CITY OF GRASS VALLEY

PUBLIC WORKS DEPARTMENT - ENGINEERING DIVISION

CONSTRUCTION STANDARDS

AND

STANDARD DETAILS

Revision: May 2016

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SECTION 1

PURPOSE, DEFINITIONS AND ABBREVIATIONS (PD)

1-1 PURPOSE - The purpose of these Construction Standards is to provide **minimum** standards to be applied to the construction of improvements which are to be dedicated to the public and accepted by the City for maintenance and/or operation. These Construction Standards may also apply to certain private works, as well as improvements to be installed within existing right-of-ways and easements. This is necessary in order to provide for coordinated development of required facilities to be used by the public and for the protection of the health, safety and welfare of the public. These Construction Standards shall apply to, regulate, and guide construction of streets, bikeways, alleys, traffic signals, site access, drainage facilities, sewerage collection facilities, water supply facilities and related public improvements, and shall set guidelines for all private works which involve drainage, grading, trees and related improvements.

1-2 CONSTRUCTION PRACTICE - Because it is virtually impossible to anticipate all situations that may arise or to prescribe specifications applicable to every situation, any items or situations not included in these Construction Standards shall be constructed in accordance with the approved project improvement plans, accepted construction practices, the City of Grass Valley Public Works Department "Design Standards", the State of California Department of Transportation Caltrans Standard Specifications, the State of Caltrans Construction Manual, the Caltrans Standard Plans, and/or other standards as specified by the Public Works Director/City Engineer.

Should conflicts arise between documents, specifications in these Construction Standards and the approved improvement plans shall take precedence over the Caltrans Standard Specifications. In the event of conflict between applicable documents and/or plans, the most restrictive shall prevail.

The Public Works Director/City Engineer may require additional specifications and/or regulations when deemed necessary to protect the health, safety and welfare of the public.

1-3 DEFINITIONS - Whenever the following terms or titles are used in these specifications, or in any document or instrument where these specifications govern, the intent and meaning shall be defined as:

A. Applicant - The Developer or their consulting engineer working on their behalf.

B. Approved Plans - All plans prepared for construction of improvements, reviewed, approved and signed by the necessary Departments within the City of Grass Valley.

C. City - The City of Grass Valley and its applicable Departments.

D. City Engineer - The Public Works Director/City Engineer of the City of Grass Valley, acting either directly or through the staff of the appropriate Divisions of the Public Works Department, or their authorized representatives.

E. Community Development Director - The Community Development Director of the City of Grass Valley, acting either directly or through the staff of the appropriate Divisions of the Community Development Department or their authorized representatives.

F. Compaction - The increase of density of a soil or rock fill by mechanical means.

G. **Construction Standard Details** - The standard construction drawings as set forth in these Construction Standards, approved by the Public Works Director/City Engineer, and as amended.

H. **Consulting Engineer** - Any person(s), firm(s), partnership(s) corporation(s), or combination of, legally and currently registered, licensed and authorized to practice professional engineering in the State of California who prepares or submits improvement plans and specifications for approval by the Public Works Department of the City of Grass Valley.

I. **Contractor** - Any person(s), firm(s), partnership(s), corporation(s) or combination of, currently licensed to perform the type of work involved, who has entered into a contract with any person, corporation or company, or their legal representatives, for the construction of any approved improvement, or portion of any improvement, within the City of Grass Valley.

J. **Developer** - Any person(s), firm(s), partnership(s), corporation(s), or combination of, financially responsible for the work involved.

K. **Development** - The act or process of any construction on properties as well as subdivision improvements.

L. **Fees** -The schedule of fees and costs shall be those established and adopted by the City Council, from time to time, by resolution or ordinance.

M. **Geotechnical Engineer** - A professional engineer, currently licensed by the State of California as qualified in the field of soil mechanics, and soil engineering, and eligible to use the title "Soils Engineer."

N. **Hazards** - Any work or condition on private or public property that constitutes a risk to public safety, endangers property, negatively impacts the air quality, or negatively impacts the water quality of any bodies of water or water courses. Also any work or condition that adversely affects the safety, use, and/or stability of adjacent property, overhead or underground utilities, public ways, waterways or drainage channels

O. **Improvements** - Refers to street work, bridges, sidewalk, curb, gutter, driveways, sanitary sewer, water facilities, storm drainage, traffic signals, public utilities, landscaping, irrigation, parks, fences, walls, and other facilities to be constructed or installed, by the developer within an existing or future public right-of-way or easement, private areas, and other improvements that the City of Grass Valley is responsible to inspect.

P. **Laboratory** - Any testing agency or testing firm, which has been approved by the Public Works Department.

Q. **National Pollutant Discharge Elimination System (NPDES)** - A Federal permit administered by the State Water Resources Control Board and the Regional Water Quality Control Boards (Region 5S-Central Valley).

R. **Notice of Intent (NOI)** - The notification to the State Water Quality Board necessary to comply with the NPDES General Permit if the project area results in the disturbance of one-acre or more of total land area, or which is part of a larger common area of development or sale

S. **Owner** - The legal owner of the property on the latest equalized assessment roll in the office of the County assessor.

T. **Public Works Department** - The Public Works Department of the City of Grass Valley.

U. **Permits** - An official document or certificate issued by a government agency authorizing performance of a specified activity.

V. **Public Facilities** - Streets, sewers, water supply, etc., for public use.

W. **Rainy Season** - For the purpose of the Construction Standards, the rainy season is defined as October 15th to April 15th, inclusive.

X. **Relative Compaction** - The result of processing soil and moisture in the most effective manner to obtain the maximum density and stability (or as a minimum, the required percentage of compaction). All relative compaction testing shall reference ASTM D 1557-1578.

Y. **Safety Rules/Orders** - Subchapter 4, Construction Safety Orders, of Chapter 4, Division of Industrial Safety, of the California Division of Occupational Health and Safety, Title 8 regulations.

Z. **Soils Report** - A report prepared by any person(s), firm(s), partnership(s), or corporation(s) currently legally licensed to prepare "Soils Reports" in the State of California.

AA. **State** - As used in State Specifications, is the City of Grass Valley. If a state in the USA, is the State of California.

BB. **State Highway Design Manual** - The "Highway Design Manual" of the State of California, Department of Transportation (Caltrans), latest edition.

CC. **State Standard Plans** - The "Standard Plans" of the State of California, Department of Transportation (Caltrans), latest edition.

DD. **State Standard Specifications** - The "Standard Specifications" of the State of California, Department of Transportation (Caltrans), latest edition.

EE. **State Traffic Manual** - The “Manual on Uniform Traffic Control Devices for Streets and Highways”, of the State of California, Department of Transportation (Caltrans), latest edition.

FF. **State Construction Manual** - The “Construction Manual” of the State of California, Department of Transportation (Caltrans), latest edition.

GG. **Stop Work Notice** - An order issued by the City Engineer to suspend the Contractors work until an illegal or hazardous situation can be resolved**.**

HH. **Storm Water Pollution Prevention Plan (SWPPP)** - The plan required by the National Pollution Discharge Elimination System (NPDES) permit. This shall include BMPs for stormwater management, including a revegetation and winterization plan for review and approval.

II. **Subdivision Ordinance** - The "Subdivision Ordinance" of the City Code as adopted by the City Council of the City of Grass Valley.

JJ. Work Hours - The hours authorized to perform project work involving machinery or equipment with engines running. Workers shall not be on site more than ½ hour before or after authorized work hours and then only to perform project related functions.

KK. Zoning Ordinance -The "Zoning Ordinance" of the City Code as adopted by the City Council of the City of Grass Valley.

1-4 ABBREVIATIONS - The following abbreviations are used within these Construction Standards:

AASHTO: American Association of State Highway and Transportation Officials
AB: Aggregate Base
ABS: Acrylonitrile-Butadiene-Styrene
AC: Asphalt Concrete and Alternating Current
AS: Aggregate Subbase
ANSI: American National Standards Institute
ARV: Air Release Valve
ASTM: American Society for Testing and Materials
AWG: American Wire Gauge
AWWA: American Water Works Association

BCR: Beginning of Curb Return
BMP: Best Management Practices
BO: Blow Off

CAL OSHA: State of California Occupational Safety and Health Act
Caltrans: State of California Department of Transportation
C & G: Curb and Gutter
C-C: Center to Center
CEQA: California Environmental Quality Act
C.F.: Cubic Foot
CIP: Cast-in-place
C/L: Centerline
C.M.P.: Corrugated Metal Pipe
CMUTCD: California Manual on Uniform Traffic Control Devices
Const. : Construction
CST: Construction Standards, Construction
Ctrs: Centers
Cu. Ft.: Cubic Feet

DET: Detail
DFR; Daily Field Report
Dia.: Diameter
DIP: Ductile Iron Pipe
DLC: Detector Lead-in Cable
DR: Drainage
Dwg: Drawing

Fdn.: Foundation
FL: Flowline

Ga.: Gauge

Gal.: Gallon
Galv.: Galvanized
GR: Grading

HDPE: High Density Polyethylene
Horz.: Horizontal
Hz: Hertz

IBOC: Internal Battery Operated Clock
ID: Inside Diameter

LED: Light Emitting Diode
LS: Landscaping
LMA: Luminaire Mast Arm

MAS: Mast-Arm Side mount
MAT: Mast -Arm Top mount
Max.: Maximum
Mil.: Millimeter
Min.: Minimum
M.P.: Metal Plate

NPDES: National Pollutant Discharge Elimination System:
No.: Number

O.C.: On Center
OD: Outside Diameter
OSHA: Occupational Safety & Health Act

P.C.C.: Portland Cement Concrete
PEU: Photoelectric Unit
P.O.C.: Point of Connection
PPB: Pedestrian Push Button
Ppm: parts per million
psi: pounds per square inch
P.U.E Public Utility Easement
PVC: Polyvinyl Chloride
PWD: Public Works Director/Department

RCP: Reinforced Concrete Pipe
RCV: Remote Control Valve
Rwd.: Redwood
RWQCB: California Regional Water Quality Control Board
R.P.: Radius Point
R/W: Right-of-Way

Sch.: Schedule
SDMH: Storm Drain Manhole
SMA: Signal Mast Arm
SS: Sanitary Sewer System
SSMH: Sanitary Sewer Manhole

ST:	Street
STD:	Standard
SWPPP:	Storm Water Pollution Prevention Plan
SWRCB:	State Water Resources Control Board
TCP:	Traffic Control Plan
TS:	Traffic Signals and Markings
Typ.:	Typical
UBC:	Uniform Building Code
UL:	Underwriters' Laboratory, Inc.
U.S.A.:	Underground Service Alert
VA:	Volts ampere
Var.:	Variable
Vert.:	Vertical
WWF:	Welded Wire Fabric
WWM:	Welded Wire Mesh

All references to specifications, standards or other publications refer to the current issue.

1-5 UPDATES - These Construction Standards and the Standard Details shall be updated as necessary to reflect the changing technology and thinking of the engineering profession, the construction industry and the City of Grass Valley. All updates will be as directed by the Public Works Director/City Engineer and as approved by the City Council of the City of Grass Valley. Users of this document shall be responsible for obtaining updates from the City of Grass Valley, Engineering Division

SECTION 2

RESPONSIBILITIES AND REQUIREMENTS (RR)

2-1 GENERAL - All improvements within the City of Grass Valley right-of-way shall be approved and permitted by the City and shall conform to the City of Grass Valley Design Standards. All work within the City's right-of-way shall be installed in strict accordance with the approved project improvement plans and specifications, these City of Grass Valley Construction Standards and the Caltrans Standard Specifications and Standard Plans. Developers and their contractors shall follow all applicable City, County, State and Federal laws and regulations relating to construction of the improvements.

If it is determined that any work on private or public property is in disagreement with the approved plans or specifications, performed in a un-permitted or unlawful manner, or constitutes a hazard to the public, the City Engineer may issue a stop work notice to the owner of the property upon which the condition is located, or other person or agent in control of such property. Upon receipt of such stop work notice, the recipient shall, within the period specified therein, stop all work, obtain any necessary permits, and conform to the requirements identified in the stop work notice. The City Engineer may require the submission of plans or other reports, detailed construction recommendations, studies, or other engineering data prior to and in connection with any corrective or proposed work or activity.

2-2 DEVELOPER'S RESPONSIBILITY - It shall be the Developer's responsibility for:

A. Consulting Engineer Changes - If the Developer elects to have a registered civil engineer or licensed land surveyor, other than the engineer who prepared the plans, provide the construction staking, then the Developer or the contractor shall provide the City Engineer the name of the individual or firm, in writing, one (1) week prior to the staking of the project for construction.

The Developer's notification of a change in the firm providing construction staking shall include a statement accepting responsibility for design changes and record drawings, as described in "Plan Revisions During Construction" and "Record Drawings," of this section.

B. Inspection and Other Fees - The fees shall be in accordance with the latest fee schedule as adopted by City Council resolution. Before permits are issued, the Developer shall deposit with the City of Grass Valley, a check or cash in a sufficient sum to cover the estimated fees for issuance of permits, charges for review of plans, specifications and reports, other engineering services, field investigations, necessary inspection or other work, and routine laboratory tests of materials and compaction.

Should the actual cost of City services exceed the amount of fees on deposit, the Developer will be notified in writing to deposit additional fees necessary to complete the project.

Should the fees on deposit exceed the actual cost of City services, the excess fees shall be refunded to the Developer at time of release of the Warranty and Guarantee Security.

If any work is done in violation of any laws or rules, or not performed in accordance with approved permits, plans, or specifications, a fee covering investigation of any violation and inspection and plan checking of work required to correct such violation shall be charged to the violator to cover all actual costs and fees.

C. Overtime Inspection Fees - If permission is received for any inspection services performed beyond normal working hours, or on weekends or holidays, either at the request of the Developer/Contractor, or at the discretion of the City Engineer, there will be overtime rates charged for this inspection work. Payment of the overtime charges shall be in addition to the normal plan checking and inspection fees. The amount of the additional fees shall conform to the fee schedule for plan checking and inspection fees as adopted by City Council.

If the overtime services are desired, payment shall be made at least 48-hours in advance, unless the amount currently on deposit for plan checking and inspection fees is determined to be sufficient by the City Engineer.

D. Plan Revisions During Construction - The Developer shall be responsible for providing all professional engineering services that may be required during construction, the preparation of revised plans for construction changes, and the timely preparation of record drawings upon completion of the construction.

Minor changes not affecting the basic design of the improvements may be made without formally revising the plans. The requested change shall be provided to the Public Works Department in writing, and approval shall be in writing from the City Engineer. These changes shall appear in the record drawings.

E. Plans and Permits - The following plans, notices, and permits shall be on site or accomplished prior to beginning any construction on-site:

1. Approved project improvement plans shall be identified by placement of the City Engineer's signature on the cover sheet. No construction shall be authorized until the project improvement plans are approved in this manner. Any construction prior to approved project improvement plans shall be done at the risk of work being rejected and removed.

2. Approval and necessary permits from any and all jurisdictional agencies whose facilities are involved, or whose approval is required. The Developer/Contractor shall file a request for permit forms. The City Engineer may refer an application to other interested public agencies for their recommendations.

3. If the project area results in the disturbance of one-acre or more of total land area, or is part of a larger common area of development or sale, a copy of the landowner's filed Notice of Intent (NOI) and attached acceptable Storm Water Pollution Prevention Plan (SWPPP) with WDID number shall be available on site at all times. The SWPPP shall comply with Section A of the Statewide National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activity.

The site-specific SWPPP, if required, shall be submitted concurrently with the grading plans or project improvement plans, and shall be an integral part of the requirements for development. The SWPPP shall be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The Developer shall also inform the lot/home buyers of appropriate BMPs after purchase.

4. Application for permit and payment of required fees for sewer taps and water connections.

5. Any areas identified on the plans as "no grading" areas shall be designated as such with appropriately placed signs, notices and fencing.

6. A Tree Removal Permit shall be onsite.

7. Approved permits by a State agency where required, including but not limited to, the State Department of Transportation, Department of Fish and Game, etc.

F. Record Drawings - The Developer/Contractor shall keep an accurate record of all approved deviations from the plans before and during construction. One complete set of the record civil plans, plotted on "Mylar" film (or equivalent), shall be submitted to the Public Works Department after project completion.

2-3 CONTRACTOR'S RESPONSIBILITY - It shall be the Contractor's responsibility for:

A. Blasting and Explosive Requirements - The Contractor shall have a valid California State Blasting License issued from the State of California, Department of Industrial Relations, Occupational Safety and Health Administration. Additionally, the Contractor shall obtain a City of Grass Valley "Blasting Permit" from the City's Fire Department prior to any and all blasting within the limits of the City of Grass Valley. The Contractor shall have on file, and keep current, all required insurance documents as established by the City's Fire and Public Works Departments. The Contractor shall notify the following City Departments 72 hours in advance of blasting (if the blasting event involves a street closure or public safety concern, the City reserves the right to require more notification time):

Fire Department	274-4370
Police Dispatch:	477-4600
Public Works Department, Engineering Division	274-4373

B. Cultural Resources - If signs of cultural resources or an archeological site, such as any unusual amounts of stone, bone or shell, are uncovered during grading or other construction activities, work shall be halted at once within 100-feet of the find and the Grass Valley Community Development Department shall be notified immediately. A qualified archaeologist shall be consulted for an on-site evaluation. Additional mitigation may be required by the archaeologist.

C. Concrete Truck Washout Areas - The Contractor shall use precautions, and/or devices, for the protection of storm drain inlets, wetlands, vernal pools and sensitive open space areas, which may border the respective project during all concrete pouring operations. A concrete washout area shall be provided that is confined to the respective project site.

D. Construction Safety - Construction safety within the City of Grass Valley shall be governed by the Construction Safety Orders of the Occupational Safety and Health Standards of Title 8 of the California Code of Regulations.

E. Contractor Employee Vehicle Parking - The Contractor's employee parking shall be limited to designated areas on-site, and shall not encroach into designated wetland areas, tree protected zones or any other areas protected by jurisdictional boundaries, Conditions of Approval or City ordinances.

F. Dust Control – All dust resulting from the performance of the work shall be controlled, either inside or outside the City's right-of-way. No dust shall leave the project site at any time. Appropriate measures such as watering exposed earth surfaces during clearing, grading, earth moving, other site

preparation, and project activities shall be taken throughout the day to minimize dust and provide appropriate air quality. Work shall be curtailed when wind exceeds 15-miles per hour, and at the direction of the City Engineer if adequate air quality cannot be maintained.

G. Emergency Contact Person - Prior to the commencement of project construction, the Public Works Inspector shall be furnished with the name and telephone number of a contact person who can be reached 24 hours per day regarding problems or emergencies at the site.

H. Fluid Discharge - Utilizing the City's drainage system for residual discharge from boring equipment, flushing or other operations without the required measures is prohibited. This discharge is a violation of the Clean Water Act. Discharge shall not be allowed into an open area without the written approval of the property owner, or into a wetlands or creek area prior to approval by the California State Department of Fish and Game.

All activities generating fluids shall include adequate measures to mitigate muddy or other fluid discharge as directed by the project's SWPPP. Proposed mitigation measures should be presented to the City Engineer in writing if they deviate from the acceptable SWPPP. Removal of any residual material is the responsibility of the contractor.

I. Hazardous Materials - Should the contractor encounter hazardous materials, or materials which the Contractor believes may be hazardous waste, as defined in Section 25117 of the Health and Safety Code, the City of Grass Valley Fire Department and the Nevada County Department of Environmental Health shall be contacted immediately. This material is required to be removed to a Class I, Class II or Class III disposal site in accordance with provisions of existing law. The area which contains the hazardous materials shall be marked off and securely protected until an investigation by a member of the Fire Department is conducted.

J. Inspection Requirements - Inspection shall be required for any improvement constructed to the City Construction Standards for which it is intended that the City will assume maintenance responsibility. Inspection is also required for private on-site improvements for conformance with the approved Grading Plans.

1. Adequate access to the site for inspection shall be provided at all times during the construction phase and for a minimum period of one year after completion of the work.

2. Private on-site grading and improvements shall be inspected during construction by the Public Works Inspector for conformance with the Grading Plans.

3. Any improvements constructed without inspection as provided above, or constructed contrary to the order or instructions of the City Engineer, shall be deemed as not complying with the City Construction Standards, and shall not be accepted by the City. Written notice of non-compliance shall be given to the developer and the contractor. All non-compliant work shall be at the Developer's and/or Contractor's risk, and subject to rejection and removal. When the City Engineer deems the improvements may proceed, a written notice shall be provided by the City Engineer.

4. A pre-construction meeting is required prior to starting work on all Grading Permit and Encroachment Permit permitted projects in the City. All tree and any wetland protection measures must be in place prior to the pre-construction meeting. Prior to commencement of

grading activities between October 15 and April 15 of every year, all necessary sediment control measures must be in place and inspected by the City.

5. Within ten days after receiving the request for final inspection, the Public Works Inspector shall inspect the work. A written notice ("punch list") shall be provided to the Contractor, Consulting Engineer, and Developer listing any particular defects or deficiencies that must be remedied. The Contractor shall proceed to correct any such defects or deficiencies at the earliest possible date.

6. When the punch list work has been completed, a second inspection shall be made by the Public Works Inspector to determine if the previously mentioned defects have been repaired, altered, and completed in accordance with the plans. After the City Engineer approves the work and the City Council has accepted the work, the Contractor, Consulting Engineer, and/or Developer shall be notified in writing of the date of final approval and acceptance.

7. On assessment districts and projects where the City participates in the costs, quantities shall be measured in the presence of the Public Works Inspector, Consulting Engineer, and Contractor, and witnessed accordingly.

K. Interruption of Parking Areas - Where parking needs to be interrupted by construction work, the Contractor shall obtain and comply with the conditions of an Encroachment Permit. Type II barricades shall be placed with "No Parking" notices behind the curb, adjacent to the respective parking area, a minimum of 24 hours prior to the start of construction. Information on the notice shall include the date and times when parking is prohibited, the following language: "subject to tow by the City of Grass Valley Police Department pursuant to section 22651(i) CVC" and shall be legible from a distance of 25 feet. Barricades/notices shall be placed at a minimum interval of one for each parking space and shall not obstruct pedestrian use of any sidewalk.

L. Material Disposal – All material removed from a project shall be disposed of properly. Special attention shall be given to planning for recycling of material whenever feasible. For material to be disposed of on other property, approval shall be obtained from the applicable property owner or responsible entity. A written authorization of this approval shall be provided to the City Engineer, upon request.

M. Materials Approval - To illustrate conformance with the plans and these Construction Standards, the Contractor shall provide the Public Works Inspector with formal submittals for all materials planned to be used that are not specifically listed in the latest Construction Standards as approved materials and for all aggregate, concrete and asphalt concrete.

The submittals shall be delivered to the Public Works Department a minimum of 7 calendar days prior to delivery and installation. The City shall review the submittals and any comments on the returned submittals shall be addressed by the Contractor, to the satisfaction of the City Engineer, prior to the delivery and installation of submitted materials.

Materials not approved for use on the project shall be removed from the site within 24 hours if requested by the City Engineer.

N. Notification/Preconstruction Meeting - The Contractor shall schedule a preconstruction meeting with the Public Works Department and any other City departments reviewing and inspecting the

improvements. The meeting shall not be scheduled prior to the City departments' receipt of approved plans and shall take place a minimum of 48 hours prior to the start of construction.

Minimum advance notice to the Public Works Inspector for inspection shall be 48 hours. The Public Works Inspector shall have the opportunity to inspect all underground/subsurface improvements prior to backfill or cover.

O. Personnel - Only personnel competent in the particular trade undertaken shall be employed for the construction work.

P. Plans - Perform construction as specified on the approved project plans, the Design Standards, these Construction Standards, and any and all laws pertaining to the project work. Any additions, deletions or changes to the approved plans shall be submitted for review and approval prior to construction.

Q. Preservation of Property - The Contractor shall take extreme care to protect existing site and adjacent improvements from damage. The Contractor shall be responsible for any damage resulting from the construction and shall be responsible for repair or replacement conforming to the latest standards.

R. Record Drawing Plans - A set of project plans shall be kept on-site and updated regularly. These are to be coordinated with the Public Works Inspector's set of plans for preparing a complete and accurate set of record drawings for the permanent records of the City.

S. Staking - The Consulting Engineer shall notify the Public Works Inspector when the Contractor first calls for grades and staking and shall provide the Inspector with a copy of all cut sheets.

T. Storm Water Pollution Prevention Plan (SWPPP) - The SWPPP shall be implemented at the appropriate level to protect water quality at all times throughout the life of the project. Non-storm water BMPs must be implemented throughout the year. The dynamic nature of construction allows for, and may require, changes to the SWPPP based on the particular nature of the storm should the Plan not be effective. Any deviation from the approved SWPPP shall be reported in writing to the project Developer so the appropriate notice can be sent to the Regional Water Quality Board and a copy sent to the City Engineer.

U. Street Cleaning - Where dirt, mud, rock, sand or other foreign material are tracked onto public street pavement, the Contractor shall clean the streets daily, or as directed by the Public Works Inspector. If the Contractor fails to keep the streets clean, the City may clean the areas and bill the Contractor. Streets shall be cleaned with a power broom or hand brooms and shall not be washed with water without the approval of the Public Works Inspector. Any mud displaced into the City storm drain system by the Contractor shall be removed at the discretion of the Public Works Inspector.

V. Survey Monuments - All existing monuments and/or other survey markers shall be protected, and the Contractor shall notify the City Engineer of any damaged or removed private, City, County, State, or Bureau of Land Management monuments.

W. Temporary Fencing - Any excavation exceeding two feet in depth, left unattended outside project work hours, within a close proximity or within a City right-of-way or easement, as determined by the Public Works Inspector, shall be enclosed with a six foot high temporary fence.

Where temporary fencing is placed along the street in the gutter pan or at the back of a City sidewalk, a delineator or cone shall be placed at a maximum 50 foot interval along the outside of the fence.

X. Trenching Safety - Prior to excavation of trenches 5 feet or deeper, the Contractor shall submit the following to the Public Works Inspector:

1. A copy of the company's annual CALOSHA trenching permit.

2. A copy of the company's letter informing CALOSHA of the time the trenching is commencing and the location of the work.

An encroachment permit shall be obtained from the Public Works Department, Engineering Division prior to trenching within any City right-of-way or easement.

Following trenching and pipe laying, backfill shall be accomplished immediately unless approved otherwise by the Public Works Inspector. Any excavation left open over night and the method of protection shall be approved by the Public Works Inspector.

Y. Traffic Control – A construction area traffic control plan shall be provided whenever traffic flow is impacted by the project or as required by the City Engineer. Traffic control plans may not be required, when in the opinion of the Public Works Inspector, the situation is adequately covered by the MUTCD.

When the Public Works Inspector has determined a TCP is required, the Contractor shall submit the plan to the Public Works Inspector for review. A minimum review time of 72 hours should be allowed prior to the start of the activity causing traffic disturbance, with more complex TCP's requiring additional time. The plan shall include at a minimum: The project title, the encroachment permit number if applicable, the requested traffic alteration specifics and the requested working hours.

Upon approval, the TCP shall be available at the site at all times during the work. The contractor shall assure that the traffic control equipment is erected prior to the work beginning and that it is removed immediately when appropriate.

All traffic control measures shall be installed in accordance with the City approved project specific traffic control plan, the approved improvement plans and specifications, these Construction Standards, the City Design Standards and the California Manual on Uniform Traffic Control Devices. In addition to these manuals, the following measures shall apply:

1. **Start of Construction** - Construction within City right-of-way shall not start until all equipment required by the Caltrans Manual of Traffic Controls for Construction and the accepted Traffic Control Plan has been erected, all required permits from other agencies have been obtained and the Contractor has obtained approval from the Public Works Inspector. Parties not obtaining prior approval shall be subject to a stop-work order from the City. The Traffic Control Plan shall be the primary governing traffic document.

2. **Access** - All residences and businesses shall be notified by the Contractor 48 hours prior to site access being affected. At no time shall any occupant be restricted from access to their property without written permission from the City Engineer and the affected entity/owner.

3. **Lane Changes and Closures** - Lanes shall be closed or transitioned conforming to the Caltrans Traffic Control Manual, or the approved TCP. Lane closures shall not be allowed when the visibility is less than 1/4 mile due to fog, dust or rain.

   A lighted arrow board may be employed as an additional lane change measure and shall always be used for lane changes and closures 1/2 hour after sunset to 1/2 hour before sunrise.

   Lane closures/transitions are only permitted from 9:00 AM to 4:00 PM unless otherwise noted on the approved traffic plan.

   Traffic control devices/equipment setup/placement shall be accomplished in a manner which renders the safest condition for drivers, pedestrians and workers. As examples, warning signs should be erected prior to erection of cones or delineators.

4. **Flag persons** - Flag persons shall be equipped as required in the governing manual with bright colored or fluorescent vests or clothing, flags and/or stop/slow paddles and other equipment as needed. During darkness, clothing shall be reflectorized and shall be visible for one thousand feet and the flag person shall be equipped with a flashlight with an orange or lime green cone. During darkness, flag persons' stations shall be illuminated per the State Traffic Manual.

5. **Temporary Transitions** - A W8-8 ("Rough Road") or W8-1 ("Bump") sign shall be installed 200 feet ahead of any steel plates or temporary pavement transitions in the roadway. The sign may be mounted to an operable, lighted barricade for a maximum of 24 hours. The sign shall be mounted to a 4" x 4" post if the placement exceeds 24 hours.

6. **Sidewalk Removal** - Barricades are required where construction requires the removal of sidewalk or curb and gutter. Wooden lathe with flagging or cones shall not be allowed. Signs indicating "Sidewalk Closed" shall be installed at the ends of construction areas, or where required by the Public Works Inspector.

7. **Barricades** - Barricades shall be Type 2 per Caltrans Specifications. Barricades shall only be used where collision with an object would be more severe than collision with the barricade and as approved by the Public Works Inspector. Barricades shall not be used to channelize or route traffic. All barricades shall include operable warning lights. Barricades placed in an excavated street section adjacent to a traffic lane shall be placed at a maximum 50 feet interval.

8. **Warning Signs** - All traffic warning signs shall be a minimum 36 inches square, shall be mounted on a metal flag tree assembly, and shall include two flags each, fully exposed above the sign. The sign shall only be metal, fabric or as approved by the Public Works Inspector. The top of the sign shall be a minimum six feet high. No sign shall be placed on a barricade unless specifically allowed by the Public Works Inspector or specified by the Traffic Control Plan.

   Upon the approval of the Public Works Inspector, signs may be placed on a 4" x 4" wood post for long durations. Clearance shall be seven feet from finish grade to bottom of sign.

   Signs which are prefabricated to be site specific which may specify detour routing and street names shall be steel or aluminum, 0.080 gauge.

   Minimum six inch black letters shall be employed on a clean, traffic orange background. The signs shall be approved by the Public Works Inspector prior to erection.

9. Cones and Delineators - Cones shall be a minimum 28 inches in height and delineators a minimum 36 inches high by three inches in diameter. Delineators shall include white or yellow reflective stripe(s). Cones shall include a white or yellow reflective sleeve after dark. Yellow reflective material shall be used between opposing traffic and white at the side of the roadway. Only cones, delineators, k-rail, temporary striping, or temporary tape, shall be used to temporarily channelize traffic.

Z. Trailer and Material Storage - Dumpsters, construction materials or equipment shall not be placed in the City of Grass Valley right-of-way without first obtaining an Encroachment Permit from the Public Works Department. As a minimum, two (2) operable, Type II, lighted barricades shall be placed at each end of the obstacle. The Encroachment Permit conditions may indicate additional reflectorization requirements.

AA. U.S.A. Markings - "Underground Service Alert" shall be contacted 48 hours prior to any excavation. Any areas not marked with white paint shall not be included in the U.S.A. and these areas shall not be excavated. The Contractor shall be responsible for any damage resulting from excavation in unmarked areas. The Applicant requesting the U.S.A. markings shall be responsible for the removal of the U.S.A. markings upon completion of the work, at the discretion of the City Engineer.

The location of storm drain lines and gravity sewer lines is not included within the U.S.A. markings. The contractor shall take routine precautions to ascertain the location of storm drain and sewer pipes prior to excavating around them. The contractor shall notify the Public Works Department when the storm drain or sewer system is affected.

BB. Weather - Construction work shall not commence or progress when the weather jeopardizes a safe working environment or the quality of the project in any manner.

Construction activities within or adjacent to the public right of way during inclement weather may be prohibited where the activity constitutes an unsafe condition for the public and/or the workers.

CC. Working Hours - The hours of project construction for work requiring inspection shall be limited to the following:

8:00 AM to 4:00 PM, Monday through Friday

Work between 8:00 AM and 5:00 PM on Saturday, Sunday and Holidays requires a written request to the City Engineer 72 hours prior to the desired construction. If work is allowed outside regular work hours, the Contractor shall have a copy of the written approval available at the work site. The Contractor shall be responsible for the cost of any City staff overtime charges necessitated by inspection requirements outside of the regular work hours.

There may be additional limitations placed on working hours specified on the project's approved plans, conditions of approval, special provisions, or encroachment permit.

DD. **Public Works Contractor Registration Program**- Per SB 854:

1. All contractors and subcontractors who bid on a public works project must register and pay an annual fee to the California Department of Industrial Relations (DIR).

2. No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with DIR.
3. No contractor or subcontractor may work on a public works project unless registered with DIR.
4. An awarding body may not accept a bid or enter into a contract for public work with an unregistered contractor.
5. Any improvements made within the present or future public right of way shall be subject to the DIR requirements.

2-4 RESIDENTIAL OCCUPANCIES DURING SUBDIVISION BUILDING - Upon the occupancy of one or more homes in public or private subdivisions, the occupant(s) shall have a safe, clean, un-obstructed travel way, including sidewalks, in accessing and exiting the area of their home. This applies to newly constructed streets within the subdivision and extends to the closest existing street. The following minimum standards are to be met:

A. Barricades - Unoccupied cul-de-sacs or other sections of streets for which there is no public access necessary shall be barricaded. Barricades shall be Type III (or fencing as approved by the City Fire Department), subject to the approval of the City Engineer.

B. Debris - No building materials, portable toilets or construction equipment shall be stored within the street right-of-way without a valid Encroachment Permit. Portable toilets shall be a minimum of 50 feet from drain inlets.

C. Erosion Control - Erosion control materials at drain inlets, such as gravel bags, shall be removed. Silt bags shall only be removed from drain inlets fronting homes with completed landscaping and for which there is no potential of silt runoff.

D. Landscaping Materials - Landscaping related materials (such as cobbles, bark or gravel) may be staged in the streets for immediate removal. If stored overnight, a lighted barricade shall be placed on each side of the pile, toward traffic. The pile shall not extend into the street from the curb further than the width of a parked car and shall not cover any portion of the sidewalk.

E. Other Requirements - All other requirements within the Subdivision Ordinance and Building Division regulations for approval of occupancy shall apply.

F. Street Cleaning - Streets shall be thoroughly cleaned from back of walk to back of walk at the end of each work day.

G. Street Lighting - Completion of the street lighting system shall be a condition of home occupancy and not a condition of building permit issuance.

H. Street Parking - A trailer with a valid California license may be parked along edges of the street within a subdivision for a period of 72 hours, provided the travel ways are unobstructed and each outside corner of the trailer has lighted barricades.

2-5 REQUIREMENTS FOR CERTIFICATE OF COMPLETION (C.O.C.) - Prior to acceptance of improvements by the City of Grass Valley, the following items must be completed and provided to the Public Works Department (Engineering Division):

A. Landscaping - All required irrigation and landscaping shall be in place and accepted.

B. Grading- The grading contractor shall submit a statement of conformance to the as-built plan and specifications.

C. Final Inspection - The Contractor or Developer shall request a final inspection and punch list for the improvements from the Engineering Division.

D. Warranty and Guarantee - The Developer shall post a Warranty and Guarantee Security to cover the one year maintenance warranty period, if required (as determined by the City Engineer).

E. Fees - All outstanding plan check, inspection and other fees shall be paid.

F. Pad Certificates - Lot pad elevation and compaction certifications (original stamped documents), shall be submitted to the Public Works Department, if applicable.

G. Record Drawings - One complete set of the record civil plans, plotted on "Mylar" film (or equivalent) and an electronic copy of the utility composite on CD/DVD in .dwg format shall be submitted to the Public Works Department after project completion.

H. Storm Water Facilities - All legal owners of Regulated Projects shall sign and record a covenant and agreement to ensure onsite storm water facilities will be maintained by the property owner(s).

I. Certificate of Completion - The Engineering Division will coordinate approval of all applicable City Departments and seek C.O.C. approval by the City Council, if required.

2-6 WARRANTY AND GUARANTEE - The Contractor/Developer shall warranty and guarantee all materials supplied as being fit for the purposes intended and that all work performed as having been accomplished in a proper and workman-like manner. The warranty and guarantee shall continue for a period of one year after the Certificate of Completion is accepted.

A. Security - A Warranty and Guarantee Security shall be submitted prior to the acceptance of improvements by the City of Grass Valley, if required (as determined by the City Engineer). The amount of the security shall be equivalent to ten (10) percent of the approved Engineer's cost estimate for the improvements.

B. Repairs - Should any failure of work occur within the warranty period, the Contractor shall promptly make the needed repairs at the Contractor's own expense. Should such failure of work result in excessive maintenance by the City, or in the opinion of the City, the failure is best left un-repaired, the Contractor shall incur the additional maintenance cost. The cost shall be equal to the annual maintenance cost divided by the current prime rate.

Should the Contractor not make or undertake the necessary repairs within 30 days of having received written notification from the City Engineer, the City may make the repairs and the Contractor shall pay the entire cost. If, in the opinion of the City Engineer, an emergency situation exists where a delay would cause serious loss or damages, or a serious hazard to the public, the repairs may be made without prior notice to the Contractor (provided a reasonable attempt has been made to notify the Contractor), and the Contractor shall pay the entire cost.

All repair work done as a result of the one year warranty and guarantee shall be completed in conformance with the City of Grass Valley Improvement Standards and as approved by the City Engineer.

C. Obligations - The warranty and guarantee obligations for the inspection and repair of warranted improvements shall be as follows:

1. **City's Responsibility** - All necessary City departments shall complete their warranty and guarantee inspections during approximately the tenth month following the Certificate of Completion. The Public Works Department shall compile all outstanding issues and prepare and deliver a final punch list to the Contractor by approximately the end of the tenth month.

2. **Final Punch list Repairs** - Within 30 days of receipt of the final punch list, the Contractor shall repair or address all items indicated. The Public Works Department shall then be notified for re-inspection of repairs.

3. **Final Action** - Within 30 days of notifying the Contractor (by the end of the eleventh month), the City departments shall re-inspect the repaired improvements. If the Contractor does not complete the required work by the end of the eleventh month, the list of repairs will be referred to the City Attorney's office for further management.

D. Release of Security - At the conclusion of one year following the Certificate of Completion and upon the City's approval any warranted repair work, the Warranty and Guarantee Security will be released.

SECTION 3

STREETS (ST)

3-1 GENERAL - Street surface improvements shall include: barricades, bikeways, bridges, bollards, curbs, gutters, driveways, pavement, curb ramps, sidewalks, signs, traffic stripes, pavement markings and trenches. These improvements shall be installed in accordance with the approved improvement plans, these Construction Standards, the latest edition of Caltrans Standard Specifications, the Grass Valley Downtown Streetscapes Standards Manual and as specified by the City Engineer. No street shall be cut in the City's right of way, nor any public improvement disturbed, until the Developer/Contractor has obtained an Encroachment Permit from the City of Grass Valley.

3-2 EXISTING ROADWAY DISTURBANCE - Removal or disturbance of an existing roadway requires that the following conditions be met:

A. Existing Stub Street Connection - The Developer shall be responsible for removing and reconstructing a portion of the existing roadway to make a satisfactory connection, as required by the City Engineer.

B. Street Widening - When widening is necessary to complete an existing partial street along a development project, the Developer shall be responsible for saw cutting and removing a narrow strip along the outside portion of the pavement to provide a clean and stable section for constructing the new pavement against. The width from centerline shall be shown on the approved plans or as determined in the field, and verified by the Public Works Inspector.

C. Sawcutting Existing Streets - When sawcutting within the street for trenching or other purposes, the Contractor shall sawcut or grind and remove the pavement to a minimum depth of 2 inches and repave the removed section with asphalt concrete in accordance with these Standards. Edges of sawcut trenches must avoid wheel paths in travel lanes and be reviewed and approved by the Public Works Inspector. Any delineators and/or striping removed during the grind shall be re-striped or replaced.

All installations on paved surfaces less than 5-years old shall be by boring and jacking only. If trenching is unavoidable, the entire lane width of the disturbed area shall be slurry sealed.

D. Adjacent Roadway Excavation - Where excavation adjacent to an existing roadway results in an elevation difference of greater than 2 inches, the excavated area shall be filled with compacted ¾-inch Class 2 aggregate base, flush with the adjacent roadway at a slope not to exceed 4:1 (horizontal to vertical) prior to the end of each workday. Temporary fill with "native" soil may only be used with the approval of the Public Works Inspector. Delineators or cones shall be placed two feet off the edge of pavement.

Where concrete forms are placed within three feet of the existing pavement edge, the preceding requirement may be exempted overnight upon the placement of appropriate delineation and the approval of the Public Works Inspector.

E. Pavement Milling Requirements - All milled edges perpendicular and diagonal to the travel way shall be temporarily transitioned at 30:1 slope with temporary pavement (cut-back).

3-3 CONSTRUCTION STAKING - Construction staking shall be provided by the Developer for all surface improvements. Such staking shall provide the station and offset, as well as the cut to the nearest hundredth

(0.01) of a foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections and every 25 feet in curved sections. Monuments shall have straddle ties placed.

Cut sheets for the appropriate phase of work shall be on-site and shall be furnished to the Public Works Inspector upon request.

3-4 UTILITY RELOCATION - Existing utilities interfering with the proposed improvements shall be removed, reset, relocated, adjusted, or otherwise managed as specified on the approved project improvement plans; these Construction Standards, or as directed by the City Engineer.

If the utility is the property of a public utility or franchise, the owner shall be notified to relocate the utility within a specified reasonable amount of time. No work shall occur within the road right-of-way prior to completion of the conflicting utility relocation. Utilities damaged during construction shall be repaired to the satisfaction of the City Engineer and with direction from the owner of the utility.

3-5 TRENCH WORK - Refer to the applicable section of these Construction Standards for additional information on the specific type of trench. In addition, these general requirements will be followed:

A. Existing Pavement Trenching - When the trench is in an existing surfaced area, the pavement shall be sawcut or scored and broken ahead of the trenching operations. The pavement shall be cut accurately on neat and parallel lines.

B. Trench T-Cut - Before the final asphalt concrete patch is placed, the edges of the asphalt concrete shall be smooth otherwise sawcut one-foot wider than the width of the trench to create smooth parallel edges. The asphalt between the new sawcut lines and the walls of the trench shall be removed to a minimum depth of 2 inches. The paved trench edges shall be seal coated with Type 3 seal coat or seal coat with sand.

C. Weather - During inclement weather, trenches shall be excavated only as far as pipe can be laid and backfilled during the course of the day.

D. Water in Trench - When a saturated trench condition is encountered, where the pipe is to be installed below historic groundwater levels or where the trench is subject to inundation, the Geotechnical Engineer shall be contacted to provide input to the City Engineer. Dewatering for the installation of structures and pipelines shall commence when groundwater is first encountered and shall be continuous until the excavation is backfilled. Best Management Practices including but not limited to scouring and erosion control measures shall be used to eliminate sediment-laden discharges in accordance with the approved SWPPP. Dewatering methods and operations shall be subject to the approval of the City Engineer.

The trench shall be kept reasonably dry until the placing of the approved bedding material, laying and jointing of the pipe, and placing of the shading material has been completed and approved.

E. Unsuitable Trench Bottom - If the bottom of the trench is soft, yielding, or otherwise unsuitable as a foundation for the pipe, the Geotechnical Engineer shall be consulted for site specific recommendations. In most cases, the unsuitable material shall be removed to the depth necessary to provide a stable and satisfactory foundation. Three-quarter inch crushed rock shall be placed in the trench to provide a stable foundation. The rock is in addition to the required pipe bedding used in the pipe zone. All rock shall be wrapped with geo-fabric.

F. Trench Backfill - All trench backfill within the City's right of way shall be mechanically compacted ¾-inch Class 2 aggregate base or two sack cement slurry material, as shown in Utility Trench Bedding, Backfill and Paving of the Standard Details. The use of the existing soil ("native") for backfill shall not be allowed.

1. General - Trench backfill within the City of Grass Valley street right-of-way shall conform to the Standard Details. Moisture content shall be controlled to obtain the optimum density. All compaction testing shall conform to ASTM D1557-78 test methods. Trench backfill compaction shall be tested by a licensed Geotechnical Engineer at the expense of the Contractor/Developer. Certification shall be provided to the Public Works Inspector prior to the construction of surface improvements.

2. Existing Streets- Longitudinal trenches for dry utilities (CATV, telephone, gas, electric, traffic signal and signal interconnect cable) shall be excavated six inches clear from the gutter lip. Following the patching of the trench with asphalt concrete, the street surface shall be slurry sealed from the gutter lip to the edge of the bike lane stripe. If the bike lane stripe is obliterated in any manner by the construction process, it shall be replaced with thermoplastic per these Construction Standards.

3. Jetting- Compaction of trench backfill by jetting methods is **NOT** allowed in City of Grass Valley right-of-way or over storm, sewer or water trenches. Jetting of joint utility trenches behind the right-of-way and within public utility easements may be allowed under specific conditions and upon the written approval of the City Engineer and the Geotechnical Engineer.

4. Material - Material for backfilled trenches shall contain no organic material and no soil lumps. Controlled Density Fill (CDF), other than two sack cement slurry, may be used on a case by case basis. The Contractor shall submit proposed CDF design mix to the City Engineer for review and approval prior to placement.

Bedding for utility conduits or chases within the City right-of-way shall use only select bedding materials such as sand.

5. Compaction of Material - Equipment used for material compaction shall be of a size and type satisfactory to the on-site Geotechnical Engineer and the Public Works Inspector. Impact-type pavement breakers or compactors (hydrahammers) shall not be used within five (5) feet of the top of any type pipe. Material for mechanically compacted backfill shall be placed in horizontal lifts which, prior to compaction, shall not exceed the depths specified below for the type of equipment employed. Actual maximum lift depth will vary with backfill material conditions and the compaction equipment. The Contractor shall consult with a Geotechnical Engineer to determine the appropriate maximum depths.

The Contractor shall be responsible for verifying compaction requirements for each lift.

6. Maximum Lift Depth for Typical Compaction Equipment -

a. Maximum lift depth of four (4) inches, equipment type:
Portable, engine driven pneumatic type (wacker)
Portable vibratory plate

b. Maximum lift depth of twelve (12) inches, equipment type:
Backhoe mounted sheepsfoot

Vibratory smooth wheeled roller
Vibratory smooth wheel roller with pneumatic tires

c. Maximum lift depth of eighteen (18) inches, equipment type:
Excavator boom-mounted sheepsfoot
Walk behind, vibratory roller, "Rammax"or "Bomag"
Backhoe/excavator boom-mounted vibratory plate "hoe-pack"

d. Maximum lift depth of thirty-six (36) inches, equipment type:
Impact, free-fall or stomping equipment (hydrahammer)

G. Inspection - No facility is to be backfilled without inspection by the Public Works Inspector. Improvements installed without proper inspection shall be exposed and inspected as required by the Public Works Inspector.

H. Temporary Surfacing - In roadway areas, a temporary asphalt plant mix “cut-back” surface not less than 2-inches in thickness may be placed immediately after the top backfill has been completed and compacted. This temporary surface shall be maintained at a level surface until removal. The temporary surfacing material shall be removed just prior to placing the permanent surface material.

I. Steel Plates - Steel plates shall not be used over open trench areas without the approval of the City Engineer. Steel plates do not eliminate the need for shoring.

All steel plates shall have an anti-skid surface and shall be adequately restrained to eliminate shifting and rocking. Temporary asphalt pavement (cut-back) at least one-foot in width shall be used to secure the plate and provide a smooth transition. Grade differences between the plate and the existing pavement may require notching of pavement for acceptable transitions.

3-6 INSTALLATION -

A. General - Subbase and aggregate base for the street and/or sidewalk, curb and gutter shall not be placed until these items within the City street right-of-ways are completed:

1. Installation of underground domestic water, irrigation water, sewer, storm drain, and landscaping irrigation sleeves with all appropriate testing, approval and acceptance by the City Engineer.

2. Installation of underground dry utility crossings, including electric, natural gas, telephone, traffic signal and cable TV systems with all appropriate testing.

3. Backfill and compaction of all trenches with all appropriate testing approved by the designated Geotechnical Engineer and accepted by the City Engineer.

B. Subgrade - The Geotechnical Engineer shall closely monitor and test subgrade to assure the material meets soil resistance values (R-Values) identified in the street design portion of the project soils report. If R-Values differ from the soils report, structural sections shall be adjusted (including plan revisions) by the design engineer and approved by the City Engineer.

1. Compaction - Subgrade for sidewalk, curb ramps, curb and gutter, driveways and asphalt concrete pavement shall be processed to 95% relative compaction to a minimum depth of six

inches. Compaction results will be evaluated by the Public Works Inspector based upon the material and equipment used, the lift depth, compaction effort and number of passes performed and the observed stability of the resulting subgrade area. If required by the Public Works Inspector, compaction shall be tested and certified by a Geotechnical Engineer, licensed in California and certification shall be provided to the Public Works Inspector prior to the placement of concrete or aggregate base. Soils testing for relative compaction shall reference ASTM D1557-78 test methods.

2. **Stability** - Subgrade stability for curb, gutter and sidewalk, and asphalt concrete pavement shall be load tested by proof rolling with a loaded, minimum 3,000 gallon water truck (or equipment of equivalent weight as approved by the Public Works Inspector) in the presence of the Public Works Inspector, the Geotechnical Engineer and the Contractor. Deflecting, unstable areas shall, be corrected and retested per the recommendation of the Geotechnical Engineer and with the approval of the Public Works Inspector prior to placement of aggregate base, or concrete curb, gutter and sidewalk.

