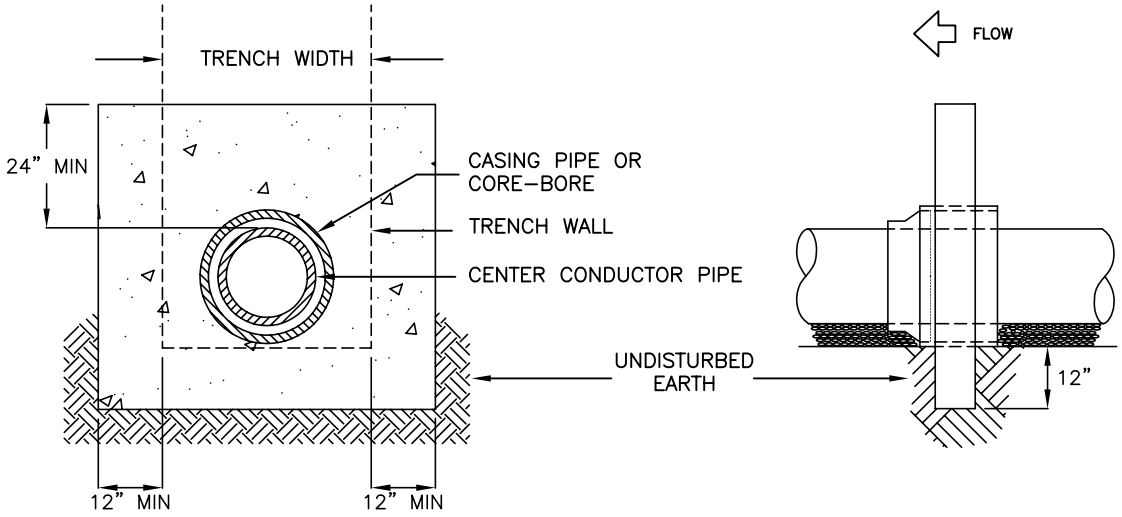
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
JACKED CASING DETAIL	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 7–9



REBAR DETAIL



COLLECTOR SIZE	CONDUCTOR PIPE SIZE
8"	12" VCP
10"	15" PVC SDR 26
12" TO 21"	CORE–BORE THE APPROPRIATE SIZE HOLE IN THE DAM

NOTES:

TOP OF DAM TO EXTEND INTO INTERMEDIATE BACKFILL 12" MINIMUM OR TOP OF GROUND WATER HGL.

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City of Colusa
PUBLIC WORKS DEPARTMENT

DATE: NOV 2007

CONCRETE DAM DETAIL

SHEET # 1 OF 1

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 7–10

SECTION 8.

WATER SYSTEMS DESIGN

8-1 INTRODUCTION

These improvement standards govern the design of all water systems intended for operation and maintenance by the City of Colusa. All new water systems shall also comply with the City of Colusa Water System Master Plan.

8-2 INTENT OF WATER SYSTEM IMPROVEMENT STANDARDS

The intent of these water system improvement standards is to provide water systems that reliably and safely convey water at a reasonable capital cost and to provide water systems that minimize operation and maintenance costs.

8-3 DEFINITIONS

When the following terms or titles are used in these water system improvement standards or in any document or instrument where these standards govern, the intent and meaning shall be as herein defined:

AWWA - American Water Works Association

Recycled Water - Non-potable water for irrigation use only.

Water System - Refers to potable, raw water, and recycled (reclaimed) water systems.

8-4 APPLICABLE STANDARDS

The most current requirements of the following agencies and standards shall apply to design of water systems. In case of conflict between the requirements of these water system improvement standards and the agencies and documents listed below, these improvement standards shall govern.

1. U.S. Environmental Protection Agency Drinking Water Regulations.
2. Laws, Codes, and Standards of the State of California, Department of Health Services relating to Domestic Water Supply.
3. Rule and Regulations, as appropriate, of Colusa County, Department of Health Services.
4. Standard Construction Specifications of the City of Colusa.
5. General Order No. 103 of the California Public Utilities Commission.
6. Title 17, Chapter V, Sections 7583-7622, California Administrative Code, and City Ordinance 20-17 regarding cross-connections and backflow prevention.
7. Uniform Fire Code.
8. Title 22, Chapter 3 of the Regulations of the California Administrative Code.

8-5 IMPROVEMENT PLAN SUBMITTAL

Improvement plans shall meet the requirements of Section 2 - General Requirements of these Improvement Standards. If improvement plans for commercial, industrial, or apartment developments, or street improvements will have landscaping, two complete sets of landscape plans must also be submitted.

Commercial, Industrial, or Apartment developments must also submit a completed Cross Connection Control Questionnaire.

8-6 APPROVAL OF IMPROVEMENT PLANS

The City Engineer will approve water system improvements concurrently with any street, sewer, storm drainage or other improvements shown on the Improvement Plans. The following must occur before the plans can be approved:

1. The Fire Department must approve and sign the improvement plans.
2. The location of all wells in use and all abandoned wells must be shown on the improvement plans, and properly destroyed in accordance with the requirements of the Colusa County Environmental Health Department. Copies of well destruction permits for all destroyed wells must be provided to the City before obtaining final acceptance of any public improvements.

8-7 IMPROVEMENT PLAN REVISION

All plan revisions that affect a water system to be maintained and operated by City of Colusa shall be approved and signed by the City Engineer prior to construction.

8-8 CONNECTION PERMITS AND FEES

A water connection permit shall be obtained for each connection to the water system. Contact the Department for information concerning fees.

8-9 WATER QUALITY

The quality of the potable water supplied or delivered into any portions of the City system will conform to the Environmental Protection Agency Drinking Water Act and the State Department of Health Services Drinking Water Standards.

8-10 WATER PRESSURE

Water distribution systems shall be designed so that normal operating pressures at service connections to the distribution system are no less than 35 pounds per square inch (psi) and no more than 100 psi. During periods of maximum day domestic demand plus fire demand, the pressure shall not be less than 20 psi at the location of the fire flow.

8-11 WATER DEMAND

For the design of water distribution systems serving single family residential areas, assume the water demand is one gallon per minute per residential connection (maximum day demand) plus fire flow. For the design of water distribution systems serving commercial areas, water demand shall be determined in consultation with the City Engineer. The City Engineer may require that some distribution mains be upsized in accordance with approved City of Colusa Master Water Plans.

8-12 FIRE FLOWS

Required fire flows shall be determined by the California Uniform Fire Code (CUFC), the fire protection district having jurisdiction, and the City of Colusa. The minimum combustible area fire flows measured at 20 psi are:

Development Category	Gallons per Minute
Single-Family Residential	1,500
Multi-Family Residential	1,750
Central Business District	2,000
Industrial/Other Business District	3,000

8-13 WELLS, TREATMENT PLANT AND STORAGE FACILITY DESIGN

The City Engineer will either design or provide design oversight of wells, treatment plants, booster pumping plants, and storage facilities.

In general, all developments must have a minimum of two (2) sources of water. If adequate elevated or ground level storage is provided, a single source of water system may be acceptable upon approval by the City Engineer and the Fire Department.

Site selection for water facilities shall be provided when required in the Conditions of Approval for a project.

Sites for wells shall meet the following criteria

1. Sites shall beet the requirements of the Environmental Health Division of the Agency Environmental Management Department, and the State Department of Health Services, Office of Drinking Water.
2. In general, a minimum horizontal separation of 1000 feet shall be maintained between existing wells of any type and new municipal wells. The Agency may require a greater minimum horizontal separation in certain aquifers. If less separation is proposed, a hydrogeologic study shall be provided to evaluate the influence on and by other wells. The study shall be approved by the City Engineer.
3. Sites shall be located to minimize the length of raw water mains.
4. Sites shall abut a paved street with a minimum 30 feet frontage
5. Where possible, well sites shall be bordered by open space, such as parks or school sites. If such open space does not exist, well sites shall be bordered by commercial space.
6. Site facilities shall incorporate at a minimum:
    a. Removable roofs and wall/door systems designed to facilitate pump removal and well maintenance equipment.
    b. PLCs and SCADA equipment meeting the City's specifications.

The applicant shall provide the City Engineer with information necessary to verify that proposed well sites and treatment plants sites comply with the setbacks recommended by the Environmental Health Division of the Agency Environmental Management Department, and the State Department of Health Services, Office of Drinking Water. The information shall consist of copies of existing environmental site assessment reports for all properties within 1000 feet of proposed well sites and treatment plant sites. If these reports are not available, the applicant shall procure the services of a qualified firm, acceptable to the City Engineer, to prepare a site assessment report provided the necessary information.

A preliminary hydro-geologic and sanitary assessment, including exploratory test hold drilling and evaluation, shall be performed for each proposed well site. If the results are not acceptable to the City Engineer, alternative well site locations shall be provided and evaluated as above until acceptable results are obtained. When well sites are required by the Conditions of Approval, improvement plan will not be approved until acceptable results are obtained and acceptable sites provided for all well sites. Sufficient time shall be provided for this process to be completed prior to plan approval.

8-14 DISTRIBUTION MAIN DESIGN

In general, water distribution systems shall be looped, with two points of connection to water sources, separated by a minimum of one valve and an adequate separation distance approved by the City Engineer. Sizing of distribution mains shall be such that the normal pressures stated in Section 8-10 and the minimum requirements as stated below for distribution main spacing and sizing are maintained.

The Hazen-Williams formula shall be used in the hydraulic study of the system, using a "C" value of 125 for cement-lined pipe, polyvinyl chloride pipe and ductile iron pipe. Velocity distribution mains shall not exceed 7 feet per second at peak hour. Head loss shall not exceed 5 psi per 1000 feet.

A Hardy-Cross hydraulic analysis of any proposed distribution system shall be provided to the City Engineer. The analysis shall comply with the requirements of Section 8-10, 8-11, and 8-12.

A. Distribution Main Design Plan Requirements

Plans for the construction of water mains whether in conjunction with other improvements or for a water project only, shall conform to the following standards, as well as other standards contained in the General and Plan Sheet Requirements of these Improvement Standards.

1. Distribution mains shall be shown on the Street Plan and Profile sheets and for non-street areas on separate plan and profile sheets as required.
2. Details of distribution mains crossing other utilities or unusual alignments will be provided if deemed necessary by the City Engineer.
3. Water mains shall be Ductile Iron conforming to the Standards Specifications. A sand bedding shall be provided around all water mains (6 inches minimum all directions), regardless of pipe material type. If existing soil is too porous to hold sand, geotextile fabric placed on the trench bottom and covered with 6 inches of sand may be used. Geotextile fabric shall comply with Caltrans Standard Specifications and as approved by the City Engineer. Ductile Iron mains shall be encased in 8 mil polyethylene encasement in accordance with AWWA C 105.

   Bedding and backfill for both ductile iron pipe shall be compacted to 90% relative compaction. Grooves shall be dug in the pipe bedding to accommodate pipe bells, fittings, and joints so that the pipe is continuously supported by the bedding material.
4. Stationing for all fittings, shut off valves, air release/vacuum valves, and in line blow-off valves shall be called-out in the profile view of the improvement plan sheets. Elevations shall be called-out at all changes in pipe slope. Horizontal alignment changes shall be called out on the plan view.
5. Commercial, industrial, and apartment Improvement Plans with a water easement shall have a note that states, "Utilities may not be located within water easement(s) except if the utility crosses the water easement within 20 degrees of perpendicular to the water main."

B. **Distribution Main Location**

All water distribution mains shall be installed within public rights-of-way or easements.

1. In new subdivisions, the centerline of the water distribution main shall be located six feet north or west of street centerlines within minor and primary streets. If a street loops 180 degrees or more it is not necessary for the water main to cross to the other side of the street to meet this requirement.
2. If it is necessary to install a water distribution main within a private road, the water easement shall be the width of the paving plus one foot each side. Water easements over water distribution mains located on commercial, industrial, or apartment properties shall have a minimum width of 15 feet. The water main shall be centered in the easement.
3. If it is necessary to install a water distribution main within a landscape corridor, then no trees shall be planted within five feet of the water main. The water distribution main shall be centered within a 15 foot wide water easement. The landscape plans for the corridor shall be submitted prior to approval of the improvement plans.
4. If a water distribution main is required to be installed between residential homes, the pipe material shall be Class 350 Ductile Iron Pipe. The minimum depth shall be four feet to top of pipe and the center of the main shall be centered within a 15 foot wide easement.
5. Ten (10) feet shall be the minimum horizontal distance between the exterior surfaces of parallel water distribution and sanitary sewer mains or recycled water mains. The water distribution main shall be higher than the sewer main or recycled water main. Separation may be less if it is accordance with California State Department of Health Services requirements and approved by the City Engineer.
6. On all utility crossings, the water distribution main shall maintain a separation or clearance of at least 12-inches (1 foot) from the utility.
7. When crossing over a sanitary sewer force main, it shall be specified that the water distribution main be installed a minimum of three (3) feet above the sewer line, as close to perpendicular as possible, and shall be ductile iron with a minimum rated working pressure of 200 psi. All sanitary sewer and water main crossings shall comply with the latest California Department of Health Services criteria.
8. Water distribution mains to be installed in public right-of-ways or easements not conforming to Items 1 through 5 above shall be approved by the City Engineer in consultation with other affected utility providers.

C. **Distribution Main Layout and Sizing**

The distribution system, whenever possible, shall be in grid form so that pressures throughout the system tend to become equalized under varying rates and locations of maximum demand, and to provide system redundancy. The minimum pressures and flows as specified in Section 8-10, 8-11, and 8-12 shall govern design of the system. The following conditions are to be considered for the distribution system design:

1. In general, the minimum pipe size shall be 8 inches nominal diameter for looped systems. Dead end runs of more than 50 feet that have a hydrant at the end shall be a minimum of 8 inches. Dead end runs that do not have a fire hydrant at the end, or dead end runs of less than 50 feet that have a hydrant at the end my be 6 inches in diameter as approved by the City Engineer.

2. Where distribution mains are installed in arterial street, dual mains (one pipeline on each side of the street) may be required.

3. Mains shall maintain a minimum cover of 30-inches in rights-of-way less than 50 feet and 36 inches in rights-of-way 50 feet and greater, and as necessary to provide sufficient cover for air release/vacuum valve lines and to ensure that gate valve stems are a minimum of 6 inches below the street subgrade, and when not avoiding other utilities mains shall have a maximum depth of 60-inches, unless otherwise approved by the City Engineer. Both distances shall be measured from gutter flow-line. Mains installed in easements between residences shall maintain a minimum cover of 48 inches.

D. **Distribution Main Pipe Restraint**

Pipes shall be restrained from movement as a result of thrust on the fittings and valves of the water system. Thrust restraints shall be provided al all valves, bends, reducers, trees, crosses, and dead ends. Thrust restraint for bends and tees may be accomplished with thrust blocks as described or by means of pipe joint restraining devices as shown in Drawing 8-3. Thrust blocks must be poured against undisturbed soil or restraint devices shall be used.

E. **Type of Distribution Main Pipe and Pipe Deflection**

Pipe used in the construction of water distribution systems shall be Ductile Iron pipe. Pipe deflection greater than two and one-half degrees shall require a fitting.

F. **Distribution Main Valves**

Valves clusters shall be placed at all pipe intersections with a valve on each leg of the main. Gate valves shall be used on 12” diameter and smaller mains. Butterfly valves shall be used on all mains larger size mains. Valves shall be placed in between main line intersections at intervals no greater than 500 feet between valves.

G. **Corrosion Protection of Metal Pipes and Components**

Corrosion protection may be required by City Engineer.

8-15 WATER SYSTEM APPURTENANCES

Water system appurtenances include fire hydrants, water service lines, water meters, detector check valves, and back-flow devices.

A. Valves

Valves on the distribution main shall be design per the following requirements.

1. A valve shall be spaced a maximum 500 feet apart. In residential areas, valves shall be spaced such that no single shutdown will result in shutting down more than 15 services.

2. Valves shall be spaced so that in no case shall more the two fire hydrants be removed from services by a shutdown.

3. Valves shall be located so that any section of main can be shutdown without going to more than three locations to close valves.

4. Valves at intersections shall be located within the curb returns and set as close to minimum pipe depth (30 to 36”) as possible. As a minimum, three valves shall be placed where mains cross and two valves where mains tee.

5. If it is necessary to install valves between street intersections, they shall be located on property lines between lots.
6. Each section of pipeline between crosses or tees shall have a minimum of one valve.
7. All valves shall be gate valves. The depth of the water line shall be adjusted to keep the stern of gates valves below the street pavement section and base sections. Operators shall be located as near as possible to lane lines or centers lanes.

B. Fire Hydrants and Blow-off Assemblies

Fire hydrants and blow-off assemblies shall comply with the requirements of this section, the Fire Department, and the City Engineer. Fire hydrants and blow-off assemblies shall be located as follows:

1. Fire hydrants shall be connected to distribution mains only. Fire hydrants shall not be connected to transmission mains.
2. Fire hydrants shall be placed at street intersections wherever possible, and located to minimize the hazard of damage by traffic. They shall have a maximum normal spacing of 300 feet measured along the street frontage in residential and commercial developments, or closer if deemed necessary by the local Fire Department. Hydrants located at intersections shall normally be installed at the curb return. Within residential areas, all other hydrants shall be located on property lines between lots. See Drawing 8-2 specifications and typical installation details.
3. The minimum size main serving a fire hydrant shall be six inches in diameter, however in this situation, the distance from the nearest intersecting main to the hydrant shall not be greater than 50 feet if fire flow requirements to any adjacent site are 1500 gpm, or 10 feet if fire flow requirements to any adjacent site are greater than 1500 gpm. Not more than one hydrant shall be placed on a six-inch main between intersecting water mains. The pipeline connecting the hydrant and the main shall be a minimum of six-inches in diameter, with a gate valve flange connected to the main.
4. A fire hydrant or four (4)-inch blow-off assembly shall be installed on all permanent dead-end runs including cul-de-sacs. If the local Fire Department requires a hydrant at the end of a dead-end run, then a 4-inch Blow-off assembly will not be allowed. Two-inch Blow-off valves shall be used if dead-end runs are temporary. Wherever possible, the blow-off assemblies shall be installed in the street right-of-way, a minimum distance of three (3) feet from the lip of gutter. In no case shall the location be such that there is a possibility of siphoning into the distribution system. See Drawings 8-12, and 8-13 for specifications and typical installation details.

C. Water Service Lines

Service lines from the water distribution main to the property line or edge of easement shall always be installed at the time the main is constructed. Services from mains installed in private roads shall extend one foot beyond the edge of the pavement. Service line criteria shall be as follows:

1. In all new subdivisions, the service line shall be located between 9 inches and 30 inches from the side property line.
2. Minimum size of a new residential service line and meter shall be one inch (1") diameter. All residences requiring fire sprinklers shall install minimum one and one half inch (1½") service line and meter. Replacement services for existing residential uses without a fire

sprinkler requirement shall use a minimum of one inch (1") diameter service and meter. Schools, commercial, industrial, or multiple-family units with higher water demand shall be provided with larger service lines, subject to approval of the City Engineer. All services shall be installed with a corporation stop at the main and valve at the property line. The property line valve shall be the angle meter stop (2" and smaller services) or a gate valve (services larger than 2").

3. The Contractor shall make all water service taps into existing mains upon application for a permit and payment of the required fees. A note to this effect shall be placed on the plan sheet which details the area that requires such tapping. Application shall be made to City of Colusa Public Works Department and the required fees paid at least five (5) days in advance of the time the tap is desired. The Contractor shall perform all work subject to inspection and acceptance by the City Engineer.
4. See the Standard Specifications for allowable materials.
5. The location of all water services shall be permanently marked with a "W" impressed in the top of the concrete curb.

D. **Water Meters**

Water meters shall be installed on all residential, commercial, industrial, multi-family, and irrigation water services. Meter boxes with an idler will be installed by the water main construction contractor. Meters will be installed by the builder after building permits are issued. Meter boxes shall be adjusted, as needed, to final grade by the building contractor. Size of water meter shall not be less than the size of the service line unless approved by the City Engineer. See Drawing 8-6 for specifications and typical installation details.

E. **Fire Department Connections**

A backflow prevention device shall be provided for each fire service line into a building, whether residential, commercial or industrial use. See Drawing 8-7 for specifications and typical installation details. The Fire Department will review and approve all connection details. Contact the Fire Department for requirements based on specific uses.

F. **Back-Flow Devices**

Back-flow devices are required in accordance with Title 17, Chapter V, and Sections 7583-7622 of the California Administrative Code. See Drawing 8-8 for specifications and typical installation details.

1. Reduced Pressure Principle Back Flow Devices shall be required on all water services including residential, landscaping, commercial, industrial, and apartment services lines. Reduced pressure principle devise are for use on services lines only.

G. **Air Release/Vacuum Valve Assemblies**

Air release/vacuum valve assemblies shall be required at high points in a distribution system as determined by the City Engineer. See Drawing 8-14 for specifications and typical installation details.

8-16 UNUSED CONSTRUCTION & RECORD PLAN REQUIREMENTS

Plans for the construction of water distribution systems whether in conjunction with other improvements or for a water main project only, shall conform to the following standards, as well as other standards contained in the General and Plan Sheet Requirements of these Improvement Standards.

A. **General Requirements** - All information, which, in the opinion of the City Engineer, is necessary for the satisfactory design, review, construction, and maintenance of a project shall be provided and, where applicable, shall be shown on the plans.

1. A parcel or area which benefits from and financially participates in a water main construction project, but is not included within the project boundaries, shall have a note to this effect placed on the layout map and on the plan and profile sheet if the parcel appears thereon. Parcels, which make use of those facilities, may be subject to additional fees at the time of connection, if the participation has not been so noted.
2. Elevations of the top of the end of distribution mains and transmission main.
3. The type of fitting and pipe at the end of the distribution mains and transmission mains shall be described.
4. Changes of location of shut-off valves, fittings, air release/vacuum valves, blow-off assemblies, hydrants, and water services for which an improvement plan revision was not obtained.

B. **Plan and Profile Sheets** - Water mains shall be shown on the Project Street Improvements Plan and Profile sheets. The following standards, with respect to drafting and the information to be included on the plan and profile sheets, generally apply to projects in developed areas. In new subdivisions, only the requirements that are applicable shall apply.

1. Water mains to be constructed shall be indicated on the profile by parallel lines spaced by one pipe diameter. Water valves shall also be indicated by parallel lines spaced according to scale. The length, size, and type of pipe material between each tee shall be printed parallel to the pipe.
2. In improved areas, the location of each water service proposed to be constructed shall be indicated on the plans by stationing, or by reference to a permanent, well-defined structure, if available. In new subdivisions, the water services shall be located by stationing unless the situation exists, such as at the end of a cul-de-sac, where stationing is not an adequate description of location. In such cases a dimension to a lot line may be used.
3. Permanent and working (temporary construction) easements shall be shown to scale on the plans. Easement dimensions shall be given and each easement shall be tied to the property line and the water main. Each permanent easement shown on the plans shall be identified by a box or table, on the same plan sheet, which gives the property owner's name and the book and page number in which the easement is recorded. The Consulting Engineer shall provide the book and page number.
4. Proposed water mains shall be adequately dimensioned from street centerline. If the water main is to be located outside of the right of way, sufficient dimensions and bearings from an approved horizontal control shall be shown on the plans to locate the main in the field.
5. Indicate the limiting maximum trench width, as measured at the top of the pipe, on the plans between well-defined points of application, the pipe material and class, if more than one class is available; and the bedding-backfill type. If more than one combination of pipe material or class, maximum limiting trench width, or bedding type is available, a practical range of such combinations shall be shown on the plans.
6. Any other existing or proposed gas, electric, sewer, storm drain, etc., shall be determined and accurately shown on the plans. The location of any utility line which is parallel to and within five feet of the water main or which crosses the water main at an angle of 30

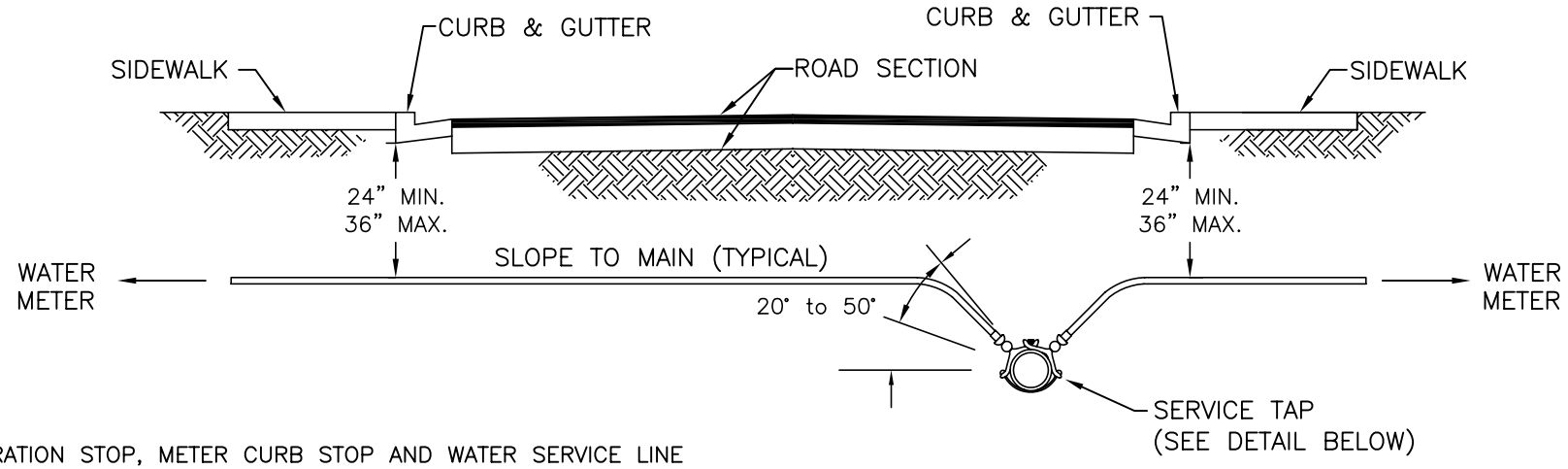
degrees or less shall be determined with an accuracy of 1.0± foot and the clearance shown on the plans.

7. Trees, aerial utilities and other objects within 10 feet of construction centerline shall have their correct location shown on the plans and the clearance from construction centerline shown. The diameter of tree trunks and interfering heavy tree branches shall be noted. Removal of a tree or object, or other special handling shall be noted on the plans. The Consulting Engineer shall assume full responsibility for such notes as it is assumed that he has made all necessary arrangements with the owner of the object to be handled. Written documentation of any special arrangements regarding preservation of property made between property owners and the Consulting Engineer shall be supplied to the City Engineer if no easement document is involved. If an easement is negotiated, all special arrangements are to be included in the easement document. The City Engineer must approve tree removal within public rights-of-way or easements.
8. Addresses of buildings shall be shown on the plan view, within the outline of the building. Only the front line and indication of sidelines of buildings need be shown.

C. **Detail Drawings** - Items of a special nature should be shown with detail drawings, either on the plan sheets, or on a separate detail sheet.

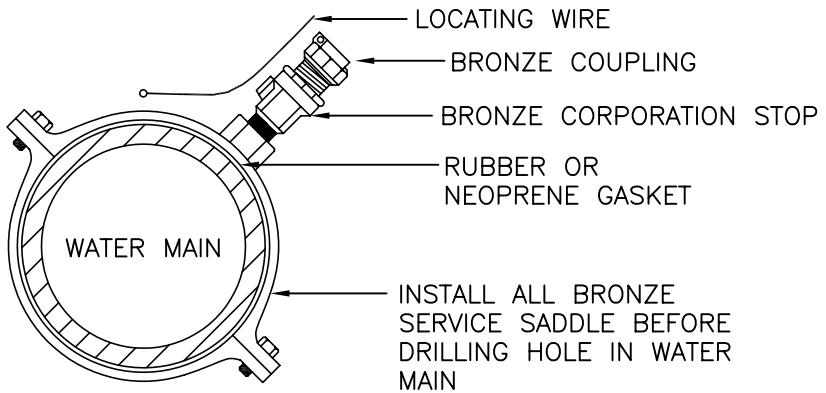
D. **Connection to existing facilities where shut off of existing water will be required** - When improvement plans require connection to an existing facility which will require shut off of existing water, a note shall be placed on the plans which provides an estimate of the times between which the water may be shut. Where the operation will be accomplished on a major distribution line, submittal of a work plan for review will be required prior to initiation of the operation.

Standard Drawings Section 8 – Water Systems Design		
Drawing	**Sheets**	**Description**
8-1	1	Water Service Installation
8-2	1	Fire Hydrant Installation (Main in Street)
8-3	1 of 2	Thrust Block Bearing Area
8-3	2 of 2	Pipe Restrained Length
8-4	1	Locating Wire for Mains and Services
8-5	1	Valve Box Installation and Operating Nut Extension
8-6	1 of 2	1", 1½" or 2" Residential or Commercial Metered Water Service
8-6	2 of 2	3" to 6" Meter Installation
8-7	1 of 2	Fire Sprinkler Service - Residential
8-7	2 of 2	Fire Sprinkler Service - Commercial
8-8	1 of 2	Reduced Pressure Backflow Preventer 1" to 3"
8-8	2 of 2	Reduced Pressure Backflow Preventer 4" and larger
8-9	1	Maximum Deflection for PVC Pipe
8-10	1	Utility Crossing
8-11	1	Utility Crossing under Existing Water Main
8-12	1	Blow-Off Assembly – 2" Temporary
8-13	1	4" Blow-Off Assembly at End of Main
8-14	1	Air/Vacuum Valve Combination
8-15	1	Cut-in
8-16	1	Unused
8-17	1	Trench Detail



NOTES:

1. CORPORATION STOP, METER CURB STOP AND WATER SERVICE LINE ARE TO BE THE SAME SIZES.
2. SERVICE SADDLES SHALL HAVE A SINGLE WIDE BRONZE STRAP FOR 1" AND 2" SERVICES. DOUBLE STRAPS, FLATTENED TO PROVIDE A WIDE BEARING SURFACE AGAINST THE PIPE, SHALL BE USED FOR SERVICE SADDLE SIZES LARGER THAN 2 INCHES, EXCEPT WHERE SIZE OF TAP EXCEEDS. MANUFACTURE'S RECOMMENDED LIMIT FOR SIZE OF WATER MAIN. FOR THIS SITUATION, A SPECIAL FITTING SHALL BE SPECIFIED. BRONZE 'U' BOLTS (NOT FLATTENED) MAY BE PLACED ON CAST IRON AND DUCTILE IRON WATER MAINS.
3. SERVICE SADDLES, CORPORATION STOPS, COUPLING NUTS, BOLTS, AND ALL APPURTENANCES SHALL BE BRONZE.
4. SERVICE TAP MUST BE MADE BETWEEN 20 DEGREES TO 50 DEGREES ABOVE THE SPRINGLINE OF THE PIPE.
5. SERVICE TAPS SHALL BE A MINIMUM OF 18" APART ALONG THE WATER MAIN.
6. INSULATED LOCATING WIRE REQUIRED ON ALL SERVICE LINES, SEE DRAWING 8–4. WIRE SHALL BE CONNECTED TO LOCATING WIRE ALONG WATER MAIN FOR CONTINUITY.
7. SERVICE CONNECTIONS SHALL NOT BE MADE ON WATER MAINS LARGER THAN 12"ø, WITHOUT PRIOR APPROVAL OF ENGINEER (SPECIAL CASES ONLY).
8. WATER SERVICE PIPE MATERIAL SHALL BE POLYETHYLENE TUBING PER SECTION 50–40 OF THE CONSTRUCTION STANDARDS. 1"ø MINIMUM PIPE SIZE OR 1½"ø REQUIRED FOR HOUSES WITH FIRE SPRINKLERS.



SERVICE TAP DETAIL

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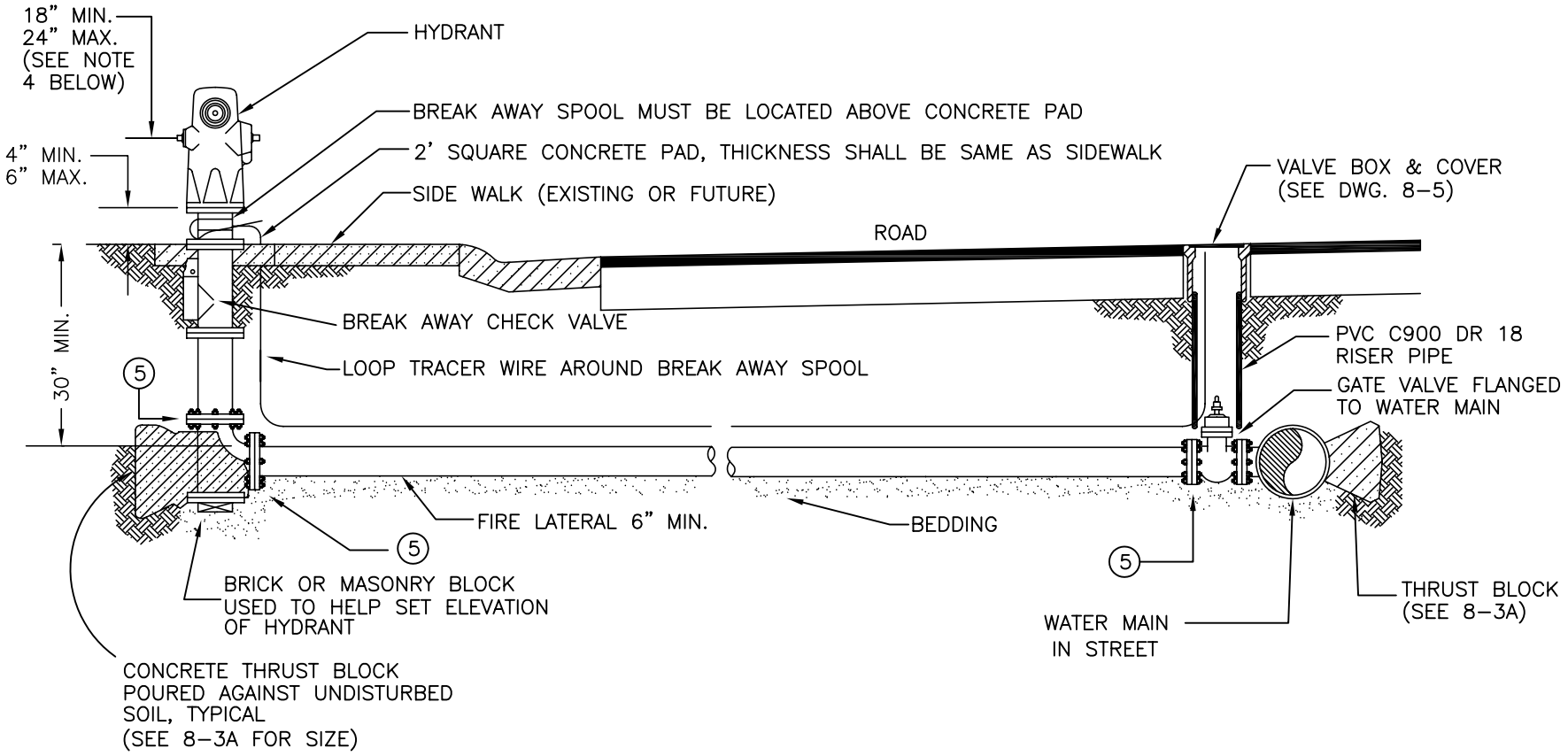
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
WATER SERVICE INSTALLATION	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8–1



NOTES:

1. IN COMMERCIAL AREAS, FIRE HYDRANTS SHALL BE PROTECTED FROM VEHICULAR DAMAGE BY BOLLARDS AND ACCESSIBLE TO FIRE PROTECTION EQUIPMENT. MIN CLEARANCE FROM HYDRANT TO ABOVE GROUND OBJECTS IS 3'.
2. TYPE OF FIRE HYDRANT SHOWN IS FOR ILLUSTRATIONS ONLY.
3. GATE VALVE SHALL BE FLANGED TO THE WATER MAIN.
4. CENTER OF LOWEST CAP NUT ON HYDRANT SHALL BE 18" MIN. TO 24" MAX. ABOVE TOP OF CONCRETE PAD.
5. THESE JOINTS MAY BE FLANGED, OR RESTRAINED MECHANICAL JOINTS WITH CITY APPROVED RESTRAINING DEVICE.

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DATE: NOV 2007

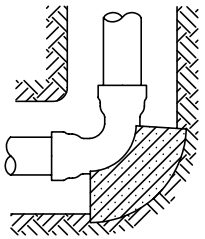
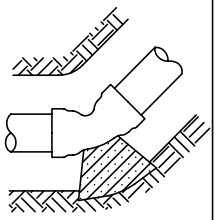
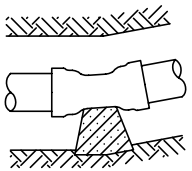
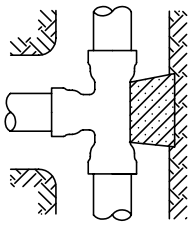
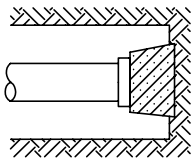
FIRE HYDRANT INSTALLATION
WATER MAIN IN STREET

SHEET # 1 OF 1

DRAWING #: 8-2

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

REQUIRED BEARING AREA IN TOTAL SQUARE FEET

TYPE OF FITTING		90° BEND	45° BEND	11-1/4" BEND 22-1/2" BEND	TEE	DEAD END	TEE WITH PLUG	CROSS WITH PLUGS
TYPICAL INSTALLATION								
SIZE OF PIPE	4"	2	1	1	2	2	THRUST BLOCKS NOT ALLOWED USE RESTAINED JOINTS WITH RESTRAINED LENGTH PER SEE SHEET 2 FOR "DEAD ENDS"	
	6"	4	2	1	3	3		
	8"	7	4	2	5	5		
	10"	12	6	3	8	8		
	12"	16	10	5	12	12		

NOTES:

1. THRUST BLOCKS SHALL BE CONSTRUCTED OF CLASS "B" CONCRETE.
2. BEARING AREAS GIVEN ARE FOR TEST PRESSURES OF 150 PSI IN SOIL WITH 2,000 PSF BEARING CAPACITY. IF TEST PRESSURE IS HIGHER OR SOIL BEARING CAPACITY IS LOWER, THRUST BLOCK SIZE SHALL BE SUBJECT TO APPROVAL BY AGENCY.
3. THRUST BLOCKS ARE TO BE POURED AGAINST UNDISTURBED SOIL. IF THIS CANNOT BE DONE, USE RESTAINED JOINTS TO RESIST THRUST OVER RESTAINED LENGTHS WITH AGENCY APPROVAL.
4. PIPE JOINTS ARE TO BE KEPT CLEAR OF CONCRETE.
5. FOR DEAD ENDS, INSTALL 2" TEMPORARY BLOW OFF PER DETAIL 8-12.

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THRUST BLOCK
BEARING AREA

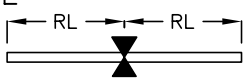
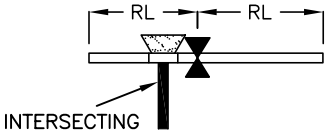
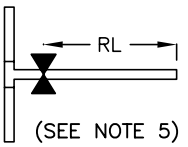
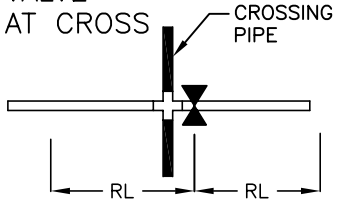
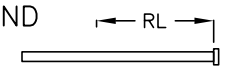
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 1 OF 2

DRAWING #: 8-3

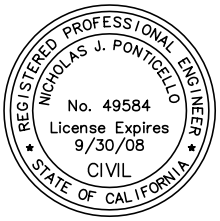
RESTRAINED LENGTH IN FEET

PIPE CONFIGURATION	CROSSING PIPE SIZE	30" COVER AND GREATER								60" COVER AND GREATER							
		6"		8"		10"		12"		6"		8"		10"		12"	
		DIP	PVC	DIP	PVC	DIP	PVC	DIP	PVC	DIP	PVC	DIP	PVC	DIP	PVC	DIP	PVC
X = PVC PIPE NOT ALLOWED IN RESTRAINED LENGTH, USE ONLY DUCTILE IRON.																	
IN LINE VALVE 		38	X	45	X	58	X	70	X	17	17	26	X	32	X	41	X
VALVE AT TEE  (SEE NOTE 4)	6"	6	6	17	13	37	X	48	X	6	6	12	10	20	19	30	X
	8"	6	6	12	8	27	19	43	X	6	6	6	6	17	15	27	X
	10"	6	6	6	6	19	15	39	X	6	6	6	6	12	11	24	X
	12"	6	6	6	6	14	10	32	X	6	6	6	6	10	8	20	19
TEE W/O THRUST BLOCK  (SEE NOTE 5)		37	X	42	X	56	X	68	X	16	15	23	X	30	X	38	X
VALVE AT CROSS  (SEE NOTE 5)	6"	6	6	18	15	41	X	50	X	6	6	14	12	22	20	32	X
	8"	6	6	16	12	32	20	44	X	6	6	6	6	18	16	29	X
	10"	6	6	6	6	20	17	40	X	6	6	6	6	14	12	26	X
	12"	6	6	6	6	18	14	34	X	6	6	6	6	12	10	22	20
DEAD END W/O THRUST BLOCK 		64	X	84	X	100	X	118	X	34	X	44	X	53	X	63	X

RL = RESTRAINED LENGTH

NOTES:

1. ALL JOINTS WITHIN THE RESTRAINED LENGTH MUST BE RESTRAINED.
2. RESTRAINING DEVICES FOR MJ'S: FOR DUCTILE IRON USE EBAA MAGALUG 1100, STAR PIPE PRODUCTS STARGRIP 3000, OR SIGMA ON LOK SLD; FOR PVC PIPE USE EBAA 2000PV, OR STAR PIPE PRODUCTS ALL GRIP 3600.
3. RESTRAINING DEVICES FOR PUSH–ON JOINTS: FOR DUCTILE IRON USE U.S. PIPE FIELD LOK GASKET, U.S. PIPE TR FLEX PIPE, OR APPROVED EQUAL; RESTAINED PVC PUSH–ON JOINTS NOT ALLOWED, USE DUCTILE IRON PIPE ONLY FOR RESTRAINED PUSH–ON JOINTS.
4. IF THRUST BLOCK IS NOT INSTALLED BEHIND TEE, RESTAINED LENGTH SHALL BE APPROVED BY AGENCY.
5. THIS CONFIGURATION IS ALLOWED ONLY IF A THRUST BLOCK CANNOT BE INSTALLED BEHIND THE TEE/DEAD END IN ACCORDANCE WITH SHEET 1. IF THRUST BLOCK IS INSTALLED, RESTRAINED LENGTH NOT REQUIRED.
6. JOINTS ON CROSSING PIPES CROSSING PIPES SHALL BE RESTRAINED FOR MINIMUM 18 FEET IN EACH DIRECTION.
7. RESTRAINED LENGTHS ARE BASED ON 150 PSI PRESSURE. IF HIGHER PRESSURE OR HIGHER SURGES ARE ANTICIPATED, THEN THIS TABLE DOES NOT APPLY AND RESTRAINED LENGTHS MUST BE APPROVED BY AGENCY.



City of Colusa
PUBLIC WORKS DEPARTMENT

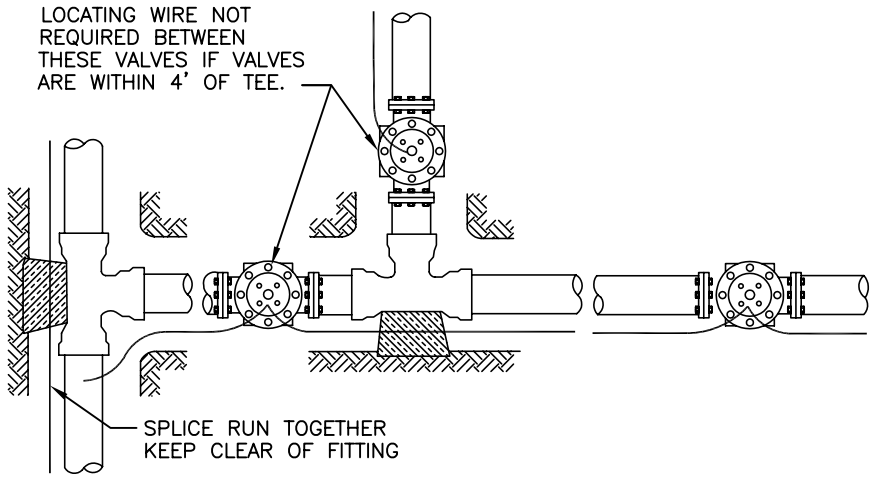
PIPE RESTRAINED LENGTH

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

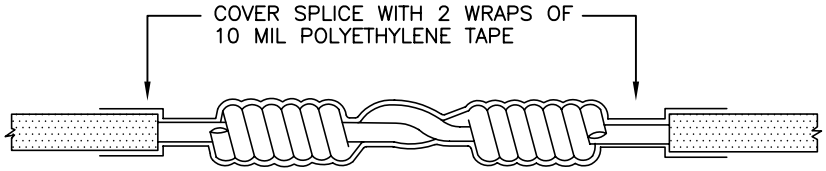
DATE: NOV 2007

SHEET # 2 OF 2

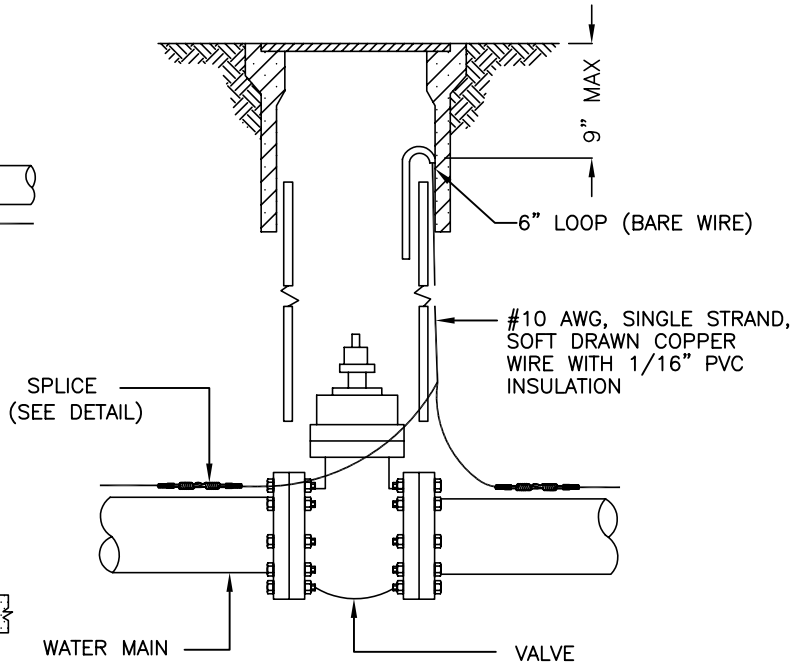
DRAWING #: 8–3



TYPICAL LAYOUT



SPLICE DETAIL



VALVE DETAIL

NOTES:

1. WIRE SHALL BE CONTINUOUS BETWEEN VALVE BOXES, EXCEPT AS NOTED.
2. LOCATING WIRE SHALL BE LAID ON TOP OF THE WATER MAIN, AND SHALL BE TAPED TO IT OR THE POLYETHYLENE ENCASEMENT (IF THE PIPE IS DUCTILE IRON) AT 10' INTERVALS AND TAPED AT ALL FITTINGS. TAPE SHALL BE 10 MIL POLYETHYLENE.
3. CONTRACTOR SHALL CONDUCT A CONTINUITY TEST ON ALL LOCATING WIRE SPLICES.
4. ALL SPLICES SHALL BE SOLDERED.

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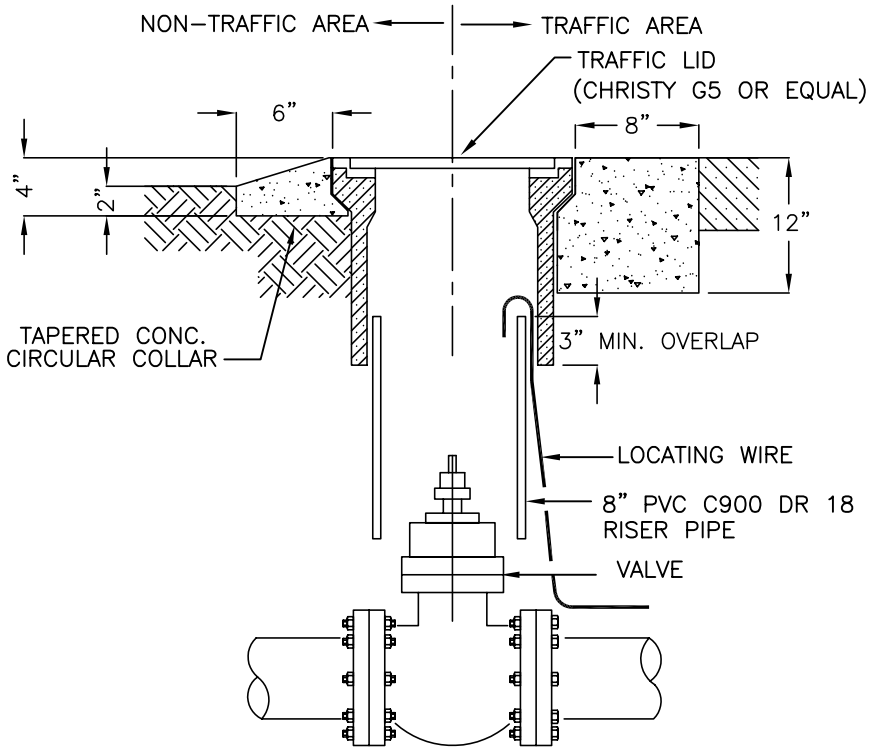
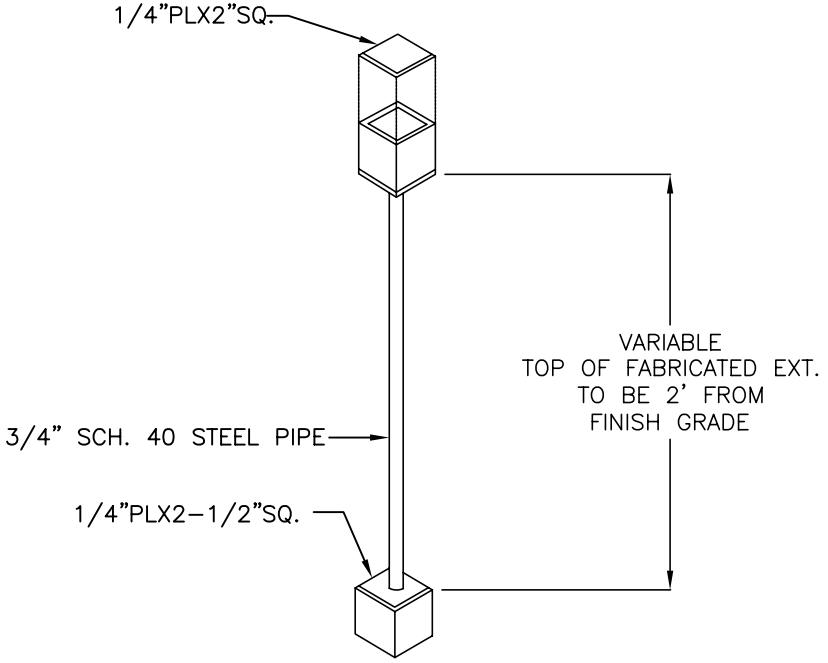
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
LOCATING WIRE FOR WATER MAINS AND SERVICES	SHEET # 1 OF 1
CITY ENGINEER APPROVED *Nicholas J. Ponticello* P.E. NO. 49584	DRAWING #: 8-4



TRAFFIC VALVE BOX



VALVE OPERATING NUT EXTENSION

REQUIRED WHERE VALVE NUT IS IN EXCESS OF 5' FEET BELOW FINISH GRADE. TOP OF OPERATING NUT SHALL BE LESS THAN 3' BELOW FINISH GRADE.