3. **Sidewalk Subgrade** - Aggregate base is not required in the structural section for concrete sidewalk. 3/4-inch aggregate base may be substituted for a compacted soil subgrade at the Contractor's discretion and shall be processed to 95% relative compaction. Sidewalk subgrade exposed upon removal of existing sidewalk shall remain intact unless it is determined by the Public Works Inspector to be unstable. In this event, it shall be processed per the preceding paragraphs.

C. Aggregate Base - All aggregate base shall be 3/4-inch maximum, Class 2 AB complying with applicable sections of the Caltrans Standard Specifications and these requirements.

1. **Compaction** - Aggregate base shall be moisture conditioned to optimum moisture content and compacted to 95% relative compaction. Aggregate base shall be tested for compaction and approved by a Geotechnical Engineer licensed in California. Compaction tests shall be tested using nuclear testing gauges in accordance with ASTM D-1557, D-2922 and 3017.

2. **Stability** - Base stability shall be load tested by proof rolling with a loaded, minimum 3,000 gallon water truck (or equipment of equivalent weight as approved by the Public Works Inspector) in the presence of the Public Works Inspector, the Geotechnical Engineer and the Contractor. Deflecting, unstable areas shall be corrected and retested per the recommendation of the Geotechnical Engineer and with the approval of the Public Works Inspector prior to placement of asphalt concrete pavement or concrete curb, gutter and sidewalk, if applicable.

3. **Recycled Materials** - Aggregate base may contain recycled asphalt concrete pavement and concrete. The recycled material shall be clean and not contain deleterious materials including wood, plastic or metal. The aggregate base shall comply with all of the applicable quality requirements for Class 2 AB. AC Grindings shall not be used directly for aggregate base.

D. Concrete - All concrete curbs and gutters, curb ramps, sidewalks, driveways, bus stop pads and turnouts shall be installed in accordance with Sections 51 and 73 of the Caltrans Standard Specifications, the Standard Details and the following requirements.

1. **Certification** - All concrete shall have a 28-day compressive strength of 3,000 psi or greater with a 4-inch slump (typically a “six sack” mix will meet this requirement) unless otherwise specified on the approved project improvement plans where a 28-day minimum compressive strength

and/or mix design shall be noted. The supplier shall provide certification that any concrete furnished conforms to the proper specifications for all proposed
mix designs. The maximum allowable holding time before concrete placement shall be 90-minutes from batch plant to pour.

2. **Thickness** - All residential and commercial sidewalks shall be six inches thick. Across commercial driveways and bus turnouts, the concrete section shall be eight inches thick with grade 60, #4 rebar, 18 inches on center each way, conforming to the Standard Details. Rebar shall be set on 3 inch concrete dobies/rebar supports (including wire ties) at three foot maximum spacing each way.

3. **Finishing** - Concrete shall not be placed or finished in the rain. It shall be the Contractor's responsibility to schedule construction operations accordingly.

   All gutters shall be flow tested with water during the pour to assure proper drainage. Following concrete finishing, no water shall pond in the gutter pan.

   All concrete surfaces shall be completed with a medium broom finish unless otherwise specified. Surfaces to be used by pedestrian traffic shall be broomed transversely to the direction of travel. Blemishes and alignment tolerances, not conforming to the Caltrans Standard Specifications, shall be cause for rejection of the work. No stamps advertising construction companies or other private concerns shall be placed in the concrete.

4. **Curb Ramps** – See the Standard Details for curb ramp specifications. Other ramp configurations in the Caltrans Standard Plans may be permitted with approval of the City Engineer if site conditions prohibit the use of the standard ramps.

   A detectable warning surface panel (raised truncated dome) shall be placed at the back of curb line, immediately behind the curb and gutter, centered in the opening to the street at every curb ramp. Warning surfaces shall be pre-fabricated, yellow panels, except in the downtown area, where the panels shall be gray granite or brick red in color, in accordance with the Grass Valley Downtown Streetscapes Standards Manual.

   Any runoff water standing behind the curb on the panel, or concrete voids under the panel shall be cause for replacement of the panel.

5. **Joints and score marks** - Expansion joints, consisting of ½-inch wide asphalt impregnated felt shall be placed to full depth at both sides of driveway approaches, at ends of curb returns and at 40 foot intervals in all curb, gutter, valley gutter and sidewalk sections. The concrete adjacent to expansion joints shall be finished with an edger tool.

   Deep tool joints, 2-inches deep, shall be placed at 10-foot intervals in all curb, gutter, valley gutter and sidewalk sections. During final finishing the joint shall be readdressed/finished with a 3/8-inch joint tool. A deep tool joint shall be placed at the back of the curb for the total length of all monolithic curb, gutter, and sidewalk. The use of sawcutting in lieu of deep tool joints is not acceptable.

   Score marks, 3/8” deep, shall be placed at 5-foot intervals in all sidewalks, regardless of width. Alternate score mark configurations in the downtown area may be approved by the City Engineer in accordance with the Grass Valley Downtown Streetscapes Standards Manual.

6. **Slopes** - All sidewalks (including portions through driveways and curb ramps) shall be constructed with a minimum cross slope of 1% and a maximum of 2%. The maximum grade in the direction of travel shall be 5% if the street grade allows.

   For all curb ramps the maximum longitudinal slope is 8.33%. For a street with a steeper longitudinal grade, (where the ramp on the higher side of the landing must be lengthened to achieve the maximum 8.33% grade), 20 feet shall be the maximum length transition required, with the City Engineer's approval.

7. **Monolithic sidewalk, curb and gutter** - Adjoining sidewalk, curb and gutter shall be poured monolithically whenever possible.

8. **Curb and gutter installation in an existing street** - In an existing street, a minimum width of 24 inches of existing asphalt concrete paving shall be removed outside the proposed gutter lip and the lip poured against a form board. The resulting asphalt concrete patch between the gutter lip and the existing pavement shall be four inches thick minimum, or the thickness of the existing pavement, whichever is greater.

9. **Curb, Gutter and Sidewalk Patching** - The Public Works Inspector shall determine if damage to concrete curb, gutter or sidewalk warrants patching. Generally, any conspicuous damage shall be patched. Any spall extending more than one inch into the gutter pan from the vertical face of the gutter lip shall be patched at a minimum. The patch shall be flush and of a similar finish to the existing concrete. Any sidewalks with cracks greater than ¼" in width and/or ½" or more of vertical displacement shall be repaired or replaced. When over half of a substandard driveway is replaced, the entire driveway shall be replaced to current City Standards.

10. **Joining New Concrete to Existing** - Whenever new concrete curb, gutter and sidewalk adjoins existing, the existing concrete vertical face shall be doweled 4-inches deep with 12 inch long, grade 60, #4 rebar. Abutting sidewalk shall be doweled mid-section with a minimum of two dowels. Abutting curb and gutter ends shall be doweled twice, 18 inches apart, centered on the curb and gutter section.

    Expansion joint material shall also be placed between all adjoining sections of new to existing curb, gutter and sidewalk.

11. **Section Replacement** - Replaced sections of curb, gutter and sidewalk shall be removed back to expansion joints or deep tool joints; or at the discretion of the Public Works Inspector.

    If the existing edge is damaged during removal, the concrete shall be sawcut again with the Public Works Inspector's approval.

12. **Concrete and Asphalt Concrete Saw Cutting** - Residue from sawcutting shall be removed by vacuum method and disposed of conforming to local environmental and Stormwater Pollution Prevention Plan requirements. Downstream drain inlets shall be protected. In no case shall the residual be allowed to enter the storm drain system or any water of the United States.

13. **Concrete Cure** - Newly placed concrete shall be cured in accordance with the provisions in Section 90-7.01B of the State Standard Specifications and these Construction Standards. Unless

otherwise approved by the Public Works Inspector, exposed surfaces of all concrete sidewalk, curb and gutter, driveways, bus turnouts and curb ramps shall be coated with a non-pigmented curing compound immediately following surface finishing, prior to the moisture sheen disappearing from the surface.

E. Asphalt Concrete Paving - All asphalt concrete shall be installed per the specifications in Section 39 of the Caltrans Standard Specifications and these requirements.

1. Mix Design - The Contractor shall provide the asphalt concrete mix design to the City Engineer at least seven (7) working days prior to the start of work on the project for review and approval. The mix design must be approved prior to commencement of work.

2. Tack Coat - All vertical edges of asphalt concrete and concrete facilities that abut proposed asphalt concrete shall be tack coated. The surface edges shall be clean and free of dirt and dust prior to placing the tack coat.

When new pavement that is to receive a second lift has been exposed to traffic or other sources of contaminants an asphalt emulsion shall be used as a tack coat or paint binder. A tack coat shall also be applied to all existing pavements that are to receive an asphalt concrete overlay.

3. Crack Sealing - All cracks and joints in asphalt concrete pavement shall be filled prior to overlay. Cracks less than 1/4 inch in width shall be sealed with asphalt emulsion and 30 grit sand. Cracks from 1/4 inch to 3/4 inch shall be sealed with a hot melt rubber joint sealant. Excess sealant shall not extend more than two inches outside the crack onto the pavement surface or above the finished surface of the street. Where cracks larger than 3/4 inch (or pavement alligatoring) occur, asphalt concrete patching may be required at the discretion of the Public Works Inspector.

4. Edge Grinding - Edge grinding (Cold Planing) shall be required where existing asphalt is to be overlayed. The edge grind shall match the depth of the asphalt concrete overlay along the length of the gutter lip and abutting pavement where the asphalt concrete pavement is proposed to conform to the existing pavement. The width of the grind shall be 6 feet, unless otherwise approved by the Public Works Inspector.

5. Existing Pavement Between the Gutter Lip and Patched Areas- If the width of existing pavement between the gutter lip and excavated patch/pave area is three (3) feet or less, all existing pavement between the patch/pave area and the gutter lip shall be removed or milled 2 inches in depth, and patched conforming to the adjacent patch/pave area requirements.

6. Fog Sealing – Joints of asphalt concrete pavement and patched trench edges shall be fog sealed with a diluted asphalt emulsion per Caltrans Fog Seal Guidelines. The application of fog seals shall not be applied where rain might prevent the emulsion from fully curing before freezing conditions are encountered.

7. Finishing - The average finished pavement thickness shall be equal to or greater than the design thickness. The finished surface after rolling shall be free of coarse and fine pockets.

Finish, compacted pavement height shall be ¼-inch above and over the gutter lip, except for five (5) feet at the curb ramp opening, where it shall be flush with the top surface of the gutter lip. Corrective operations for recently placed pavement more than ¼-inch above the gutter lip may

include reheat, knead and re-compact with pneumatic tired rollers, in order to bring the improvements into compliance.

If the finished surface of the asphalt concrete does not meet required surface tolerances as specified in the Standard Specifications and these Construction Standards, the Contractor shall, at its own expense, bring pavement surface within tolerance by cold planing and replacing the failing section to a minimum depth of 0.15-feet.

A fog or slurry seal may be required at the Public Works Inspector's discretion if, following cold planing, it is determined the paving surface is sufficiently irregular, boney, discolored, or unsealed to warrant it.

Longitudinal joints in successive pavement lifts shall be offset from lift to lift a minimum of one foot. The surface pass seam shall be located on the lane line.

8. Testing - Asphalt concrete shall be compacted to not less than 95 percent of the theoretical maximum density and shall be finished to the lines, grades, and cross section shown on the Project Plans.

Pavement surface variance shall be checked using a 12 foot long straightedge as detailed in the Standard Specifications. In addition, new pavement may be flooded to check for standing water. All low areas in the asphalt concrete pavement holding water more than 0.01-feet longitudinally and 0.02-feet transversely shall be marked by the Public Works Inspector and patched by the contractor with asphalt concrete fines.

F. Sound and Retaining Walls - Construction of sound and retaining walls shall conform to the approved improvement plans and retaining wall permits. An anti-graffiti coating shall be applied to the City side of all sound and retaining walls bounding the City right-of-way or to the side/surface of sound or retaining walls facing public-owned wetlands, open spaces, or parks, at the discretion of the Public Works Inspector. The Public Works Inspector shall be furnished a letter from the applying contractor certifying that the coating has been applied per the Manufacturer's recommendations, prior to the Certificate of Completion.

The top course of loose block retaining wall such as "Keystone" type shall be epoxy set in place. The adhesive shall conform to Section 3-9 (Materials) below.

G. Survey Monuments - Survey monuments shall be placed at right of way boundaries, property boundaries or sectional corners within the improvement area as shown on the plans, as required by the Public Works Director/City Engineer and as required by the Subdivision Map Act.

Survey monuments placed in the street surface shall be installed per the Boxed Survey Monument Standard Detail.

H. Street Barricades - All sidewalk barricades, pedestrian barricades, and street barricades shall conform to Standard Details.

I. Pavement Removal - Upon demolition of concrete and asphalt concrete pavement, rubble shall be immediately removed or hauled from, and not piled in the City right-of-way. Disposal of such materials shall conform to all local ordinances and regulations of the City of Grass Valley and

Nevada County relating to land grading, flood plains, drainage facilities and disposal of surplus materials.

J. Utility Boxes - Boxes for dry utilities shall be placed behind sidewalks and not in asphalt concrete pavement, the gutter pan, in driveways or in the ramped portion of curb ramps. Utility boxes may be placed in City sidewalk or street only upon the approval of the City Engineer and must meet H-20 load rating requirements.

K. Slurry Seal - After completion of vertical construction on a street, and prior to placement of traffic stripes and pavement markings, all new public streets shall be slurry sealed with a clay-stabilized emulsion.

All streets to be sealed shall be cleaned and all debris shall be removed prior to applying seal coat material. Oil spots shall be treated with an oil spot primer to insure proper adhesion. All cracks shall be blown clean with all debris removed prior to sealing. All cracks greater than ¼-inch wide shall be sealed using a hot-applied crack sealant to the level of the adjacent areas.

Upon completion of any slurry seal, all loose, residual material shall be swept up and removed as soon as the slurried area is adequately cured to do so. The surface shall be maintained in a clean condition until such a time as raveling has stopped.

L. Raising Iron to Finished Grade - For appurtenances such as manholes and water system valves that are in landscaped areas, the top elevation/lid of the manhole or valve shall be flush with the top of grass or to 1-inch maximum above the top of grass as determined by the Public Works Inspector. In landscaped areas using bark for cover, the top elevation/lid of the manhole shall be 2-inches minimum, to 4-inches maximum above the top of the bark.

In concrete or asphalt concrete areas, the iron shall be raised to ¼ ” below the finished surface grade in accordance with Adjust Utility Cover/Manhole to Grade of the Standard Details.

3-7 SIGNS - Signs shall be constructed and installed in accordance with the approved improvement plans and specifications, these Construction Standards, The California Manual on Uniform Traffic Control Devices, the Caltrans California Sign Specifications, and the latest edition of the Caltrans Standard Specifications.

A. Street Signs - At non-signalized intersections, street name signs shall be provided, and shall conform to the Street Name Sign detail of these Construction Standards. Signs in the downtown area shall be constructed in accordance with the Grass Valley Downtown Streetscapes Standards Manual.

Street name signs shall be 6-inches high, 0.080 gauge aluminum, and a minimum of 24-inches long. Panels shall have ½-inch-rounded corners. The finish shall be reflectorized white letters on an engineering grade reflectorized brown background (green background for private streets) with a reflectorized white border.

Street name signs mounted on signal mast arms shall not be the swinging arm type. One side of each street name sign shall be attached to the signal pole in at least two places, and the other end shall be attached to the signal mast arm.

B. Sign Posts - Sign posts shall be a 2” X 2” square metal tube, or as approved by the City Engineer, conforming to the standard specifications for cold rolled carbon sheet steel, commercial quality, ASTM A-446 or hot rolled carbon steel sheet, structural quality, ASTM A-570-90 and ASTM A-653-

94 structural grade 50. The square end of the post can be pointed for easy penetration and shall be capable of being driven into the ground by the use of an approved driving cap.

The finished posts shall be straight and shall have a smooth uniform finish. All holes and ends shall be free from burrs and the ends shall be cut square. Permissible variation in the straightness is one-sixteenth of an inch in three feet. The square tubes shall have holes that are seven-sixteenths plus or minus one sixty-fourth inches diameter on one (1) inch centers, on all four sides for the entire length of the pole. The holes shall be on the centerline of each side in true alignment and opposite to each other directly and diagonally. All posts shall be cut in such a manner to ensure hole alignment between anchors and sleeves when driven into the ground.

Square tubes shall be installed into a sleeve of the same material. A 27-inch long anchor sleeve shall be embedded in Class B/Class 3, 5-sack concrete that is placed in an excavated hole a minimum of 36-inches deep and 6-inches in diameter. Two holes of the sleeve shall remain showing above the finished grade, with all holes below grade taped closed. No material other than the square post shall intrude into the sleeve. The square signpost inside the sleeve shall move freely in the vertical direction after installation.

2" round metal and 4" x 4" redwood posts may be allowed with prior approval of the City Engineer.

C. Roadside Signs - All sign panels, except as otherwise directed in these standards, shall be fabricated using reflective high intensity prismatic sheeting. Message and sheeting shall be on one side of the panel only. No mixing of diamond, high intensity, or engineering grade sheeting on the same panel shall be allowed. All Fluorescent Yellow Green (FYG) background colored signs shall be fabricated using diamond grade sheeting.

All signs shall be securely anchored to the posts with theft-proof bolts, washers, and nuts. Signs with a surface area greater than 5 square feet shall have back bracing attached from the post support to the sign panel.

Efforts shall be made to ensure that all signs in the center median or shoulder areas are not installed next to landscaping or other objects which may impair visibility of the sign. In addition to meeting the minimum standard height requirements of the CMUTCD, signs should be placed at a height and location to maximize visibility while ensuring the safety of pedestrians, cyclists and motorists.

All existing traffic signs, which are in conflict with the proposed work as shown on the plans, shall be removed by the Contractor and returned to the City. The Public Works Inspector shall make the final decision if a question arises as to what represents a conflict.

3-8 TRAFFIC STRIPES AND PAVEMENT MARKINGS - All traffic stripes and pavement markings shall be installed in accordance with the approved improvement plans and specifications, these Construction Standards, the State Traffic Manual, the State Standard Plans and the State Standard Specifications.

A. Material - Traffic stripes and pavement markings shall be thermoplastic material conforming to State Specifications. Painted traffic stripes and pavement markings may be permitted with approval of the City Engineer. All traffic stripes and pavement markings shall include the application of glass beads.

B. Removal - Sandblasting of traffic stripes shall not be permitted. Removal of traffic stripes shall be by grinding, or by other methods approved in writing by the City Engineer. For removal of pavement markings, a rectangular area shall be ground to prevent ghosting of the original marking and be covered with rectangular area of Type II slurry or OverKote asphalt coating, or approved equal.

All conflicting striping shall be completely removed. A Type II slurry seal of conflicting striping from lane line to lane line may be required at the discretion of the City Engineer. Damage to the pavement or surfacing caused by removal shall be repaired by the Contractor, at the Contractor's expense, by methods acceptable to the City Engineer.

All striping or pavement markings damaged during construction shall be repaired at the contractor's expense. Repairs shall consist of complete replacement of markings or legends, replacement of sections of thermoplastic striping, and replacement of damaged or missing markers as directed by the City Engineer.

Residue resulting from removal operations shall be removed from pavement surfaces by sweeping or vacuuming before the residue is blown by action of traffic or wind, or migrates across lanes or shoulders. Drain inlets adjacent to areas to be ground shall be protected from grindings entering the storm drain system.

Dirt and contaminants shall be removed from existing surfaces that are to receive thermoplastic material by mechanical wire brushing. Portland Cement Concrete shall be mechanically wire brushed or abrasive blast cleaned to remove all laitance and curing compound.

C. Thermoplastic Application - Thermoplastic material shall be applied per Caltrans Standard Specifications Section 84 and these requirements:

1. Thermoplastic material shall be applied only to dry pavement surfaces and only when the surface temperature is above 50°F.

2. Existing surfacing which is to receive the thermoplastic material shall be mechanically wire brushed to remove all dirt and contaminants.

3. A primer recommended by the thermoplastic material manufacturer shall be applied to all Portland Cement Concrete surfaces and all asphalt surfaces over six (6) months old. The primer shall be applied immediately in advance of, and concurrent with, the application of thermoplastic material. The application rate shall be as recommended by the primer manufacturer and shall not be thinned.

4. Preheaters with mixers having a 360° rotation shall be used to preheat the thermoplastic material. The thermoplastic material shall be between 400°F and 425°F when applied to the pavement, unless the manufacturer recommends a different temperature.

5. The thermoplastic material shall be applied by either spray or extrusion methods in a single uniform layer. Unless otherwise specified in special provisions, the thermoplastic material for traffic stripes shall be applied at a minimum thickness of 0.06-inch. Pavement markings shall be applied at a thickness of 0.1 to 0.15-inch. The pavement surface shall be completely coated by the material and the voids of the pavement surface shall be filled.

6. Glass beads shall be applied immediately to the surface of the molten thermoplastic material at a rate of not less than 8-pounds per 100-square feet.

7. Metal stencils shall be used when applying pavement markings.

3-9 MATERIALS -

A. Aggregate Base and Subbase - All aggregate base and subbase materials shall be ¾-inch Class 2 as specified on the approved improvement plans and shall conform to provisions in Sections 25 and 26 of the Caltrans Standard Specifications.

Aggregate may include material processed from reclaimed asphalt concrete or Portland Cement Concrete, provided the Contractor supplies the City with written documentation that the material meets the Class 2 specifications. The amount of reclaimed material shall not exceed 50 percent of the total volume of the aggregate used.

B. Asphalt Concrete - Asphalt concrete shall be Type "A" complying with the provisions of Section 39 of the California State Standard Specifications. Asphalt binder shall be performance grade 64-16 paving asphalt conforming to Section 92, "Asphalt," of the Caltrans Standard Specifications.

Asphalt concrete for alleys and residential roadways shall be ½-inch maximum gradation. Asphalt concrete for collector and arterial streets shall be ¾-inch maximum gradation at the discretion of the City Engineer.

C. Concrete - All concrete curbs, curb and gutters, sidewalks, curb ramps, and driveways shall contain not less than 6 sacks of cementitious material per cubic yard. Cementitious material shall be "Type II Modified" Portland Cement Concrete and mineral admixture, or as otherwise approved by the City Engineer, and shall conform to the provisions in Section 90 of the Caltrans Standard Specifications.

D. Concrete Curing Compound - Curing compound shall conform to ASTM C-309, Type 1-D, and Class B, resin base, clear with fugitive red dye. Approved products include Burke Aqua Resin Cure (with dye), W.R. Meadows 1100-Clear Series (with dye) or approved equal.

E. Epoxies, Patching Material - Following are products specified for the indicated applications.

1. **Bonding the top course of loose block, sound/retaining wall:** Burk Epoxy Binder 2104 (Supplier: Whitecap), Rezi-Weld 1000, (Supplier: Spec-West), Sealtight Rezi-Weld ER-43 Type I, (Supplier: Spec-West) or approved equal.

2. **Anchor Bolts/Rebar:** Seal Tight Resi-Weld Gel Paste Unitized Cartridge Epoxy (Supplier: Spec West), Covert Operations CIA Gel 7000 (Supplier: White Cap) or approved equal.

3. **Patching:** Target Speed Set (Supplier: Spec-West), Burke Fast Patch 928 (Supplier: White Cap) or approved equal.

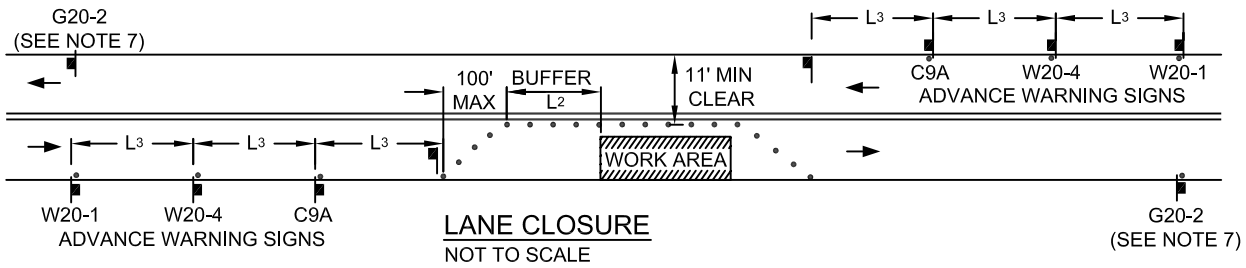
F. Filter Fabric - Geotextile fabric used in trench backfill shall conform to State Specification Section 88-1.03.

G. Reinforcement Bar - Rebar shall be grade 60 steel, deformed type. Smooth bar shall not be allowed. All rebar shall be number four (4) unless otherwise specified on the plans.

H. Sign Posts – Sign posts shall be Telespar square sign posts or approved equal.

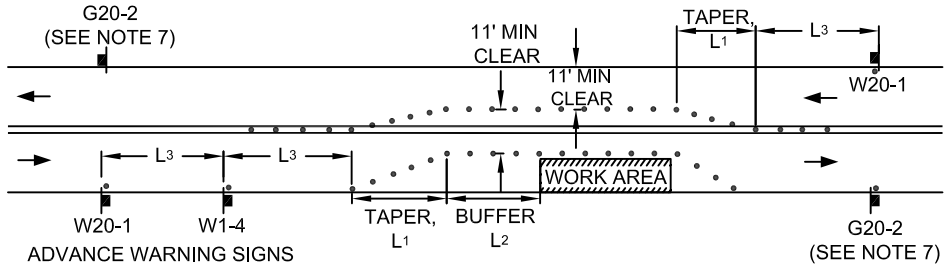
I. Slurry Seal - Slurry Seal shall be conform to Caltrans Specifications, Section 37-2. A design mix shall be submitted to the City Engineer for approval prior to commencing work.

J. Truncated Domes - Truncated dome panels shall be of vitrified polymer composite construction, embedded type manufactured by Armor Tile Tactile Systems, Buffalo, New York, ADA Solutions, N. Billerica, MA, or approved equal. The dimensions and interval of the truncated domes within the panel shall conform to Caltrans Standard Plan RNSP A88 and Division of the State Architect Accessibility Reference Manual, Figure No. 31-23A.



LANE CLOSURE

NOT TO SCALE



LANE SHIFT

NOT TO SCALE

TABLE 1: TAPER LENGTHS, L_1

APPROACH SPEED (MPH)	TAPER LENGTH L_1 (FEET)*	NUMBER OF CONES FOR TAPER*	SPACING OF CONES ALONG TAPER (FEET)
25	125	6	25
30	180	7	30
35	245	8	35
40	320	9	40

* BASED ON 12 FT. LANE WIDTH OR LESS.

LEGEND:

- SIGN
- TRAFFIC CONE/ DELINEATOR
- DIRECTION OF TRAFFIC
- FLAGGER

TABLE 2: BUFFER SPACE, L_2

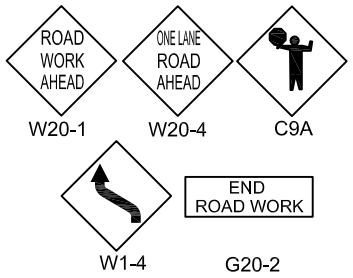
APPROACH SPEED (MPH)	LOGITUDINAL BUFFER SPACE L_2 (FEET)*
25	155
30	200
35	250
40	305

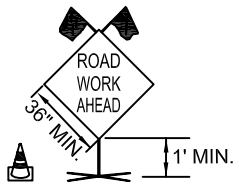
* SEE MUTCD TABLE 6E-101 FOR SUSTAINED DOWNGRADES STEEPER THAN 3%

NOTES:

1. ALL TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH THE CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
2. THE CITY ENGINEER OR HIS REPRESENTATIVE HAS THE AUTHORITY TO IMPLEMENT FIELD CHANGES AS NEEDED TO INSURE PUBLIC SAFETY.
3. UNDER EMERGENCY CONDITIONS, EQUIPMENT AND PERSONNEL WHICH ARE AVAILABLE SHOULD BE UTILIZED TO IMPLEMENT A CLOSURE, EVEN THOUGH SUCH CLOSURE DOES NOT MEET THE STANDARDS CONTAINED IN THIS PLAN. AS EQUIPMENT OR PERSONNEL BECOME AVAILABLE, AN IMMEDIATE EFFORT SHOULD THEN BE MADE TO IMPLEMENT THE STANDARDS SHOWN ON THIS PLAN.
4. ALL ADVANCE WARNING SIGNS SHALL BE 36" x 36" MINIMUM. FOR NIGHTTIME USE, ALL WARNING SIGNS SHALL BE EITHER ILLUMINATED OR REFLECTORIZED.
5. A "ROAD CONSTRUCTION AHEAD" SIGN MAY BE USED IN LIEU OF THE W20-1 SIGN.
6. FLAGGERS SHALL BE EQUIPPED WITH A HARD HAT, A MINIMUM CLASS 2 SAFETY VEST AND A STOP/SLOW PADDLE.
7. THE G20-2 SIGN IS OPTIONAL IF THE END OF WORK ZONE IS OBVIOUS OR FALLS WITHIN A LARGER PROJECT LIMIT.
8. WARNING (W) SERIES SIGNS USED IN WORK ZONES SHALL BE BLACK ON ORANGE.
9. FOR NIGHTTIME USE ALL CONES SHALL BE INTERNALLY ILLUMINATED OR FITTED WITH RETROREFLECTIVE WHITE SLEEVES.
10. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD BE APPROXIMATELY EQUAL IN FEET TO THE SPEED LIMIT. (SEE TABLE 1).

SIGNS:





NOTE: FLAGS AND CONE ARE MANDATORY

ADVANCED WARNING SIGN

NOT TO SCALE

TABLE 3: SIGN SPACING, L_3

APPROACH SPEED (MPH)	MINIMUM DISTANCE BETWEEN SIGNS, L_3 (FEET)*
LESS THAN 25	100
25 TO 40	350

* EXACT SPACING MAY VARY DUE TO FIELD CONDITIONS

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TYPICAL TRAFFIC CONTROL LANE SHIFT/ LANE CLOSURE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	FEB 9, 2010	ST - 1

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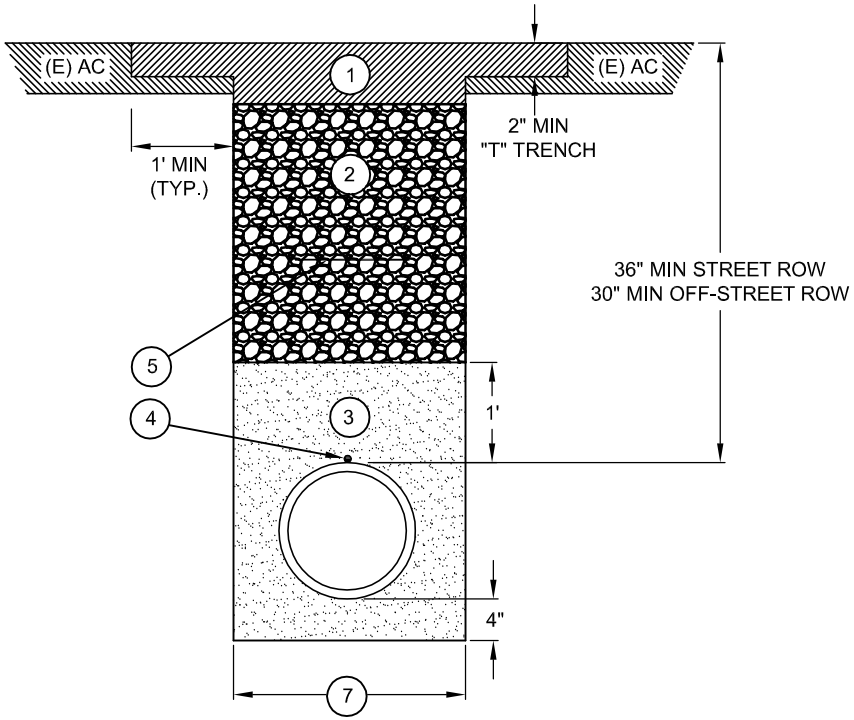
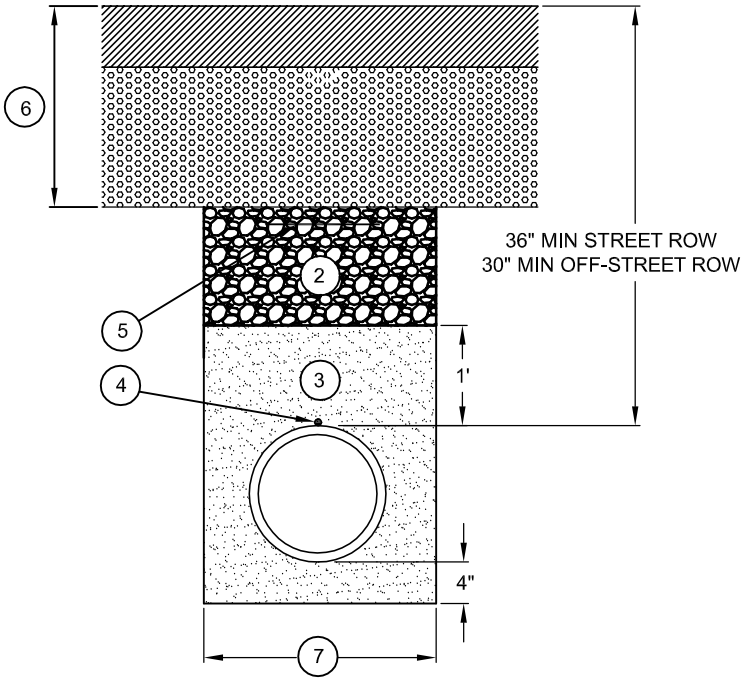


EXISTING STREET UTILITY TRENCH



NEW STREET UTILITY TRENCH

NOTES:

1. AC PATCH, 4 INCHES THICK OR THAT OF EXISTING, WHICHEVER IS GREATER. T-TRENCH MAY BE ACHIEVED BY SAWCUT OR GRIND AND REMOVE. TACK COAT ON ALL PAVEMENT SURFACES (TYP.). SURFACE OF TRENCH EDGES SHALL BE SEAL COATED.
2. AB PROCESSED TO 95% RELATIVE COMPACTION OR TWO SACK SLURRY CEMENT WITH CITY ENGINEER APPROVAL.
3. IMPORTED SAND BEDDING: MECHANICALLY CONSOLIDATED OR SHOVEL SLICED UNDER THE HAUNCHES OF THE PIPE.
4. #10 TRACING WIRE SECURED TO TOP OF WATER MAINS
5. BACKFILL TAPE LOCATED 12"-24" BELOW FINISH GRADE FOR ALL SEWER AND WATER MAINS.
6. STREET STRUCTURAL SECTION PER APPROVED PLANS.
7. TRENCH WIDTH IS FROM UNDISTURBED TRENCH SIDES. OD + 12" MIN., OD + 24" MAX.

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

UTILITY TRENCH BEDDING BACKFILL AND PAVING

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2012	**ST - 2**

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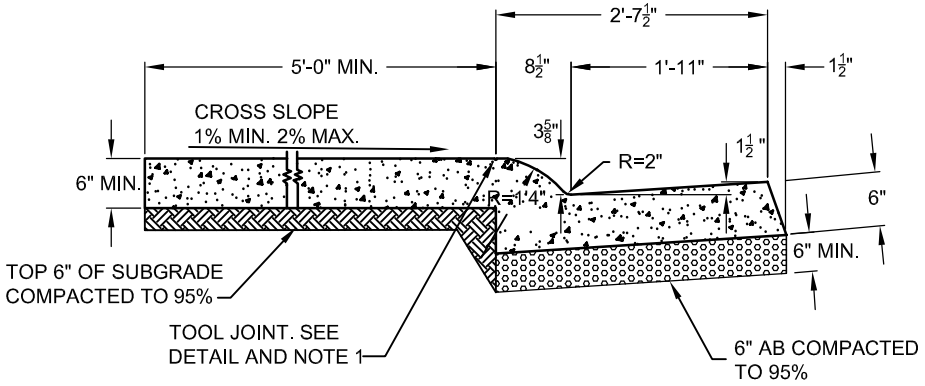
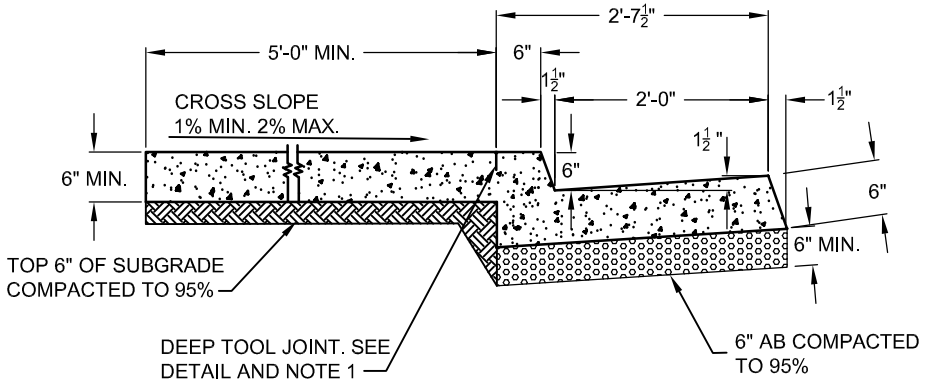


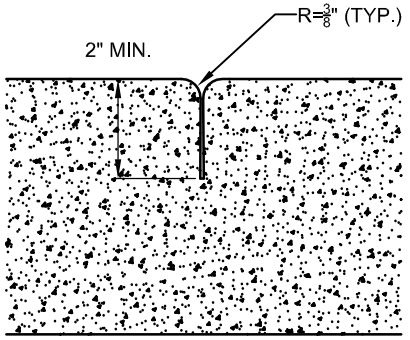
TYPE 1
ROLLED CURB AND GUTTER



TYPE 2
VERTICAL CURB AND GUTTER

NOTES:

1. 2" DEEP TOOL JOINT AT BACK OF CURB FOR ALL MONOLITHIC CURB, GUTTER AND SIDEWALK.
2. AGGREGATE BASE, COMPACTED TO 95%, MAY BE SUBSTITUTED FOR NATIVE SUBGRADE UNDER THE SIDEWALK SECTION.



DEEP TOOL JOINT DETAIL

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

CURB, GUTTER AND SIDEWALK

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**ST - 3**

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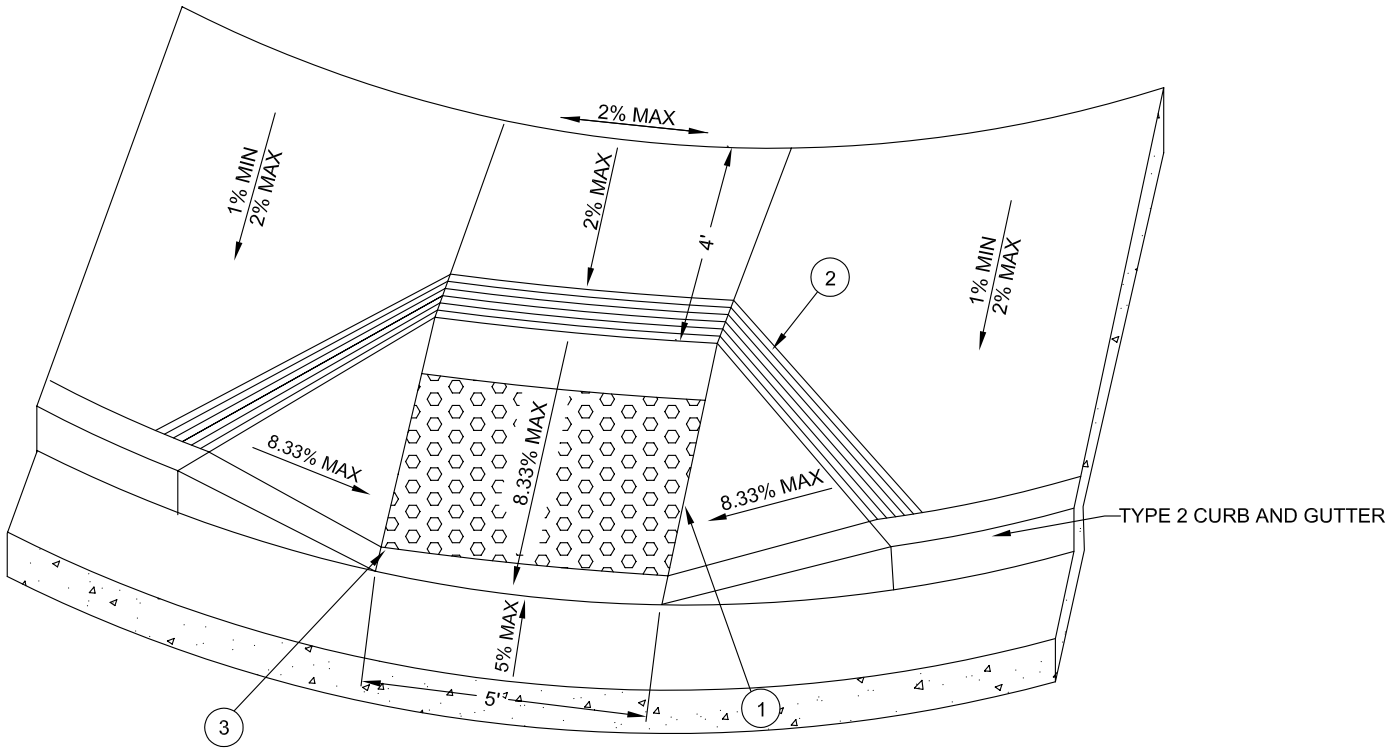

LEGEND:

1. 3' X 5' DETECTABLE WARNING SURFACE PER CALTRANS STANDARD PLANS.
2. 1' GROOVED BORDER PER CALTRANS STANDARD PLANS (TYP.)
3. DEEP TOOL JOINT, SEE CURB, GUTTER AND SIDEWALK DETAIL.
4. TRANSITION FROM RAMP LANDING TO STREET SHALL BE FLUSH AND FREE OF ABRUPT CHANGES.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

CURB RAMP DETAIL
CASE "A"

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST - 4**

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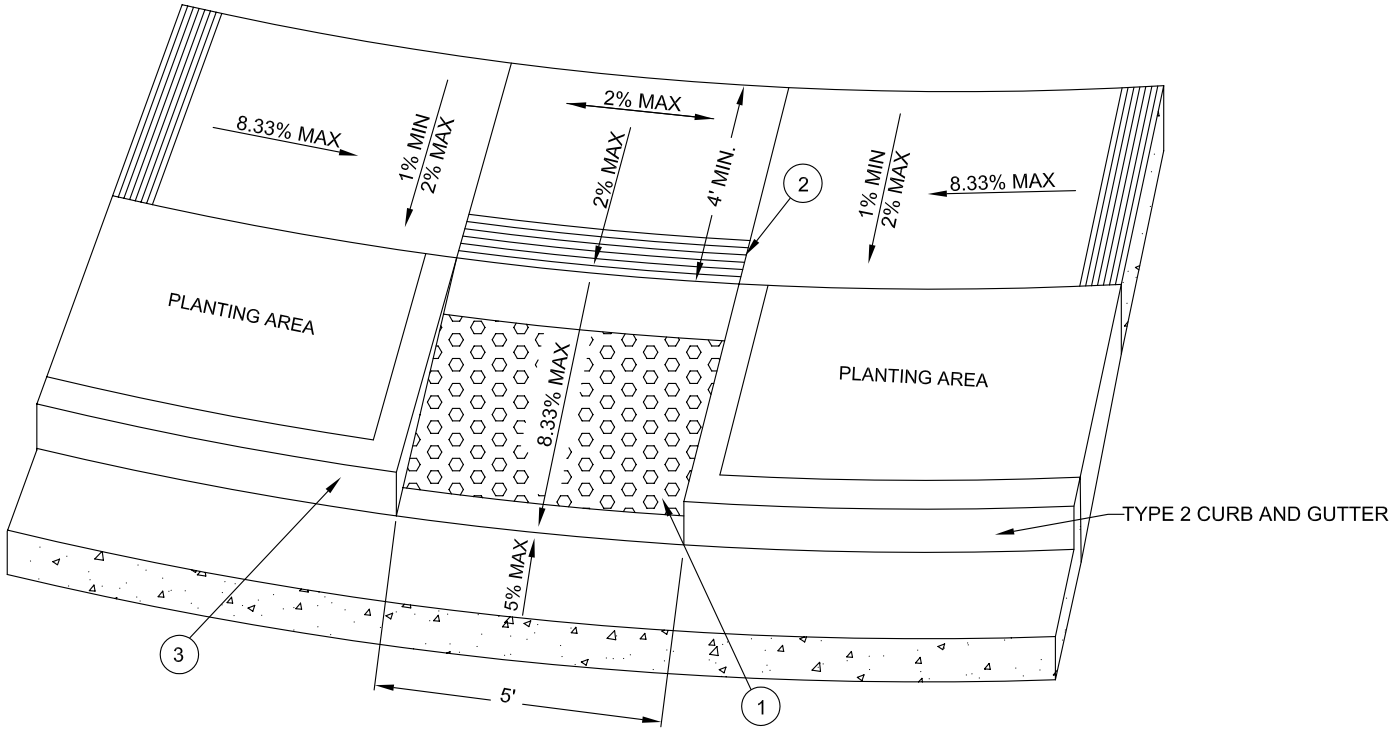

LEGEND:

1. 3' X 5' DETECTABLE WARNING SURFACE PER CALTRANS STANDARD PLANS.
2. 1' GROOVED BORDER PER CALTRANS STANDARD PLANS (TYP.)
3. RETAINING CURB
4. TRANSITION FROM RAMP LANDING TO STREET SHALL BE FLUSH AND FREE OF ABRUPT CHANGES.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

CURB RAMP DETAIL
CASE "B"

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST - 5**

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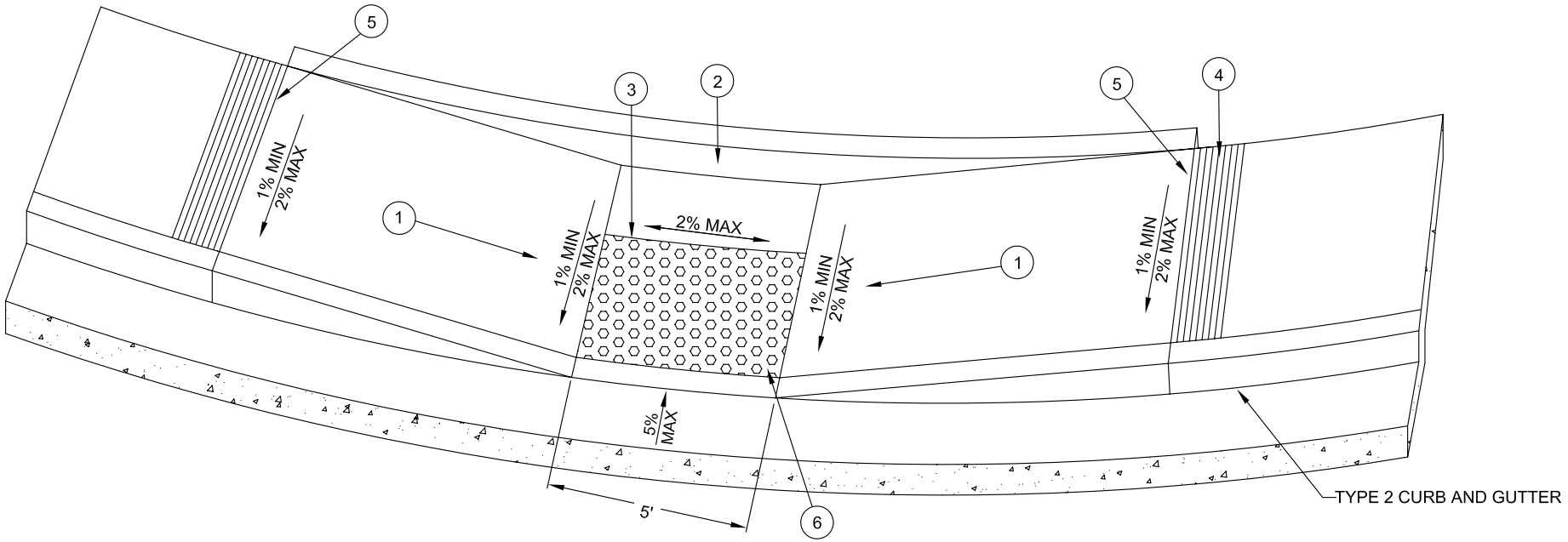

LEGEND:

1. THE MAXIMUM SLOPE IN THE DIRECTION OF TRAVEL IS 8.33%, IF LONGITUDINAL STREET GRADE ALLOWS. ON STEEPER GRADES WHERE 8.33% CANNOT BE ACHEIVED, 20 FEET IS THE MAXIMUM LENGTH TRANSITION REQUIRED WITH THE PUBLIC WORKS DIRECTOR / CITY ENGINEERS APPROVAL.
2. 6 INCH WIDE RETAINING CURB, POURED MONOLITHICALLY WITH SIDEWALK. HEIGHT TO BE DETERMINED BY PROJECTED BACK OF WALK GRADE; MINIMUM DEPTH SECTION FLUSH WITH BOTTOM OF SIDEWALK.
3. 3' X 5' DETECTABLE WARNING SURFACE PER CALTRANS STANDARD PLANS.
4. 1' GROOVED BORDER PER CALTRANS STANDARD PLANS (TYP.)
5. EXPANSION JOINT.
6. DEEP TOOL JOINT, SEE CURB, GUTTER AND SIDEWALK DETAIL.
7. TRANSITION FROM RAMP LANDING TO STREET SHALL BE FLUSH AND FREE OF ABRUPT CHANGES.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

CURB RAMP DETAIL
CASE "C"

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST - 6**

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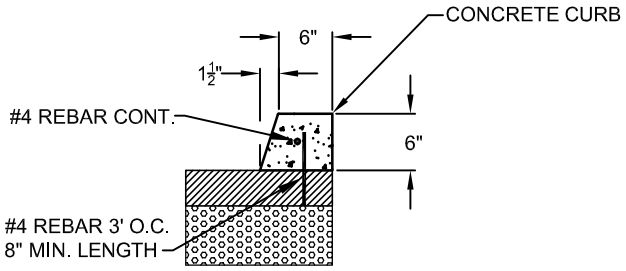
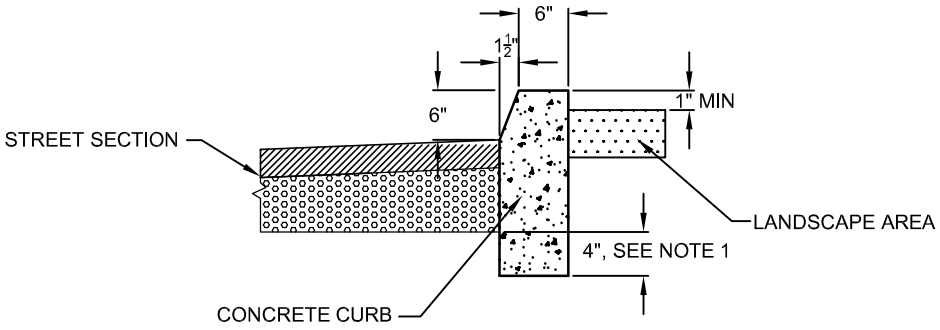


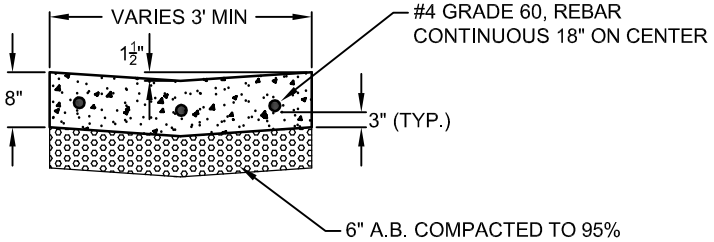
TYPE 3 BARRIER CURB
ADJACENT TO UNIRRIGATED AREAS



TYPE 4 BARRIER CURB
ADJACENT TO IRRIGATED AREAS

NOTES:

1. TYPE 4 CURB TO BE 18" TALL OR 4" DEEPER THAN THE STREET SECTION, WHICHEVER IS GREATER.
2. LANSCAPE AREA TO BE SLOPED TO DRAIN TO AN APPROVED DRAINAGE OR FIELD INLET



VALLEY GUTTER

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

BARRIER CURB AND VALLEY GUTTER

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**ST - 7**

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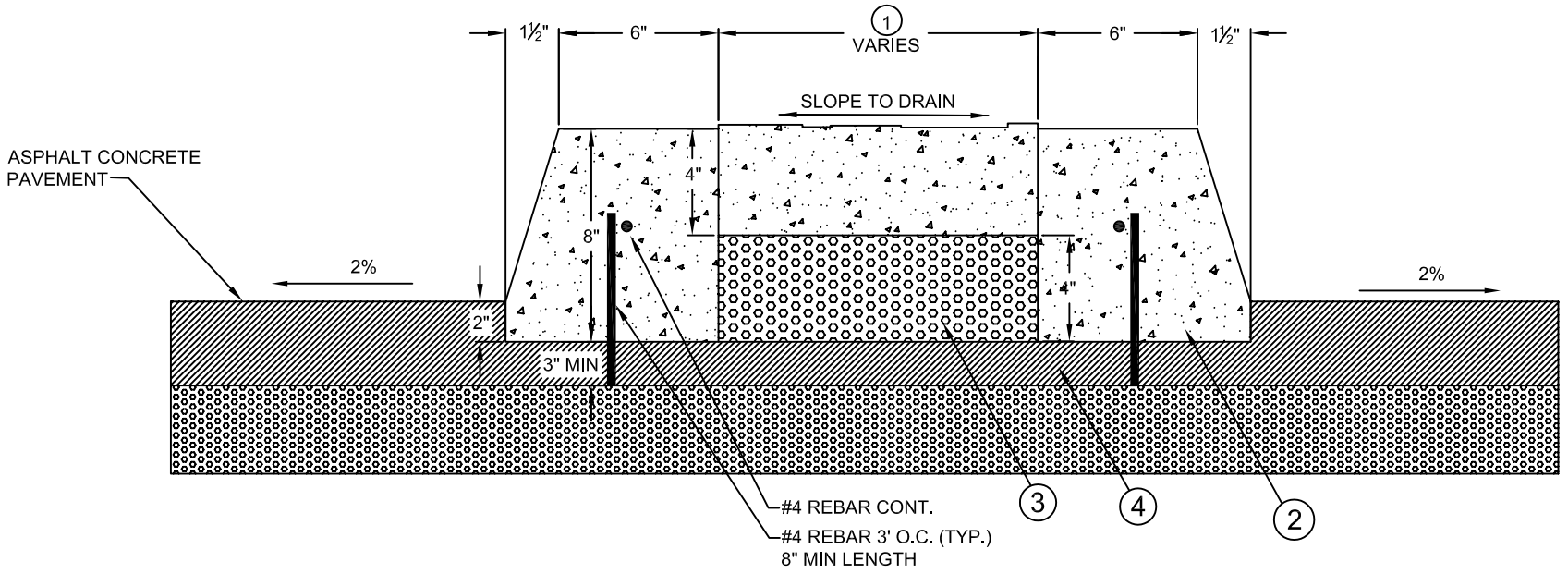


NOTES:

1. THE STANDARD PATTERN SHALL BE BASKETWEAVE BRICK WITH A BRICK RED TINT COLORING. APPLY 60 POUNDS PER 80 SQUARE FEET IN TWO HAND BROADCAST APPLICATIONS. CONTRACTOR MAY ELECT TO INCORPERATE APPROVED COLOR INTO CONCRETE MIX AT 36 POUNDS OF COLOR, INTEGRALLY MIXED, PER CUBIC YARD
2. TYPE 3 BARRIER CURB (TYP.)
3. AGGREGATE BASE COMPACTED TO 95% RELATIVE COMPACTION OR FILLED WITH CONCRETE.
4. ENTIRE AREA BELOW ISLAND MAY BE FILLED WITH AGGREGATE BASE FOR NEW CONSTRUCTION, OR AT THE CONTRACTORS DISCRETION.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

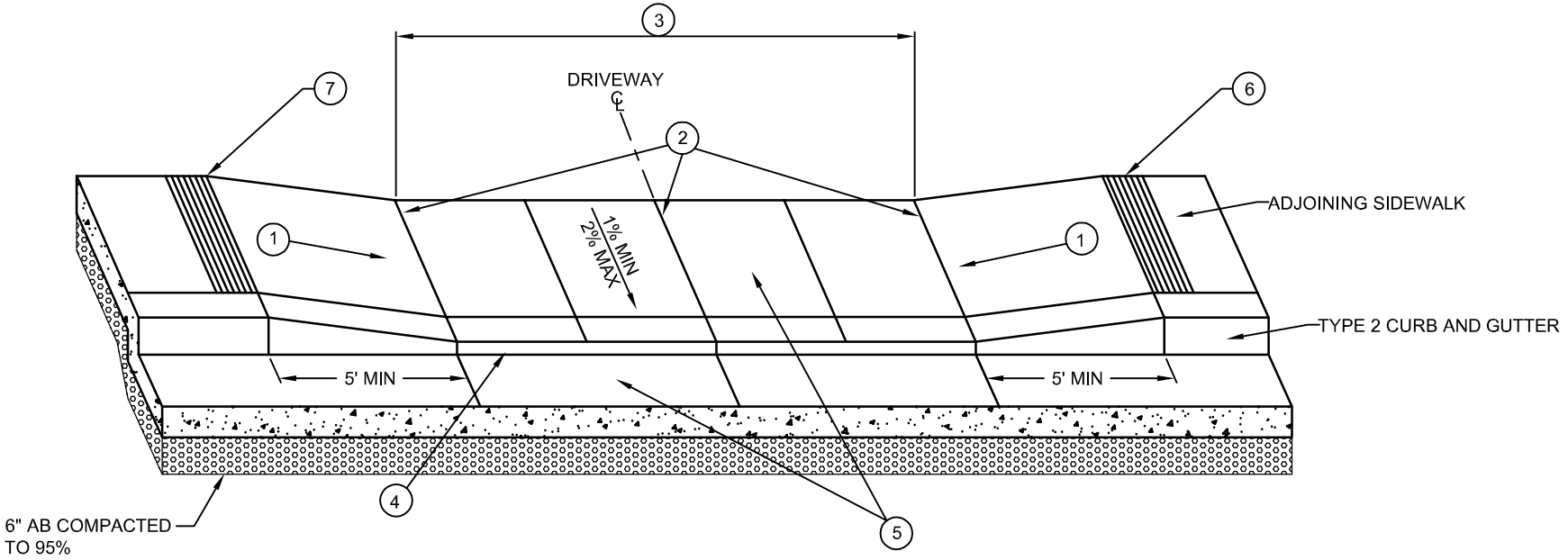
MEDIAN ISLAND

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	FEB 9, 2010	ST - 8

H:\STANDARDS\Standard Details\2_Streets\ST - 8.dwg



LEGEND:

1. THE MAX. SLOPE IS 8.33% IF LONGITUDINAL STREET GRADE ALLOWS.
2. DEEP TOOL JOINT, SEE CURB, GUTTER AND SIDEWALK DETAIL.
3. DRIVEWAY WIDTH PER THE DESIGN STANDARDS.
4. 1 INCH HIGH LIP AT 45 DEGREE BATTER.
5. COMMERCIAL DRIVEWAY: SIDEWALK, APRON AND GUTTER PAN SHALL BE MIN. 8" THICK CONCRETE WITH NO. 4, GRADE 60 REBAR 18" ON CENTER.

   RESIDENTIAL DRIVEWAY: SIDEWALK, APRON, AND GUTTER PAN SHALL BE MIN. 6" THICK CONCRETE.
6. 1' GROOVED BORDER PER CALTRANS STANDARD PLANS. (TYP.)
7. EXPANSION JOINT (TYP.)

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

RESIDENTIAL AND COMMERCIAL DRIVEWAY

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**ST - 9**

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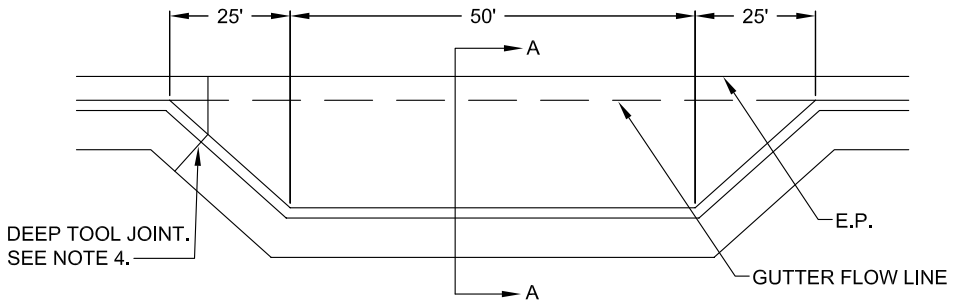
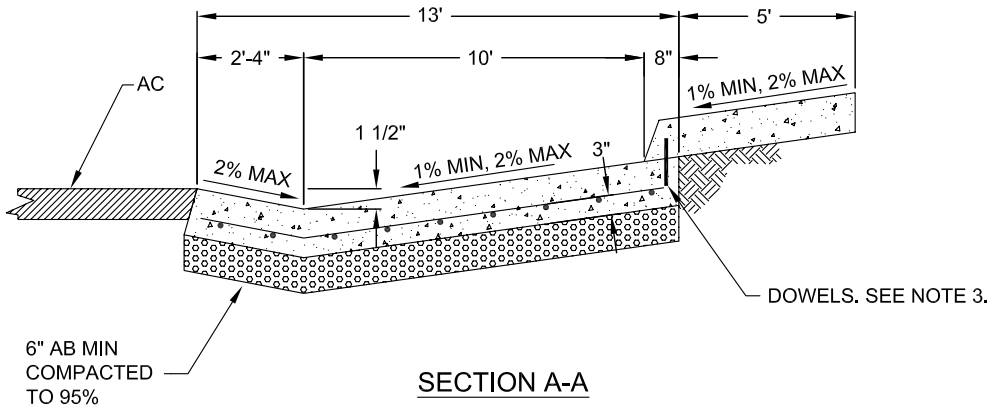


PLAN VIEW



SECTION A-A

NOTES

1. CONCRETE SHALL BE EIGHT INCHES THICK WITH #4, GRADE 60 REBAR AT 18 INCH CENTERS EACH WAY.
2. THE SLAB FOR THE BUS TURNOUT MAY BE PLACED MONOLITHICALLY WITH THE CURB AND SIDEWALK (PREFERRED). IF CONCRETE IS PLACED WITH A COLD JOINT BETWEEN THE BOTTOM OF THE CURB AND THE TURNOUT SLAB, THEN THE CURB SHALL BE DOWELED TO THE SLAB WITH 8" LONG, #4, GRADE 60 REBAR AT FOUR FOOT CENTERS.
3. PLACE 2 INCH DEEP TOOL JOINTS AT 10 FOOT CENTERS, PERPENDICULAR TO THE LIP OF GUTTER IN THE TURNOUT SLAB AND EXTENDED PERPENDICULAR TO THE FACE OF CURB IN THE CURB AND SIDEWALK. SEE CURB, GUTTER AND SIDEWALK DETAIL.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

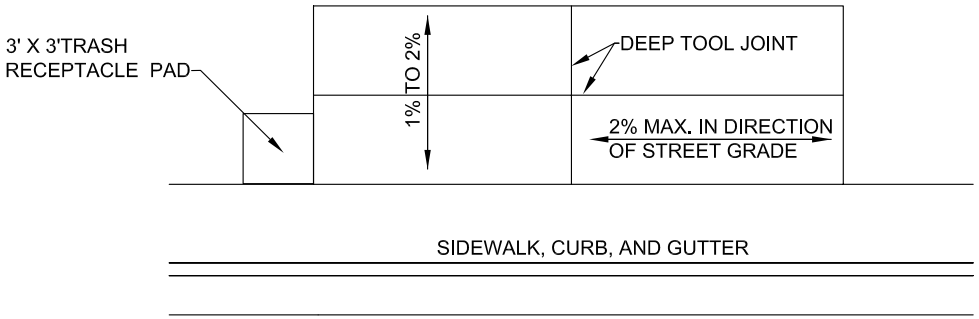
BUS TURNOUT CONCRETE SLAB

APPROVED BY:

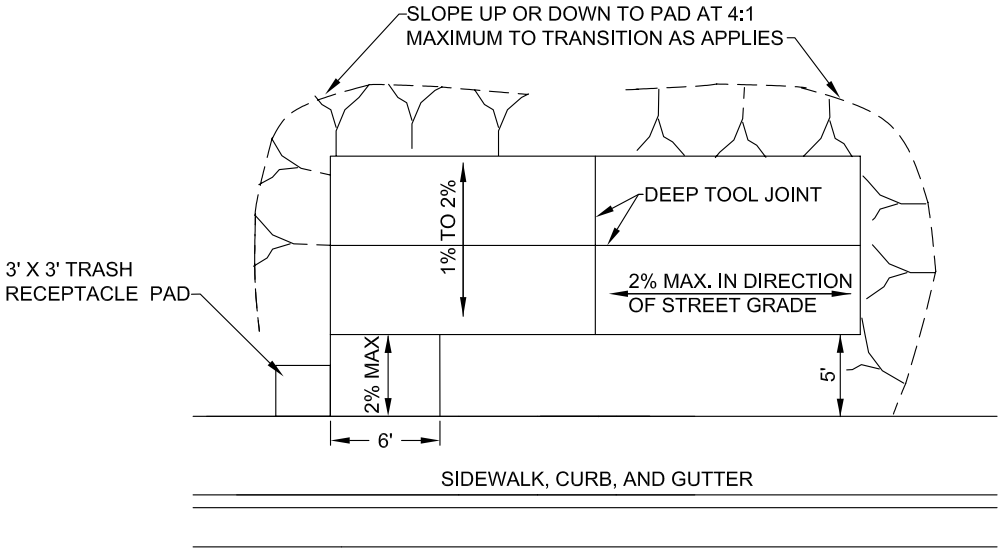
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	ST - 10

H:\STANDARDS\Standard Details\2_Streets\ST - 10.dwg



STREETS WITH LOGITUDINAL
GRADES OF LESS THAN 2%



STREETS WITH LOGITUDINAL
GRADES OF MORE THAN 2%

NOTES:

1. PAD SIZE: 7'x14' X 6" THICK PCC OR PER PLANS.
2. WALK TO BE WARPED FROM 2% AT PAD AS NEEDED TO MATCH STREET GRADE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

BUS STOP SHELTER PAD

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST - 11**

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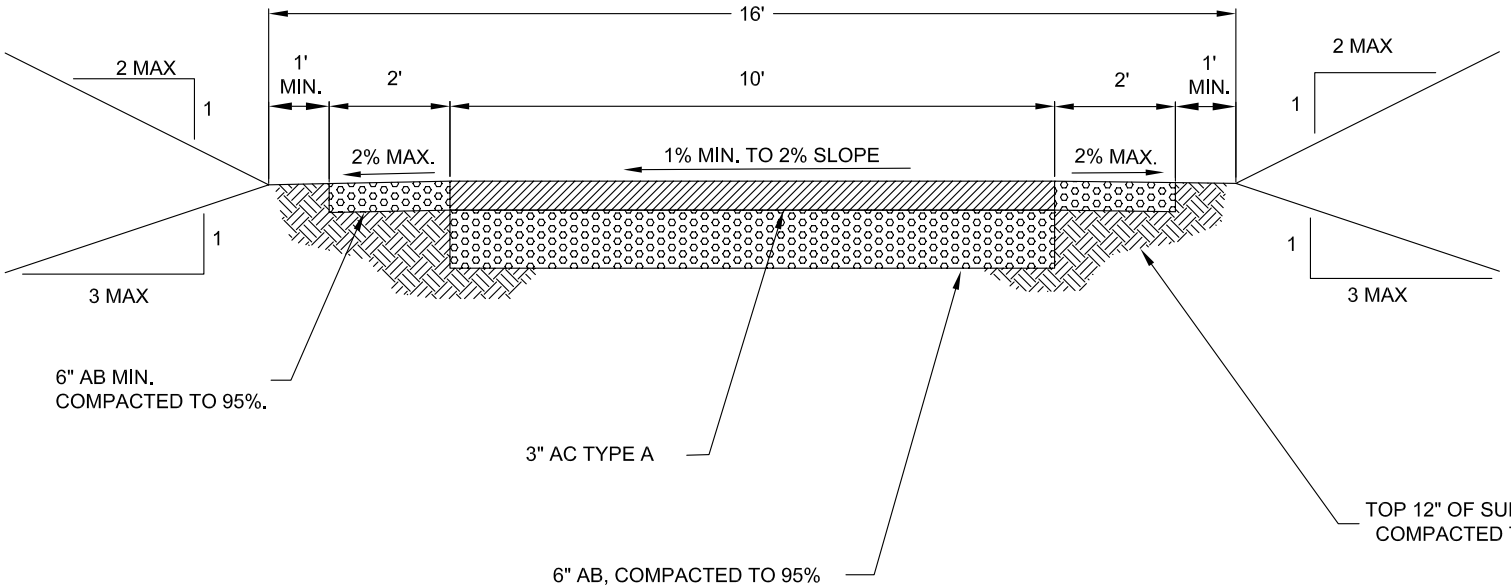


NOTES:

1. BIKE PATHS CONSTRUCTED WITHIN CUT-SLOPES SHALL HAVE A DRAINAGE DITCH OF SUITABLE DIMENSIONS ALONG THE UPHILL SIDE TO INTERCEPT THE HILLSIDE DRAINAGE. BIKE PATHS CONSTRUCTED ON TOP OF FILL SLOPES SHALL HAVE A DRAINAGE DITCH OF SUITABLE DIMENSIONS ALONG THE DOWNHILL SIDE TO INTERCEPT THE TRAIL'S DRAINAGE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

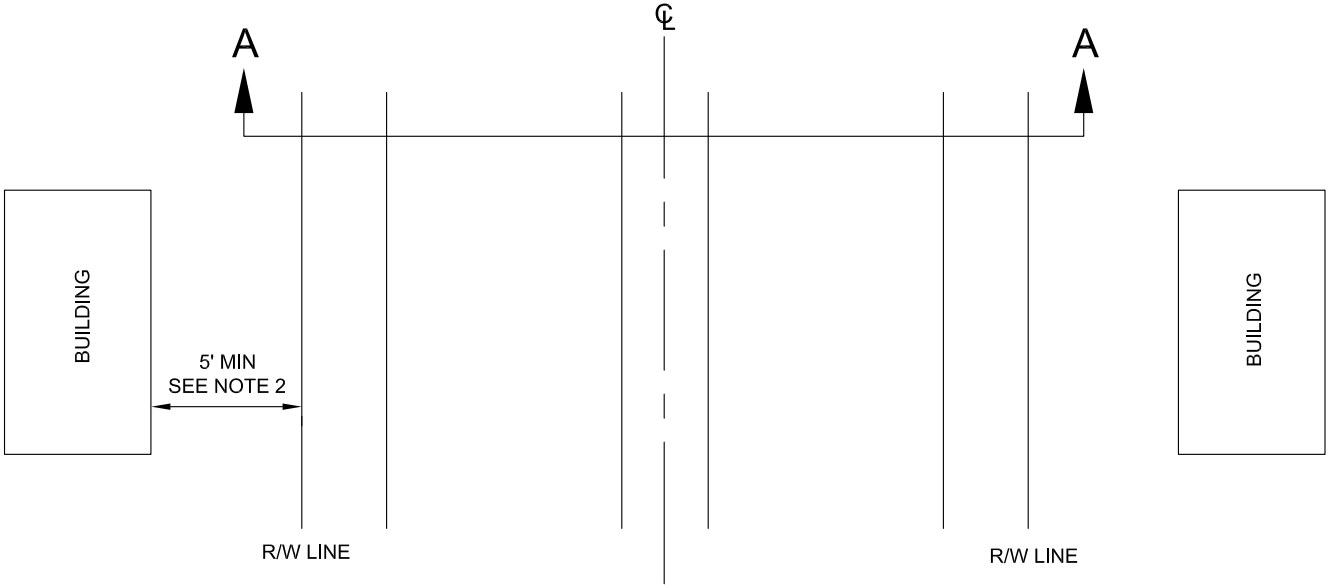
SHARED USE PATH

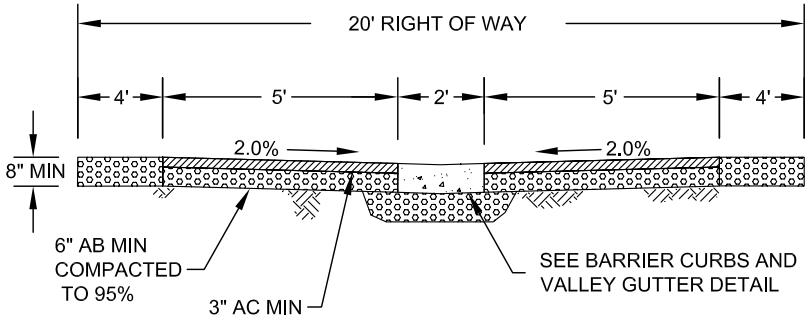
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-12**

H:\STANDARDS\Standard Details\2_Streets\ST - 12.dwg





SECTION A-A

NOTES:

1. SEE THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
2. 25' SEPARATION FROM BUILDINGS IS REQUIRED IF PARKING IS ALLOWED IN FRONT OF GARAGES.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

RESIDENTIAL ALLEY

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	ST-13

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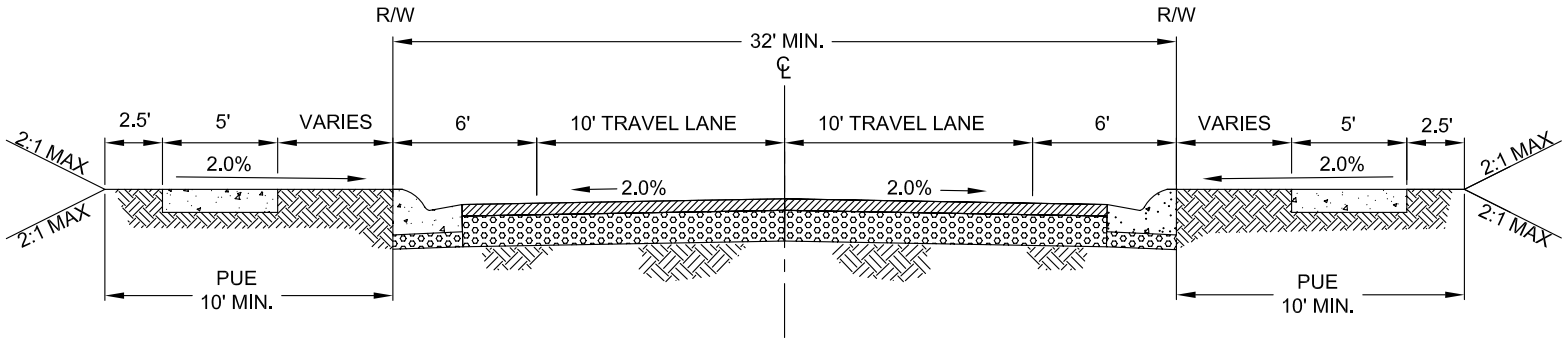
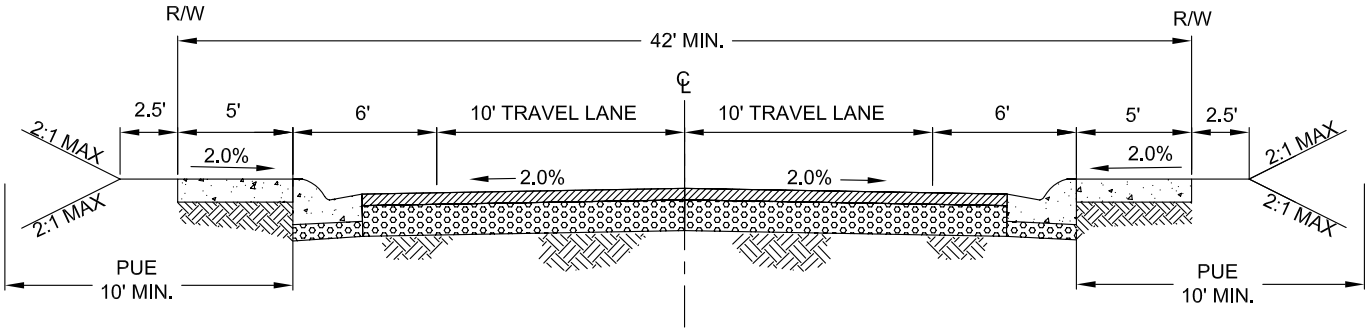


DETACHED SIDEWALK NO PARKING



ATTACHED SIDEWALK NO PARKING

NOTES:

1. FOR STREET REQUIREMENT SEE THE DESIGN STANDARDS.
2. CURB AND GUTTER TO BE TYPE 1 ADJACENT TO SINGLE FAMILY RESIDENTIAL LOTS, TYPE 2 AT ALL OTHER LOCATIONS.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

MINOR RESIDENTIAL STREET (NO PARKING)

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-14**

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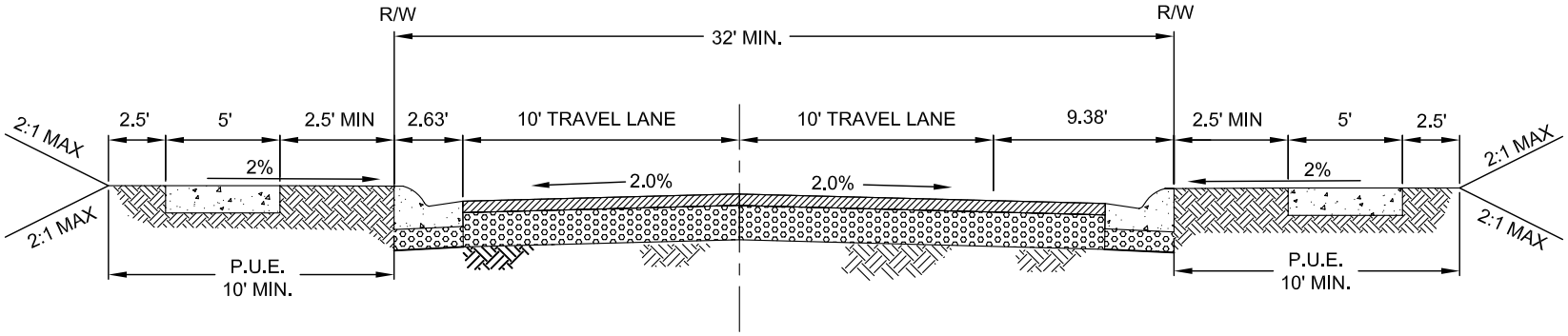
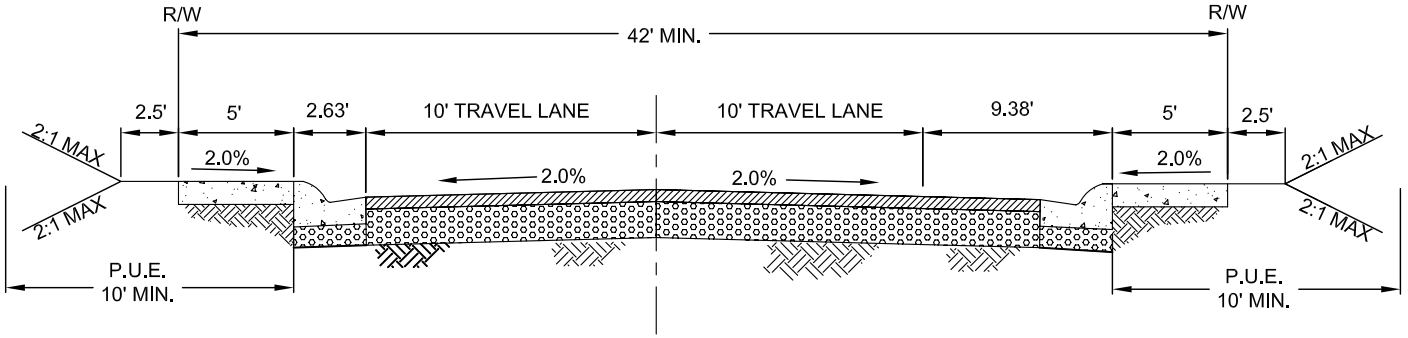


DETACHED SIDEWALK PARKING ONE-SIDE



ATTACHED SIDEWALK PARKING ONE-SIDE

NOTES:

1. FOR STREET REQUIREMENTS SEE THE DESIGN STANDARDS.
2. CURB AND GUTTER TO BE TYPE 1 ADJACENT TO SINGLE FAMILY RESIDENTIAL LOTS, TYPE 2 AT ALL OTHER LOCATIONS.

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION
	MINOR RESIDENTIAL ST (PARKING ONE-SIDE)
APPROVED BY:	PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-15**

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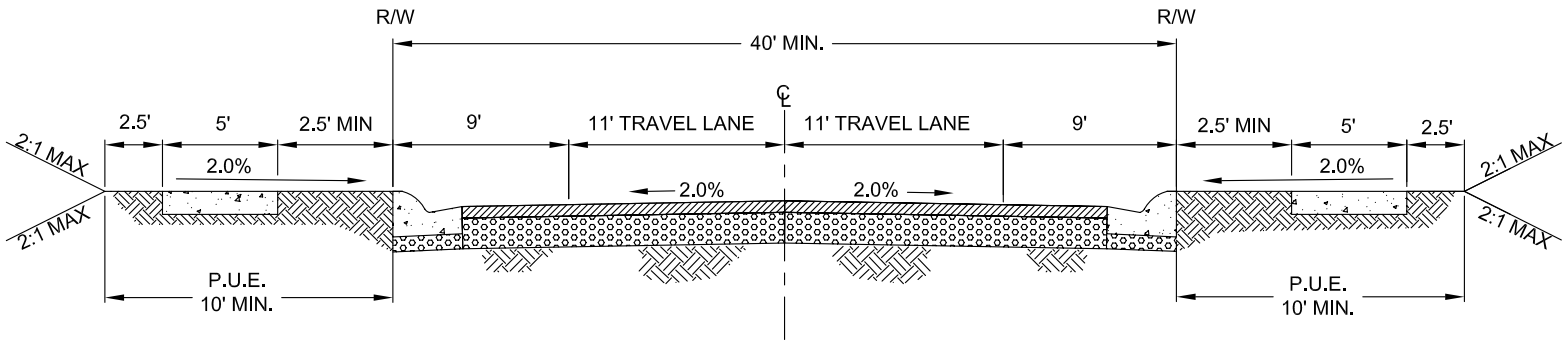
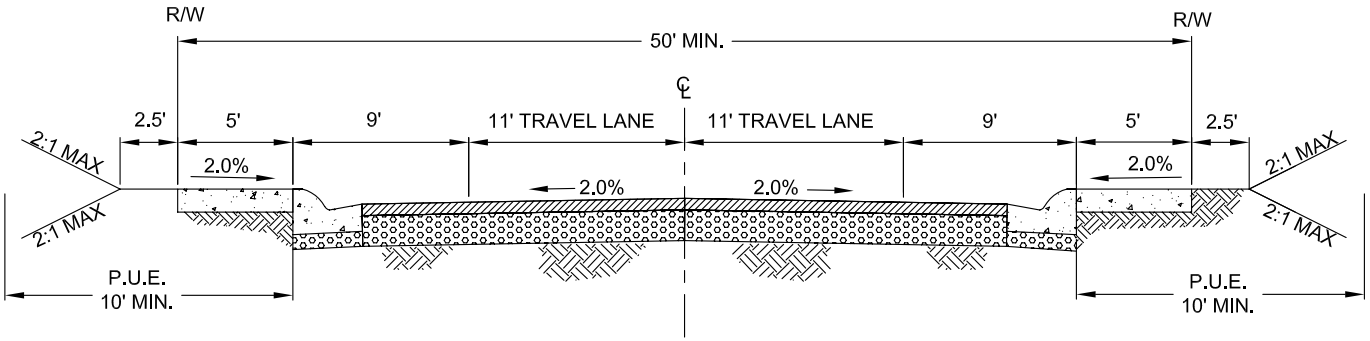


DETACHED SIDEWALK



ATTACHED SIDEWALK

NOTES:

1. FOR STREET REQUIREMENTS SEE THE DESIGN STANDARDS.
2. CURB AND GUTTER TO BE TYPE 1 ADJACENT TO SINGLE FAMILY RESIDENTIAL LOTS, TYPE 2 AT ALL OTHER LOCATIONS.

	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION
	PRIMARY RESIDENTIAL STREET
APPROVED BY:	PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-16**

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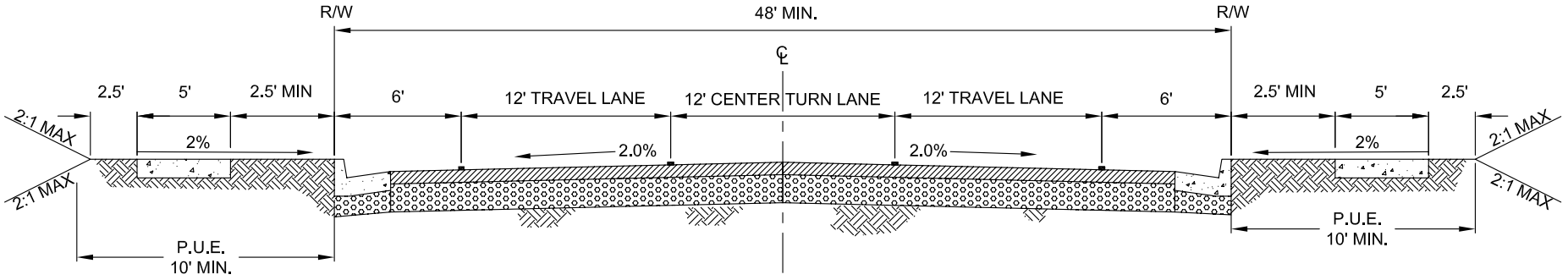
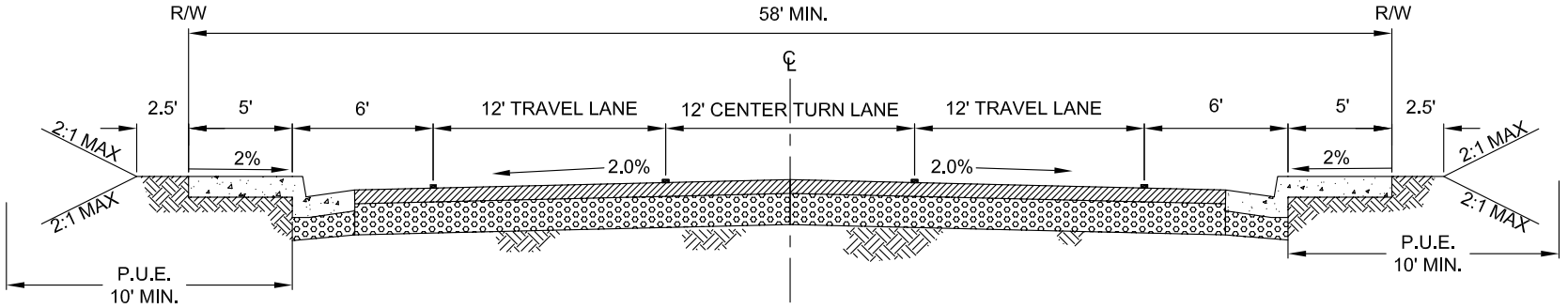


DETACHED SIDEWALK NO PARKING



ATTACHED SIDEWALK NO PARKING

NOTES:

1. CENTER TURN LANES OR LEFT TURN LANES ARE TO BE INSTALLED AS REQUIRED OTHERWISE A SOLID OR LANDSCAPED MEDIAN ISLAND IS TO BE CONSTRUCTED WITH THE APPROVAL OF THE PUBLIC WORKS DIRECTOR/CITY ENGINEER.

2. CURB AND GUTTER SHALL BE TYPE 2 . MEDIAN CURBS SHALL BE TYPE 3 BARRIER CURB WHEN SOLID MEDIANS ARE INSTALLED AND TYPE 4 BARRIER CURB WHEN LANDSCAPED MEDIANS ARE INSTALLED.

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	COLLECTOR STREET (NO PARKING)		
APPROVED BY: PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: BPJ	DATE: MAR 3, 2009	**ST - 17**

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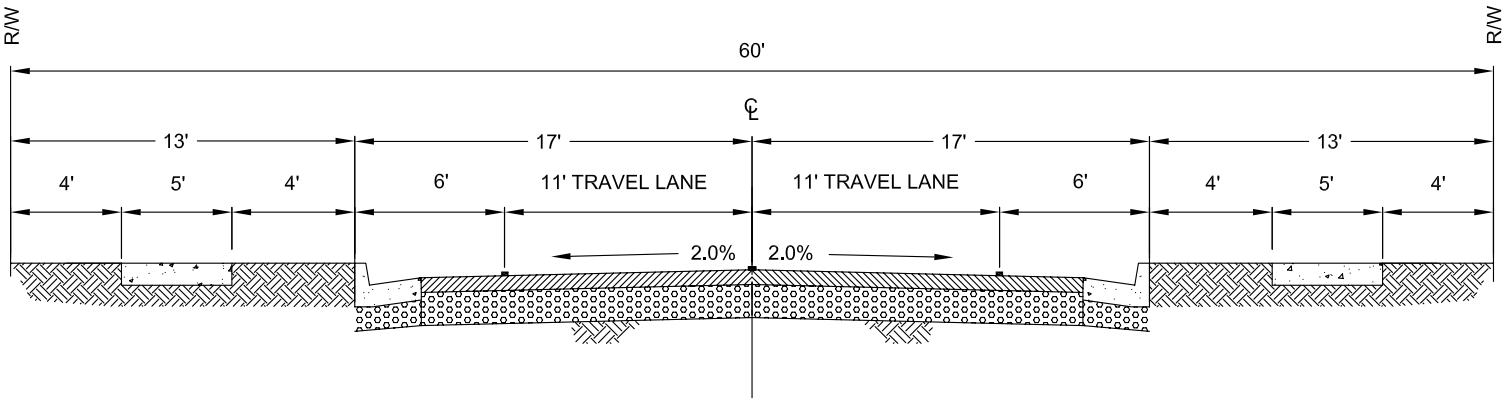

NOTES:

1. THIS MODIFIED STREET SECTION IS TO BE USED ON RIDGE RD BETWEEN SLATE CREEK AND HUGHES RD AND OTHER LOCATIONS AS DIRECTED BY THE CITY ENGINEER OR CITY COUNCIL.

2. PLANTING ADJACENT TO SIDEWALK AREA REQUIRES APPROVAL FROM THE CITY ENGINEER TO ENSURE PROPER LINE OF SITE.

3. MINIMUM RIGHT OF WAY REQUIREMENTS ARE SHOWN ABOVE. WITH CITY COUNCIL APPROVAL, ADDITIONAL RIGHT OF WAY MAY BE REQUIRED TO ALLOW FOR TURN LANES

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

MODIFIED COLLECTOR STREET 1

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-18**

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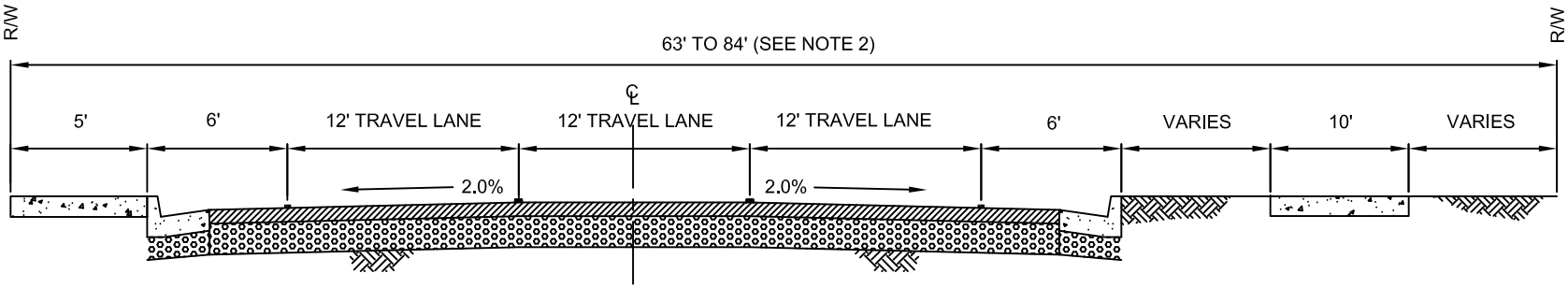
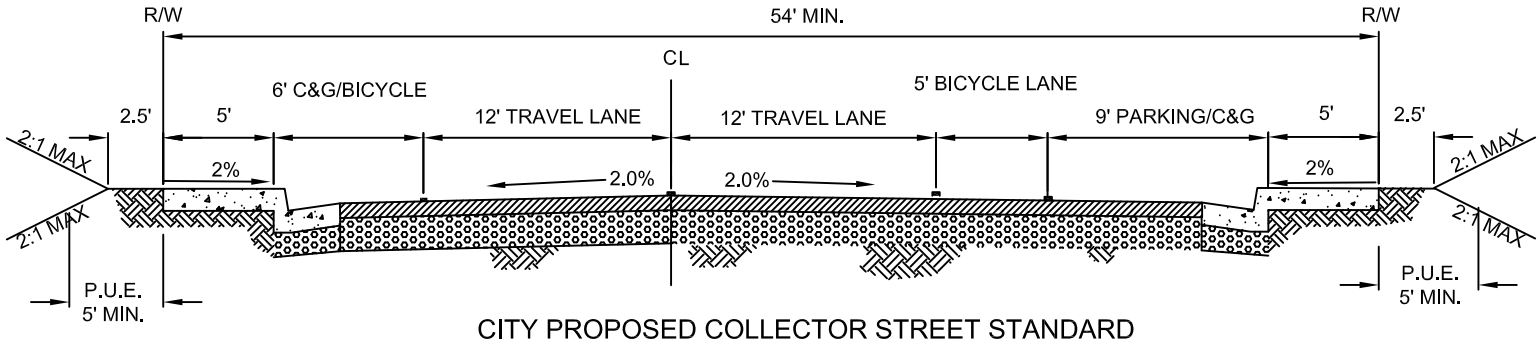


CITY PROPOSED COLLECTOR STREET STANDARD
FOR IDAHO MARYLAND ROAD AND BENNETT STREET



CITY PROPOSED COLLECTOR STREET STANDARD
FOR RAILROAD AVENUE

NOTES:

1. THIS MODIFIED STREET SECTION IS TO BE USED ON IDAHO MARYLAND RD BETWEEN EAST MAIN ST AND THE CITY LIMIT, RAILROAD AVENUE, BENNETT STREET BETWEEN OPHIR AND THE CITY LIMIT, AND OTHER LOCATIONS AS DIRECTED BY THE CITY ENGINEER OR CITY COUNCIL.

2. RIGHT OF WAY VARIES FROM 60' TO 84' DEPENDING UPON THE SITE LIMITATIONS AND OBSTRUCTIONS (I.E. WOLF CREEK) AND AS APPROVED BY THE CITY ENGINEER.

3. ALIGNMENT OF THE MEANDERING SIDEWALK REQUIRES APPROVAL FROM THE CITY ENGINEER.

4. LANE WIDTHS MAY BE REDUCED FROM 12' TO 11' WITH APPROVAL OF THE CITY ENGINEER.

5. CENTER TURN LANES OR LEFT TURN LANES ARE TO BE INSTALLED AS REQUIRED OTHERWISE A SOLID OR LANDSCAPED MEDIAN ISLAND IS TO BE CONSTRUCTED WITH THE APPROVAL OF THE PUBLIC WORKS DIRECTOR/CITY ENGINEER. CURB AND GUTTER SHALL BE TYPE 2 . MEDIAN CURBS SHALL BE TYPE 3 BARRIER CURB WHEN SOLID MEDIANS ARE INSTALLED AND TYPE 4 BARRIER CURB WHEN LANDSCAPED MEDIANS ARE INSTALLED.

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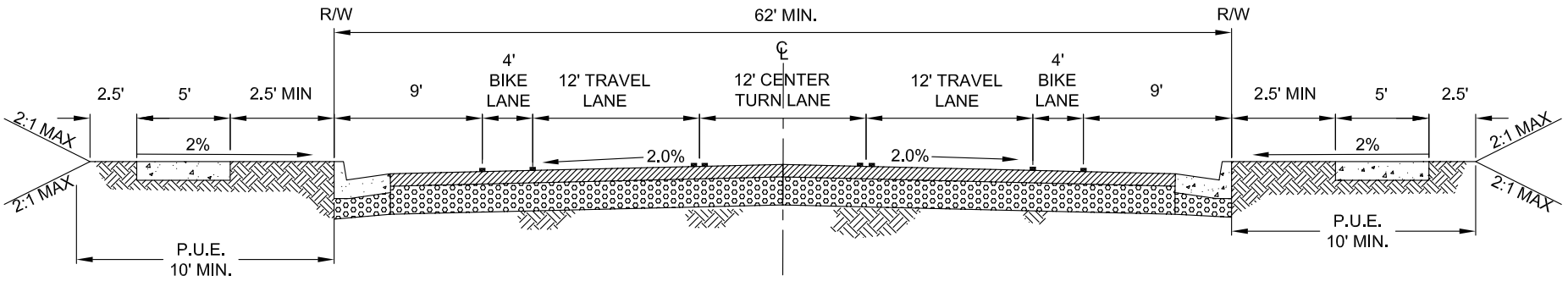
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

MODIFIED COLLECTOR STREET 2

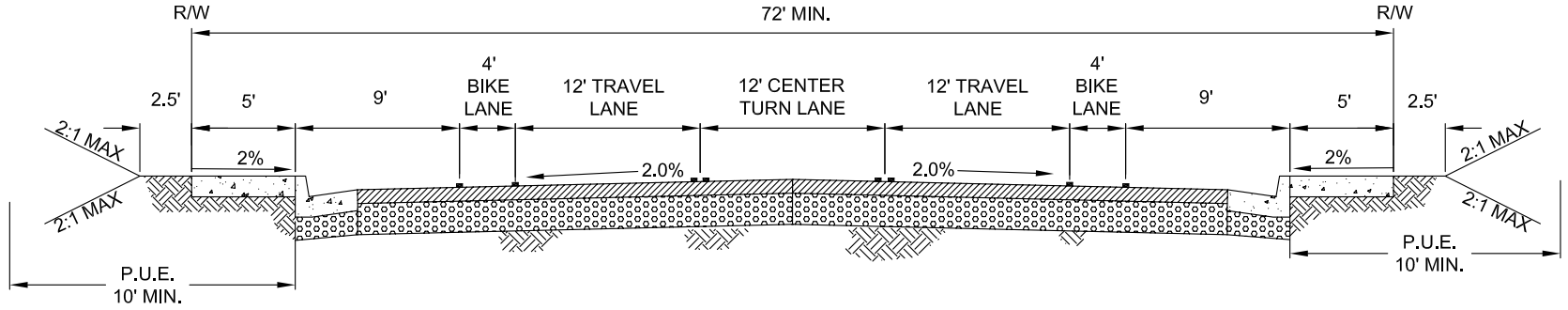
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	TMT	FEB 5, 2014	**ST-19**



DETACHED SIDEWALK PARKING BOTH SIDES



ATTACHED SIDEWALK PARKING BOTH SIDES

NOTES:

1. CENTER TURN LANES OR LEFT TURN LANES ARE TO BE INSTALLED AS REQUIRED OTHERWISE A SOLID OR LANDSCAPED MEDIAN ISLAND IS TO BE CONSTRUCTED WITH THE APPROVAL OF THE PUBLIC WORKS DIRECTOR/CITY ENGINEER.