NOTES:

1. VALVE BOX AND RISER SHALL BE SET PLUMB AND CENTERED OVER WATER VALVE NUT.
2. SET VALVE BOX TO FINAL FINISH GRADE. IN AREAS WHERE THE FINISH GRADE HAS NOT BEEN DEFINED, PLACE 4"X4" LOCATING POST PAINTED BLUE WITHIN 1 FOOT OF VALVE BOX. POST SHALL BE 6 FEET IN LENGTH AND BURIED 3 FEET.

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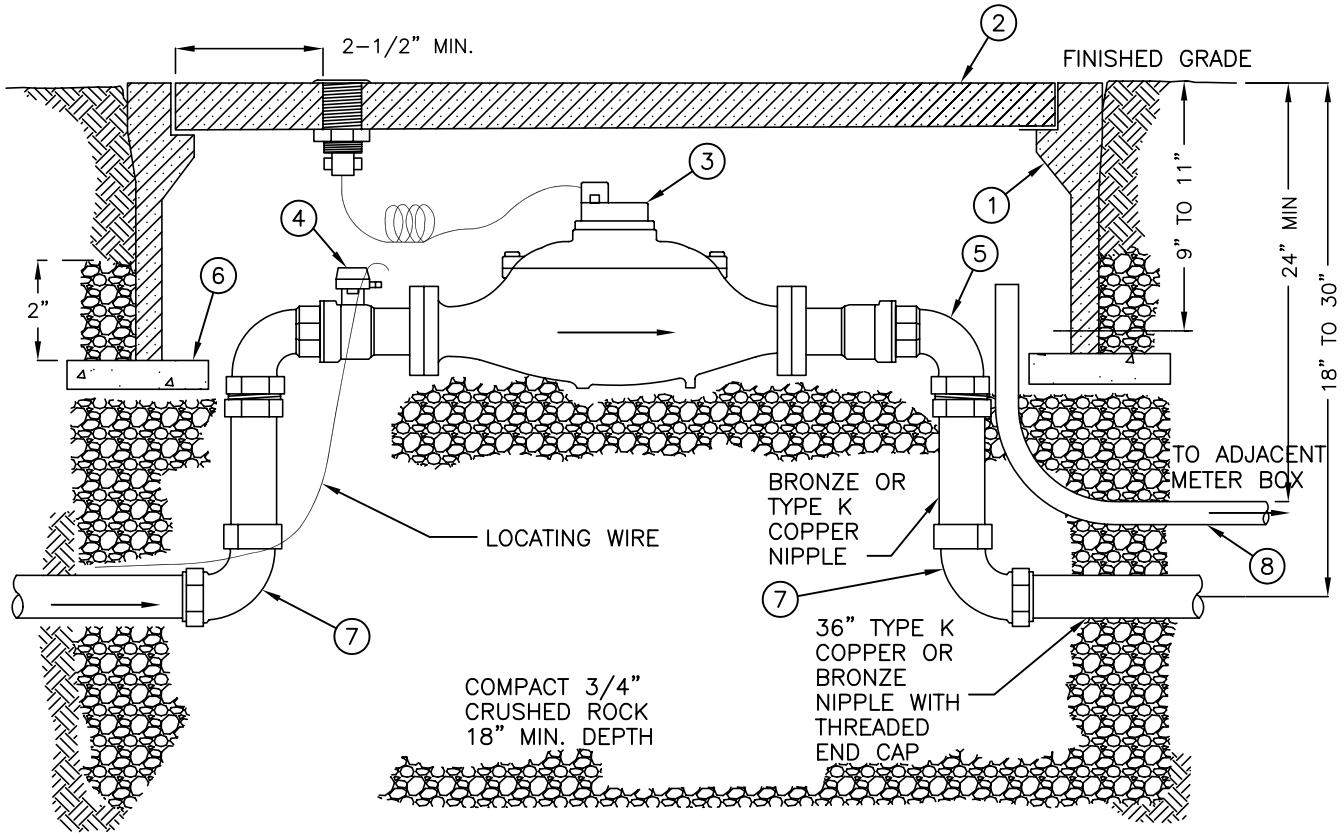
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
VALVE BOX INSTALLATION AND OPERATING NUT EXTENSION	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8–5

CONSTRUCTION NOTES O:

1. REINFORCED CONCRETE UTILITY BOX (CHRISTY B36 FOR 1–1/2" & 2", B30 FOR 1", OR EQUAL).
2. REINFORCED CONCRETE COVER WITH A HINGED CAST IRON LID AND A 1–3/4" PRE–CAST HOLE LOCATED OPPOSITE WATER LABEL (CHRISTY B36G COVER OR EQUAL).
3. INVENSYS WATER METER (NO SUBSTITUIONS)
   SEALED REGISTER MAGNETIC (100 CU. FT. REGISTER)
   MXU RADIO READ UNITS AND TOUCH READ PROBES.
4. FLANGED WINGED ANGLE METER STOP WITH TEFLON COATED BALL.
5. OVAL FLANGED 90° BRONZE FITTING.
6. 3/4" TO 1"X4"X16" CONCRETE BLOCK TO HELP SUPPORT VALVE BOX, USE ONE BLOCK ON ALL FOUR SIDES OF METER BOX. COVER ANY OPENINGS OR HOLES IN THE SIDE OF THE UTILITY BOX WITH CONCRETE BLOCK.
7. BRONZE COMPRESSION BY THREADED 90° FITTING.
8. ¾" SCHEDULE 80 PVC CONDUIT, SEAL ENDS WITH PVC TAPE, INSTALL BETWEEN METER BOXES PAIRED AT PROPERTY LINES AND BETWEEN ANY METER BOXES WITHIN 8 FEET OF EACHOTHER.



NOTE:
1. ALL METALIC PIPES AND FITTING THAT ARE BURIED SHALL BE ENCASED WITH 6 MIL PLASTIC SO THAT NO SOIL IS IN CONTACT WITH THE PIPES AND FITTINGS.
2. RESIDENTIAL METERS SHALL BE PLACED AT A MAXIMUM OF 18" FROM SIDEWALK.

City of Colusa
PUBLIC WORKS DEPARTMENT

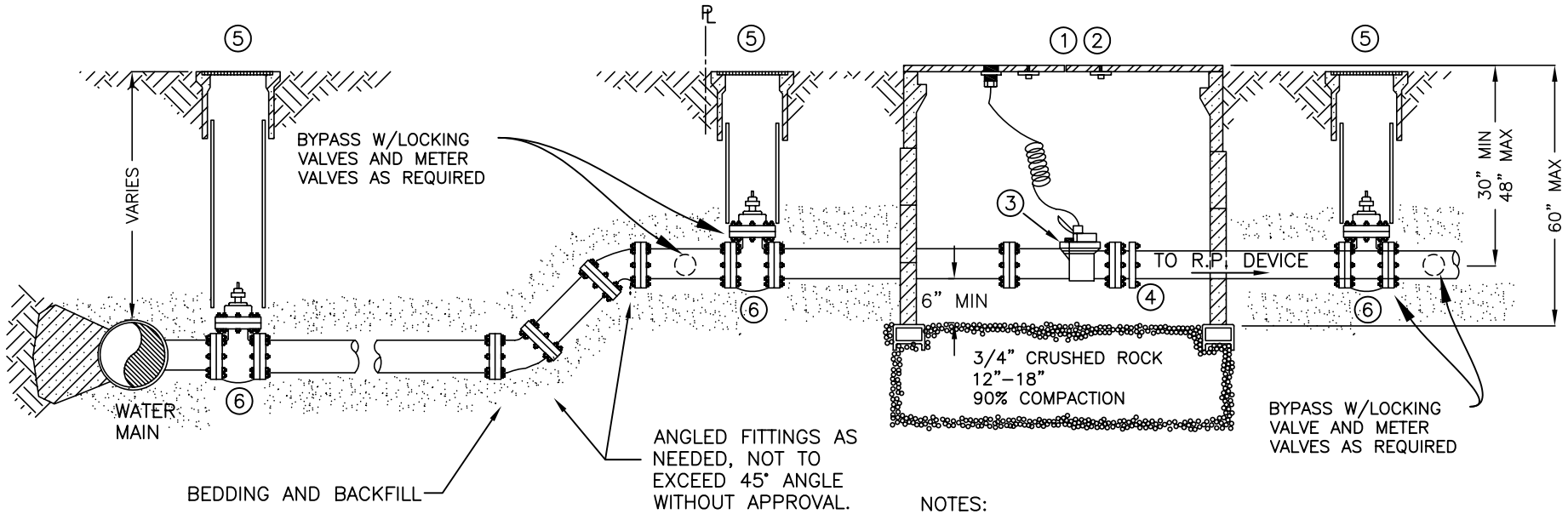
1", 1½" OR 2"
RESIDENTIAL OR COMMERCIAL
METERED WATER SERVICE

DATE: NOV 2007

SHEET # 1 OF 2

DRAWING #: 8–6

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584



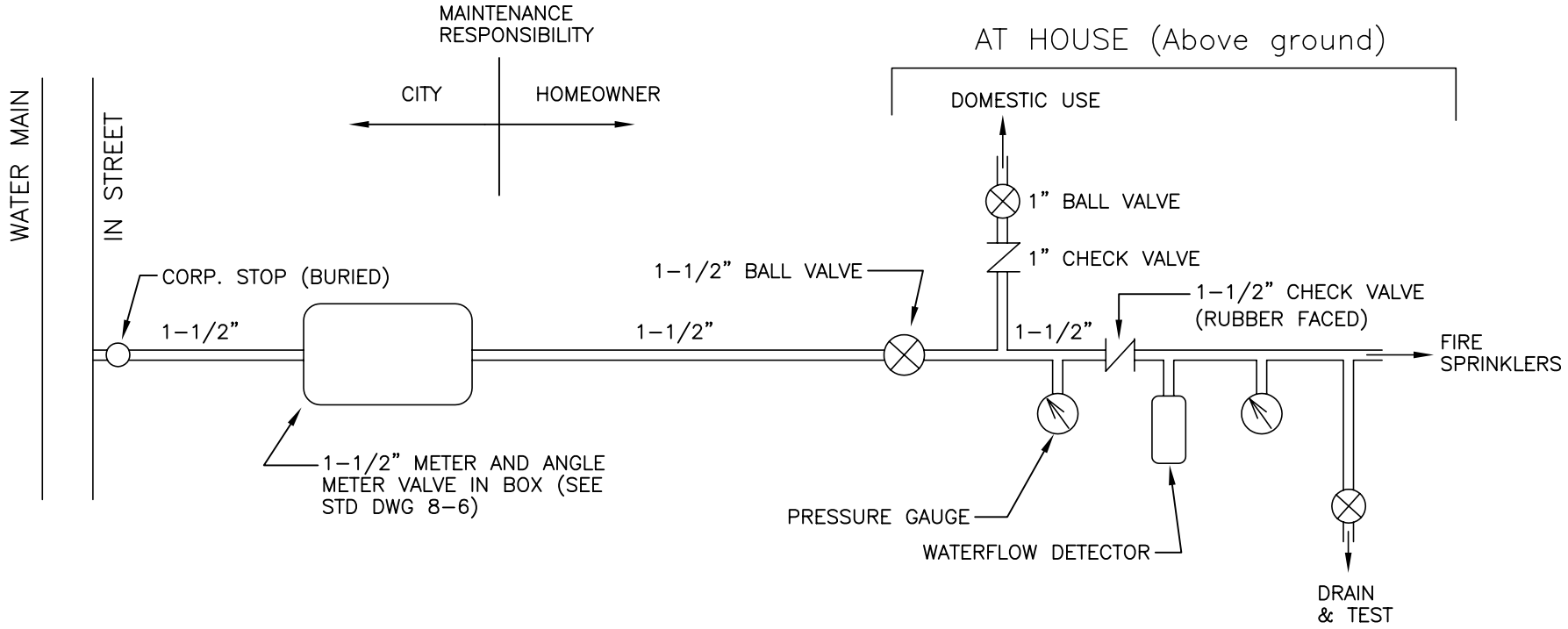
CONSTRUCTION NOTES ○:

1. REINFORCED CONCRETE UTILITY BOX WITH EXTENSIONS (CHRISTY B4B). 2 PIECE STEEL CHECKER PLATE W/ TWO 10" ROUND SELF–CLOSING READING LIDS AND 1–3/4" HOLE FOR TOUCH READ MODULE IN ONE READING LID. (CHRISTY B48–62G COVER). CONCRETE BLOCKS SHALL BE PLACED ALONG THE ENTIRE PERIMETER TO SUPPORT BOX.
2. CHRISTY BOXS AND LIDS MAY BE REPLACED WITH WELL DRAINED VAULT INCORPORATING BYPASS, VALVES, & METER(S) WITH APPROVAL.
3. INVENSYS WATER METER (NO SUBSTITUTIONS) SEALED REGISTER MAGNETIC (100 CU. FT. REGISTER) MXU RADIO READ UNITS AND TOUCH READ PROBES. TYPE OF METER SHALL BE CALLED OUT ON PLANS.
4. FLANGED COUPLING ADAPTER.
5. VALVE BOX AND LID (SEE 8–5)
6. GATE VALVE, WITH BOTH ENDS FLANGED

NOTES:

1. WHEN NEEDED CONCRETE BLOCKS SHALL BE USED TO BLOCK ANY OPENING OR CUT OUT PORTIONS OF THE METER BOX NOT UTILIZED (MINIMUM OF 1" THICK BLOCK ARE REQUIRED).
2. ALL 4" TO 6" DIA. PIPE BETWEEN THE WATER MAIN AND THE METER SHALL BE DUCTILE IRON WITH POLYETHYLENE ENCASEMENT AND 6 INCHES OF SAND BACKFILL AND 6 INCHES OF SAND BEDDING. JOINTS BETWEEN MAIN AND METER SHALL BE RESTRAINED.
3. 3" PIPE SHALL BE TYPE K COPPER OR BRONZE WRAPPED WITH 6 MIL PLASTIC AND HAVE SAND BEDDING AND BACKFILL. VALVES ON 3 INCH DIAMETER PIPE SHALL HAVE BRONZE CORPORATION AND CURB VALVES WITH TEFLON COATED BALLS.
4. VALVES ATTACHED TO THE MAIN MUST HAVE FLANGED ENDS.
5. INSTALL LOCATING WIRE PER DETAIL 8–4.
6. INSTALL BYPASS W/LOCKING VALVE AND METER VALVES AS REQUIRED BY AGENCY.

City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
3" TO 6" METER INSTALLATION	SHEET # 2 OF 2
CITY ENGINEER APPROVED *Nicholas J. Ponticello* P.E. NO. 49584	DRAWING #: 8–6



NOTES:

1. THE RESIDENTIAL SERVICE DETAILS ARE APPLICABLE ON SINGLE-FAMILY RESIDENTIAL SERVICES ONLY. ALL OTHERS SHALL USE THE COMMERCIAL STANDARD WHEN REQUIRED.
2. FIRE SERVICE IMPROVEMENTS SHALL BE INSTALLED BY THE HOUSE CONTRACTOR CONCURRENTLY WITH HOUSE CONSTRUCTION.
3. ALL IMPROVEMENTS SUBJECT TO CITY AND FIRE DIST. INSPECTION AND APPROVAL.
4. ALL CONNECTIONS SHALL BE THREADED OR GLUE JOINT ONLY.

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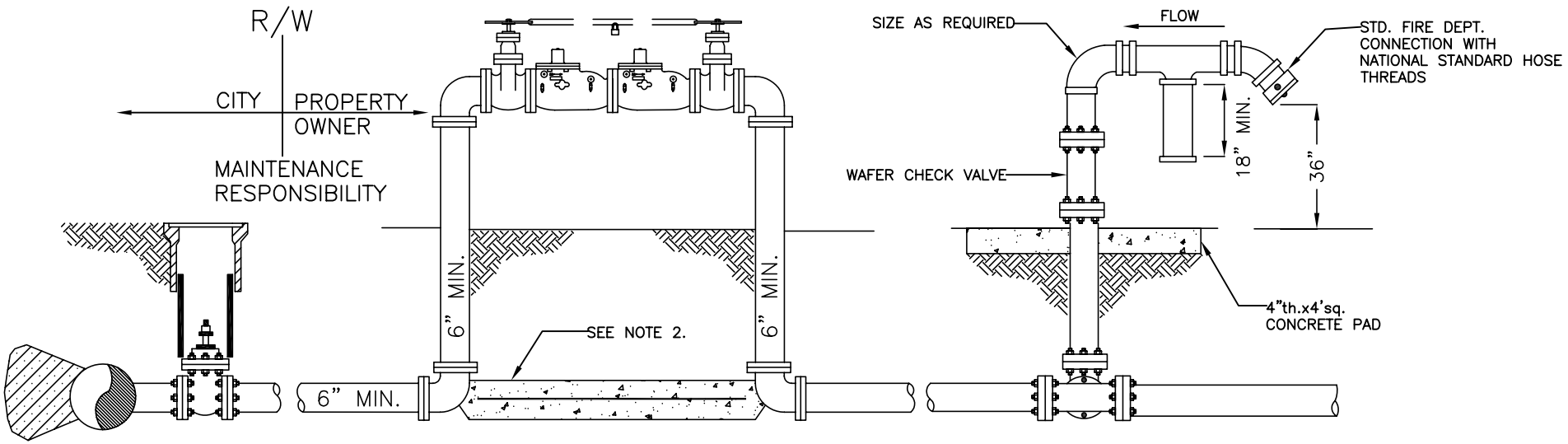
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
FIRE SPRINKLER SERVICE RESIDENTIAL	SHEET # 1 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8-7



NOTES:

1. ALL JOINTS TO BE FULLY RESTRAINED. ALL PIPE & FITTINGS SHALL BE DUCTILE IRON.
2. CONCRETE THRUST BLOCK WITH ONE PIECE OF #4 REBAR.
3. DOUBLE DETECTOR CHECK VALVE ASSEMBLY (AMES OR APPROVED EQUAL), REDUCED PRESSURE TYPE, WITH OS&Y RESILIENT WEDGE GATE VALVES, REFER TO CURRENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES PUBLISHED BY THE STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES. OS&Y VALVES TO BE LOCKED WITH FIRE DEPARTMENT APPROVED PADLOCK AND FITTED WITH TAMPER SWITCHES AS REQUIRED ON FIRE SYSTEM APPLICATION.
4. CHECK VALVE AND PIPE SHALL BE U.L.–F.M. APPROVED.
5. INSTALLATION MAY VARY WITH FIELD CONDITIONS AND FIRE DEPARTMENT REQUIREMENTS.

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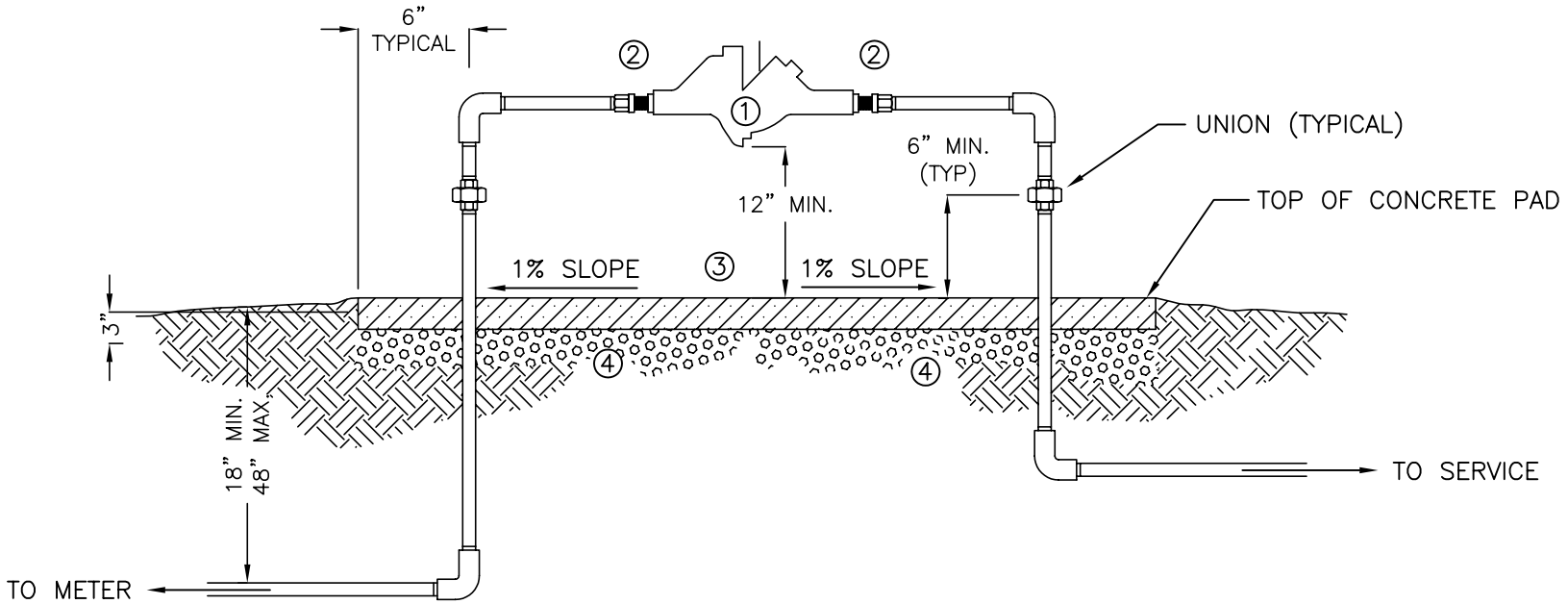
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
FIRE SPRINKLER SERVICE COMMERCIAL	SHEET # 2 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8–7



NOTES:

1. REDUCED PRESSURE BACKFLOW PREVENTER SHALL BE LISTED ON THE STATE OF CALIFORNIA'S DEPT. OF HEALTH SERVICES MOST RECENT LIST OF APPROVED REDUCED PRESSURE BACKFLOW PREVENTERS.
2. ALL PIPES SHALL BE GALVANIZED SCHEDULE 40 STEEL, TYPE K COPPER, OR BRONZE. ALL BURIED PIPES SHALL BE WRAPPED WITH 6 MIL. POLYETHYLENE ENCASEMENT OR 10 MIL POLYETHYLENE OR PVC TAPE.
3. GALVANIZED PIPE SHALL HAVE ANODE BAG PER COUNTY BUILDING INSPECTION REQUIREMENTS CODE.

CONSTRUCTION NOTES O:

1. REDUCED PRESSURE BACKFLOW PREVENTER.
2. BRONZE BODY, RESILIENT SEATED BALL VALVE MINIMUM WORKING PRESSURE OF 175 PSI.
3. 3" SLAB – 18" WIDE WITH VARYING LENGTH.
4. 1/2" OR 3/4" CRUSHED ROCK, 4" MINIMUM THICKNESS, MECHANICALLY COMPACTED.

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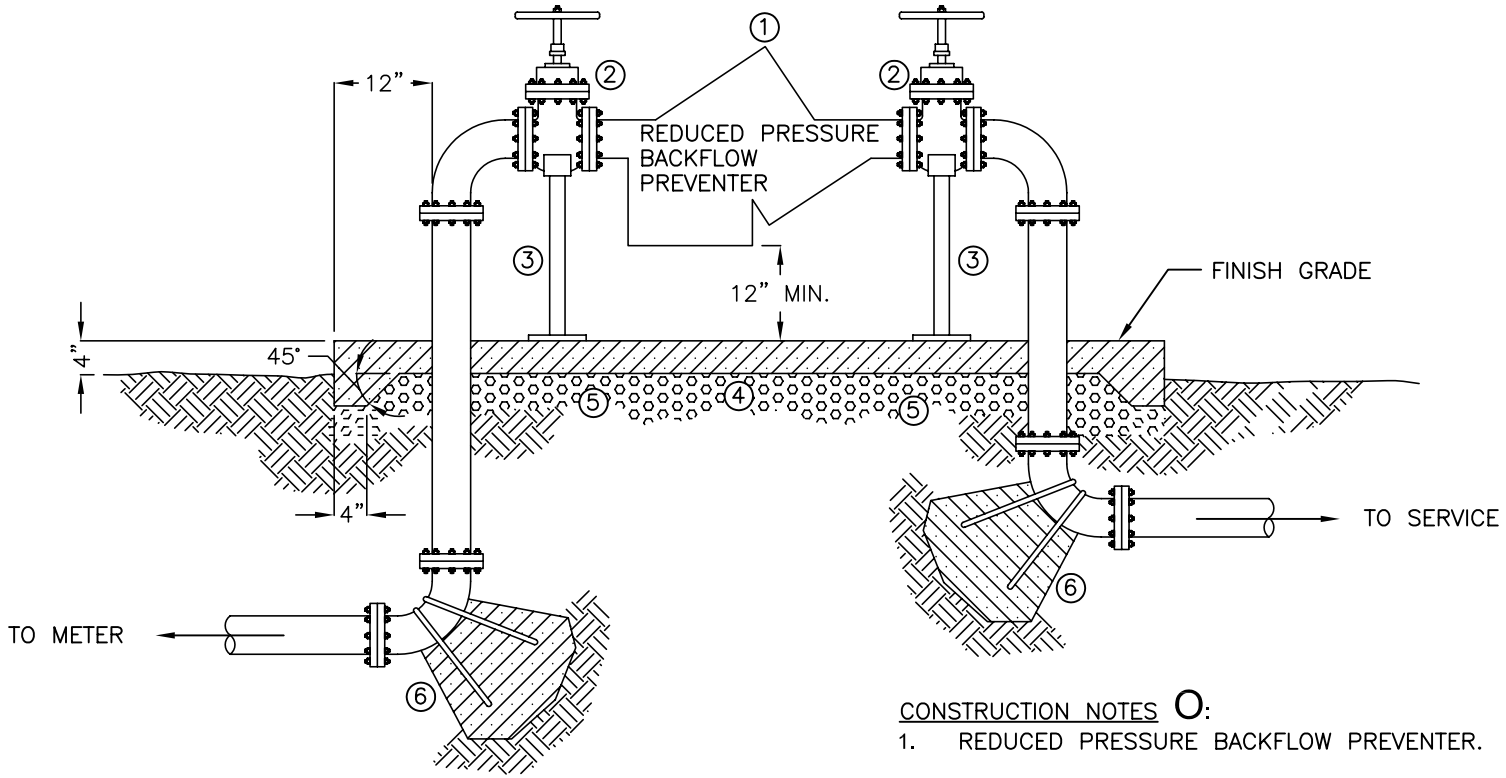
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
REDUCED PRESSURE BACKFLOW PREVENTER, 1" TO 3"	SHEET # 1 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8–8



NOTES:

1. REDUCED PRESSURE BACKFLOW PREVENTER SHALL BE LISTED ON THE STATE OF CALIFORNIA'S DEPT. OF HEALTH SERVICES MOST RECENT LIST OF APPROVED REDUCED PRESSURE BACKFLOW PREVENTERS.
2. INSTALL LOCATING WIRE PER 8–4.
3. ALL PIPE SHALL BE CEMENT LINED DUCTILE IRON, CLASS 350 MEETING THE REQUIREMENTS OF AWWA C151 AND C115 ALL JOINTS SHALL BE FLANGED. FLANGES SHALL CONFORM TO AWWA C207, CLASS D REQUIREMENTS.
4. BURIED PIPE SHALL BE WRAPPED WITH 8 MILS OF POLYETHYLENE ENCASEMENT WITH SAND BEDDING AND BACKFILL.

CONSTRUCTION NOTES O:

1. REDUCED PRESSURE BACKFLOW PREVENTER.
2. FLANGED VALVE.
3. PIPE SUPPORT, 2" GALVANIZED SCH 40 AT MINIMUM.
4. 4" CONCRETE SLAB – 24" WIDE WITH VARYING LENGTH.
5. 6" OF CRUSHED AGGREGATE MECHANICALLY COMPACTED.
6. THRUST BLOCK WITH #5 REBARS. WRAP THE PORTION OF THE REBAR THAT IS NOT EMBEDDED IN THE CONCRETE WITH 20 MIL POLYETHYLENE OR PVC TAPE. SEE DWG 8–3 FOR SIZING.

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City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
REDUCED PRESSURE BACKFLOW PREVENTER, 4" OR LARGER	SHEET # 2 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8–8

DO=AVERAGE OUTSIDE PIPE DIAMETER (INCHES)
A=OFFSET AT THE END OF THE PIPE (INCHES)
RB=MINIMUM BENDING RADIUS (FEET)

MAX. DEFLECTION FOR PVC PIPE,AWWA C900 CLASS 200 DR 14

NORMAL PIPE DIAMETER	AVERAGE OUTSIDE PIPE DIAMETER,DO	MINIMUM WALL THICKNESS	MINIMUM BENDING RADIUS,RB	OFFSET AT FREE END "A"
(INCHES)	(INCHES)	(INCHES)	(FEET)	(INCHES)
4	4.800	0.343	120	20
6	6.900	0.493	185	13
8	9.050	0.646	240	10
10	11.100	0.793	400	6
12	13.200	0.943	800	3

JOINT DEFLECTION OF AWWA C900 PVC PIPE IS PROHIBITED.

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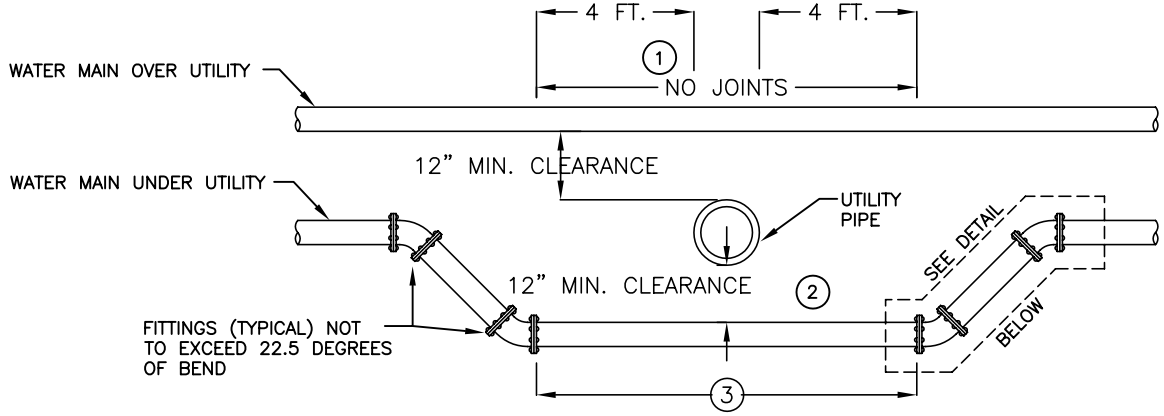
DATE: NOV 2007

MAXIMUM DEFLECTION FOR PVC PIPE

SHEET # 1 OF 1

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 8-9



CONSTRUCTION NOTES O:

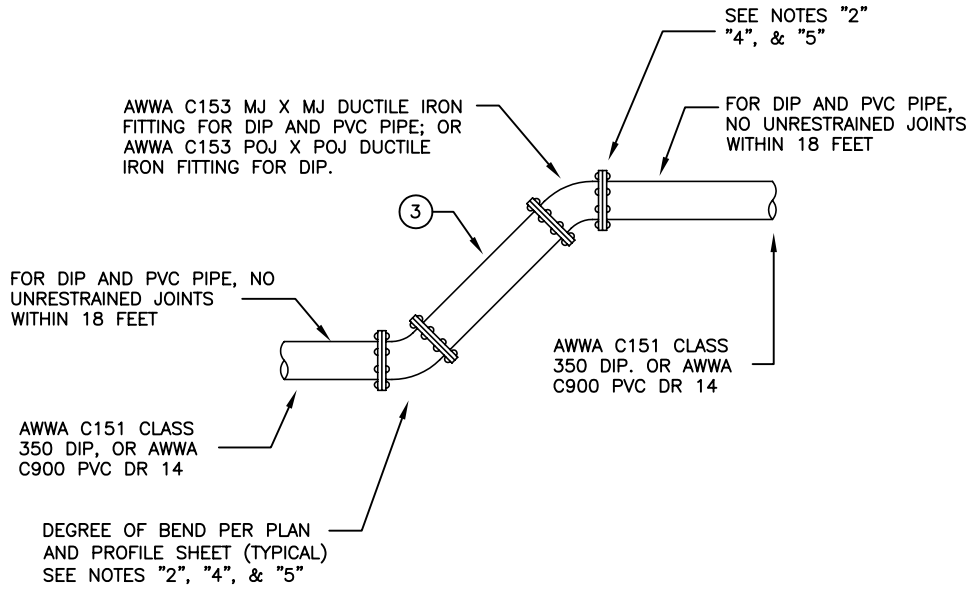
1. IF UTILITY BEING CROSSED IS NOT A STORM DRAIN, SEWER, OR OTHER WATER LINE, THEN THE "NO JOINT" REQUIREMENT DOES NOT APPLY.
2. IF THE UTILITY BEING CROSSED IS A SEWER, STORM DRAIN OR OTHER WATER LINE, THE TYPE OF PIPE MUST BE DUCTILE IRON OR AWWA C900 DR 14 PVC PIPE.
3. NO JOINTS ALLOWED IF LESS THAN 18 FEET. ALL JOINTS BETWEEN FITTINGS MUST BE RESTRAINED WITH EITHER OF THE METHODS DESCRIBED FOR DIP. BELL RESTRAINTS FOR PVC PIPE ARE NOT ALLOWED.

LEGEND

DIP=DUCTILE IRON PIPE
AWWA=AMERICAN WATER WORKS ASSOC.
PVC=POLYVINYL CHLORIDE PIPE
POJ=PUSH ON JOINTS

NOTES:

1. IF DIP IS USED, FITTINGS MAY HAVE BELL ENDS WITH U.S. PIPE FIELD LOK GASKETS FOR RESTRAINING DEVICES OR APPROVED EQUAL. BELL RESTRAINTS FOR PVC PIPE ARE NOT ALLOWED.
2. IF BEND IS TO EXCEED 22.5 DEGREES, THE BEND AND THE RESTRAINED LENGTH MUST BE APPROVED BY THE CITY.
3. WRAP ALL DIP AND FITTINGS WITH 8 MIL. POLYETHYLENE ENCASEMENT IN ACCORDANCE WITH AWWA C105.
4. RESTRAINING DEVICE FOR DIP: FOR POJS, USE U.S. PIPE FIELD LOK GASKETS OR APPROVED EQUAL, FOR MJ JOINTS USE STAR PIPE PRODUCTS STARGRIP 3000, STAR PIPE PRODUCTS ALLGRIP 3600, EBAA MEGALUG 2000PV SERIES, OR APPROVED EQUAL.
5. RESTRAINING DEVICE FOR PVC PIPE: USE MJ FITTINGS WITH STAR PIPE PRODUCTS ALLGRIP 3600, EBAA MEGALUG 2000PV SERIES, OR APPROVED EQUAL.
6. SEE PLAN & PROFILE FOR RESTRAINED LENGTH AND DEGREE OF BEND.
7. THIS DETAIL IS FOR WATER PIPES 12" IN DIAMETER & SMALLER.



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City of Colusa
PUBLIC WORKS DEPARTMENT

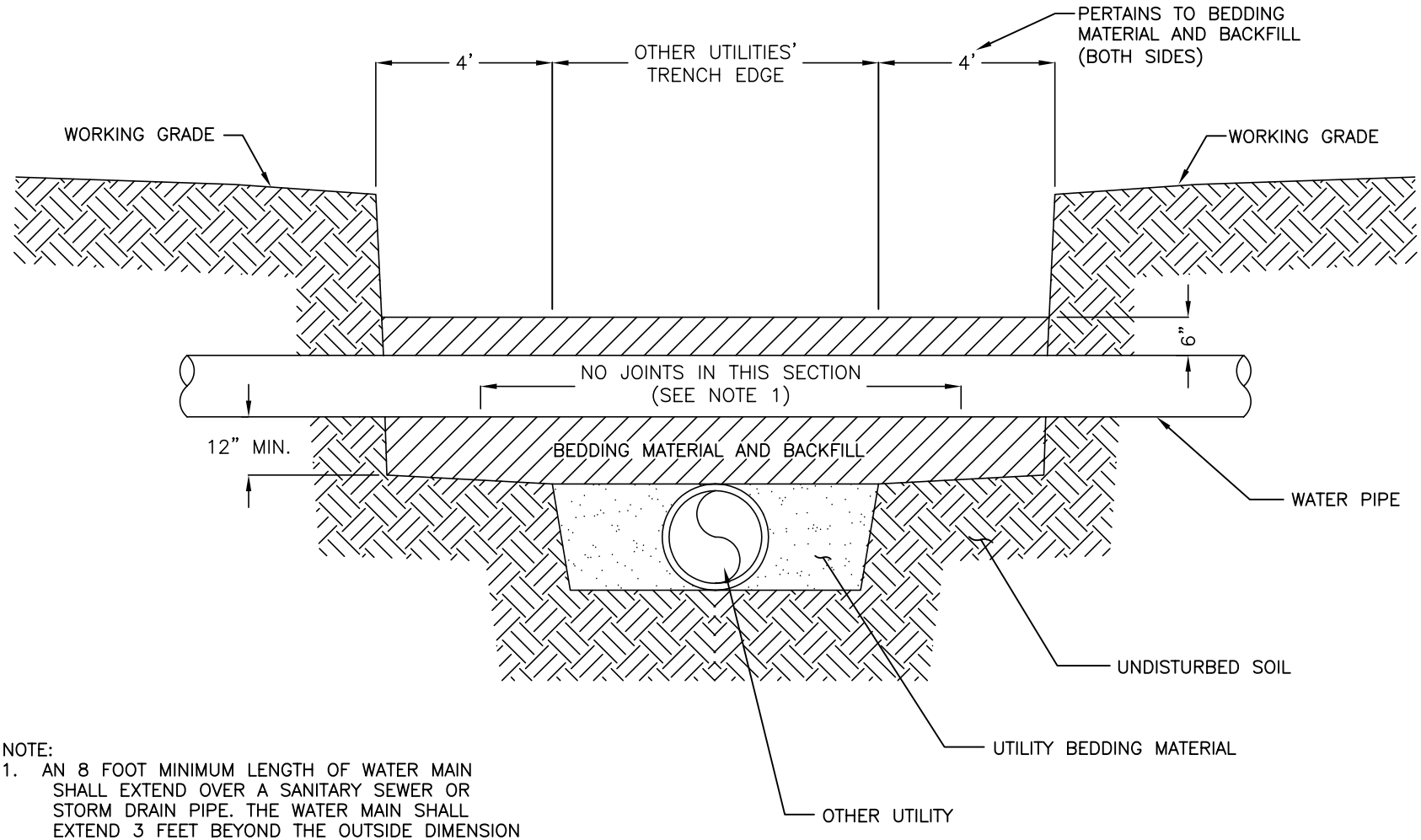
UTILITY CROSSING

DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 8-10

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584



NOTE:

1. AN 8 FOOT MINIMUM LENGTH OF WATER MAIN SHALL EXTEND OVER A SANITARY SEWER OR STORM DRAIN PIPE. THE WATER MAIN SHALL EXTEND 3 FEET BEYOND THE OUTSIDE DIMENSION OF ALL OTHER UTILITIES.

2. BEDDING AND BACKFILL MATERIAL
   USE 1/2" CRUSHED AGGREGATE FOR PVC WATER PIPE USE SAND FOR DUCTILE IRON WATER PIPE COMPACT BEDDING AND BACKFILL MATERIAL TO 90% RELATIVE COMPACTION.

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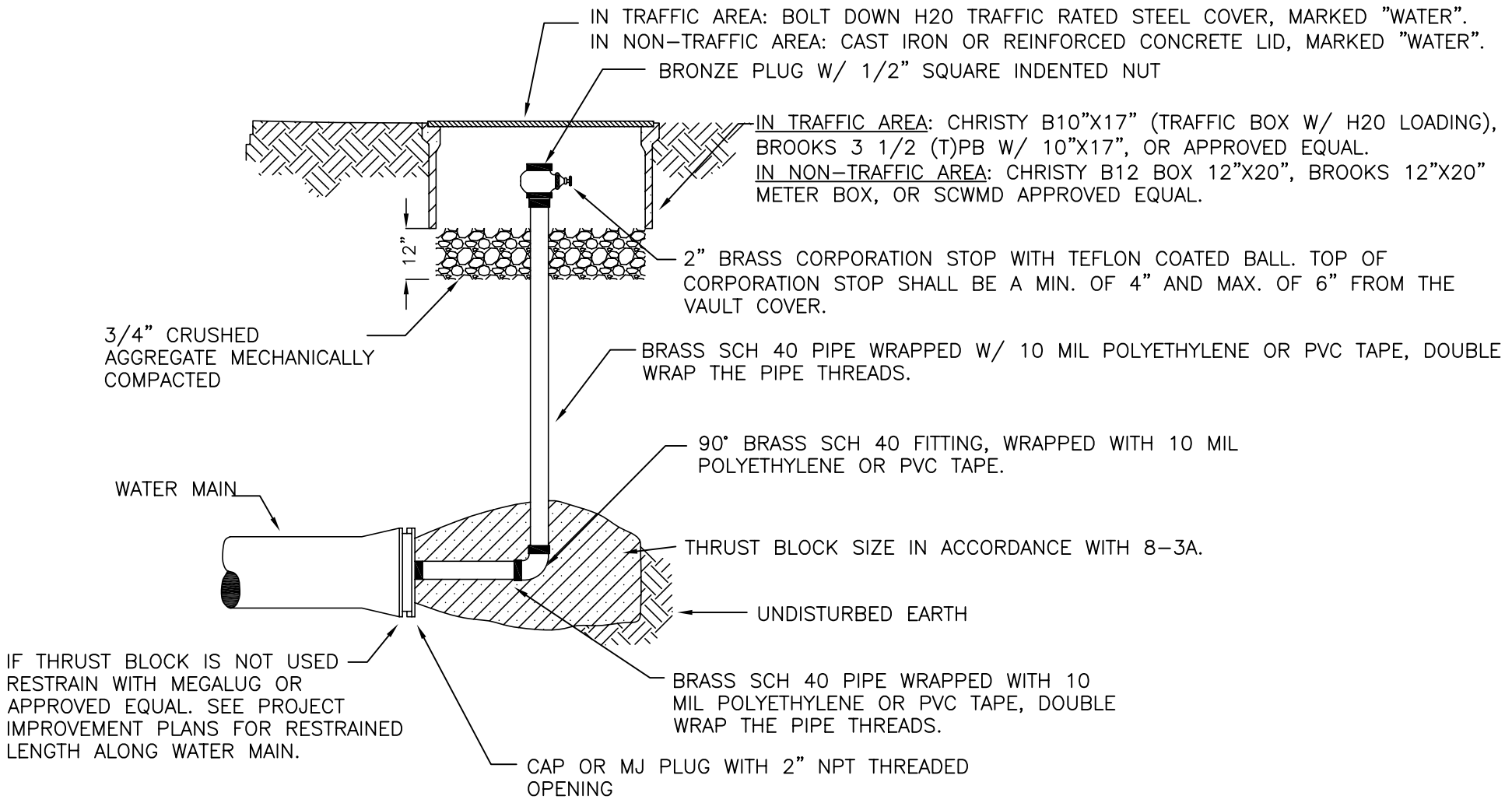
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
UTILITY CROSSING UNDER EXISTING WATER MAIN	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8-11



NOTE:

BACKFILL WITH NATIVE MATERIAL AND COMPACT TO 90% COMPACTION. IN TRAFFIC AREAS THE BACKFILL AND COMPACTION REQUIREMENTS FOR THE ROAD SHALL GOVERN.

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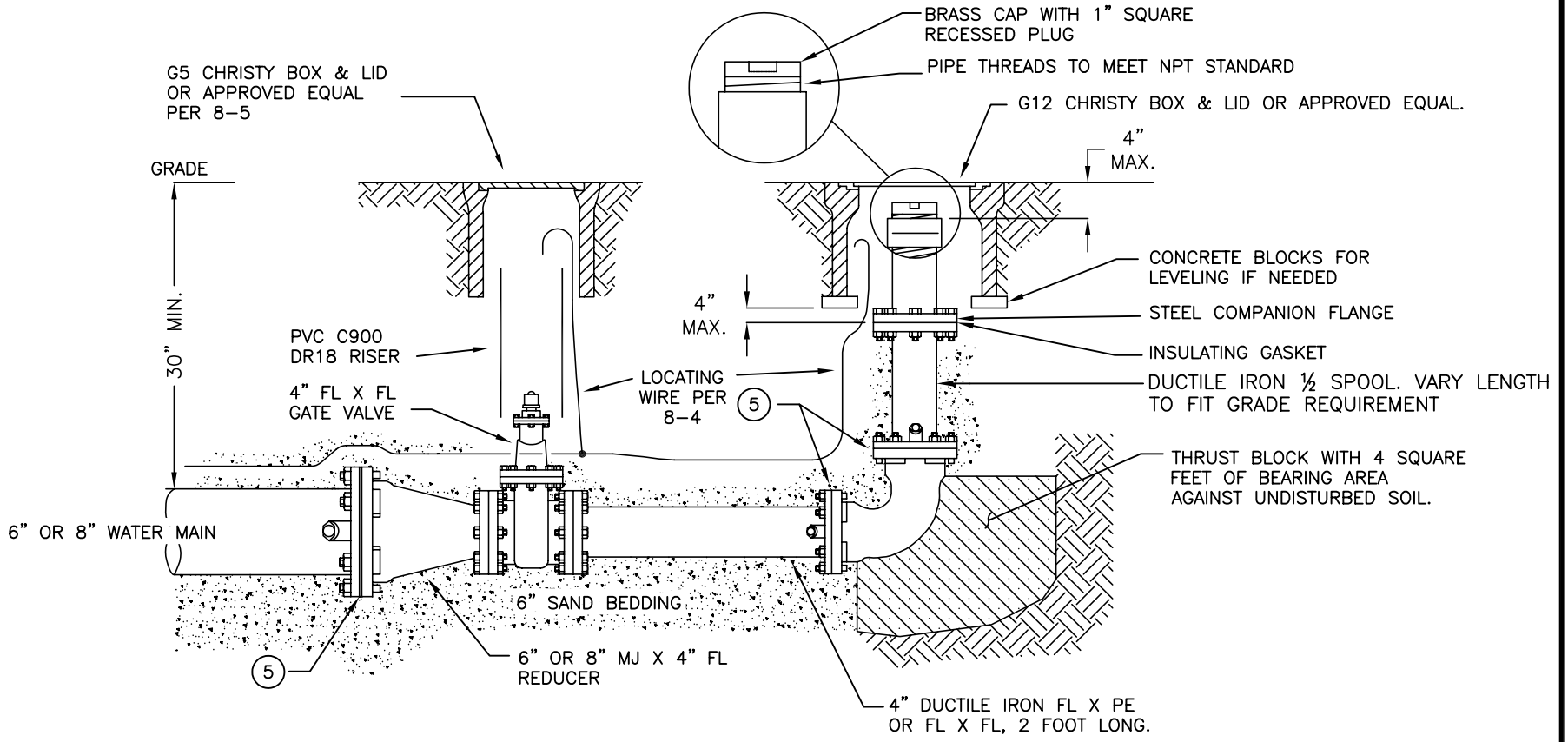
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
BLOW-OFF ASSEMBLY 2" TEMPORARY	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8-12



NOTES:

1. WRAP 4" GATE VALVE AND ALL METAL FITTINGS AND PIPE WITH 8 MIL POLYETHYLENE ENCASEMENT PER AWWA C105.
2. ALL FITTINGS SHALL HAVE A MINIMUM PRESSURE CLASS OF 200 PSI AND MEET AWWA C110 OR AWWA C153 STANDARDS.
3. PROVIDE 6 INCHES OF SAND BEDDING AND BACKFILL WITH SAND TO 6 INCHES ABOVE THE TOP OF PIPE AND FITTINGS. COMPACT TO 90% RELATIVE COMPACTION.
4. GALVANIZED STEEL PIPE NOT ALLOWED.
5. THESE JOINTS MUST BE RESTRAINED. TYPES OF RESTRAINED JOINTS MAY BE: (1) FLANGE, (2) MJ WITH APPROVED RESTRAINING DEVICES (EBAA OR STAR PIPE PRODUCTS). OR (3) FOR D.I.P., PUSH ON JOINTS WITH U.S. PIPE FIELD-LOK GASKET OR APPROVED EQUAL.

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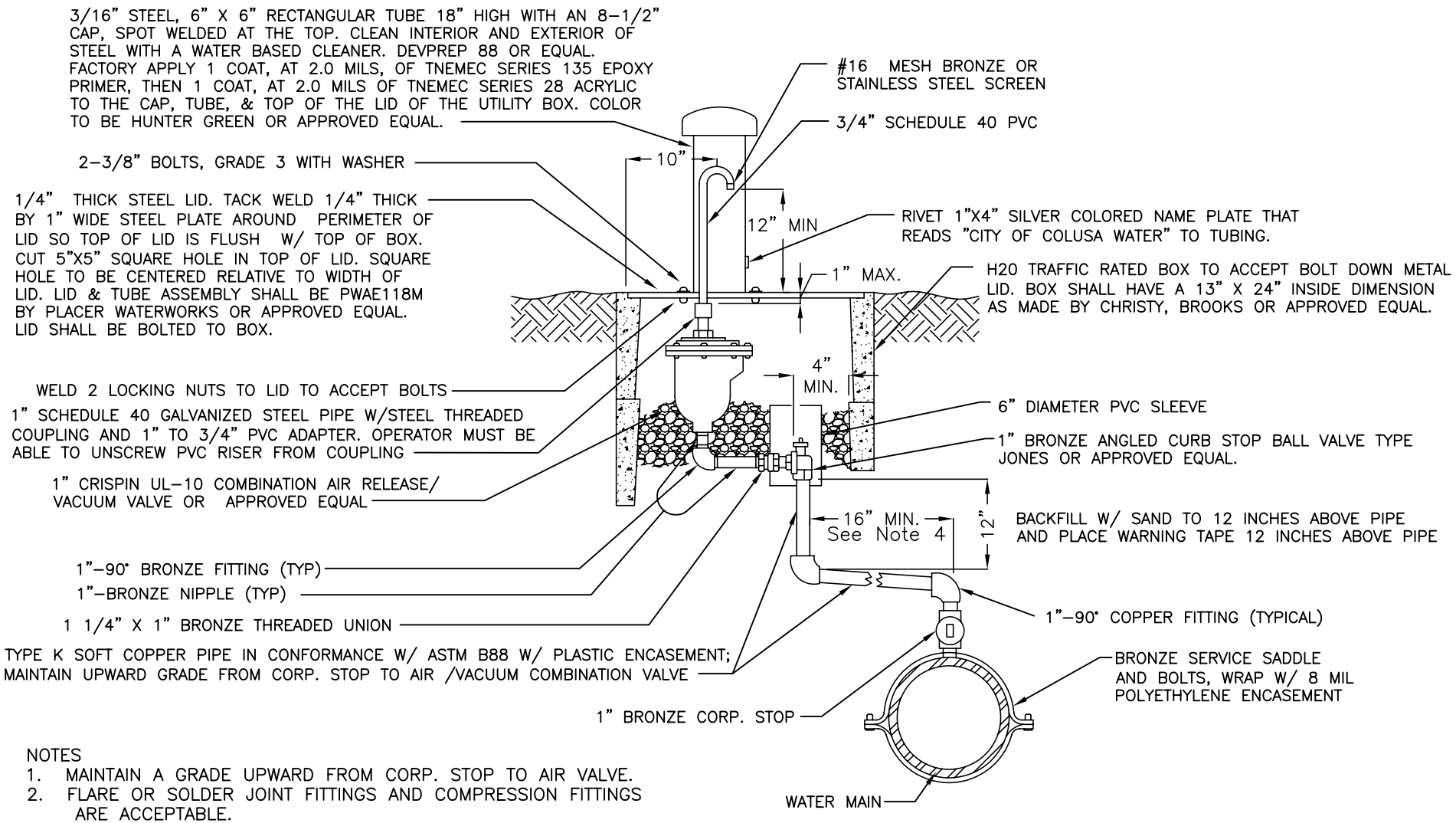
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
4" BLOW-OFF ASSEMBLY AT END OF MAIN	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8-13



NOTES

1. MAINTAIN A GRADE UPWARD FROM CORP. STOP TO AIR VALVE.
2. FLARE OR SOLDER JOINT FITTINGS AND COMPRESSION FITTINGS ARE ACCEPTABLE.
3. PROVIDE 3'X3'X3' OF 1/2" CRUSHED AGGREGATE FOR DRAINAGE AND SUPPORT UNDER VALVE, COMPACT TO 95%.
4. SEE PLAN AND PROFILE SHEETS FOR LOCATION OF VALVE BOX AND AIR VENT 5. DETAIL NOT FOR USE IN ROADWAYS.
5. ANSI AWWA C800 "UNDERGROUND SERVICE LINE VALVES AND FITTINGS" ASTM B88 SPECIFICATION FOR SEAMLESS COPPER WATER TUBES.