2. CURB AND GUTTER SHALL BE TYPE 2 . MEDIAN CURBS SHALL BE TYPE 3 BARRIER CURB WHEN SOLID MEDIANS ARE INSTALLED AND TYPE 4 BARRIER CURB WHEN LANDSCAPED MEDIANS ARE INSTALLED.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

COLLECTOR STREET (WITH PARKING)

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-20**

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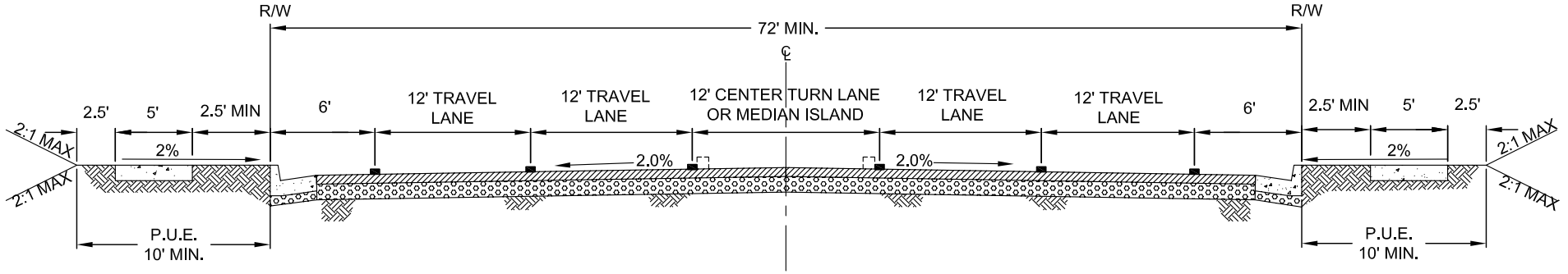
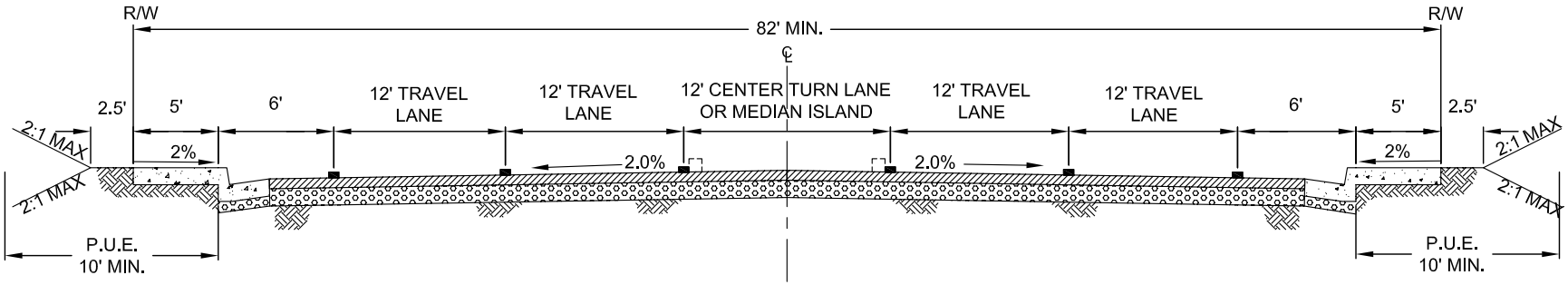


DETACHED SIDEWALK



ATTACHED SIDEWALK

NOTES:

1. CENTER TURN LANES OR LEFT TURN LANES ARE TO BE INSTALLED AS REQUIRED OTHERWISE A SOLID OR LANDSCAPED MEDIAN ISLAND IS TO BE CONSTRUCTED AT THE DISCRETION OF THE PUBLIC WORKS DIRECTOR/CITY ENGINEER.

2. CURB AND GUTTER SHALL BE TYPE 2 . MEDIAN CURBS SHALL BE TYPE 3 BARRIER CURB WHEN SOLID MEDIANS ARE INSTALLED AND TYPE 4 BARRIER CURB WHEN LANDSCAPED MEDIANS ARE INSTALLED.

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION
	ARTERIAL STREET
APPROVED BY:	PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-21**

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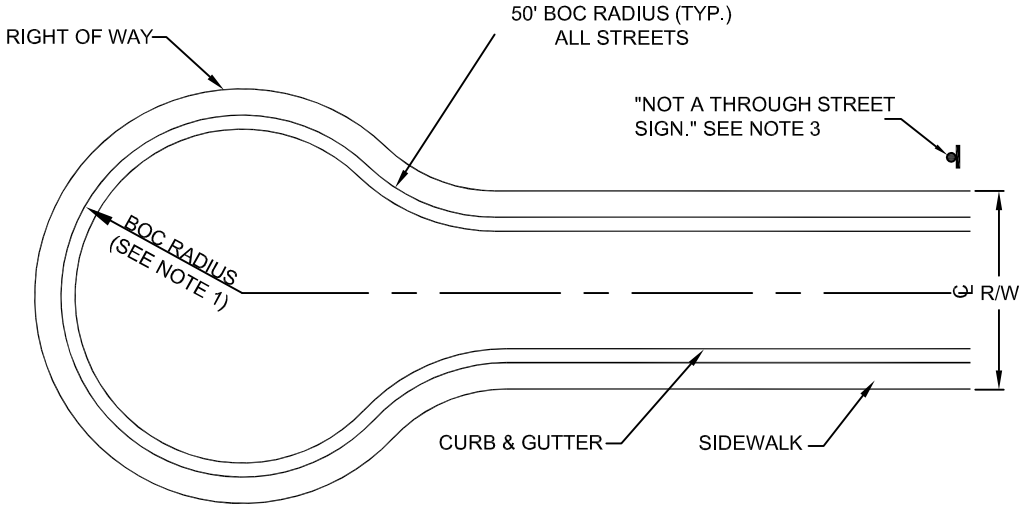
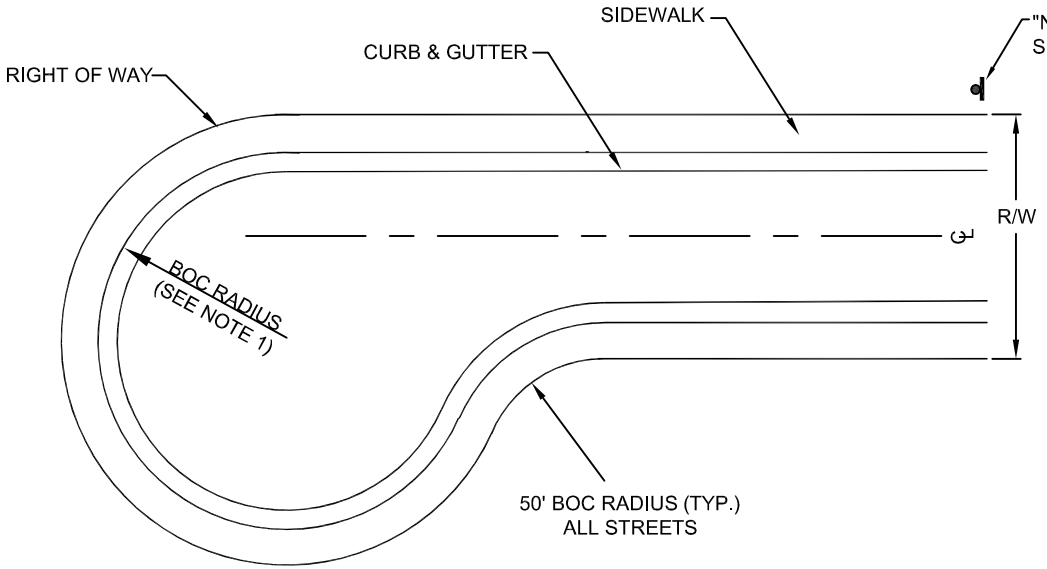


STANDARD CUL-DE-SAC



OFFSET CUL-DE-SAC

NOTES:

1. BACK OF CURB RADIUS FOR BULB SHALL BE AS FOLLOWS:

TYPE OF STREET	B.O.C. RADIUS
RESIDENTIAL	50' MIN
COMM. / ARTERIAL	50' MIN

2. INSTALL "NOT A THROUGH STREET" (CALTRANS W-53) SIGN ON STREET LIGHT POLE WHEN END OF CUL-DE-SAC IS NOT VISIBLE FROM ADJACENT STREET.

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

CUL - DE - SAC STREET

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**ST-22**

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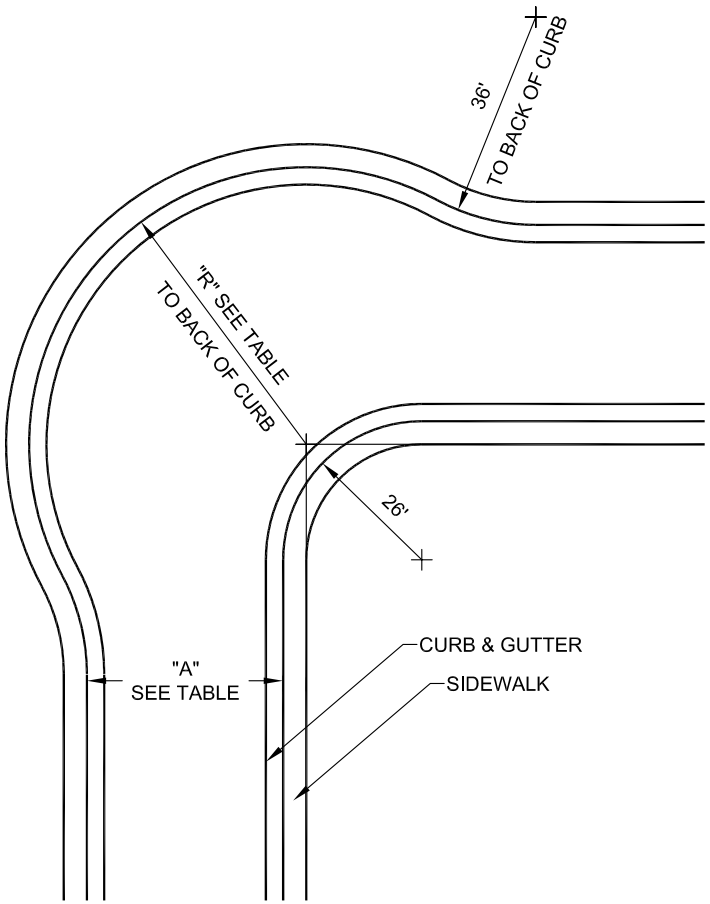


"A" (FEET)	"R" (FEET)
34	48
38	52
40	54
48	62

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

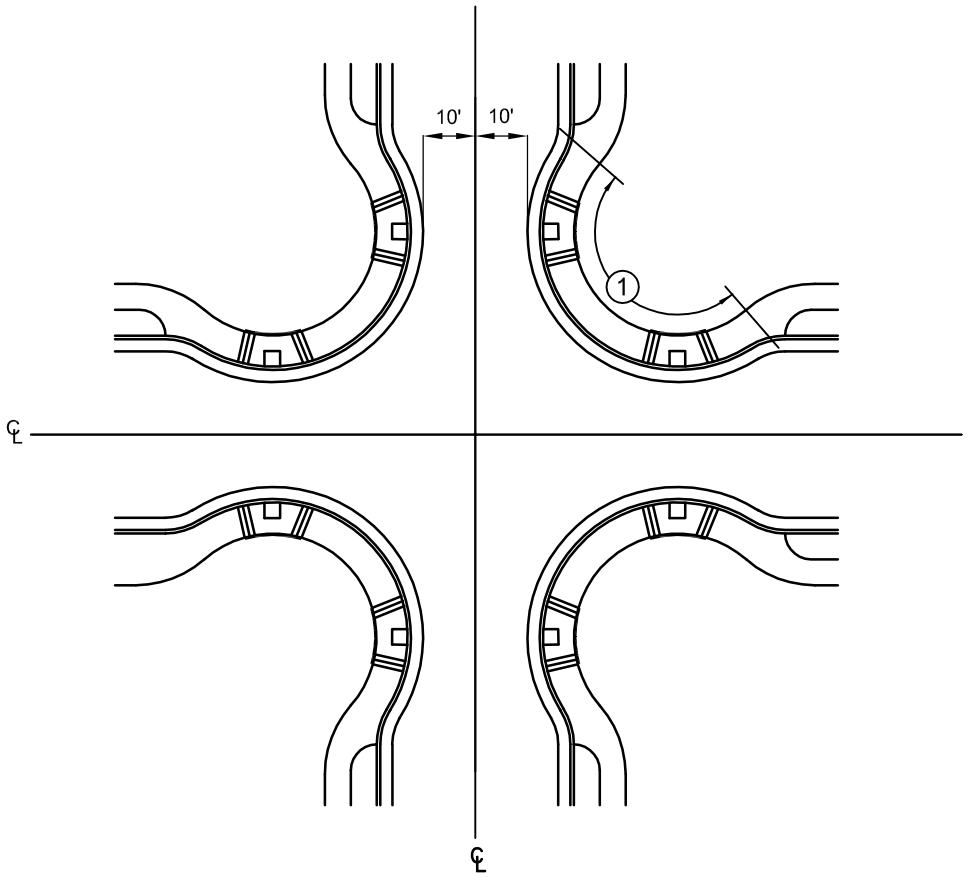
STANDARD ELBOW

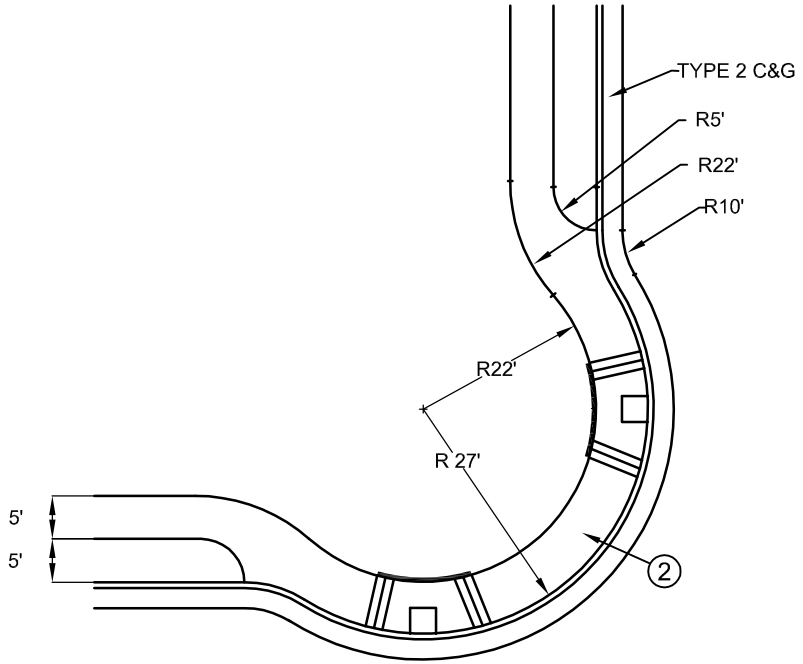
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	ST-23

H:\STANDARDS\Standard Details\2_Streets\ST - 23.dwg





NOTES:

1. TYPE 2 CURB AND GUTTER SHALL BE 8" THICK PCC, AND SIDEWALK SHALL BE 8" THICK PCC WITHIN THIS SECTION.
2. PLACE CASE "C" CURB RAMP.

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

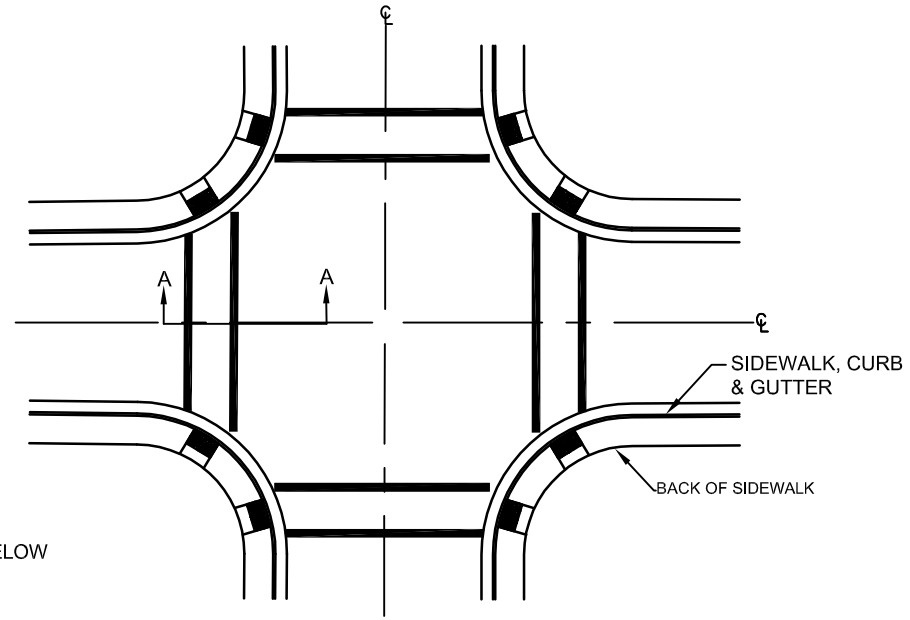
RESIDENTIAL BULBED INTERSECTION

APPROVED BY:

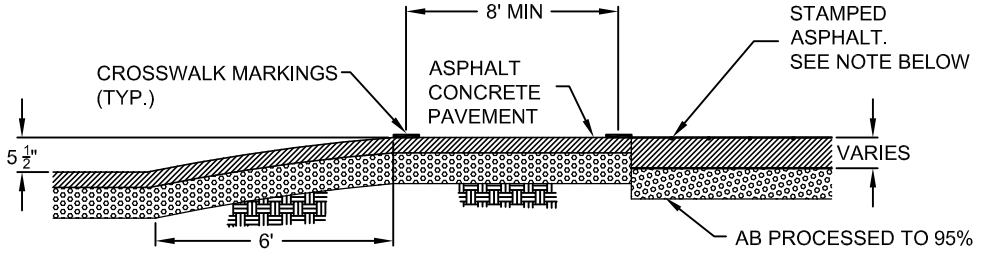
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**ST-24**

H:\STANDARDS\Standard Details\2_Streets\ST - 24.dwg



RAISED INTERSECTION PLAN VIEW



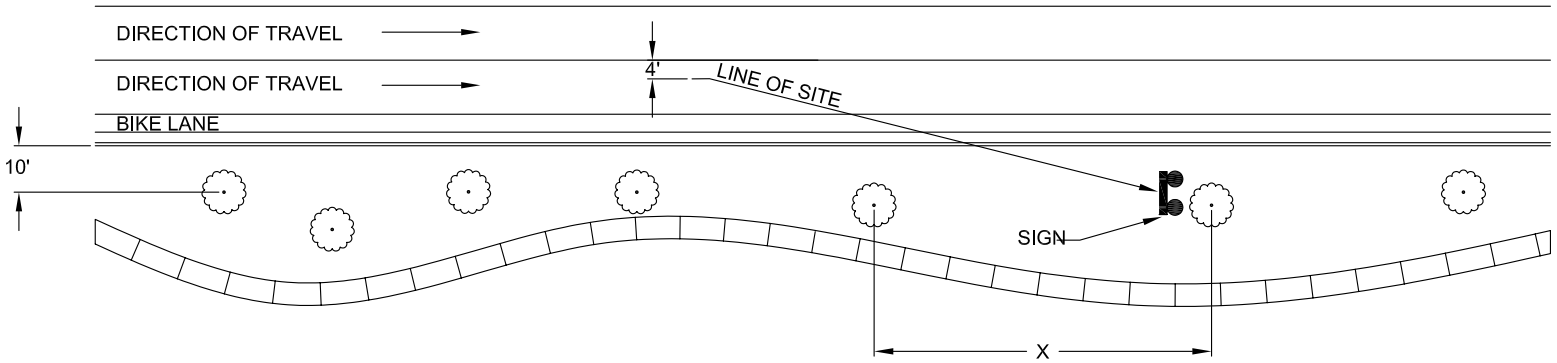
SECTION A-A
NOT TO SCALE

NOTE:

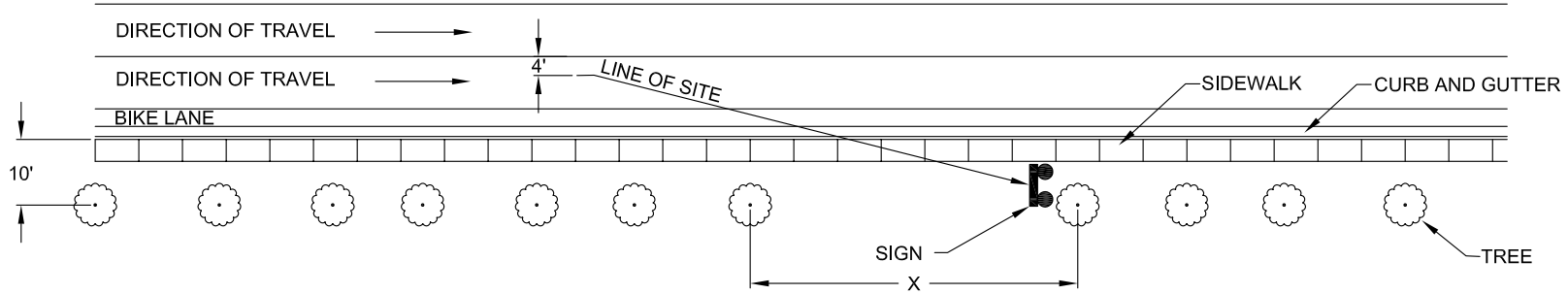
1. THE STANDARD PATTERN SHALL BE BASKETWEAVE WITH A BRICK RED TINT COLORING.

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	RESIDENTIAL RAISED INTERSECTION		
APPROVED BY: PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	**ST-25**

H:\STANDARDS\Standard Details\2_Streets\ST - 25.dwg



DETACHED SIDEWALK



ATTACHED SIDEWALK

NOTES:

1. THESE ARE MINIUM DISTANCES FOR TREES ALONG ROADWAYS.
2. DISTANCE FROM BACK OF CURB TO CENTER OF TREE IS TO BE GREATER THEN OR EQUAL TO 10'

SPEED MPH	MINIMUM CLEARANCE FOR LINE OF SITE "X"
25	75'
30	90'
40	120'
50	150'
60	180'

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

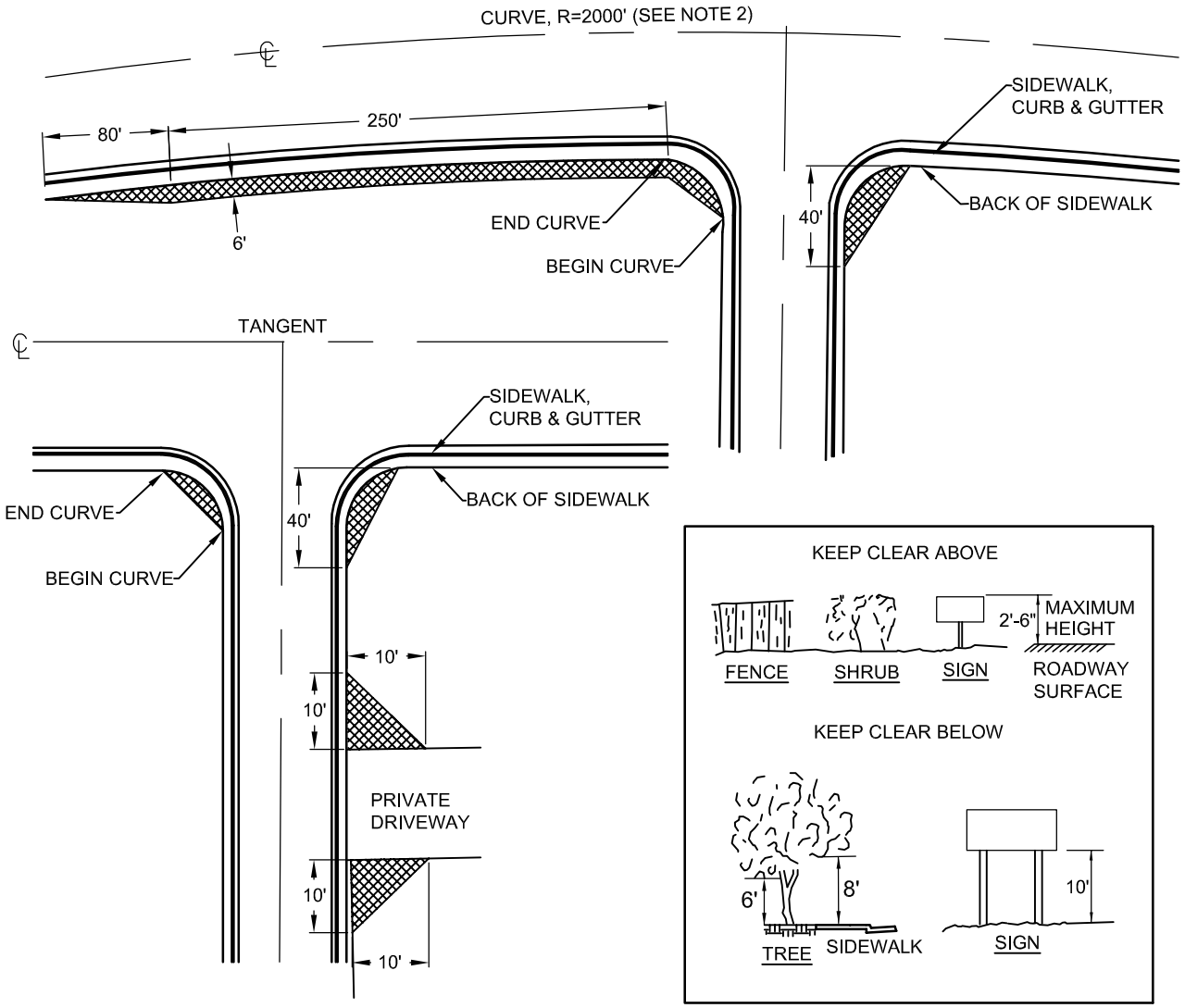
LANDSCAPE SIGHT DISTANCE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-26**

H:\STANDARDS\Standard Details\2_Streets\ST - 26.dwg



CLEARANCES WITHIN CONTROLLED AREA

NOTES:

1. FENCES,WALLS, LANDSCAPING AND SIGNS WITHIN THE CONTROLLED AREA ARE SUBJECT TO THE CLEARANCE REQUIREMENTS SHOWN.
2. TREES WITHIN THE CONTROLLED AREA MUST MAINTAIN VERTICAL CLEARANCE OF 6 FEET FOR ADEQUATE SIGHT DISTANCE AND 8 FEET CLEARANCE OVER SIDEWALKS FOR PEDESTRIANS.
3. CURVES WITH RADII LESS THAN 2000' REQUIRE SPECIAL DESIGN FOR SIGHT DISTANCE SUBJECT TO APPROVAL BY THE CITY ENGINEER.

LEGEND:

CONTROL AREA (TYP.)

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SIGHT DISTANCE REQUIREMENTS

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	CST ST-27
NONE	EAD	MAY 12, 2016	

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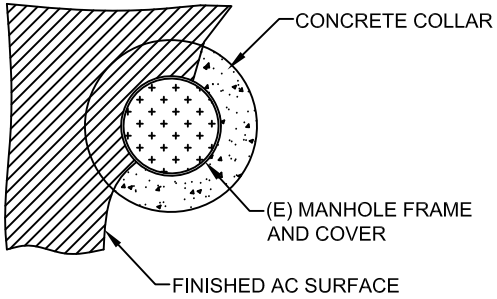
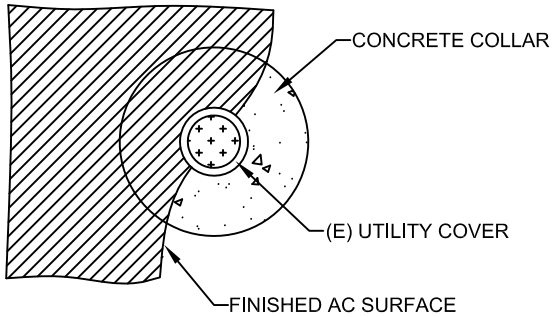
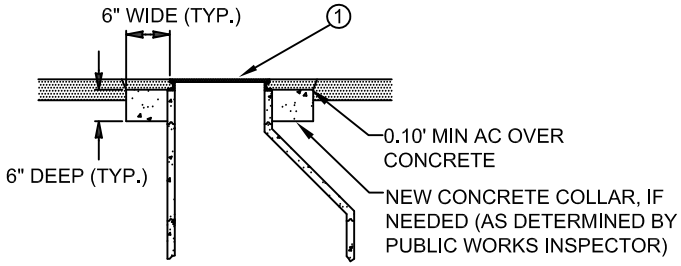
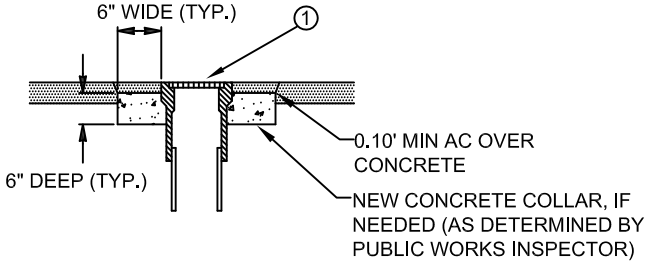






MANHOLE



UTILITY COVER

NOTES

① IRON TO BE SET 1/4 INCH BELOW FINISHED GRADE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

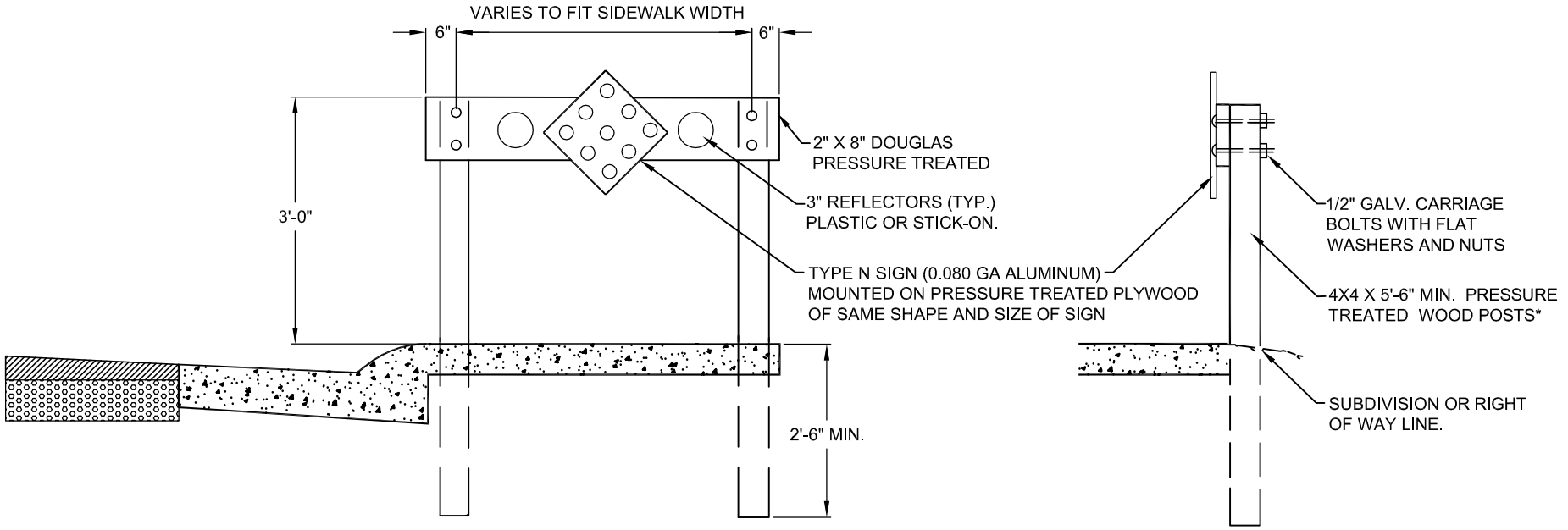
ADJUST UTILITY COVER/ MANHOLE TO GRADE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	TMT	FEB 6, 2014	**ST-28**

H:\STANDARDS\Standard Details\2_Streets\ST - 28.dwg



NOTES:

1. SIDEWALK BARRICADES SHALL BE ERECTED WHERE SATISFACTORY PROVISIONS CANNOT BE MADE FOR PEDESTRIAN TO CONTINUE BEYOND THE TERMINUS OF SIDEWALK.

2. ALL EXPOSED PRESSURE TREATED WOOD SHALL BE PAINTED WITH TWO (2) COATS OF WHITE PAINT CONFORMING TO SECTION 91-3.02 OF STATE SPECIFICATIONS.

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

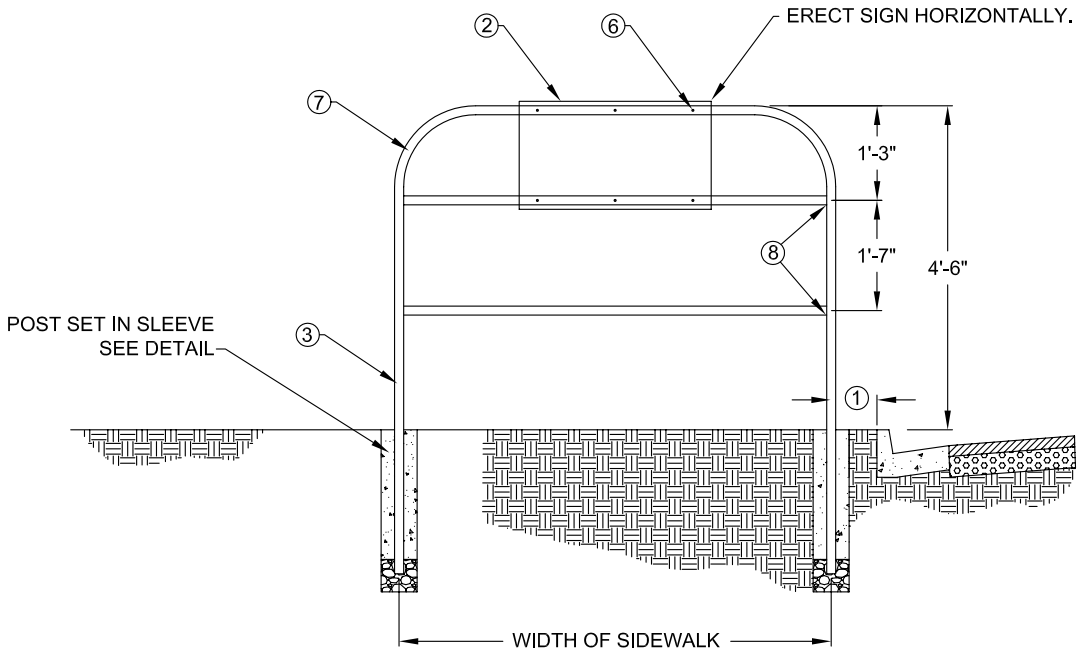
SIDEWALK BARRICADE

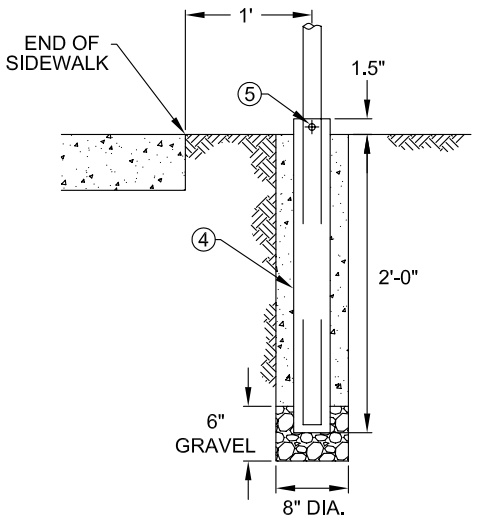
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**ST-29**

H:\STANDARDS\Standard Details\2_Streets\ST - 29.dwg





POST SLEEVE DETAIL

NOTES:

1. SIDEWALK BARRICADES SHALL BE PLACED ADJACENT TO BACK OF CURB WHEN SIDEWALK IS ATTACHED. BARRICADES SHALL BE CENTERED ON SIDEWALK WHEN SIDEWALK IS DETACHED FROM CURBS.
2. PLACE A R5-10c SIGN (2003 MUTCD DESIGN MANUAL CALIFORNIA SUPPLEMENT).
3. USE 1.5" DIAMETER NPS, GALVANIZED STANDARD PIPE
4. STEEL SLEEVE TO BE CONSTRUCTED WITH A 1/10" LARGER DIAMETER THAN POST. WALL THICKNESS OF SLEEVE TO BE SAME AS POST OR LARGER.
5. 3/8" DIAMETER GALVANIZED BOLT, WITH NUT AND WASHER. DEFORM THREADS (TYP)
6. DRILL 1/2" DIAMETERS HOLES. TOTAL OF 6.
7. ALL SURFACES SHALL BE PAINTED WITH TWO COATS OF WHITE PAINT CONFORMING TO SECTION 91-3.02 OF THE STATE SPECIFICATIONS.
8. $\frac{3}{16}$" FILLET WELD (TYP.)

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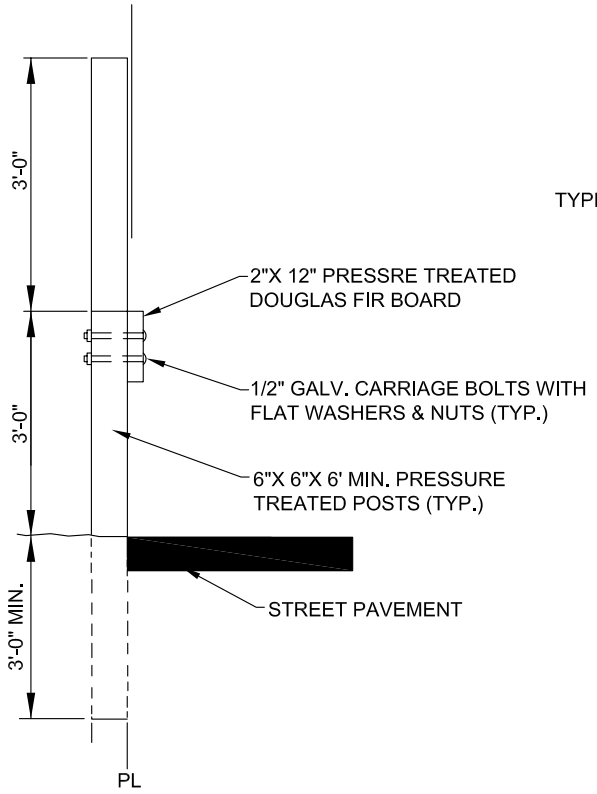
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

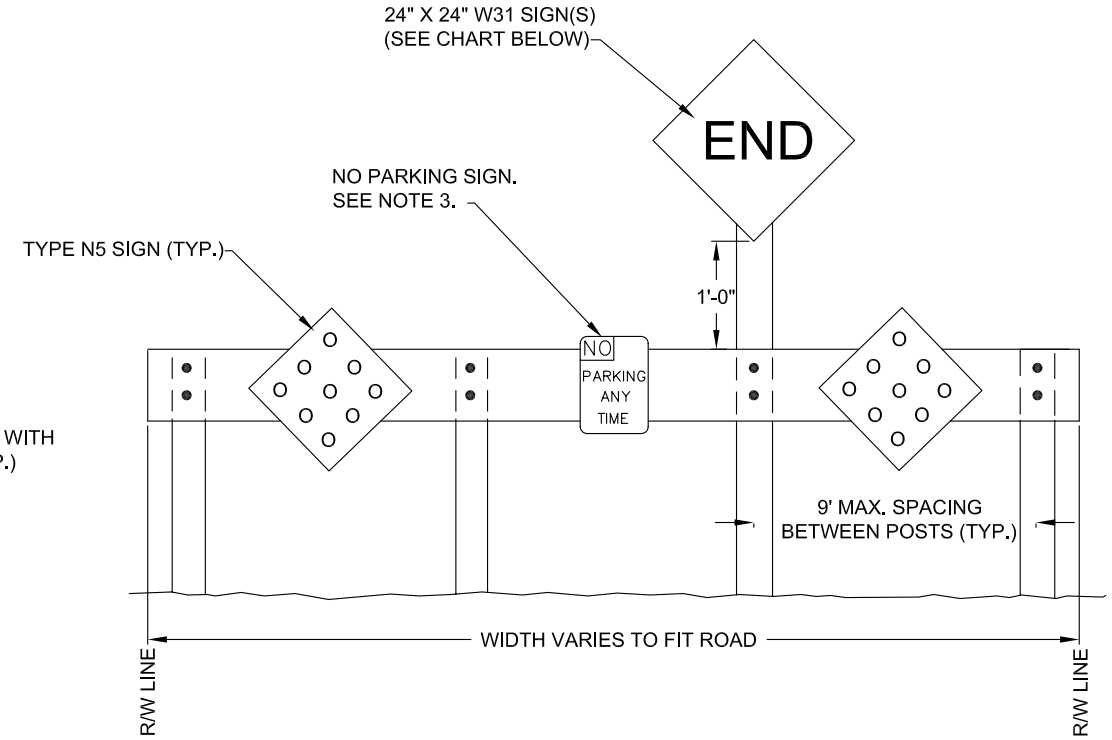
PEDESTRIAN BARRICADE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-30**





NOTES:

1. ALL EXPOSED SURFACES SHALL BE PAINTED WITH 2 (TWO) COATS OF WHITE PAINT CONFORMING TO SECTION 91-3.02 OF THE STATE SPECIFICATIONS.
2. ALL SIGNS SHALL BE 0.080 GA ALUMINUM.
3. "NO PARKING" (R-26) SHALL BE POSTED ON RAILS. REFER TO THE 2006 CALIFORNIA MUTCD.
4. SIGN POSTS SHALL BE 9-FEET MINIMUM.

NUMBER AND SIZE OF SIGNS

R/W WIDTH	W31 SIGN		C2 SIGN	
	SIZE	NO.	SIZE	NO.
UP TO 50'	24"	1	48" X 30"	1
51'-74'	24"	2	48" X 30"	1
75' AND UP	24"	2	48" X 30"	2

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

END OF STREET TIMBER BARRICADE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	ST-31

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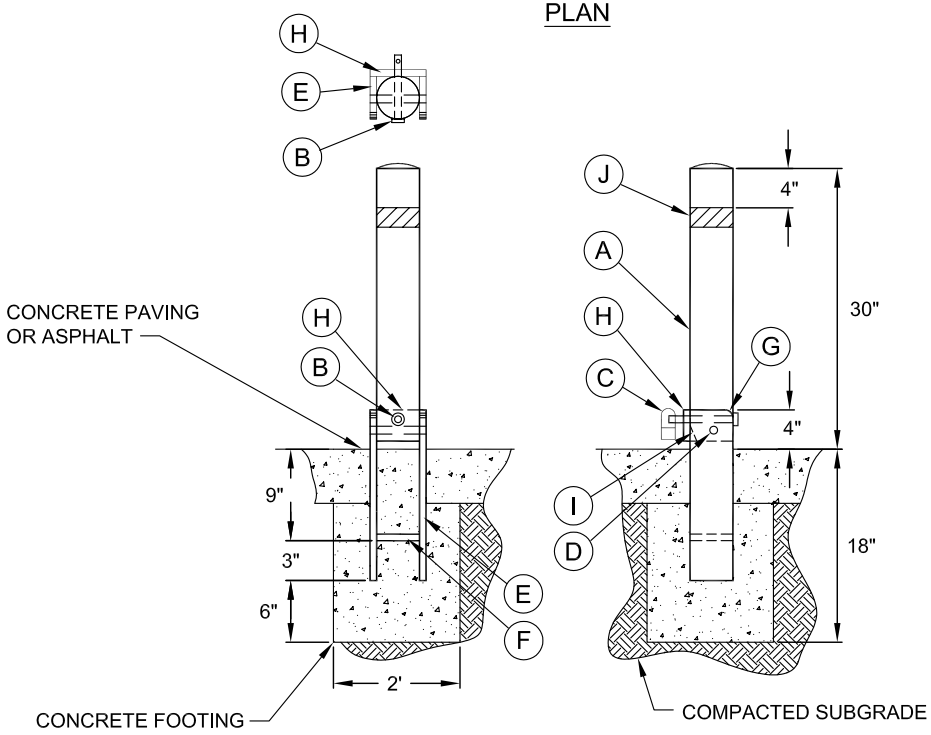
PLAN



FRONT SECTION

SIDE SECTION

LEGEND:

(A.) 3 1/2" O.D. 1/4" WALL STEEL PIPE WITH CAP WELDED ON TOP, 7/8" HOLES FOR LOCKING PIN AND 3/4" HOLES FOR SWIVEL ROD. EASE ALL EDGES OF STEEL POST.

(B.) 3/4" DIA. x 5" LOCKING PIN WITH FLAT WASHER WELDED TO ONE END AND 3/8" HOLE DRILLED 1/4" FROM END OF PIN.

(C.) CITY KEYED PADLOCK, TO BE PROVIDED BY PUBLIC WORKS DEPARTMENT.

(D.) 5/8" DIA. STEEL SWIVEL ROD, WELD SWIVEL ROD TO SIDE PLATES.

(E.) 3/8" x 16" x 4" STEEL BASE PLATE WITH 1" RADIUS CORNERS. EASE ALL EDGES.

(F.) 3/8" STEEL BRACE. FILET WELD BOTH SIDES TO BASE PLATES.

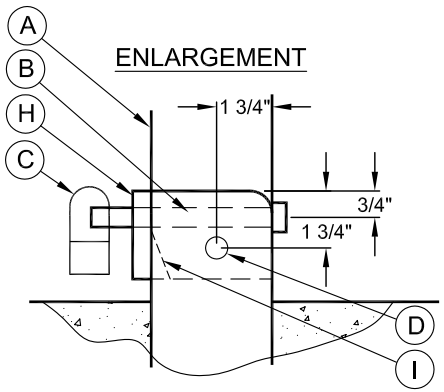
(G.) 1" RADIUS CORNERS, TYP.

(H.) 4" X 4" x 3/8" STEEL BACK PLATE WELDED TO BASE PLATE.

(I.) FISH MOUTH GRIND AT BOTTOM BACK CORNER OF POST.

(J.) PLACE 2" WHITE REFLECTIVE TAPE.

ENLARGEMENT



NOTES:

1. ALL PIPE SHALL BE BLACK STEEL PIPE.
2. ALL JOINTS SHALL BE WELDED IN ACCORDANCE WITH CA STATE STANDARD SPECIFICATIONS FOR WELDING STRUCTURAL STEEL AND GROUND SMOOTH.
3. ALL PARTS (EXCEPT PADLOCK) SHALL BE PAINTED WITH TWO COATS OF ZINC CHROMATE PRIMER AND TWO COATS OF YELLOW EXTERIOR ENAMEL.
4. BOLLARD SHALL BE INSTALLED SUCH THAT WHEN FOLDED, IT LAYS FLAT.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

BOLLARD

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-32**

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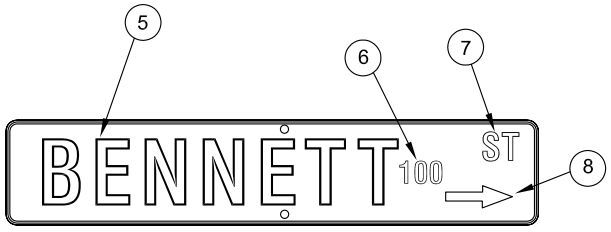
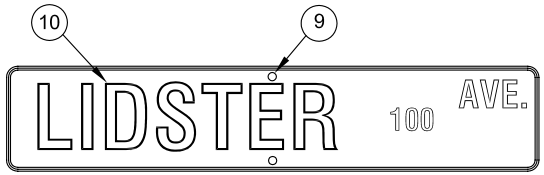
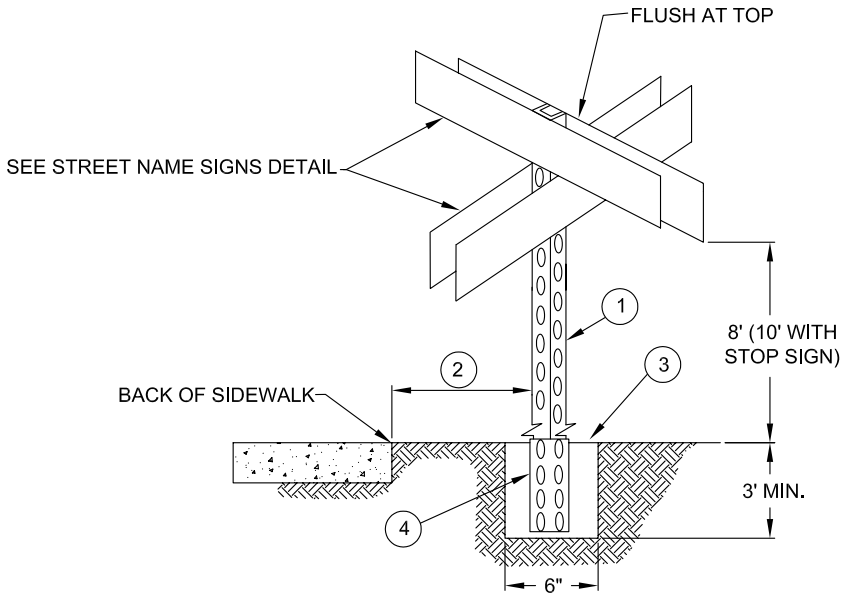


STREET NAME SIGN: ARTERIAL STREET



STREET NAME SIGN: RESIDENTIAL



LEGEND:

1. SIGN POST SHALL BE METAL SQUARE POST WITH HOLES PER THE CONSTRUCTION STANDARDS.
2. 18 INCHES BACK OF SIDEWALK, 24 INCHES BACK OF CURB IF NO SIDEWALK.
3. HOLE SHALL BE EXCAVATED TO A REQUIRED MINIMUM DEPTH OF 3' DEEP AND 6" IN DIAMETER. CONCRETE BACKFILL SHALL BE PER THE CONSTRUCTION SPECIFICATIONS.
4. A 27" LONG ANCHOR SLEEVE SHALL BE INSTALLED AND BACKFILLED PER THE CONSTRUCTION SPECIFICATIONS.
5. ALL UPPER CASE LETTERS, FOUR INCHES HIGH, WHITE HIGH INTENSITY REFLECTORIZED SERIES D (TYP.).
6. BLOCK NUMBER, 1-1/2 INCH HIGH, SERIES C, HIGHWAY FONT (TYP.).
7. ST, AVE, CT, WY, CIRCLE, DR, ETC., TWO INCH UPPER CASE SERIES C, HIGHWAY FONT TEXT FLUSH WITH TOP OF 6 INCH TEXT (TYP.).
8. ARROW, 1-1/2 INCH BY VARIABLE LENGTH, HIGHWAY FONT, WHITE HIGH INTENSITY REFLECTORIZED (TYP.).
9. SIGN ATTACHMENT SHALL BE TWO 3/8 INCH ALUMINUM DRIVE RIVETS THROUGH EACH PLATE INTO THE POST (TYP.).
10. FOUR INCHES HIGH, SERIES C, UPPER CASE LETTERS, HIGHWAY FONT (TYP.)

NOTE:

IN THE EVENT THE STREET NAME IS TOO LONG FOR A 36 INCH LONG SIGN, THE NEXT LOWER SERIES TEXT, SERIES C OR B, CAN BE USED.

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	STREET NAME SIGN		
APPROVED BY: PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: BPJ	DATE: MAR 3, 2009	**ST-33**

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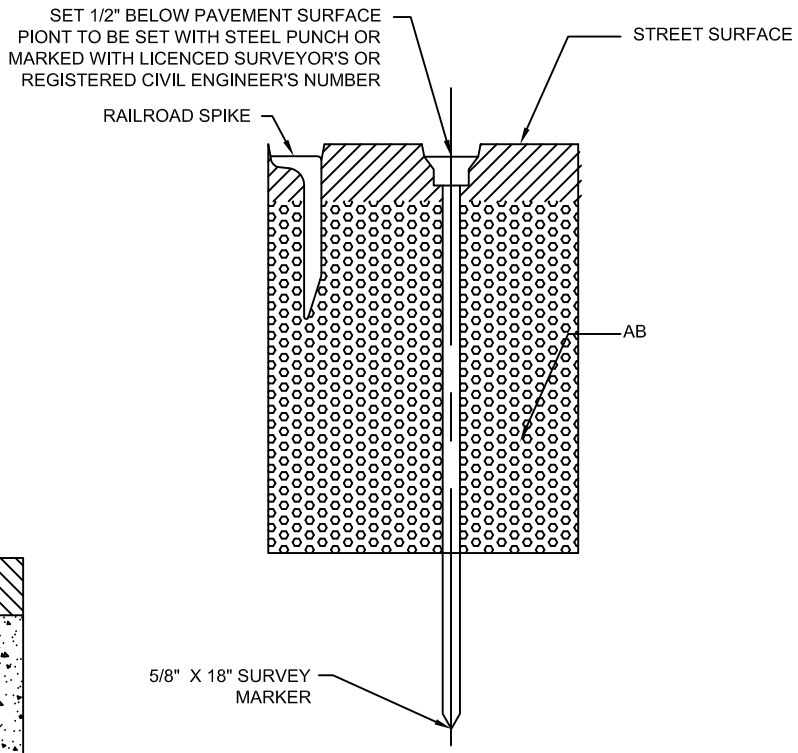

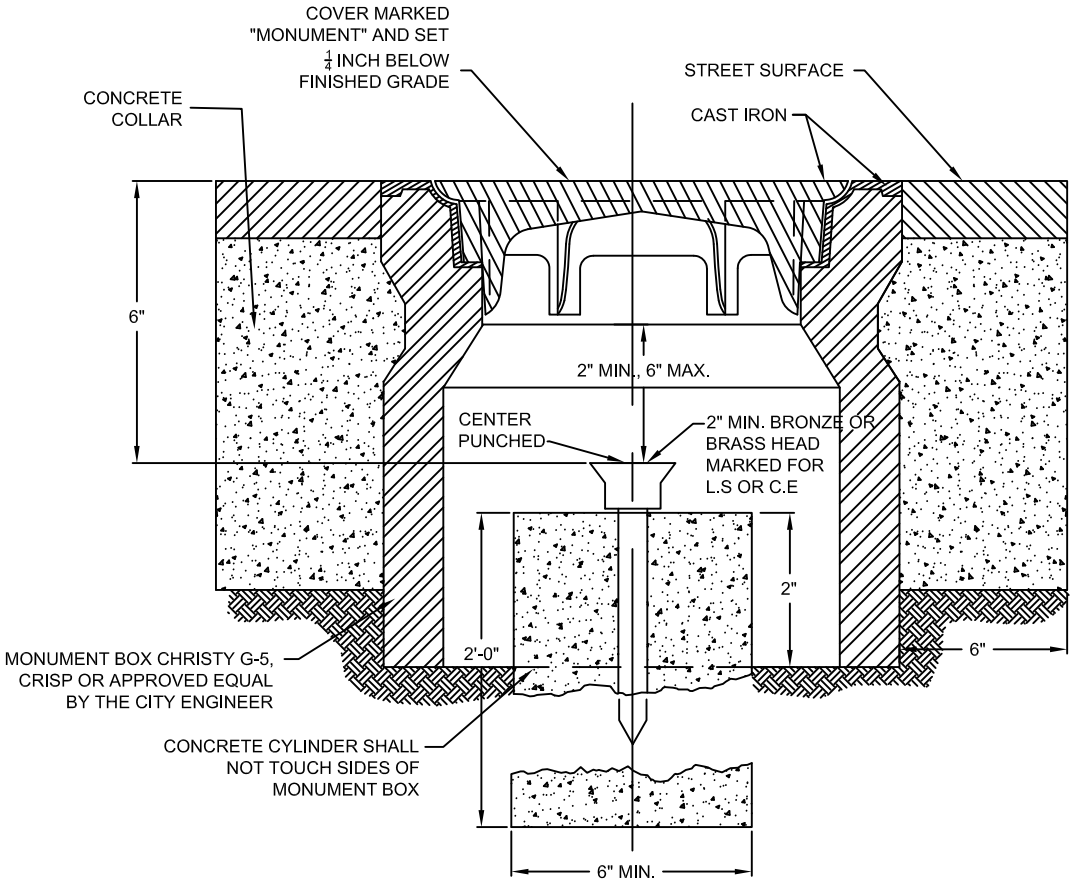

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

BOXED SURVEY MONUMENT

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	TMT	FEB 6,2014	ST-34

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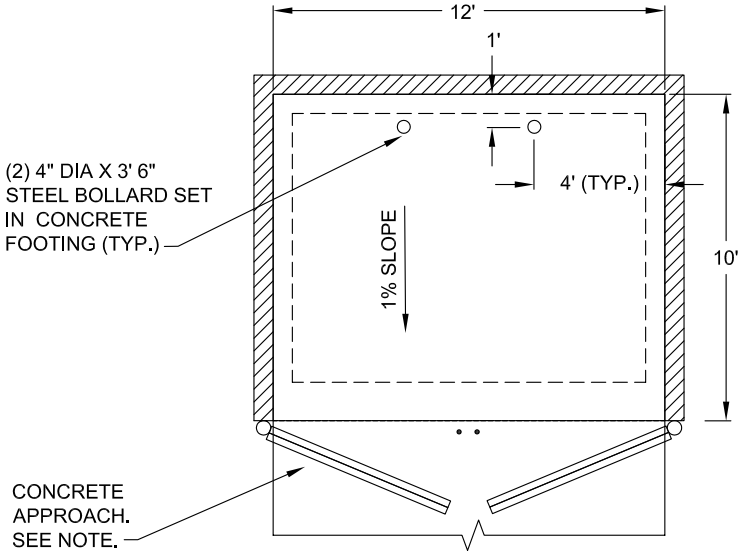
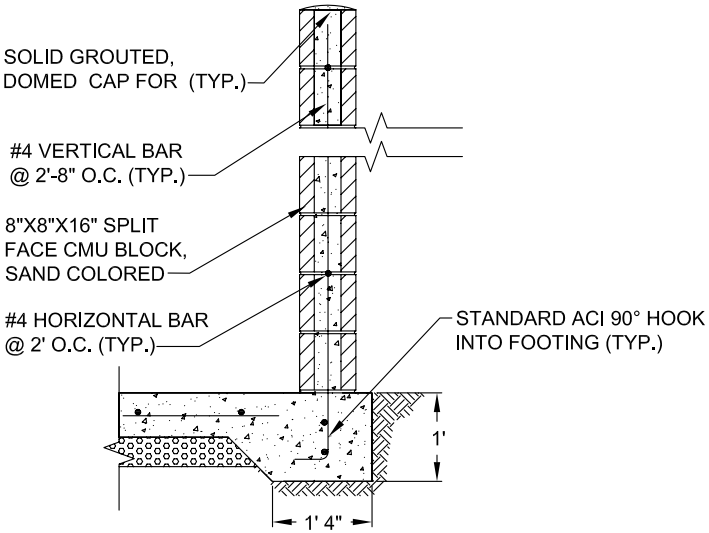
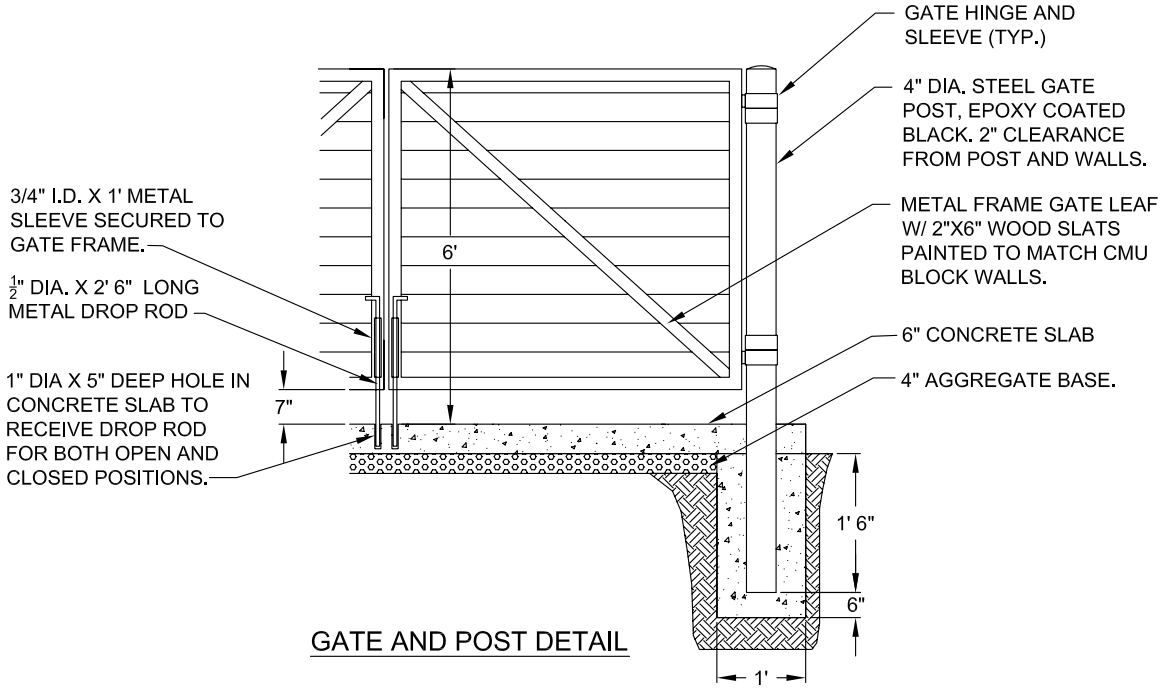


TRASH ENCLOSURE PLAN



WALL AND FOOTING DETAIL



GATE AND POST DETAIL

NOTES:

1. ALL STEEL PARTS ARE TO BE PAINTED BLACK.
2. THE STANDARD APPROACH IS A 12'X12' 6" THICK CONCRETE SLAB REINFORCED WITH #4 REBAR 1' O.C. BOTH WAYS. SITE CONDITIONS MAY DICTATE AN ALTERNATE APPROACH SIZE AS APPROVED BY THE PUBLIC WORKS DIRECTOR/CITY ENGINEER.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TRASH ENCLOSURE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-35**

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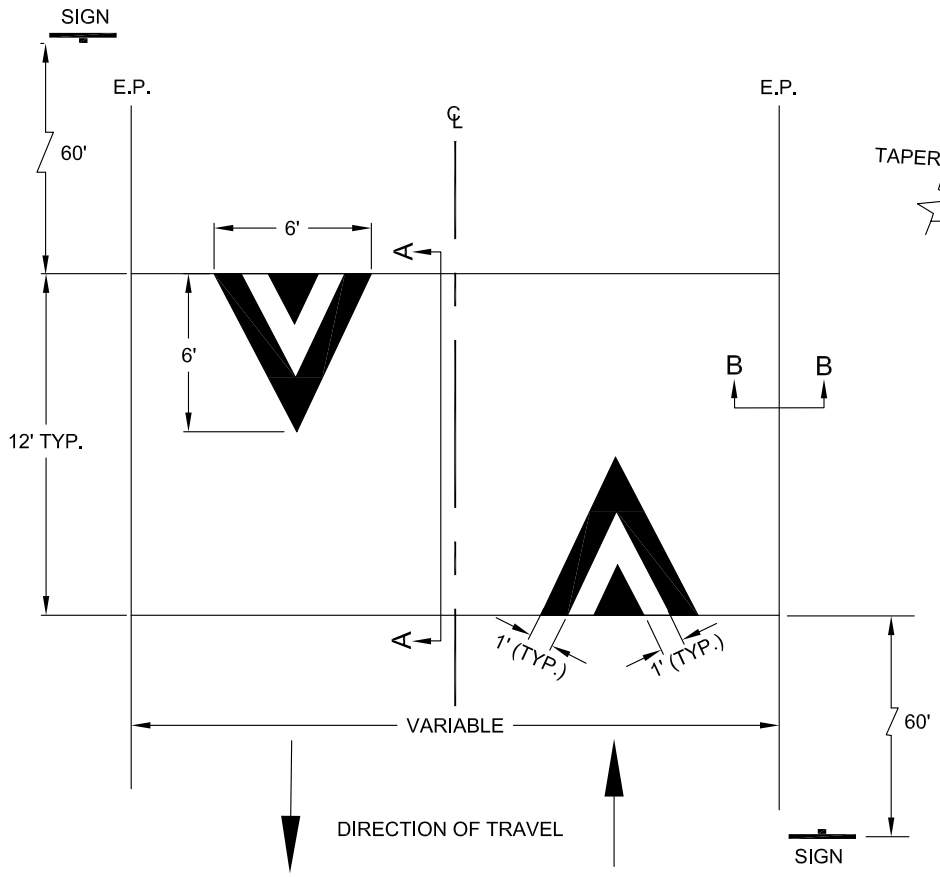
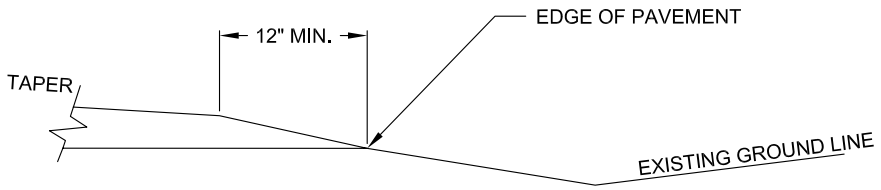


SPEED HUMP

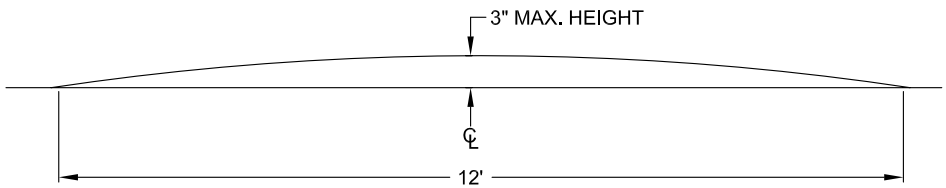


SECTION B-B

W8-1
30"X30"

W13-1
24"X24"

SIGN DETAIL



SECTION A-A

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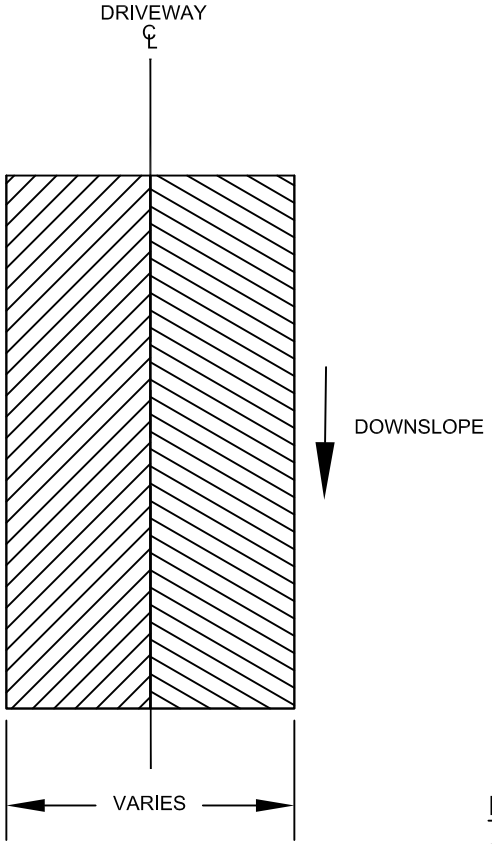
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SPEED HUMP

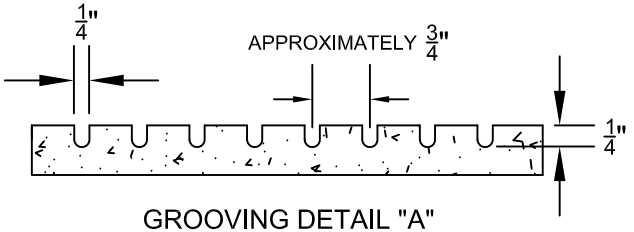
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

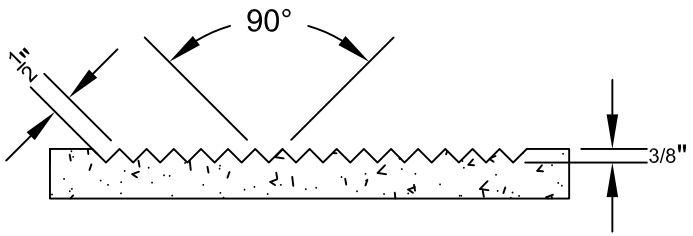
SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**ST-36**



HERRINGBONE PATTERN



GROOVING DETAIL "A"



GROOVING DETAIL "B"

NOTES:

1. DRIVEWAYS SLOPED GREATER THAN 10% SHALL HAVE A GROOVED CONCRETE SURFACE PER THE DESIGN STANDARDS. GROOVING DETAIL A OR B IS ACCEPTABLE.
2. GROOVING DETAIL 'A' CAN BE ACHIEVED USING A STANDARD GROOVING TOOL.
3. GROOVING DETAIL 'B' CAN BE ACHIEVED USING A CUT BOARD TO THE DIMENSIONS SHOWN.
4. ALL GROOVING SHALL BE COMPLETED IN A HERRINGBONE PATTERN AND ALIGNED AT 60 DEGREES TO THE LONGITUDINAL AXIS OF THE ACCESS AND SHALL BE PLACED TO ALLOW DRAINAGE TO FLOW DOWNHILL.

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	ACCESS ROAD GROOVING		
APPROVED BY: PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: TMT	DATE: FEB 6, 2014	**ST-37**

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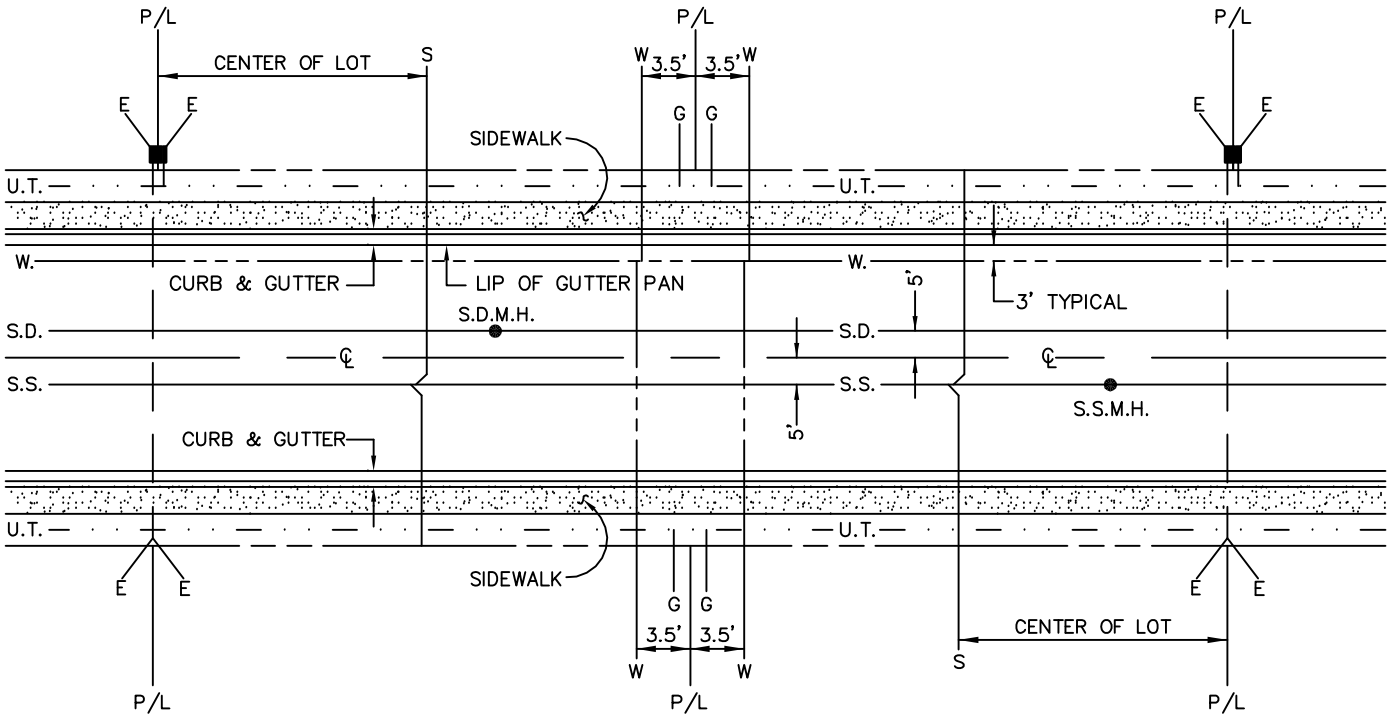

NOTES:

1. WATER IS LOCATED 3 FEET FROM THE CURB AND GUTTER ON THE NORTH OR WEST SIDE OF THE STREET.
2. SEWER IS LOCATED 5 FEET FROM THE CENTERLINE ON THE SOUTH OR EAST SIDE OF THE STREET.
3. STORM DRAIN IS LOCATED 5 FEET FROM THE CENTERLINE ON THE NORTH OR WEST SIDE OF THE STREET.
4. JOINT TRENCHES AND OTHER UTILITY TRENCHES SHOULD BE PLACED BEHIND THE SIDEWALK.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

UTILITY LINE LOCATIONS

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	TMT	OCT 2, 2012	ST-38

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SECTION 4

WATER SUPPLY SYSTEM (W)

4-1. GENERAL - All potable water pipe, fittings, valves, fire hydrants, blow-offs and other appurtenances shall be installed in accordance with the approved improvement plans, these Construction Standards, the American Water Works Association (AWWA), the latest edition of Caltrans Standard Specifications and Standard Plans, as recommended by the manufacturer and as specified by the City Engineer. These Construction Standards and the manufacturer's guidelines shall be present at the construction site at all times.

4-2. CONNECTION TO EXISTING FACILITIES - Connection to existing City water facilities may be made with approval of the Public Works Department and in conformance with the following:

A. System Tap - The Public Works Department shall make all systems tap up to 2" in diameter, as required on the plans unless otherwise approved by the City Engineer. The Contractor shall pay for such work on a time and materials reimbursement basis. The Contractor shall be responsible for the following tasks associated with the tap as determined by the Public Works Department:

1. Coordinating the work requested with the Public Works Inspector. This shall include discussions on provisions for materials and equipment required to complete the work.

2. Providing traffic control per the City's Public Works Department requirements.

3. Excavating the work area, as agreed upon by the Public Works Inspector.

4. Providing sheeting, shoring, and bracing as required.

5. Provide lighting as required if the tap is to be performed at night.

6. Backfilling, compacting, and pavement restoration of the excavation(s) upon tap completion.

B. System Tie-In - The Contractor shall tie-in the new system to an existing stub under the following conditions:

1. With specific approval of the Public Works Inspector.

2. Care shall be taken to provide a clean, sanitary tie-in site.

3. Dewatering of both the new and existing water mains shall take place in a way as to prevent contamination by trench water.

4. All material used in the tie-in shall be clean and swabbed with chlorine to the satisfaction of the Public Works Inspector.

5. All tie-ins shall take place in the presence of the Public Works Inspector.

6. Tie-ins may take place only after the newly constructed water system has successfully passed all required testing procedures as established in these Construction Standards and as determined by the Public Works Inspector.

7. Under no circumstances shall anyone other than a representative of the Public Works Department open or close valves in a City-operated system.

4-3. CONSTRUCTION STAKING - The water main shall be staked prior to excavation. Staking shall provide the station and the offset to the water main, as well as the cut to the nearest one-tenth foot (0.1'). Stakes shall be provided at a minimum of every fifty (50) feet in tangent sections, every twenty-five (25) feet in curved sections, and every ten (10) feet in approved vertical curve sections.

4-4. CONCRETE CRADLES, ARCHES & ENCASEMENTS - Concrete cradles, arches and encasements shall conform to the "Shallow Water Mains" and "Special Concrete Encasement" details and the following:

A. Placement - The pipe shall be placed in proper position on temporary cradles or arches consisting of concrete block or bricks. When necessary, the pipe shall be rigidly anchored or weighted to prevent flotation when the concrete is placed.

B. Installation - Cradles and arches shall be constructed with an ability to adjust the pipe to proper grade in order to avoid vertical joint pull. Cradles and arches shall be placed at the one-third and half-way points along each pipe segment where specified. Concrete placed beneath the pipe shall be sufficiently workable to fill the voids without excessive vibration. The concrete shall be allowed to cure and remain undisturbed for a minimum of 24 hours prior to backfill and compaction of the trench. Water shall not be permitted to enter, seep or run onto the concrete while curing.

4-5. TRENCHING AND BACKFILL - Construction of water pipes and appurtenances shall be performed to the lines and grades shown on the approved project plans, as specified in the "Streets" section of these Construction Standards and in conformance with the following requirements:

A. Excavations - Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans, with vertical sides to the pipe crown as specified on the "Utility Trench Bedding, Backfill and Paving" detail. Excavations shall conform to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property.

B. Bell Holes - Bell holes shall be excavated per manufacturer's recommendations. The minimum depth of bedding material shall be provided under the bell. Care shall be taken to ensure that the bell hole is no larger than necessary to accomplish proper joint assembly.

C. Pipe Support - Pipes shall be placed on a firm bed of imported granular material conforming to the "Utility Trench Bedding, Backfill and Paving" detail. Bedding shall provide uniform and continuous support along the barrel of the pipe. The minimum depth of bedding material shall be provided under the bell. Blocking of the pipe is not permitted. Loose material shall be removed from the trench bottom and replaced with imported material.

D. Trench Backfill and Compaction - Initial backfill material shall be placed immediately after pipe joints have been completed, inspected and passed by the Public Works Inspector. The material shall be carefully placed, consolidated around the pipe zone and shall be brought up evenly on both sides. Sufficient care shall be taken to prevent movement or damage to the pipe during shovel slicing. Shovel slicing shall be witnessed by the Public Works Inspector prior to shading the pipe.

Trench backfill shall be placed and compacted in accordance with the "Streets" section of these Construction Standards. Slurry or concrete caps shall only be used if deemed necessary by the City Engineer. Compaction equipment shall not make direct contact with the pipe.

4-6. PIPE INSTALLATION - Water pipe shall be installed in accordance with the following provisions:

A. Storage of Pipe - The Contractor shall keep the pipe interior free from foreign materials and in a clean and sanitary condition until acceptance by the City. At times when pipe-laying is not in progress, the open pipe end shall be sealed with a tight cap or plug to prevent foreign matter from entering the pipe. Provisions shall apply to the noon-hour as well as overnight.

B. Pipe Placement - Care shall be taken when lowering pipe into the trench to protect the pipe from damage. Chains are not permitted. The pipe shall be laid carefully to the lines and grades shown without grade breaks, unless designed with such, or to minimum depths shown on the approved plans. If field conditions exist such that the pipe may not be laid to the specified grade, the approved plans will require revisions prior to proceeding with construction.

C. Joints - Pipe sections shall be closely jointed to form a smooth flowline. Care shall be taken in placing the pipe and making field joints.

D. Manufacturer's Recommendations - All installations shall follow manufacturer's recommendations unless otherwise noted on the approved plans. The manufacturer’s installation guide shall be on the job site at all times.

E. Mechanical Restraint - Pipes shall be mechanically restrained to the length specified in the approved plans, using materials specified herein. **Thrust Blocks** - Thrust blocks shall only be used where specifically shown on the plan/profile sheets and as required by AWWA standards. All fittings and appurtenances shall maintain a minimum of 18 feet of restrained pipe into the fitting from all directions.

F. Tracing Wire - A continuous 10 gauge solid insulated tracing wire shall be attached to mains, service lines and appurtenances per the Construction Standard Details and the following:

1. Tracing wire shall be continuous between mainline valve boxes and fire hydrants. It shall be attached to the top of the pipe with 10-mil vinyl tape every 5 feet.

2. Tracing wires through valve boxes shall be placed outside of riser, but inside the box.

3. Tracing wire in manholes and vaults shall be attached inside the facility within one foot of the rim.

4. Wire splices shall be located above ground, when possible, and inside of valve boxes and completed per the Standard Details and as follows:

a. Twist the wire together with a minimum of 5 twists.

b. Install a copper split bolt connector on the splice.

c. Solder all connections.

d. Cover the splice with mastic tape and wrap with vinyl tape.

G. Marking Tape - A 4.0 to 5.0 mil, 3 to 4 inch wide, blue plastic non-detectable water pipe marking tape, marked "Caution Buried Water Line Below" or equivalent shall be placed in all main line trenches, 12 to 24 inches from the surface.

H. Marking Pipe in Unpaved Areas - Mains in unpaved areas shall be marked every 150 lineal feet with a blue composite utility marker having a decal stating: "Caution Water Pipeline." Appurtenances (valves, ARV's, test stations, etc.) and angle points shall also be marked. Mains in landscaped areas shall be delineated with a brass marker set in an 8-inch concrete cylinder 4 inches above finished grade. The brass marker shall state “City of Grass Valley Water Main.”

I. Protection of Underground Metal - All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 8-mils minimum thickness polyethylene encasement, per AWWA standards, with ends taped off with vinyl pipe wrap tape.

J. Polyvinyl Chloride (PVC) Pressure Pipe Installation - PVC shall be installed in accordance with the AWWA Manual M23 and the manufacturer's recommendations, except as otherwise provided herein:

1. PVC Pipe shall have been manufactured within the 18-month period prior to installation.

2. Pipe and gaskets shall be kept clean and protected against sunlight and heat damage.

3. Pipe showing signs of physical damage or excessive ultraviolet exposure will be rejected and shall be immediately removed from the job site.

4. The pipe shall be installed with the manufacturing label showing on the top.

5. The reference mark or stab line on the spigot end must be flush with the bell end and visible for inspection.

6. The beveled end of the pipe shall be cut off before placement into a mechanical joint.

7. Minimum length of pipe for installation shall be five (5) feet.

K. Ductile Iron Pipe (DIP) - DIP shall be installed in accordance with the standards for "Installation of Ductile Iron Water Mains and Their Appurtenances" (ANSI/AWWA C-600) and the manufacturer's recommendations, and as provided herein:

1. DIP shall be polyethylene-encased in accordance with these Construction Standards and the standard for "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5).

2. At the direction of the Public Works Inspector, the Contractor shall repair damages to the polyethylene encasement as described within ANSI/AWWA C-105/A21.5 or shall replace all damaged polyethylene film sections.

3. Metallic lines shall be exothermically welded and electrically continuous on DIP runs exceeding 100 feet or as approved by the City Engineer. Exothermic welds shall be installed per the Construction Standard Detail for “Exothermic Weld”, and as follows:

a. Weld only against bare metal on both the bell and spigot ends of pipe.

b. Care must be taken not to remove excess metal when removing the pipe coating.

c. After a solid weld is made, coat the bare metal with an acceptable bituminous coating material and cover with a plastic protective cap or approved equal.

d. DO NOT weld onto valves.

4. Corrosion test stations shall be installed on metallic lines at intervals not to exceed 1,000 lineal feet or as specified on the approved plans.

5. DIP cuts shall be coated with an approved bituminous material.

6. Minimum length of pipe for installation shall be two (2) feet.

L. Ductile Iron Pipe Fittings - In addition to requirements set by these standards, fittings shall be constructed per the following requirements. Mechanical joint fitting bolt threads and nut shall be coated with an approved bituminous material. Flanged bolt heads and threads shall be coated with an approved material.

M. Transitions Between DIP and PVC - Transitions between DIP and PVC shall be made as follows:

1. A PVC pipe spigot may be inserted into a DIP bell by cutting off the PVC bevel on the spigot, and leaving no more than a ½-inch taper. A Public Works Inspector shall be present to witness this process.

2. Transitions may be made by the use of a DIP repair sleeve.

N. Boring of Water Lines - Borings for installation of water lines shall be made as follows:

1. The equipment, method and sequence of operation and conductor pipe grades shall be approved by the Public Works Inspector. A minimum of 48 hours notice shall be given prior to the start of work.

2. Excavation for the boring operation shall be the minimum necessary to satisfactorily complete the work. Bracing, sheeting, and shoring shall be adequate to protect workers and any adjacent structure or roadbed.

3. When, in the opinion of the Public Works Inspector, the nature of the soil indicates the likelihood of ground loss, the Contractor shall take steps to prevent boring holes that are substantially oversized.

4. Utilizing the City's drainage system for residual discharge from boring operations is prohibited. This discharge is a violation of the City's Stormwater Ordinance and the Clean Water Act. Discharge fluid shall be recovered, contained and discharged at an appropriate location, or if the situation allows, fluid may be discharged into an open area with the pre-written approval of the property owner and approval from the Regional Water Quality Control Board, provided it does not impact sensitive areas such as wetlands, creeks, or other natural water conveyances.

All street boring shall include adequate measures to mitigate sediment laden water discharge. An acceptable measure is pumping the discharge fluid into a tanker and hauling it away. Other measures suggested by the Contractor will be considered by the City.

O. Vertical Elevation Change - Mains designed with a vertical elevation change using angle fittings shall use ductile iron pipe with an approved restraint system between the two angle fittings.

P. Bridges and Casings - Pipe within bridges and casings shall be fully restrained and fully extended prior to closure.

4-7. SERVICE INSTALLATION - Water services shall be installed in accordance with manufacturer's recommendations, the Standard Details and the following provisions.

A. Continuity of Installation - Services shall be continuous from the main line to the service box.

B. Separation of Taps, Service Saddles and Fittings - Taps, service saddles and fittings attached to mains shall be separated from each other by a minimum of 24 inches.

C. Wrapping Service Saddles - Service saddles shall be wrapped and sealed in 8-mil minimum thickness polyethylene and backfilled with sand. Use pipe wrap tape to secure and seal the polyethylene wrap.

D. Service Manifolds - Service manifolds shall be constructed per the following criteria:

1. Where a service line is extended a distance greater than 40 feet, a construction jumper shall be installed per the Construction Standard Detail for "Backflow Manifold Schematic". The new service line and manifold shall be tested in accordance with these Construction Standards.

Where a service line is extended a distance less than 40 feet, the extension shall be cleaned, swabbed with chlorine and flushed in the presence of the Public Works Inspector. The new service line and manifold shall be pressure tested in accordance with these Construction Standards.

In both cases, the installation shall be fully restrained by an approved restraint system, starting at the main and as required by the approved Improvement plans.

2. No water shall be drawn through a service prior to installation of the water meter and testing of the backflow assembly.

E. Temporary Backflow Assemblies - A backflow assembly shall be required for construction and sales trailers having a landscape irrigation system or a septic holding tank.

F. Permanent Backflow Assemblies - Backflow assemblies shall be installed per Standard Detail. A Hotbox or freeze bag may be used for above ground installations.

G. Marking Residential Water Services - The curb in front of residential water services shall be stamped with a "W."

H. Caps on Service Saddles - Service saddles shall be installed with zinc caps on all bolts, per these Construction Standards.

4-8 ABANDONMENT OF SERVICES AND MAINS - All water services requiring abandonment shall be disconnected from the main line at the corporation stop and plugged unless otherwise approved by the Public Works Department. Mainline stubs shall have the valve removed and replaced with a blind flange or as approved by the Public Works Inspector. The abandoned piping shall be removed or left in place as approved by the Public Works Inspector.

4-9 APPURTENANCES INSTALLATION - All appurtenances, including fire protection, blow-offs, sample stations, air release valves and fire hydrants shall be installed in accordance with manufacturer's recommendations, these Construction Standards and the following provisions:

A. Encasement - All valves, fittings, DIP, copper and underground brass shall be wrapped and sealed in an 10-mil minimum thickness polyethylene encasement. Use pipe wrap tape to secure and seal to the polyethylene encasement. Damaged or scratched surfaces on epoxy coated valves and appurtenances may be repaired with an epoxy kit per manufacturer's recommendations and to the satisfaction of the Public Works Inspector prior to wrapping. Otherwise, the damaged valve shall be replaced with a new valve.

B. Gate Valves and Extensions - Gate valves shall be centered in a one-piece riser stock. An operator nut extension shall be installed on valves where the operating nut exceeds 40 inches in depth from final grade. Valve extensions shall be continuous and within 24 inches of finished grade.

C. Coating Buried Nuts and Bolts - Buried nuts and bolts shall have "Sap" caps or shall be coated with a bituminous material. This includes exposed bolts found on a manufactured appurtenance (i.e., valve bonnets, etc.). "T" bolt heads do not require coating.

D. Fire Hydrant Markers - Fire hydrants shall be marked with a blue recessed reflector placed 1 foot off of street centerline on the fire hydrant side of the street. Fire hydrants located at intersections shall be marked on both streets.

E. Paint for Fire Hydrants - Fire hydrant barrels shall be painted with Sherwin Williams Polane SP Polyurethane Mueller Yellow (Part Number 172-6918). Private hydrants shall be painted chrome. The tops and nozzle caps shall be painted by the City with the following capacity indicating scheme, per NFPA standard color code:

1. **Class AA** - Flow capacity of 1,500 gpm or greater = OSHA Safety Light Blue
2. **Class A** - Flow capacity of 1,000 gpm to 1499 gpm = OSHA Safety Green
3. **Class A** - Flow capacity of 500 gpm to 999 gpm = OSHA Safety Orange
4. **Class A** - Flow capacity less than 500 gpm = OSHA Safety Red

F. Blow-Off Assemblies for Dead-End Lines - Dead-end lines, low points and pressure zone boundaries, permanent and temporary, shall have a blow-off constructed per the "2" Blowoff Hydrant Assembly" Standard Detail and marked with a Carsonite marker

G. Insulating kits - Insulating kits shall be installed at transitions between dissimilar metal pipe per the Construction Details and as required by the Public Works Department.

4-10 TESTING PROCEDURES - Testing of the water system may proceed only after joint utility crossings are completed, the sewer mains and services have passed pressure test and TV inspection and subgrade elevations have been met. Road bases to be lime-treated shall be pressure tested before and after the lime treatment process. Testing prior to subgrade placement may be subject to additional pressure tests at the discretion of the Public Works Inspector. The new system shall be filled with potable water through an approved backflow device.

A. Pressure Test:

1. The Public Works Inspector will be present during the duration of the test.

2. Contractor shall verify with the Public Works Inspector that all system valves are open prior to testing. Air shall be completely expelled from the pipe, valves and hydrants.

3. Pressure testing shall be conducted for a minimum of two hours at 150 pounds per square inch or at one-and-one-half times the operating pressure for water mains and 200 pounds per square inch for fire hydrant and fire protection assemblies, whichever is higher, as measured from the system high point. The test gauge shall be liquid-filled and capable of testing up to 300 psi.

4. Loss of pressure shall not exceed 5psi during the two hour test period.

B. Chlorine Disinfection - Chlorine disinfection shall comply with the American Water Works Association Standard for Disinfection Water Mains (C651-92) and as specified below:

1. Disinfection inspections shall begin only after passing the pressure test.

2. Prior to chlorination, pre-flush water mains and services. Pre-flushing is not permitted if using the Tablet Method for chlorination.

3. Chlorine shall be drawn through all mains, hydrant runs and services. The Public Works Inspector shall verify that a minimum chlorine residual of 50 parts per million (ppm) has been achieved.

4. After a 24-hour holding period, the Public Works Inspector will verify that a minimum chlorine content of 25 ppm remains in the system.

5. Upon approval by the Public Works Inspector, the water system shall be flushed to remove concentrated chlorine. Flushing shall be continued until the remaining water has a chlorine residual below 1 ppm and a turbidity equal to or less than 1 NTU. Chlorinated water shall be neutralized to 0.1 ppm chlorine residual or less prior to discharge. Discharge location and neutralization methods shall be documented in the SWPPP and coordinated with, and approved by, the Public Works Inspector.

6. Chlorinated water resulting from flushing newly installed water lines may be discharged into the City's sewer system only with the specific permission of the City Engineer.

Prior to discharging into the sewer system, the Contractor shall sign a form authorizing the Public Works Department to bill for the amount of water discharged into the system. At the end of each flushing exercise, and prior to tying into the City water system, the Public Works Inspector(s) shall prepare a bill for water usage based on the meter reading. This bill must be paid before the project is signed off by the City Engineer.

The Public Works Department shall determine the volume of discharge. Chlorinated water shall not be disposed of into environmentally-sensitive areas (i.e., under oak trees, vernal pools, man-made or natural streams, drainage systems, etc.) during any time of the year.

All discharges into the sewer system shall be governed by the following conditions:

a. Water used for the purpose of flushing shall be metered.

b. Discharge into the sewer system shall be done in such a manner as to avoid surcharging the sewer system.

c. No discharge into the sewer system shall be permitted on rainy days.

d. No discharge shall be permitted upstream of a small lift station.

e. An approved air gap shall be maintained at all times. Air gap distances shall be calculated as 2.5 times the pipe diameter. In no case shall the air gap be less than 12 inches.

C. Water Quality Testing - Water quality samples shall be taken per the following procedure:

1. Once flushing has lowered the chlorine residual below 1 ppm and the turbidity is equal to or less than 1 NTU, the water system shall observe a minimum 24 hour detention time. Water may not be drawn during this time period.

2. After the 24-hour holding period has elapsed, water quality samples shall be collected for testing. If the sample lot does not meet the minimum chlorine residual and turbidity criteria, additional flushing and added 24-hour holding period shall be required. The procedure shall be repeated until the criteria are met.

3. If the minimum criteria are met a final Presence/Absence test for coliform shall be performed prior to connection to the City water system. The flushing and chlorinating procedure shall be repeated until no coliform are detected.

D. Tying Into The City System - A tie-in procedure shall be submitted and approved by the Public Works Department prior to the proposed work. The Contractor shall allow up to seven days for review of the procedures by the Public Works Department. The water system shall be tied into the City system within ten (10) working days upon completing and passing all the testing procedures. Tie-ins shall be conducted as specified in Section 4-2 of these Construction Standards. After the tie-in has been made, the Contractor shall flush the segment tied-in to the approval of the Public Works Inspector.

1. If the new water system cannot be tied into the City system within ten (10) working days, the new system shall maintain a chlorine residual of 0.5 to 1.0 ppm or be subject to water quality testing and re-chlorination. This shall be discussed with the Public Works Inspector.

2. On-site private systems may connect onto the City System upon passing all testing procedures, backflow tests, and meters have been paid for and installed. A tie-in procedure shall be required per this section.

E. Continuity Testing - The Public Works Department will test continuity of the tracing wire with City standard locating equipment upon request for testing by the Contractor. Discontinuity in the tracing wire shall be repaired. It is recommended that the Contractor request continuity testing after subgrade is made, but before asphalt is placed. Final continuity testing will take place after asphalt is placed and all valve boxes are raised. Costs for said inspection shall be borne by the Contractor. Preliminary inspections may be performed by outside Contractors, but shall not be accepted by the Public Works Department as an official record.

F. Corrosion Protection System Testing - At the completion of the pipe installation and prior to curb and gutter, the Corrosion Engineer shall conduct a test of the corrosion monitoring system in the presence of the Public Works Inspector. A report showing the test results shall be submitted to the Public Works Department for review and approval. The report shall include test station locations as called out on the approved plans, appurtenance tested, test result, and recommendations for future monitoring and maintenance.

4-11 REPAIRING INSTALLED IMPROVEMENTS - All PVC and DIP water mains shall be repaired per the following procedures:

A. Damaged or Failed Pipe Sections - Damaged or failed pipe sections shall be removed and replaced with new pipe in the presence of the Public Works Inspector. Replacement can be accomplished by the use of City approved ductile iron mechanical joint repair sleeves. Pipe restraints will be required.

B. Backfill - After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified in the Utility Trench Bedding, Backfill and Paving detail. The repairs shall then be re-tested per these Construction Standards.

C. Encasement Repair - At the direction of the City, the Contractor shall repair damage to the polyethylene encasement as described within ANSI/AWWA C-105/A21.5 or shall replace all damaged polyethylene film sections.

4-12 PUNCHLIST PROCESS - When the Contractor is satisfied that all improvements are substantially complete, a punchlist of final outstanding items may be requested. With the assistance and presence of the Contractor, the punchlist shall be generated by the Public Works Inspector.

4-13 MATERIALS

A. Water Main - Unless noted on the approved plans, all water mains shall be sizes 6, 8 ,10, 12-inch, and either Polyvinyl Chloride Pressure Pipe (PVC) or Ductile Iron Pipe (DIP).

1. PVC Pressure Pipe - PVC Pressure Pipe shall be manufactured to a minimum Class 150 rating and shall conform to the "Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 6 inches through 12 inches, for Water" (AWWA C-900), and shall also include the following:

a. PVC Pressure Pipe shall be blue in color and shall have been manufactured within 18 months of installation. The pipe shall be manufacturer date coded and the City provided the manufacturer's coding for translation. Sun damaged pipe may be rejected at the Public Works Inspector’s discretion.

b. Rubber rings shall conform to the "Standard Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe" (ASTM F-477).

c. Approved PVC Pressure Pipe manufacturers include: Certain Teed Certa Lock, Diamond Plastics Corporation, J-M Manufacturing, Pacific Western Pipe, Vinyl Tech-White Knight, Pressure - Flex Pipe, or approved equals.

2. Ductile Iron Pipe - DIP shall be manufactured to conform to the standards ANSI/AWWA C-150/21.50 thickness design of ductile iron pipe and to "Ductile Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water and Other Liquids" (ANSI/AWWA C-151/A21.51) and shall also include the following:

a. DIP shall be cement-mortar lined in accordance with the standard for "Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C-104/A21.4).

b. Approved DIP manufacturers include: Pacific States, Tyler, US Pipes, Griffin, or approved equals.

B. Services

1. Polyethylene Pressure Pipe - Service laterals shall be sizes 1, 2, 4, and 6-inch iron pipe size (IPS) polyethylene pipe conforming to ASTM D2239 and shall be rated for use at a pressure class of 200 psi.

2. Brass Material

a. Brass pipe - Brass pipe shall conform to ASTM B-43 standards. A listing of approved pipe include: Hallstead 3/4" through 2" Red Brass, Cambridge-Lee, Federal WW-351, Wolverine, or approved equal.

b. Brass fittings - Brass fittings shall conform to ANSI Standard B16.15, B16.24, B2.1, T-94-1 and be a minimum of Class 125. A listing of approved manufacturers include: Lee Brass, Merritt Brass, New England Union Co., or approved equal.

3. Corporation Stops

a. Corporation stops shall be male, iron pipe thread by iron pipe thread and full throat ball valve design. A corporation stop shall be installed at the water main for all service laterals smaller than 2 inches. Approved manufacturers of corporation stops include: Jones, Mueller, or Ford. Part reference numbers are as shown below:

i. Jones: Part #J-1943 (3/4-inch to 2 inches)

ii. Mueller: Part#B-2969-N (Compression 1 1/2-inch to 2 inches)
Part#B-20013-N (Compression 3/4-inch to1 inch)

iii. Ford: Part #FB500-NL (3/4-inch to 2 inches)

4. 90° Curb Stops

a. All curb stops must have lock/padlock wings. Approved curb stop manufacturers include: Jones, Mueller, or Ford. Part reference numbers are shown below:

i. Jones: Part #E-1966W (3/4-inch to 1 inch)
Part #E-1974W (1½ inches to 2 inches)

ii. Mueller: Part #B-24265N (3/4-inch to 1 inch)
Part #B-24286N (1½ inches to 2 inches)

iii. Ford: Part #BA13-332W-NL (3/4-inch)
Part #BA13-444W-NL (1 inch)
Part #BFA13-666W-NL (1½ inches)
Part #BFA13-777-NL (2 inches)

5. Dielectric Tape - Approved manufacturers for dielectric tape include Polyken #932 Hi-Tack joint wrap tape or approved equivalent flexible dielectric tape.