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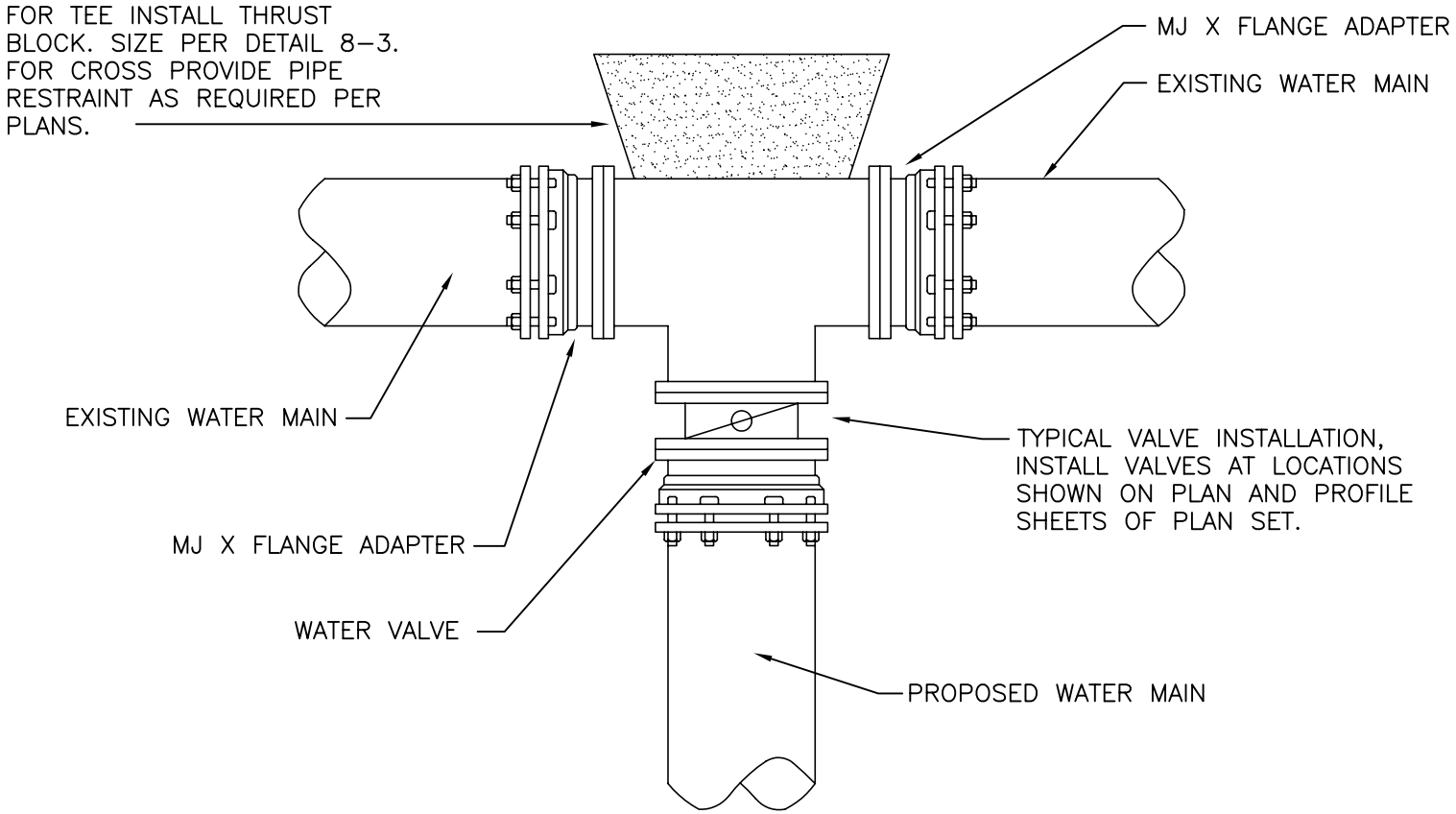
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
AIR/VACUUM VALVE COMBINATION	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8–14



NOTES:

1. TEE AND MJ X FLANGE ADAPTER SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE ENCASEMENT.
2. DIG SUMP UNDER CUT IN LOCATION AND PUMP ALL WATER FROM EXISTING MAIN AWAY FROM CUT IN LOCATION. DO NOT ALLOW ANY WATER TO ENTER EXISTING PIPE. ADHERE CHLORINE TABLETS TO TEE OR CROSS, THE NUMBER OF TABLETS SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATION. SPRAY EXISTING PIPE, ALL FITTINGS AND VALVES WITH A SOLUTION OF SUPER CHLORINATED WATER JUST PRIOR TO INSTALLATION.
3. PROVIDE RESTRAINT OF PIPE JOINT AS REQUIRED BY PLANS AND DETAIL 8–3.

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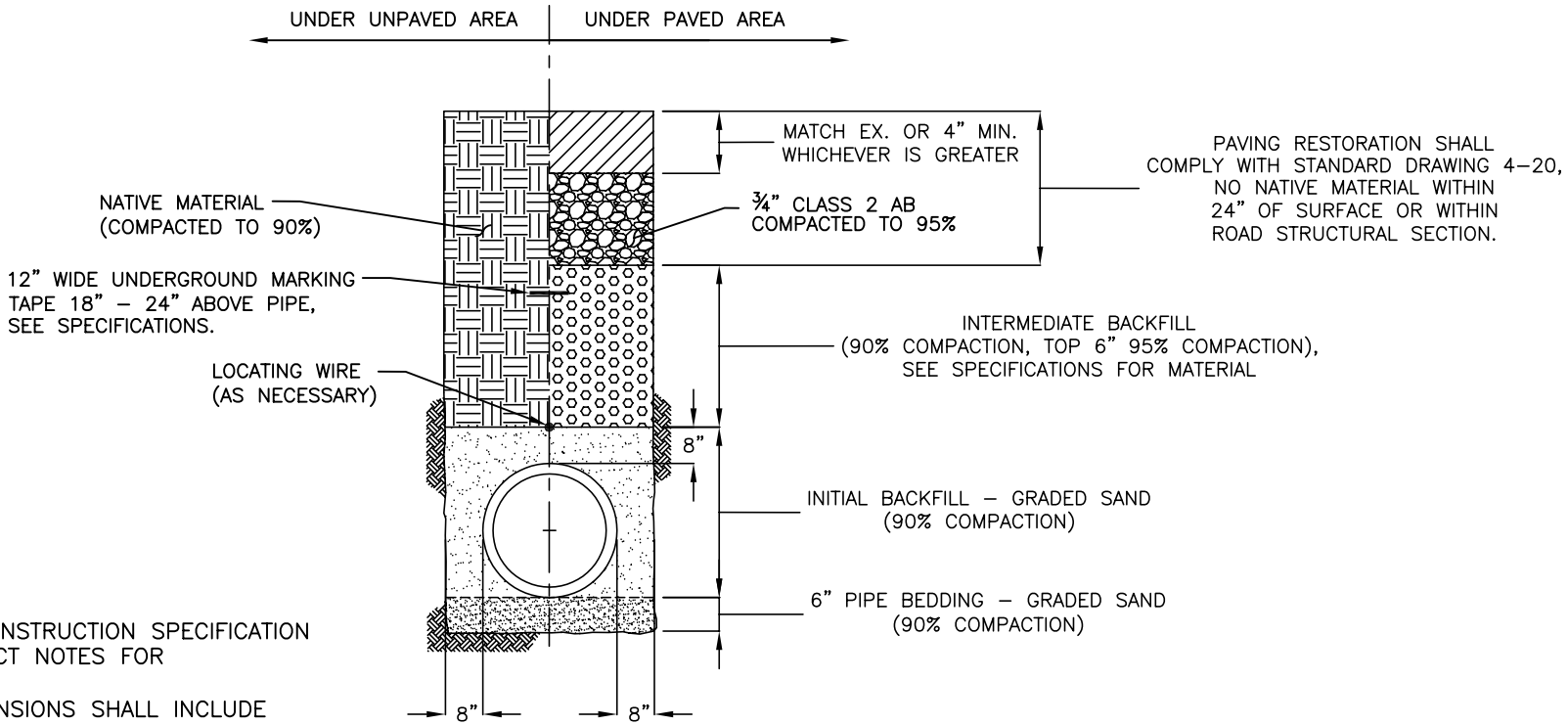
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
CUT IN	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 8–15



NOTES:

1. SEE SECTION CONSTRUCTION SPECIFICATION AND THE PROJECT NOTES FOR REQUIREMENTS.
2. 6" AND 8" DIMENSIONS SHALL INCLUDE DISTANCE BETWEEN PIPE BELL AND TRENCH WALL.
3. PLACE INITIAL SAN BACKFILL TO TOP OF PIPE, SPRAY WITH WATER TO COMPACT, THEN PLACE INITIAL SAN BACKFILL TO AT LEAST 8" ABOVE TOPE OF PIPE. SPARY WITH WATER TO COMPACT. AFTER SPRAYING WITH WATER, USE MECHANICAL COMPACTION METHODS IF NEEDED.
4. COORDINATE COMPACTION TESTS WITH RESIDENT ENGINEER.
5. JETTING WILL NOT BE ALLOWED FOR COMPACTION OF BACKFILL OR PIPE BEDDING MATERIAL.
6. IN UNPAVED AREAS, PIPE BEDDING MATERIAL AND INITIAL BACKFILL MATERIALS SHALL BE COMPACTED THE SAME AS IN PAVED AREAS.

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City of Colusa
PUBLIC WORKS DEPARTMENT

TRENCH DETAIL

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 8–17

SECTION 9.

STORM DRAINAGE DESIGN

9-1 AGENCY POLICY AND REQUIREMENTS

A. The planning, design and construction of drainage facilities and other related appurtenances to be owned, operated, and maintained by the City of Colusa shall comply with these standards.

B. All storm drainage systems shall also comply with any adopted City of Colusa Storm Drainage System Master Plan.

C. A registered Civil Engineer prior to submission for plan review shall sign all submitted plans. All work shall be in accordance with these design standards and standard engineering practice.

D. The City Engineer shall decide all questions of interpretation of "good engineering practice," guided by the standards and manuals of the discipline in question.

E. All drainage facilities shall be located within the City's rights-of-way unless otherwise approved by the City Engineer. Adequate access for maintenance of the system shall be provided.

F. All new habitable structures shall be protected from the 100-year (1%) flood event and all public roads are protected from the appropriate design flood event.

G. Finished floor elevations shall be set at least one foot (1') above the 100-year floodwater surface.

H. The design of a new storm drain system shall include consideration of the downstream creek or storm drain. The Consulting Engineer shall show that the existing storm water system can convey the proposed drainage without adverse upstream, downstream or adjacent impacts or that the upstream, downstream or adjacent facilities are being improved to carry post project flows.

9-2 DEFINITIONS

The following terms, abbreviations or definitions shall apply and the intent and meaning shall be interpreted as stated herein wherever they are encountered in these standards or in any documents or instruments referenced by these standards unless otherwise approved by the City Engineer.

ASTM - American Society for Testing and Materials

FEMA - Federal Emergency Management Agency

Trunk Drainage - Mainline drainage from an area over 30 acres.

Credit Letters or Reimbursement Agreement - An agreement between the City and the Developer identifying eligible reimbursement costs.

Right-of-Way - A strip of land dedicated, condemned or reserved for public use.

Drainage Easement - A strip of land dedicated, condemned or reserved for drainage use.

Temporary - Not permanent: generally for a specific and limited length of time.

Overland Release Path - An alignment that allows the passage of floodwater through a development at surface grades independent of underground pipe system without damaging structures.

9-3 FEDERAL FLOOD PROGRAM

A. The City of Colusa is a participant in the National Flood Insurance Program and all development in the City shall comply with the regulations of FEMA. Amendments of FEMA flood maps will be required for all commercial and subdivision development located in a federal flood zone. Petitions for a Conditional Letter of Map Amendment (CLOMA) or Conditional Letter of Map Revision (CLOMR), including any fee required by FEMA, shall be submitted to the City before improvement plans are approved. These regulations do not preclude the City from requiring additional standards to protect the public from projected runoff.

B. Fill for the removal of land from a designated FEMA 100-year floodplain, or a watercourse where building pads will be created, must be compacted to 90 percent (90%) of the maximum density obtainable with the modified proctor test method (ASTM Standard D-1557) or an equivalent test method acceptable to FEMA.

9-4 DRAINAGE DIVERSIONS

A. The diversion of natural drainage is allowable only within the limits of the proposed improvement. All drainage must enter and leave the improved area at its original horizontal and vertical alignment unless an agreement, approved by the City Engineer, has been executed with the adjoining property owners or drainage is being discharged into a City right-of-way or other existing drainage feature.

B. Temporary drainage diversions during construction may be approved by the City Engineer and shall be located and constructed in such a fashion as to permit their removal when necessary for the prevention of damage to adjoining properties.

9-5 DRAINAGE EASEMENTS

A. In unusual circumstances, where the City Engineer or designee has given prior approval, County storm drain facilities may be placed in easements. Such easements must be wide enough to accommodate normal construction equipment and shall be easily accessible to such equipment as necessary to construct, operate and maintain the facility. The easement shall be offered to the City of Colusa.

B. Where improvements fall on adjacent property (such as daylighting ditch profiles) written permission from the adjacent property owner(s) for such construction shall be required. Copies of the documents, which grant such approval, shall be submitted to the City Engineer or designee before the approval of the improvement plans.

C. In the event necessary permanent offsite easements cannot be acquired through negotiation, the City will condemn necessary rights-of-way providing the person, firm, or corporation requesting such condemnation enters into a written agreement to pay all costs and expenses of the condemnation. The agreement shall require a cash deposit that will consist of the estimated cost of condemnation plus 50%, including, but not limited to, land or easement purchase cost, temporary construction easements, staff, appraiser and attorneys fees. It shall require payment of all costs and expenses of the deposit as specified by the City. Any unspent funds will be returned.

D. Acquisition and maintenance of temporary construction easements outside of the limits of the subdivision shall be the subdivider's responsibility.

E. Easements for closed conduits shall meet the following width criteria:

    1. All easements for closed conduits shall have a minimum width equal to the greater of fifteen feet (15') or the required trench width according to the standard detail for pipe bedding and initial backfill (DWG. 9-1) plus two feet (2') of additional width for every

foot of depth as measured from the bottom of the pipe to finished grade. Exceptions to the minimum width require approval by the City Engineer.

2. All conduits shall be centered within their easements.
3. Drainage easements for open channels shall have sufficient width to contain the ultimate channel, fencing where required and a twenty-foot (20') service road with drainage ditch. Additional width shall be provided as needed to allow equipment to safely negotiate the service road for the purposes of construction, operations and maintenance activities.
4. Easements shall not be split along property lines unless otherwise approved by the City Engineer.

9-6 DRAINAGE CAPACITY/DESIGN

A. All drainage systems shall be designed to accommodate the ultimate development of the entire upstream watershed. The design storm shall be used in the design of closed conduit drainage systems. All open channel drainage systems shall be designed to carry the 100-year frequency design storm with freeboard. The City shall determine freeboard requirements. The typical freeboard requirement is three feet (3').

B. The Consulting Engineer shall design an overland release path which prevents flooding to existing and proposed structures in the event of malfunction or overloading of the drainage system. The overland release path shall also be designed to carry the 100-year-design storm flows that exceed the capacity of the drainage system. The overland release path shall be shown on the grading plan for the project. All pad grades shall be a minimum of 1' above the 100-year water surface or 1' above the overland release elevation whichever is higher. The overland release path shall be designed and constructed in a manner to transport the peak rate of runoff from the 100-year frequency storm falling on fully developed and saturated tributary watershed. Streets, parking lots, playgrounds, pedestrian areas, pedestrian walkways, exclusive utility easements and other open space areas may be considered compatible uses with the overland release.

9-7 DESIGN COMPUTATION

The design computations for drainage shall include the following information that shall be submitted before the plans will be accepted for checking:

A. Topographic map showing existing and proposed ground elevations that show on-site and off-site watershed boundaries draining onto the site. It shall also include total and sub-shed areas in acres.

B. Quantity of flow (cfs) to each structure with corresponding area and land uses that generate the quantity.

C. Quantity of flow (cfs) in each pipe.

D. Flow line elevation of manhole or structure.

E. Top of structure elevation.

F. Hydraulic grade line elevation at each structure.

G. Hydraulic gradient

H. Pipe size, type, class, length and gradient.

I. Channel dimensions, flow and water surface profile computations.

J. Electronic diskettes or compact disc with all computer input files used for analysis and design or other acceptable electronic media.

9-8 DESIGN RUNOFF

Design runoff shall be calculated in accordance with the Yolo County's Hydrology and Drainage Design Manual, in accordance with the general standard of engineering practice and as follows:

Drainage Area Size	Peak Flow Method	Design Storm
Up to 640 Acres	Yolo County Modified Rational Method	10 year for pipe systems draining less than 160 acres and 100 year for overland routing of excess storm flows. All major channels, pump stations and detention facilities shall be modeled using the "Greater than 640 acres" requirements.
Greater than 640 Acres	HEC-HMS or equivalent	100 year for pipe systems draining more than 640 acres, channels, bridges, culverts, and detention facilities.

9-9 HYDRAULICS

A flap gate shall be installed in all laterals the flow into a mainline storm drain whenever the water surface level of the main line is higher than the surrounding area drained by the lateral. The flap gate must be set back from the main line drain so that it will open freely and not interfere with the main line flow. A junction structure shall be constructed for this purpose.

A. **Hydraulic Grade Line**

1. Hydraulic grade line calculations shall begin at the worst case existing ultimate 100-year channel or basin water surface elevation. For the design storm, the hydraulic grade line shall be a minimum one-half foot (0.5') below the elevation of all inlet grates and a minimum one foot (1') below the elevation of manhole covers.
2. The hydraulic grade line shall be shown on the plans wherever the hydraulic grade line is above the soffit of the pipe.
3. A note shall be made on the plans indicating stationing where the hydraulic grade line is below the soffit of the pipe.
4. For open channel systems, the hydraulic grade line shall be shown for the 10 year and 100-year flood events.
5. In adjacent unimproved areas with no current development plans, the future gutter flow line is assumed to be one and one-half feet (1.5') lower than the natural ground elevation, for purposes of hydraulic calculations.

B. **Hydraulic Gradient (Energy Grade Line)**

In order to analyze the drainage system to determine if design flows can be accommodated without causing flooding at some locations or causing flows to exit the system at locations where this is unacceptable, the consulting engineer shall analyze the hydraulic gradient. Following are the equations and charts needed for manual calculation of the location of the hydraulic gradient. The City Engineer reserves the right to determine the appropriate method for determination of the Hydraulic Gradient (Energy Grade Line).

The Mannings Formula shall be used to compute capacities of all open and closed conduits other than driveway and cross-culverts.

C. **Friction Losses**

Friction losses can be calculated two ways. These methods cannot be interchanged for design of the pipe system. One method shall be used throughout the analysis. The first method uses a conservative Manning's "n" value to account for minor losses.

1. **Method 1 - Friction Losses**

The Manning's formula shall be used to compute capacities of all open and closed conduits and all cross culverts that will become a part of the closed conduit system.

The minimum 'n' values to be used in the Manning's formula shall conform to the following:

Pipe Material	**'n' value**
Precast Concrete Pipe	0.015
High Density Polyethylene Pipe	0.015
Polyvinylchloride Pipe	0.015
Concrete Box Culvert (within closed conduit system)	0.016
Ribbed Metal Pipe	0.015
Concrete Cast-In-Place Pipe	0.015
Pavement Surfaces	0.016
Open Channel Fully Lined	0.018
Corrugated Metal Pipe 2-2/3" x ½" Corrugations	0.024
Corrugated Metal Pipe 3" x 1" or 5" x 1" Corrugations	0.028
Open Channel with Lined Bottom, Clean Sides	0.035
Earth Channel with Clean and Uniform Sides	0.060
Earth Channel with natural bottom and sides	0.080 or as specified

Using Method 1 does not require the analysis of other minor losses except for Trashrack Head Loss identified in Section 9-9.B.2.d.4. Pipes that are designed with inlet control shall account for losses associated with inlet control.

2. **Method 2 - Minor losses**

Energy losses from pipe friction shall be determined by the following:

$$S_f=[Qn/l.486AR^{2/3}]^2$$

Where:

S_f = friction slope, ft/ft

Q = flow rate, ft /s

n = Mannings coefficient

A = area, ft^2

R = hydraulic radius

The head loss due to friction is determined by the formula:

$$H_f = S_fL$$

Where:

H_f = friction head loss, ft

L = length of outflow pipe, ft

The minimum '"n" value used in Mannings formula shall conform to the following:

Pipe Material	**'n' value**
Precast Concrete Pipe	0.012
High Density Polyethylene Pipe	0.012
Polyvinylchloride Pipe	0.012
Concrete Box Culvert (within a closed conduit system)	0.013
Ribbed Metal Pipe	0.013
Concrete Cast-In-Place Pipe	0.014
Pavement Surfaces	0.016
Open Channel Fully Lined	0.018
Corrugated Metal Pipe 2-2/3" x ½" Corrugations	0.024
Corrugated Metal Pipe 3" x 1" or 5" x 1" Corrugations	0.028
Open Channel with Lined Bottom, Clean Sides	0.035
Earth Channel (Clean, Uniform Sides) or Natural Channel	0.060
Earth Channel with natural bottom and sides	0.080 or as specified

Velocity Head Losses

Analysis methods must account for all minor losses.

Minor head loss is usually written as:

$$H_L=K_c(V^2/2g)$$

Where:

H_L =, the minor head loss

K_c = sum of minor loss coefficients

$V^2/2g$ = the velocity head

The loss coefficient and the form of the equation are different depending on the type of loss, whether flow is open channel or pressure flow, and at times, whether flow is subcritical or supercritical. Full discussion and values of coefficients are given in several references (Chow *Open Channel Hydraulics*; Brater and King *Handbook of Hydraulics*; Rouse *Fluid Mechanics for Hydraulic Engineers*; Hendrickson *Hydraulics of Culverts*). The following are minor head loss formulas for hydraulic structures commonly found in storm drain systems and open channels.

Entrance Losses - Entrance losses to box culverts and pipes of various materials can be estimated by using the entrance loss coefficients listed in Table 9-2 in conjunction with the minor head loss equation.

Manhole and Junction Losses - Junctions are locations where two or more pipes join together to form another pipe or channel.

Multiple pipes or channels coming together at a junction should flow together smoothly to avoid high head losses. Items that promote turbulent flow and-high losses include a large angle between the two (>60°), a large vertical difference between the two (greater than 6 inches (6") between the two inverts), and absence of a semicircular channel or benching at the bottom of the junction box in the case of pipes. Special problems arise when smaller pipes join a larger one at a junction.

Straight Through Manhole - In a straight through manhole where there is no change in pipe size, the minor loss shall be calculated by:

$H_m = 0.05\ (V^2/2g)$

Incoming Opposing Flows - The head loss at a junction, H_{jl}, for two almost equal and opposing flows meeting head-on with the outlet direction perpendicular to both incoming directions is considered as the total velocity head of outgoing flow.

$H_{j1}=V^2/2g$

Changes in Direction of Flow - When main storm drainpipes or lateral lines meet in a junction, velocity is reduced within the chamber and specific head increases to develop the velocity needed in the outlet pipe. A sharper bend (approaching 90°) will result in more severe the energy loss. When the outlet conduit is sized, determine the velocity and compute head loss in the chamber by the minor head loss formula in conjunction with the following:

K	Degree of Turn (In Junction)
0.19	15
0.35	30
0.47	45
0.56	60
0.64	75
0.70	90 and greater

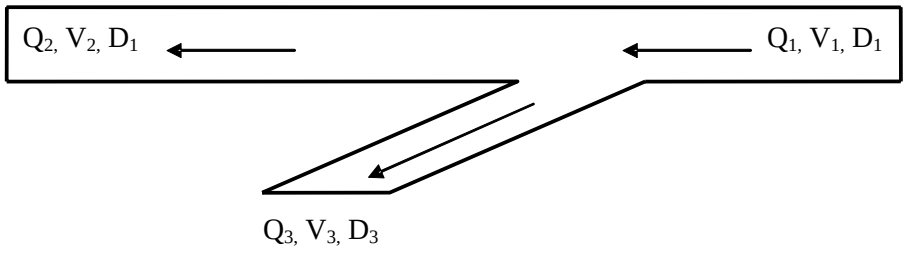
Any degree of turn greater than 90 degrees requires approval prior to submission of plans. For a graphic solution to other degree of turns, refer to Drawing 9-2.

Table 9-2: Entrance Loss Coefficients for Culverts (FHWA 1985) Outlet Control, Full or Partly Full Entrance Head Loss. $H_e = k_e (V^2/2g)$

Type of Structure and Design of Entrance	Coefficient k_e
Pipe, Concrete	
Projecting from fill, socket end (groove-end)	0.2
Projecting from fill, sq. cut end	0.5
Headwall or headwall and wingwalls	
Socket end of pipe (groove-end)	0.2
Square Edge	0.5
Rounded (radius = 1/12D)	0.2
Mitered to conform to fill slope	0.7
*End-section conforming to fill slope	0.5
Beveled edges, 33º or 45º bevels	0.2
Side- or slope-tapered inlet	0.2
Pipe, or Pipe-Arch, Corrugated Metal	
Projecting from fill (no headwall)	0.9
Headwall or headwall and wingwalls square-edge	0.5
Mitered to conform to fill slope, paved or unpaved slope	0.7
*End-section conforming to fill slope	0.5
Beveled edges, 33º or 45º bevels	0.2
Side- or slope-tapered inlet	0.2
Box, Reinforced Concrete	
Headwall parallel to embankment (no wingwalls)	
Square-edged on 3 edges	0.5
Rounded on 3 edges to radius of 1/12 barrel dimension, or beveled edges on 3 sides	0.2
Wingwalls at 30º to 75º to barrel	
Square-edged at crown	0.4
Crown edge rounded to radius of 1/2 barrel dimension, or beveled top edge.	0.2
Wingwalls at 10º to 25º to barrel	
Square-edged at crown	0.5
Wingwalls parallel (extension of sides)	
Square-edged at crown	0.7
Side- or slope-tapered inlet	0.2

*Note: "End-section conforming to fill slope," made of either metal, concrete or HDPE are the sections commonly available from manufacturers. From limited hydraulic tests they are equivalent in operation to a headwall in both inlet and outlet control. Some end sections, incorporating a closed taper in their design, have a superior hydraulic performance.

The following equation may be used to determine the loss in head in cases where it may be necessary to split or branch the flow into another drain.



$H_{br} = cV_1^2/2g$

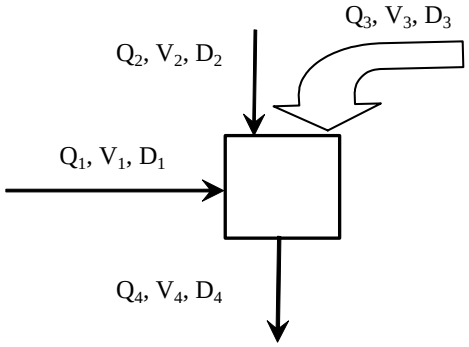
Where H_{br} denotes Branch Head loss

Divergence Angle	Q3/Q1 = 0.3	Q3/Q1=0.5	Q3/Q1=0.7
90°	c = 0.76	0.74	0.80
60°	c=0.59	0.54	0.52
45°	c = 0.35	0.32	0.30

Several Entering Flows - The computation of losses in a junction with several entering flows utilizes the principle of conservation of energy, involving both position energy (elevation of water surface) and momentum energy (mass times velocity head). Thus, for a junction with several entering flows, the energy content of the inflows is equal to the energy content of the outflows plus additional energy required by the collision and turbulence of flows passing through the junction. In addition, when two nearly equal flows enter the junction from opposing directions, head loss is considered as the total velocity head of the outgoing flow.

For example, the total junction losses at the sketched intersection are as follows:

$$H_{J2} = [(Q_4V_4^2) - (Q_1V_1^2) - (Q_2V_2^2) + (KQ_1V_1^2)] / (2gQ_4)$$



Where:

H_{J2}	=	junction losses, ft
$Q_\#$	=	discharges, cfs
$V_\#$	=	horizontal velocities ft/s
V_3	=	is assumed to be zero
K	=	bend loss factor

Subscript nomenclature for the equation is as follows:

Q_1 = 90° lateral, cfs

Q_2 = straight through inflow, cfs

Q_3 = vertical dropped-in flow, from an inlet, cfs

Q_4 = main outfall = total computed discharge, cfs

Also assume:

$H_b = K(V_1^2)/2g$ for change in direction.

No velocity head of an incoming line is greater than the velocity head of the outgoing line.

Water surface of inflow and outflow pipes in junction to be level.

When losses are computed for any junction condition for the same or a lesser number of inflows, the above equation will be used with zero quantities for those conditions not present. If more directions or quantities are at the junction, additional terms will be inserted with consideration given to the relative magnitudes of flow and the coefficient of velocity head for directions other than straight through.

Bend Loss - Bend losses shall be calculated from the following equations:

$$H_b = K_b (V^2/2g)$$

Where

$$K_b = 0.20 (\Delta/90°)^{0.5}$$

Δ = Central angle of bend in degrees.

Bend losses should be included for all closed conduits, those flowing partially full as well as those flowing full.

Trash-rack Head Loss - The head loss through a stationary trash-rack is commonly determined from the following equation:

$$H_{TR} = K_{TR} V^2_n/2g)$$

$$K_{TR} = 1.45 - 0.45\ A_n/A_g - (A_n/A_g)^2$$

Where

K_{TR} =: Trash-rack coefficient

A_n = Net area through bars, ft^2

A_g = Gross area of trash-rack and supports, ft^2

V_n = Average velocity through the rack openings (Q/A_n), ft/sec

For design, assume that the rack is clogged, thereby reducing the value of A_n by 50%.

9-10 CLOSED CONDUITS

The specific type of pipe or alternate pipe to be used in the development shall be shown on the profile sheets. If the Consulting Engineer or contractor proposes to use any type of pipe not shown on the approved plans, the plans shall be resubmitted to the City for approval. The minimum inside diameter for pipes shall be no less than twelve inches (12"). No storm drain conduit shall have a diameter less than that of the conduit immediately upstream of it. Use of plastic, polyvinyl chloride or high density polyethylene pipes at channel or detention basin outfall shall not be allowed.

A. **Material**

Publicly maintained drainage systems shall be constructed of the following materials and installed consistent with the latest edition of the City of Colusa Construction Specifications:

1. **Reinforced Concrete Pipe**

   Class of pipe shall be based upon depth as detailed in the Standard Drawings. Pipe shall conform to ASTM C76, latest revision. The consultant shall specify on the plans that the assembly of joints shall be in accordance with the pipe manufacturer's recommendations and the requirements of ASTM C 443.

2. **Concrete Cast-In-Place-Pipe**

   a. Where Concrete Cast-In-Place-Pipe is to be used, a soil report is required for the project that addresses placement of Concrete Cast-In-Place-Pipe. Copies of said soil report must be provided in addition to the items required in Section 9-7.

   b. The Consulting Engineer shall provide details on the plans for connection of the Concrete Cast-In-Place-Pipe to the different piping materials being used.

   c. The minimum wall thickness at all points shall be 1/12 of the nominal internal diameter of the pipe plus one-half inch (1/2"), but in no case less than two inches (2").

   d. Under no circumstance shall Concrete Cast-In-Place Pipe be placed in seasonal or permanent ground water tables.

3. **Polyvinyl Chloride Pipe**

   a. Polyvinyl Chloride (PVC) Pipe is not allowed in public storm drain systems.

4. **High Density Polyethylene Pipe**

   a. High Density Polyethylene Pipe is not allowed in public storm drain systems.

5. **Metal Pipe**

   a. Metal pipe may only be used for roadside access culverts of length less than 60 feet. Metal pipe shall be corrugated steel, corrugated aluminum, corrugated aluminized steel Type II, ribbed steel, ribbed aluminized steel Type II or ribbed aluminum. Metal pipe shall be bedded and initial backfilled with Class 2 aggregate base or crushed rock.

   b. Metal -pipe shall be designed for a minimum maintenance free service life of fifty (50) years in accordance with the methods specified in Section 854.3 and 854.4 of the California Department of Transportation Highway Design Manual. To assure that the maintenance free service life is achieved, alternative metal pipe may require added thickness and/or protective coatings. The Consulting Engineer shall provide certified copies of the laboratory report giving the results of pH and resistivity tests. The report shall also include a map showing the location of each site and depth where samples were taken.

   c. Unless otherwise specified by the City Engineer, a minimum of two soil samples shall be taken for the first 1,000 lineal feet of pipe or fraction thereof on a project with a minimum of one additional sample being required for each additional 1,000 lineal feet of pipe or fraction thereof. The samples shall be taken along the

approximate alignment and at the approximate depth of the pipe to be installed. Priority in sampling shall be given to trunk facilities.

B. **Cover Requirements**

At locations where the minimum cover requirements cannot feasibly be obtained, the conduit shall be either encased in concrete or provided with a concrete cover or other methods of pipe protection as approved by the City Engineer. Cover shall be measured from the top of a rigid pavement or the bottom of a flexible pavement.

1. **Minimum Cover**

Table 9-3: Minimum Pipe Cover Requirements

Pipe Material Type and Location	Minimum Cover Requirement
Corrugated Metal	Span/8 but not less than 12 inches (12")
Spiral Rib – Steel	Span/3 but not less than twelve inches (12")
Spiral Rib - Aluminum with spans less than or equal to 72"	Span/2 but not less than twelve inches(12")
Spiral Rib - Aluminum with spans greater than 72"	Span/3 but not less than thirty inches (30")
Reinforced Concrete in unpaved areas and under flexible pavements	1/8 the diameter or rise (the greater of) but not less than twelve inches (12")
Reinforced Concrete under flexible pavements (Class IV, V)	1/8 the diameter or rise (the greater of) but not less than twelve inches (12")
Reinforced Concrete under flexible pavements (Class I, II and III)	1/8 the diameter or rise (the greater of) but not less than twelve inches (24")
Reinforced Concrete under rigid pavements	A nine-inch (9") space between top of pipe and bottom of slab consisting of compacted granular fill shall be maintained at a minimum.
Cast-in-Place-Concrete-Pipes in paved areas	The Structural Section (AC & AB) plus twenty-four inches (24")
Cast-in-Place-Concrete-Pipes in unpaved areas	Twenty-four inches (24")
Note: All depths shown are for a minimum trench width equal to the outside diameter of the pipe plus sixteen inches (16") measured at the top of the pipe.	

2. **Maximum Cover**

Table 9-4a: Maximum Pipe Cover Requirements - Concrete Pipe

Measured to bottom of trench in feet

DIA.	RCP					Cast In Place
	Class					
	I	II	III	IV	V	
12	Not Permitted	8	12	30	No Limit	No Limit
15		10	15	35		
18		11	16	38		
21		12	17	39		
24		12	18	39		
27		13	19	39		
30		14	19	38		
33		14	20	38		
36		13	17	27	69	
42		14	18	29	62	38
48		15	19	30	60	30
54		16	20	31	58	26
60	14	16	21	31	57	24
66	15	17	22	32	56	21
72	15	18	23	33	56	21

Note: All depths shown are for a minimum trench width equal to the outside diameter of the pipe plus sixteen inches (16") measured at the top of the pipe.

Table 9-4b: Maximum Pipe Cover Requirements - Metal Pipes

Measured to bottom of trench in feet

DIA.	CMP**					Ribbed Steel Pipe			Ribbed Aluminum Pipe			
	Thickness - inches					Thickness - inches			Thickness - inches			
	0.064	0.079	0.109	0.138	0.168	0.064	0.079	0.109	0.060	0.075	0.105	0.135
12	99	No Limits										
15	99											
18	99											
21	99	99										
24	93	99				36	50	67	21	29	49	64
30	74	93	99			30	40	56	17	24	40	51
36	62	78	99	99		26	35	48	14	21	34	44
42	53	66	93	99		21	31	41	13	18	30	37
48	46	58	81	99	99	20	28	38	12	17	26	34
54	47	52	72	93	99	19	26	34		15	25	31
60	43	53	65	84	99		25	32		14	23	28
66	39	48	68	76	93		22	30			21	26
72	35	42	62	70	85		22	28			20	25

Notes:
1: All depths shown are for a minimum trench width equal to the outside diameter of the pipe plus sixteen inches (16") measured at the top of the pipe.
2: ** Normal pipe corrugation profile is 2 2/3" x Vi". The corrugation of the pipes within the shaded box area shall have profile of 3" x 1" or 5" x 1".
3: When flow velocity exceeds five (5) feet per second, the next thicker gauge shall be used for CMP pipe.

3. **Temporary Construction Vehicle Loading**

    a. A note shall be made on the plans stating the minimum cover requirement during construction for temporary construction vehicle loading, such as scraper or truck haul routs.

    b. For metal pipes, place at least four feet (4') of cover over the top of the pipe.

    c. For rigid pipes, place at least three feet (3') of cover over the top of the pipe.

C. **Trench Requirements**

1. Trenches shall be excavated with full depth, vertical sides whenever possible.

2. The minimum trench width shall not be less than the outside diameter of the pipe barrel plus sixteen inches (16"), measured at the top of the pipe. Where conditions require side sloping of trenches, the minimum vertical trench shall be from the bottom of the trench to one foot (1') over the top of the pipe.

3. In fill areas, or in areas with poor soil conditions where it is anticipated that a good, firm, vertical-walled trench cannot be constructed, the consulting engineer shall design the pipe structural requirements in accordance with good engineering practice. A note shall be placed on the plans directing the contractor to place the proper strength pipe if trench conditions encountered differ from the design trench.

D. **Spacing Requirements**

When multiple adjacent pipe lines are used, they shall be spaced so that the sides of the pipes shall be no closer than two feet (2'), or for parallel pipes larger than forty-eight inches (48") in diameter, the spacing shall be one half (1/2) the nominal diameter. This is to permit adequate compaction of backfill material. Special bedding and backfill considerations shall be taken when depths of parallel pipes vary.

E. **Alignment Requirements**

1. The location of storm drainage pipelines in new streets shall be approximately one and one-half feet (1½') behind the face of curb. The storm line shall be placed to enter the curb inlets at the center of the box.

2. All new storm drains shall be placed a minimum of one hundred feet (100') from existing and proposed water wells. Encroachments less than one hundred feet (100') require special approval.

3. Meandering and unnecessary angular changes of pipelines shall be avoided. Angular changes, when necessary, shall not exceed 90 degrees unless approved by the City Engineer. No angular changes in direction are allowed for Concrete Cast-In-Place-Pipe other than on a radius.

4. Pipeline Radius Criteria: All pipe placed on curves shall meet manufacturer's recommendations for curved alignment. All curves, radii, length of pipe joints, and types of pipe shall be shown on the plans. The minimum radius of curvature for Concrete Cast-In-Place-Pipe shall be determined by the formula R = 30D where R = radius of curvature, and D = nominal internal pipe diameter, with R and D expressed in the same units.

5. Pipelines shall be laid straight in both horizontal and vertical planes between manholes unless otherwise approved by the City Engineer.

6. Where storm drain pipelines of different diameter join, the invert elevations shall be adjusted to maintain a uniform energy gradient.

7. In some situations, pipelines may be placed in alternative locations, including under curb and gutter, as approved by the City Engineer.

F. **Velocity**

1. The minimum full flow velocity shall be no less than two (2) feet per second. The maximum velocity shall be less than the critical velocity at full flow.
2. When full-flowing pipelines that produce velocities greater than twelve (12) feet per second are approved by the City Engineer, special provisions shall be taken to prevent erosion or pipe displacement and to keep the EGL contained underground.

G. **Entrances and Exits**

1. Headwalls, flared end sections and other structures at entrances shall be designed to increase hydraulic efficiency, prevent erosion adjacent to the conduit and provide a counterweight to prevent flotation. Headwalls or flared ends sections should be used at discharge ends of culverts and pipe.
2. When a drop inlet is not installed, flared end sections should be used. Headwalls may be used where dictated by physical conditions. Both installations shall conform to the State Standard Plans.
3. Where exits are necessary, headwalls or flared end sections should be used for culverts. Where drainage systems discharge into a channel, standard headwalls shall be installed per the State Standard Plans. The vertical face of the headwall shall be set back a sufficient distance from the channel side slope to accommodate flapgates in a fully opened position without encroachment of the flap past the channel side slope face.
4. Energy dissipation shall be designed at outlets into earthen channels.

H. **Water and Soil Tight System**

1. All storm drain pipe, manholes, and fitting connections, including drain inlet laterals shall be water and soil tight and tested in conformance with Section 38-10 of the Construction Specifications.
2. A note shall be placed on the improvement plans stating these requirements and that the contractor is responsible for providing equipment and labor for performing tests and making measurements when directed to do so by the City's inspector.

I. Bores and Jacked Pipe

All casing pipes shall be sealed at both ends in such a manner as to provide a water resistant seal.

9-11 MANHOLES

Requirements for manholes are as follows:

A. Standard precast concrete or saddle type manholes shall be used except where special manholes or junction boxes are required. The design of special manholes and junction boxes must be submitted to the City Engineer for approval.

B. In no case will junction boxes or manholes be allowed which are smaller than forty-eight inches (48") greatest inside dimension. Design engineer may be required to submit specific structure designs for manholes on larger pipes or multi-pipe intersections.

C. Manholes on intersections of pipe or multiple pipelines larger than 42" may require riser barrels greater than 48" diameter.

Precast concrete manholes shall be manufactured in accordance with ASTM C 478. Cast-in-place manholes shall conform to Drawings 9-3 and 9-4. Cast-in-place manholes on 60" diameter pipe or larger shall be Type 'B' Saddle Manholes per Drawing 9-4.

D. Manholes shall be located at junction points, angle points greater than 15 degrees, and changes in conduit size or materials. On curved pipes with radii of 200-feet to 400-feet, manholes shall be placed at the B.C. and E.C. and on 300-feet maximum intervals along the curve. On curves with radii exceeding 400-feet, manholes shall be placed at the B.C. and E.C. and on 400 feet maximum intervals along the curve for pipes twenty-four inches (24") and less in diameter and 500-feet maximum intervals along the curve for pipes greater than twenty-four inches (24") in diameter. Manhole spacing on curves with radii less than 200-feet will be determined on an individual basis.

E. Spacing of manhole, junction boxes or inlets of such size as to be accessible for maintenance shall not exceed 400-feet for drains fifteen inches (15") and smaller in diameter, 500-feet for drains between eighteen inches (18") and thirty-six inches (36") in diameter, and 600-feet for pipes forty-two inches (42") or larger in diameter. The spacing of manholes shall be nearly equal whenever possible. Manholes shall not be placed in roadway intersections unless necessary as a junction point.

F. All manholes and junction boxes other than inlets shall have standard manhole frames and covers as shown in Drawings 9-5. Manholes will not be allowed in the gutter flow line.

G. A reinforced concrete lid as shown on Standard Drawing 9-4 shall be required when any pipe would enter the manhole above any portion of the base of a manhole cone.

H. Slotted manhole covers may be used to pick up minor drainage in non-traffic areas, including on-site drainage on residential lots. Covers shall conform to Drawing 9-7.

I. Improvement plans shall include a special detail for all manholes at junction points where there is a change in pipe direction and pipe diameter exceeds forty-eight inches (48").

J. The maximum manhole chimney height is eighteen inches (18").

K. Resilient connectors are required between the manhole and pipe except in the case of type of Type B Saddle Manholes (Drawing 9-4). The resilient connector is manufactured in accordance with ASTM C 923. Use of non-shrinking or expansive grout for making connections of pipe and water stop to manhole walls is required.

9-12 JUNCTION BOXES

Drop inlets may be used as junction boxes provided that no pipe entering or leaving the box is larger than 18 inches inside diameter. For any junction box with a pipe 21 inches or larger in diameter, the inlet shall have a manhole base and top slab. The inlet shall be mounted on top of the top slab. All other non-inlet junction boxes shall conform to the requirements for manholes.

9-13 INLETS

The standard curb inlet shall be "Santa Rosa" grateless inlet as specified in Drawings 9-12. Combination grate and curb-inlets may be required on steeply sloped streets (generally greater than 4%) when high velocity street flows require energy dissipation and a larger inlet area. Grate only inlets shall **NOT** be used in sump conditions to avoid complete clogging of the drain. All inlet selections other than "Santa Rosa" style require approval by the City Engineer.

Requirements for inlets are as follows:

A. Inlets shall be placed so that the length of flow in the gutter does not exceed 500-feet in either direction. The flow rate used to check the depth shall include any runoff that may by-pass upstream grates. Exceptions to the 500-feet limit standard may be granted by the City Engineer.

B. The figure below is a cross section of a typical compound gutter.

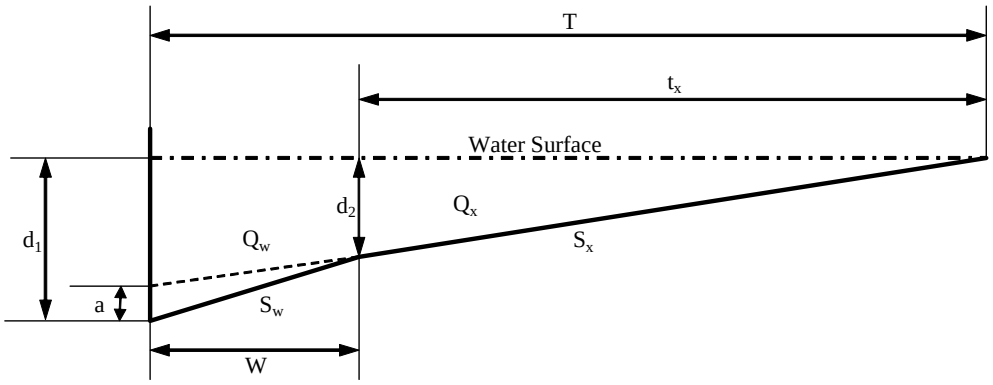


Figure: Flow in Compound Gutters

The equations for determining spread and depth in compound gutter sections are given below.

$$d_1 = TS_x + a$$

$$S_w = a/W + S_x$$

$$A = (T^2S_x + Wa)/2$$

$$d_2 = (T\text{-}W)S_x$$

$$t_s = (Q_s n/0.56S_x^{5/3}S^{1/2})^{3/8}$$

$$Q = Q_w + Q_s$$

$$Q_s = 0.56[(T - W)S_x]^{2.67}S^{0.5}/nS_x$$

$$Q_w = 0.56\{(TS_x + a)^{2.67} - [(T - W)S_x]^{2.67}\}S^{0.5}/n(a/W + S_x)$$

Where:

T = width of flow or spread, ft

S = longitudinal slope, ft/ft

Q = gutter flow rate, cfs

Q_w = depressed section flow, cfs

Q_s = gutter capacity above depressed section, cfs

S_x = pavement cross slope, ft/ft (typically 0.02)

S_w = depressed section slope, ft/ft

W = width of depressed gutter section, ft

a = gutter depression, ft

d_1 = depth of water at curb, ft

d_2 = depth of water at change in section slope, ft

n = Manning's roughness coefficient (typically 0.016)

t_s = width of flow or spread beyond depressed section, ft

C. A clogging factor of fifty percent (50%) shall be used when computing the interception capacity of the inlet.

D. The connector pipe from inlets at sag points shall be sized to accommodate the design runoff taking into consideration bypass flow from upstream inlets.

E. Caltrans type OCP or OCPI, Sheet D75B, inlets shall be used in unimproved medians, and may be used in roadside ditches away from driveway locations and in back lot situations.

F. Curb opening catch basins with grating(s) and debris skimmer, Caltrans type GO, Sheet D74B, shall be used in locations where additional inlet capacity beyond what a single "Santa Rosa" inlet can intercept. If further grate capacity is required then Caltrans type GT4, Sheet D74A, may be considered.

G. Inlets in streets shall be placed at lot lines in residential subdivisions, except at intersections where they shall be placed at the curb return.

H. A minimum horizontal distance of eight feet (8') along the trunk line must separate laterals.

9-14 PIPE STUBS

The criteria for pipe stubs shall be as-follows:

A. Temporary pipe stubs shall be two (2) sizes larger than the permanent pipe and a flared end section or a drop inlet shall be used at the entrance.

B. A headwall and trash rack shall be required where the upstream pipe ends at a park or open field.

C. Whenever a pipe stub is required, all ditches and swales shall be graded toward the stub.

D. Pipe stubs shall be as deep as possible to provide for future extension.

E. Flared end sections shall be required for the upstream/downstream end of a pipe system that does not connect to an existing pipe system or channel.

9-15 HEADWALLS, WINGWALLS, ENDWALLS, TRASH RACKS, ACCESS CONTROL RACKS AND RAILINGS

The requirements for these facilities are as follows:

A. All headwalls, wingwalls and endwalls shall be considered individually and in general shall be designed in accordance with the Caltrans Standards and Specifications.

B. Trash racks will be provided where they are necessary to prevent clogging of culverts and storm drains and eliminate hazards. Trash racks shall be designed such that the ratio of trash rack open area to drain opening is at a minimum four to one (4:1).

C. Access control racks shall be required on pipes twenty-four inches (24") or larger and shall be designed such that the ratio of access control rack open area to drain opening is at a minimum four to one (4:1).

D. The City Engineer may require metal beam guardrail or chain link fencing at culverts, headwalls, box culverts, and on steep side slopes. Installation shall be in accordance with the Caltrans Standards.

9-16 DRAINAGE PUMPS

Drainage pumping plants shall be designed in accordance with the latest edition of the Hydraulic Institute Standards and as specified by the City Engineer. Consideration shall be given to the following minimum criteria:

1. Redundant pumping capability shall be provided.
2. Back up power supply or natural gas or diesel driven engines.
3. Trash cleaning from waste stream during pumping operations.
4. Automate control system and telemetry for alarm notification, including integration into any existing SCADA system.
5. Minimum life-cycle costs for the pumping facilities including construction costs.
6. Site security and lighting.
7. Aesthetics such as landscaping and fencing.

9-17 DETENTION SYSTEMS

Detention system designs require the approval of the City Engineer. Consideration shall be given to the following minimum criteria:

1. Storage volume based on 100 year storm; critical storm duration to be determined based on analysis of rainfall and runoff patterns for the entire storm season.
2. Peak discharge shall not exceed 95% of the undeveloped or pre-existing peak flow from the 1-day, 100-year event.
3. One foot (1') minimum freeboard, increased as required to account for wave action in the primary storm wind direction. Three feet (3') minimum freeboard may be required on larger facilities.
4. Overflow elevation and route to be at least 1' below any affected buildings.
5. 3:1 maximum earth side slopes where exposed to water.
6. 10' wide access road around entire basin; including access road to basin bottom for maintenance during dry periods.
7. Outlet control facilities to consist of gated gravity release (preferred) and pumped when unavoidable. Nominal pumping facilities required to empty pond if it doesn't empty by gravity flow.
8. Any required pumping facilities to meet above requirements for Drainage Pumps.
9. Minimum life-cycle costs for the detention facilities including construction costs.
10. Temporary and permanent erosion control and landscaping.
11. Site fencing to prevent unauthorized entry.
12. Special requirements will be determined by the City Engineer where a facility is planned to provide mixed public use.