6. Service Saddles

a. PVC Pressure Pipe Service Saddles manufacturers include: Jones or Mueller. Part reference numbers are as indicated below:

i. Jones: 4-inch through 12-inch saddles with ¾-inch through 2-inch tap, Part #J-996

ii. Mueller:

Saddle Size	Part #
4-inch	H-13490
6-inch	H-13491
8-inch	H-13492
10-inch	H-13493
12-inch	H-13494

b. DIP Service Saddles manufacturers include: Jones, Mueller, or approved equal. Part reference numbers are as indicated below:

i. Jones: 4-inch through 12-inch saddles with ¾-inch through 2-inch taps: Part #J-979

ii. Mueller: ¾-inch through 2-inch taps:

Saddle Size	Part #
4-inch	BR2B0474IP *
6-inch	BR2B0684IP *
8-inch	BR2B0899IP *
10-inch	BR2B1104IP *
12-inch	BR2B1314IP *
16-inch	BR2B1732IP *

C. Appurtenances

1. Air Release Valves - Air release valves shall be epoxy coated vacuum break type and include a drain valve. A listing of approved manufacturers includes: Crispin, Valmatic, or approved equal. Part reference numbers are as shown below:

Crispin	Part #	Valmatic	Part #
1"	UL10	1"	201C
2"	UL20	2"	202C
3"	UL31	3"	203C
4"	UL41	4"	204C
6"	UL61	6"	206C
8"	UL81	8"	208C

2. Backflow Assembly - Refer to the current "List of Approved Backflow Prevention Assemblies" from the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research. Where there is a conflict between these standards, the University of California Testing Laboratory approved list and Title 17 of the State of California Administrative Code, the more restrictive requirement shall apply.

3. Blocking for Boxes - Slump Block - 4"x4"x15-1/2", or approved equal.

4. Blow-Off Assemblies - Kupferle, Eclipse #78 (2-inch) or approved equal.

5. Cadwelds - A listing of approved materials includes:

a. #4 jumper cable, CP cable, 18" long with 1" bare end

b. #4 cadweld copper sleeve
c. #4 cadweld shot with thermite mastic weld cap-t-cap

6. Fittings -

a. PVC - All fittings to be used with PVC Pressure Pipe shall conform to AWWA C-900 and C-905 standards.

b. Ductile Iron Pipe - Unless otherwise specified or shown on the approved plans, all fittings to be used with DIP shall employ either mechanical joints or restrained joints conforming to the standard for "Ductile Iron Compact Fittings for Water and Other Liquids" (ANSI/AWWA C-153/A21.53). Approved fitting manufacturers include Tyler, Union, and US Pipe.

i. All ductile iron fittings shall be mortar lined in accordance with the standard for "Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water" (ANSI/AWWA C-104/A21.4).

ii. All fittings shall be wrapped and sealed in clear polyethylene encasement in accordance with these Construction Standards.

7. Gaskets - Gaskets shall conform to the following specifications:

a. Flange Gaskets - Flange gaskets shall be neoprene rubber, red rubber, US Pipe, Flange Tyte, or approved equal.

b. Insulating Flange Gaskets - Insulating flange gaskets shall be USSO Standard B.16.21 insulation flange kits, Type E Full Face Gasket with two-side insulation as manufactured by Calpico, or approved equal.

8. Hydrants - Hydrants shall be dry barrel type with bronze operating nut, hydrant seat and drain ring lining. Caps shall be cast iron. Approved hydrants include: Meuller #A-423 yellow or approved equal.

9. Meters - All meters shall be provided by the City of Grass Valley Public Works Department.

10. Meter Spud Couplers -

a.

Ford	Part #
3/4" x 2 ½”	C38-23-2.5NL
1” x 2 ½”	C38-44-2.625NL
1 1/2” x 2 ½”	CF31-66NL
2" x 2 ½”	CF31-77NL

b.

Jones	Part #
¾” x 2 ½”	JE130
1” x 2 5/8”	JE130

11/2" x 2"	JE129

c.

Mueller	Part #
¾ "	H-10890N
1"	H-10890N
1 ½"	H-10129JN
2"	H-10129JN

11. Nuts and Bolts

a. Flange Bolts and Nuts - Flange bolts and nuts shall conform to a minimum ASTM #A307. Bolts less than ¾ inches in diameter shall be a minimum Grade B (heavy hex). Bolts ¾ inches and larger in diameter shall be a minimum Grade A (standard hex).

b. Meter Bolts - Meter bolts are to be stainless steel, Grade 316 with brass nuts

c. Tee Bolt - Steel bolts are to be 3/4" high strength, low alloy steel with a heavy nut, conforming to AWWA Standard C-111-90

12. Nylon Bushings - Nylon bushings shall be 76-76R, 2 1/2" NST x 2" Pipe.

13. Patching Material - Cop-Coat Carboline Company (Bitumastic No. 50, Coal Tar), Coppers Coat 50, or approved equal.

14. Pipe Wrap Tape - 10-mil vinyl tape manufactured by Calpico Inc. (Calpico VI-10) or approved equal.

15. Polyethylene Encasement - "Clear" non-colored polyethylene film shall be used. The polyethylene film shall have a minimum thickness of 8-mils. The thickness shall not be less than 10 percent of the nominal thickness. The polyethylene shall be in either tubular or in sheet form. Polyethylene film shall be manufactured from a Type 1, Class C raw polyethylene material conforming to "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5). Approved manufacturers include: Fee Spec's-LP378D Northtown, Fulton Enterprise Inc., Global Polymer Tech, Unisource, or approved equal.

16. Pressure Regulators - Watts (3/4" through 2", UB5-series), Wilkens (3/4" through 2"-600 series, 2.5" through 3"-500YSBR), or approved equal.

17. Restraints

a. PVC – Megalug 2000PV Series, Sigma One-Lok Series, or approved equal.

b. DIP - Field Lock Gaskets (3 inches through 12 inches diameter only), Mega Lug 1100 Series, Sigma One-Lok Series, or approved equal.

18. Riser Aligners - Davis & Associates Riser Aligners (8"), or approved equal.

19. Riser Stock For Main Line Valves - Riser stock shall be 8-inch diameter PVC C-900 or SDR 35 for all main line valves.

20. Sampling Stations - The Kupferle Foundry Company Eclipse #88 or approved equal.

21. Silicone - Silicone shall be clear, 100% silicone with a 25-year life.

22. Tracing Wire Connectors - Tracing wire connectors shall be copper split-bolt type connectors. A listing of approved products include: Perminate Seal-Wire Connectors- Part #97811, Christy's (S-X), or approved equal.

23. Tracing Wire Mastic Tape Seal - 3M Mastic Tape #2229 or approved equal.

24. Utility Boxes and Lids - All box lids are to be permanently marked with the appropriate label (i.e., Water, ARV, CPT, etc.). In commercial projects, meter lids shall be stenciled with the number address it serves. The numbers shall be painted using white enamel paint and 2-inch stenciling. Traffic rated boxes are required in all streets. When located in a traffic area, boxes shall be rated for H20 loading. A list of approved box manufacturers include: Christy (Oldcastle), BES, or approved equal. Part reference numbers for Christy boxes and Christy or Nicor Inc. lids are shown below:

	Non-Traffic	Traffic
Christy	Part #	Part#
¾" service	B16BOX	B1324BOX
	FL16D Lid	B1324-51JH
	B16X12 Extension	B1324X12 Extension
1" to 2" services	N30BOX	B1324BOX
	FL30D Lid	B1324-51JH
	B30X12 Extension	B1324X12 Extension
3" meter box	N36BOX	B1730BOX
	FL36D Lid	B1730-51JH
	B36X12 Extension	B1730X12 Extension
4" meter box	N40BOX	B2436BOX
	B40D Lid	B2436-52JH
	N40X10 Extension	B2436X12 Extension
Valve box	G05TBOX	G05TBOX
	G05CT Lid	G05CT Lid
	G08X12 Extension	G08X12 Extension

25. Valves

a. Butterfly Valves - Butterfly valves to be used on diameters ranging from 12" to 72",shall be Mueller Lineseal III (Holiday free epoxy, interior lining and standard black asphalt varnish exterior) or approved equal. Certification shall be provided by the valve manufacturer stating the epoxy lining is holiday free. The epoxy coating shall be spark tested and approved for installation by the Public Works Inspector.

b. Gate Valves - Gate valves for 2" - 2 1/2" services shall be A2360 Thread or approved equal. Gate valves to be used on diameters ranging from 3" to 12" shall be grey cast iron or approved equal. All in-line gate valves shall have integral flat face flanges on both ends. A list of approved valves includes: Mueller-A-2360 RS Gate Valve, AFC 2500, US Pipe-Metro Seal 250, Clow 604, or approved equal.

c. Provide additional o-rings for each purchased valve.

26. Poly Adaptors –

a. Ford	Part #
2” male	C86-77NL
2” female	C16-77NL

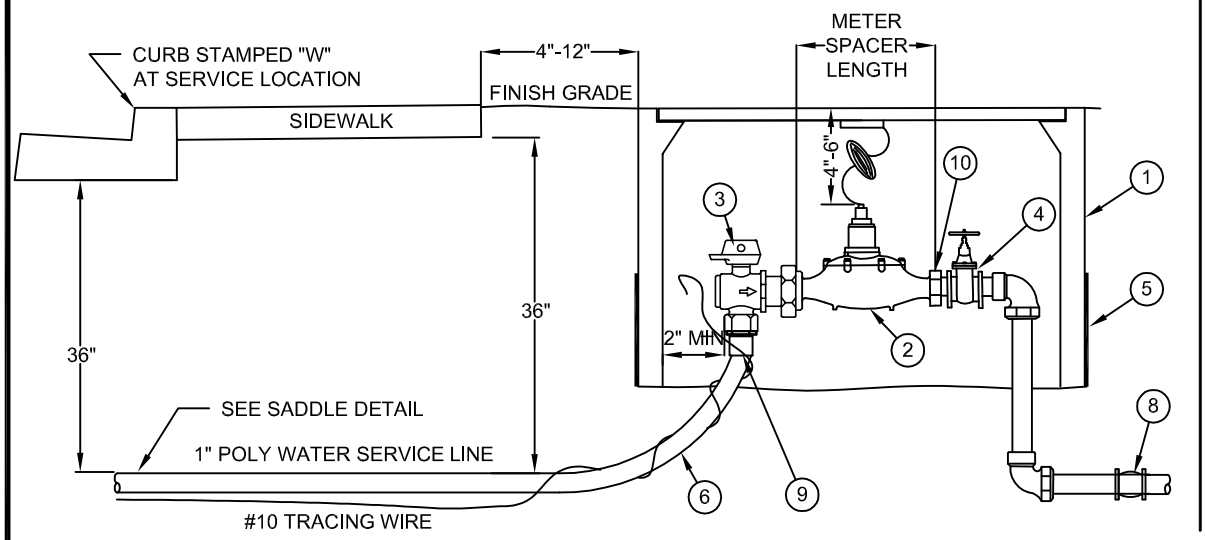
b. Jones	Part #
2” male	JE-15429N
2” female	JE-15454N
2” MIP x IPS	JE-2640
2” female	JE-2608

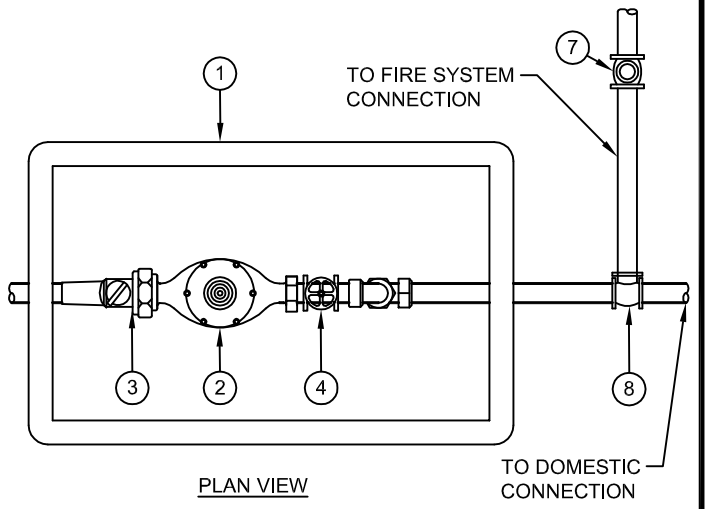
c. Mueller	Part #
1" MIP x IPS	H-15426
1" FIP x IPS	H-15456

27. Zinc Caps - Zinc caps shall be Mars or approved equal. Mars part numbers are listed below:

a. 7/16" to 1/2"-2.5 ounce weight

b. 5/8" to 1"- 6.0 ounce weight





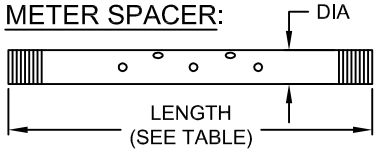
LEGEND:

1. CHRISTY B16 BOX WITH FL16D LID FOR 3/4" METER / CHRISTY N30 BOX WITH FL30D LID FOR 1" METER (OR APPROVED EQUAL)
2. WATER METER (CITY)
3. 90 ° BRASS CURB STOP (CITY)
4. GATE OR BALL VALVE (PRIVATE).
5. CEMENT BOARD END PLATE (TYP.)
6. RADIUS 24" MIN.
7. SINGLE BRASS CHECK VALVE (PRIVATE)
8. TEE (PRIVATE)
9. POLY ADAPTOR
10. METER SPUD ADAPTOR (NOT NECESSARY FOR 1" METER)

NOTES:

1. WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
2. ALL PIPE AND FITTINGS SHALL BE BRASS, WITH THE EXCEPTION OF THE SERVICE LINES.
3. BURIED BRASS PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
4. METER SPACER (SEE DETAIL) SCH 80 PVC NPT PIPE NIPPLE WITH 5 EA. X $\frac{1}{4}$" DIA. HOLES THROUGH BOTH SIDES

METER SPACER:



METER SPACER TABLE		
METER SIZE	SPACER	
	DIA	LENGTH
3/4"	3/4"	7-1/2"
1"	1"	7-3/4"

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

3/4" & 1"
SERVICES

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-1**

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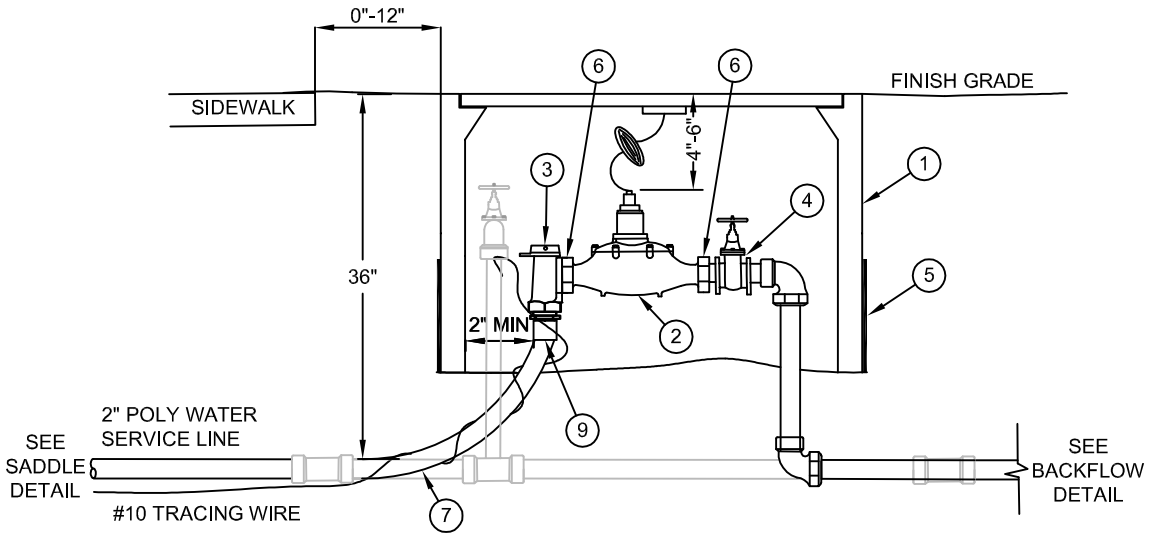

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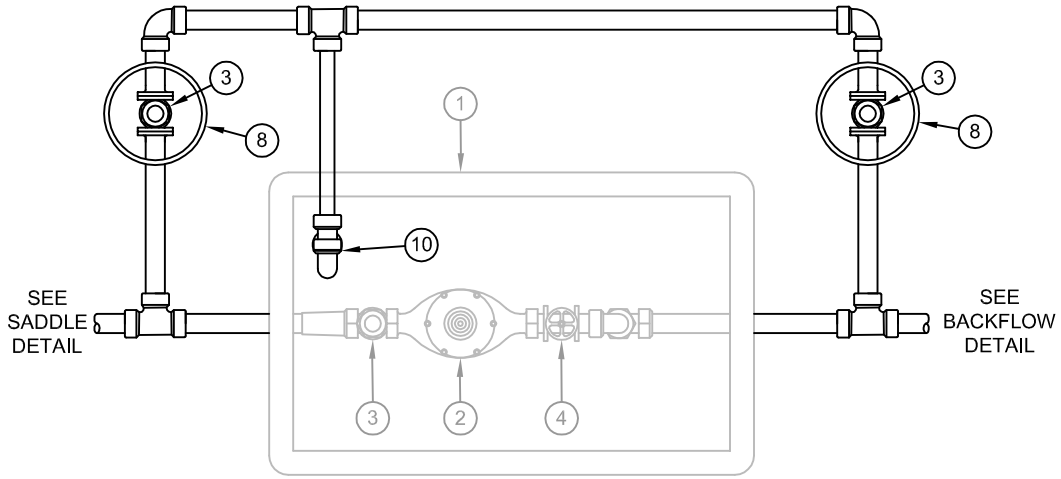

PLAN: BYPASS

LEGEND:

1. CHRISTY N30 BOX WITH FL30D LID FOR OTHER METERS (OR APPROVED EQUAL)
2. WATER METER (CITY)
3. 90 ° BRASS CURB STOP (CITY)
4. GATE OR BALL VALVE ON CUSTOMER SIDE
5. CEMENT BOARD END PLATE (TYP.)
6. METER SPUD ADAPTOR
7. RADIUS 24" MIN
8. VALVE BOX PER W-9
9. POLY ADAPTOR
10. 3/4" NPT BRASS PIPE AND 3/4" NPT BRASS HOSE BIB AND CAP.

NOTES:

1. WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
2. ALL PIPE AND FITTINGS SHALL BE BRASS, WITH THE EXCEPTION OF THE SERVICE LINES.
3. BURIED BRASS PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
4. BYPASS FOR SERVICE LINE METERS ONLY NEEDED IF REQUESTED BY CITY.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

1-1/2" & 2" SERVICES

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-2**

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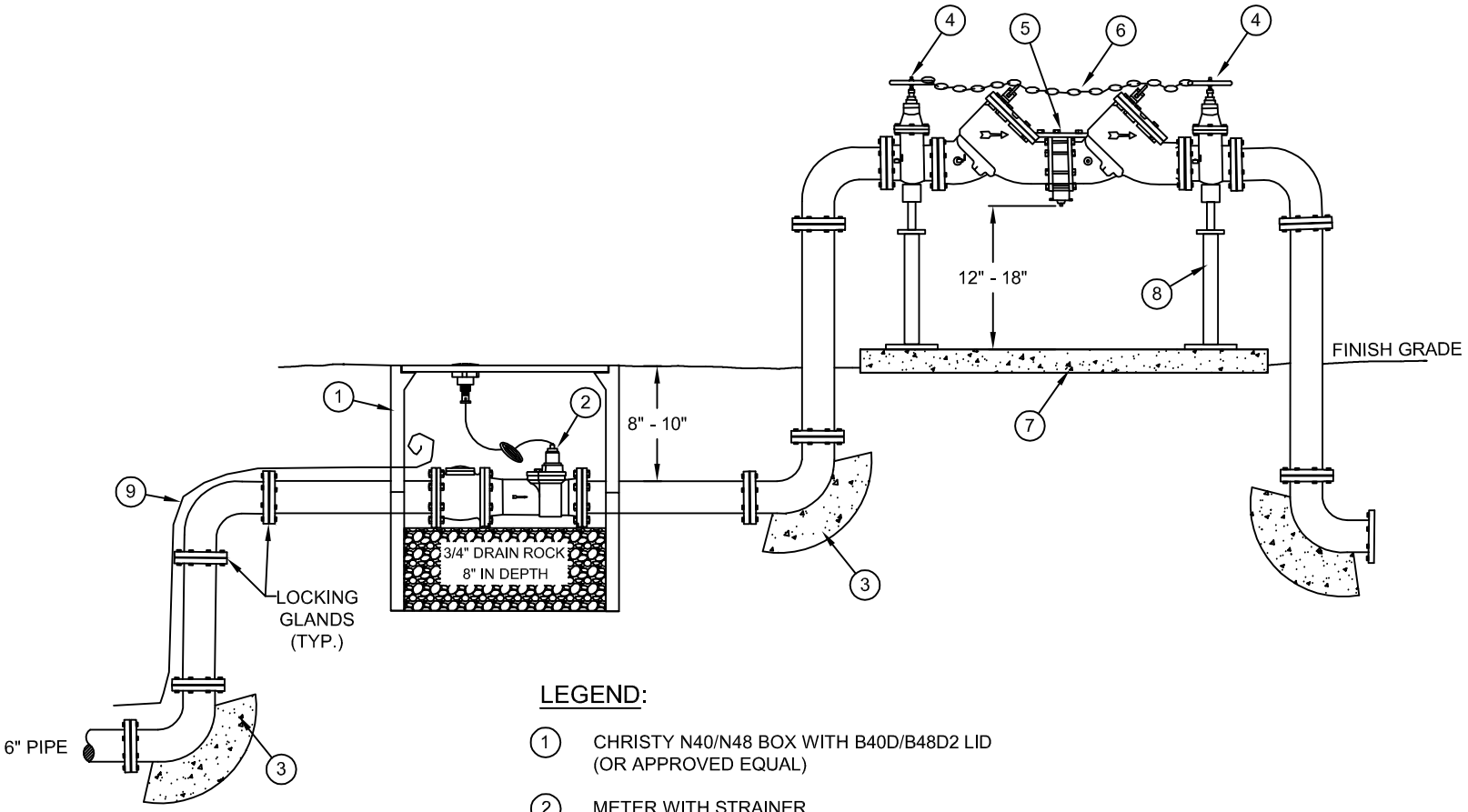

NOTES:

1. FOR LATERAL SIZES 4", 6", 8" AND LARGER
2. NO WATER IS TO BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY A CERTIFIED BACKFLOW TESTER. CITY INSPECTOR MUST RECEIVE CERTIFICATION PRIOR TO TURN ON.
3. PIPE SHALL BE DUCTILE IRON OR C900 PVC.
4. PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL. POLYETHYLENE
5. USE CITY APPROVED RESTRAINED JOINTS OR FLANGED SPOOLS
6. WATER METER SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
7. THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG.
8. GATE VALVE REQUIRED PER DETAIL W-9.

LEGEND:

1. CHRISTY N40/N48 BOX WITH B40D/B48D2 LID (OR APPROVED EQUAL)
2. METER WITH STRAINER
3. THRUST BLOCK (TYP.)
4. RESILIENT SEAT GATE VALVE
5. REDUCED PRESSURE BACKFLOW DEVICE
6. 1/4" NON-CASE HARDENED CHAIN WITH BREAKAWAY LOCK
7. 4" THICK REINFORCED CONCRETE SLAB
8. SUPPORT STANDS BOLTED INTO CONCRETE (TWO BOLTS MINIMUM)
9. #10 TRACING WIRE

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

4" AND LARGER SERVICES

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-3**

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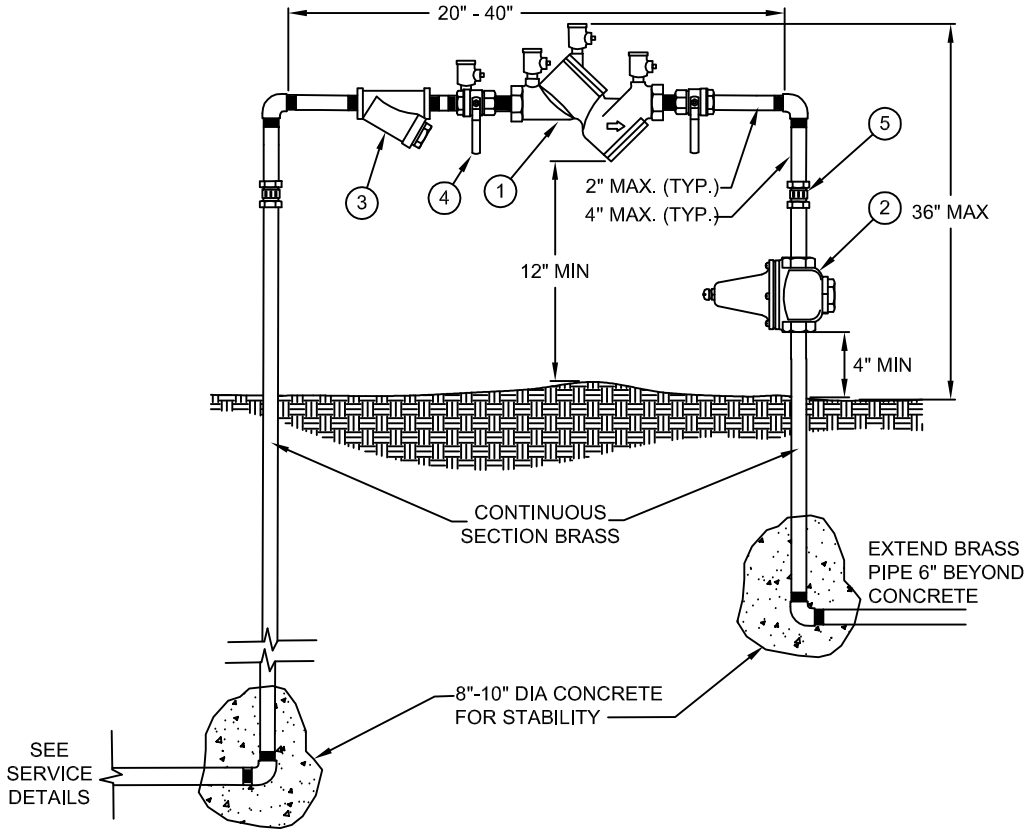

LEGEND:

1. REDUCED PRESSURE BACKFLOW DEVICE
2. BRASS PRESSURE REGULATOR, IF REQUIRED (NOT REQUIRED WHERE WORKING PRESSURE < 80PSI OR FOR IRRIGATION SERVICE)
3. BRASS STRAINER WITH BRASS PLUG
4. BALL VALVE (TYP.)
5. (2) UNIONS NOT CONNECTED TO PRESSURE REGULATOR

NOTES:

1. REDUCED PRESSURE BACKFLOW ASSEMBLY TO BE LOCATED AS CLOSE TO THE CITY WATER BOX AS POSSIBLE, 3' MAX.
2. NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY A CERTIFIED BACKLOW TESTER. CITY INSPECTOR MUST RECEIVE CERTIFICATION PRIOR TO TURN ON.
3. THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG.

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

RP BACKFLOW ASSEMBLY 2" AND SMALLER SERVICE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-4**

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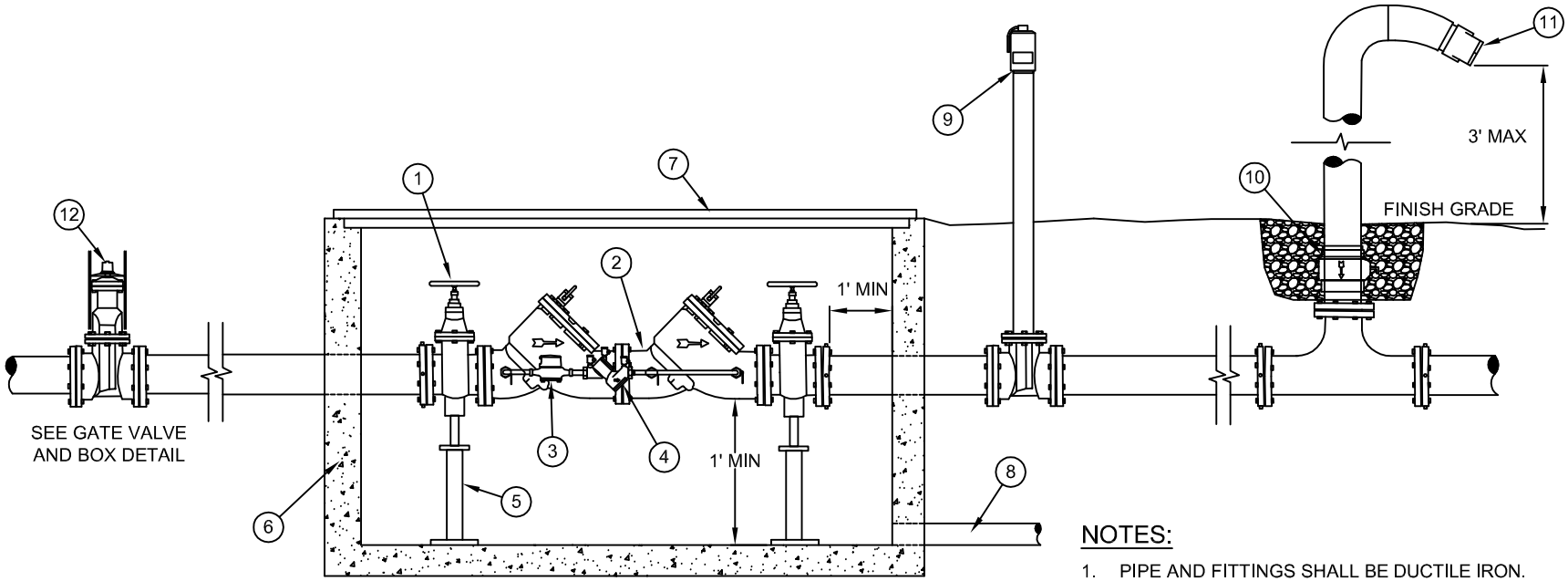

NOTES:

1. PIPE AND FITTINGS SHALL BE DUCTILE IRON.
2. FITTINGS SHALL BE RESTRAINED MECHANICAL JOINTS.
3. BURIED NUTS AND BOLTS SHALL HAVE SAP CAPS.
4. BURIED PIPE AND FITTINGS SHALL BE WRAPPED AND SEALED WITH 10 MIL POLYETHYLENE AND VINYL TAPE.

LEGEND

(1) ISOLATION GATE VALVE WITH NON-RISING STEM AND WHEEL (FIRE PROTECTION ASSEMBLY ONLY)

(2) DOUBLE DETECTOR CHECK, AMES 3000 SERIES, AMES MAXIM SERIES M300, OR APPROVED EQUAL

(3) WATER METER TO BE SUPPLIED BY CITY

(4) METER CHECK VALVE

(5) SUPPORTS 2-TYP. SHALL BE BOLTED DOWN WITH A MINIMUM OF TWO BOLTS EACH

(6) CONCRETE VAULT OR BOX FOR FIRE PROTECTION ASSEMBLY: BROOKS OR JENSEN 4' X 6'-6'" VAULT (OR APPROVED EQUAL). DOUBLE CHECK VALVE: CHRISTY N30 BOX WITH B-30 LID (OR APPROVED EQUAL)

(7) VAULT LID FOR FIRE PROTECTION ASSEMBLY: GALVANIZED STEEL TWO PIECE TORSION ASSIST LID. VAULTS IN TRAFFIC AREAS REQUIRE H20 LID.

(8) 4" SCH40 PVC PIPE DRAINED TO DAYLIGHT OR GRAVEL SUMP AS NECESSARY

(9) POST INDICATOR VALVE.

(10) CHECK VALVE WITH BALL DRIP.

(11) SIAMESE 45 DEGREE FDC WITH UL FM APPROVED METAL BREAK-AWAY C.I. CAP.

(12) GATE VALVE (FIRE PROTECTION ASSEMBLY ONLY)

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

FIRE PROTECT. ASSEMBLY /DOUBLE CHECK VALVE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-5**

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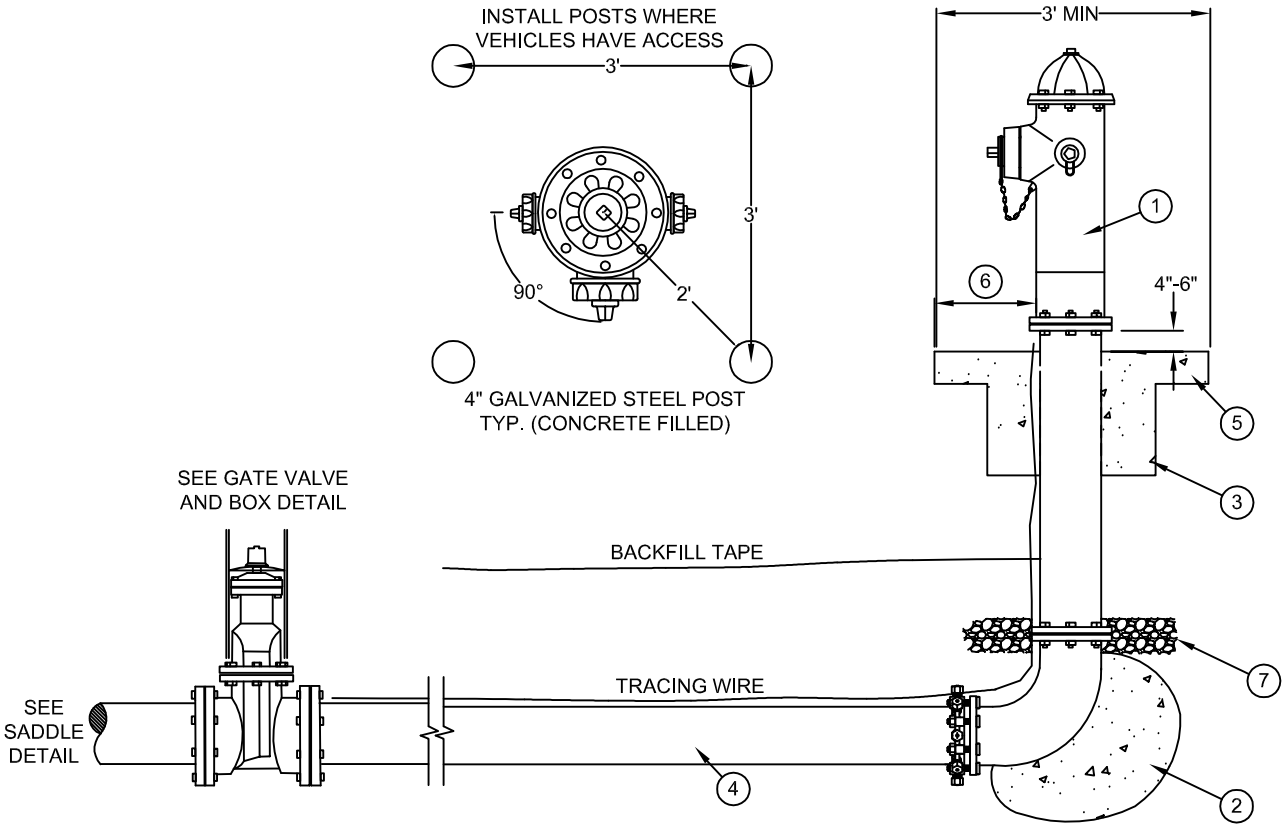

NOTES:

1. PIPE AND FITTINGS SHALL BE DUCTILE IRON.
2. FITTINGS SHALL BE RESTRAINED MECHANICAL JOINTS.
3. BURIED NUTS AND BOLTS SHALL HAVE SAP CAPS.
4. BURIED PIPE AND FITTINGS SHALL BE WRAPPED AND SEALED WITH 10 MIL POLYETHYLENE AND VINYL TAPE, EXCEPT AT DRAIN PLUG LOCATIONS.
5. MARK THE LOCATION OF THE HYDRANT WITH A BLUE REFLECTOR PLACED 1' OFF STREET CENTERLINE.
6. HYDRANTS LOCATED AT INTERSECTIONS SHALL BE MARKED ON BOTH STREETS.
7. A MINIMUM 3 FOOT CLEAR AREA SHALL BE MAINTAINED AROUND THE FIRE HYDRANT.
8. BOLLARDS REQUIRED WHERE THERE IS NO VERTICAL CURB. 6' POSTS TO BE SET TO A DEPTH OF 2' IN CONCRETE. BOLLARDS SHALL BE FILLED WITH CONCRETE AND PAINTED WITH TWO COATS OF YELLOW EXTERIOR ENAMEL PAINT.

LEGEND:

(1) MUELLER A423 FIRE HYDRANT PAINTED WITH TWO COATS OF MUELLER YELLOW PAINT. PRIVATE HYDRANTS SHALL BE PAINTED CHROME. TOPS AND NOZZLE CAPS TO BE PAINTED BY CITY.

(2) CONCRETE THRUST BLOCK AGAINST UNDISTURBED SOIL.

(3) 12" X 12" X 12" CONCRETE COLLAR FOR STABILITY

(4) DUCTILE IRON PIPE AND FITTINGS FOR ENTIRE LENGTH.

(5) MINIMUM 3' X 3' CONCRETE SLAB (4" THICK) WITH 2' CLEARANCE AROUND OPERATING NUT. SIDEWALK MAY CONSTITUTE A PORTION OF THE SLAB.

(6) HYDRANT MAY NOT PROTRUDE OVER SIDEWALK. HYDRANT 3' FROM BACK OF CURB IF DETACHED OR NO SIDEWALK.

(7) 6" MIN OF 1½" DRAIN ROCK SURROUNDING DRAIN PLUG.

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CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

FIRE HYDRANT ASSEMBLY

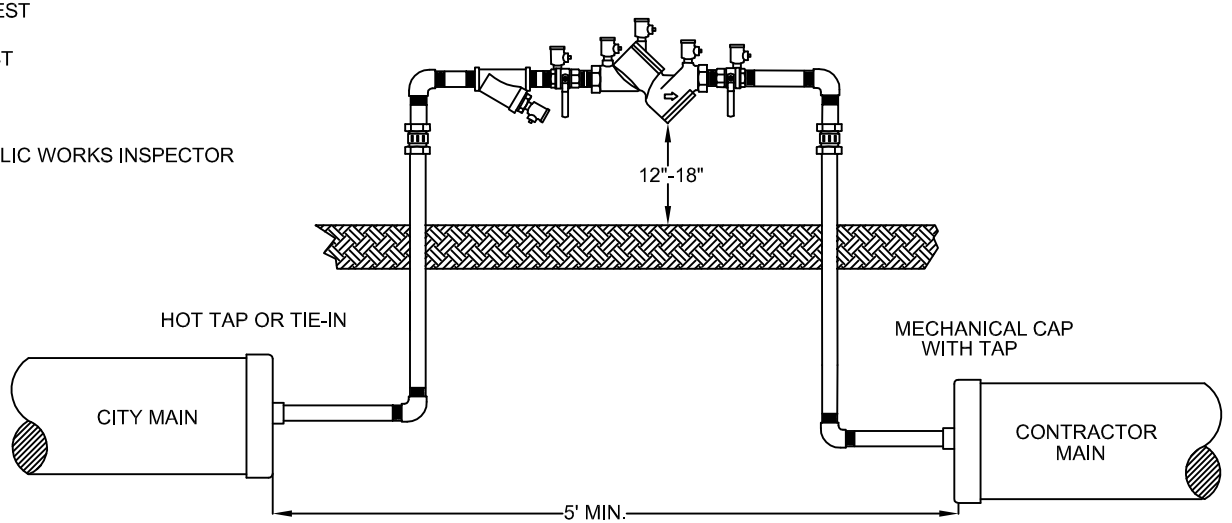
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-6**

PRIOR TO CONNECTION TO THE CITY MAIN,
THE FOLLOWING CONDITIONS SHALL BE MET:

1. PASSED A PRESSURE TEST
2. PASSED A CHLORINE TEST
3. PASSED TURBIDITY TEST
4. PASSED A BACTII TEST
5. APPROVAL BY THE PUBLIC WORKS INSPECTOR



NOTES:

1. WATER SHALL ONLY BE DRAWN INTO THE CONTRACTORS MAIN THROUGH A CITY APPROVED RP TYPE BACKFLOW DEVICE WHICH HAS BEEN TESTED BY A CERTIFIED BACKFLOW TESTER. CITY INSPECTOR MUST HAVE THE CERTIFICATE PRIOR TO TURNING ON.
2. FINAL SYSTEM COMPONENTS NECESSARY FOR TIE-IN SHALL BE PRE-CHLORINATED AND PRE-FLUSHED IN THE PRESENCE OF AN PUBLIC WORKS INSPECTOR.

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	CONSTRUCTION WATER DETAIL		
APPROVED BY: PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	**W-7**

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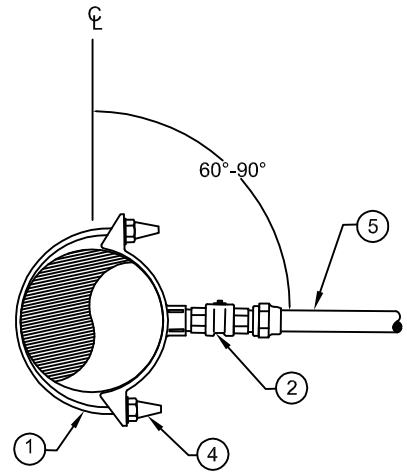
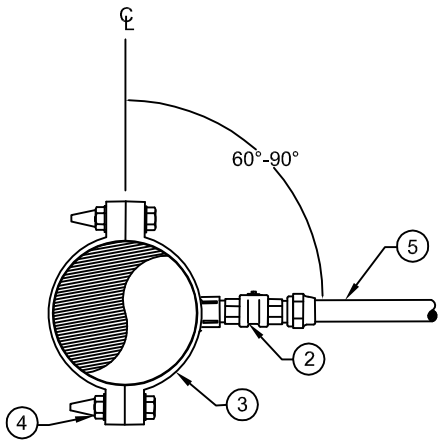
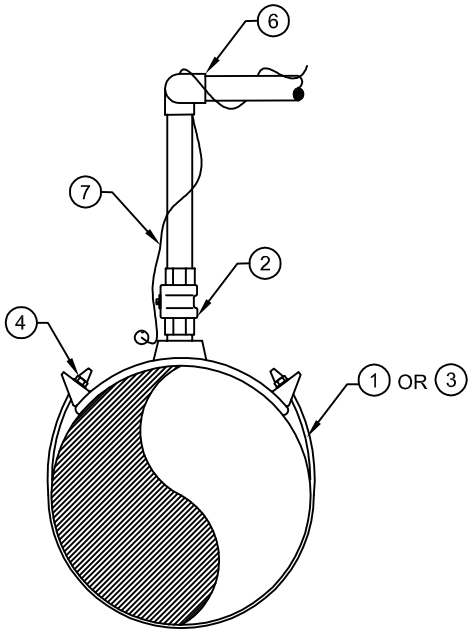


DOUBLE STRAP DUCTILE IRON
PIPE SADDLE



PVC PIPE SADDLE



ARV SADDLE

LEGEND:

1. DOUBLE STRAP BRASS OR STAINLESS STEEL SADDLE FOR DUCTILE IRON MAIN
2. INSULATING BALL STYLE CORPORATION STOP OR NON INSULATED CORPORATION STOP WITH NYLON BUSHING
3. BRASS OR STAINLESS STEEL SADDLE FOR PVC MAIN
4. ZINC CAPS ON ALL BOLTS (ONLY WITH NON-INSULATED CORPORATION STOP)
5. POLY SERVICE
6. SWING JOINT (2 - 90° BRASS FITTINGS)
7. #10 INSULATED TRACING WIRE

NOTES:

1. SADDLES SHALL BE WRAPPED IN 10 MIL POLYETHYLENE AND BACKFILLED WITH SAND.
2. TRACING WIRE SHALL BE REQUIRED ON ARV, HYDRANT RUNS, BLOW OFFS, SERVICES WITHOUT CONTINUOUS COPPER PIPE, AND OTHER MAJOR APPURTENANCES.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SADDLE DETAIL

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-8**

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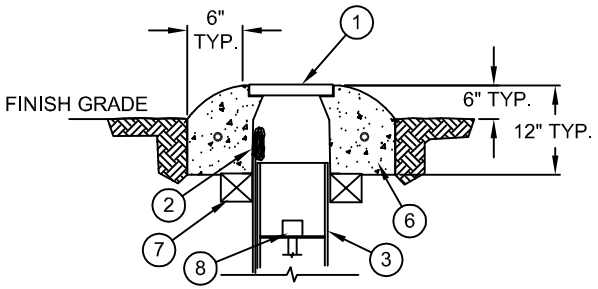
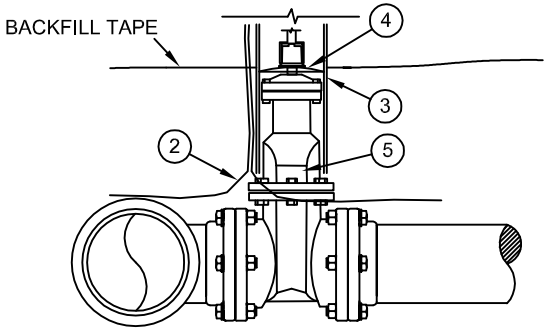
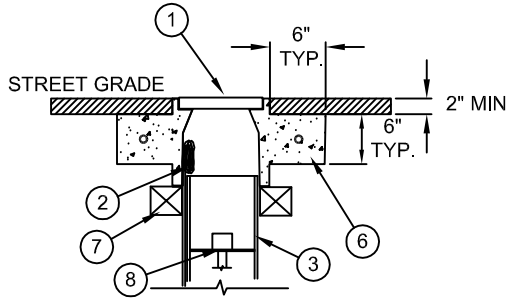


UNDEVELOPED OR LANDSCAPED AREA



GATE VALVE



PAVED AREA

LEGEND

1. CHRISTY G5 BOX (OR APPROVED EQUAL)
2. #10 INSULATED TRACING WIRE
3. 8" PVC RISER STOCK
4. RISER ALIGNER
5. GATE VALVE
6. CONCRETE COLLAR W/ #4 REBAR HOOP
7. 4X4 SOLID CONCRETE BLOCKING UNDER BOX PERIMETER
8. VALVE EXTENSION PER THE CONSTRUCTION STANDARDS

NOTES:

1. TRACING WIRE THROUGH VALVE BOXES SHALL BE PLACED OUTSIDE OF RISER BUT INSIDE OF BOX.
2. TRACING WIRE SHALL BE SPLICED INSIDE THE VALVE BOX PER TRACING WIRE SPLICE DETAIL AND SHALL LOOP WITHIN THE VALVE BOX WITH 18" OF SLACK WIRE.
3. ALL GATE VALVES SHALL BE CENTERED IN A ONE PIECE RISER STOCK WITH THE USE OF A RISER ALIGNER.
4. OPERATOR NUTS DEEPER THAN 40 INCHES FROM FINISH GRADE SHALL REQUIRE A VALVE NUT EXTENSION, 2 FEET MINIMUM IN LENGTH.
5. VALVES AND FITTINGS SHALL BE WRAPPED AND SEALED IN 10 MIL POLYETHYLENE.
6. VALVE BOX IN PAVEMENT TO BE SET $\frac{1}{4}$ INCH BELOW FINISHED GRADE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

GATE VALVE AND BOX

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-9**

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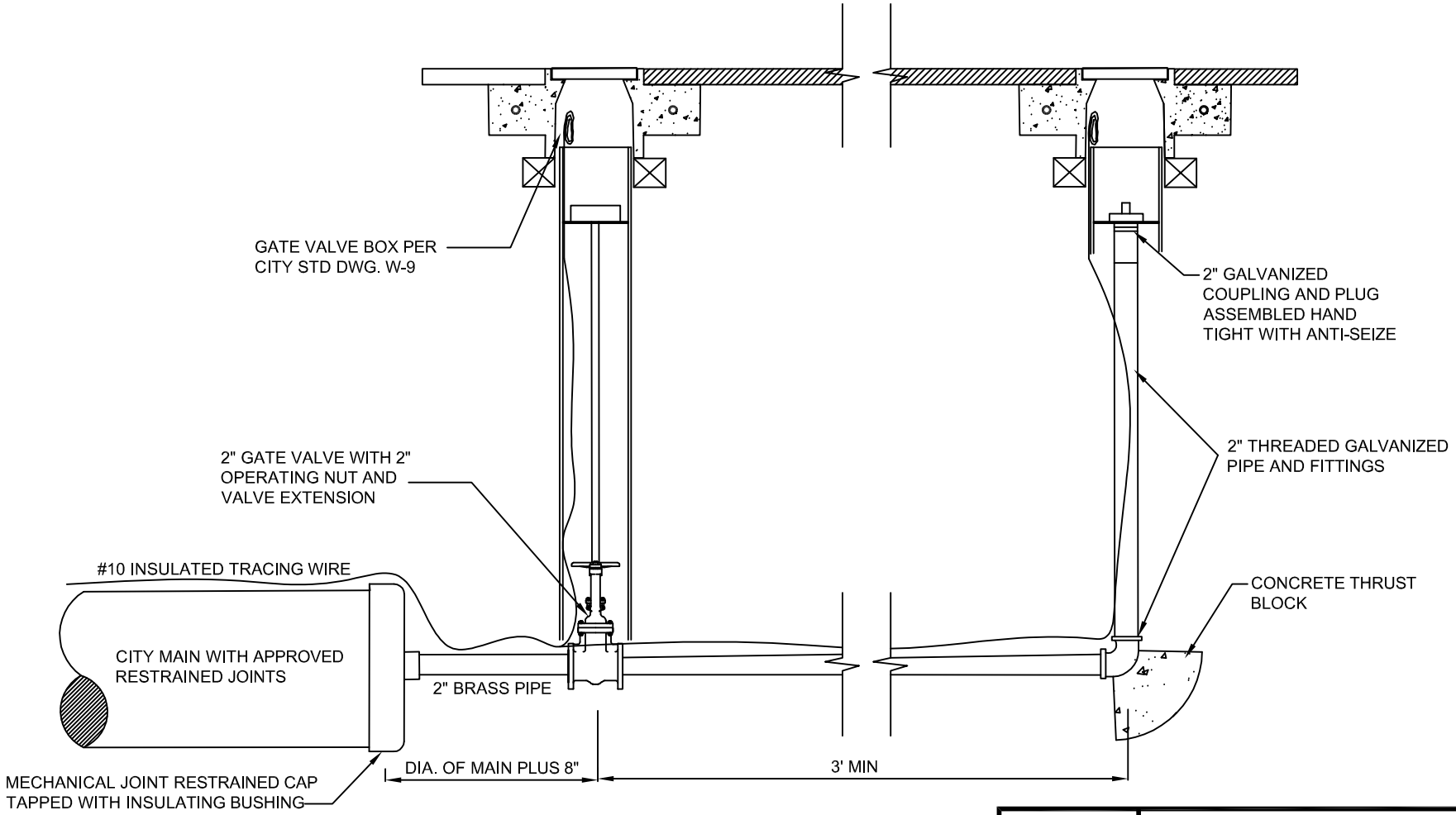

NOTES:

1. LOCATE BLOWOFF OUT OF STREET IN A PROTECTED AREA.
2. BLOWOFFS OUTSIDE OF PAVED AREAS SHALL BE A MINIMUM OF 6" ABOVE GRADE AND MARKED WITH A CARSONITE MARKER.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

2" BLOWOFF ASSEMBLY

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-10**

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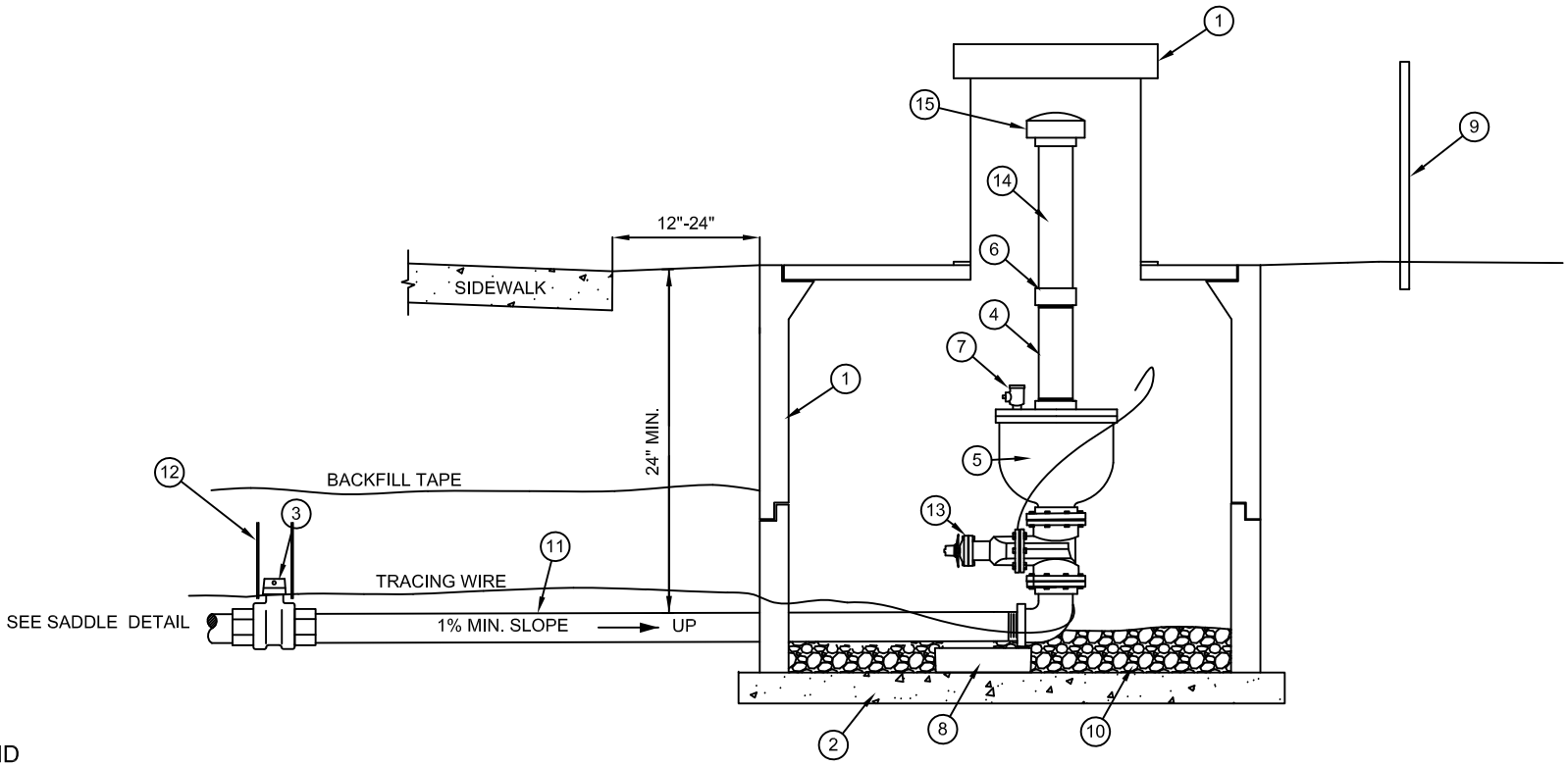

LEGEND

1. CHRISTY B36 UTILITY BOX W/ B30X12 EXTENSION AND PLACER WATERWORKS AE3618MC COVER AND ENCLOSURE (OR APPROVED EQUAL).
2. CONCRETE BLOCKING (4X4X151/2" SOLID SLUMP BLOCK) UNDER ENTIRE PERIMETER OF UTILITY BOX.
3. BRASS CORP STOP
4. BRASS NIPPLE (SIZED PER ARV OUTLET)
5. COMBINATION AIR / VACUUM VALVE WITH DRAIN VALVE
6. NPT PVC COUPLING
7. 1/4" TEST COCK
8. CONCRETE BLOCK FOR SUPPORT
9. IDENTIFIER PADDLE, AS REQUIRED BY THE CITY ENGINEER.
10. 3" DEEP DRAIN ROCK.
11. ALL FITTINGS AND PIPE TO BE BRASS
12. SEE GATE VALVE AND BOX DETAIL
13. GATE VALVE ACCESSIBLE WITHIN BOX
14. NPT SCH 80 PVC PIPE (SIZE PER ARV OUTLET)
15. NPT MUSHROOM VENT CAP W/SS SCREEN, BOTTOM VENTING (SIZED PER ARV OUTLET)

NOTES:

1. BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.
2. FITTINGS AND PIPE ABOVE GROUND SHALL BE GALVANIZED.
3. IF THE ARV MUST BE LOCATED IN A TRAFFIC AREA AND H/20 RATED BOX OF EQUIVALENT SIZE SHALL BE USED.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

1" AND 2" AIR RELEASE VALVE ASSEMBLY

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	TMT	MARCH 4, 2014	**W-11**

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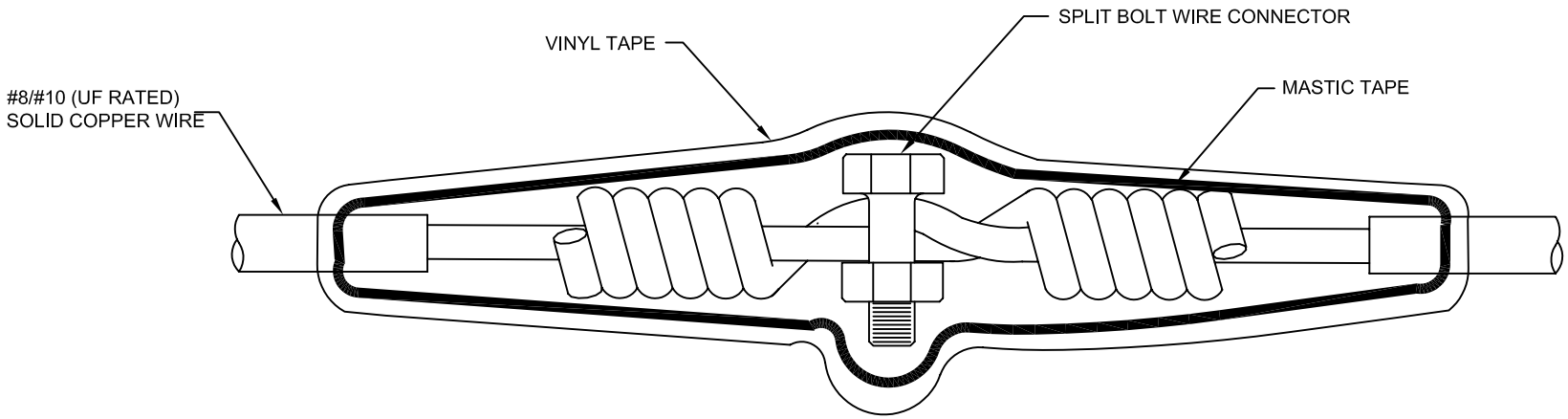


NOTES:

1. TWIST THE WIRE A MINIMUM OF (5) TIMES ON EACH END.
2. INSTALL SPLIT BOLT CONNECTOR.
3. SOLDER WIRE.
4. COVER THE ENTIRE SPLICE WITH MASTIC TAPE WRAP
5. WRAP MASTIC WITH VINYL TAPE.
6. WIRE SPLICES SHALL BE LOCATED WITHIN A VALVE BOX PER GATE VALVE AND BOX DETAIL.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TRACING WIRE SPLICE

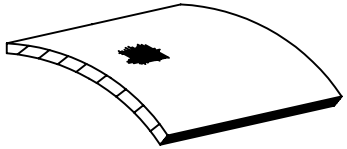
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

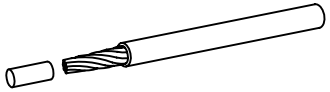
SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	FEB 9, 2010	W-12

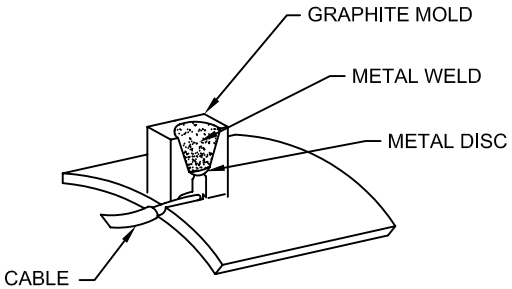
H:\STANDARDS\Standard Details\3_Water\W - 12.dwg

1) FILE TO BARE METAL & CLEAN OVER SURFACE

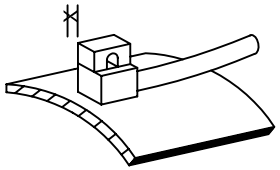


2) STRIP INSULATION FROM WIRE AND ATTACH SLEEVE



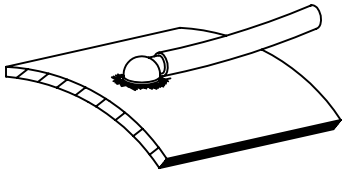


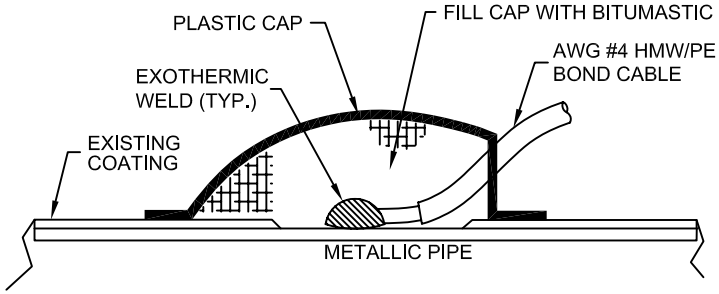
3) HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR, IGNITE WITH FLINT GUN



NOTE:
EACH JOINT SHALL HAVE TWO SEPARATE WELD WIRES.

4) REMOVE SLAG FROM CONNECTION, COVER CONNECTION WITH COMPATIBLE COATING AND CAP OVER ALL EXPOSED METAL





PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

EXOTHERMIC WELD

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	FEB 9, 2010	W-13

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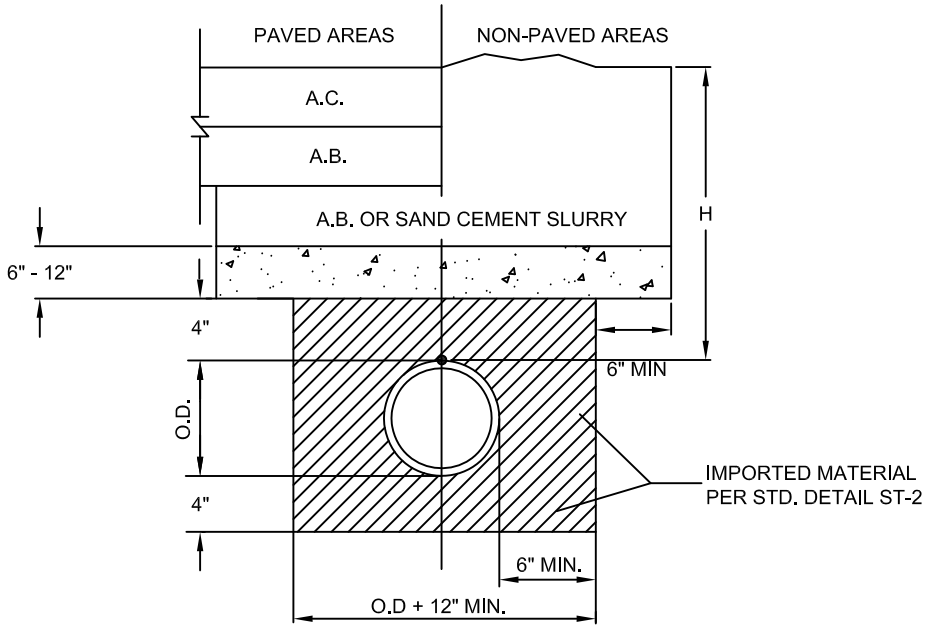
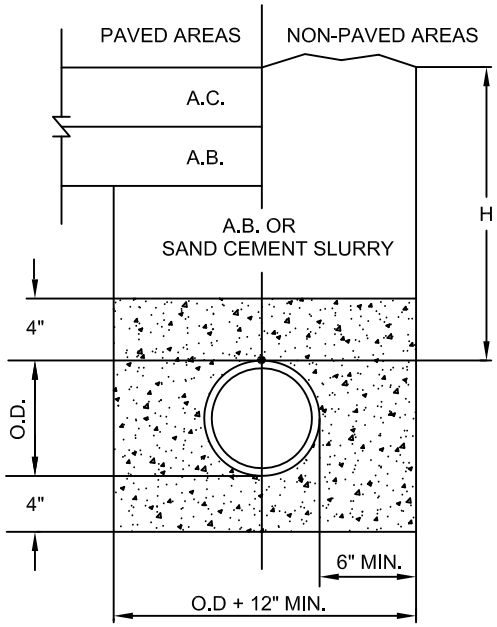


CONCRETE CAP



CONCRETE ENCASEMENT

APPLICATION:

- WHERE 30" < H < 36", USE DIP ONLY
- WHERE 20" < H < 30"
  - WITH SERVICES, USE DIP AND CONCRETE CAP
  - WITHOUT SERVICES, USE DIP AND CONCRETE ENCASE (WRAP DIP IN FOAM PRIOR TO ENCASEMENT)
- WHERE H < 20", REDESIGN WATERLINE

NOTE:

THIS DETAIL SHALL BE USED ON A CASE-BY-CASE BASIS WITH THE APPROVAL OF THE CITY ENGINEER. IN MOST CASES, THE 36" MINIMUM COVER SHALL PREVAIL.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SHALLOW WATER MAINS

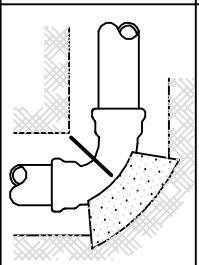
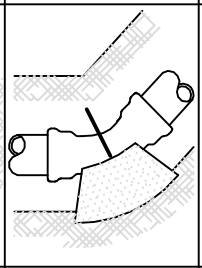
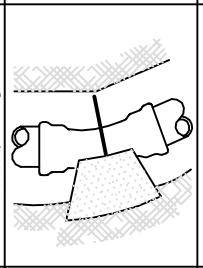
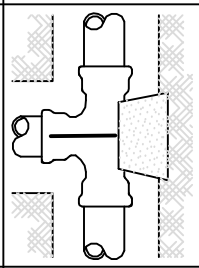
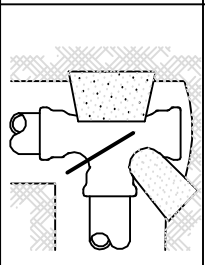
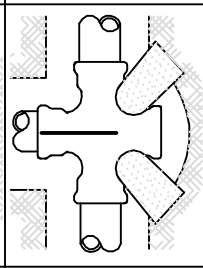
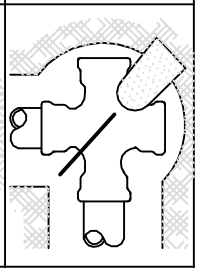
APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	JP	DEC 14, 2010	**W-14**

G:\DATA\ENG\STANDARDS\Standard Details\3_Water\W - 14.dwg

REQUIRED BEARING AREA – TOTAL SQUARE FEET

TYPE OF FITTING		90° BEND	45° BEND	11 1/4" OR 22 1/2" BEND	TEE OR DEAD END	TEE W/PLUG	CROSS W/PLUG	CROSS W/PLUGS
TYPICAL INSTALLATION								
SIZE OF PIPE	4"	2	1	1	2	2	2	2
	6"	4	2	1	3	4	4	4
	8"	7	4	2	5	7	7	7
	10"	12	6	3	8	12	12	12
	12"	16	10	5	12	16	16	16
	16"	28	15	8	21	28	28	28

NOTES:

1. THRUST BLOCKS TO BE CONSTRUCTED OF SIX SACK CONCRETE AND POURED AGAINST UNDISTURBED SOIL.
2. AREAS GIVEN ARE FOR CLASS 150 PIPE AT TEST PRESSURE OF 200 P.S.I. IN SOIL WITH 2,000 P.S.F. BEARING CAPACITY. INSTALLATINS USING DIFFERENT PIPE, TEST PRESSURES AND/OR SOIL TYPES SHOULD ADJUST AREAS ACCORDINGLY.
3. JOINTS AND FACE OF PLUGS TO BE KEPT CLEAR OF CONCRETE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

THRUST BLOCKS

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	TMT	OCT 2, 2012	**W-15**

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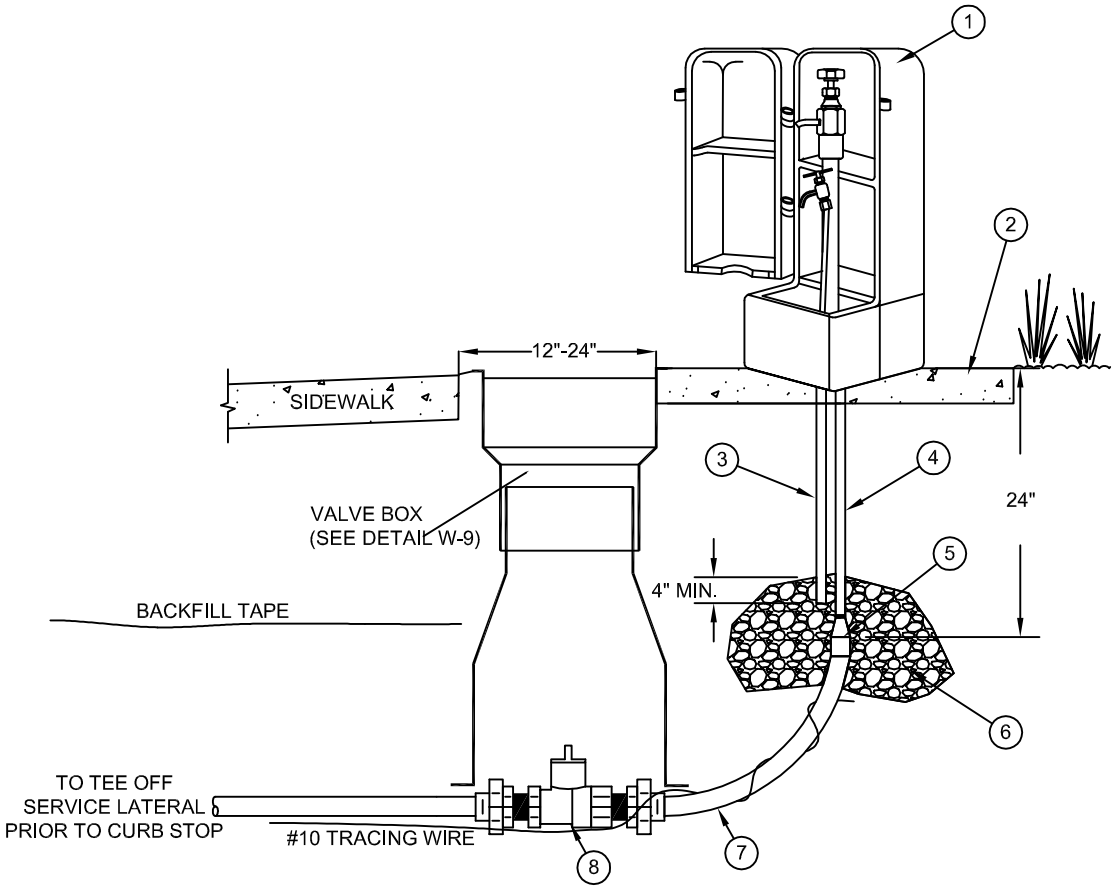

LEGEND:

1. SAMPLING STATION
2. 18" X 18" X 4" CONCRETE PAD
3. 1/2" PVC DRAIN
4. 1/2" STAINLESS STEEL PIPE
5. POLY ADAPTOR AND SS REDUCER
6. 1 CF 3/4" CRUSHED ROCK
7. 1" POLY WATER SERVICE LINE
8. 1" CORP STOP

NOTES:

1. SAMPLING STATIONS SHALL HAVE A SAMPLING BIBB WITH A 7/16" UNTHREADED BLOW OFF.
2. SECURE WITH STAINLESS STEEL ANCHOR BOLTS, SIZED PER SAMPLING STATION MANUFACTURER
3. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE ALUMINUM HOUSING WITH HINGED OPENING.
4. ALL WORKING PARTS SHALL BE OF STAINLESS STEEL AND SERVICEABLE FROM ABOVE GROUND.
5. A STAINLESS STEEL PET COCK WILL BE LOCATED BELOW THE SAMPLING BIBB.
6. MANUFACTURED BY KUPFERLE FOUNDRY. MAINGUARD MODEL #88-SS (OR EQUAL)

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

WATER QUALITY SAMPLING STATION

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-16**

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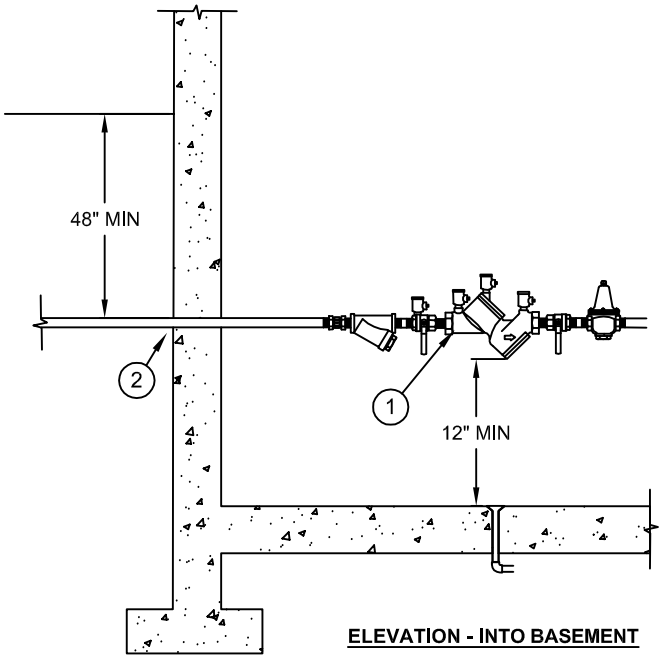
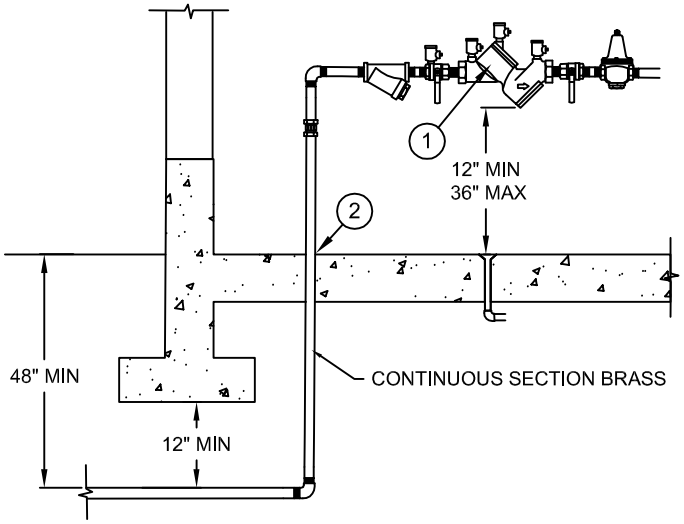


ELEVATION - INTO BASEMENT



ELEVATION - INTO BUILDING

NOTES:

1. THIS DETAIL IS APPLICABLE TO 1" AND SMALLER COLD CLIMATE BACKFLOW PREVENTION DEVICES LOCATED WITHIN BUILDING OR STRUCTURES.
2. REQUIRES CITY ENGINEER APPROVAL WHEN A STANDARD REDUCED PRESSURE BACKFLOW DEVICE IS IMPRACTICAL.
3. ALL PIPE AND APPURTENANCES DOWNSTREAM OF METER BOX ARE THE RESPONSIBILITY OF THE CUSTOMER.
4. MUST BE NO CONNECTIONS BETWEEN THE METER AND THE BACKFLOW PREVENTION DEVICE.
5. DRAIN REQUIRED PER CHAPTER 8 OF THE 2007 UNIFORM PLUMBING CODE.
6. PROVIDE 12' OF CLEARANCE FROM ANY PART OF THE DEVICE.

LEGEND:

(1) REDUCED PRESSURE BACKFLOW DEVICE PER DETAIL W-4.

(2) WALL/FLOOR PENETRATIONS

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

INDOOR R.P. BACKFLOW DEVICE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-17**

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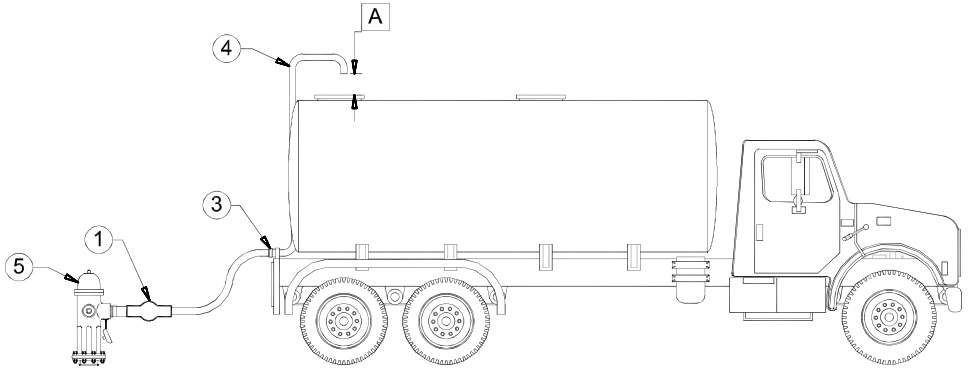
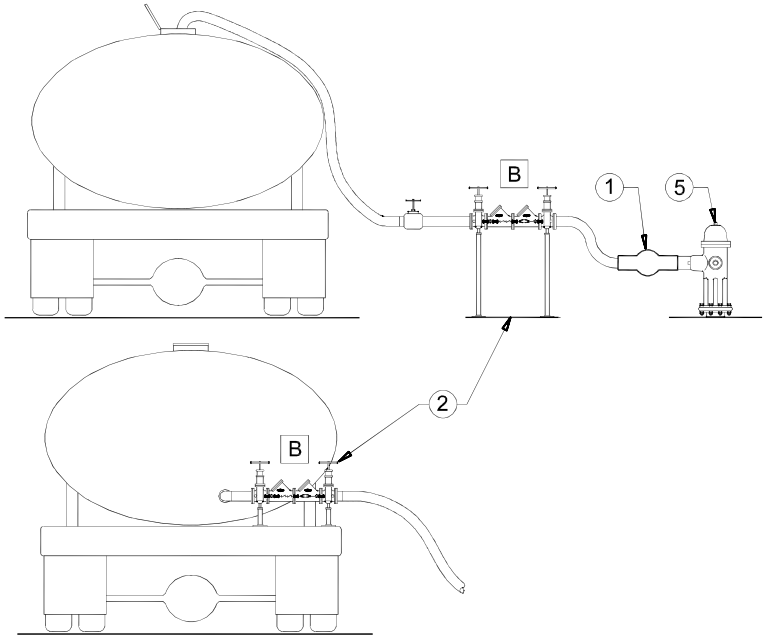


CASE 1: AIR GAP EQUIPPED TANKER TRUCK



CASE 2: REDUCED PRESSURE BACKFLOW PREVENTION DEVICE USED

LEGEND:

1. HYDRANT METER PROCURED FROM CITY
2. TRUCK MOUNTED OR TEMPORARY REDUCED PRESSURE BACKFLOW PREVENTION DEVICE
3. HOSE CONNECTION
4. PIPE ATTACHED TO WATER TRUCK
5. CITY APPROVED SOURCE OF WATER

NOTES:

A. AIR GAP (AT LEAST 2X PIPE DIAMETER FROM FLOOD RIM OF TANK AND >12")

B. REDUCED-PRESSURE BACKFLOW PREVENTION DEVICE MUST BE TESTED AND CERTIFIED ACCURATE. SUBMIT CERTIFICATE TO CITY PRIOR TO USE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

APPROVED METHODS FOR FILLING WATER TANKERS

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-18**

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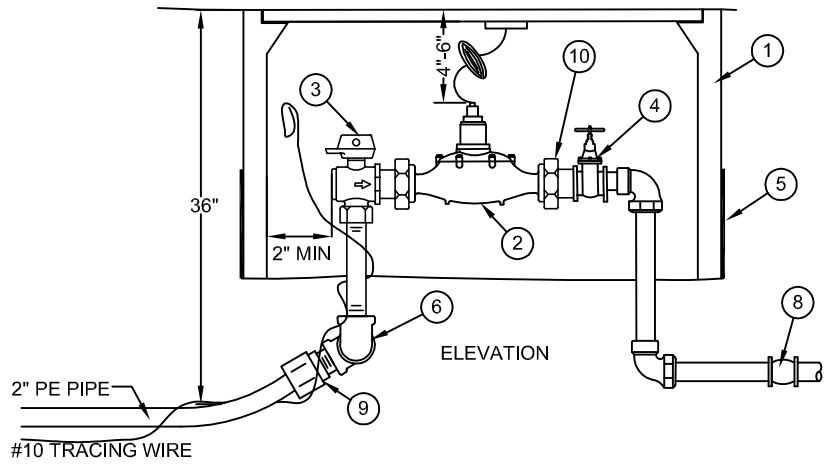
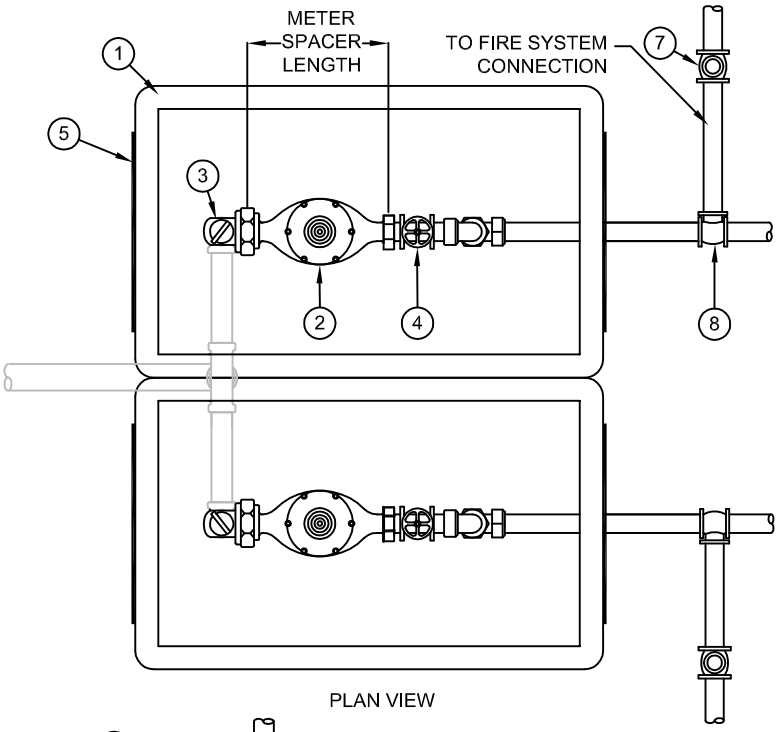
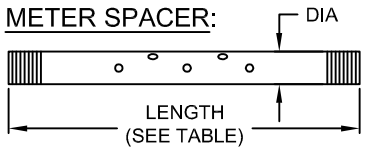




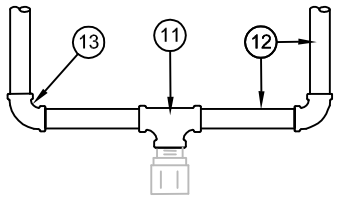
LEGEND:

1. CHRISTY B16 BOX WITH FL16D LID FOR 3/4" METER / CHRISTY N30 BOX WITH FL30D LID FOR 1" METER (OR APPROVED EQUAL)
2. WATER METER (CITY)
3. 90 ° BRASS CURB STOP (CITY)
4. GATE OR BALL VALVE (PRIVATE).
5. CEMENT BOARD END PLATE (TYP.)
6. DOUBLE METER BRASS MANIFOLD
7. SINGLE BRASS CHECK VALVE (PRIVATE)
8. TEE (PRIVATE)
9. POLY ADAPTOR
10. METER SPUD ADAPTOR (NOT NECESSARY FOR 1" METER)
11. BRASS TEE 1x1x2
12. BRASS SPOOL 1"
13. BRASS ELBOW 1"

METER SPACER:



METER SPACER TABLE		
METER SIZE	SPACER	
	DIA	LENGTH
3/4"	3/4"	7-1/2"
1"	1"	7-3/4"



6 DOUBLE METER MANIFOLD

NOTES:

1. WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.
2. ALL PIPE AND FITTINGS SHALL BE BRASS, WITH THE EXCEPTION OF THE POLY SERVICE LINES.
3. BURIED BRASS PIPE AND FITTINGS SHALL BE WRAPPED WITH 10 MIL POLYETHYLENE OR APPROVED EQUAL.
4. METER SPACER SCH 80 PVC NPT PIPE NIPPLE WITH 5 EA. X $\frac{1}{4}$" DIA. HOLES THROUGH BOTH SIDES

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

3/4" & 1" DOUBLE WATER SERVICE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**W-19**

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SECTION 5

SANITARY SEWER (SS)

5-1 GENERAL - All sewer pipe, fittings, manholes and other appurtenances shall be installed in accordance with the approved improvement plans, these Construction Standards, the latest edition of Caltrans Standard Specifications, as recommended by the manufacturer and as specified by the City Engineer. These Construction Standards and the manufacturer's guidelines shall be present at the construction site at all times.

5-2 CONNECTION TO EXISTING FACILITIES - Connection to existing City of Grass Valley sewer facilities may be made upon approval of the City Engineer.

A. System Tap - The Public Works Department will make all system taps as required on the plans. The Contractor shall pay for such work on a time and materials reimbursement basis. The Contractor shall be responsible for the following tasks associated with the tap, and any additional requirements as determined by the City Engineer:

1. Obtaining an Encroachment Permit from the Public Works Department, Engineering Division.

2. Coordinating the work with the Public Works Department, including provisions for materials and equipment required to complete the work.

3. Providing traffic control per the Public Works Department, Engineering Division requirements.

4. Excavating the work area, as agreed upon by the Public Works Department.

5. Providing sheeting, shoring, and bracing as required.

6. Providing lighting as required if the tap is to be performed at night.

7. Installing the sewer lateral from the City provided tee to the cleanout or building.

8. Backfilling, compacting, and pavement restoration of the excavation(s) upon tap completion.

B. Existing Sewer Stubs - The Contractor shall excavate and connect to an existing sewer stub in the presence of the Public Works Inspector.

C. Sewer System Outfalls - Sewer system outfalls shall be mechanically plugged and grouted. The plug shall remain in place until final acceptance by the Public Works Department.

5-3 CONSTRUCTION STAKING - New sewer main construction shall be staked prior to installation. Such staking shall provide the station and offset to the sewer main, as well as the cut to the nearest one-tenth foot (0.10'). Stakes shall be provided at a minimum of every fifty (50) feet in tangent sections and every twenty-five (25) feet in curved sections, and every ten (10) feet in approved vertical curve sections.

5-4 CONCRETE CRADLES, ARCHES AND ENCASEMENTS - Concrete cradles, arches and encasements shall conform to the Construction Standard Details and the following:

A. Pipe Supports and Anchors - Pipe shall be placed in proper position on temporary cradles or arches consisting of concrete block or bricks. When necessary, the pipe shall be rigidly anchored or weighted to prevent flotation when the concrete is placed.

B. Cradles and Arches - Cradles and arches shall be constructed with the ability to adjust the pipe to the proper grade in order to avoid vertical joint pull. Cradles and arches shall be placed at the one-third and halfway points along each pipe segment where specified.

C. Concrete - Concrete for cradles, arches or encasements shall be placed uniformly along the pipe. Concrete placed beneath the pipe shall be sufficiently workable to fill the voids without excessive vibration. The concrete shall be allowed to cure and remain undisturbed for 24 hours prior to backfill and compaction of the trench. Water shall not be permitted to enter, seep, or run onto the concrete while curing

5-5 TRENCHING AND BACKFILL - Construction of sewer pipes and appurtenances shall be performed to the lines and grades shown on the approved project plans, as specified in the "Streets" section of these Construction Standards and in conformance with the following requirements:

A. Excavations - Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans, with vertical sides to the pipe crown as specified on the "Utility Trench Bedding, Backfill and Paving" detail. Excavations shall conform to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property.

B. Bell Holes - Bell holes shall be excavated per the manufacturer's recommendations. The minimum depth of bedding material shall be provided under the bell. Care shall be taken to ensure that the bell hole is no larger than necessary to accomplish proper joint assembly.

C. Pipe Support - Pipes shall be placed on a firm bed of imported granular material conforming to the "Utility Trench Bedding, Backfill and Paving" detail. Bedding shall provide uniform and continuous support along the barrel of the pipe. The minimum depth of bedding material shall be provided under the bell. Blocking of the pipe is not permitted. Loose material shall be removed from the trench bottom and replaced with imported material.

D. Trench Backfill and Compaction - Initial backfill material shall be placed immediately after pipe joints have been completed, inspected and passed by the Public Works Inspector. The material shall be carefully placed, consolidated around the pipe zone and shall be brought up evenly on both sides. Sufficient care shall be taken to prevent movement or damage to the pipe during shovel slicing. Shovel slicing shall be witnessed by the Public Works Inspector prior to shading the pipe.

Trench backfill shall be placed and compacted in accordance with the "Streets" section of these Construction Standards. Compaction equipment shall not make direct contact with the pipe.

5-6 PIPE INSTALLATION - Sewer pipe (gravity and pressure) shall be installed in accordance with the following provisions:

A. Pipe Cleanliness - The Contractor shall keep the pipe interior free from foreign materials and in a clean and sanitary condition until acceptance by the City. At times when pipe-laying is not in progress, the open pipe end shall be sealed with a tight cap or plug to prevent foreign matter from entering the pipe.

B. Placing Pipe - Care shall be taken when lowering pipe into the trench to protect the pipe from damage. Chains are not permitted. The pipe shall be laid carefully to the lines and grades shown without grade breaks, unless designed with such, to the minimum depths shown on the approved plans. If field conditions exist such that the pipe may not be laid to the specified grade, the approved plans will require revisions prior to proceeding with construction.

C. Joining Pipe - Pipe sections shall be closely jointed to form a smooth flow line. Care shall be taken in placing the pipe and making field joints.

D. Manufacturer's Recommendations - All installations shall follow manufacturer's recommendations unless otherwise noted on the approved plans. The manufacturer's installation guide shall be on the job site at all times.

E. Markings in Unpaved Areas - Mains in unpaved areas shall be marked every 125 lineal feet with a green composite utility marker have a decal stating "Caution Buried Sewer Pipeline." Appurtenances (such as manholes, valves, ARV's, test stations, etc.) and angle points shall also be marked. Mains in landscaped areas shall be delineated with a brass marker set in an 8-inch diameter concrete cylinder.

F. Ductile Iron Pipe Installation - DIP for sewer applications shall have an interior coating of ceramic epoxy unless otherwise specified on the approved plans. The pipe shall be exothermically welded, electrically continuous as described herein. DIP shall be encased in polyethylene as specified in Domestic Water Supply System section of these Construction Standards. DIP sewer systems shall be constructed per the manufacturer's recommendations and the following:

1. The force main shall be constructed and tested in accordance with the water pressure pipe standards established in the Water Supply System section of these Construction Standards and the following deviations:

a. The main shall be pre-flushed and flushed again with a properly sized ball after the pressure test. Flushing shall occur in the presence of the Public Works Inspector.

b. Exothermic welds shall be made on the bell of the pipe as near to the edge as possible and on the weld pads provided on the spigot end of the pipe. Exothermic welds shall conform to the Water Supply System section of these Construction Standards.

c. When it is necessary to cut an epoxy lined pipe all repairs shall be made prior to installation.

d. All DIP fittings for wastewater use shall have an interior lining of ceramic epoxy.

e. Tracing wire shall be installed per the Water Supply System section of these Construction Standards. Above ground access to the tracing wire shall not exceed 500 linear feet along the main. Access shall be provided by raising and securing the tracing wire through a conduit into a valve box. This location shall be two (2) feet minimum from back of walk and marked per standards.

G. Transitions from Vitrified Clay Pipe - When specified on the approved Improvement Plans transitions between PVC or DIP and existing VCP pipe segments shall be made using an approved rubber repair coupling.

H. Boring - The equipment, method of operation and conductor pipe grades shall be approved by the City Engineer prior to initiating any boring. A minimum of 48 hours notice shall be given prior to the start of work. All boring operations shall conform to the approved plan and the following requirements:

1. Excavation for the boring operation shall be the minimum necessary to satisfactorily complete the work. Bracing and shoring shall be adequate to protect workers and any adjacent structure or roadbed.

2. The conductor shall closely follow the boring operation. The bored hole shall not be more than one-tenth foot (0.10') larger in diameter than the outside diameter of the conductor. Guide rails shall be accurately set to line and grade to insure installation of the conductor within allowable limits. The conductor diameter shall be sufficient to allow adjustment of line and grade of the conducted pipe to meet allowable tolerances and to allow sand to be placed between the conductor and the conducted pipe.

The inside diameter of the conductor shall be a minimum of 6 inches larger than the outside diameter of the conducted bell pipe or joint, as approved by the City Engineer. A minimum of 4 inches clearance shall be required between the conducted pipe and the casing, taking the skids into consideration.

3. Conductor pipe shall be supported by a minimum of three sets of synthetic skids per stick of pipe, or as required by the City Engineer. Pipe sections shall be joined outside of the conductor. The skids and casing entrance shall be lubricated prior to sliding the conducted pipe into place. The height of the skids may be adjusted to meet specified grades.

4. The space between the conducted pipe and conductor shall be completely filled with clean, dry silica sand, blown into place. The method of placing sand in the void shall be approved by the City Engineer. Both ends of the casing shall be plugged with non-shrink grout a minimum of 12 inches into the casing.

5. When, in the opinion of the Public Works Inspector or the Geotechnical Engineer, the nature of the soil indicates the likelihood of ground loss which would result in a greater space between the outer surface of the conductor than allowed, the Contractor shall take immediate steps to prevent such occurrences by installing a jacking head extending at least 18 inches from the leading edge of the conductor.

The jacking head shall cover the upper two-thirds of the conductor and project not more than ½-inch beyond the conductor outer surface. Excavation shall not be made in advance of the jacking head. Voids greater than allowable shall be filled with sand, soil cement, grout, or as approved by the Public Works Department. Where voids are suspected, the Developer's Design or Geotechnical Engineer may direct the Contractor to drill the conductor and to pressure inject grout until refusal to repair the drilled hole. Grouting pressure shall not exceed 50 pounds per square inch at the nozzle.

I. Backfill Tape - A 3 or 4 inch wide metallic backfill tape with the warning "Buried Sewer Main" shall be placed in the trench lines of all mains and services, within 12 to 24 inches of the subgrade.

5-7 MANHOLE INSTALLATION - Manholes shall be installed in accordance with the Construction Standard Details and as specified herein:

A. Top of Manhole in Pavement - Unless otherwise noted on the approved plans, manholes shall be set flush with finish grade per the Standard Sewer Manhole detail.

B. Top of Manhole Off Roadway - Manholes placed in off-site, unimproved areas shall be constructed with the top of the casting cover a minimum of one (1) foot above the final surrounding grade. Manholes placed in landscape areas adjacent to City improvements shall be constructed with the top of the casting cover a minimum of 6 inches above the final surrounding grade. A minimum 12-inch wide concrete collar with a #4 rebar ring shall be constructed around the casting and 6 inches below finish grade for all manholes placed off the roadway.

C. Frame and Lid - The manhole frame and lid shall be sealed with an approved rubber gasket. Manhole lids and castings shall be 24-inch diameter bolt-down type with two cast-in-place bars and a gas detector probe hole. Lids shall have no poke holes. Lids shall be bolted when a manhole is constructed outside a paved area, as specified on the approved plans, or as directed by the City Engineer.

D. Existing Manholes - Sewer mains or services entering an existing manhole shall be core drilled, without exception. The space between the pipe and the manhole shall be filled with non-shrink grout. Any work on an existing sewer manhole shall require the manhole to pass a vacuum test as described in these Construction Standards. The work completed shall remain exposed until the vacuum test has been accepted by the Public Works Inspector.

E. Bases - Concrete manhole bases shall be pre-cast unless otherwise approved by the City Engineer. Pre-cast bases shall conform to the specifications in the Materials portion of this section. Unused channels shall be grouted with mortar to form a smooth bottom. Sewer main stubs from pre-cast manholes are not required unless specified otherwise.

F. Adjusting Manholes - The manhole neck and frame shall be adjusted to grade using pre-cast concrete grade rings or as approved by the Public Works Inspector. Use of metal grade rings is not permitted.

G. 60" and 72" Diameter Manholes – All 60" and 72" manholes shall have eccentric cone sections and steps. Steps must: be factory installed using sanitary wastewater and hydrogen sulfide degradation resistant epoxy as recommended by the manufacturer; be aligned in each section to form a continuous ladder within the assembled manhole; be equally vertically spaced between 10 and 14 inches between the top surfaces of the rungs; be uniform length; conform to ASTM C-478 and ASTM C-497 and OSHA requirements. Reinforced plastic steps shall be polypropylene coated with an inner deformed steel reinforcing rod (Grade 60/ASTM A-615).

H. Epoxy Coated Manholes - Sewer manholes in force mains, lift stations and where required by the City Engineer shall be epoxy coated. Manholes shall first pass a vacuum test, per these Construction Standards, prior to epoxy coating and shall then be constructed as follows:

1. The exterior of the manhole shall be coated with an asphaltic material and wrapped in 8-mil polyethylene sheeting prior to backfilling. 10-mil vinyl tape shall be used to secure and seal the polyethylene sheeting.

2. All voids and imperfections in the interior of the manhole shall be mortared or "sacked" smooth with a cement paste composed of 50 percent Portland Cement Concrete and 50 percent sand. The mortar mixture shall be manually worked into the dampened surface with sufficient pressure to

completely fill voids and imperfections. This process shall be continued until the entire manhole surface (base, barrel, cone, neck and joints) is smooth and free of imperfections.

Upon receiving the Public Works Inspector's approval of the sacking, the outlet channel(s) of the manhole to be epoxy coated, and the first upstream manhole, shall be mechanically plugged to prevent water flow. The newly sacked manhole shall be allowed to cure for a period of 28 days.

3. The epoxy coating and applicator's certification must be submitted to the Public Works Department for approval. The approved coating may be applied after the 28-day curing period has ended. An accepted method of epoxy application is as follows:

a. Mask off the metal frame.

b. Sandblast the interior concrete surfaces of the sewer manhole.

c. Apply a sealer/primer and allow to cure per the manufacturer's recommendations. Application may be withheld if, in the opinion of the Public Works Inspector, the walls of the manhole exceed the recommended moisture content.

d. Apply an approved epoxy to obtain a minimum thickness of 80-mils and allow to cure per the manufacturer's recommendations.

e. Submit a report to verify the thickness and adherence of the coating by coring samples, to the satisfaction of the City Engineer.

f. Repair the sampled areas and allow the repairs to cure.

g. "Spark test" the entire epoxy surface area. The electrode shall provide a minimum of 10,000 volts. Areas failing the spark test shall be removed, repaired and retested.

h. After approval from the Public Works Inspector, remove the masking from the metal frame and use an approved poly urethane sealant to caulk the transition joint between the epoxy coating and the metal frame.

i. Use poly urethane sealant at the pipe interface and for all epoxy transitions.

j. Remove the plugs.

I. Manhole Backfill - Structural backfill shall be Class 2 Aggregate Base to a minimum depth of five feet surrounding all sewer manholes. Backfill shall be installed per the requirements of the "Streets" section of these Construction Standards.

5-8 SERVICE INSTALLATION - Sewer service laterals shall be installed in accordance with the Construction Standard Details and the approved improvement plans.

A. Marking Residential Sewer Services - The curb in front of residential sewer services shall be stamped with a "S."

B. Backflow Prevention – Backflow prevention devices are required for all:

1. New construction.

2. Replacements or repairs made to an existing sanitary sewer lateral.

3. Building Permit applicants who are remodeling more than twenty five percent (25%) of the structure area or where plumbing fixtures are added to the property.

4. Properties that have been damaged by the blockage of the City sanitary sewer main or the private lateral.

5. On all structures where a pump is used to lift sewage to the sanitary sewer system main line. The backflow relief device shall be located to protect the structure from damage in the event that the pump is pumping against a closed backflow device.

6. Existing buildings which have plumbing drain outlets at an elevation 12" or less above the ground surface of the next upstream manhole, where the elevation of any floor is at or below the invert of the adjacent City sanitary sewer main or is less than 12" above the ground surface of the next upstream manhole, or where a plug in the City sanitary sewer main will cause the hydraulic gradient to rise above the lowest floor level.