9-18 RETENTION STORAGE

Retention ponds may be used with prior written authorization by the City Engineer. If authorized, the retention ponds will be sized using the criteria provided below:

A. Configure all retention storage (effective flood control storage) above maximum groundwater elevation for the proposed retention pond site. Maximum groundwater elevations will be estimated using all the best available information, including actual seasonal groundwater measurements of monitoring wells, preferably within a one mile radius. The maximum groundwater elevation shall be approximated using data from the California Department of Water Resources groundwater database for Colusa County, and the worst-case condition from either site-specific or regional estimations. Minimum allowable groundwater separation is 0' from a flood control perspective; however, as soil conditions may vary, separation shall be increased if groundwater contamination is a permit issue with federal, state, or local agencies.

B. Determine the pervious and impervious tributary area within the directly contributing watershed. Include the retention pond site/area as an impervious surface.

C. Determine/verify that the surrounding (non-tributary) area 100-year (worst-case) flood condition does not overflow and/or spill into or across the contributing watershed of the retention pond, utilizing established City Standards for assessing flooding impacts.

D. Determine the precipitation on the contributing watershed resulting from the l00-year storm with one-year duration. Precipitation data shall be obtained from the City Engineer. Distribute the precipitation from this step according to the following distribution:

Month	Percent Total
October	0.8
November	10.1
December	6.9
January	30.9
February	0..7
March	3.1
April	3.4
May	1.6
June	1.7
July	0.8
August	0
September	0
TOTAL	**100%**

E. Attribute no losses to impervious areas within the contributing watershed. Attribute losses to pervious areas differently each month using effective rainfall estimates (reaching retention storage) expressed as a percentage of the monthly rainfall below (for each month): (Note the monthly effective rainfall for pervious areas varies due to varying saturation levels during the year).

Month	Effective Rainfall (% Monthly Rainfall as Runoff)
October	0
November	43.4
December	31.4
January	51.5
February	90.4
March	58.0
April	5.0
May	0
June	0
July	0
August	0
September	0

F. Develop a table to calculate month-by-month water balance accounts to assess the impacts of infiltration (percolation into soil), evaporation, transpiration, rainfall (from steps C and D above), total runoff volume, impervious area and runoff volume, pervious area and runoff volume, and incidental runoff volume (lawn over-watering). Monthly evaporation (pan) and transpiration estimates shall be estimated according to Bulletin 113 of the California Department of Water Resources or other appropriate climatological station. Full evaporation will only be allowed to deplete the storage volume if the operation and maintenance activities include annual removal/destruction of all vegetation within the water storage prism. Otherwise, transpiration values shall be used as if the pond is completely vegetated. On-site percolation tests shall be performed at a minimum of two tests per acre of pond footprint, at the elevation of the proposed soil interface. This pond design calculation shall begin with an empty pond and leave no more than 25% of the total design volume in the pond at the end of a year's cycle.

G. All retention ponds must be designed to be dewatered for a two-month period between September 1 and October 31 (or other period specified by the City) to an elevation at or below the invert of all connecting storm drain inlet pipes to allow for City inspection and maintenance. If pumping becomes necessary to dewater the pond, installation and operation of dewatering pump(s) shall be provided at no additional cost to the City. If pumping is required to dewater the pond for five consecutive years, a permanent pump installation to effectively dewater the pond within a two-month period between September 1 and October 31 will be required.

H. All retention ponds shall be designed with a minimum 15-foot-wide operating road around the perimeter of the pond that is a minimum of one foot above the maximum calculated (design) pond level. If overland release is considered, the overland release shall be at or above the maximum design pond level (based upon the 100-year annual volume calculations noted above). Overland release over the perimeter road shall include sufficient erosion control measures to armor the release path. All other applicable release criteria adopted by the City shall still apply

I. Retention pond design shall include a staff gage for reliably monitoring the water level in the pond at all times. Retention pond design shall also include an access ramp and sump area to provide the City with an emergency pumping/dewatering and discharge location that is easily accessible,

J. If the pond design is proven to be inadequate/incorrect after the operation of the pond, the tributary area to the pond will provide a permanent pump installation, or other reliable dewatering construction (i.e., channel or pipe) to the satisfaction of the City Engineer_ The pond design shall be considered inadequate if the water surface exceeds maximum design pond stage at any time,

unless the previous year's rainfall records indicate the design precipitation was exceeded. The pond design shall also be considered inadequate if greater than 25% of the design volume is present in the pond at the end of August of any year.

9-19 HYBRID RETENTION/DETENTION STORAGE

A. If groundwater pumping is introduced as a means of gaining effective flood control storage, it shall be done only with the written approval of the City Engineer. If the groundwater table is invaded by design, the design shall include volume influences on the pond with groundwater permanently at maximum levels during the water balance calculations in Step F of the Section - 18, Retention Storage. The location of proposed flood control storage below the groundwater table will only be allowed with reliable pumping or gravity drainage that can effectively drain both rainfall and groundwater inflows,

B. If permanent pumping is introduced as a means of dewatering the pond (by design) during months where there is expected rainfall that reaches design storage (November 1 – April 30), then such a pond will be considered a "Hybrid Retention/Detention" Pond, and pumping will be evaluated for downstream impacts during downstream design flood event analyses. Such pumping will be considered continually "on" for any such downstream impacts calculations. Such pumping shall not exceed the 2-year peak flow determined at the point of discharge under existing conditions. Note: Existing conditions tributary areas will be utilized for determining peak pumping flow, as tributary areas to a designed storage pond are generally larger. All permanent pump installations shall be designed according to current adopted City Standards with backup power supply and pumping redundancies,

9-20 OPEN CHANNELS

A. Open channels are required whenever one or more of the following applies:

1. The design flow rate exceeds the capacity of a seventy-two inch (72") pipe.
2. The outfall is at an elevation such that minimum cover cannot be obtained over the pipe.
3. City policy or project approvals require the channel to remain natural.

B. Open channels shall consist of natural earth channels, lined bottom channels or concrete lined channels as approved by the City Engineer.

C. Criteria for open channels shall be as follows:

1. Open channel design shall include a water surface profile analysis using the Corps of Engineers HEC RAS computer program or their UNET program or other hydraulic program if approved by the City Engineer.
2. Open channels shall be designed to convey the 100-year flood event with a minimum one-foot (1') of freeboard. The City Engineer or FEMA may specify additional freeboard requirements.
3. Minimum velocity: Two-feet per second (ft/s)
4. Maximum velocity:
    a. Earth channels, six ft/s
    b. Lined channels, ten ft/s
    c. Bottom-lined channels, eight ft/s

5. The Consulting Engineer shall determine if a need for super elevating the outside bank on bends is required.
6. The centerline curve radius of an open channel shall be equal to or greater than twice the bottom width (thirty -five foot (35') minimum).
7. Natural earth channels shall be vegetated with native grasses or other permanent vegetative cover as determined by the City Engineer.
8. Channels shall be constructed to a typical cross section. Fully lined channels shall be designed with side slopes of 1 horizontal to 1 vertical (1:1); channels with unlined sides shall be designed with side slopes of 3 horizontal to 1 vertical (3:1) or flatter. Any exceptions shall be subject to approval by the City Engineer.
9. All channels shall have a minimum bottom width of six feet (6') and shall have access ramps for maintenance equipment. An access ramp is required between each set of culverts or other above grade channel obstructions and at the upstream and downstream ends of the channel. Drawing 9-18 shows the typical ramp and transition detail. A twenty foot (20') service road shall be provided having a sixteen-foot (16') improved surface and two-foot (2') shoulders on each side. Roads having a radius tighter than forty-two feet (42') shall require additional width as determined by the City Engineer.
10. For all channels, either improved or natural, the following items shall be shown on improvement plans in addition to information heretofore required:
    a. Typical sections and cross-sections.
    b. Profile of the existing channel and top of bank profile for a minimum of 1,000-feet each side of the development in order to establish an average profile grade through the development. The Consulting Engineer shall contact the City for profiles of major drainage channels.
    c. Interceptor Ditches - Interceptor ditches or approved alternates shall be placed at the top of the cut or bank where deemed necessary by the City Engineer to prevent erosion of the channel bank. Runoff shall not be allowed to "sheet drain" over top of bank.
11. Erosion Protection – All natural or graded surfaces disturbed by construction operations shall be protected from erosion by installation of temporary and permanent erosion control improvements. Drawings 9-19 and 9-20 show details for both pipe and ditch discharge erosion.

9-21 OUTFALL DESIGN

Requirements for outfall design are as follows:

A. All drainage outfalls shall be shown in plan and profile on the improvement plans for a distance of 1,000 feet beyond the improvement or until a definite "daylight" condition is established.

B. All existing and proposed drainage ditches upstream and downstream of the improvement shall be shown on the plans and profile for a distance of at least 500 feet or until an average profile grade through the improvement is established.

C. The profiles shall include ditch flow-line and top of bank elevations (right and left when different).

D. When improvements have more than one unit or phase, the drainage outfall shall be shown as extending to the property boundary and beyond, if required, although it may not be constructed

with the current unit development. All temporary outfalls shall be shown in both plan and profile on the improvement plans.

9-22 FENCING REQUIREMENTS

The requirements for fencing (see Drawings 9-21 and 9-22) shall be as follows:

A. Detention facilities, pumping stations and improved channels exceeding three feet (3') in depth and with side slopes steeper than 3:1 shall be fenced with six foot (6') chain link or other suitable open style fencing. The approval of the City Engineer is necessary for other suitable open style fencing.

B. In all other areas, fencing shall be placed only upon the recommendation of the City Engineer.

C. Drive gates shall be minimum 12-feet (12') wide, and walk gates shall be 4-feet (4') wide minimum. Drive gates shall be set a minimum of 20-feet (20') back from the edge of pavement to allow for a safe parking area off of the traveled way while opening /closing gates. AC paving shall be provided between the traveled way and drive gate. AC paving design shall be per Section 4 - STREETS of these Improvement Standards.

D. Fences shall be located 6-inches (6") inside the drainage right-of-way and easement lines and a minimum one-foot (1') from top of bank.

9-23 CROSS CULVERT CRITERIA

The design of cross culverts shall be as follows:

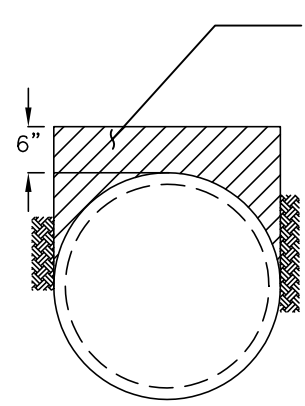
A. Cross culverts shall be designed in accordance with procedures outlined in the U.S. Department of Transportation "Hydraulic Design of Highway Culverts," Hydraulic Design Series No. 5, September, 1985.

B. Cross culvert size shall be determined based-on runoff-as specified in these standards.

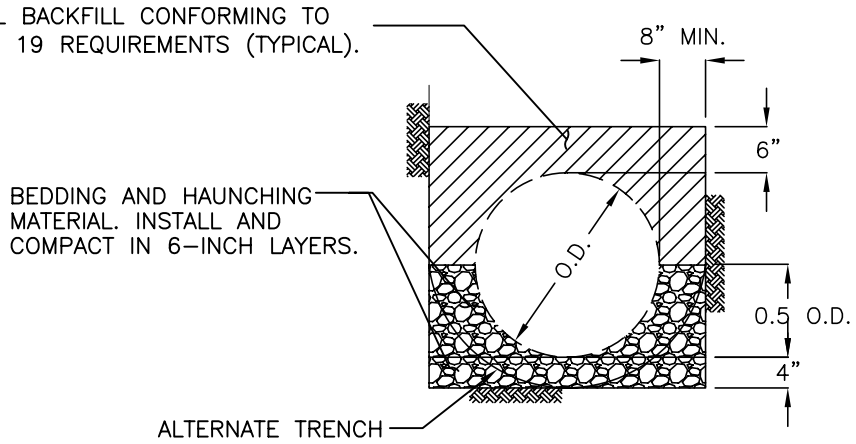
C. Cross culverts shall be checked against 100-year run off to assure, that no adverse effect will occur upstream and downstream because of the higher design event.

D. Cross culvert profile will be determined by an examination of the overall profile of the channel for a minimum distance of 500-feet on each side of the installation.

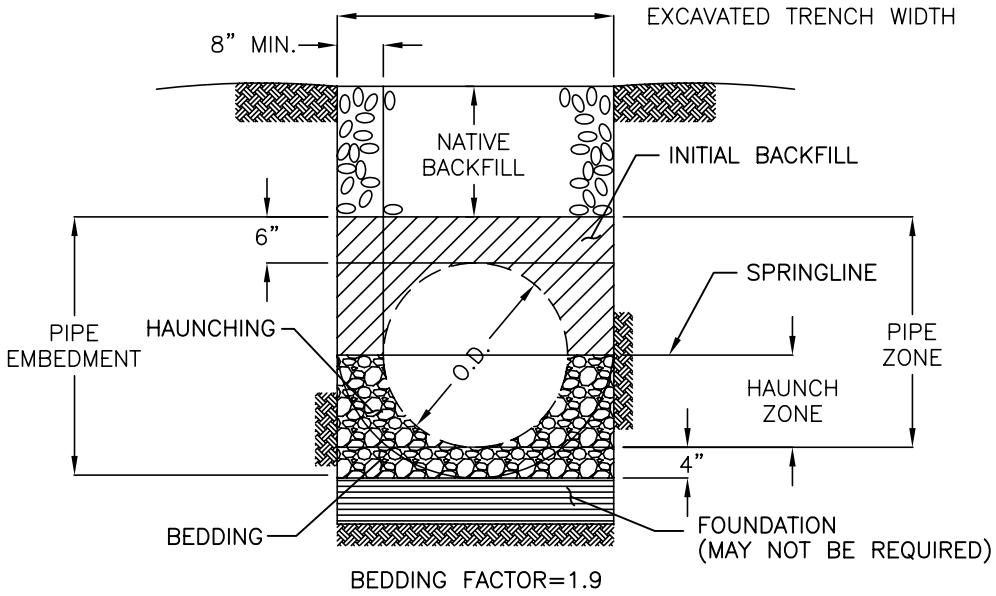
Standard Drawings Section 9 – Storm Drainage Design		
Drawing	**Sheets**	**Description**
9-1	1	Pipe Bedding and Initial Backfill (Drainage)
9-2	1	Loss in Junction Due to Change in Direction of Flow in Lateral
9-3	1	Type A Saddle Manhole
9-4	3	Type B Saddle Manhole (Main Line ID = 60” or Larger)
9-5	1	Grey Cast Iron Standard 24” Manhole Frame & Cover
9-6	2	Unused
9-7	1	Grate Type Manhole Cover
9-8		Unused
9-9		Unused
9-10		Unused
9-11		Unused
9-12	3	Drop Inlet Type G (Vertical C & G Only)
9-13		Unused
9-14		Unused
9-15		Unused
9-16		Unused
9-17		Unused
9-18	1	Typical Ramp and Transition Detail
9-19	1	Erosion Control Pipe Discharge
9-20	1	Erosion Control Ditch Discharge
9-21	3	Barbed Wire and Wire Mesh Fences
9-22	2	Chain Link Fence
9-23	1	Utility Stream Crossing
9-24	1	Flexible Connector Pipe to Manhole Detail



CAST–IN–PLACE
CONCRETE PIPE



PIPES 24" OR GREATER
IN DIAMETER



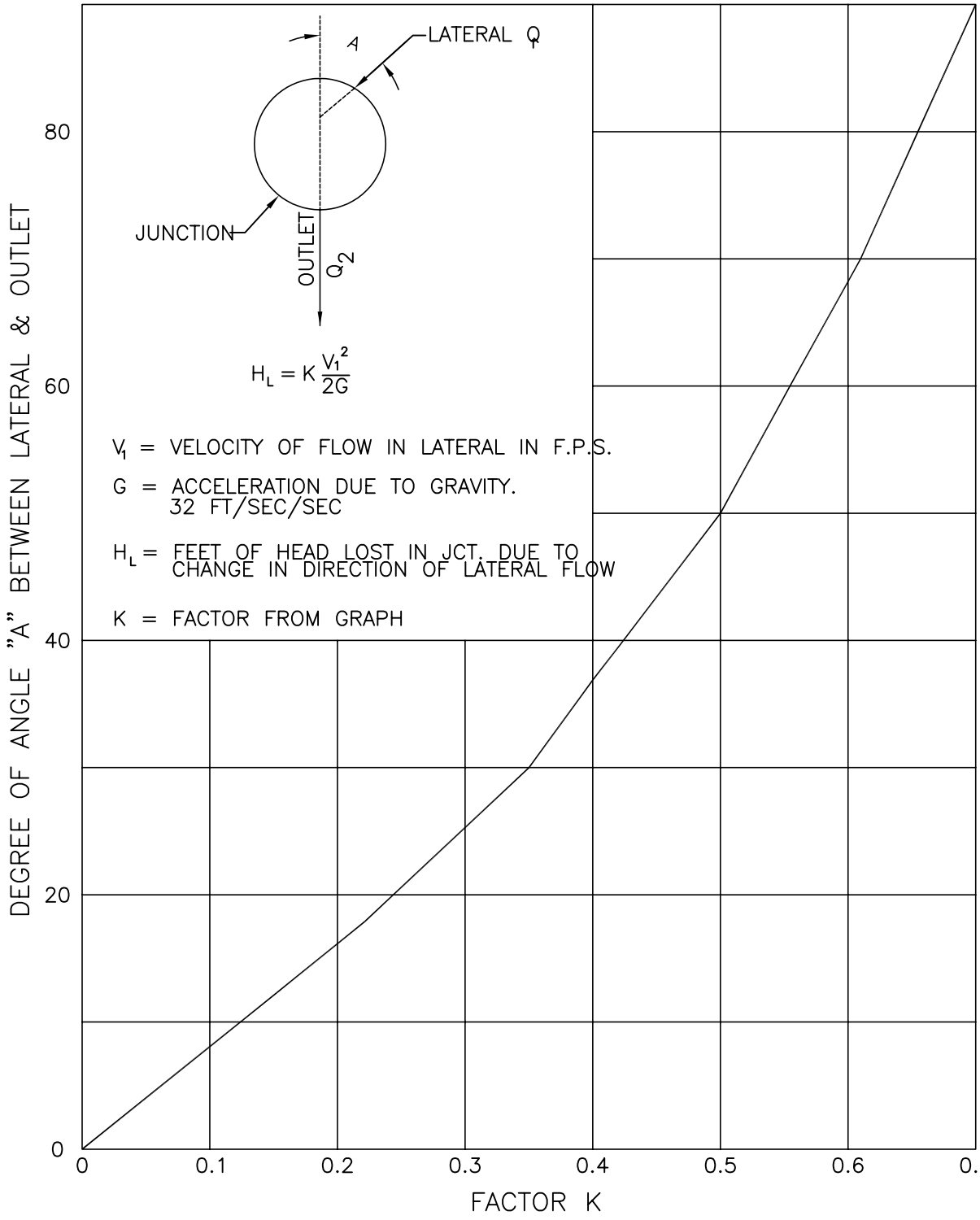
BEDDING FACTOR=1.9

PIPES LESS THAN 24"
IN DIAMETER

NOTES
1. INITIAL BACKFILL MATERIAL SHALL BE THOROUGHLY COMPACTED AROUND PIPE.
2. TRENCH WIDTH SHALL CONFORM TO CONSTRUCTION SPECIFICATION SECTION 19.
3. BEDDING AND HAUNCHING SHALL BE CL2 AB OR ½" OR ¾" CRUSHED ROCK. BEDDING AND INITIAL BACKFILL MATERIAL SHALL BE NATIVE MATERIAL PER SECTION 19, CLASS 2 AB OR ½" OR ¾" CRUSHED ROCK.
4. INITIAL BACKFILL FOR METAL PIPE SHALL BE CRUSHED ROCK OR CLASS 2 AB.

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS J. PONTICELLO
No. 49584
License Expires
9/30/08
CIVIL
STATE OF CALIFORNIA

City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
PIPE BEDDING AND INITIAL BACKFILL (DRAINAGE)	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–1



REGISTERED PROFESSIONAL ENGINEER
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CIVIL
STATE OF CALIFORNIA

City of Colusa
PUBLIC WORKS DEPARTMENT

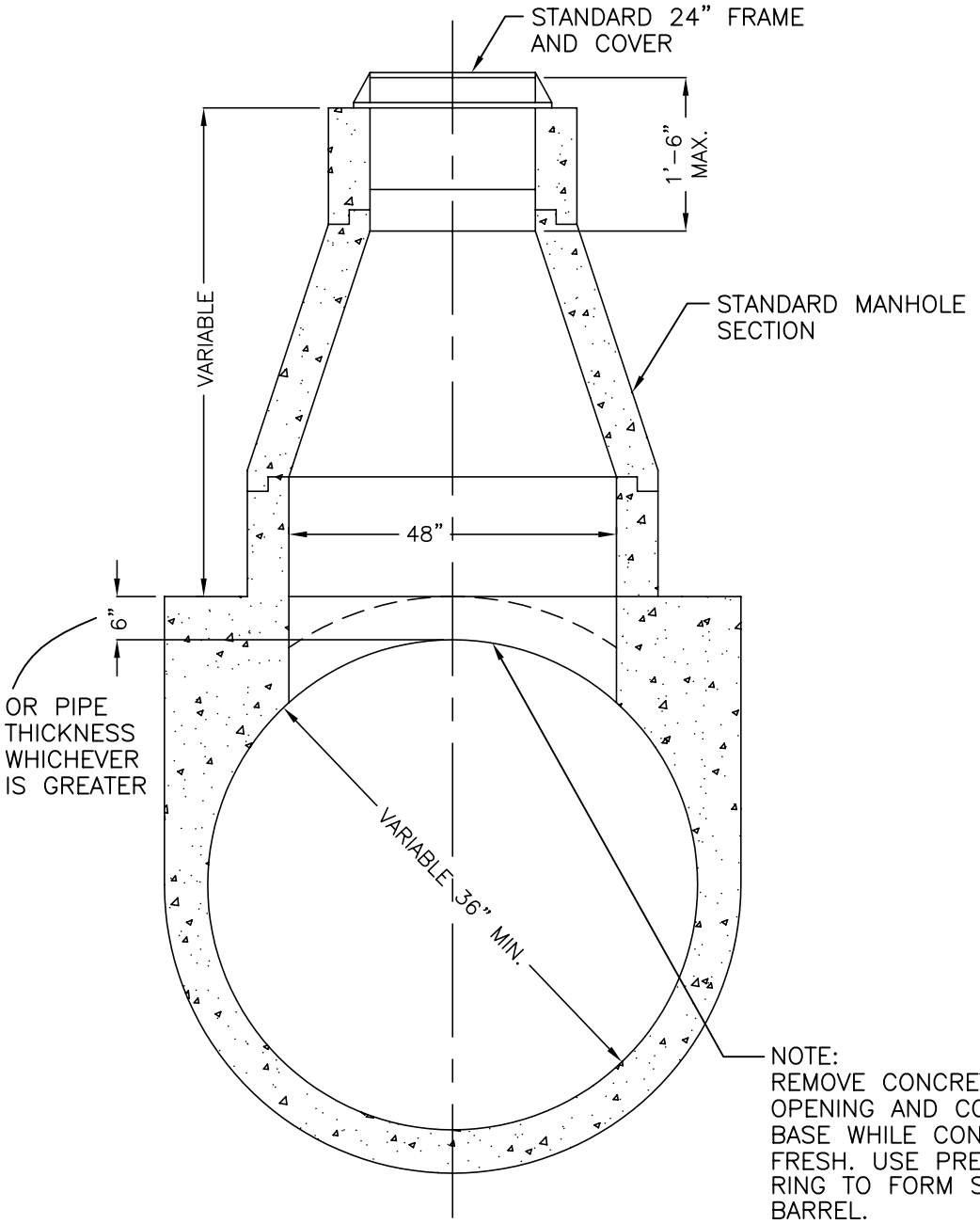
LOSS IN JUNCTION DUE TO CHANGE IN DIRECTION OF FLOW IN LATERAL

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 9–2



NOTE:
REMOVE CONCRETE IN MANHOLE OPENING AND CONSTRUCT RISER BASE WHILE CONCRETE IS STILL FRESH. USE PREFORMED IMPRESSION RING TO FORM SEAT FOR FIRST BARREL.

PLACE RISER SECTION AFTER CONCRETE HAS SET.

TYPE A
CAST-IN-PLACE PIPE ONLY

USE STD PLAN 7-1 FOR STORM MANHOLE WITH PIPES SMALLER THAN 36" I.D.

REGISTERED PROFESSIONAL ENGINEER
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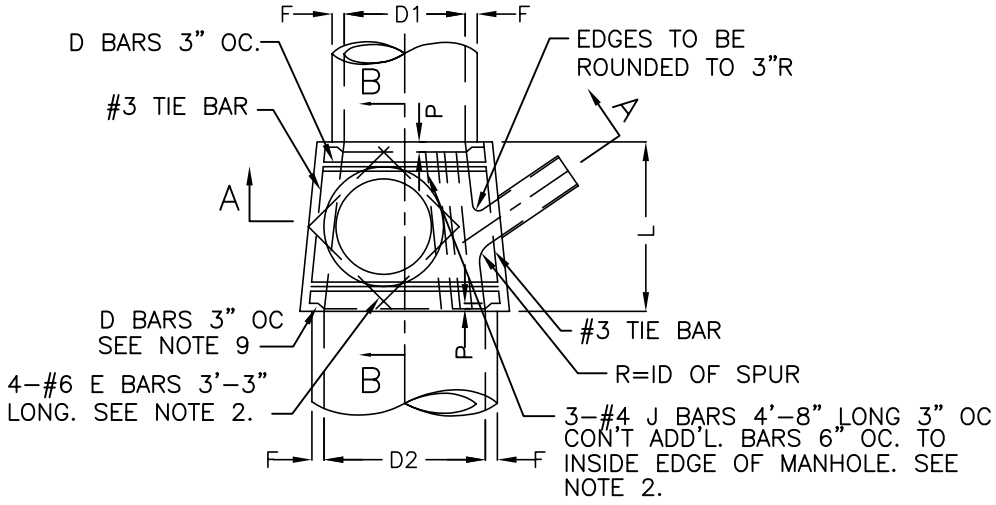
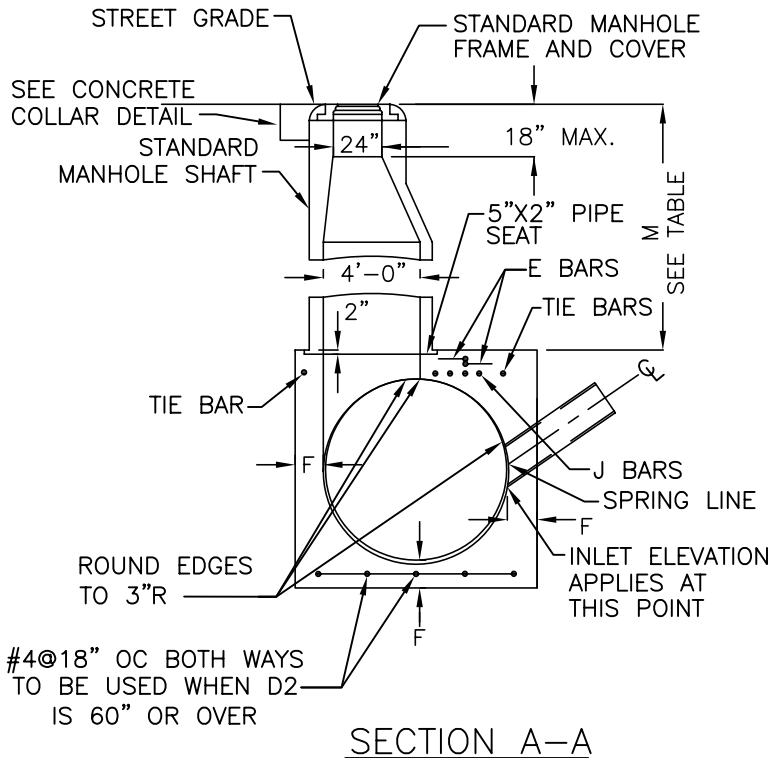
9/30/08
CIVIL
STATE OF CALIFORNIA

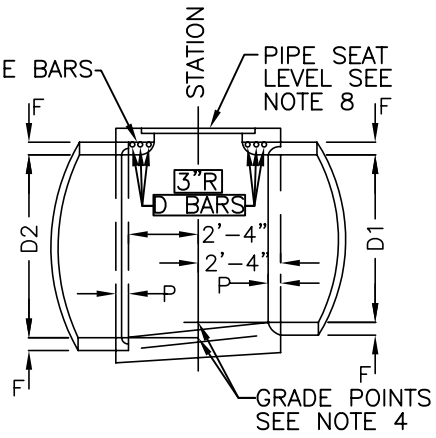
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
TYPE A SADDLE MANHOLE	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9-3



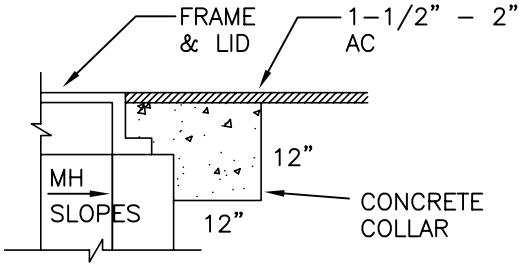
PLAN



SECTION A–A



SECTION B–B



CONCRETE COLLAR DETAIL

USE STD DWG 7–1 FOR STORM MANHOLES WITH PIPES SMALLER THAN 36" I.D.

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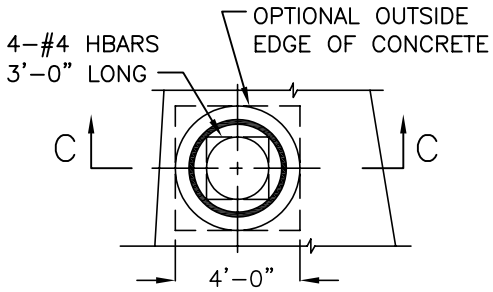
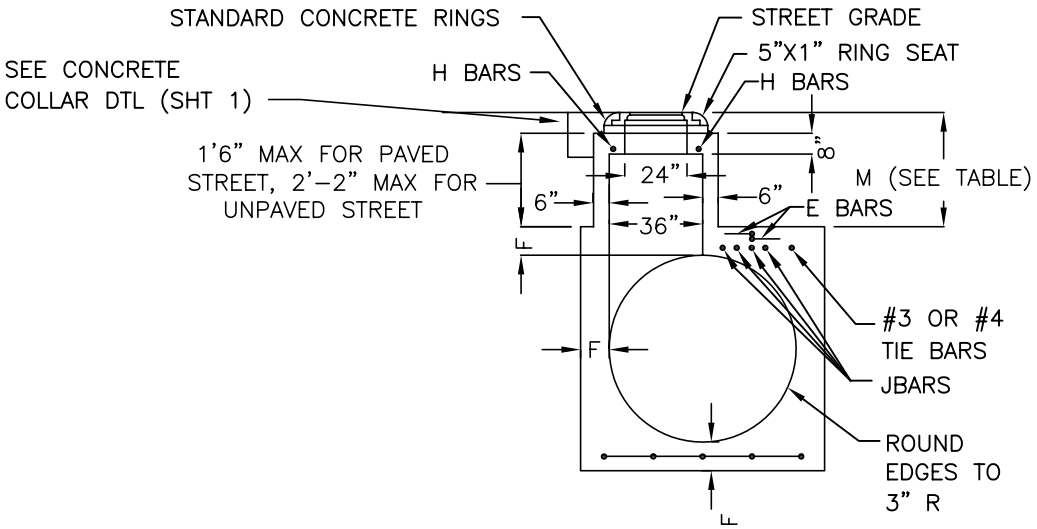
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
TYPE B SADDLE MANHOLE (MAIN LINE ID = 48" OR LARGER)	SHEET # 1 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–4



DETAIL "N"

(RINGS AND COVER NOT SHOWN)
(SEE NOTE 1)



SECTION C–C

TABLE OF VALUES FOR F			
D2	F	D2	F
48"	8"	90"	13–1/4"
51"	8–1/2"	96"	14"
54"	9"	102"	15–1/2"
57"	9–1/4"	108"	16"
60"	9–1/2"	114"	16–1/2"
63"	10"	120"	17"
66"	10–1/4"	126"	17"
69"	10–3/4"	132"	17–1/2"
72"	11"	138"	17–1/2"
78"	11–3/4"	144"	18"
84"	12–1/2"		

TABLE OF VALUES FOR M (SEE NOTE 1)				
SECTION	PAVED STREET		UNPAVED STREET	
	MAX.	MIN.	MAX.	MIN.
A–A		2'–10 1/2"		3'–6"
C–C	16"	8 1/2"	16"	12"

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DATE: NOV 2007

TYPE B SADDLE MANHOLE
(MAIN LINE ID = 48" OR LARGER)

SHEET # 2 OF 3

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 9–4

NOTES:

1. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 2'–10½" FOR PAVED STREETS OR 3'–6" FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C–C AND DETAIL "N". WHEN DIAMETER D_1 IS 48", CENTER OF SHAFT MAY BE LOCATED PER NOTE 2.
2. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTER LINE OF STORM DRAIN WHEN DIAMETER D_1 IS 48" OR LESS. IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTER LINE AND OMIT J BARS.
3. L AND P SHALL HAVE THE FOLLOWING VALUES UNLESS OTHERWISE SHOWN ON THE PROJECT DRAWINGS:

   D_2 =96" OR LESS, L=5'–6", P=5"

   D_2 OVER 96", L=6'–0", P=8"

   L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS. WHEN L GREATER THAN THAT SHOWN ABOVE IS SPECIFIED, D BARS SHALL BE CONTINUED 6" OC.
4. STATIONS OF MANHOLES SHOWN ON PROJECT DRAWINGS APPLY AT CENTER LINE OF SHAFT. ELEVATIONS ARE SHOWN AT CENTER LINE OF SHAFT AND REFER TO THE PROLONGED INVERT GRADE LINES.
5. REINFORCEMENT SHALL CONFORM TO ASTM A 615, GRADE 40 AND SHALL TERMINATE 1½" CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
6. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.
7. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.
8. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN THE TABULAR VALUES FOR F SHOWN ON DRAWING 9–7 SHEET 1.
9. D BARS SHALL BE #4 FOR D_2 =39" OR LESS, #5 FOR D_2 =42" TO 84" INCLUSIVE AND #6 FOR D_2 =90" OR OVER.
10. CENTER LINE OF LATERAL PIPE SHALL INTERSECT INSIDE WALL OF MANHOLE AT SPRING LINE UNLESS OTHERWISE SHOWN.
11. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:

    A. MAIN LINE=48" INSIDE DIAMETER OR LARGER.

    B. THE OUTSIDE DIAMETER OF THE LATERAL MUST BE LESS THAN OR EQUAL TO ½ THE INSIDE DIAMETER OF THE MAIN LINE. IF THE UPSTREAM AND DOWNSTREAM DIAMETERS OF THE MANHOLE ARE NOT THE SAME, THE GOVERNING INSIDE DIAMETER OF THE MAIN LINE SHALL BE CONSIDERED TO BE THAT WHERE THE EXTENDED CENTER LINE OF THE LATERAL ENTERS THE MANHOLE.

    C. IN NO INSTANCE SHALL THE INSIDE DIAMETER OF THE LATERAL TO THE MANHOLE BE GREATER THAN 30".

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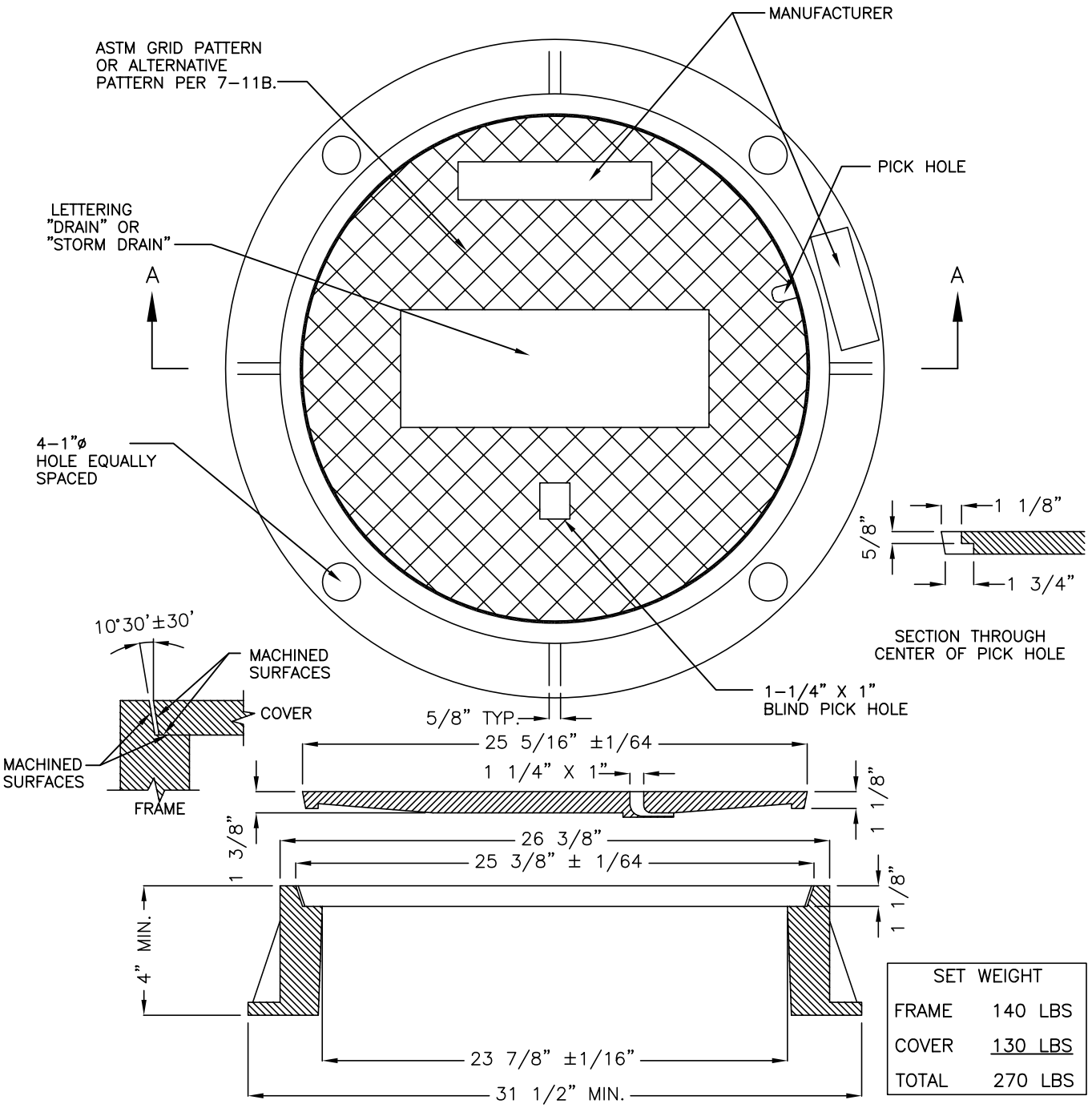
DATE: NOV 2007

TYPE B SADDLE MANHOLE
(MAIN LINE ID = 48" OR LARGER)

SHEET # 3 OF 3

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 9–4



SET WEIGHT	
FRAME	140 LBS
COVER	130 LBS
TOTAL	270 LBS

SECTION A-A

NOTES:

1. FRAME AND COVER TO BE TEICHERT A-1024 OR EQUAL WITH "STORM DRAIN" LABEL.
2. ALL CASTINGS TO CONFORM TO ASTM A48. CLASS 35B.
2. FRAME AND COVER TO MEET H-20 LOAD SPECIFICATIONS.
3. MACHINED HORIZONTAL AND VERTICAL BEARING SURFACES NOT TO EXCEED 1/64" TOLERANCE.
4. FOUR 1" HOLES SHALL BE PROVIDED EQUALLY SPACED AROUND COVER.
5. LOCKING COVER TYPE FRAME AND COVERS SHALL BE USED IN EASEMENT AREAS UNLESS OTHERWISE APPROVED.

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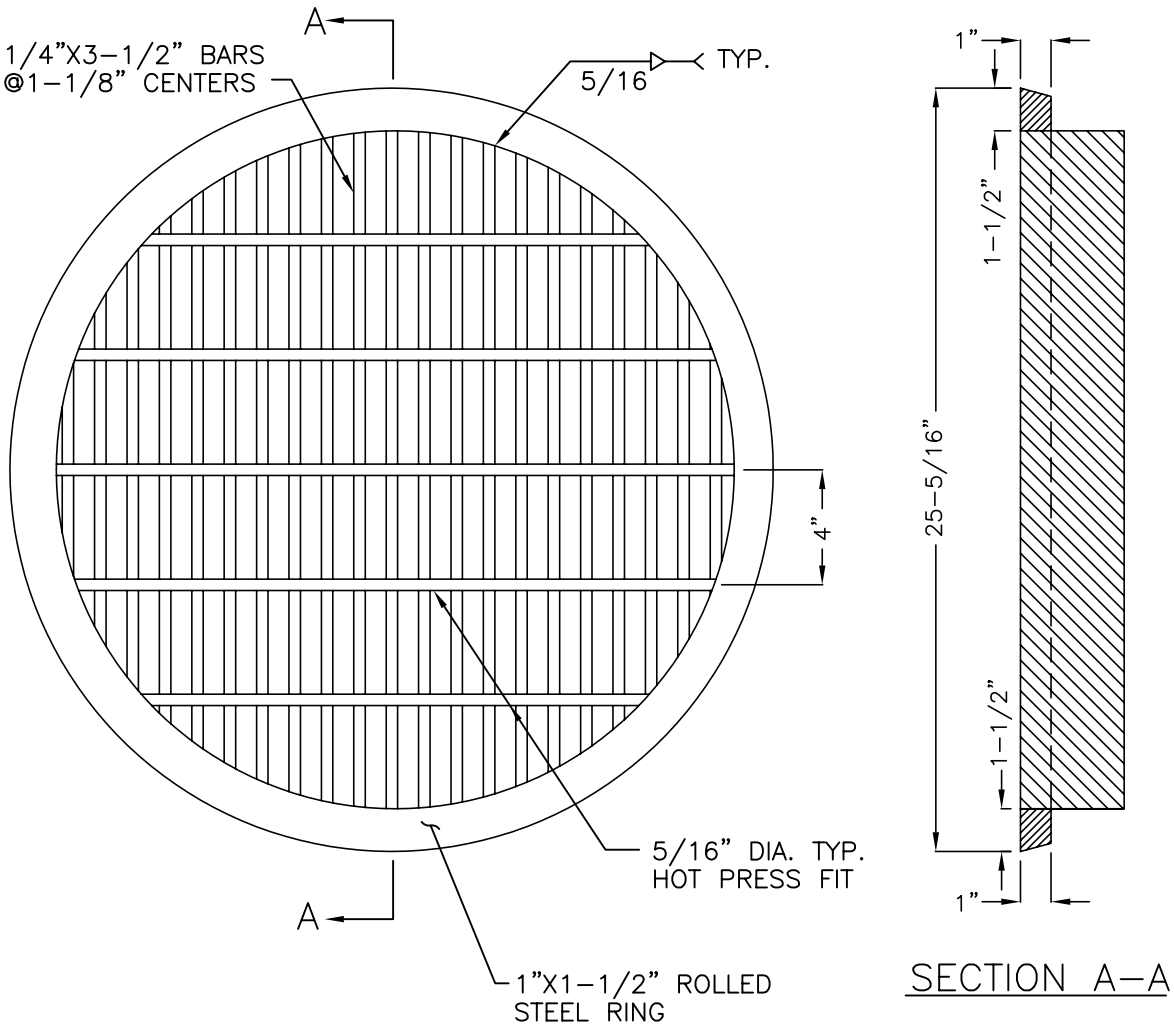
GRAY CAST IRON
STANDARD 24" MANHOLE
FRAME & COVER

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 1 OF 1

DRAWING #: 9-5



%%UNOTES 1. MANHOLE COVER SHALL FIT FRAME SHOWN ON DRAWING 9-5. 2. SEATING SURFACES SHALL BE MACHINED AS SHOWN IN DETAIL ON DRAWING 9-5. 3. THIS COVER MAY BE USED ONLY WITH APPROVAL OF DIRECTOR. 4. GALVANIZE AFTER FABRICATION PER ASTM 123.

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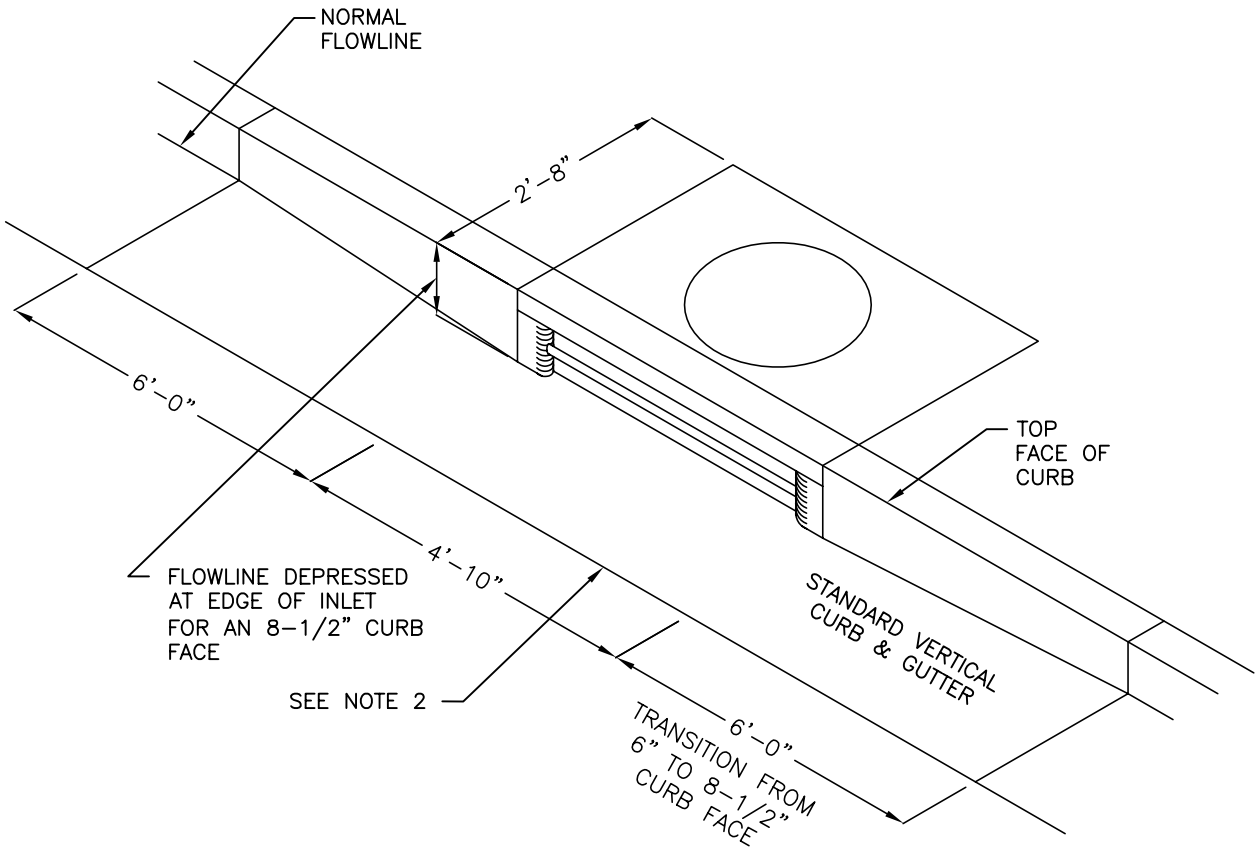
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
GRATE TYPE MANHOLE COVER	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9-7



NOTES:

1. WHEN AT CURB RETURN, FACE OF BOX SHALL BE ON TANGENT.
2. LIP OF GUTTER SHALL NOT BE DEPRESSED ACROSS FACE OF INLET.
3. INLET MODEL SHALL BE SANTA ROSA MODEL 4A OR TEICHERT MODEL CB4-2 (2'X4') OR APPROVED EQUAL WITH GUARD ROD AND FORM FOR FLOW LINE.
4. INLET COVER SHOULD BE CONCRETE WITH CAST IRON FRAME RING AND NPDES LOGO.

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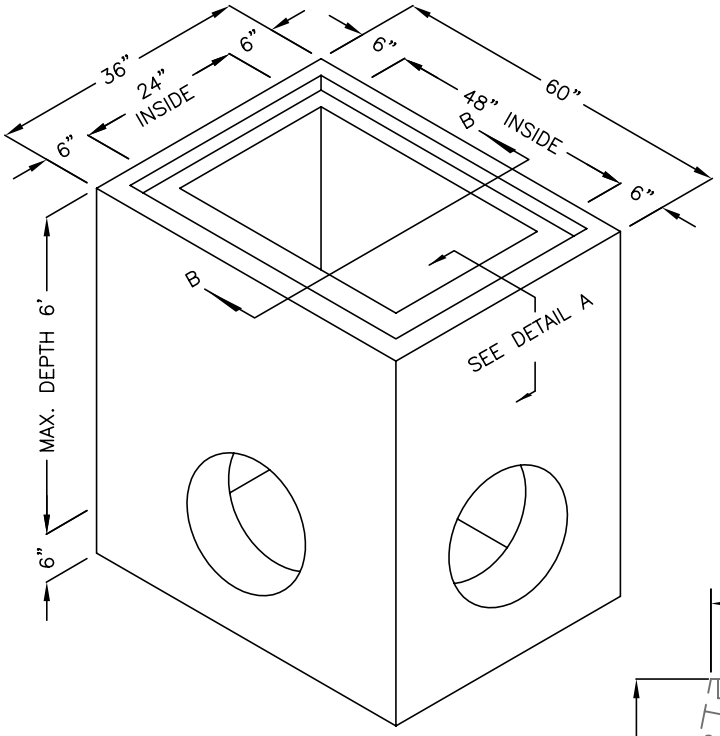
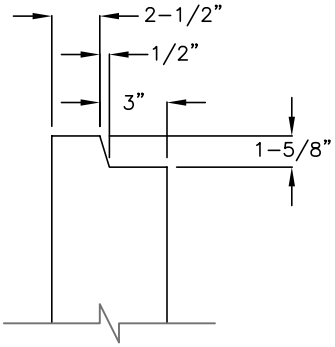
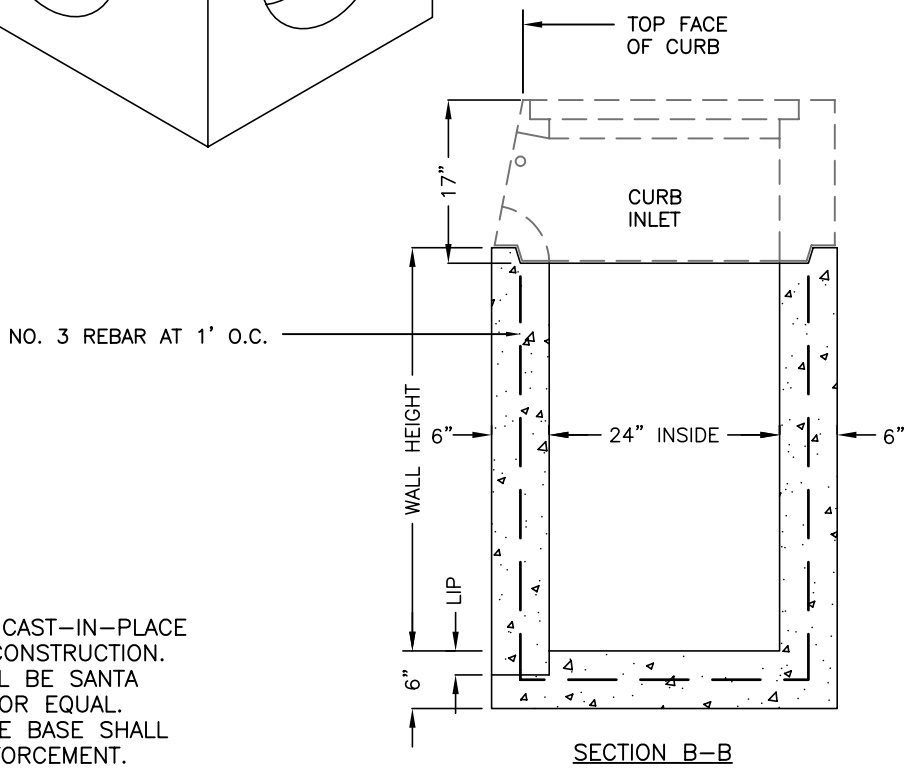
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
CURB INLET	SHEET # 1 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9-12





DETAIL A



SECTION B-B

NOTES:
1. BASE MAY BE CAST-IN-PLACE OR PRECAST CONSTRUCTION.
2. PRECAST SHALL BE SANTA ROSA B48R4, OR EQUAL.
3. CAST-IN-PLACE BASE SHALL INCLUDE REINFORCEMENT.

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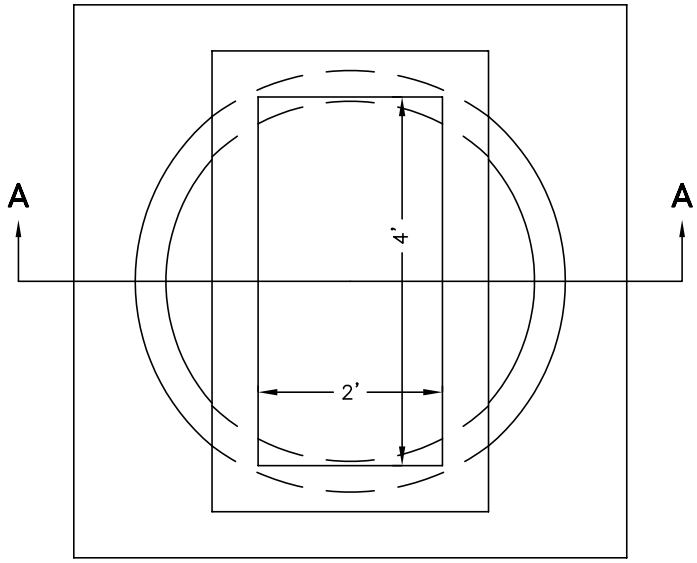
DATE: NOV 2007

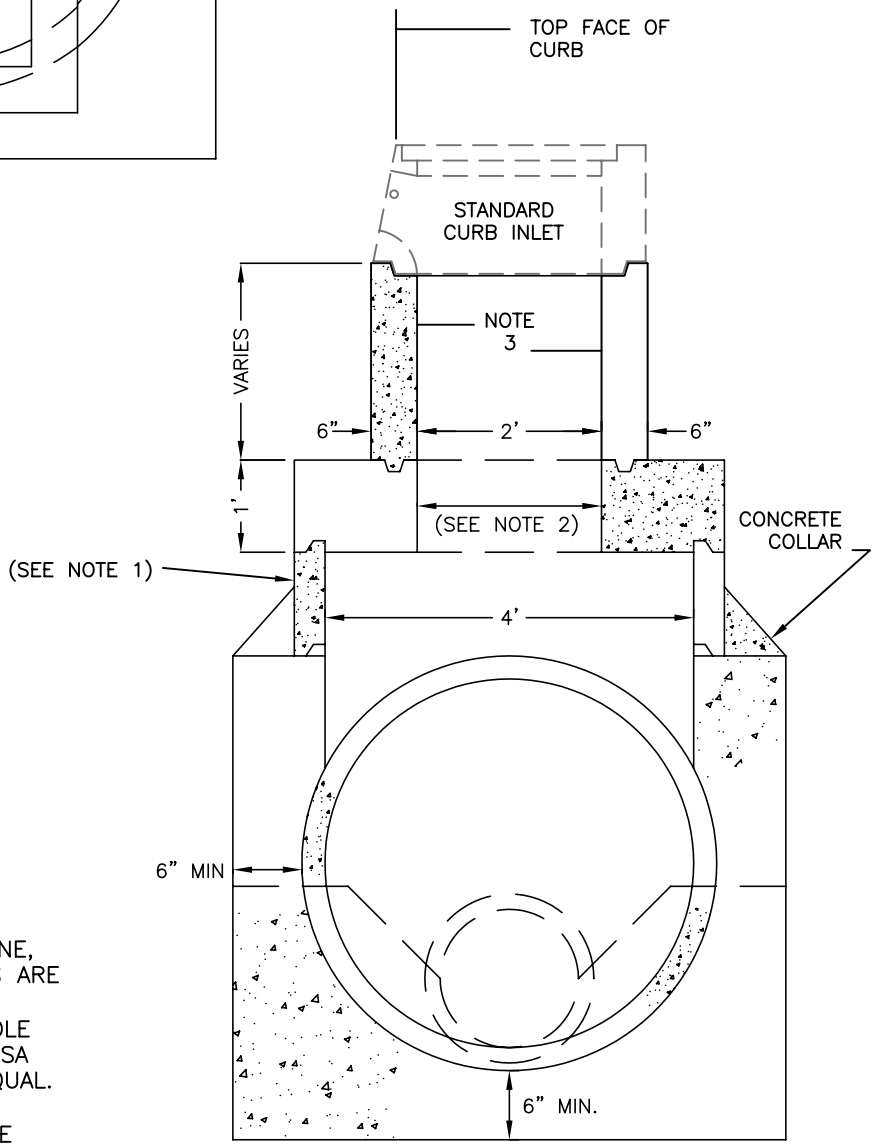
CATCH BASIN BASE

SHEET # 2 OF 3

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DRAWING #: 9-12





SECTION A–A

NOTES:

1. CAST–IN–PLACE OR PRE–CAST VERTICAL MANHOLE WALL IN ONE, TWO OR THREE FOOT LENGTHS ARE OPTIONAL.
2. PRECAST 48" DIAMETER MANHOLE REDUCER SLAB FOR SANTA ROSA MODEL 4A CURB INLET, OR EQUAL.
3. 24"X48" (INSIDE DIMS.) CATCH BASIN VERTICAL WALL. MAY BE CAST– IN–PLACE OR PRECAST. CAST–IN– PLACE SHALL INCLUDE ENGINEERED REINFORCEMENT.

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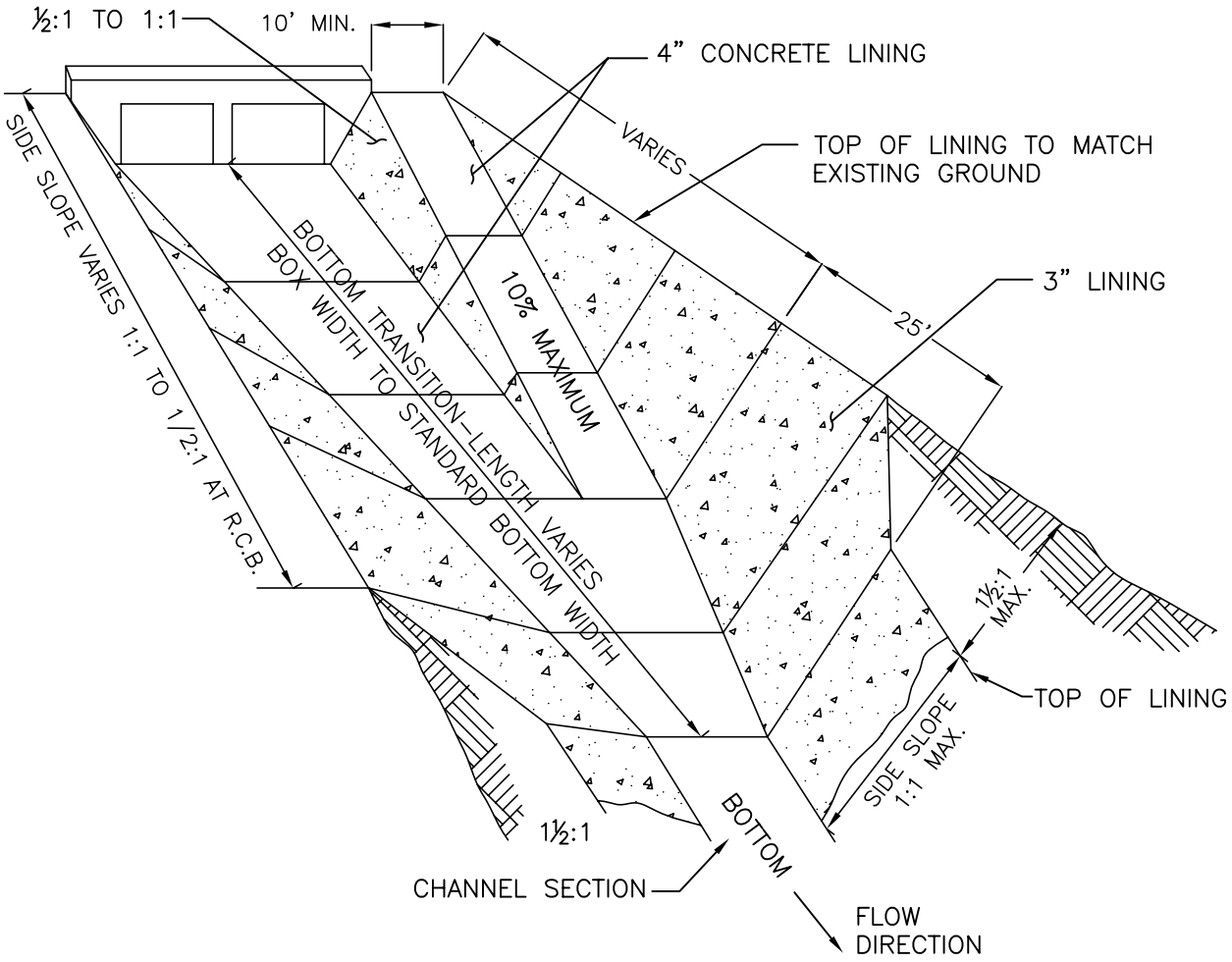
CURB INLET MANHOLE

CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584

DATE: NOV 2007

SHEET # 3 OF 3

DRAWING #: 9–12



NOTES:

1. BOTTOM TRANSITION 25' MINIMUM LENGTH WITH NO RAMP.
2. WEEP HOLES AND JOINTS AS REQUIRED FOR ALL LINED CHANNEL SECTIONS.
3. LOW SIDE OF CHANNEL TO BE OPPOSITE RAMP.
4. SIDE SLOPE LINING MAY BE DELETED ON CHANNELS WITH BOTTOM LINING ONLY.

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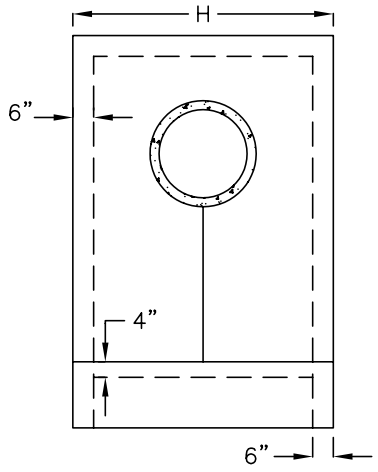
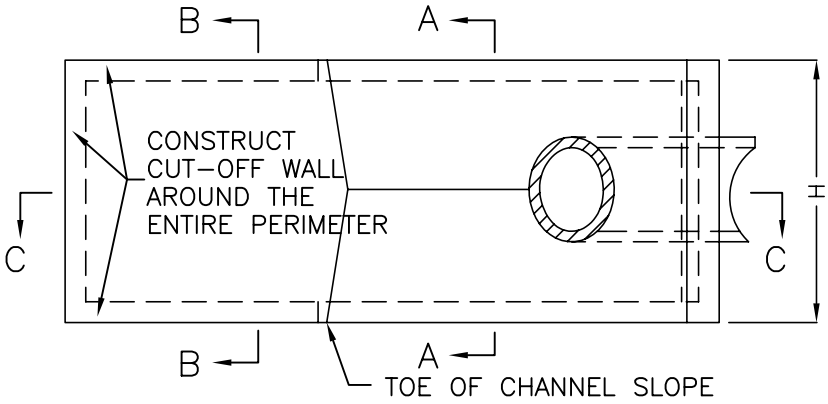
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
TYPICAL RAMP & TRANSITION DETAIL	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–18

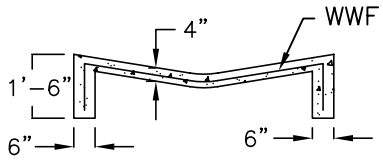
H=6'–0" MINIMUM
H=2X PIPE DIA. (3' TO 6')



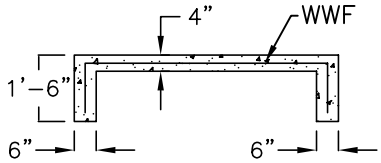
FRONT VIEW



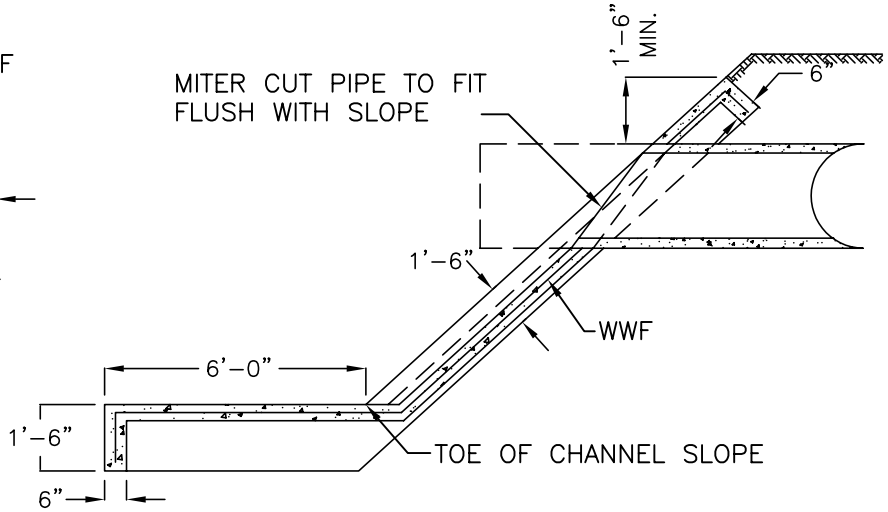
TOP VIEW



SECTION A–A



SECTION B–B



SECTION C–C

NOTES:
1. USE CLASS "B" CONCRETE OR GROUTED COBBLES AS SPECIFIED.
2. 6"X6"–W6XW6 WWF THROUGHOUT CONCRETE SUPPORTED ON WIRE CRADLES @ 24" +/– O.C. BOTH WAYS.

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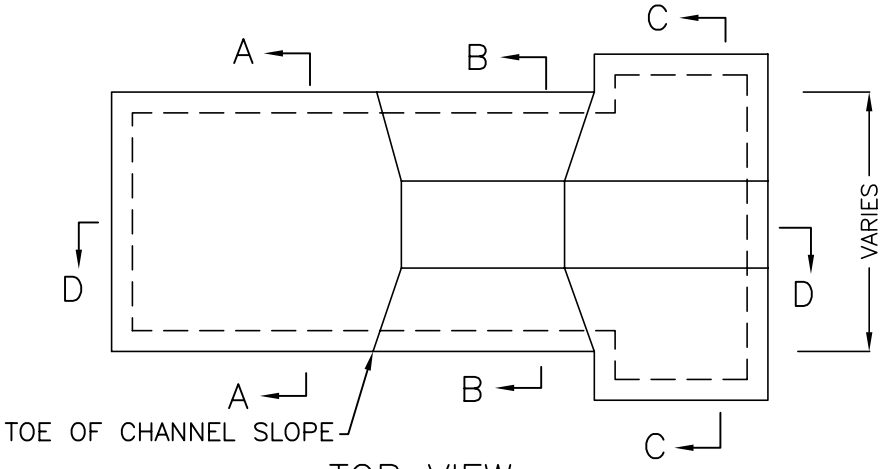
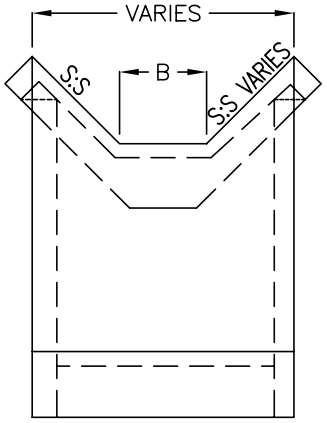
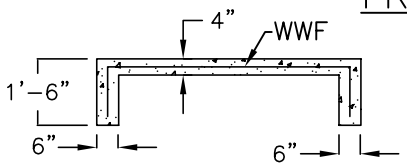
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
EROSION CONTROL PIPE DISCHARGE	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–19



TOP VIEW



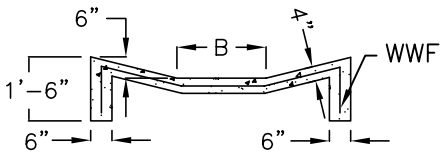
FRONT VIEW



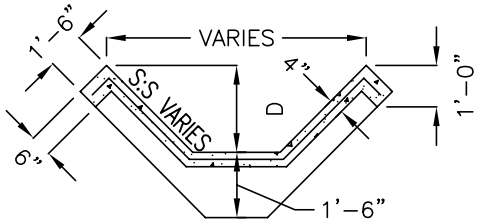
SECTION A–A

NOTES:

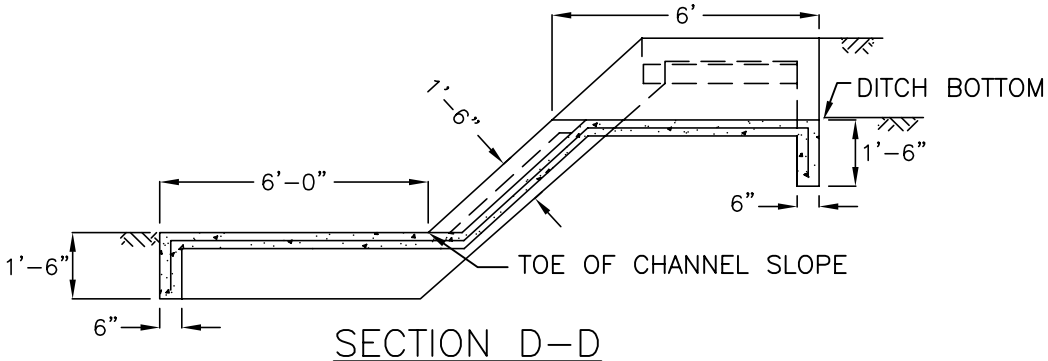
1. USE CLASS "B" CONCRETE OR GROUTED COBBLES AS SPECIFIED.
2. 6"X6"–W6XW6 WWF THROUGHOUT CONCRETE SUPPORTED ON WIRE CRADLES @ 24" +/– O.C. BOTH WAYS.
3. ON LINED CHANNELS APRON SHALL CONNECT TO SIDE LINING.
4. B=DITCH BOTTOM WIDTH OR AS SHOWN ON PLANS.
5. D=DITCH WATER DEPTH PLUS ONE FOOT OF FREEBOARD.



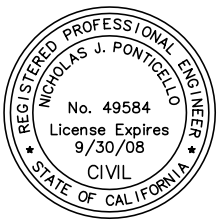
SECTION B–B



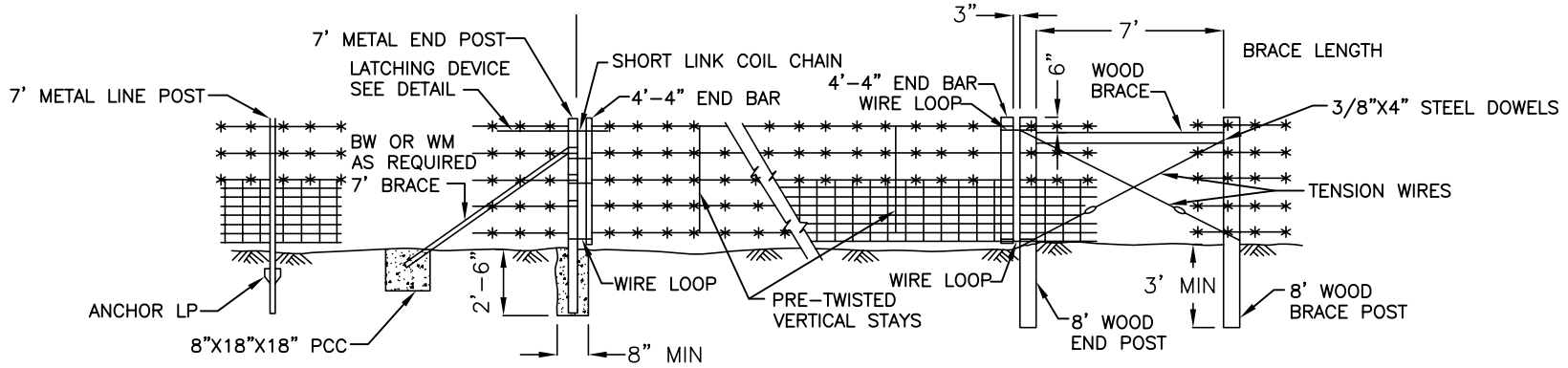
SECTION C–C



SECTION D–D



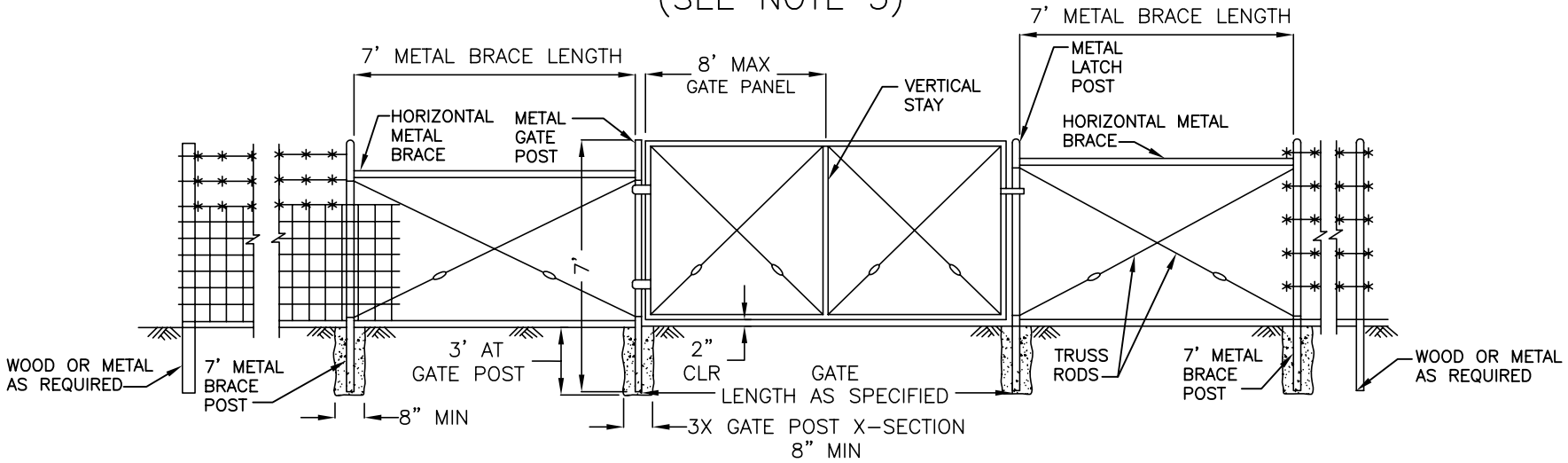
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
EROSION CONTROL DITCH DISCHARGE	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–20



METAL POST INSTALLATION

WOOD POST INSTALLATION

GATEWAY (SEE NOTE 3)



WIRE MESH GATE INSTALLATION
FOR EITHER WOOD OR METAL POST FENCES

NOTE:
ALL METAL PRODUCTS SHALL BE GALVANIZED OR SS AS APPROPRIATE. ALL WOOD MATERIALS SHALL BE PRESSURE PRESERVATIVE TREATED.

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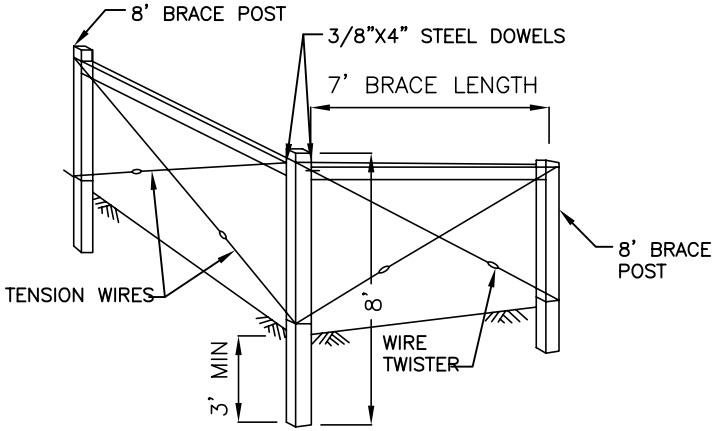
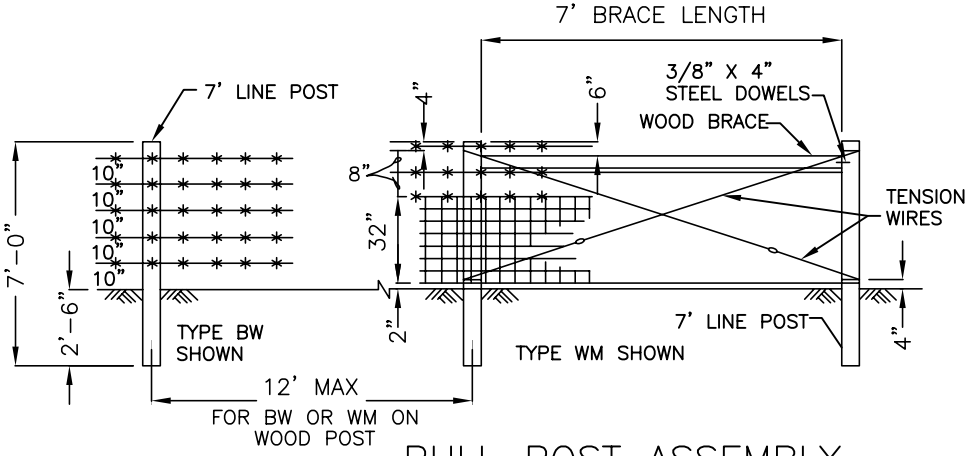
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
BARBED WIRE AND WIRE MESH FENCES	SHEET # 1 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9-21



END AND CORNER POST ASSEMBLY

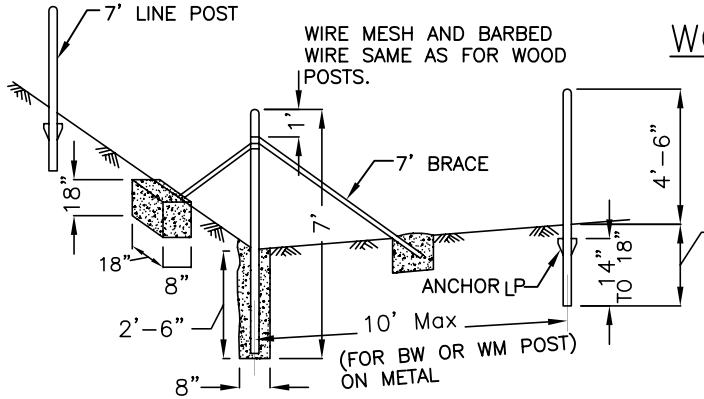


PULL POST ASSEMBLY

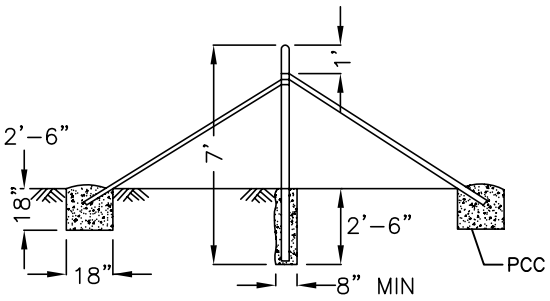
AT 660' MAXIMUM INTERVALS FOR WM FENCE.
AT 1320' MAXIMUM INTERVALS FOR BW FENCE.

TYPE BW = 5 LINES OF BARBED WIRE.
TYPE WM = WIRE MESH AND 3 LINES OF BARBED WIRE.

WOOD POST INSTALLATION



END AND CORNER POST ASSEMBLY



PULL POST ASSEMBLY

AT 660' MAXIMUM INTERVALS FOR WM FENCE.
AT 1320' MAXIMUM INTERVALS FOR BW FENCE.

METAL POST INSTALLATION

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STATE OF CALIFORNIA

City of Colusa
PUBLIC WORKS DEPARTMENT

BARBED WIRE AND WIRE MESH FENCES

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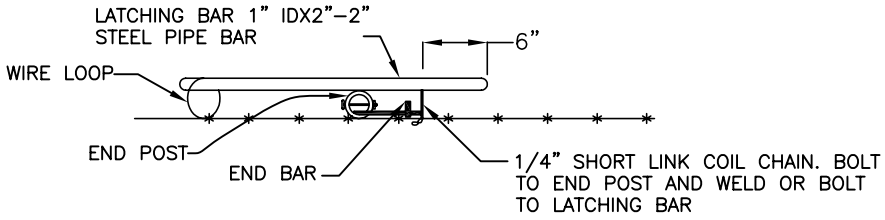
DATE: NOV 2007

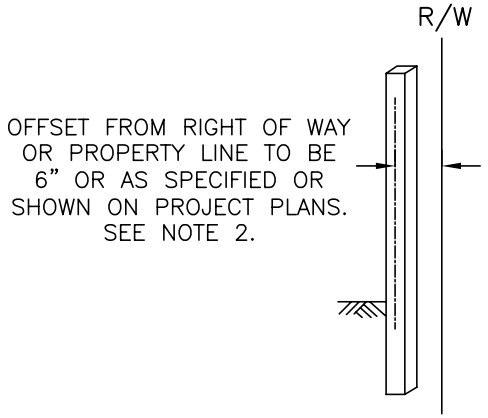
SHEET # 2 OF 3

DRAWING #: 9-21

WIRE MESH GATE POST (SEE NOTE 4)		
GATE WIDTHS	NOMINAL OD	WEIGHT PER FT
UP THRU 6'	2-7/8"	5.79
OVER 6' THRU 12'	4"	9.11
OVER 12' THRU 18'	5-9/16"	14.62
OVER 18' TO 24' MAX	6-5/8"	18.97



LATCHING DEVICE
FOR GATEWAYS
(SEE NOTE 1)



FENCE LOCATION

NOTES:
1. METAL END POST AND END BAR SHOWN. USE WOOD END POST AND END BAR FOR WOOD POST INSTALLATION.
2. OFFSET TO BE 2' AT MONUMENT LOCATIONS, MEASURED AT RIGHT ANGLES TO R/W LINES. TAPER TO ACHIEVE OFFSET TO BE AT LEAST 20' LONG.
3. GATEWAY TO BE USED WHEN SPECIFIED IN THE SPECIAL PROVISIONS.
4. POST DIMENSIONS AND WEIGHTS ARE MINIMUMS. LARGER SIZES MAY BE USED ON APPROVAL OF ENGINEER.
5. LINE POST SPACING FOR WOOD POST EQUALS 12' MAXIMUM. LINE POST SPACING FOR METAL POST EQUALS 10' MAXIMUM.

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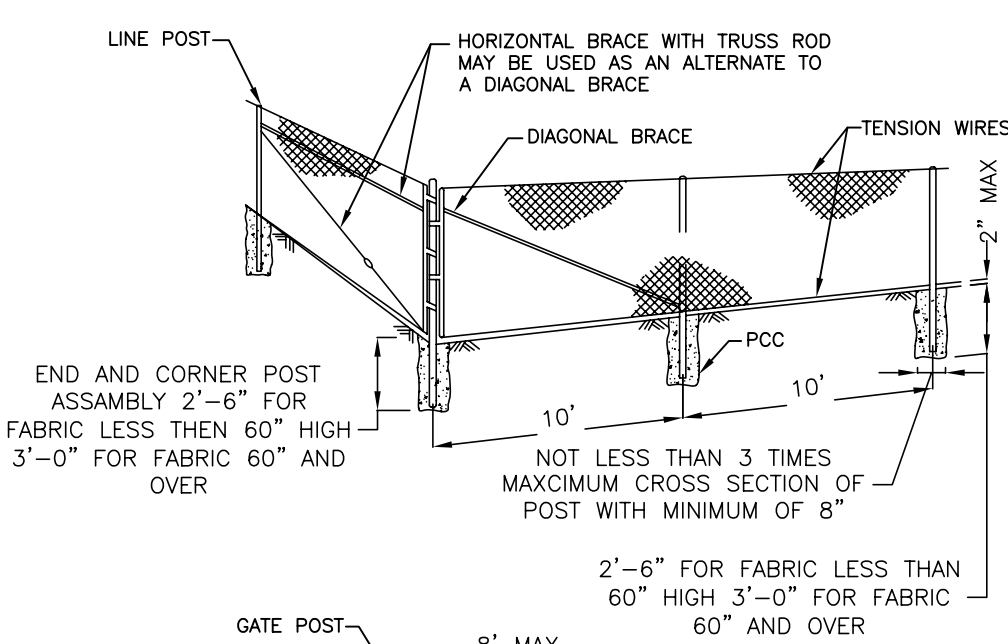
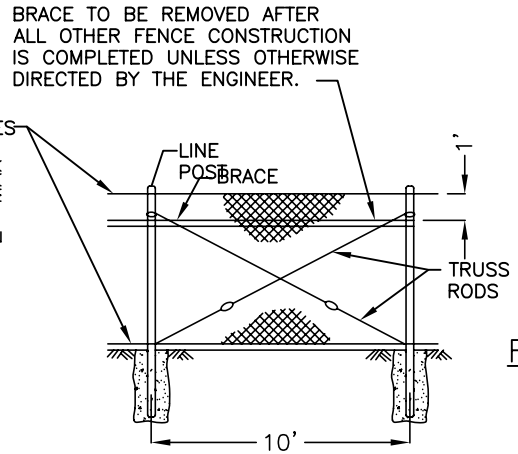
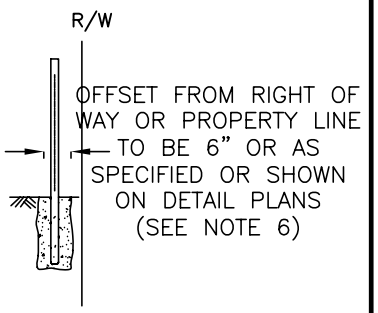
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
BARBED WIRE AND WIRE MESH FENCES	SHEET # 3 OF 3
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9-21

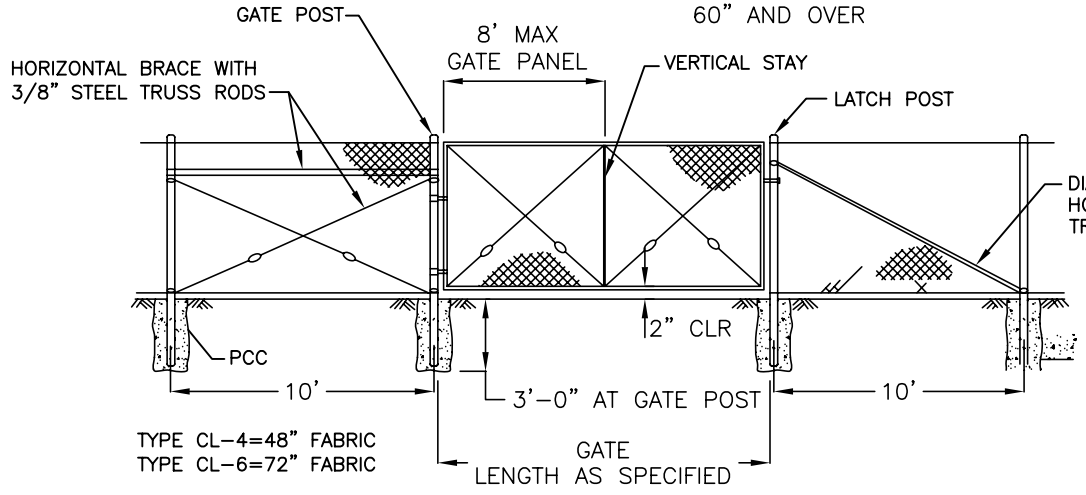




LINE POSTS AT 1000' MAXIMUM INTERVALS BRACED AND TRUSSED IN BOTH DIRECTIONS EXCEPT THAT THIS BRACING AND TRUSSING MAY BE OMITTED WHEN THE FABRIC IS STRETCHED BY THE EQUIPMENT



FENCE LOCATION



NOTES:
1. CHAIN LINK FABRIC SHALL BE ZINC COATED STEEL MANUFACTURED IN COMPLIANCE WITH ASTM STANDARD A 392 WITH A 2 INCH MESH OF 9 GAUGE WIRE WITH KNUCKLED SELVAGE.
2. TENSION WIRE SHALL BE 7 GAUGE.
3. WHERE BARBED WIRE IS SPECIFIED, IT SHALL INCLUDE 3 STRANDS OF GALVANIZED 4 POINT WIRE ATTACHED WITH EXTENSION ARMS SET AT 45 DEGREES.

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City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
CHAIN LINK FENCE	SHEET # 1 OF 2
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–22

TYPICAL MEMBER DIMENSIONS (SEE NOTES)										
FENCE HEIGHT	LINE POSTS			END, LATCH & CORNER POSTS			RAILS & BRACES			
	NOMINAL ROUND O.D. (NOTES 7 & 8)	H	ROLL FORMED	NOMINAL ROUND O.D. (NOTES 7 & 8)	ROLL FORMED		NOMINAL ROUND O.D. (NOTES 7 & 8)	H	ROLL FORMED	
6' & LESS	2-3/8"	1-7/8"X1-5/8"	1-7/8"X1-5/8"	2-7/8"	3-1/2" X 3-1/2"	2" X 1-3/4"	1-5/8"	1-1/2" X 1-5/16"	1-5/8" X 1-1/4"	1-3/4" X 1-1/4"
OVER 6'	2-3/8"	2-1/4" X 2"	2" X 1-3/4"	2-7/8"	3-1/2" X 3-1/2"	2-1/2" X 2-1/2"	1-5/8"	1-1/2" X 1-5/16"	1-5/8" X 1-1/4"	1-3/4" X 1-1/4"

GATE POST (NOTE 7)			
FENCE HEIGHT	GATE WIDTHS	NOMINAL O.D.	WEIGHT PER FOOT
6'-0" AND LESS	UP THRU 6'	2-7/8"	5.79
	OVER 6' THRU 12'	4-1/2"	10.79
	OVER 12' THRU 18'	5-11/16"	14.62
	OVER 18' TO 24' MAX	6-5/8"	18.97
OVER 6'-0"	UP THRU 6'	3-1/2"	7.58
	OVER 6' THRU 12'	5-11/16"	14.62
	OVER 12' THRU 18'	6-5/8"	18.97
	OVER 18' TO 24' MAX	8-5/8"	28.55

ABOVE POST DIMENSIONS AND MASSES ARE MINIMUMS. LONGER SIZES MAY BE USED ON APPROVAL OF THE ENGINEER.

NOTES:

1. THE ABOVE TABLE SHOWS EXAMPLES OF POST AND BRACE SECTIONS WHICH MAY COMPLY WITH THE STANDARD CONSTRUCTION SPECIFICATIONS.
2. SECTIONS SHOWN IN THE TABLES MUST ALSO COMPLY WITH THE STRENGTH REQUIREMENTS AND OTHER PROVISIONS OF THE STANDARD CONSTRUCTION SPECIFICATIONS.
3. OTHER SECTIONS WHICH COMPLY WITH THE STRENGTH REQUIREMENTS AND OTHER PROVISIONS OF THE STANDARD CONSTRUCTION SPECIFICATIONS MAY BE USED ON APPROVAL OF THE ENGINEER.
4. OPTIONS EXERCISED SHALL BE UNIFORM ON ANY ONE PROJECT.
5. DIMENSIONS SHOWN ARE NOMINAL.
6. OFFSET TO BE 2'-0" AT MONUMENT LOCATIONS, MEASURED AT RIGHT ANGLES TO R/W LINES. TAPER TO ACHIEVE OFFSET TO BE AT LEAST 20' LONG.
7. PIPE SECTIONS FOR POSTS, RAILS, BRACES, AND GATES SHALL BE SCHEDULE 40 GALVANIZED PIPE MANUFACTURED IN CONFORMANCE WITH ASTM F 1083.
8. WEIGHT PER FOOT VALUES FOR 1-5/8" O.D. PIPE = 2.27 LBS/FT, 2-3/8" O.D. PIPE = 3.65 LBS/FT, 2-7/8" O.D. PIPE = 5.79 LBS/FT.
9. CHAIN LINK GATE FRAMES SHALL BE A MINIMUM OF 1-7/8" PIPE WEIGHING 2.72 LBS/FT.
10. GALVANIZED GATE HOLDERS OF HEAVY CAST CONSTRUCTION WITH COUNTERBALANCED LATCHES SHALL BE PROVIDED FOR ALL GATES. GATE HOLDERS SHALL BE ANCHORED WITH A MINIMUM 24" LENGTH OF 1-5/8" SCHEDULE 40 PIPE SET IN 8" ø CONCRETE BASE.
11. DOUBLE GATE ASSEMBLIES SHALL ALSO BE FITTED WITH HEAVY DUTY HINGES AND LIFT BAR INTERLOCKING DEVICE WITH DROP ANCHOR AT MIDSPAN THAT LATCHES TO EMBEDDED PIPE.

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CHAIN LINK FENCE

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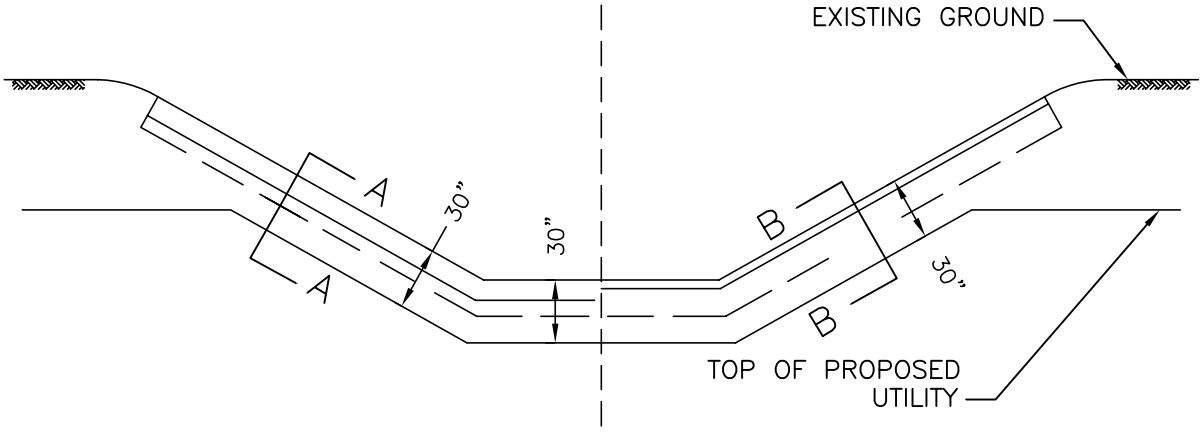
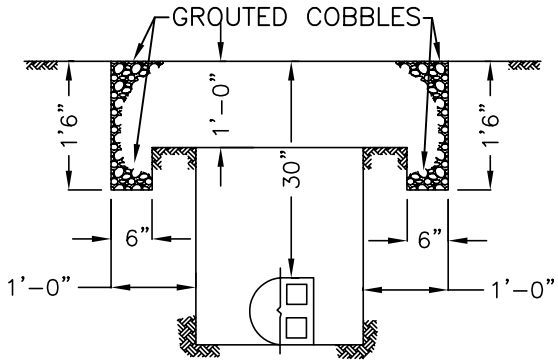
DATE: NOV 2007

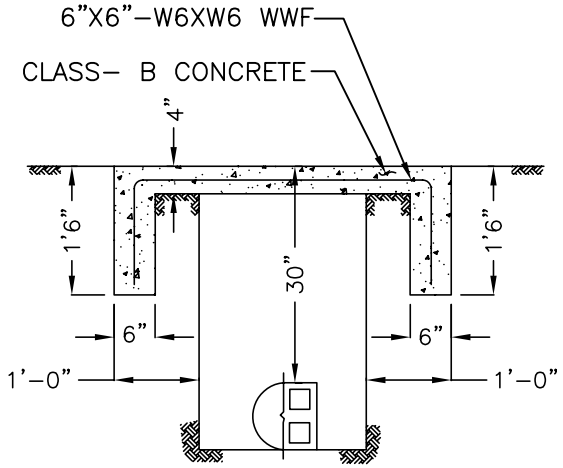
SHEET # 2 OF 2

DRAWING #: 9-22





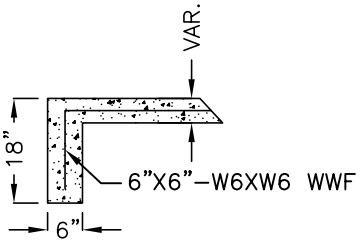
SECTION A–A



SECTION B–B

NOTES:

1. ALL UTILITY CROSSINGS OF EXISTING STREAMS SHALL BE AT LEAST 30" BELOW EXISTING CHANNEL SIDES AND BOTTOMS. DEEPER PLACEMENT MAY BE REQUIRED IF FUTURE CHANNEL IMPROVEMENTS ARE ANTICIPATED.
2. THE CUT SHALL BE SEALED AS SHOWN WITH GROUTED COBBLES OR CLASS B CONCRETE TO A WIDTH 1' EACH SIDE OF THE UTILITY TRENCH. ALL NATURAL STREAMS, AS SHOWN ON THE NATURAL STREAMS PLAN, SHALL UTILIZE GROUTED COBBLES.



CUTOFF WALL

TO BE PLACED ALONG ENTIRE END OF LINED SECTION AT BEGINNING AND AT END OF LINING

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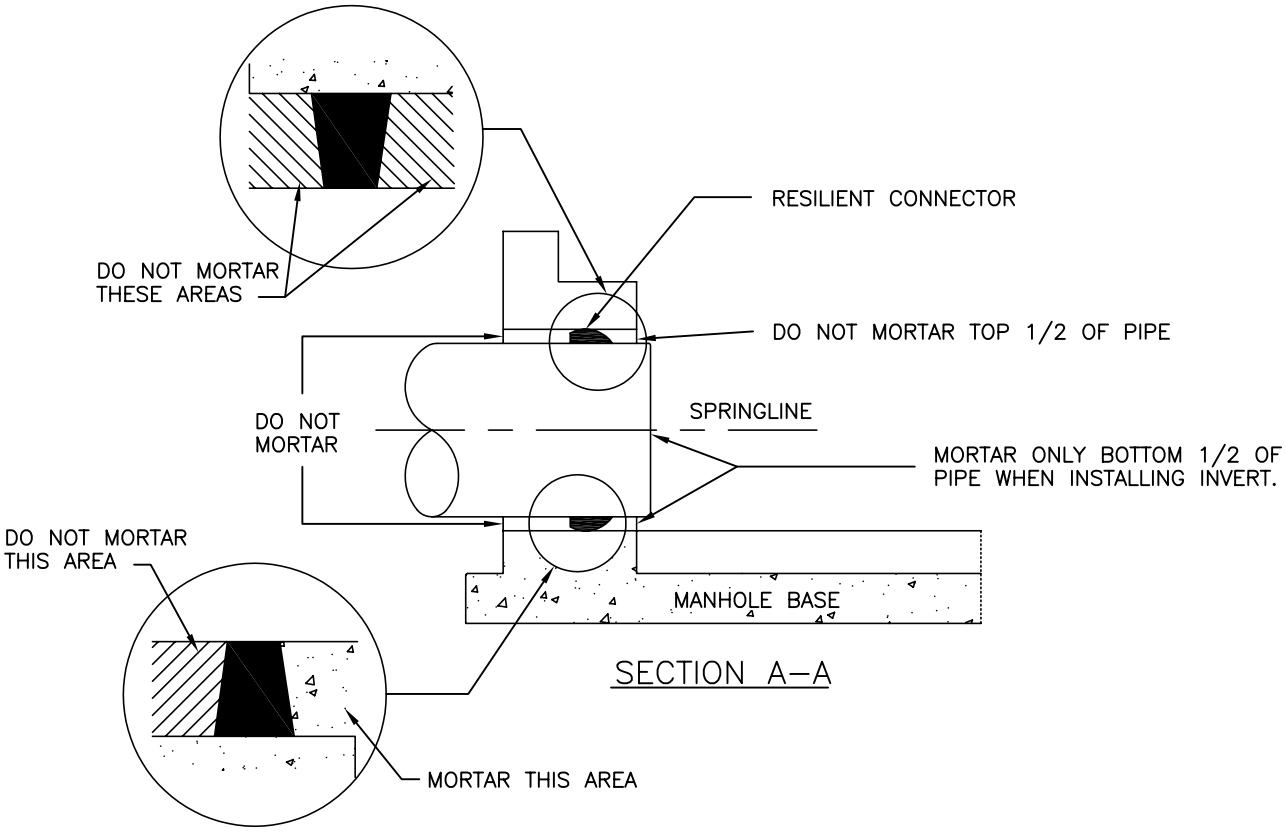
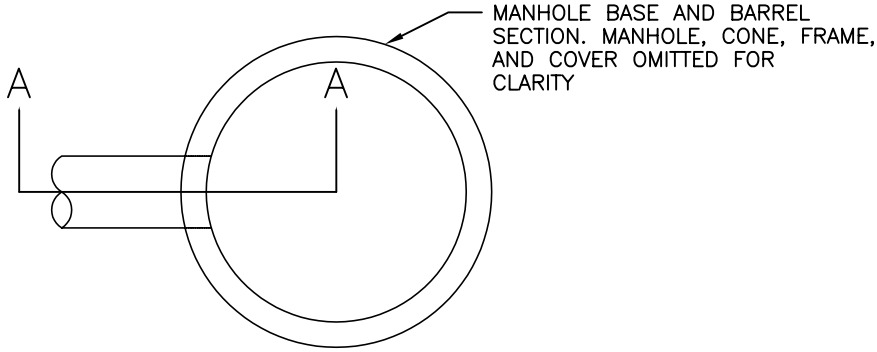
City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
UTILITY STREAM CROSSING	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–23



SECTION A–A



PLAN

NOTES:

1. TO HELP CREATE A FLEXIBLE, WATERTIGHT JOINT. DO NOT PLACE MORTAR AROUND THE CONNECTOR ON THE OUTSIDE OF THE STRUCTURE OR AROUND THE TOP HALF OF THE CONNECTOR ON THE INSIDE WHEN COMPLETING THE INVERT WORK.
2. RESILIENT CONNECTORS SHALL BE A–LOK, PRESS–SEAL, OR APPROVED EQUAL.
3. ALL CONNECTORS SHALL MEET OR EXCEED THE REQUIREMENTS OF A.S.T.M. C–923

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City of Colusa *PUBLIC WORKS DEPARTMENT*	DATE: NOV 2007
FLEXIBLE CONNECTOR PIPE TO MANHOLE DETAIL	SHEET # 1 OF 1
CITY ENGINEER APPROVED Nicholas J. Ponticello P.E. NO. 49584	DRAWING #: 9–24

Appendix B

Technical Memorandum-City of Colusa Sewer Collection System and Sewer Pump Station Upgrades (NEXGEN, October 2022)

NEXGEN

TECHNICAL MEMORANDUM

SEWER COLLECTION SYSTEM AND SEWER PUMP STATION UPGRADES

Prepared for

City of Colusa

Public Works Department
425 Webster Street
Colusa, CA 95932

October 2022

NEXGEN Utility Management

4010 Lennane Drive
Sacramento, CA 95834
916.564.8000
nexgenum.com

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Introduction

The purpose of this technical memorandum (TM) is to describe wastewater flows expected within the City of Colusa's (City) Sphere of Influence (SOI) and how these flows will be conveyed to the City's WWTP.

In 2009 the City completed a sewer master plan to serve City growth. The master plan recommended abandoning two older sewer pump stations, deepening and increasing the gradient of certain sewers through town, construction of a new larger station serving the western side of the City, and expanding the South Wescott pump station to serve growth in the Eastern side of the City (see Figure 1). Since 2009, the City's SOI and zoning has changed and there is better information on how to expand these two pumps stations.

This memo will describe:

1. The existing sewer collection system
2. Existing and future average and peak hourly flows
3. Sewer sheds, flowrates, and a plan to route the flows to the WWTP
4. Locations and future capacity of sewer pump stations
5. A sewerage plan for the western side of the City to abandon and replace two older sewer stations near Will S Green Avenue.
6. A sewerage plan for the eastern side of the City to maximize capacity and expand the Wye and South Westcott Pump Station.

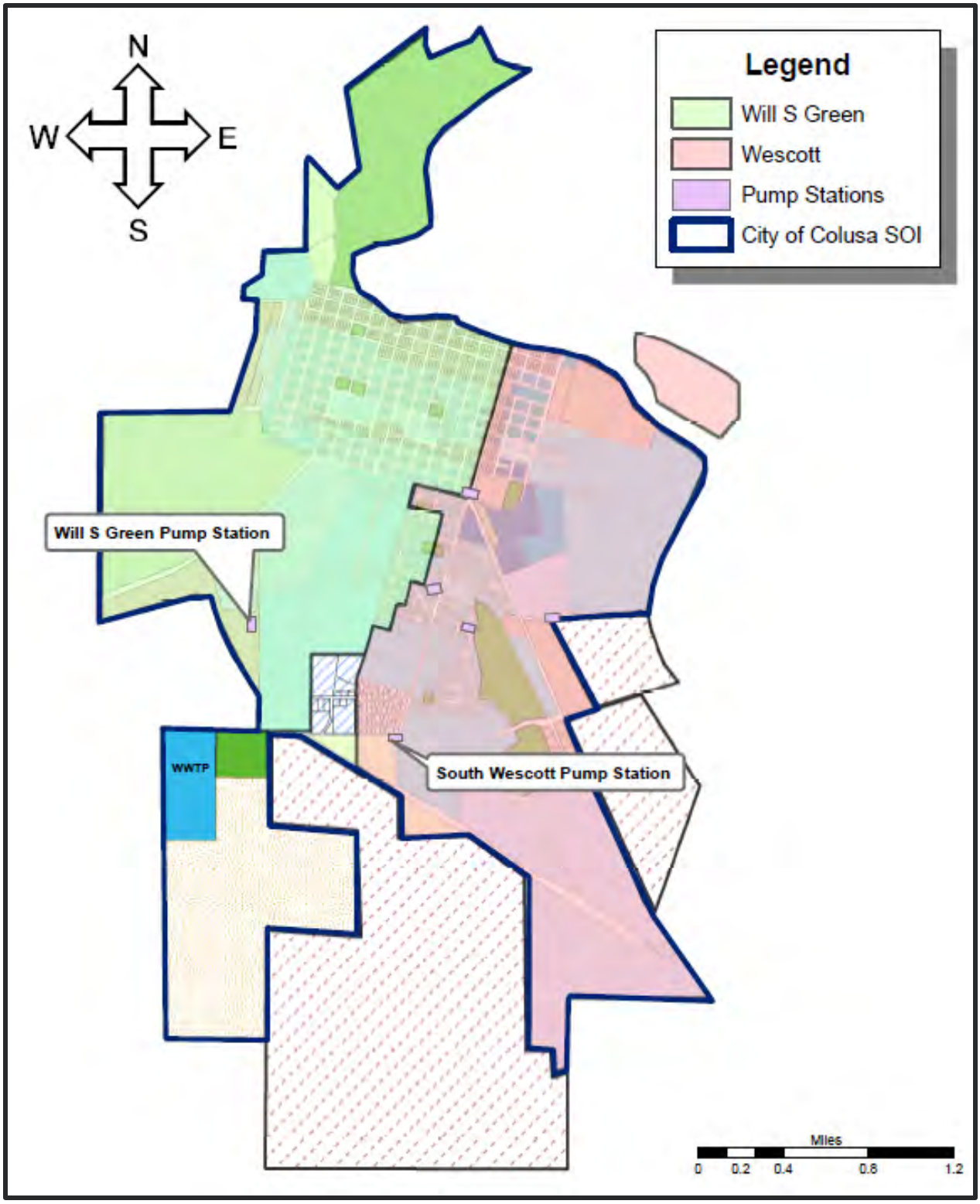


Figure 1: Tributary Areas for Major Pump Stations

Existing City Sewer Collection System

Existing Sewers

The City's existing wastewater collection system covers an area of approximately 1000 acres and provides service to about 6600 residents as well as commercial and industrial users. The city owns and maintains a network of over 28 miles of sewer pipelines, force main, and six existing pump stations, which convey flow from throughout the City's service area to the City of Colusa Wastewater Treatment Plant (WWTP). The City's existing wastewater collection system including pump stations and tributary areas are shown in Figure 2.

Existing Pump Stations

The City currently has six operating pump stations that convey wastewater to the City's WWTP. The location of each pump station is shown in Figure 2. Almost all the City's pump stations operate to lift the City's wastewater into adjacent gravity sewers with the exception of the South Wescott pump station, which pumps wastewater into an 8-inch force main that discharges to the City's WWTP. A summary of attributes associated with the City's six existing pumps stations are outlined in Table 1 below.

Table 1: Summary of Existing Pump Stations

Pump Station	Type	Rated Capacity ea. (gpm)	TDH (feet)	HP	Comments
Indian Oaks	Submersible	310	--	3.2	Not impacted by growth
Primary	Vertical Centrifugal	600	--	10	To be abandoned
Ross	Vacuum	300	--	7.5	Not impacted by growth
South Wescott	Submersible	650	60	20	Flygt Model NP 3153.095

Pump Station	Type	Rated Capacity ea. (gpm)	TDH (feet)	HP	Comments
Screens	Vertical Centrifugal	600	N/A	10	To be abandoned
Wye	Submersible	600	25	10	Flygt Model FP 3127.390

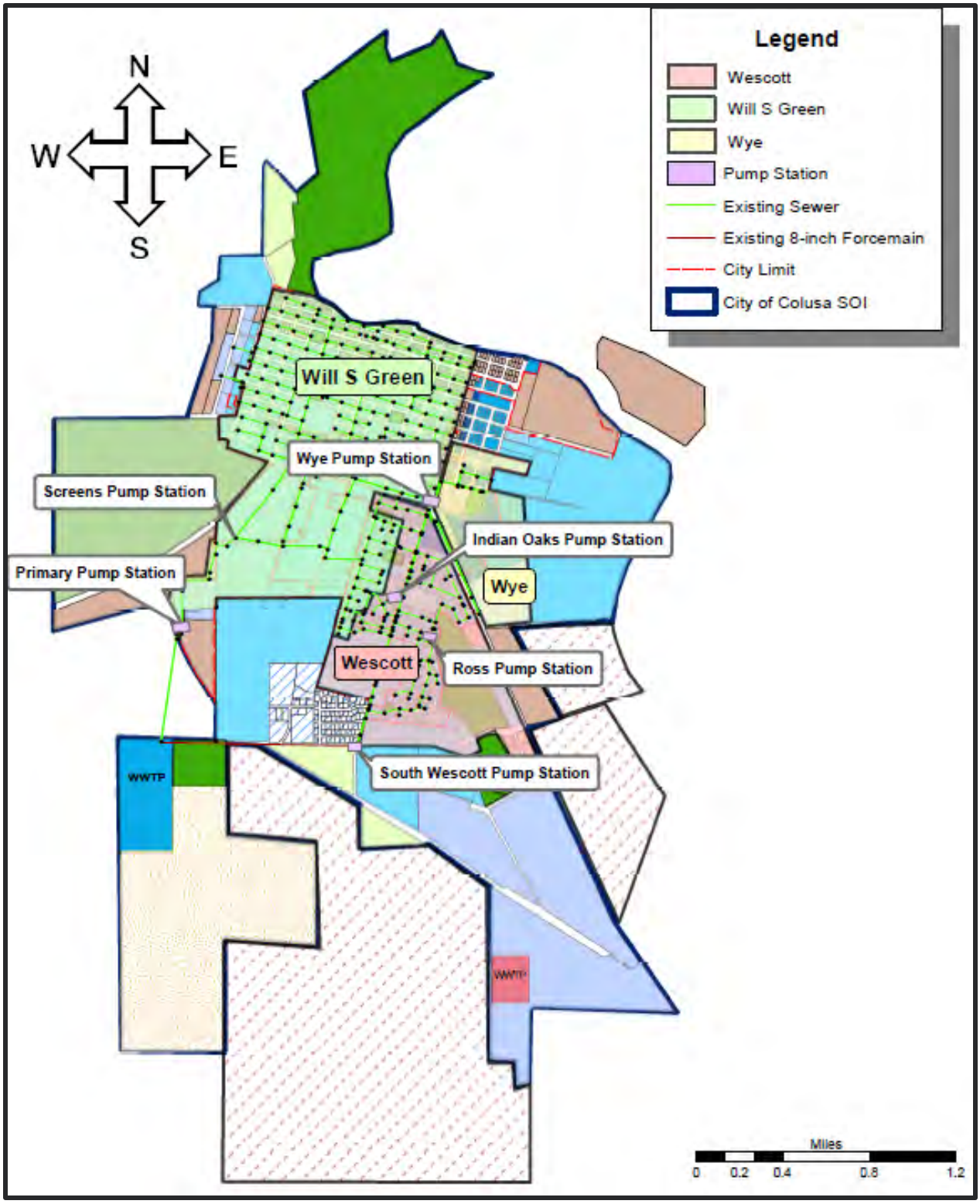


Figure 2: Existing Tributary Areas, Sewer Collection System, and Pump Stations

City Growth Plans

Existing and proposed land use types were established using the City's 2007 General Plan Land Use Map, City of Colusa 2014 Zoning Map, Colusa County GIS zoning maps, and input from City staff. Future development on vacant land was based on land uses described by the General Plan as well as anticipated land development plans currently under review by the City including: Rancho Colus Apartments, Walnut Ranch, Wescott Property Development, Cannabis industrial and other specific commercial and residential development throughout the City's SOI (see Table 2).

Table 2: Summary of Planned Development Projects (2022)

Planned Development Project	EDUs	Total Acreage
Brookins Ranch	441	147
Cannabis Industrial	9	80
Colusa Crossings	2790	350
Rancho Colus Apartments	98	4
RV Commercial Resort	323	81
Tennant Estates	101	40
Walnut Ranch	70	33
Wescott Property	265	86
820	4097	820

The City's wastewater flows were calculated using the acreage attributed to existing and projected types of land use and multiplying it by its designated equivalent dwelling unit (EDU). An EDU is a unit of measure that normalizes all land use types to the level of demand created by one single-family housing unit consisting of 2 people. Including specific projects in the land use calculations will provide a more accurate estimate of future EDUs. The EDU/acre land use designation and specific public facility information used to calculate existing flows are shown in Table 3.

Table 3: Existing and Projected Land Use

Land Use Designation (EDU/acre)		
	Existing	Projected
High Density Residential (HDR)	12	16
Medium Density Residential (MDR)	8	10
Low Density Residential (LDR)	3	6
Urban Reserve	1	1
Mixed Use	8	8
Industrial	4 (850 gal/acre)	4
Commercial	4 (850 gal/acre)	4
Public Facility	EDU	Specific Criteria
Hospital	40	48 beds
Private School	10	100 students
Elementary	43	428 students
Junior High	57	573 students
High School	40	400 students

All areas within the City's SOI were assumed to be connected to the City's wastewater collection system in the future. A map portraying the City's existing and future land use within their SOI are shown in Figure 3. A summary of existing and future land use acreage and EDUs are outlined in Tables 4 and 5.

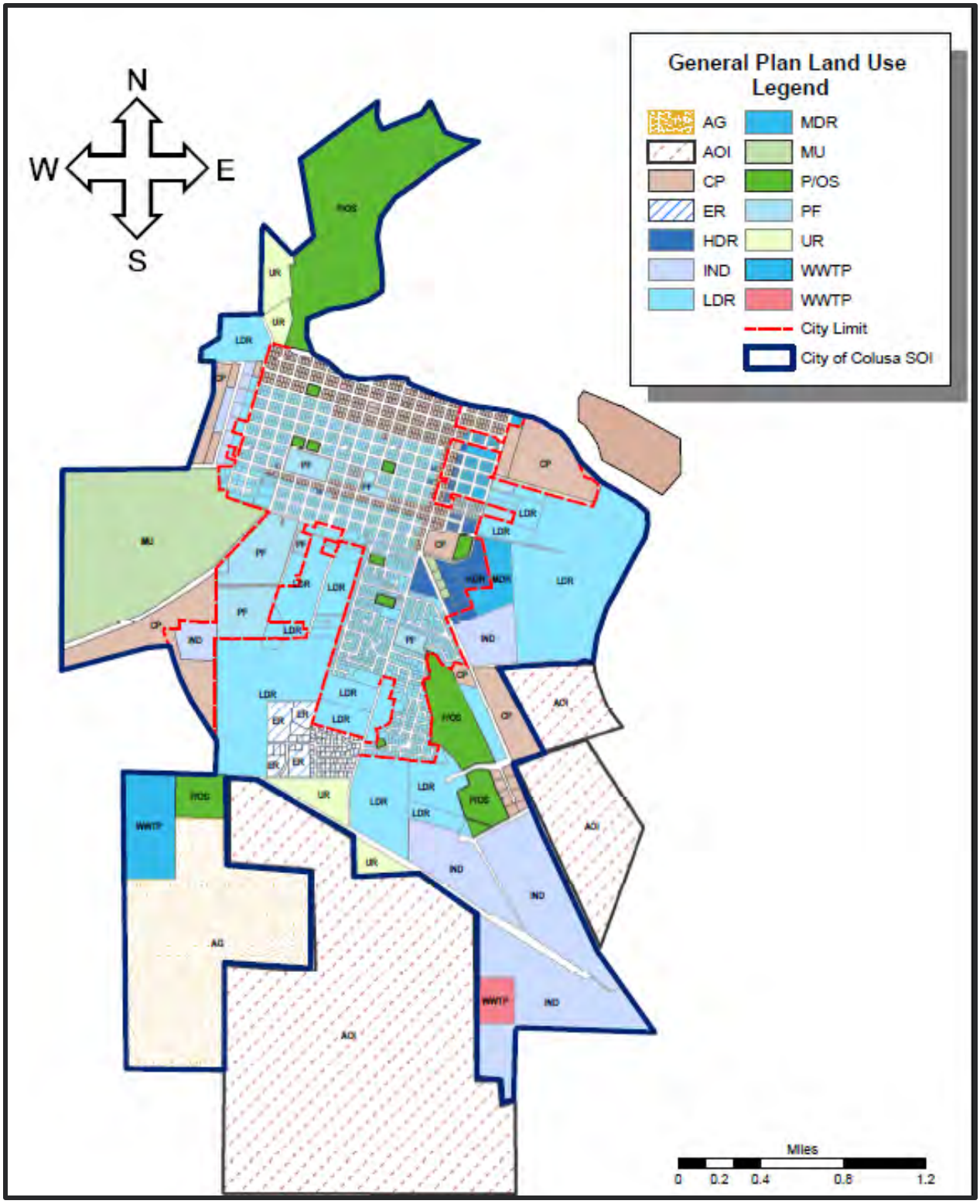


Figure 3: General Plan (2022) Land Use Diagram for the City of Colusa

Table 4: Summary of Existing Land Use Acreage and EDUs

Land Use Designation	EDUs	Total Acreage
Urban Reserve	60	60
Low Density Residential	1200	400
Medium Density Residential	952	119
High Density Residential	1135	95
Mixed Use	-	-
Commercial	725	181
Industrial	182	45
Public Facility	470	102
Existing Total	4724	1003

Table 5: Summary of Projected Land Use Acreage and EDUs

Land Use Designation	EDUs	Total Acreage
Urban Reserve	159	159
Low Density Residential	4440	1143
Medium Density Residential	1152	165
High Density Residential	1393	109
Mixed Use	2870	359
Commercial	1508	377
Industrial	567	539
Public Facility	470	102
Projected Total	12559	2954

Wastewater Generation Rates

The City's wastewater flows were calculated using the acreage attributed to existing and projected types of land use and multiplying it by its designated EDU. Existing EDU wastewater generation rates were calibrated using the influent flow meter from the City of Colusa's WWTP which reported an ADWF of approximately 0.43 MGD. This was accomplished by multiplying a calibration factor to the existing development flows from tributary areas listed in Tables 6 through 10 until the total flow generated by the existing tributary areas was within a reasonable range of the ADWF. Each existing EDU was found, on average, to generate 99 gallons per day. However, a future development EDU was attributed a conservative wastewater generation rate of 210 gallons per day as per recommendation by the *Ten State Standards (Recommended Standards for Wastewater Facilities: Policies for the Design, Review, and Approval of Plans and Specifications for Wastewater Collection and Treatment: 2004 Edition*). Using a conservative wastewater generation rate for future development allows room for flexibility should City plans change.

Analysis of Sewer Sheds & Pumping Requirements

The following tables summarize the existing, build out, and ultimately projected flows for each tributary area as shown in Figure 4. For the City, a peaking factor of 3.1 was applied to dry weather flows within each sewer shed. This peaking factor was developed using the *Ten State Standards Peak Factor Curve* and was observed to be reasonably close to peak flows measured in existing sewer sheds in 2009. Each tributary area is named after the primary pump station that conveys wastewater in that section of the City. The City may expect the peak flow peaking factor to decrease as population increases. For instance, at buildout of the SOI (12,559 EDUs), the *Ten States Curv*e shows a peaking value of 2.7 x average flow.

A spreadsheet analysis was developed to determine logical sewer sheds and the resulting peak flows through trunk sewers and pump stations.

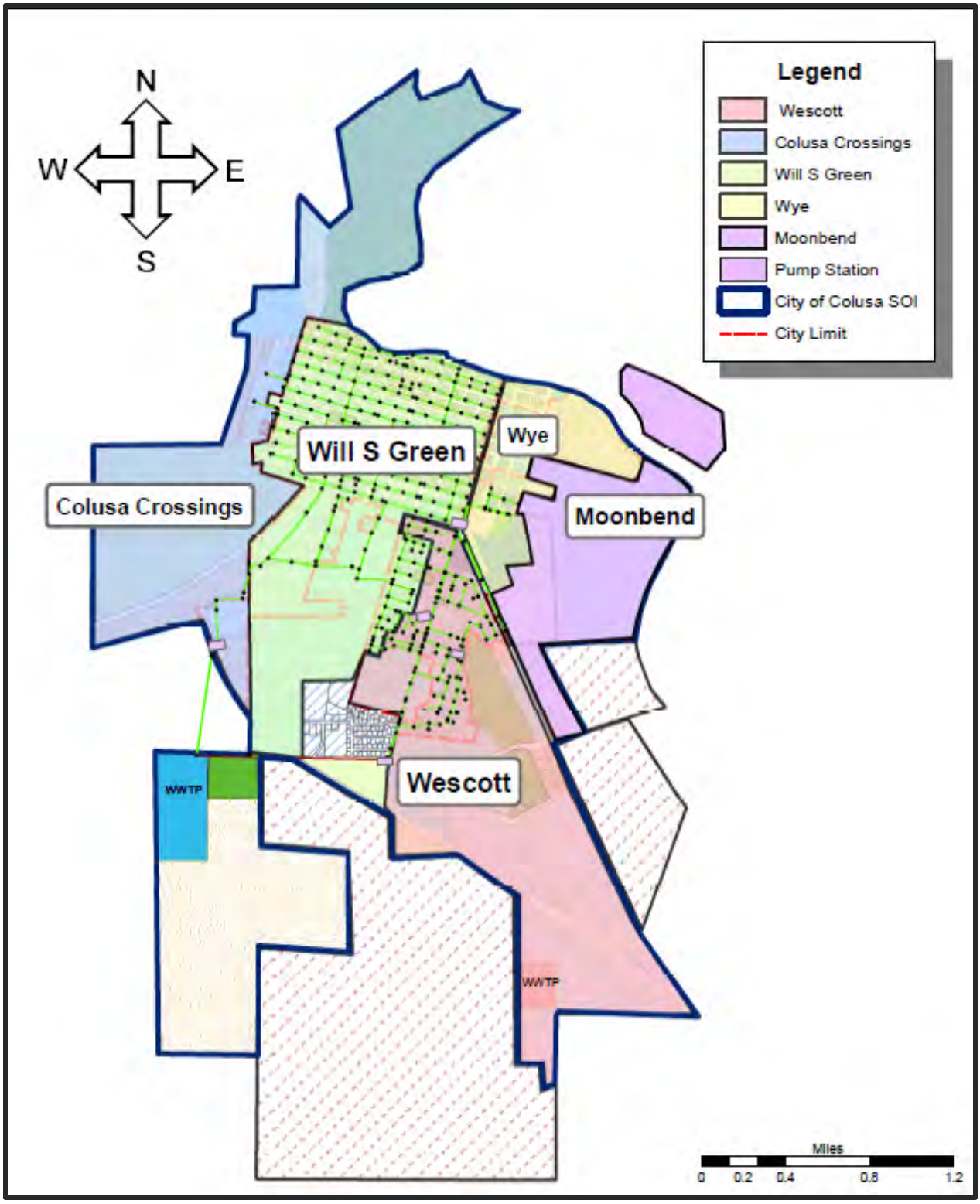


Figure 4: General Plan (2022) Land Use Diagram for the City of Colusa

Table 6: Existing & Projected Wastewater Flows into Wye Pump Station

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (MGD)	Peak Flow (x3.1)
High Density Residential	223	19	99	0.02	0.07
Commercial	85	21	99	0.01	0.03
Public Facility[1]	40	9	99	0.01	0.03
	51	3	99	0.01	0.03
Existing Total	399	52		0.05	0.15
Future Build Out					
Mixed Use	80	10	210	0.02	0.06
Medium Density Residential[2]	90	35	210	0.02	0.06
Industrial[3]	9	80	210	0.00	0.01
High Density Residential	98[4]	4	210	0.02	0.06
	96	6	210	0.02	0.06
Build Out Total	373	135		0.08	0.25
Projected Total	**772**	**188**		**0.13**	**0.40**

Notes:

1. Hospital: Colusa Medical Center estimated wastewater generation of 175 gal/bed for a reported total of 48 beds
2. Jail: Colusa County Jail estimated wastewater generation of 115 gal/inmate for a reported 92 inmate capacity and 13 employees
3. Septic community assumed to be directed into recommended 15″ line down East Oak and D St.
4. Cannabis estimated wastewater generation of 15 gal/employee/day with 120 employees
5. Rancho Colus Apartments

Table 7: Existing & Projected Wastewater Generation into South Wescott Pump Station

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (MGD)	Peak Flow (x3.1)
Low Density Residential	762	254	99	0.08	0.23
High Density Residential	132	11	99	0.01	0.04
Existing Total	894	265		0.09	0.27
Future Build Out					
Urban Reserve	11	11	210	0.00	0.01
	37	37	210	0.01	0.02
Low Density Residential[1]	816	200	210	0.17	0.54
Industrial[2]	240	380	210	0.03	0.11
Build Out Total	1104	628		0.22	0.68
Projected Total	**1998**	**893**		**0.30**	**0.95**

Notes:

1. Tennant Estates, W. Ranch, W. Property
2. CIP (100 septic units)

Table 8: Projected Wastewater Generation into Moonbend Pump Station

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (gal/day)	Peak Flow (x3.1)
Industrial	182	45	99	0.02	0.06
Existing Total	182	45		0.02	0.06
Commercial[1]	323	81	210	0.07	0.21

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (gal/day)	Peak Flow (x3.1)
Low Density Residential	1620	270	210	0.34	1.05
Medium Density Residential	110	11	210	0.02	0.07
High Density Residential	64	4	210	0.01	0.04
Build Out Total	2117	366		0.45	1.38
Projected Total	**2298**	**411**		**0.47**	**1.44**

Notes:

1. Addition of possible future RV commercial resort across the Sacramento River

Table 9: Existing & Projected Wastewater Generation into Will S Green Pump Station

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (MGD)	Peak Flow (x3.1)
Urban Reserve[1]	60	60	99	0.01	0.02
Low Density Residential	438	146	99	0.04	0.13
Medium Density Residential	952	119	99	0.09	0.29
High Density Residential	780	65	99	0.08	0.24
Commercial	640	160	99	0.06	0.20
Public Facility[2]	379	90	99	0.03	0.10
Existing Total	3249	640		0.32	0.98
Future Build Out					
Low Density Residential[3]	621	207	210	0.11	0.34

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (MGD)	Peak Flow (x3.1)
	33	16	210	0.01	0.03
Build Out Total	654	223		0.12	0.37
Projected Total	**3903**	**863**		**0.44**	**1.35**

Notes:

1. Fairgrounds
2. high school, elementary, junior high, private school with a wastewater generation of 25 gal/student/day
3. Brookins Ranch and 60 acres of MDR

Table 10: Existing & Projected Wastewater Generation into Colusa Crossings Pump Station

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (MGD)	Peak Flow (x3.1)
Low Density Residential	150	50	99	0.01	0.05
Commercial	144	36	99	0.01	0.04
Industrial	136	34	99	0.01	0.04
Existing Total	430	120		0.04	0.13
Future Build Out					
Commercial	316	79	210	0.07	0.21
Mixed Use[1]	2790	349	210	0.59	1.82
Urban Reserve	51	51	210	0.01	0.04
Build out Total	3157	479		0.66	2.06

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation Rate (gal/EDU)	WW Generation (MGD)	Peak Flow (x3.1)
Projected Total	3587	599		0.71	2.19

Notes:

1. Colusa Crossings

Table 11: Summary of Existing, Build Out, & Projected EDU and Wastewater Generation for the City of Colusa

Land Use Designation	EDUs	Total Acreage (Acres)	WW Generation (MGD)	Peak Flow (x2.7)
Existing (EDU @99 gal/day)	4724	1003	0.46	1.43
Build Out (EDU @210 gal/day)	7835	1951	1.64	4.43
Projected SOI Total	12559	2954	2.10	5.85

Notes:

1. Peaking factor for the Build Out reduced from 3.1 to 2.7

Sewer Capacity and Upgrades

The City's existing sewer collection system cannot convey wastewater flows from the build out of the City's SOI. The installation of new gravity sewers, force mains, and pump stations will be needed to accommodate projected peak flows from each tributary area as described in Tables 6-10 and depicted in Figure 5. Provisions for additional flow from SOI build out are described in referenced Figures with an *F* for Future.

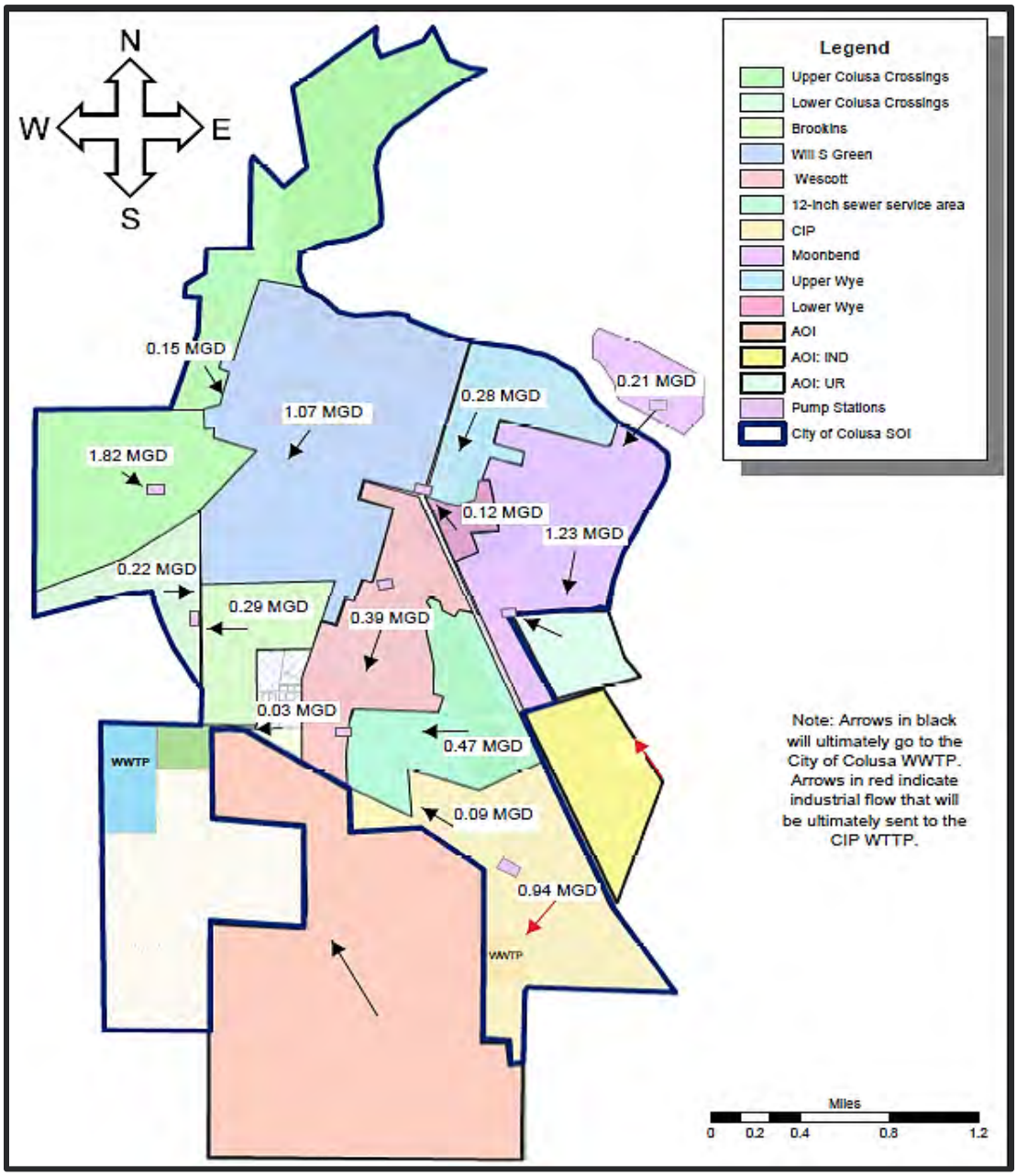


Figure 5: Projected Peak Flows for the City of Colusa

West Side Sewer Improvements

Tributary Area to New Colusa Crossings Pump Station

For all the recommended sewer collection system installations for the tributary area to Colusa Crossings please refer to Table 12 and Figures 1 and 3 in the Appendices for the sewer line attributes and their orientation. The tributary area to Colusa Crossings is divided into two areas, Upper and Lower Colusa Crossings (see Figure 5).

Sewer upgrades for the tributary area to Will S Green will be deep enough such that the future 15-inch pipe conveying flows from Upper Colusa Crossings (see Figure 1 in the Appendices) can be gravity sewer.

Table 12: New Sewer Line Recommendations for the Tributary Area to Colusa Crossings

New Trunk	Diameter (in)	Length (ft)	Slope	Capacity (MGD)
Upper West SOI to NMH below G04-019	15	7860	0.0015	1.92
New Force Main	Diameter (in)	Length (ft)	Quantity	Capacity (gpm)
CC PS to 24" on WSG Ave	8	2000	2	1300

Tributary Area to a New Will S. Green Pump Station

For all the recommended sewer collection system installations for the tributary area to Will S Green please refer to Table 13 and Figures 1, 2 and 3 in the Appendices for the sewer line attributes and their orientation.

Capacity/surcharging issues for some limiting sections of sewer in this area (8th St, 6th St., So. Fifth St, etc.) were highlighted in the 2009 Wastewater Collection System Master Plan for the City of Colusa. The sewer system recommendations in Table 13 will improve bottlenecks with limiting sections, accommodate flows from future build-out, as well as upgrade existing sewers to be consistent with City standards.

A new Will S Green Pump Station will be constructed to replace the existing Primary and Screens Pump Stations. This pump station will be deep and built in phases to eventually convey all the wastewater from the City's west side to the WWTP. Design criteria for the new pump station can be found in Table 18. Provisions for additional flows from SOI build out are provided (see Figure 3 I the Appendices).

Table 13: New Sewer Line Recommendations for the Tributary Area to Will S Green

New Trunk	Diameter (in)	Length (ft)	Slope	Capacity (MGD)
Parkhill and 6th St. to Sioc and 8th St.	15	2794	0.0015	1.92
8th St. and Sioc to Will S Green Ave	18	3842	0.0010	2.54
Will S Green Ave to Wil S Green PS	24	1661	0.0008	4.90
New Force Main	**Diameter (in)**	**Length (ft)**	**Quantity**	**Capacity (gpm)**
WSG PS to NMH	8	3100	1	1000
WSG PS to NMH	10	3100	1	1600

East Side Sewer Improvements

Tributary Area to Wye

For all the recommended sewer collection system installations for the tributary area to Wye please refer to Table 14 and Figures 4 in the Appendices for the sewer line attributes and their orientation. The tributary area to Wye is divided into two areas, Upper and Lower Wye (see Figure 5).

Lower Wye has a series of capacity issues that cannot currently accommodate the peak flows generated by the build out of the SOI. A new deeper 12-inch trunk sewer installation above the industrial zone adjacent to highway 20 is proposed to alleviate capacity issues in the existing 8-inch sewer along HWY 20 (see Figure 4 in the Appendices). This 12-inch line will ultimately connect into the main sewer trunk conveying to the Moonbend Pump Station.

Table 14: New Sewer Line Recommendations for the Tributary Area to Wye

New Trunk	Diameter (in)	Length (ft)	Slope	Capacity (MGD)
East Oak and D St. to MH (G06-001)	15	1633	0.0015	1.92
NMH #1 to NMH #2	12	2915	0.0020	1.22

Tributary Area to Moonbend

For all the recommended sewer collection system installations for the tributary area to Moonbend please refer to Table 15 and Figures 4 and 5 in the Appendices for the sewer line attributes and their orientation.

The tributary area to Moonbend will accommodate the future commercial-resort development across the Sacramento River that is currently outside of the City's SOI. This future development was included in peak flow contributions after discussions with City staff on potential growth plans.

Attributes for the existing 12-inch sewer along Sunrise Blvd. will need to be confirmed by City staff to assess capacity for build out flows from the Moonbend area. It is likely that the 12-inch line will not be able to accommodate peak flows from build out and it is recommended that it be disconnected from the Wescott Trunk and attached to a new parallel 15-inch sewer line once build-out of the area occurs.

Table 15: New Sewer Line and Force Main Recommendations for the Tributary Area to Moonbend

New Trunk	Diameter (in)	Length (ft)	Slope	Capacity (MGD)
Upper portion to NMH #2	12	3049	0.0025	1.36
NMH #2 to MB PS	15	2370	0.0015	1.92
Existing 12″ Sewer to SW PS	15	735	0.0015	1.92
New Force Main	**Diameter (in)**	**Length (ft)**	**Quantity**	**Capacity (gpm)**
Commercial Resort to 12″ sewer MH	6	2240	2	150
MB PS under HWY 20	8	3400	2	2000
HWY 20 to SW PS	8	3700	1	1000

Tributary Area to South Wescott Pump Station

For all the recommended sewer collection system installations for the tributary area to Wescott please refer to Table 16 and Figure 5 in the Appendices for the sewer line attributes and their orientation.

There are approximately 100 septic units from CIP that were included in peak flow contributions after discussions with City staff on anticipated connection to the City's sewer system. The location of the septic units and how they will connect into the new pump station are currently unknown. Further information is needed from City staff.

Table 16: New Sewer Line Recommendations for the Tributary Area to Wescott

New Trunk	Diameter (in)	Length (ft)	Slope	Capacity (MGD)
Wescott Rd to SW PS	15	800	0.0015	1.92
New Force Main	Diameter (in)	Length (ft)	Quantity	Capacity (gpm)
SW PS to NMH	8	3400	1	1600

Pump Station Capacity and Planned Upgrades

The future sewer collection system will ultimately convey wastewater to the City's WWTP via two major pump stations: The Will S Green Pump Station, serving the City's West side, and the South Wescott Pump Station, serving the City's East side.

The Primary and Screens Pump Stations are to be abandoned due to their old age and lack of sufficient capacity for projected City growth. Both Will S Green and South Wescott Pump stations will be sized to accommodate the build out of the SOI encompassing two consolidated tributary areas as shown in Figure 1.

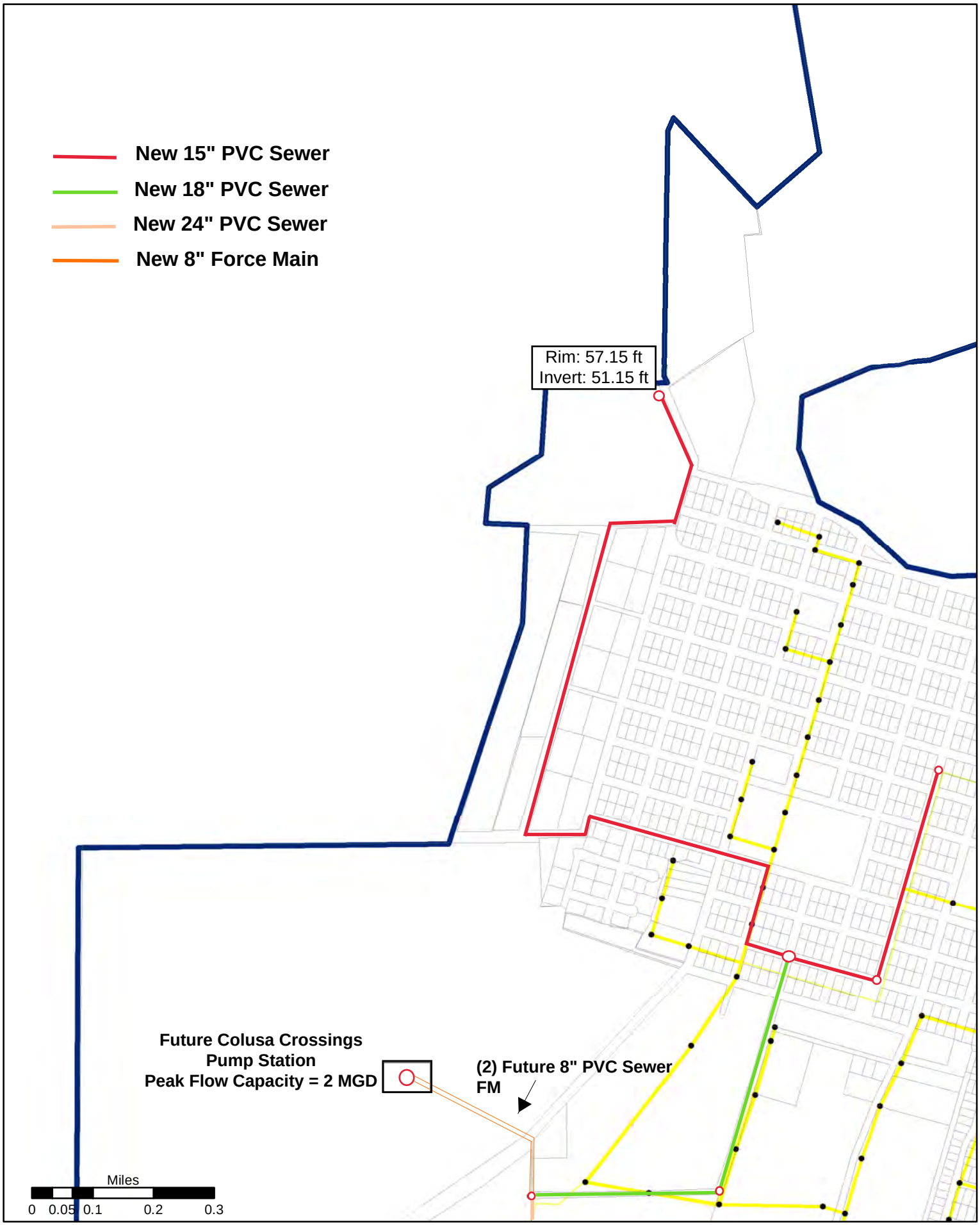
A summary of the recommended pump station improvements for the Build-Out of the SOI are listed in Table 17. The recommended capacity for each pump station was calculated using the peak flows associated with the coinciding tributary areas.

Table 17: Recommended Pump Station Improvements for Build out of the SOI at Peak Flow Conditions

Pump Station	Recommended Capacity (gpm)
South Wescott	1940
Will S. Green	2460

RV Commercial Resort	150
CIP	100
Moonbend	1000
Colusa Crossings	1300

Appendices

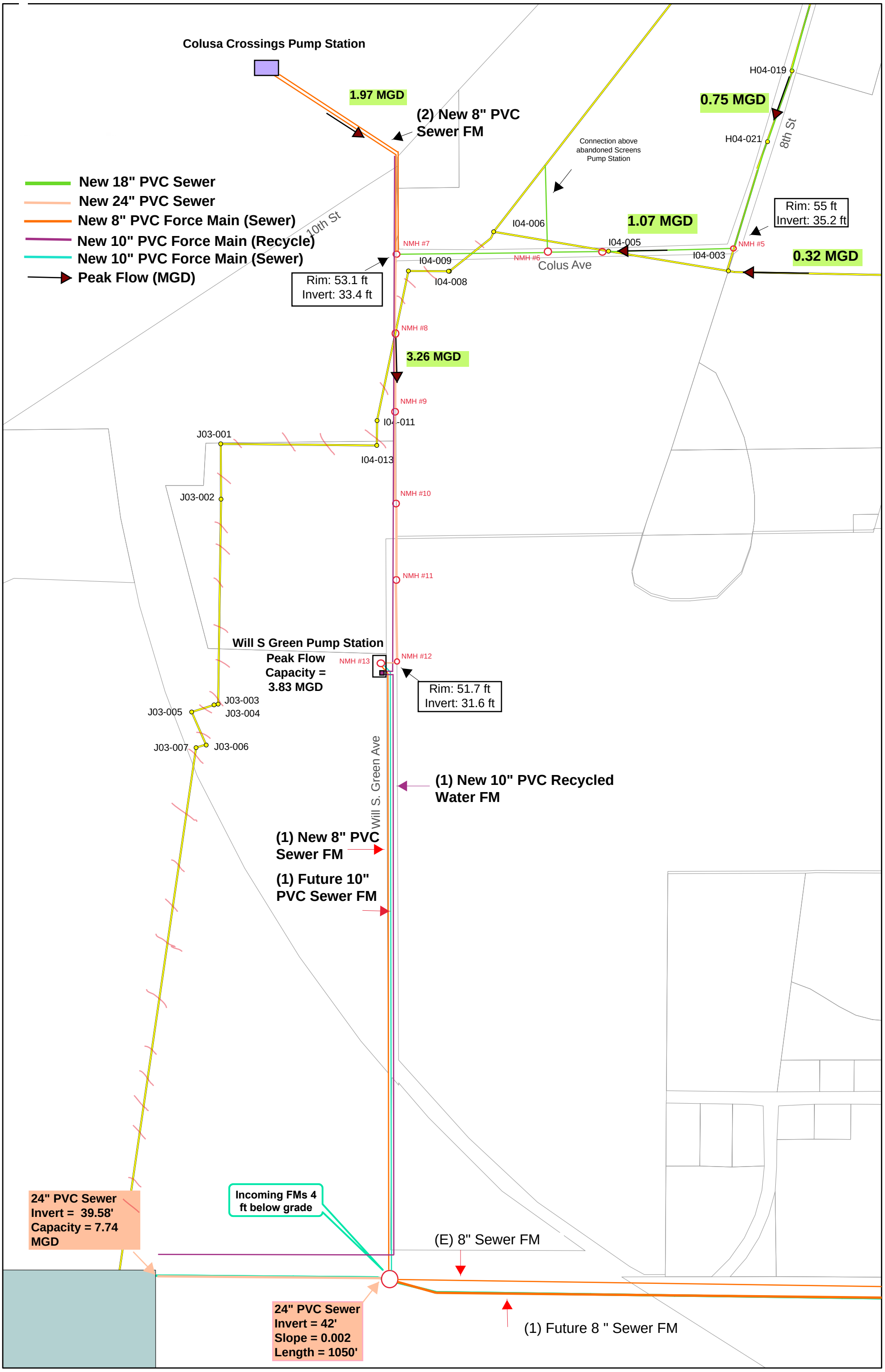


NEXGEN
City of Colusa Sewer Collection System and Pump Upgrades

Figure 1
Future Sewer Collection System and Pump Stations:
Colusa Crossings

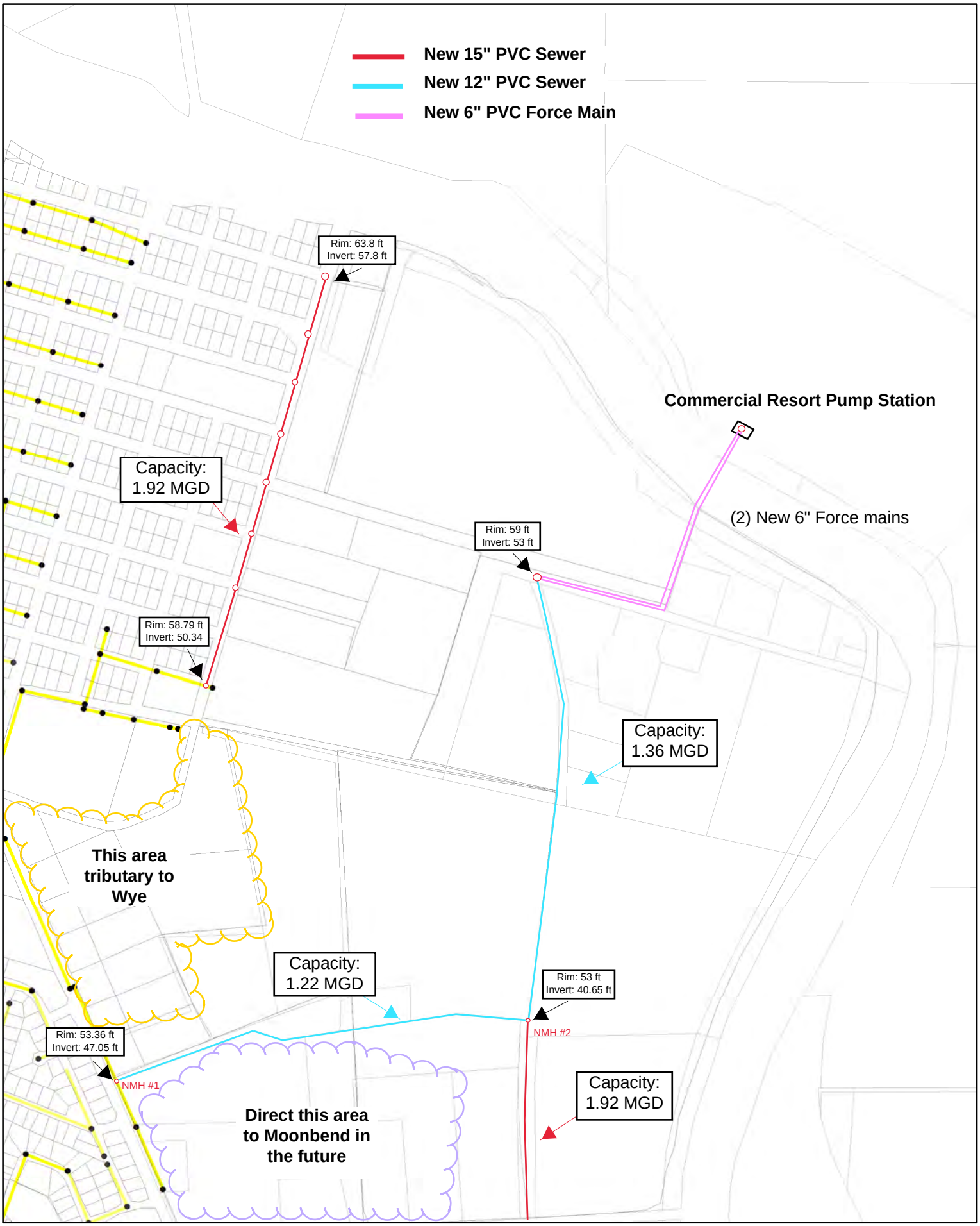
NEXGEN
City of Colusa Sewer Collection System and Pump Station Upgrades

Figure 2
Future Sewer Collection System and Pump Stations:
6th Street Sewer Improvements



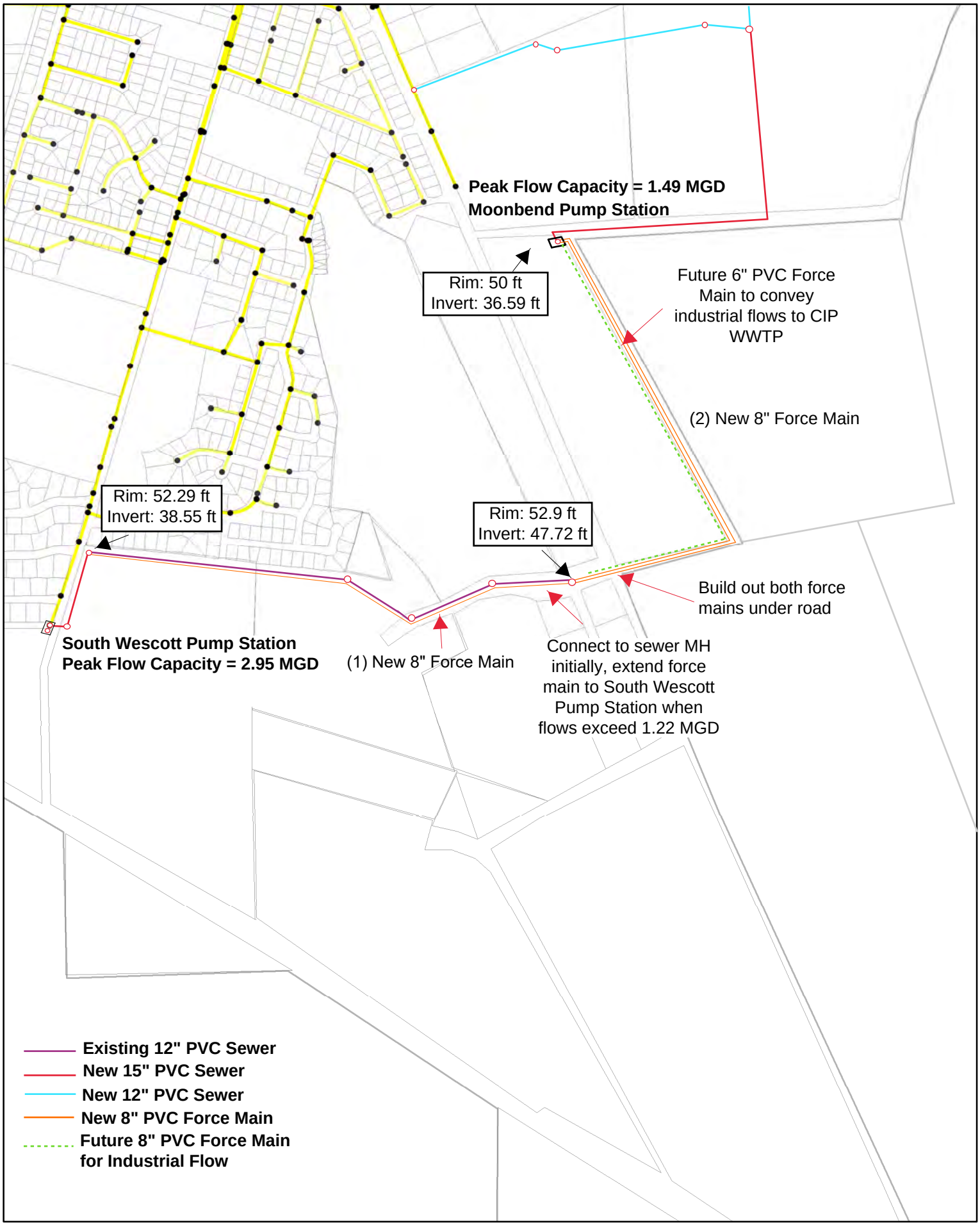
NEXGEN
City of Colusa Sewer Collection System and Pump Station Upgrades

Figure 3
Future Sewer Collection System and Pump Stations:
Will S Green Ave



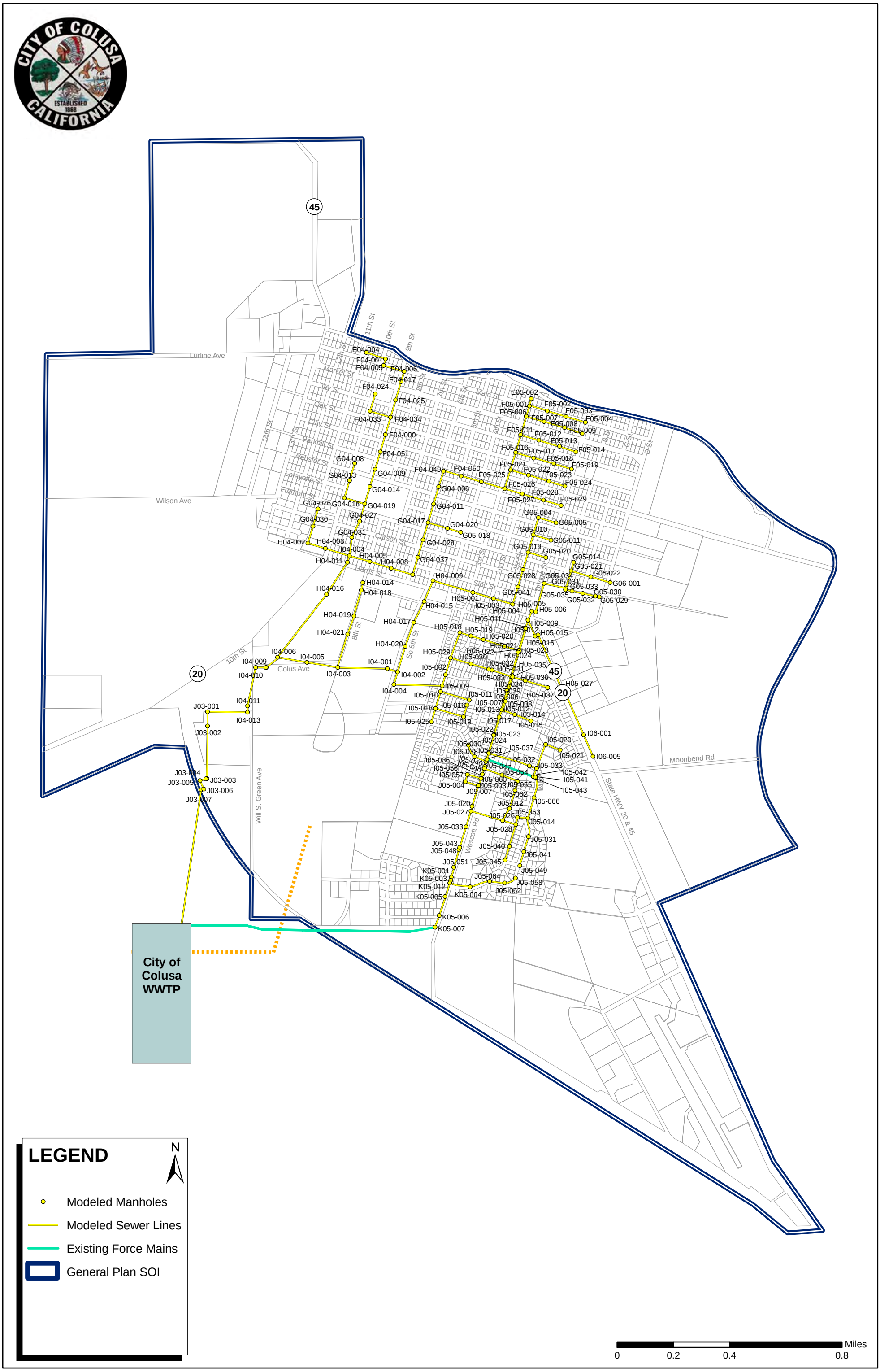
NEXGEN
City of Colusa Sewer Collection System and Pump Upgrades

Figure 4
Future Sewer Collection System and Pump Stations:
Wye and Upper Moonbend



NEXGEN
City of Colusa Sewer Collection System and Pump Upgrades

Figure 5
Future Sewer Collection System and Pump Stations:
Lower Moonbend & CIP



NEXGEN
City of Colusa 2009 Wastewater Collection System Master Plan

Figure 6
City of Colusa Modeled Manholes

Appendix C

City of Colusa Sanitary Sewer Overflow and Backup Response Plan (Revised 2023)

City of Colusa, CA

Sanitary Sewer Overflow and Backup Response Plan

Effective Date:

Revised Date: 5/11/23

Approved by:

Signature:

Date:

Prepared by David Patzer, DKF Solutions Group
707.373.9709 losscontrol@sbcglobal.net

City of Colusa

Sanitary Sewer Overflow and Backup Response Plan

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Claims Submittal Checklist ..... -5
Sewer Lateral CCTV Report ..... -6
Collection System Failure Analysis Form ..... -7
Customer Service Packet
- Instructions ..... -envelope
- Customer Information CS-1
- Claim Form ..... -2
- Sewer Spill Reference Guide ..... pamphlet

Door Hanger ..... n/a
Sewer Spill Reference Guide ..... pamphlet

Sanitary Sewer Overflow Packet (OP)

Instructions and Chain of Custody ..... Envelope Label
Responding to a Sanitary Sewer Overflow **OP**-1
Sewer Overflow Report ..... -2
Collection System Failure Analysis Form ..... -3
Sewer Spill Reference Guide ..... pamphlet
Door Hanger ..... n/a

Miscellaneous

Public Posting
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Sewer Spill Reference Guide

City of Colusa	Purpose, Policy, and Definitions	PB-1

PURPOSE

The purpose of the Spill Emergency Response Plan (SERP) is to support an orderly and effective response to Sanitary Sewer Overflows (SSOs). The SERP provides guidelines for City personnel to follow in responding to, cleaning up, and reporting SSOs that may occur within the City's service area.

POLICY

The City's employees are required to report all wastewater overflows found and to take the appropriate action to secure the wastewater overflow area, properly report to the appropriate regulatory agencies, relieve the cause of the overflow, and ensure that the affected area is cleaned as soon as possible to minimize health hazards to the public and protect the environment. The City's goal is to respond to sewer system overflows as soon as possible following notification procedures. The City will follow reporting procedures in regards to sewer spills as set forth by the Central Valley Regional Water Quality Control Board *(CVRWQCB)* and the California State Water Resources Control Board.

DEFINITIONS AS USED IN THIS SANITARY SEWER OVERFLOW & BACKUP RESPONSE PLAN

Nuisance - California Water Code section 13050, subdivision (m), defines nuisance as anything which meets all of the following requirements:

a. Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
b. Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
c. Occurs during, or as a result of, the treatment or disposal of wastes.

Private Lateral Sewage Discharges - Sewage discharges that are caused by blockages or other problems within a privately owned lateral.

Sanitary Sewer Overflow (S5O) - Any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system. SSOs include:

(i) Overflows or releases of untreated or partially treated wastewater that reach waters of the United States;
(ii) Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States; and
(iii) Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a sanitary sewer system.

NOTE: *Wastewater backups into buildings caused by a blockage or other malfunction of a building lateral that is privately owned are not* SSOs.

SSO Categories –

Category	Definition
Category 1	A spill of any volume of sewage from or caused by a sanitary sewer system regulated under the General Order that results in a discharge to: • A surface water, including a surface water body that contains no flow or volume of water; or • A drainage conveyance system that discharges to surface waters when sewage is not fully captured and returned to the sanitary sewer system or disposed of properly. Any spill volume that is not recovered from a drainage conveyance system is considered a discharge to surface water, unless the drains conveyance system discharges to a dedicated stormwater infiltration basin or facility.
Category 2	A spill of 1,000 gallons or greater, from or caused by a sanitary sewer system regulated under the General Order that does not discharge to a surface water
Category 3	A spill of equal to or greater than 50 gallons and less than 1,000 gallons, from or caused by a sanitary sewer system regulated under the

Category	Definition
	General Order that does not discharge to a surface water.
Category 4	A spill of less than 50 gallons, from or caused by a sanitary sewer system regulated under the General Order that does not discharge to a surface water.
Enrollee Owned/Operated Lateral Spills	A spill of any volume from an Enrollee's owned and/or operated lateral that is caused by a failure or blockage in the lateral and that do not discharge to a surface water.
Private Lateral Sewage Discharge (PLSD)	A spill of untreated or partially treated wastewater resulting from blockages or other problems within a privately owned sewer lateral connected to the Enrollee's sanitary sewer system or from other private sewer assets.

Sanitary sewer system - Any system of pipes, pump stations, sewer lines, or other conveyances, upstream of a wastewater treatment plant headworks used to collect and convey wastewater to the publicly owned treatment facility. Temporary storage and conveyance facilities (such as vaults, temporary piping, construction trenches, wet wells, impoundments, tanks, etc.) are considered to be part of the sanitary sewer system, and discharges into these temporary storage facilities are not considered to be SSOs.

Untreated or partially treated wastewater - Any volume of waste discharged from the sanitary sewer system upstream of a wastewater treatment plant headworks.

REGULATORY REQUIREMENTS FOR OERP ELEMENT OF SSMP

RWQCB Requirement

The collection system agency must develop an overflow emergency response plan that provides procedures for SSO notification, response, reporting, and impact mitigation.

GWDR Requirement

The collection system agency shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:

(a) Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;
(b) A program to ensure appropriate response to all overflows;
(c) Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, regional water boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the Monitoring and Reporting Program(MRP). All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board Waste Discharge Requirements or National Pollutant Discharge Elimination System (NPDES) permit requirements. The Sewer System Management Plan should identify the officials who will receive immediate notification;
(d) Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained;
(e) Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities; and
(f) A program to ensure that all reasonable steps are taken to contain untreated wastewater and prevent discharge of untreated wastewater to Waters of the United States and minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.

GOALS

The City's goals with respect to responding to SSOs are:

- Respond quickly to minimize the volume of the SSO;
- Eliminate the cause of the SSO;
- Contain the spilled wastewater to the extent feasible;
- Minimize public contact with the spilled wastewater;
- Mitigate the impact of the SSO; and
- Meet the regulatory reporting requirements.

SSO DETECTION

The processes that are employed to notify the City of the occurrence of an SSO include: observation by the public, receipt of an alarm, or observation by City Staff during the normal course of their work.

PUBLIC OBSERVATION

Public observation is the most common way that the City is notified of blockages and spills. Contact numbers and information for reporting sewer spills and backups are in the phone book and on the City's website.

Normal Work Hours

When a report of a sewer spill or backup is made during normal work hours, City staff receives the call, takes the information from the caller, and communicates it to the field crew.

After Hours

Service calls are forwarded to the Fire Department who receives the call, takes the information from the caller, pages the On-Call Employee, and communicates the necessary information to the On-Call Employee.

City Staff Observation

City staff conducts periodic inspections of its sewer system facilities as part of their routine activities. Any problems noted with the sewer system facilities are reported to appropriate City staff that, in turn, responds to emergency situations. Work orders are issued to correct non-emergency conditions.

SSO RESPONSE PROCEDURES

First Responder Priorities

- The first responder's priorities are:
- To follow safe work practices.
- To respond promptly with the appropriate and necessary equipment.
- To contain the spill wherever feasible.
- To restore the flow as soon as practicable.
- To minimize public access to and/or contact with the spilled sewage.
- To promptly notify the Water/Sewer Supervisor or the Public Works Superintendent in event of major SSO.
- To return the spilled sewage to the sewer system.
- To restore the area to its original condition (or as close as possible).

Safety

The first responder is responsible for following safety procedures at all times. Special safety precautions must be observed when performing sewer work. There may be times when City personnel responding to a sewer system event are not familiar with potential safety hazards peculiar to sewer work. In such cases it is appropriate to take the time to discuss safety issues, consider the order of work, and check safety equipment before starting the job.

Initial Response

The first responder must respond to the reporting party/problem site and visually check for potential sewer stoppages or overflows.

The first responder should:

- Note arrival time at the site of the overflow/backup.
- Verify the existence of a sewer system spill or backup.
- Identify and assess the affected area and extent of spill.
- Contact caller if time permits.
- If the spill is large or in a sensitive area, document conditions upon arrival with photographs. Decide whether to proceed with clearing the blockage to restore the flow or to initiate containment measures. The guidance for this decision is:
    - Small spills – proceed with clearing the blockage.
    - Moderate or large spill where containment is anticipated to be simple – proceed with the containment measures.
    - Moderate or large spills where containment is anticipated to be difficult – proceed with clearing the blockage; however, whenever deemed necessary, call for additional assistance and implement containment measures.

Restore Flow

Using the appropriate cleaning equipment, set up downstream of the blockage and hydro clean upstream from a clear manhole. Attempt to remove the blockage from the system and observe the flows to ensure that the blockage does not recur downstream. If the blockage cannot be cleared within a reasonable time from arrival, or sewer requires construction repairs to restore flow, then initiate containment and/or bypass pumping. If assistance is required, immediately contact other employees, contractors, and equipment suppliers.

Initiate Spill Containment Measures

The first responder should attempt to contain as much of the spilled sewage as possible using the following steps:

- Determine the immediate destination of the overflowing sewage.
- Plug storm drains using air plugs, sandbags, and/or plastic mats to contain the spill, whenever appropriate. If spilled sewage has made contact with the storm drainage system, attempt to contain the spilled sewage by plugging downstream storm drainage facilities.
- Contain/direct the spilled sewage using dike/dam or sandbags.
- Pump around the blockage/pipe failure/pump station.

RECOVERY AND CLEAN-UP

The recovery and clean-up phase immediately begins when the flow has been restored and the spilled sewage has been contained to the extent possible. The SSO recovery and clean-up procedures are:

Estimate the Volume of Spilled Sewage

Use the methods outlined the Field Guide to estimate the volume of the spilled sewage. Wherever possible, document the estimate using photos of the SSO site before and during the recovery operation.

Recovery of Spilled Sewage
Vacuum up and/or pump the spilled sewage and discharge it back into the sanitary sewer system.

Clean-up and Disinfection
Clean up and disinfection procedures should be implemented to reduce the potential for human health issues and adverse environmental impacts that are associated with an SSO event. The procedures described are for dry weather conditions and should be modified as required for wet weather conditions. Where clean up is beyond the capabilities of City staff, a clean up contractor will be used.

Private Property
City crews are responsible for the clean up when the property damage is minor in nature and is outside of private building dwellings. In all other cases, affected property owners can call a water damage restoration contractor to complete the clean up and restoration. If the overflow into property is the definite cause of City system failure, the property owner can call out a water damage restoration contractor to complete the clean up and restoration. In both cases, City claim forms may be issued if requested by the property owners.

Hard Surface Areas
Collect all signs of sewage solids and sewage-related material either by protected hand or with the use of rakes and brooms.
Wash down the affected area with clean water until the water runs clear. Take reasonable steps to contain and vacuum up the wastewater.
Allow area to dry. Repeat the process if additional cleaning is required.

Landscaped and Unimproved Natural Vegetation
Collect all signs of sewage solids and sewage-related material either by protected hand or with the use of rakes and brooms.
Wash down the affected area with clean water until the water runs clear. The flushing volume should be approximately three times the estimated volume of the spill.
Either contain or vacuum up the wash water so that none is released.
Allow the area to dry. Repeat the process if additional cleaning is required.

Natural Waterways
The Department of Fish and Game should be notified in the event an SSO impacts any surface water. Fish and Game will provide the professional guidance needed to effectively clean up spills that occur in these sensitive environments.
Clean up should proceed quickly in order to minimize negative impact. Sewage causes depletion of dissolved oxygen, which will kill aquatic life.
Any water that is used in the clean up should be de-chlorinated prior to use.

Wet Weather Modifications
Omit flushing and sampling during heavy storm events with heavy runoff where flushing is not required and sampling would not provide meaningful results.

PUBLIC NOTIFICATION
Post signs and place barricades to keep vehicles and pedestrians away from contact with spilled sewage. Do not remove the signs until directed by the Utilities Superintendent, County Environmental Health or designee.

Creeks, streams and beaches that have been contaminated as a result of an SSO should be posted at visible access locations until the risk of contamination has subsided to acceptable background levels. The warning signs, once posted, should be checked every day to ensure that they are still in place.

In the event that an overflow occurs at night, the location should be inspected first thing the following day. The field crew should look for any signs of sewage solids and sewage-related material that may warrant additional clean up activities.

FAILURE ANALYSIS INVESTIGATION
The objective of the failure analysis investigation is to determine the "root cause" of the SSO and to identify corrective action(s) needed that will reduce or eliminate future potential for the SSO to recur.

The investigation should include reviewing all relevant data to determine appropriate corrective action(s) for the line segment. The investigation should include:

- Reviewing and completing the Sewer Overflow Report,
- Reviewing past maintenance records,
- Reviewing available photographs,
- Conducting a CCTV inspection to determine the condition of the line segment immediately following the SSO and reviewing the video and logs, and
- Interviewing staff that responded to the spill.

The product of the failure analysis investigation should be the determination of the root cause and the identification of the corrective actions. The Collection System Failure Analysis Form should be used to document the investigation.

POST SSO EVENT DEBRIEFING

Every SSO event is an opportunity to evaluate the response and reporting procedures. Each overflow event is unique, with its own elements and challenges including volume, cause, location, terrain, and other parameters.

As soon as possible after major SSO events, all of the participants, from the person who received the call to the last person to leave the site, should meet to review the procedures used and to discuss what worked and where improvements could be made in responding to and mitigating future SSO events. The results of the debriefing should be recorded and tracked to ensure the action items are completed.

EQUIPMENT

This section provides a list of specialized equipment that is required to support this Overflow Emergency Response Plan.

Closed Circuit Television (CCTV) Inspection Unit – A CCTV Inspection Unit is required to determine the root cause for all SSOs from gravity sewers.

- *Camera* -- A digital or disposable camera is required to record the conditions upon arrival, during clean up, and upon departure.
- *Emergency Response Trucks* -- A utility body pickup truck, or open bed is required to store and transport the equipment needed to effectively respond to sewer emergencies. The equipment and tools should include containment and clean up materials.
- *Portable Generators, Portable Pumps, Piping, and Hoses* – Equipment used to bypass pump, divert, or power equipment to mitigate an SSO.
- *Combination Sewer Cleaning Trucks* -- Combination high velocity sewer cleaning trucks with vacuum tanks are required to clear blockages in gravity sewers, vacuum spilled sewage, and wash down the impacted area following the SSO event.

SSO RESPONSE TRAINING

This section provides information on the training that is required to support this Overflow Emergency Response Plan.

Initial and Annual Refresher Training

All City personnel who may have a role in responding to, reporting, and/or mitigating a sewer system overflow should receive training on the contents of this OERP. All new employees should receive training before they are placed in a position where they may have to respond. Current employees should receive annual refresher training on this plan and the procedures to be followed.

SSO Response Drills

Periodic training drills should be held to ensure that employees are up to date on the procedures, the equipment is in working order, and the required materials are readily available. The training drills should cover scenarios typically observed during sewer related emergencies (e.g. mainline blockage, mainline failure, force main failure, pump station failure, and lateral blockage). The results and the observations during the drills should be recorded and action items should be tracked to ensure completion.

SSO Training Record Keeping

Records should be kept of all training that is provided in support of this plan. The records for all scheduled training courses and for each overflow emergency response training event and should include date, time, place, content, name of trainer(s), and names of attendees.

Contractors Working On City Sewer Facilities

All contractors working on City sewer facilities will be required to develop a project-specific OERP. All contractor personnel will be required to receive training in the contractor's OERP and to follow that OERP in the event that they cause or observe an SSO.

AUTHORITY

- Health & Safety Code Sections 5410-5416
- Fish & Game Code Sections 5650-5656
- CA Water Code Section 13271
- State Water Resources Control Board Order No. 2006-0003-DWQ

City of Colusa

Sewer Overflow/Backup & Unauthorized Discharge Response Summary

PB-2

Receive notification of Overflow/ Backup or Unauthorized Discharge

Has the overflow impacted private property?

NO

City Staff performs the following:

Follow the instructions on the Sanitary Sewer Overflow Packet:

- Notify supervisor or designee of the incident
- Relieve blockage and clean impacted areas
- Forward completed Sanitary Sewer Overflow Packet to the Utilities Superintendent or Designee
- The Utilities Superintendent or designee will perform required regulatory reporting in accordance with the Regulatory Notifications Packet (*inside the Sewer Overflow Packet)*

YES

Is it possible the overflow/backup is due to a failure in the City -owned/maintained sewer lines?

YES

City Staff performs the following:

Follow the instructions on the Sanitary Sewer Backup Packet:

- Notify supervisor or designee of the incident
- Relieve blockage and clean impacted areas
- Contact York Insurance Services and a restoration firm, as appropriate
- Wait for restoration firm to arrive, if possible
- Forward completed Sanitary Sewer Backup Response Envelope to the Utilities Superintendent or Designee
- The Utilities Superintendent or designee will perform required regulatory reporting in accordance with the Regulatory Notifications Packet (*inside the Sewer Overflow Packet)*

Finance Director or Designee performs the following:

1. Review incident reports, claim form and other incident information and forward, as appropriate, to:
   Shawn Milar
   York Insurance Services Claims Adjustor
   Office: 916.783.0100
   Cell: 530.680.7272 or 530.230.3704
   48 Hanover #C, Chico CA 95973
2. Communicate with claimant as appropriate
3. Communicate with York Insurance Services to adjust and administer the claim to closure

NO

City Staff performs the following:

Follow the instructions on the Sanitary Sewer Backup Packet:

If customer is <u>not</u> home:

- Complete Door Hanger and leave on customer's door

If customer is home:

1. Explain to customer that the blockage is in their lateral and that the City does not have legal authority to maintain or perform work on privately owned laterals.
2. Recommend to customer they hire a contractor to clear their line.
3. Give customer the Sewer Spill Reference Guide pamphlet.

City of Colusa

Receiving a Sewage Overflow/Backup Report

PB-3

Receive notification of Overflow/ Backup

Business Hours

Business Hours
Main Office
530.458.4941 Ext. 101

Gather caller's name, address of the problem and call back number.

After Hours

Non-Business Hours
Fire Department: **530.458.7721**
They will notify the On-Call Employee

ON-CALL Employee:

1. Contact customer reporting the problem.
2. Gather caller's name, address of the problem and call back number.

Is the overflow/backup in the service area?

NO

1. **Provide Customer with the contact info for the responsible Agency.**
2. **Then notify the responsible Agency**

YES

Is the spill inside a building or outside?

OUTSIDE

1. If this is during business hours:
   - The service call request is forwarded to the Utilities Superintendant.
   - City Staff will be dispatched to the scene and will complete the Sanitary Sewer Overflow Response Packet.
2. If this is after business hours, the On-Call Employee will go to scene and complete the Sanitary Sewer Overflow Response Packet.

INSIDE

WHAT TO TELL THE CUSTOMER (See Field Guide for tips)

- Clearly communicate who will respond, estimated time they will arrive and what area(s) will need to be accessed.
- Clearly communicate that a blockage in the sewer main line will be promptly cleared, but that the City is **not allowed to work on a blockage in the property owner's/resident's service lateral line.** Use general terms that the caller can understand, and give the caller your name for future reference.
- Show concern and empathy for the property owner/resident, **but do not admit or deny liability.**
- Instruct the caller to turn off any appliances that use water and to shut off any faucets inside the home.
- Instruct the caller to keep all family members and pets away from the affected area.
- Instruct the caller to place towels, rags, blankets, etc. between areas that have been affected and areas that have not been affected.
- Instruct the caller to not remove any contaminated items – *let the professionals do this.*
- Instruct the caller to turn off their HVAC system.
- Instruct the caller to move any **uncontaminated** property away from impacted areas.

1. If this is during business hours:
   - The service call request is forwarded to the Utilities Superintendant..
   - City Staff will be dispatched to the scene and will complete the Sanitary Sewer Overflow Backup Packet.
2. If this is after business hours, the On-Call Employee will go to the scene and complete the Sanitary Sewer Backup Response Packet.

City of Colusa

Regulatory Notifications Packet

Instructions to First Responder:

Provide this packet to the person responsible for and authorized to make regulatory notifications.

Instructions for Person Responsible for Making Regulatory Notifications:

1. Open this packet
2. Refer to RN-1: Guide to Reporting to Regulatory Authorities for instructions on performing required regulatory notifications.
3. Document all regulatory reporting using RN-4: SSO 2-Hour Notification/24-Hour Certification Worksheet.

Contents:

Form	Page Number
Guide To Reporting To Regulatory Authorities	RN-1
Fax Reporting Form: to Water Board	-2
Fax Reporting Form: to Local Health Agency	-3
SSO 2-Hour Notification/24-Hour Certification Worksheet	-4

Print on 6"x9" envelope

City of Colusa	Sanitary Sewer Backup Response **SANITARY SEWER OVERFLOW REPORT**	**BP-6** Side B

REGULATORY NOTIFICATIONS START HERE

YES — **Is the Estimated Volume > 1,000 gallons?**

NO

YES — **Did the spill reach a drainage channel or waterway?**

NO

YES — **Did the spill discharge to a storm drain that was not fully captured?**

NO

This SSO is a Category 3-4 SSO or Lateral Spill
Forward this completed form and all other documentation and pictures to the Sr. Wastewater Systems Operator or designee as soon as possible.

This SSO is a Category 1 or 2 SSO
Immediately contact one of the following in the order listed and request they make the 2-hour notification to CalOES as indicated in the Regulatory Notifications Packet.

PERSON	CELL
Utilities Superintendent	(530) 458-3324

RECOMMENDED FOLLOW-UP ACTIONS TO PREVENT FUTURE OCCURRENCES

CURRENT PREVENTIVE MAINTENANCE FREQUENCY:

DATE OF LAST PREVENTIVE MAINTENANCE:

RECOMMENDED ACTIONS:
☐ TV
☐ RE-RUN
D CHANGE CLEANING SCHEDULE
D REPAIR LINE SEGMENT
D REPLACE LINE SEGMENT
D OTHER (describe):

NOTES:

Place completed form in Sewer Backup Envelope and follow routing instructions.

City of Colusa	Regulatory Notifications Packet

The following table provides a detailed description of SSO Categories as defined in the 2022 Statewide Sanitary Sewer Systems General Order

Spill Categories

Category	Definition
Category 1	A spill of any volume of sewage from or caused by a sanitary sewer system regulated under the General Order that results in a discharge to: • A surface water, including a surface water body that contains no flow or volume of water; or • A drainage conveyance system that discharges to surface waters when sewage is not fully captured and returned to the sanitary sewer system or disposed of properly. Any spill volume that is not recovered from a drainage conveyance system is considered a discharge to surface water, unless the drains conveyance system discharges to a dedicated stormwater infiltration basin or facility.
Category 2	A spill of 1,000 gallons or greater, from or caused by a sanitary sewer system regulated under the General Order that does not discharge to a surface water
Category 3	A spill of equal to or greater than 50 gallons and less than 1,000 gallons, from or caused by a sanitary sewer system regulated under the General Order that does not discharge to a surface water.
Category 4	A spill of less than 50 gallons, from or caused by a sanitary sewer system regulated under the General Order that does not discharge to a surface water.
Enrollee Owned/Operated Lateral Spills	A spill of any volume from an Enrollee's owned and/or operated lateral that is caused by a failure or blockage in the lateral and that do not discharge to a surface water.
Private Lateral Sewage Discharge (PLSD)	A spill of untreated or partially treated wastewater resulting from blockages or other problems within a privately owned sewer lateral connected to the Enrollee's sanitary sewer system or from other private sewer assets.

Notification, Monitoring and Reporting Requirements

Reporting requirements for different category SSO's to the California Integrated Water Quality System (CIWQS) are outlined in the Tables below.

Spill Category 1: Spills to Surface Waters

Spill Requirement	Due	Method
Notification	Within two (2) hours of the Enrollee's knowledge of a Category 1 spill of 1,000 gallons or greater, discharging or threatening to discharge to surface waters: Notify the California Office of Emergency Services and obtain a notification control number.	California Office of Emergency Services at (800) 852-7550
Monitoring	Conduct spill specific monitoring; Conduct water quality sampling of the receiving water within 18 hours of initial knowledge of spill of 50,000 gallons or greater to surface waters.	
Reporting	Submit Draft Spill Report within three (3) business days of the Enrollee's knowledge of the spill; Submit Certified Spill Report within 15 calendar days of the spill end date; Submit Technical Report within 45 calendar days after the spill end date for a Category 1 spill in which 50,000 gallons or greater discharged to surface waters; and Submit Amended Spill Report within 90 calendar days after the spill end date	

Spill Category 2: Spills of 1,000 Gallons or Greater That Do No Discharge to Surface Waters

Spill Requirements	Due	Method
Notification	Within two (2) hours of the Enrollee's knowledge of a Category 2 spill of 1,000 gallons or greater, discharging or threatening to discharge to waters of the State: Notify Cal OES and obtain a notification number	California Office of Emergency Services (CalOES) at (800) 852-7550
Monitoring	Conduct spill-specific monitoring.	

Spill Requirements	Due	Method
Reporting	Submit Draft Spill Report within three (3) business days of the Enrollee's knowledge of the spill; Submit Certified Spill Report within 15 calendar days of the spill end date; and Submit Amended Spill Report within 90 calendar days after the spill end date	

Spill Category 3: Spills of Equal or Greater than 50 Gallons and Less than 1,000 Gallons That Does Not Discharge to Surface Waters

Spill Requirements	Due	Method
Notifications	Not Applicable	Not Applicable
Monitoring	Conduct spill-specific monitoring.	
Reporting	Submit monthly Certified Spill Report to the online CIWQS Sanitary Sewer System Database within 30 calendars days after the end of the month in which the spills occur; and Submit Amended Spill Reports within 90 calendar days after the Certified Spill Report due date.	

Spill Category 4: Spills Less Than 50 Gallons That Do Not Discharge to Surface Waters

Spill Requirements	Due	Method
Notification	Not Applicable	Not Applicable
Monitoring	Conduct spill-specific monitoring.	
Reporting	If, during any calendar month, Category 4 spills occur, certify monthly, the estimated total spill volume exiting the sanitary sewer system, and the total number of all Category 4 spills into the online CIWQS Sanitary Sewer System Database, within 30 days after the end of the calendar month in which the spills occurred. Upload and certify a report, in an acceptable digital format, of all Category 4 spills to the online CIWQS	

Spill Requirements	Due	Method
	Sanitary Sewer System Database, by February 1st after the end of the calendar year in which the spills occur.	

Enrollee Owned and/or Operated Lateral Spills That Do Not Discharge to Surface Waters

Spill Requirements	Due	Method
Notification	Within two (2) hours of the Enrollee's knowledge of a spill of 1,000 gallons or greater, from an enrollee owned and/or operated lateral, discharging or threatening to discharge to waters of the State: Notify California Office of Emergency Services and obtain a notification control number. Not applicable to a spill of less than 1,000 gallons.	California Office of Emergency Services at (800)852-7550
Monitoring	Conduct visual monitoring	
Reporting	Upload and certify a report, in an acceptable digital format, of all lateral spills (that do not discharge to a surface water) to the online CIWQS Sanitary Sewer System Database, by February 1st after the end of the calendar year in which the spills occur. Report a lateral spill of any volume that discharges to a surface water as a Category 1 spill.	

Internal Notification Requirements

Report to	Trigger for Reporting
Public Works Director	Backups into homes/businesses and Category 1 SSO's

Additional External Notifications

Report to	Phone	Trigger for Reporting
Colusa Resources Conservation District	(707) 578-1655 or cell: (916) 425-5669	Any SSO impacting irrigation channel

City of Colusa

RN-1
Side B

Regulatory Notifications Packet

Guide To Reporting To Regulatory Authorities

Call or Notify in the Order Listed

Regulatory Agency	Contact Information	Report if SSO meets any of the following conditions	Timeframe
California Emergency Management Agency (*CalEMA*) Make certain to get a Control Number from CalEMA	Telephone: 800.852.7550 Main Statewide Number	• Results in a discharge into a drainage channel or a surface water, and/or • Discharged to a storm drain & not fully recovered (regardless of volume) • 1,000 gallons or more	**Within 2 hours of becoming aware of the discharge**
County Health Department Colusa County Environmental Health Department Notify County Health Department of the known details of the SSO using RN-3	Business Hours Telephone: 530.458.0395 Fax: 530.458.0204	• Results in a discharge into a drainage channel or a surface water, and/or • Discharged to a storm drain & not fully recovered (regardless of volume) • 1,000 gallons or more	**Within 2 hours of becoming aware of the discharge**
Regional Water Quality Control Board: Central Valley RWQCB Notify the Regional Water Quality Control Board of the known details of the SSO via one the following means, in the order listed: 1. By phone 2. Fax (use RN-2)	Business Hours: 530.224.3208 Main Fax: 530.224.4857	• Results in a discharge into a drainage channel or a surface water, and/or • Discharged to a storm drain & not fully recovered (regardless of volume) • 1,000 gallons or more	**Within 2 hours of becoming aware of the discharge AND within 24 hrs submit certification to RWQCB that CalEMA and County Health Dept. have been notified.**
		• All SSOs & Backups from a public sewer	**Immediate reporting required as soon as practical**
		• Was caused by problems with a private service lateral	**Optional reporting within 30 days**
State Water Resources Control Board 1. Go to the CIWQS Online SSO Reporting Database 2. Enter User Name & Password. 3. Enter requested information using information on the completed Sewer Overflow Report	Website: http://www.ciwqs.waterboards.ca.gov/ciwqs/index.jsp/ Notes: • All electronic reports must be certified by the Legally Responsible Official • If SSO was from a private service lateral, provide all information available, indicate cause as being a private service lateral and identify responsible party, if known.	• 1,000 gallons, and/or • Discharged to a storm drain & not fully recovered (regardless of volume) and/or • Spills that enter waters of the State	**Immediate, but within 3 days reporting required** If you leave any requested information blank, then you must return within 15 days and complete
		• All SSOs & Backups from a public sewer	**Reporting required within 30 days after end of the month the SSO occurs in**
		• Was caused by problems with a private service lateral	**Optional reporting within 30 Days**

City of Colusa

Regulatory Notifications Packet

Sanitary Sewer Overflow Report for IMMEDIATE REPORTING BY FAX

RN-2

Central Valley RWQCB

Category 1 & 2 SSO Two (2) Hour Notification/24-Hour Certification. This does not replace the requirement to report to CIWQS-SSO eReporting Program within 3 days of the spill.

CalOES Telephone Number: 1-800-852-7550

Important: * = Required Field

CalEMA Control number*

Date Reported: • __ /__ /__ _ *(mm/dd/yyyy)*

Time Reported: * ___ .___ (hh:mm)

Reported By: • _____ Phone Number: * _____

Reporting Sewer Agency: * _____

Responsible Sewer Agency:" _____

Overflow Street Location/Comments -please indicate the spill cause, sources, and final spill destination entered:" ***(e.g., drainage channel/surface water entered)*** _____

City:* _____ ZIP Code:* _____ County:* _____

SSO Description *if information is not available, please input 00:00 for time and 00 for gallons*

Overflow Start Estimate: " Date:* __ /__ /___ (mm/dd/yyyy)

Time:* _____ (hh:mm)

Overflow End: Date:* Date:* __ /__ /___ (mm/dd/yyyy)

Time:* _____ (hh:mm)

Estimated Overflow Flow Rate: * _____ (gallons per minute)

Estimated Total Overflow Volume:* _____ (gallons)

Overflow Volume Recovered:* _____ (gallons)

Person Completed:* _____ Date: __ /__ /____ (mm/dd/yyyy)

Official Title: * _____ Phone Number:* _____

Email:* _____

City of Colusa

Regulatory Notifications Packet

IMMEDIATE REPORTING BY FAX To Local Health Agency

RN-3

TO:
Colusa County Environmental Health Department
Fax: 530.458.0204
Telephone: 530.458.0395
Re:

FROM:
City of Colusa
Fax:
Telephone:

DATE:
# of Pages:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY

NOTICE OF SANITARY SEWER OVERFLOW

In accordance with California Health and Safety Code Section 5410 et. seq.

Overflow Street Location/Comments -please indicate the spill cause, sources, and final spill destination entered:* *(e.g., drainage channel/surface water entered)* _____

_____

_____

City: * _____ ZIP Code: * _____ County: * _____

SSO Description *if information is not available, please input 00:00 for time and 00 for gallons*

Overflow Start Estimate: * Date:* _____/_____/_____ (mm/dd/yyyy)

Time:* _____:_____(hh:mm)

Overflow End: Date:* Date:* _____/_____/_____ (mm/dd/yyyy)

Time:* _____:_____(hh:mm)

Estimated Overflow Flow Rate: * _____ (gallons per minute)

Estimated Total Overflow Volume:* _____ (gallons)

Overflow Volume Recovered: * _____ (gallons)

Person Completed:* _____ Date: _____ / _____ / _____(mm/dd/yyyy)

Official Title: * _____ Phone Number :* _____

Email:* _____Time spill was noticed: _____

Notifications:

- ☐ Notified Regional Water Quality Control Board
- ☐ Notified California Emergency Management Agency

City of Colusa

SSO 2-HOUR NOTIFICATION/24-HOUR CERTIFICATION WORKSHEET

RN-4

PART A - SSO NOTIFICATION/CERTIFICATION

SSO Description

Location of SSO: ----------

Drainage channel/surface water entered: _____

Suspected cause and source(s): _____

Estimated rate of flow, gal/min: ----------

Estimated volume, gallons: ----------

Status of response: ----------

Total amount recovered: ----------

SSO Notification

Name of person making 2-Hr Notification: _____

- **Date notification made:** - - - - - - - - -
- **CalEMA** - Phone Number: 800.852.7550

  Time called: ____ Control number: _____

  Colusa County Environmental Health Department Phone Number: 530.458.0395

  Time called: ___

  Spoke to _____ or ☐ Left voicemail message or ☐ Faced notification

SSO 24-hour Certification

Date certification made: _____ **Time called:** ___

Name of person making 24-Hr Certification: _____

PARTB ADDITIONAL NOTIFICATIONS

1. AGENCY: _____

   Time called: ___

   Spoke to _____ or ☐ Left voicemail message
2. AGENCY: ----------

   Time called: ----

   Spoke to _____ or ☐ Left voicemail message
3. AGENCY: _____

   Time called: ___

   Spoke to _____ or ☐ Left voicemail message

In the event of a Sewer Backup into a home/business
READ THIS FIRST

Response Instructions

Property Address: _____

Date:_____ **Time Arrived:**_____

City Staff

1: Open this envelope.

2: Follow the steps on the "Responding to a Sanitary Sewer Backup" card (*BP-1 - inside this envelope).*

3: If customer is home, give them the Customer Service Packet and have them initial this envelope below:

Customer acknowledgement of receipt of Customer Service Packet: _____

4: Put everything back in this Sewer Backup Envelope:

- **First Responder Form**
- **SSO Report**
- **Camera (if used)**
- **Cleaning Declination (if used)**

5: Document the service call according to City procedures.

6: Forward this packet to the Utilities Superintendent or designee.

Utilitites Superintendent or Designee

1: Open this envelope and review forms for accuracy and completeness.

2: Open the Regulatory Notifications Packet (*inside this envelope)* and make the required notifications.

3: Send camera out for processing (*if applicable)* or include digital images on cd in this Packet.

4. Copy all items in this Packet and forward this Packet, with originals and photos, to the City Finance Director.

5. Debrief the spill response with affected personnel, as appropriate, using the Collection System Failure Analysis Form and make any necessary procedural/maintenance changes.

6. Archive all information known about this SSO in accordance with City policy

FInance Director or Designee

1: Open this envelope and review forms for accuracy and completeness.

2: Complete the Claims Submittal Checklist (*inside this envelope).*

3: Refer to Claims Handling Procedure Summary in the SSO/Backup Response Plan for further instructions.

FIELD CREW NOTIFICATIONS:	
If:	Then Notify:
The backup is into/onto private property *AND* possibly due to a problem in the public sewer	Contact the Utilities Superintendent or designee
The media arrives	Contact the Public Works Director or designee

City of Colusa

City of Colusa	Sanitary Sewer Backup Response Packet Contents and Assembly	BP

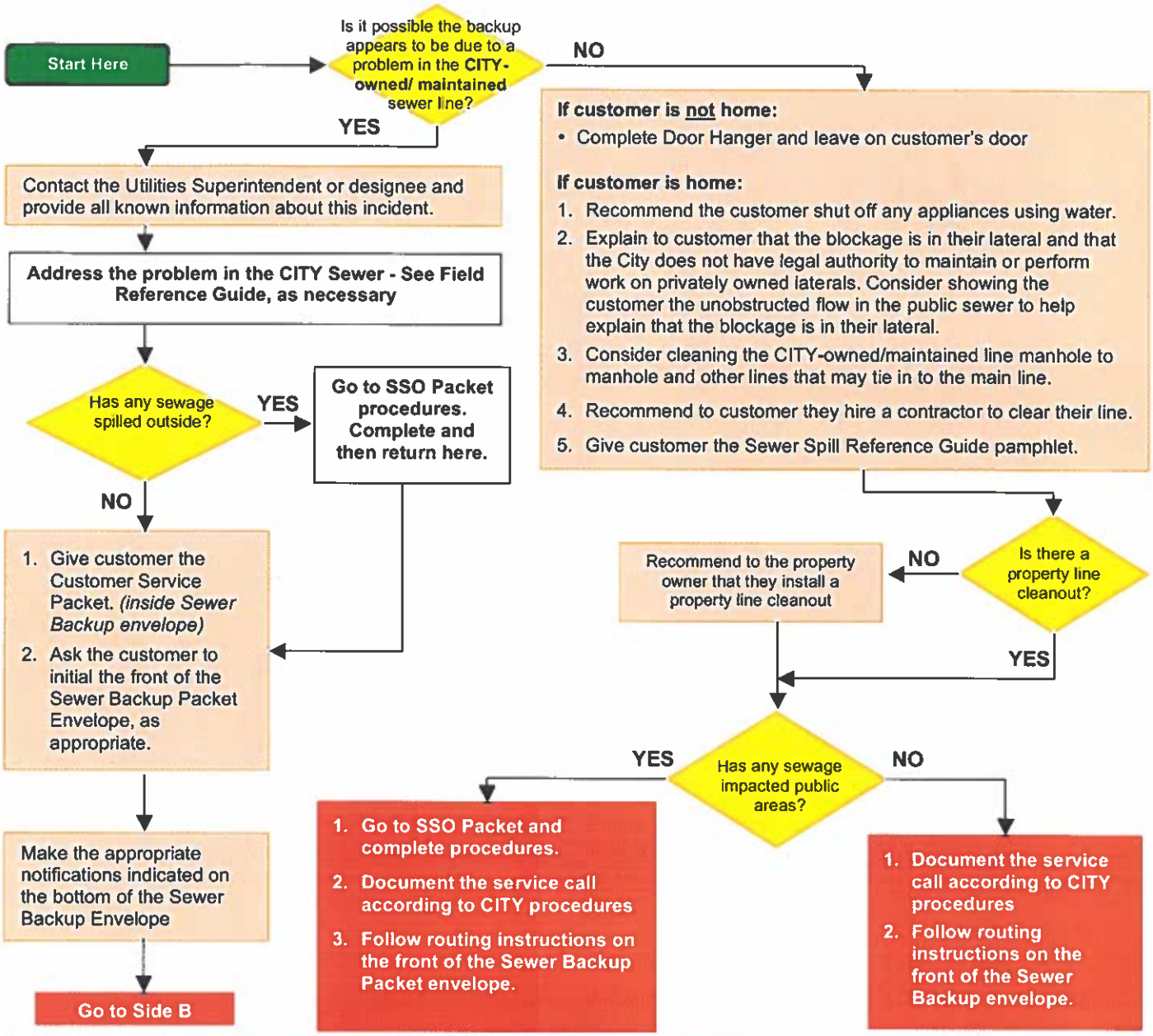
Form	Form Number
Response Instructions	envelope label
Response Flowchart	BP-1
Cleaning Declination Form (3-copy NCR)	-2
First Responder Form	-3
Sewer Overflow Report	-4
Claims Submittal Checklist	-5
Sewer Lateral CCTV Report	-6
Collection System Failure Analysis Form	-7
Customer Service Packet	
Instructions	-envelope
Customer Information	CS-1
Claim Form	-2
Sewer Spill Reference Guide	pamphlet
Door Hanger	n/a
Sewer Spill Reference Guide	pamphlet

For pre-assembled packets contact DKF Solutions Group at 707.373.9709 or losscontrol@sbcglobal.net

City of Colusa

Responding to a Sanitary Sewer Backup

BP-1 Side A



MEDIA AND PUBLIC RELATIONS GUIDELINES:

In ***ALL*** cases, refer media requests to the Public Works Director or designee.

Exercise caution in contacts with the public or media when you respond to a spill. Any information you provide or statements you make may become pertinent in the event of possible court action, it is important to:

- Avoid giving out the wrong information,
- Avoid speculating about the situation you are responding to,
- Avoid making accusations against customers, businesses or other public agencies, and
- Avoid providing incorrect facts about a company or other agency.

Be courteous and attempt to provide accurate information to questions within the limits above. In some cases, it may be appropriate to say that we do not have any information, or delay answering a question and say when an answer may be available.

City of Colusa

Responding to a Sanitary Sewer Backup

BP-1 Side B

Continue Here from Side A

Does the customer want cleaning service?

NO

1. Have Customer sign the Cleaning Declination form *(inside Sewer Backup envelope)*.
2. Ask permission to photograph the affected area. If they decline, note on the Cleaning Declination form.
3. Give the customer the bottom copy of the form and put other copies in the Sewer Backup envelope.

YES

1. Contact the Itilities Superintenent or designee and request permission to call out a restoration firms on behalf of the customer: Cleanrite Restoration at 800.870.0030
2. Wait for restoration team to arrive, if possible.
3. Clean/disinfect any overflow **outside** of the building. **Note:** DO NOT allow any disinfectants to escape to storm drains.

Remove the First Responder form from the Sewer Backup Packet envelope and complete as much as possible. Immediately contact Shawn Milar (*York insurance adjustor)* at 530.680.7272/230.3704 or 916.960.0900 and provide the information from the completed First Responder Form.

Remove the Sanitary Sewer Overflow Report from the Sewer Backup Packet envelope and complete sides A and B. *Be sure to make all required internal notifications listed on Side B.*

Can you locate a backwater prevention device (BPD) or cleanout on the affected building?

YES

Ask for permission to photograph the backwater prevention device or cleanout and photograph, if allowed.

NO

Do you want the lateral televised? (if applicable)

YES

1. Schedule televising of the lateral as soon as possible
2. Complete Lateral TV Report (inside the Sewer Backup Packet envelope)

NO

1. **Document the service call according to CITY procedures.**
2. **Complete the remaining instructions in the CITY STAFF box on the front of the Sewer Backup Packet envelope.**
3. **Follow routing instructions as indicated on the front of the Sewer Backup Packet envelope.**

City of Colusa	Sanitary Sewer Backup Response **CLEANING DECLINATION FORM**	**BP-2**

Customer Information		
NAME:	ADDRESS:	TELEPHONE:

ON (date)	AT (time)	Approximately (quantity)	GALLONS OF: ☐ Sewage ☐ Grey Water ☐ Toilet Bowl Water ☐ Odor ☐ Other (describe):

Overflowed from (or odor emanating from)
- ☐ Toilet
- ☐ Shower/Tub
- ☐ Washer
- ☐ Other (describe):

The overflow affected the following areas *(check one)*:
- ☐ Bathroom ☐ Bedroom
- ☐ Hallway ☐ Garage
- ☐ Kitchen ☐ Crawlspace
- ☐ Other (specify):

The overflow affected the following flooring:
- ☐ Tile ☐ Wood Flooring
- ☐ Linoleum ☐ Carpet
- ☐ Other (specify):

and/or additional materials:
- ☐ Area Rugs ☐ Towels
- ☐ Clothing ☐ Other (specify):

Photos: ☐ Were Not Taken ☐ Were Taken, number of photos: _____

This Form Completed By: **Date:** _____ **Time:**

CUSTOMER, please read the following and sign below:
I/We acknowledge that City of Colusa (*City*) has offered to provide professional cleaning and decontamination services to remediate the sewage backup and/or overflow described above and that we declined the offer. We further understand and acknowledge that because we have declined, any necessary remediation activities will be conducted without City assistance, and that the City will not accept responsibility for work performed by persons other than those engaged by the City. The City will also not accept responsibility for any charges related to this incident that are not usual and customary. Please contact the Utilities Superintendent at **(530) 682-2933** if you have any questions.

Customer Signature*:		**Date:**
The information above was explained to the customer by the following employee:	**Name:**	**Title:**
	Signature:	**Date:**

*Note to responders: if customer declines to sign this form, have a co-worker sign as a witness and check here ☐

Co-worker Signature (*if necessary*): _____

Recommendations to customers choosing to clean up their own spill:

- Keep pets and children out of the affected area
- Turn off heating/air conditioning systems
- Wear rubber boots, rubber gloves, and goggles during cleanup of the affected area.
- Remove and discard items that cannot be washed and disinfected (such as: mattresses, rugs, cosmetics, baby toys, etc.)
- Remove and discard drywall and insulation that has been contaminated with sewage or flood waters.
- Thoroughly clean all hard surfaces (such as flooring, concrete, molding, wood and metal furniture, countertops, appliances, sinks and other plumbing fixtures) with hot water and laundry or dish detergent.
- Consider using over-the-counter deodorizer products, as necessary.
- After completing cleanup, wash your hands with soap and water.
- Wash all clothes worn during the cleanup in hot water and detergent (wash separately from uncontaminated clothes).
- Wash clothes contaminated with flood or sewage water in hot water and detergent. Use a laundromat for washing large quantities of clothes and linens until your onsite wastewater system has been professionally inspected and serviced.
- Seek medical immediate attention if you become injured or ill.
- Take photos of areas affected by the spill and any damaged items you discarded.

Distribution Instructions – Top Copy to City records; Middle Copy to York Insurance Services.; Bottom Copy to Customer

City of Colusa	Sanitary Sewer Backup Response **FIRST RESPONDER FORM**	**BP-3** Side A

Fill out this form as completely as possible.
Ask customer if you may enter the home. If so, take photos of affected and adjacent areas not affected.

TIME STAFF ARRIVED ON-SITE:		
DID CUSTOMER CALL A CLEANING CONTRACTOR? ☐ Yes ☐ No		TIME CALLED:
IF YES, NAME OF CONTRACTOR:		TELEPHONE:

CITY REQUESTED CLEANING CONTRACTOR? ☐ Yes ☐ No	TIME CALLED:	TIME ARRIVED:

SECTION A

DATE:	TIME:	EMPLOYEE NAME:
RESIDENT:		PROPERTY MANAGERS:
STREET ADDRESS: CITY, STATE AND ZIP: PHONE:		STREET ADDRESS: CITY, STATE AND ZIP: PHONE:

IS NEAREST UPSTREAM MANHOLE VISIBLY HIGHER THAN THE DRAIN THAT OVERFLOWED? ☐ Yes ☐ No

OF PEOPLE LIVING AT RESIDENCE:

Approximate Age of Home:	# of Bathrooms:	# of Rooms Affected:
Approximate Amount of Spill (gallons):	Approximate Time Sewage Has Been Sitting (hrs/days):	
How Was Spill Volume Calculated?:		
Numbers of Pictures Taken	Digital or Film?	
Does property have property line cleanout? Does the Customer have a Backwater Prevention Device (BPD)? If yes, was the BPD operational at the time of the overflow?	☐ YES ☐ NO ☐ Unknown ☐ YES ☐ NO ☐ Unknown ☐ YES ☐ NO ☐ Unknown	

Have there ever been any previous spills at this location? ☐ YES ☐ NO ☐ UNKNOWN

Has the Resident had any plumbing work done recently? ☐ Yes ☐ No

If YES, please describe:

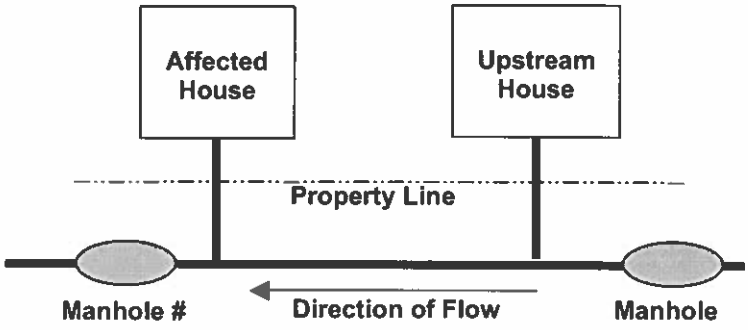
GO TO SIDE 2

City of Colusa	Sanitary Sewer Backup Response **FIRST RESPONDER FORM**	**BP-3** Side B

SANITARY SEWER LINE BLOCKAGE LOCATION

PLEASE CHECK THE BOX THAT DESCRIBES YOUR OBSERVATIONS			
Customer Cleanout Was:	Public Cleanout was:		
	Non - Existent	Full	Empty
Non-Existent			
Full			
Empty			

Place an X where the blockage occurred
Circle the areas where sewage overflowed/backed



Did sewage go under buildings? ☐ Yes ☐ No ☐ Unsure

Recommended Follow-Up Action(s):

Place completed form in Sewer Backup Envelope and follow routing instructions.

City of Colusa	Sanitary Sewer Backup Packet **SANITARY SEWER OVERFLOW REPORT**	**BP-4** **Side A**

INSTRUCTIONS: Complete all items *EXCEPT* those shaded gray

Spill Category *(check one)*: ☐ Category 1 ☐ Category 2

A. SPILL LOCATION

Spill Location Name:

Latitude Coordinates: Longitude Coordinates:

Street Name and Number:

Nearest Cross Street City: Zip Code:

County: Colusa

B. SPILL DESCRIPTION

Spill Appearance Point: ☐ Building/Structure ☐ Force Main ☐ Gravity Sewer ☐Other Sewer System Structure *(i.e. cleanout)* ☐Pump Station ☐ Manhole- Structure ID#: ☐ Other *(specify):*

Did the spill reach a drainage channel and/or surface water? ☐ Yes (*Category 1)* ☐No

If the spill reached a storm sewer, was it fully captured and returned to the Sanitary Sewer? ☐ Yes ☐No (*Category 1)*

Was this spill from a private lateral? ☐ Yes ☐No If YES, name of responsible party:

Final Spill Destination: ☐ Beach ☐ Building structure ☐ Other paved surface ☐ Storm drain ☐ Street/curb& gutter ☐ Surface water ☐ Unpaved surface ☐ Other *(specify)*:

Estimated spill volume *(in gallons – 1,000 gal or more = Category 1)*: Method calculated:

Est. volume of SSO recovered (gal): Were photos taken? ☐ No ☐Yes – how many?

Estimated volume of spill reaching surface water, drainage channel, or not recovered from a storm drain (gal):

C. SPILL OCCURRING TIME

Estimated spill start date and time:

Date and time spill reported to sewer crew: | Date and time sewer crew arrived:

Estimated spill end date and time:

D. CAUSE OF SPILL, IF KNOWN

Location of Blockage: ☐ Main ☐ Lateral ☐Private Lateral ☐ Other

SSO cause *(check all that apply)*: ☐ Debris/Blockage ☐ Flow exceeded capacity ☐Grease ☐ Operator error ☐ Roots ☐ Pipe problem/failure ☐ Pump station failure ☐ Rainfall exceeded design ☐ Vandalism ☐ Inflow/infiltration ☐ Animal carcass ☐ Electrical power failure ☐ Bypass ☐ Debris from laterals ☐ Construction Debris ☐ Unknown ☐ Other (specify):

Weather conditions prior 72 hours: ☐ Sunny Weather ☐ Cloudy Weather ☐ Measurable Rain ☐ Rain for Several Days

If SSO is caused by wet weather, choose size of storm: ☐1-yr ☐2-yr ☐5-yr ☐10-yr ☐50-yr ☐100-yr ☐>100-yr ☐Unknown

Diameter (in inches) of pipe at point of blockage/spill cause (if applicable):

Sewer pipe material at point of blockage/spill cause (if applicable):

Description of terrain surrounding point of blockage/spill cause: ☐ Flat ☐ Mixed ☐ Steep

E. SPILL RESPONSE

Spill response activities (check all that apply): ☐ Cleaned up ☐ Contained all/portion of spill ☐ TV inspection ☐ Restored flow ☐ Returned all/portion of spill to sanitary sewer ☐Other (specify):

Spill response completed (date & time): Name of impacted waters (if applicable):

Visual inspection result of impacted waters (if applicable):

Any fish killed? ☐ Yes ☐ No *if Yes, try to estimate number of fish killed:* Any ongoing investigation? ☐ Yes ☐ No

Name of impacted beach (if applicable): Were health warnings posted? ☐ Yes ☐ No

Health warning/beach closure posting/details:

Were samples of impacted waters collected? ☐ Yes ☐ No If YES, select the analyses: ☐ DO ☐ Ammonia ☐ Bacti ☐ Other

Recommended corrective actions: ☐ Add sewer to PM Program ☐ Adjust PM schedule ☐ Adjust PM method ☐ Rehab sewer ☐ Replace sewer ☐ Enforcement action against FOG source ☐ Other (specify):

F. NOTIFICATION DETAILS

CalEMA contacted date and time (if applicable):

CalEMA Control Number (if applicable): Spoke to:

GO TO SIDE B

City of Colusa	Sanitary Sewer Backup Response CLAIMS SUBMITTAL CHECKLIST	BP-5

Utilities Superintendent or Designee

1. **Complete the following information:**

   Title: _____

   Name: _____

   Phone: _____

   Today's Date: _____

2. **Copy the items listed below and retain the originals for internal archiving purposes.**

   - ☐ Form BP-2: Cleaning Declination Form *(If applicable)*
   - ☐ Form BP-3: First Responder Form
   - ☐ Form BP-4: Sanitary Sewer Overflow Report
   - ☐ Form BP-5: Claims Submittal Checklist *(this form)*
   - ☐ Form BP-6: Sewer Lateral CCTV Report
   - ☐ Form BP-7: Collection System Failure Analysis Form
   - ☐ All photos taken *(hardcopy or electronic)*
   - ☐ Any other information you feel is important in this claim

3. **Place the copies back in the Backup Response Envelope and forward envelope to the City Finance Director or designee.**

Finance Director or Designee

1. **Verify claims packet is complete.**

2. **Notify the following that you are sending them information regarding this incident:**

   York Insurance Services Claims Adjustor

   Office: 916.783.0100

   Cell: 530.680.7272 or 530.230.3704

   48 Hanover #C, Chico CA 95973

City of Colusa	Sanitary Sewer Backup Response **SEWER LATERAL CCTV REPORT**	**BP-6**

PLEASE COMPLETE AS THOROUGHLY AS POSSIBLE

PERSON COMPLETING THIS FORM: DATE:
PHONE:

CAMERA TYPE:

LOCATION OF CAMERA ENTRY:

AFFECTED PROPERTY STREET ADDRESS:

LOCATION OF CAMERA STOP:

CITY, STATE AND ZIP:

DESCRIBE AREA TV'd:

PHONE

UPSTREAM MANHOLE #:

PLEASE CHECK ALL THAT WERE DISCOVERED – *Describe Extent & Location Using Camera Entry Point As Reference*:

TIME OF OVERFLOW:

TIME BLOCKAGE RELIEVED:

TIME LATERAL TV'd:

DEPTH OF LATERAL:

- ☐ Broken Lateral – Describe:
  Depth:
- ☐ Roots – Severity: ☐ Light ☐ Moderate ☐ Heavy
- ☐ Grease – Severity: ☐ Light ☐ Moderate ☐ Heavy
- ☐ Sag – Describe:
  Depth:
- ☐ BPD – Describe:
  Location:
- ☐ Cleanout – Describe:
  Location:
- ☐ Joint/Junction – Describe:
  Depth
- ☐ Grade – Describe:
- ☐ Grit – Severity: ☐ Light ☐ Moderate ☐ Heavy
- ☐ Other – Describe:

RECOMMENDED FOLLOW UP WORK ACTIONS:

Mark for USA location? ☐ Yes ☐ No

Lateral Locations Marked in Green Paint? ☐ Yes ☐ No

SIGNATURE OF EMPLOYEE PERFORMING TV WORK:

DATE

If applicable, place completed form in Sewer Backup Envelope and follow routing instructions.

City of Colusa

Customer Service Packet

Contents:

Form	Form Number
Customer Information Letter	CS-1
Claim Form	-2
Sewer Spill Reference Guide	pamphlet

Instructions:

1. Review the Customer Information Letter to determine actions that need to be taken immediately including:
    a. Turn off the HVAC system if necessary.
    b. Block floor vents to prevent sewage from entering if necessary.
    c. Turn off any appliances using water.
2. Complete the City Claim Form to file a claim. See the Customer Information Letter for information about returning the form.
3. Review the Sewer Spill Reference Guide pamphlet.

This packet provided by:

Name: _____

Title: _____

Telephone: _____

If you have any questions contact:

Utilities Superintendent at **(530) 682-2933**

Print on 6" x 9" envelope

City of Colusa	Sanitary Sewer Backup Response **CUSTOMER INFORMATION** **Regarding Sewer Backup Claims**	**CS-1**

Dear Property Owner:

We recognize that sewer backup incidents can be stressful and require immediate response when all facts concerning how an incident occurred are unknown. Rest assured that we do all we can to prevent this type of event from occurring. Nevertheless, occasionally tree roots or other debris in the sewer lines can cause a backup into homes immediately upstream of the blockage. At this time the City of Colusa is investigating the cause of this incident.

If the City is found to be responsible for the incident, we are committed to cleaning and restoring your property, and to protecting the health of those affected during the remediation process.

The cleaning contractor provided by the City has been selected because of their adherence to established protocols that are designed to assure all parties thorough, cost-effective and expeditious cleaning services. You also have the right to select your own cleaning contractor, but the City does not guarantee payment of fees/expenses incurred and reserves the right to dispute fees/expenses deemed not usual and customary.

The City Finance DIrector has the responsibility for processing any claims for damages that are submitted. If you wish to discuss this matter, or submit a claim for damages, please contact them at **530.458.4941 ext. 107**.

What you need to do now:

City of Colusa has prepared this brief set of instructions to help you minimize the impact of the loss by responding promptly to the situation.

- Do not attempt to clean the area yourself; let the cleaning and restoration company handle this.
- Keep people and pets away from the affected area(s).
- Turn off heating/air conditioning systems.
- Turn off any appliances using water.
- Prevent any material from reaching floor vents to prevent contamination.
- Do not remove items from the area – the cleaning and restoration company will handle this.
- If you had recent plumbing work, contact your plumber or contractor and inform them of this incident.
- Contact your homeowner's insurance carrier to report a claim.
- Call the City's Claims Administrator (*York Insurance Services)* at 530.680.7272/230.3704 or 916.960.0900 and provide a number where you can be reached:
- If you intend to file a claim, do so as soon as practical –The California Government Code, Sections 900 - 960, requires the filing of a written claim and outlines specific time lines and notice procedures that must be used in order to have a claim considered.
    - File your claim with the City of Colusa's Finance Director at 425 Webster Street Colusa, CA 95932; Phone **530.458.4740**

City of Colusa	Sanitary Sewer Backup Response CLAIM FORM Regarding Sewer Backup Claims	CS-2

READ THIS FIRST

In the event of a Sanitary Sewer Overflow

☐ Check here if a FOG investigation is necessary

Response Instructions

Property Address: _____

Date:_____ **Time Arrived:**_____

City Staff

1st: Open this envelope.

2nd: Follow the steps on the "Responding to a Sanitary Sewer Overflow" card (*OP-1 - inside this envelope).*

3rd: Reference the Field Guide as necessary.

4th: Put everything back in this Sewer Overflow Envelope:

- Camera (if used)
- SSO Report
- Any additional notes/documentation made

5th: Document the service call according to City procedures.

6th: Forward this packet to the Utilities Superintendent or designee.

Utilities Superintendent or Designee

1st: Open this envelope. Review forms/documentation.

2nd: Open the Regulatory Notifications Packet (*inside this envelope)* and make the required notifications.

3rd: Send camera out for processing (*if applicable)* or copy digital images to cd and place in this Sewer Overflow Envelope.

4th: Debrief the spill response with affected personnel, as appropriate, using the Collection System Failure Analysis Form and make any necessary procedural/maintenance changes.

5th: File this completed Sewer Overflow Envelope in accordance with City policy.

For any media requests, immediately contact the Public Works Director or designee.

City of Colusa

Sanitary Sewer Overflow and Backup Response Plan

City of Colusa

Sanitary Sewer Overflow Packet OP

Form	Form Number
Instructions and Chain of Custody	envelope label
Responding to a Sanitary Sewer Overflow	OP-1
Sewer Overflow Report	-2
Collection System Failure Analysis Form	-3
Sewer Spill Reference Guide	pamphlet
Door Hanger	n/a

For pre-assembled packets contact DKF Solutions Group at 707.373.9709 or losscontrol@sbcglobal.net

City of Colusa

Responding to a Sanitary Sewer Overflow

OP-1 Side A

Start Here

Is the spill entering an area where public contact is ***likely*** to occur?

YES

Post "WARNING RAW SEWAGE" signs in immediate areas (*Be sure to document how many signs were posted and where they were posted).*

- Consider isolating the affected area to prevent access by vehicles/ pedestrians
- Photograph areas where warnings/barricades are posted, as appropriate.

NO

1. **Immediately notify the Utilities Superintendent and provide known information about this incident.**
2. Consider the need to call out additional staff, contractor or mutual aid assistance or to notify upstream users to curtail water use.

FOR LARGE SPILLS/SPILLS TO SENSITIVE AREAS: BEGIN DIVERSION AND CONTAINMENT – OTHERWISE GO TO CLEARING BLOCKAGE

1. **DIVERT AWAY FROM SENSITIVE AREAS:**
   a. Cover unplugged storm drains w/mats, or use dirt/ other material to divert sewage away from sensitive areas (e.g., schools, daycares, playgrounds, intersections, etc.).
   b. ENSURE PUBLIC CONTACT DOES NOT OCCUR. Use cones/barricades to isolate area.
2. **CONTAIN SPILL & RETURN TO SYSTEM, IF POSSIBLE:**
   a. Plug storm drain catch basins or use rubber mats to cover basin inlet and divert flow to catch basin
   b. Build/excavate a berm to channel flow to downstream sanitary sewer manhole (*barricade manhole if left open)*
   c. Use bypass pumps to pump around blockage until it can be removed
   d. Divert to low area of ground where it can be collected later
3. **PHOTOGRAPH HOW THE SSO WAS DIVERTED/CONTAINED, AS APPROPRIATE**

Where is the SSO coming from?

Private Property

Pump Station

Manhole or Cleanout

PUMP STATION FAILURE RESPONSE

1. Ensure all electrical hazards have been Locked & Tagged out!
2. ***Refer to Each Station's Specific Emergency Response Plan***
3. Photograph staff activities to document City actions, as appropriate
4. Go to Side B

PRIVATE PROPERTY SSO

1. Photograph & document all evidence that this SSO is from private property.
2. If customer is not home, complete Customer Service door hanger. If they are home, provide them with the pamphlet – "Sewer Spill Reference Guide."
3. If tenant or property owner is unable or unwilling to address the cause of the overflow, immediately contact your supervisor and discuss whether the City Code Enforcement, County Department of Environmental Health or Regional Water Quality Control Board should be notified.
4. Go to Side B.

CLEAR BLOCKAGE/STOPPAGE

1. Use cleaning equipment appropriate to situation and hydroflush to clear blockage. Make certain to either have the vactor setup at downstream manhole or use a fork/trap at the manhole outlet to catch any debris released. Once flow is normal, run line to next manhole.
2. Photograph staff activities while clearing the blockage, as appropriate.
3. Go to Side B.

MEDIA AND PUBLIC RELATIONS GUIDELINES:

Exercise caution in contacts with the public or media when you respond to a spill. Any information you provide or statements you make may become pertinent in the event of possible court action. It is important to:

- Avoid giving out the wrong information,
- Avoid making accusations against customers, businesses or other public agencies,
- Avoid speculating about the situation you are responding to
- Avoid providing incorrect information about a company or other agency.

Be courteous and attempt to provide accurate information to questions within the limits above. In some cases, it may be appropriate to say that we do not have any information, or to delay answering a question and then to say when an answer might be available and from whom.

City of Colusa

Responding to a Sanitary Sewer Overflow

OP-1 Side B

Start here from Side A

Immediately notify the Utilities Superintendent. Or designee of any Category 1 SSO for 2-hour reporting

Has the SSO reached receiving waters?

NO

YES

Contact Utilities Superintendent or designee and request assistance collecting water samples.

Assign staff to post "WARNING: RAW SEWAGE" signs or other means of warning along the shoreline of impacted receiving waters as appropriate, or as directed by the County Environmental Health Department.

Document and photograph how many signs were posted and where they were posted.

Is it feasible/practical to contain/recover any of the SSO from the receiving waters?

NO

YES

Contain/recover/clean-up as much of the spill in the waters and shoreline as possible. Contact Supervisor to request outside assistance recovering any debris from the water, as appropriate or possible.

Were storm drains impacted?

NO

YES

STORM DRAIN CLEANING SOP

1. Seal or berm the storm drain immediately downstream of point the SSO reached
2. Photograph impacted storm drain catch basins before cleaning
3. Vacuum any visible sewage – *Record the volume of sewage recovered*
4. Flush impacted sections of storm drain with 3X amount of SSO, if possible – *Record volume of flush water*
5. Ensure all visible signs of sewage have been removed
6. Return flush water to sanitary sewer – *Record volume of flush water recovered*
7. Photograph all storm drain catch basins after cleaning is completed

AREA CLEANUP

1. **Begin cleanup**
   NOTE: If SSO was caused by a failure in a private service line, clean up impacted public areas & document staff time, equipment used & expenses incurred
2. **Remove all signs of solid material and debris**
   (toilet paper, solids, grease, etc.)
3. **Flush area w/metered or unchlorinated water – Unless raining**
   (*3X amount of SSO, if possible*)
   NOTE: Setup berm/other means to contain all chlorinated flush water so it can be returned to sewer
4. Consider the need to disinfect impacted public areas where human contact may occur (*i.e. sidewalks*)
   NOTE: Don't use disinfectants if they may enter storm drain system and not be fully recovered or if they may enter a water body
4. **Photograph the area when cleanup operations are complete**

ESTIMATE SPILL VOLUME

Estimate SSO volume using one of the methods listed in the Field Guide. Also, interview available witnesses, Emergency Responders, etc to help determine spill start time, overflow rates and any other factors that will help you to determine, as accurately as possible, the spill volume.

NOTE: Remember – the spill was probably occurring for a period of time before it was reported – take that into account when estimating SSO volume. Be sure to document all assumptions made when estimating volume so that you can explain how you arrived at the volume you did.

DOCUMENTATION AND REPORTING

Complete the **SSO Report.**

Place the following in Sewer Overflow Packet envelope and follow paperwork routing instructions indicated on the front of the envelope:

1. **All completed forms**
2. **Digital or disposable camera**
3. ***ALL* notes/documentation made**

City of Colusa	Sanitary Sewer Backup Packet **SANITARY SEWER OVERFLOW REPORT**	**OP-2** **Side A**

INSTRUCTIONS: Complete all items *EXCEPT* those shaded gray

Spill Category *(check one)*: ☐ Category 1 ☐ Category 2

A. SPILL LOCATION

Spill Location Name:

Latitude Coordinates: Longitude Coordinates:

Street Name and Number:

Nearest Cross Street City: Zip Code:

County: Colusa

B. SPILL DESCRIPTION

Spill Appearance Point: ☐ Building/Structure ☐ Force Main ☐ Gravity Sewer ☐Other Sewer System Structure *(i.e. cleanout)* ☐Pump Station ☐ Manhole- Structure ID#: ☐ Other *(specify)*:

Did the spill reach a drainage channel and/or surface water? ☐ Yes (*Category 1*) ☐No

If the spill reached a storm sewer, was it fully captured and returned to the Sanitary Sewer? ☐ Yes ☐No (*Category 1*)

Was this spill from a private lateral? ☐ Yes ☐No If YES, name of responsible party:

Final Spill Destination: ☐ Beach ☐ Building structure ☐ Other paved surface ☐ Storm drain ☐ Street/curb& gutter ☐ Surface water ☐ Unpaved surface ☐ Other *(specify)*:

Estimated spill volume *(in gallons – 1,000 gal or more = Category 1)*: Method calculated:

Est. volume of SSO recovered (gal): Were photos taken? ☐ No ☐Yes – how many?

Estimated volume of spill reaching surface water, drainage channel, or not recovered from a storm drain (gal):

C. SPILL OCCURRING TIME

Estimated spill start date and time:

Date and time spill reported to sewer crew: | Date and time sewer crew arrived:

Estimated spill end date and time:

D. CAUSE OF SPILL, IF KNOWN

Location of Blockage: ☐ Main ☐ Lateral ☐Private Lateral ☐ Other

SSO cause *(check all that apply)*: ☐ Debris/Blockage ☐ Flow exceeded capacity ☐Grease ☐ Operator error ☐ Roots ☐ Pipe problem/failure ☐ Pump station failure ☐ Rainfall exceeded design ☐ Vandalism ☐ Inflow/infiltration ☐ Animal carcass ☐ Electrical power failure ☐ Bypass ☐ Debris from laterals ☐ Construction Debris ☐ Unknown ☐ Other (specify):

Weather conditions prior 72 hours: ☐ Sunny Weather ☐ Cloudy Weather ☐ Measurable Rain ☐ Rain for Several Days

If SSO is caused by wet weather, choose size of storm: ☐1-yr ☐2-yr ☐5-yr ☐10-yr ☐50-yr ☐100-yr ☐>100-yr ☐Unknown

Diameter (in inches) of pipe at point of blockage/spill cause (if applicable):

Sewer pipe material at point of blockage/spill cause (if applicable):

Description of terrain surrounding point of blockage/spill cause: ☐ Flat ☐ Mixed ☐ Steep

E. SPILL RESPONSE

Spill response activities (check all that apply): ☐ Cleaned up ☐ Contained all/portion of spill ☐ TV inspection ☐ Restored flow ☐ Returned all/portion of spill to sanitary sewer ☐Other (specify):

Spill response completed (date & time): Name of impacted waters (if applicable):

Visual inspection result of impacted waters (if applicable):

Any fish killed? ☐ Yes ☐ No *if Yes, try to estimate number of fish killed:* Any ongoing investigation? ☐ Yes ☐ No

Name of impacted beach (if applicable): Were health warnings posted? ☐ Yes ☐ No

Health warning/beach closure posting/details:

Were samples of impacted waters collected? ☐ Yes ☐ No If YES, select the analyses: ☐ DO ☐ Ammonia ☐ Bacti ☐ Other

Recommended corrective actions: ☐ Add sewer to PM Program ☐ Adjust PM schedule ☐ Adjust PM method ☐ Rehab sewer ☐ Replace sewer ☐ Enforcement action against FOG source ☐ Other (specify):

F. NOTIFICATION DETAILS

CalEMA contacted date and time (if applicable):

CalEMA Control Number (if applicable): Spoke to:

GO TO SIDE B

City of Colusa	Sanitary Sewer Backup Packet **SANITARY SEWER OVERFLOW REPORT**	**OP-2** **Side B**

REGULATORY NOTIFICATIONS START HERE

YES — **Is the Estimated Volume > 1,000 gallons?**

NO

YES — **Did the spill reach a drainage channel or waterway?**

NO

YES — **Did the spill discharge to a storm drain that was not fully captured?**

NO

This SSO is a Category 2 SSO
Forward this completed form and all other documentation and pictures to Sr. Wastewater Systems Operator or designee as soon as possible.

This SSO is a Category 1 SSO
Immediately contact one of the following in the order listed and request they make the 2-hour notification to the RWQCB as indicated in the Regulatory Notifications Packet.

PERSON	CELL
Utilities Superintendent	(530) 458-3324
NEED YOUR BACKUP	**NEED NUMBER**

RECOMMENDED FOLLOW-UP ACTIONS TO PREVENT FUTURE OCCURRENCES	
CURRENT PREVENTIVE MAINTENANCE FREQUENCY:	DATE OF LAST PREVENTIVE MAINTENANCE:
RECOMMENDED ACTIONS: ☐ TV ☐ RE-RUN ☐ CHANGE CLEANING SCHEDULE ☐ REPAIR LINE SEGMENT ☐ REPLACE LINE SEGMENT ☐ OTHER (describe):	
NOTES:	

Place completed form in Sewer Backup Envelope and follow routing instructions.

City of Colusa	Sanitary Sewer Overflow Response **COLLECTION SYSTEM FAILURE ANALYSIS**	**OP-3**

Incident Report #	Prepared By

SSO/Backup Information

Event Date/Time	Address
Volume Spilled	Volume Recovered
Cause	

Summary of Historical SSOs/Backups/Service Calls/Other Problems

Date	Cause	Date Last Cleaned	Crew

Records Reviewed By	Record Review Date

Summary of CCTV Information

CCTV Inspection Date	Tape Name/Number
CCTV Tape Reviewed By	CCTV Review Date

Observations

Recommendations

☐	No Changes or Repairs Required
☐	Maintenance Equipment
☐	Maintenance Frequency
☐	Repair (Location and Type)
☐	Add to Capital Improvement Rehabilitation/Replacement List: Yes ☐ No☐

Supervisor Review Date	Superintendent Review Date

City of Colusa

On (date) _____, at (location) _____,
we responded to a reported blockage of the sanitary sewer service to your property.

We discovered a blockage in:

- ❒ The City-maintained sanitary sewer main and cleared the line
- ❒ The City-maintained portion of your sanitary sewer lateral and cleared the line.
- ❒ The sanitary sewer lateral, which is your responsibility to maintain
- ❒ Your portion of the sanitary sewer lateral, which is your responsibility to maintain. We also found the City's portion of the lateral and the main to be flowing normally.

If you require assistance to clear your portion of the lateral you can look in the Yellow Pages of your telephone book under "Sewer Contractors" or "Plumbing Drains & Sewer Cleaning". If you plan to hire a contractor, we recommend getting estimates from more than one company.

City of Colusa representative notes: _____

_____

_____

City of Colusa Representative:

_____

For questions or comments, please call
530.458.4941 Ext. 101

For Sewer Emergencies
at Night and on Weekends, please call
530.458.7721

City of Colusa

On (date) _____, at (location) _____,
we responded to a reported blockage of the sanitary sewer service to your property.

We discovered a blockage in:

- ❒ The City-maintained sanitary sewer main and cleared the line
- ❒ The City-maintained portion of your sanitary sewer lateral and cleared the line.
- ❒ The sanitary sewer lateral, which is your responsibility to maintain
- ❒ Your portion of the sanitary sewer lateral, which is your responsibility to maintain. We also found the City's portion of the lateral and the main to be flowing normally.

If you require assistance to clear your portion of the lateral you can look in the Yellow Pages of your telephone book under "Sewer Contractors" or "Plumbing Drains & Sewer Cleaning". If you plan to hire a contractor, we recommend getting estimates from more than one company.

City of Colusa representative notes: _____

_____

_____

City of Colusa Representative:

_____

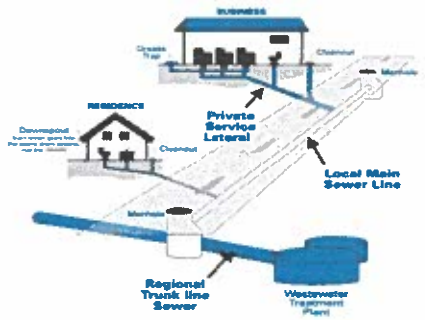
For questions or comments, please call
530.458.4941 Ext. 101

For Sewer Emergencies
at Night and on Weekends, please call
530.458.7721

How a Sewer System Works

A property owner's sewer pipes are called ***service laterals*** and are connected to larger local main and regional trunk lines.

Service laterals run from the connection at the home to the connection with the public sewer. These laterals are the responsibility of the property owner and must be maintained by the property owner.

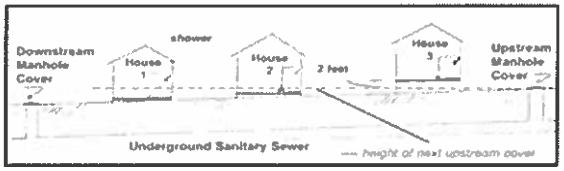


Is My Home Required to Have a Backflow Prevention Device?

Section 710.1 of the Uniform Plumbing Code (U.P.C.) states: *"Drainage piping serving fixtures which have flood level rims located below the elevation of the next upstream manhole cover or private sewer serving such drainage piping* ***shall*** *be protected from backflow of sewage by installing an approved type of backwater valve."*

The intent of Section 710.1 is to protect the building interior from mainline sewer overflows or surcharges.

Additionally, U.P.C. 710.6 states: *"Backwater valves* ***shall*** *be located where they will be accessible for inspection and repair at all times and, unless continuously exposed, shall be enclosed in a masonry pit fitted with an adequately sized removable cover."*



If you have a sewage spill from your private sewer line that impacts storm drains, waterways or public property, contact:

City of Colusa
530.458.4941 (Business Hours)

Colusa County Environmental Health
530.458.0395

California Health and Safety Code, Sections 5410-5416 requires:

- No person shall discharge raw or treated sewage or other waste in a manner that results in contamination, pollution, or a nuisance.
- Any person who causes or permits a sewage discharge to any state waters:
  - Must immediately notify the local health agency of the discharge.
  - Shall reimburse the local health agency for services that protect the public's health and safety.
  - Who fails to provide the required notice to the local health agency is guilty of a misdemeanor and shall be punished by a fine (between $500–$1,000) and/or imprisonment for less than one year.

Central Valley Regional Water Quality Control Board
916.464.3291
Requires the prevention, mitigation, response to, and reporting of sewage spills.

California Emergency Management Agency
800.852.7550

California Water Code, Article 4, Chapter 4, Sections 13268-13271 & California Code of Regulations, Title 23, Division 3, Chapter 9.2, Article 2, Sections 2250-2260 require:

- Any person who causes or permits sewage in excess of 1,000 gallons to be discharged to state waters shall immediately notify the California Emergency Management Agency.
- Any person who fails to provide the notice required by this section is guilty of a misdemeanor and shall be punished by a fine (less than $20,000) and/or imprisonment for not more than one year.

Sewer Spill Reference Guide

Your Responsibilities as a Private Property Owner

Provided to you by:

City of Colusa, CA
425 Webster Street, Colusa, CA 95932
(530) 458-4941

Why do sewage spills happen?
Sewage spills occur when the wastewater in underground pipes overflows through a manhole, cleanout, or broken pipe. Most spills are relatively small and can be stopped and cleaned up quickly, but left unattended they can cause health hazards, damage to homes and businesses, and threaten the environment, local waterways, and beaches.

CAUTION!

When trying to locate a sewer problem, never open manholes or other public sewer structures. Only our crews are allowed to open & inspect these structures.

Common causes of sewage spills:
- Grease build-up
- Tree roots
- Broken/cracked pipes
- Missing or broken cleanout caps
- Undersized sewers
- Groundwater/rainwater entering the sewer system through pipe defects and illegal connections

Prevent most sewage backups with a Backflow Prevention Device
This type of device can help prevent sewage backups into homes and businesses. If you don't already have a Backflow Prevention Device, contact a professional plumber or contractor to install one as soon as possible.

Protect the environment!
If you let sewage from your property discharge to a gutter or storm drain, you may be subject to penalties and/or out-of-pocket costs for clean-up and enforcement efforts. A property owner may be charged for costs incurred by agencies responding to spills from private properties.

What to look for:
Sewage spills can be a very noticeable gushing of water from a manhole or a slow water leak that may take time to be noticed. Don't dismiss unaccounted-for wet areas. Look for:
- Drain backups inside the building.
- Wet ground and/or water leaking around manhole lids onto your street.
- Leaking water from cleanouts or outside drains
- Unusual odorous wet areas: sidewalks, external walls, ground/landscape around a building.

The following are indicators of a possible obstruction in your sewer line:
- Water comes up in floor drains, showers or toilets.
- Toilets, showers or floor drains below ground level drain very slowly.

What to do if there is a spill:
Immediately notify the City of Colusa. Our crews locate the blockage and determine if it is in the public sewer; if it is the crew removes the blockage and arranges for cleanup.
If the backup is in your private internal plumbing or in the private service laterals, you are required to immediately:
- Control and minimize the spill by shutting off or not using the water
- Keep sewage out of the storm drain system using sandbags, dirt and/or plastic sheeting
- Call a plumbing professional to clear blockages and make repairs as needed. Look in the yellow pages under "Plumbing Drain & Sewer Cleaning" or "Sewer Contractors."
- Always notify your sewer/public works department or public sewer district of sewage spills.

Spill cleanup inside the home:
For large clean ups, a professional cleaning firm should be contacted to clean up impacted areas, You can locate local firms by looking in the Yellow Pages under "Water Damage" or "Fire Damage." If you hire a contractor, it is recommended to get estimates from more than one company. Sometimes, homeowner's insurance will pay for the necessary cleaning due to sewer backups. Not all policies have this coverage, so check with your agent.

If you decide to clean up a small spill inside your home, protect yourself from contamination by observing the following safety measures. Those persons whose resistance to infection is compromised should not attempt this type of clean up.

Other Tips:
- Keep children and pets out of the affected area until cleanup has been completed.
- Turn off heating/air conditioning systems
- Wear rubber boots, rubber gloves, and goggles during cleanup of the affected area.
- Discard items that cannot be washed and disinfected (such as: mattresses, rugs, cosmetics, baby toys, etc.)
- Remove and discard drywall and insulation that has been contaminated with sewage or flood waters.
- Thoroughly clean all hard surfaces (such as flooring, concrete, molding, wood and metal furniture, countertops, appliances, sinks and other plumbing fixtures) with hot water and laundry or dish detergent.
- Help the drying process with fans, air conditioning units, and dehumidifiers.
- After completing cleanup, wash your hands with soap and water. Use water that has been boiled for 1 minute (allow the water to cool before washing your hands) OR use water that has been disinfected (solution of 1/8 teaspoon of household bleach per 1 gallon of water). Let it stand for 30 min. If water is cloudy, use ¼ teaspoon of household bleach per 1 gallon of water.
- Wash clothes worn during cleanup in hot water and detergent (wash apart from uncontaminated clothes).
- Wash clothes contaminated with sewage in hot water and detergent. Consider using a Laundromat until your onsite wastewater system has been professionally inspected and serviced.
- Seek immediate attention if you become injured or ill.

Spill cleanup outside the home:
- Keep children and pets out of the affected area until cleanup has been completed.
- Wear rubber boots, rubber gloves, and goggles during cleanup of affected area.
- Clean up sewage solids (fecal material) and place in properly functioning toilet or double bag and place in garbage container.
- On hard surfaces areas such as asphalt or concrete, it is safe to use a 2% bleach solutions, or ½ cup of bleach to 5 gallons of water, but don't allow it to reach a storm drain as the bleach can harm the environment.
- After cleanup, wash hands with soap and water. Use water that has been boiled for 1 minute (allow to cool before washing your hands) OR use water that has been disinfected (solution of 1/8 teaspoon of household bleach per 1 gallon of water). Let it stand for 30 min. If water is cloudy, use ¼ teaspoon of household bleach per 1 gallon of water.
- Wash clothes worn during cleanup in hot water and detergent (wash apart from uncontaminated clothes).
- Wash clothes contaminated with sewage in hot water and detergent. Consider using a Laundromat until your onsite wastewater system has been professionally inspected and serviced.
- Seek immediate attention if you become injured/ill.

SSO/Backup Response Plan

Public Posting

DANGER

RAW SEWAGE • AVOID CONTACT

PELIGRO

AGUA CONTAMINADA • EVITE TODO CONTACTO

For more information — Para mas informacion

City of Dixon

Business Hours: 530.458.4941 Ext. 101

After Hours: 530.458.7721

Print this on Orange Paper

Appendix D

City of Colusa CIP (excerpted from City of Colusa Fiscal Sustainability Plan for Wastewater Infrastructure (June 2021))

Projected Growth (from Revenue Tab)											
		FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24
Residential EDU		2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033	2,033
			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-Residential EDU's		168	168	166	166	166	166	166	166	166	166
			0.00	-2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Running Total			2,201	2,199	2,199	2,199	2,199	2,199	2,199	2,199	2,199
New EDU's			0.00	-2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		$/EDU	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Connection Fee /EDU		8,477	8,731	8,993	9,263	9,541	9,827	10,122	10,426	10,738	11,061
Connection Fee Revenue			0.00	-17,986.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Running Total of EDU Revenue:			0.00	-17,986.50	-17,986.50	-17,986.50	-17,986.50	-17,986.50	-17,986.50	-17,986.50	-17,986.50

Capital Budget		FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24
Capital Revenue											
Carry Over Balance		4,131,104	4,630,007	5,061,638	2,475,782	4,967,342	4,584,332	2,253,466	2,335,551	2,597,417	2,859,365
Annual Revenue			0.00	-17,986.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Debt Issuance - WWTP					4,700,000						
Debt Issuance - Collection System						4,100,000					
Grants WWTP					6,000,000						
Grants Collection System						2,000,000					
Interest Earnings	0.001		4,131.10	4,630.01	5,061.64	2,475.78	4,967.34	4,584.33	2,253.47	2,335.55	2,597.42
Rates											
REDIP Reserve											
USDA		25,883	0	0	0	0	0	0	0	0	0
Capital Reserve		102,263	77,500	77,500	77,500	77,500	77,500	77,500	77,500	77,500	77,500
Collection System		0	0	0	0	0	0	0	94,613	94,613	94,613
WWTP		350,000	350,000	350,000	350,000	0	0	0	87,500	87,500	87,500
Other		20,757									
Annual Debt Payment - Rates		772,589	772,589	772,589	954,624	954,624	1,137,689	1,137,689	1,137,689	1,137,689	1,137,689
Available Capital Revenue:		5,402,596	5,834,227	6,248,371	14,562,967	12,101,942	5,804,489	3,473,240	3,735,105	3,997,054	4,259,263

Running Balance of Reserves		FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24
REDIP Reserve		43,347									
USDA		25,883	25,883	25,883	25,883	25,883	25,883	25,883	25,883	25,883	25,883
Capital Reserve		492,504	570,004	647,504	725,004	802,504	880,004	957,504	1,035,004	1,112,504	1,190,004
Collection System		1,892,300	1,892,300	1,892,300	1,892,300	1,892,300	1,892,300	1,892,300	1,986,913	2,081,525	2,176,138
WWTP		1,746,500	2,096,500	2,446,500	2,796,500	2,796,500	2,796,500	2,796,500	2,884,000	2,971,500	3,059,000
Adjustment											
Connection Fees		0	0	-17,986	-17,986	-17,986	-17,986	-17,986	-17,986	-17,986	-17,986
		4,131,304	4,584,687	4,994,201	5,421,701	5,499,201	5,576,701	5,654,201	5,913,813	6,173,426	6,433,038
Change in Reserve Contribution		427,500	427,500	427,500	77,500	77,500	77,500	77,500	259,613	259,613	259,613
Confee per year		25,883	-17,986	0	0	0	0	0	0	0	0

Fix to reflect reduction in fund balance…

Capital Projects											
Capital Reserve Requirement											
A											
B											
C											
Total:		0	0	0	0	0	0	0	0	0	0
Debt Payment		772,589	772,589	772,589	954,624	954,624	1,137,689	1,137,689	1,137,689	1,137,689	1,137,689
Owner Finance 3-yrs											
Total:		772,589	772,589	772,589	954,624	954,624	1,137,689	1,137,689	1,137,689	1,137,689	1,137,689

Table 2.1
Capital Improvement Project List

	Project Description	Project Cost	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24
1	WWTP Compliance - Phase 1	9,000,000.00			3,000,000	6,000,000						
2	WWTP Reclamation - Phase 2	1,500,000.00				0	1,500,000					
3	Collection System - Phase 3	380,000.00				380,000			Green is loan/grant 1 (10.7 million)			
4	Property Purchase 1 on Loan	1,320,000.00				1,320,000.00			Pink is loan/ grant 2 (6.1 million)			
5	Property Purchase 1 w/ Reserves	741,001.00				741,001.00			Blue is funded with reserves (3.9 m)			
6	Property Purchase 2	733,000.00					733,000.00					
7	Property Purchase 3 under loan	1,623,319.00					1,623,319.00					
8	Property Purchase 3 w/ reserves	1,700,000.00				200,000.00	1,500,000					
9	Collection System - Phase 4	3,620,000.00					1,206,666.67	2,413,333.33				
	Total:		0.00	0.00	3,000,000.00	8,641,001.00	6,562,985.67	2,413,333.33	0.00	0.00	0.00	0.00
Total Capital Expense		20,617,320.00	772,589	772,589	3,772,589	9,595,625	7,517,610	3,551,022	1,137,689	1,137,689	1,137,689	1,137,689

Available Capital		5,402,596	5,834,227	6,248,371	14,562,967	12,101,942	5,804,489	3,473,240	3,735,105	3,997,054	4,259,263
Capital Expenditures		772,589	772,589	3,772,589	9,595,625	7,517,610	3,551,022	1,137,689	1,137,689	1,137,689	1,137,689
Remaining Balance		4,630,007	5,061,638	2,475,782	4,967,342	4,584,332	2,253,466	2,335,551	2,597,417	2,859,365	3,121,575
Fund Increase or Drop from Prior Year			431,631	-2,585,856	2,491,561	-383,010	-2,330,866	82,084	261,866	261,948	262,210
Remaining Fund Balance		4,630,007	5,061,638	2,475,782	4,967,342	4,584,332	2,253,466	2,335,551	2,597,417	2,859,365	3,121,575

	Reserve Requirements	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24
Reserve Requirement	103,383	103,383	103,383	103,383	103,383	103,383	103,383	103,383	103,383	103,383	103,383

Appendix E

SSMP Program Audit Form

City of Colusa
Sewer System Management Plan
Audit Report Form

The purpose of the SSMP Audit is to evaluate the effectiveness of the City of Colusa's (City's) SSMP and to identify any needed improvements.

Directions: Please check **YES** or **NO** for each question. You may also write N/A for any items that are not relevant. Each Element must include supplementary explanatory material of actions and activities completed and describe the updates/changes needed to fully implement the SSMP and the timeline(s) to complete those changes.

		YES	NO
INTRODUCTION			
A. Is the current system description complete and up to date? Are all infrastructure statistics current and complete?			
Discussion:			
ELEMENT 1 – SSMP GOAL AND INTRODUCTION			
A.	Includes SSMP updates?		
B.	Includes schedule and dates for appropriate upcoming milestones?		
C.	Are the updated sewer map referenced and an overview of sewer system assets included?		
Discussion:			
ELEMENT 2 - ORGANIZATION			
A.	Lists the name of the Legally Responsible Official (Designation of a Legally Responsible Official).		
B.	Address the position titles, telephone numbers, and email addresses for management, administrative, and maintenance positions responsible for implementing specific Sewer System Management Plan elements.		
C.	Addresses organizational lines of authority.		
D.	Addresses the chain of communication for reporting spills from receipt of complaint.		
Discussion:			

ELEMENT 3 - LEGAL AUTHORITY			
A.	Does the Plan include copies or an electronic link to the City's current sewer system use ordinances, service agreements and/or other legally binding procedures to demonstrate the City possesses the necessary legal authority?		
B.	Prevent illicit discharges.		
D.	Require proper design and construction of sewers and connections.		
E.	Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the City.		
F.	Enforce any violation of its sewer ordinances.		
G.	Obtain easement accessibility agreements for locations requiring sewer system operations and maintenance.		
Discussion:			
ELEMENT 4 - OPERATIONS AND MAINTENANCE			
A.	An up-to-date sanitary sewer system map (with all sewer system components) and procedures for maintaining and providing State and Regional Water Board staff access to the maps.		
B.	A scheduling system and a data collection system for preventive operation and maintenance activities including: • Inspection and maintenance activities • Higher-frequency inspections and maintenance of hot spots • Regular CCTV inspections of manholes and pipes		
C.	In-house and external training provided for sanitary sewer system operations training.		
D.	An inventory of sewer system equipment, including the identification of critical replacement and spare parts.		
Discussion:			
ELEMENT 5- DESIGN AND PERFORMANCE PROVISIONS			
A.	Updated design criteria, and construction standards and specifications for the construction, installation, repair, and rehabilitation of existing and proposed system infrastructure components, including but not limited to pipelines, pump stations, and other system appurtenances.		
B.	Procedures and standards for the inspection and testing of newly constructed, newly installed, repaired, and rehabilitated system pipelines, pumps, and other equipment and appurtenances.		
Discussion:			

ELEMENT 6 – SPILL EMERGENCY RESPONSE PLAN			
A.	Does the City's Spill Emergency Response Plan (SERP) Plan include an up to date Spill Emergency Response Plan to ensure prompt detection and response to spills to reduce spill volumes and collect information for prevention of future spills?		
B.	Does the SERP have a program to notify primary responders, appropriate local officials, and appropriate regulatory agencies of a spill in a timely manner?		
C.	Does the SERP notify other potentially affected entities (for example, health agencies, water suppliers, etc.) of spills that potentially affect public health or reach waters of the State?		
D.	Does the SERP comply with the notification, monitoring and reporting requirements of this General Order, State law and regulations, and applicable Regional Water Board Orders?		
E.	Does the SERP ensure that appropriate staff and contractors implement the Spill Emergency Response Plan and are appropriately trained?		
F.	Does the SERP address emergency system operations, traffic control and other necessary response activities?		
G.	Does the SERP address the means to contain a spill and prevent/minimize discharge to waters of the State or any drainage conveyance system?		
H.	Does the SERP minimize and remediate public health impacts and adverse impacts on beneficial uses of waters of the State?		
I.	Does the SERP discuss cleaning spill areas and drainage conveyance system in a manner that does not inadvertently impact beneficial uses in the receiving waters?		
J.	Does the SERP implement technologies, practices, equipment, and interagency coordination to expedite spill containment and recovery?		
K.	Does the SERP implement pre-planned coordination and collaboration with storm drain agencies and other utility agencies/departments prior, during, and after a spill event?		
L.	Does the SERP conduct post-spill assessments of spill response activities, document, and report spill events, and annually review and assess effectiveness of the Spill Emergency Response Plan?		
Discussion:			

ELEMENT 7 – SEWER PIPE BLOCKAGE CONTROL PROGRAM			
A.	Does the program include an implementation plan and schedule for a public education and outreach program that promotes proper disposal of pipe-blocking substances?		
B.	Does the program include a plan and schedule for the disposal of pipe-blocking substances generated within the sanitary sewer system service area?		

C.	Does the program include the the legal authority to prohibit discharges to the system and identify measures to prevent spills and blockages?		
D.	Are there requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping, and reporting requirements?		
E.	Does the City have the authority to inspect grease producing facilities, enforcement authorities, and have sufficient staff to inspect and enforce the fats, oils, and grease ordinance?		
F.	Does the Program identify sanitary sewer system sections subject to fats, oils, and grease blockages (hot spots) and have an established cleaning schedule for each section?		
G.	Does the program implement source control measures for sources of fats, oils, and grease reaching the sanitary sewer system?		
Discussion:			
ELEMENT 8- SYSTEM EVALUATION, CAPACITY ASSURANCE AND CAPITAL IMPROVEMENTS			
A.	Does the Plan include procedures and activities for routine evaluation and assessment of system conditions, capacity assessment and design criteria, prioritization of corrective actions, and capital improvement plan?		
B.	Does the Plan Identify and justify the amount (percentage) of its system for its condition to be assessed each year?		
C.	Does the Plan prioritize condition assessment of system areas that: • Hold a high level of environmental consequences if vulnerable to collapse, failure, blockage, capacity issues, or other system deficiencies • Are located in or within the vicinity of surface waters, steep terrain, high groundwater elevations, and environmentally sensitive areas • Are within the vicinity of a receiving water with a bacterial-related impairment on the most current Clean Water Act section 303(d) List		
D.	Does the Plan include procedures to identify system components that are experiencing or contributing to spills caused by hydraulic deficiency and/or limited capacity, including procedures to identify the appropriate hydraulic capacity of key system elements?		
E.	Assess the system conditions using visual observations, video surveillance and/or other comparable system inspection methods?		

F.	Maintain documents and recordkeeping of system evaluation and condition assessment inspections and activities?		
G.	Identify system assets vulnerable to direct and indirect impacts of climate change, including but not limited to: sea level rise; flooding and/or erosion due to increased storm volumes, frequency, and/or intensity; wildfires; and increased power disruptions?		
H.	If needed, does the Plan identify system components contributing to spills by limiting hydraulic capacity?		
I.	If needed, does the Plan have a procedure to identify dry-weather peak flow conditions that are contributing to capacity issues?		
J.	Does the Plan have an appropriate design storm or wet weather event(s) to analyze the system for hydraulic limitations?		
K.	Does the Plan identify key components of the system that are limited hydraulically and contribute to spills?		
L.	Does the Plan identify major sources of that contribute to peak flows associated with sewer spills?		
M.	Does the capacity assessment consider data from existing system condition assessments, system inspections, system audits, spill history, and other available information?		
N.	Does the capacity assessment consider the capacity of flood-prone systems subject to increased infiltration and inflow, under normal local and regional storm conditions?		
O.	Does the capacity assessment include the capacity of systems subject to increased infiltration and inflow due to larger and/or higher-intensity storm events as a result of climate change?		
P.	Does the capacity assessment include the capacity of major system elements to accommodate dry weather peak flow conditions, and updated design storm and wet weather events?		
Q.	Does the capacity assessment consider necessary redundancy in pumping and storage capacities?		
R.	Does the Plan utilize the findings of the condition assessments, capacity assessments, and the severity of the consequence of potential spills, to prioritize corrective actions?		

S.	Does the Plan include a capital improvement plan?		
Discussion:			
ELEMENT 9- MONITORING, MEASUREMENT, AND PROGRAM MODIFICATIONS			
A.	Does the City maintain relevant information, including audit findings, to establish and prioritize appropriate Plan activities?		
B.	Has the City implemented and measured the effectiveness of each Plan Element (e.g. using this audit)?		
C.	Has the City assessed the success of the preventive operation and maintenance activities?		
D.	Has the City continued to update Plan procedures and activities, as appropriate, based on results of monitoring and performance evaluations?		
E.	Has the City identified and illustrated spill trends, including spill frequency, locations and estimated volumes?		
Discussion:			
ELEMENT 10 – INTERNAL AUDITS			
A.	Does the Plan include internal audit procedures, appropriate to the size and performance of the system?		
Discussion:			
ELEMENT 11- COMMUNICATION PROGRAM			
A.	Does the Plan include procedures for the City to communicate with the public for spills and discharges resulting in closures of public areas, or that enter a source of drinking water?		
B.	Does the Plan include opportunities for public input regarding implementation and updates?		
C.	Does the Plan include procedures for the City to communicate with owners/operators of the system that connect into the City's system for system operation, maintenance, and capital improvement-related activities?		