7. Property title changes.

C. A pop-off relief device and an approved backflow prevention device shall be installed on the sewer lateral at the property line per the Standard Details.

D. Tapping into a Lined Sewer Main - Installing a service into a lined sewer shall use a top hat connection for 6 inch main. For larger sized mains use Inserta Tee or approved equivalent.

5-9 TESTING OF INSTALLED IMPROVEMENTS - Sewer mains, services, manholes and appurtenances shall be tested by the following procedures:

A. Sewer Mains and Services - Sewer mains and services shall be tested after installation of any joint trench utility crossings and after subgrade elevations have been met. An air pressure test shall be performed by the Contractor in the presence of the Public Works Inspector, and the Public Works Department shall provide closed circuit TV inspection.

1. Air Pressure Test - Sewer mains and laterals shall be pressure tested in accordance with the following:

a. For mains installed in an area where the water table is higher than the pipe, the test pressure shall be increased 0.5 PSI per foot of water over the pipe.

b. The test gauge shall be liquid-filled, capable of testing up to 15 PSI, and graduated to 1/10 PSI.

c. Minimum test time shall be 60 seconds.

d. Minimum air pressure shall be 3.5 PSI.

2. TV Inspection - TV inspection shall be performed by the Public Works Department. Costs for said inspection shall be borne by the Contractor. Preliminary inspections may be performed by

outside contractors, but shall not be accepted by the Public Works Department as an official record.

a. The sewer system shall be completely cleaned by an approved method prior to TV inspection. The sewer system shall be rejected if any of the following conditions exist during the TV inspection:

i. Standing water or sags greater than ½-inch in depth.

ii. Offset joints.

iii. Joint separations.

iv. Cracked or otherwise damaged pipe.

v. Infiltration.

vi. Debris or other foreign objects.

B. Manholes - Sewer manholes shall pass a vacuum test after assembly of the manhole and installation of the pipe entering or exiting the manhole, but prior to backfilling. In cases where groundwater is anticipated to be encountered, the City Engineer may require a leak test to be performed.

1. Vacuum Test - The vacuum test shall consist of the following criteria and procedures:

a. The Contractor shall supply all test equipment and perform the test in the presence of the Public Works Inspector.

b. Lift holes shall be filled with non-shrink grout and allowed to cure prior to testing.

c. Pipe entering and exiting the manhole shall be plugged. Plugs shall be securely braced to prevent them from being drawn into the manhole. Unused channels shall be permanently plugged with a plastic or clay stopper, filled and grouted.

d. A liquid-filled vacuum gauge shall be used for testing. A vacuum of ten (10) inches of mercury shall be drawn to start the test. The amount of time required for the vacuum to drop to nine (9) inches shall be measured. The manhole will pass the test if the amount of elapsed time is greater than 60 seconds for a 48" manhole, 75 seconds for a 60" manhole, 90 seconds for a 72" manhole and 120 seconds for an 84" manhole.

e. If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until the elapsed times are satisfactory.

2. Joint Mortaring - After passing the vacuum test, all joints shall then be mortared, inside and out. Outside mortared joints shall be allowed to dry prior to backfilling.

3. Damage During Construction - If damage to the manhole is evident any time during the construction, the Public Works Inspector may require repairs be made to the manhole which would require a new vacuum test prior to acceptance.

5-10 PUNCHLIST PROCESS - After the sewer manholes have been raised and finished to grade, the sewer system shall be balled and flushed in the presence of the Public Works Inspector. When all improvements are substantially complete, the Contractor shall provide a written request for a punchlist inspection of the improvements. With the assistance and presence of the Contractor, the sewer facilities punchlist shall be generated by the Public Works Inspector.

5-11 ABANDONING SEWER STUBS AND SERVICES - Sewer stubs and services to be abandoned shall be removed to the main or manhole of origination. Abandonment of existing sewer stubs shall be as directed by the City Engineer.

5-12 MATERIALS

A. Sewer Mains and Service Laterals - Unless noted on the approved plans or otherwise approved by the City Engineer, all sewer mains and service laterals shall be Polyvinyl Chloride SDR 26 Pipe..

1. PVC Pipe - PVC Pipe shall conform to the standards of ASTM D 3034.

a. Approved PVC pipe manufacturers include: Diamond Plastics Corporation, J-M Eagle, Vinyl Tech or approved equals.

2. Ductile Iron Pipe - DIP pipe and fittings shall be lined with Protecto-401 or equivalent and conform to the standards of AWWA C-151 pressure class 350 (ANSI A21.51) and AWWA C153. All ductile iron joints shall be push-on type with styrene butadiene rubber gaskets. Flange coupling adaptors shall be ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C225/A21.15. Restraint for the flange adaptor shall consist of a plurality of individually actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of the gripping wedges.

a. Approved DIP manufacturers include: Pacific States, Tyler, US Pipes, Griffin, or approved equals.

B. Manholes - Concrete for manhole bases shall be Type V Portland Cement Concrete conforming to ASTM C-150 specifications.

1. Barrels, Cones, Grade Rings and Lids - Manhole barrels, cones, grade rings and lids shall be Jensen Precast concrete per the following (or approved equal):

a. 48" Manhole Material:

i. Jensen Precast 12" barrel, BL485812S, or approved equal.

ii. Jensen Precast 18" barrel, BL485818S, or approved equal.

iii. Jensen Precast 24" barrel, BL485824S, or approved equal.

iv. Jensen Precast 36" barrel, BL485836S, or approved equal.

v. Jensen Precast 48" barrel, BL485848S, or approved equal.

vi. Jensen Precast 36" eccentric cone, CN48E36S, or approved equal.

vii. Jensen Precast 30" concentric cone, CN48C30S, or approved equal.

viii. Jensen Precast 24" concentric cone, CN48C24S, or approved equal.

ix. Jensen Precast 18" concentric cone, CN48C18, or approved equal.

x. Jensen Precast 3" grade ring, GR2432023, or approved equal.

xi. Jensen Precast 8-inch lid, 24-inch opening, FT4824C, or approved equal.

xii. Jensen Precast 8-inch lid, 36-inch opening, FT4836C, or approved equal.

b. 60" Manhole Material:

i. Jensen Precast 36" barrel, BL607236S, or approved equal.

ii. Jensen Precast 3" grade ring, GR364803, or approved equal.

iii. Jensen Precast 6" grade ring, GR364806, or approved equal.

iv. Jensen Precast flat lid with 24" opening, FT6024C, or approved equal.

v. Jensen Precast flat lid with 36" opening, FT6036C, or approved equal.

c. 72" Manhole Material:

i. Jensen Precast 12" barrel section, BL728612, or approved equal.

ii. Jensen Precast 24" barrel section, BL728624, or approved equal.

iii. Jensen Precast 36" barrel section, BL728636, or approved equal.

iv. Jensen Precast flat lid with 24" opening, FT7224C, or approved equal.

v. Jensen Precast flat lid with 36" opening, FT7236C, or approved equal.

2. Manhole Frame and Cover

a. D&L Foundry A-1021 (24”) Manhole Rings and Covers. .

3. Precast Bottom

a. Jensen Precast 6"- two way, MBS4824-2W-6P-BT, or approved equal.

b. Jensen Precast 8"- two way, MBS4824-2W-8P-BT, or approved equal.

c. Jensen Precast 6"- 90 degree left, MBS4824-90L-6P-BT, or approved equal.

d. Jensen Precast 6"- 90 degree right, MBS4824-90R-6P-BT, or approved equal.

C. Appurtenances

1. Concrete Joint Sealant - Ram-Nek, or approved equal.

2. Epoxy Coating - Hydro Pox 204, or approved equal.

3. Flange Gaskets - All flange gaskets to be neoprene rubber or red rubber, USSO Standard B.16.21 insulation flange kits-Calpico Type E full-face gasket with two-side insulation.

4. Location Stakes - Carsonite CUM 375 with anchor barb kit, or approved equal.

5. Mortar - Non-shrink grout during manhole vacuum testing and as specified. Standard mortar mix for all other applications.

6. Polyurethane Sealant - Sikaflex, or approved equal.

7. Silicone - 100 percent silicone with a 25-year life, or approved equal.

8. Rubber Repair Coupling - Fernco 1000 RC Series or 5000 RC Series coupling or equivalent.

D. Back Flow Prevention Devices- Approved backflow prevention device manufacturers include: Clean Check, Inc., Mainline Backflow Products and Oatey (for less than 3' depth), or approved equals.

E. Treatment Plant Equipment- The listed manufacturers currently offer the best available equipment efficiency and shall be used on all of the City's treatment facilities:

Equipment	**Manufacturer**
Submersible pumps/mixers	Flygt
Valves and Actuators	Keystone
Instrumentation	HACH
Variable Frequency Drives	Allen-Bradley
Programmable Logic Controllers	Allen-Bradley

F. Sewer Lift Stations

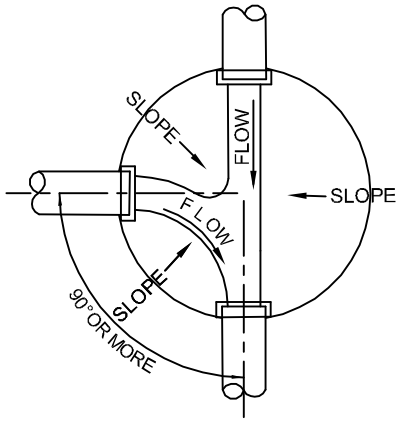
1. Sewer lift stations shall be Flygt TOP 6 Pump Stations with FLYGT pumps and FLYGT panels.

2. All control panels shall be covered with a canopy.

3. All lift stations shall include a bypass connection.

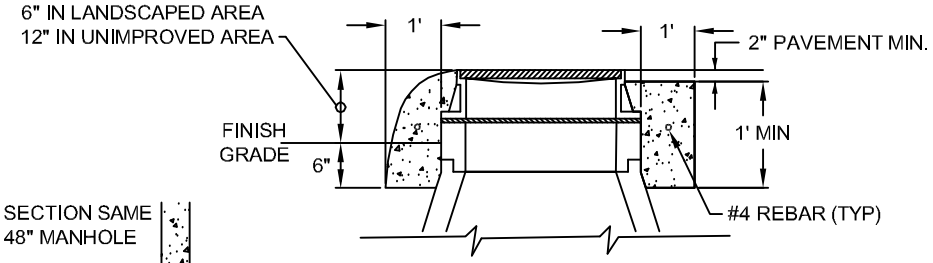
4. Generators shall be Generac Industrial Diesel Generator meeting the criteria of the specific lift station needs.

5. Automatic transfer switch shall be a Generac unit compatible with the industrial generator selected and meeting the criteria of the specific lift station needs.



NOTES

1. MANHOLE LIDS SHALL BE SEALED WITH AN APPROVED RUBBER GASKET.
2. ALL JOINTS SHALL BE SEALED WITH JOINT COMPOUND OR MORTAR INSIDE AND OUT.
3. UNUSED CHANNELS SHALL BE COMPLETELY FILLED WITH GROUT.
4. STUBS, IF REQUIRED, SHALL BE PLUGGED AND END MARKED ABOVE FINISHED GRADE WITH A REDWOOD 4 BY 4 POST PAINTED GREEN.
5. ECCENTRIC CONES FOR 60" AND 72" SHALL BE PLACED SUCH THAT THE OPENING IS OVER THE UPSTREAM INVERT.
6. FLOW LINES SHALL HAVE A 1/10 DROP OR AS INDICATED ON PLANS.
7. MANHOLES WITH DROPS SHALL BE EPOXY COATED PER THE SANITARY SEWER SYSTEM STANDARDS.



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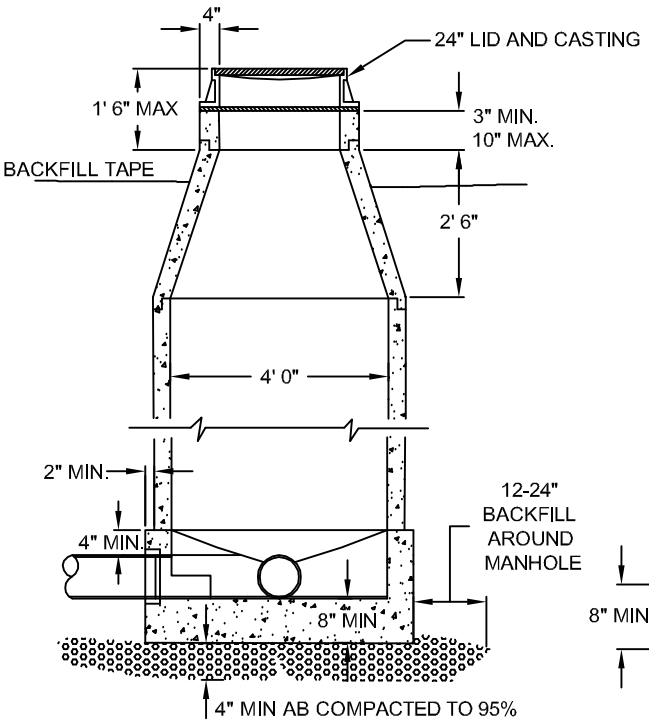
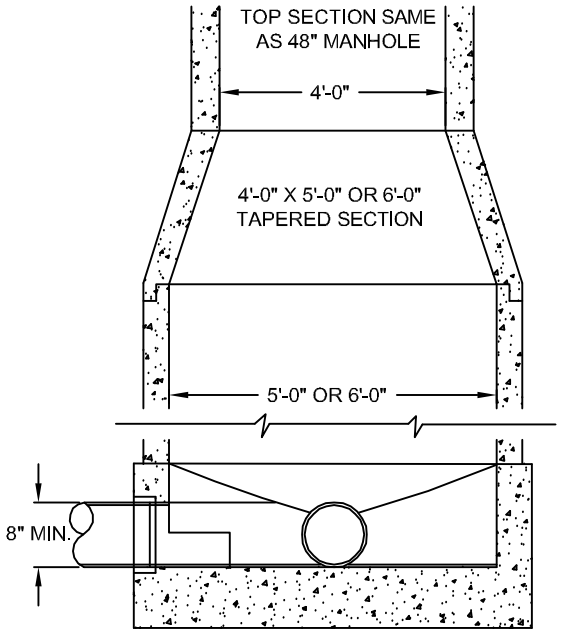


48" MANHOLE



60" OR 72" MANHOLE

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

STANDARD SEWER MANHOLE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	CDH	FEB 27, 2012	SS - 1

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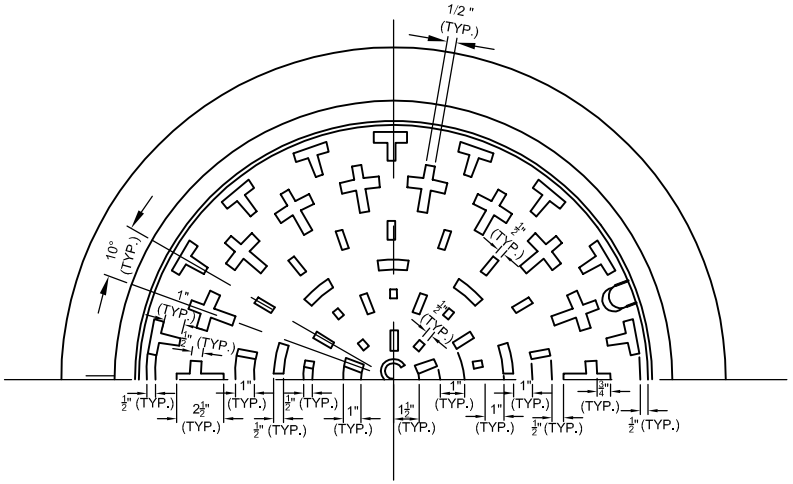
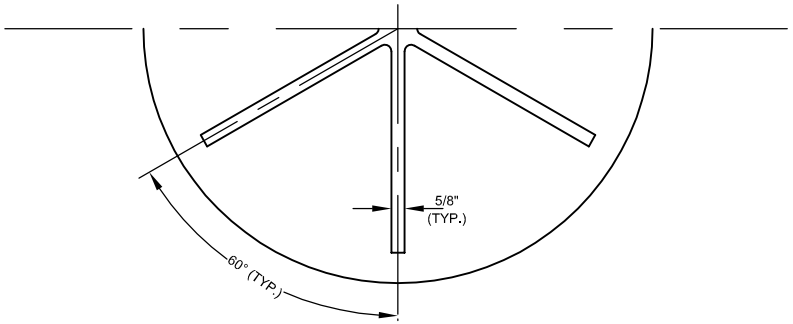
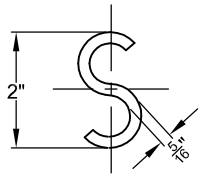


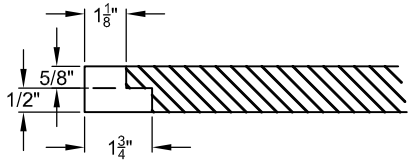
HALF PLAN OF UPPER COVER FACE



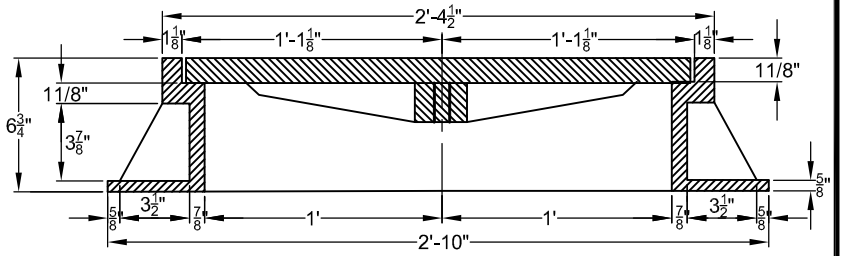
HALF PLAN OF LOWER COVER FACE



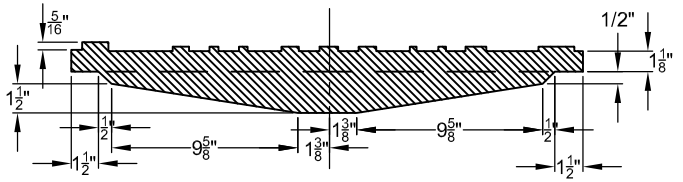
LETTER "S" ON COVER



SECTION OF PICK HOLE



SECTION OF FRAME AND COVER



SECTION OF COVER

PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION			
SEWER MANHOLE FRAME AND COVER			
APPROVED BY: PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	**SS - 2**

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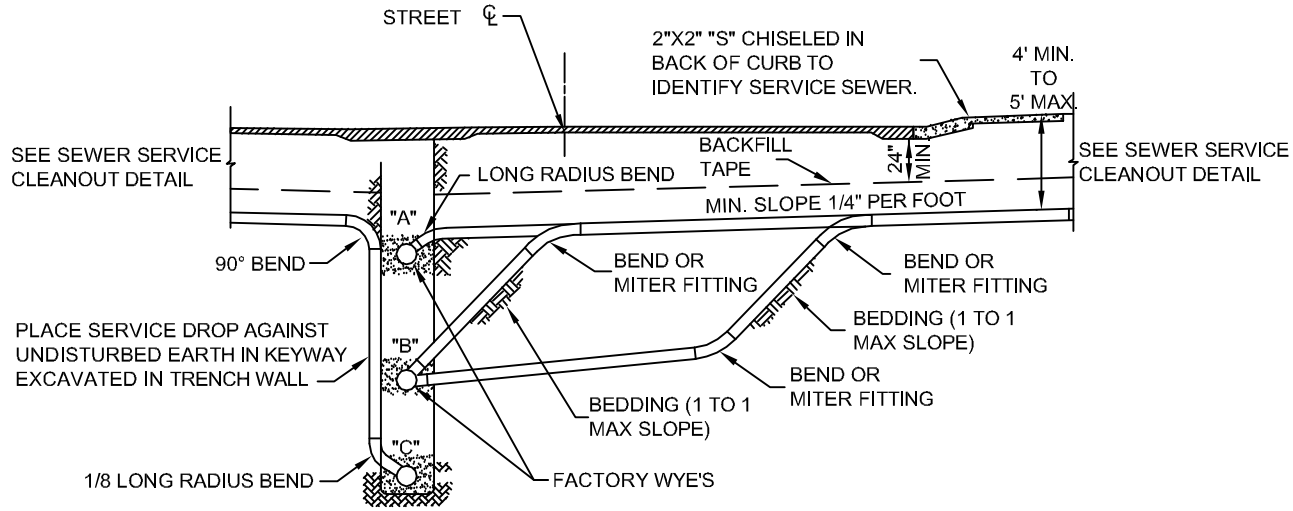
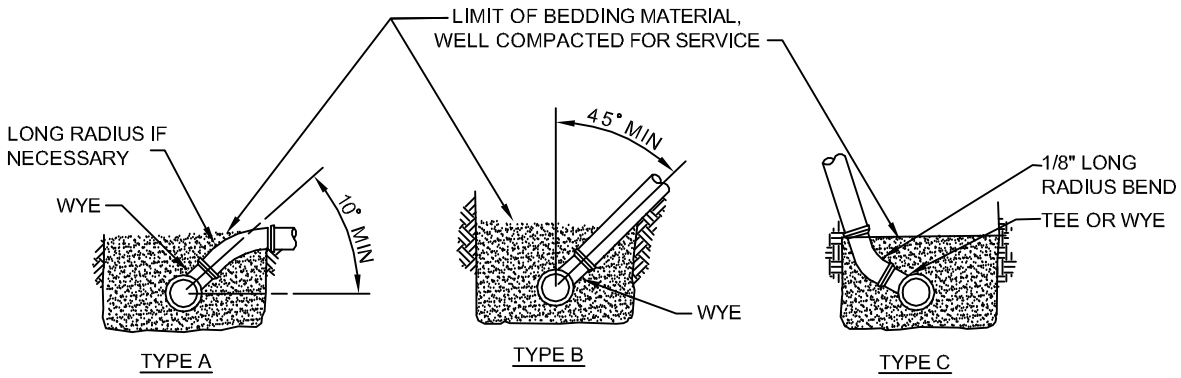


ELEVATION

GENERAL NOTES:

1. ALL SERVICE LINES SHALL BE 4" FOR RESIDENTIAL AND 6" FOR COMMERCIAL UNLESS OTHERWISE NOTED.
2. SERVICES SHALL HAVE SAME BEDDING AND BACKFILL AS LATERAL SEWER.
3. CONTRACTOR SHALL USE THE MOST APPROPRIATE TYPE CONNECTION (A, B, OR C) FOR THE PARTICULAR SITUATION ENCOUNTERED
4. SERVICE SEWER SHALL HAVE MINIMUM 4'-0" COVER AT PROPERTY LINE WHENEVER LATERAL DEPTH AND SERVICE SEWER SLOPE OF 1/4" PER FOOT (MINIMUM) PERMIT.
5. MIN. SPECIFIED COVER AT THE PROPERTY LINE SHALL BE MEASURED FROM EXISTING GROUND SURFACE OR EDGE OF ADJACENT ROADWAY, WHICHEVER IS LOWER.
6. MITER FITTING SHALL BE MAX. 45°.
7. MINIMUM DEPTH OF COVER SHALL BE INCREASED TO 4'-6" WHERE A WATER MAIN IS TO BE INSTALLED AT BACK OF SIDEWALK AS PART OF THE SUBDIVISION IMPROVEMENTS. IN SUCH CASES, THE SERVICE SHALL BE EXTENDED TO A MINIMUM OF 7' BACK OF SIDEWALK; CLEANOUT TO GRADE SHALL REMAIN WITHIN 3' OF BACK OF SIDEWALK.



CONNECTION DETAILS

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SEWER SERVICES

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	CDH	FEB 27, 2012	**SS - 3**

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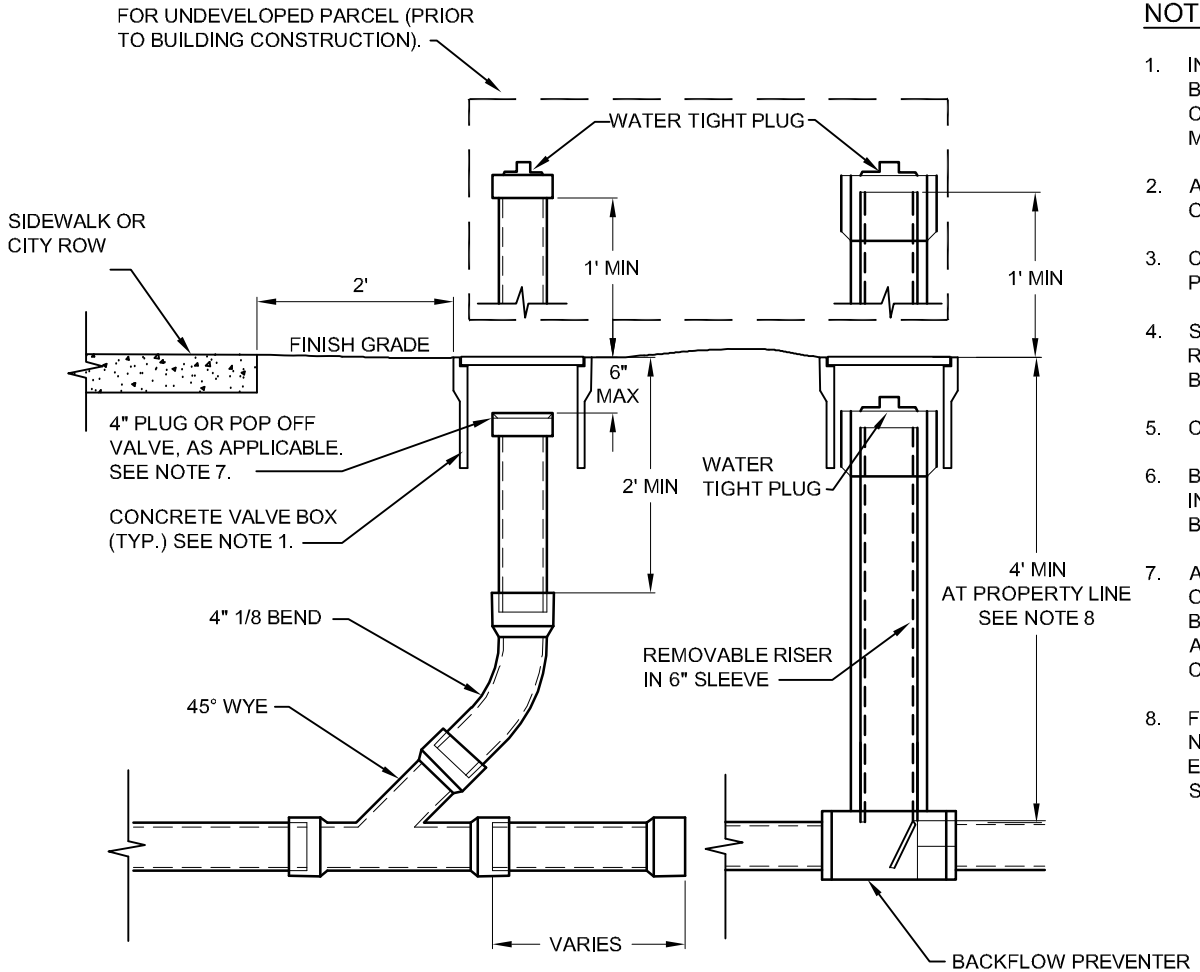

NOTES:

1. IN NON-TRAFFIC AREAS INSTALL A ROUND CONCRETE VALVE BOX & COVER MARKED "SEWER". IN TRAFFIC AREAS INSTALL A CHRISTY G5 BOX (OR APPROVED EQUAL) WITH A TRAFFIC RATED METAL LID MARKED "SEWER".
2. A THREE FOOT CAPPED STUB SHALL BE INSTALLED UPSTREAM OF THE BACKFLOW PREVENTER ON UNDEVELOPED PARCELS.
3. CLEANOUT BOX TO BE FREE OF ALL DIRT AND READY AT TIME OF PRE-FINAL INSPECTION.
4. SERVICES OVER 100' LONG AND COMMERCIAL SERVICES REQUIRE A MIN. 6" CLEANOUT WITH 6" FITTINGS. THE CLEANOUT BOX SHALL BE CONSTRUCTED PER THE DESIGN STANDARDS.
5. CONNECTION TO MAIN SHALL BE WITH A FACTORY WYE.
6. BUILDING CONTRACTOR SHALL SET BOX TO FINISH GRADE AND INSTALL AN ABS PLUG SET 6" BELOW THE SURFACE PRIOR TO BUILDING PRE-FINAL.
7. A POP OFF RELIEF VALVE SHALL BE INSTALLED IN THE CAP OF ONE CLEANOUT LOCATED ON THE STREET SIDE OF THE BACKFLOW PREVENTER. THE CLEANOUT SHALL BE LOCATED IN AN AREA LEAST LIKELY TO CAUSE DAMAGE TO PROPERTY OR CONTAMINATION OF SURROUNDING AREA IF ACTIVATED.
8. FOR EXISTING SERVICES, SEWER LINE DEPTH SHALL BE AS NEEDED TO MATCH EXISTING PIPE INVERT ELEVATION. CITY ENGINEER MAY INCLUDE SPECIAL REQUIREMENTS FOR SHALLOW SERVICES IN THE CITY RIGHT OF WAY.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SEWER SERVICE CLEANOUT

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	CDH	FEB 27, 2012	SS - 4

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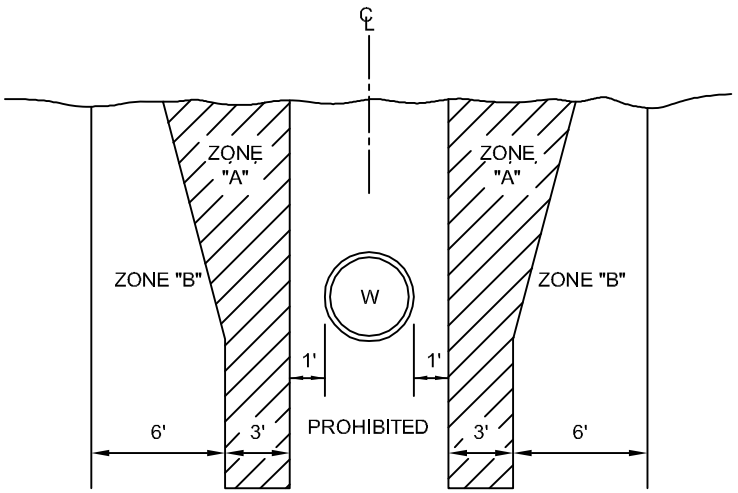
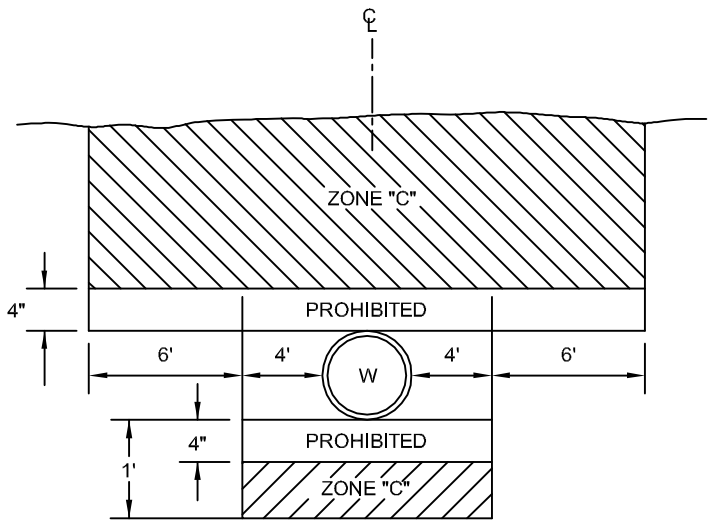


PARALLEL CONSTRUCTION



CROSSINGS

NOTES:

1. ZONE "A" SPECIAL PERMISSION (ALL ZONES REQUIRE REVIEW BY CITY ENGINEER).

2. ZONE "B" SPECIAL PIPE REQUIRED:
   - PVC SEWER PIPE WITH RUBBER RING JOINTS.
   - CAST OR DUCTILE IRON PIPE WITH COMPRESSION JOINTS.
   - IF THE SEWER PIPE DOES NOT MEET THE ABOVE REQUIREMENTS THE WATER LINE MUST BE CONSTRUCTED OF DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING OR CLASS 200 PVC PIPE.

3. ZONE "C" SPECIAL PIPE, NO JOINTS.
   - A CONTINUOUS SECTION OF DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING.
   - A CONTINUOUS SECTION OF CLASS 200 PVC PIPE.
   - ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE.
   - IF THE SEWER PIPE DOES NOT MEET THE ABOVE REQUIREMENTS THE WATER LINE MUST BE CONSTRUCTED OF A CONTINUOUS SECTION (NO JOINTS), DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING OR CLASS 200 PVC PIPE.

4. MINIMUM CLEARANCES ARE REQUIRED WHENEVER POSSIBLE. REDUCED SEPERATION WITHIN THE ZONES SHOWN ARE SUBJECT TO REVIEW AND APPROVAL.

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SEWER AND WATER SEPARATION DETAILS

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	CDH	FEB 28, 2012	**SS - 5**

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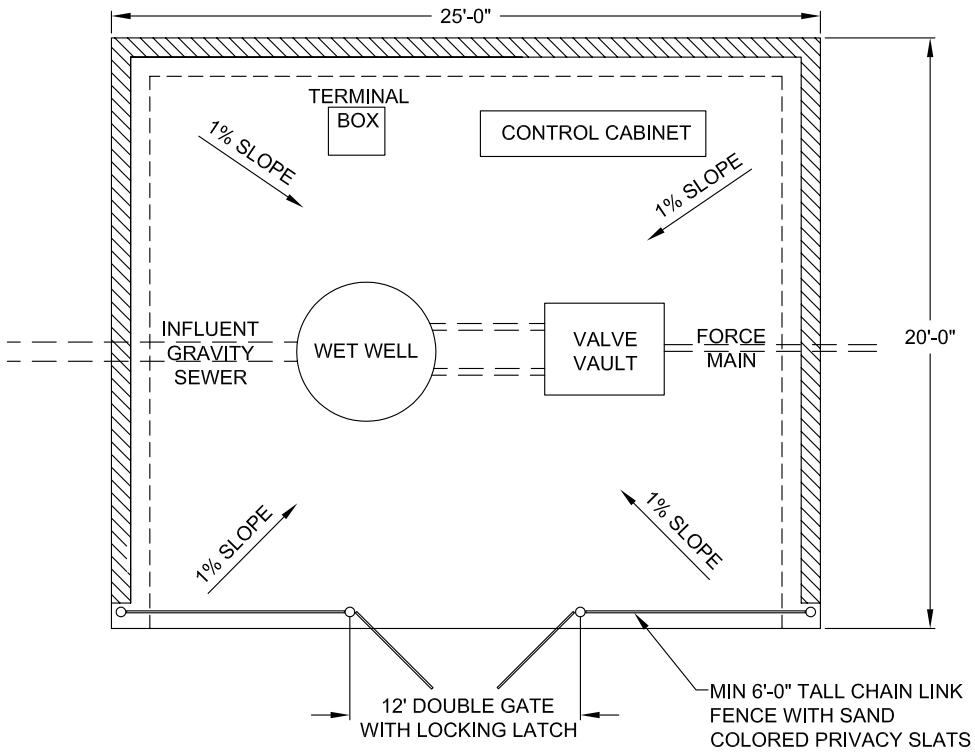
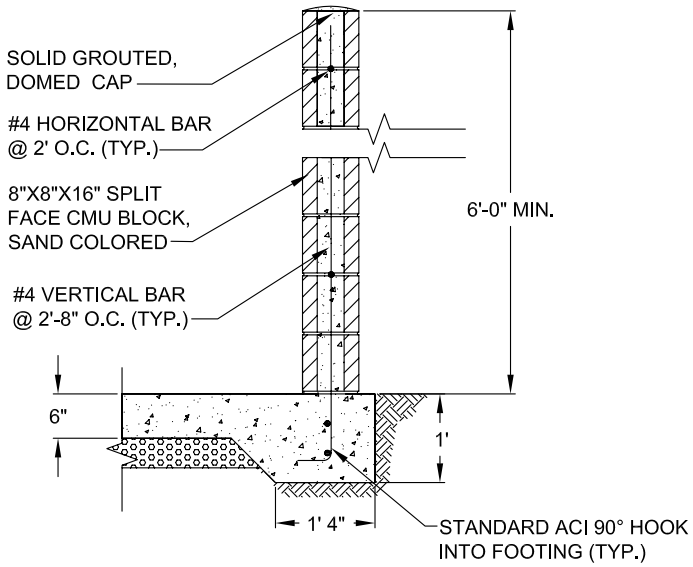


LIFT STATION SITE PLAN



BLOCK WALL AND FOOTING

NOTES:

1. MODIFICATIONS TO THE STANDARD LAYOUT MAY BE NEEDED AS SITE CONDITIONS DICTATE. ALL CHANGES ARE TO BE APPROVED BY THE CITY ENGINEER.

2. A DRAINAGE INLET PIPED TO OUTSIDE THE ENCLOSURE MAY BE REQUIRED AT THE DISCRETION OF THE CITY ENGINEER.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

STANDARD SEWER LIFT STATION SITE PLAN

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**SS - 6**

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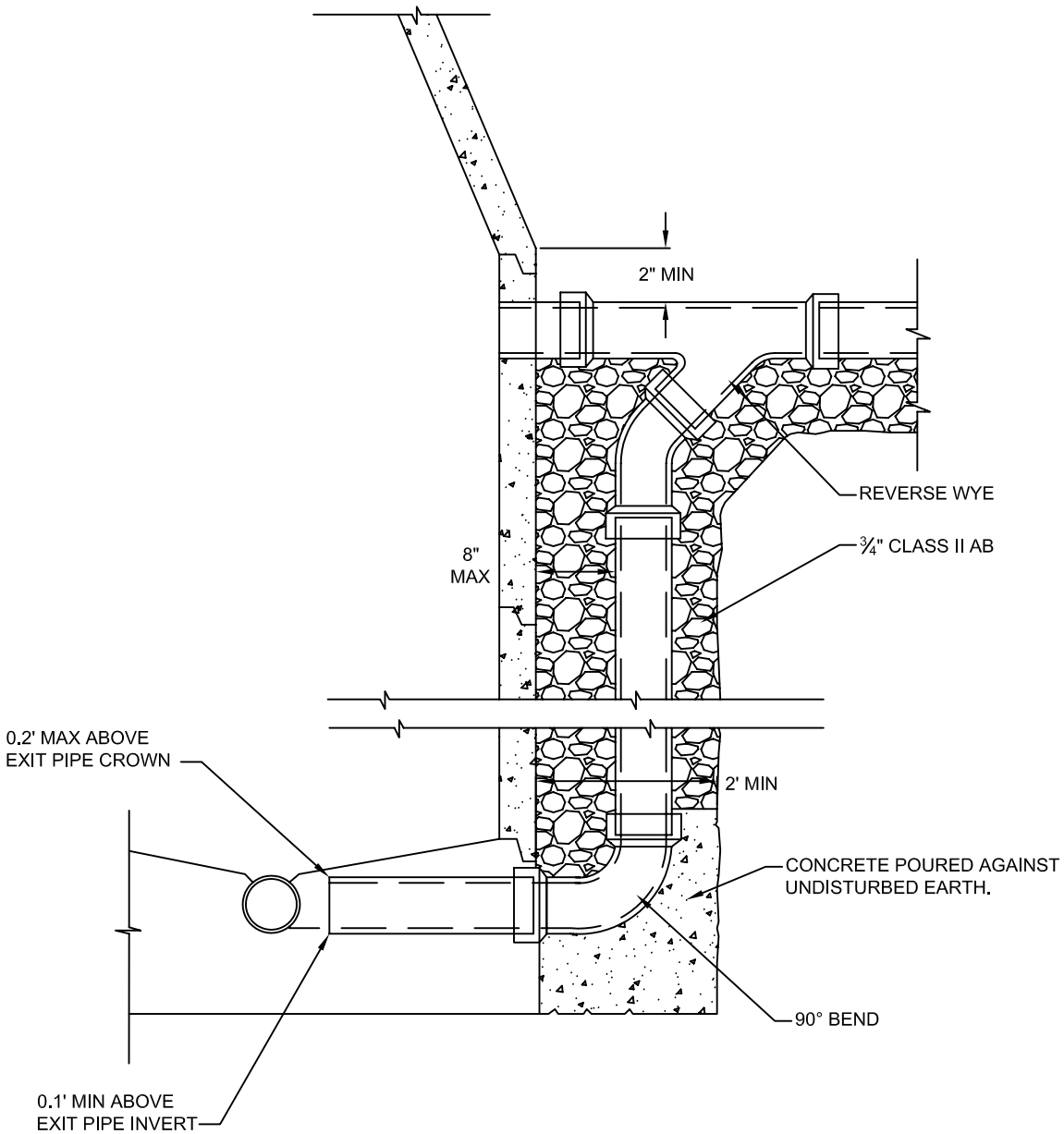

NOTES:

1. OUTSIDE DROP CONNECTION MAY ONLY BE USED WITH APPROVAL OF THE CITY ENGINEER.

2. MINIMUM DROPS. (IF NOT ATTAINABLE SEWER LINE SHALL BE REDESIGNED TO FALL DIRECTLY INTO MANHOLE):

   6" & 8" = 20" MIN DROP
   10" = 32" MIN DROP
   12" & LARGER = 36" MIN DROP

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

OUTSIDE DROP CONNECTION

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	FEB 9, 2010	**SS - 7**

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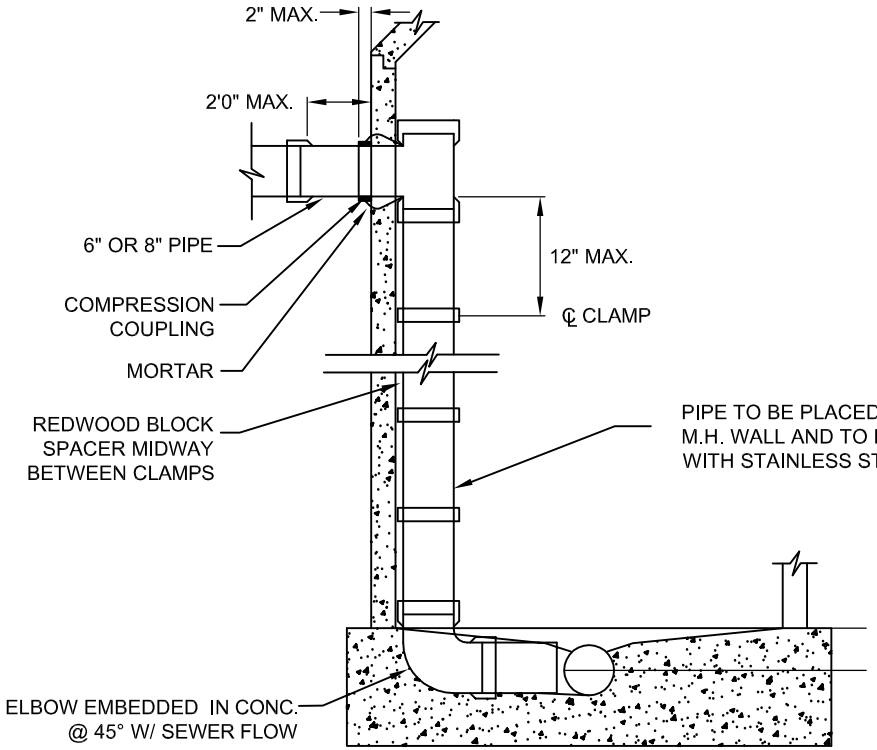
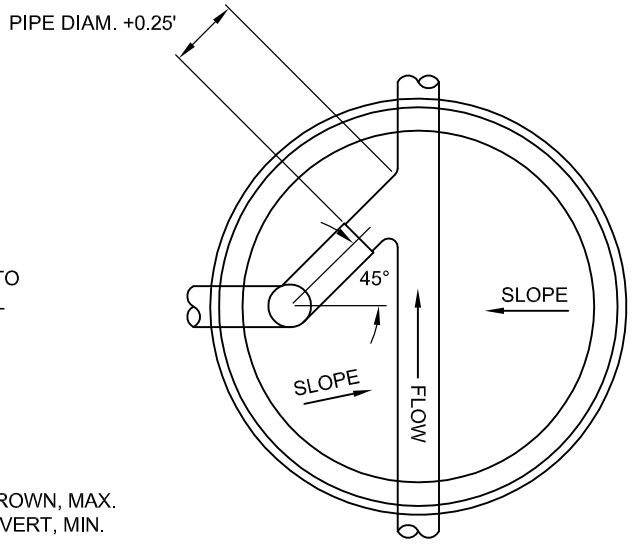


PROFILE



PLAN

NOTES:

1. REQUIRES CITY ENGINEER APPROVAL WHEN AN OUTSIDE DROP IS IMPRACTICAL.
2. ALL INSIDE DROP PIPING TO BE P.V.C. OR A.B.S.
3. CEMENT ALL JOINTS.
4. DROP CONNECTION PIPE AND FITTINGS TO BE SAME SIZE AS ENTERING PIPE.
5. 11/2:X12 GAUGE STAINLESS STEEL CLAMPS TO BE ANCHORED TO M.H. WALL WITH 2-1/2" CADMIUM PLATED BOLTS.
6. MANHOLES WITH INSIDE DROPS SHALL BE A MINIMUM 60" IN DIAMETER.

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

INSIDE DROP SEWER MANHOLE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**SS - 8**

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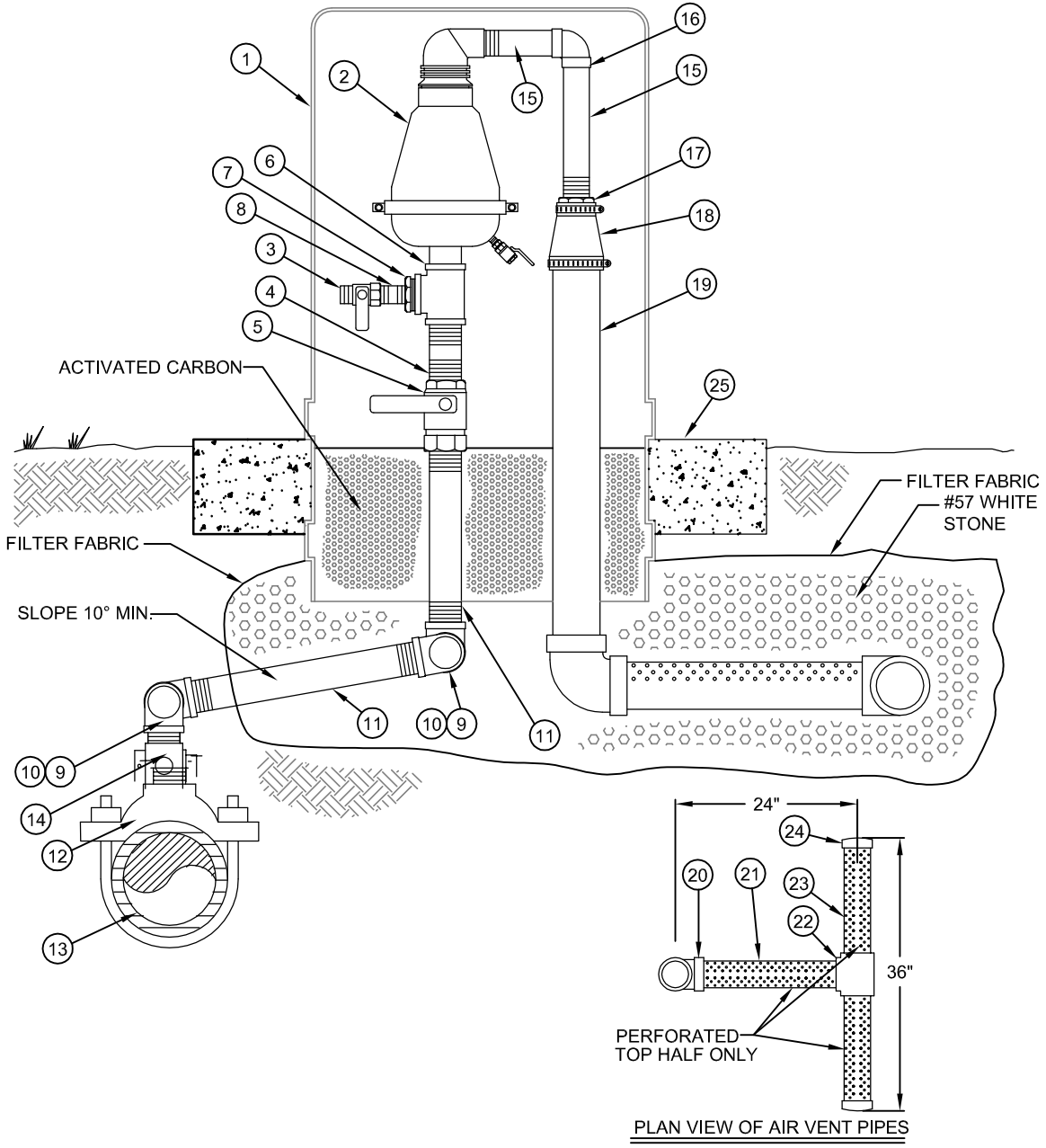

PLAN VIEW OF AIR VENT PIPES

MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	ENCLOSURE
2	1	AIR RELEASE VALVE 2" NPT
3	1	1" CURB STOP, S.S.
4	1	2" x 4" NIPPLE, S.S.
5	1	2" BALL VALVE, S.S.
6	1	2" TEE, S.S.
7	1	2" X 1" REDUCER, S.S.
8	1	1" SHORT NIPPLE, S.S.
9	4	2" x 90° ELBOW, S.S.
10	2	2" SHORT NIPPLE, S.S.
11	2	2" PIPE, S.S. LENGTH AS REQUIRED
12	1	2" DOUBLE STRAP TAPPING SADDLE, S.S.
13	1	4" & LARGER PIPE, D.I. OR PVC
14	1	2" CORPORATION BRASS
15	2	1-1/2" PIPE, PVC, LENGTH AS REQUIRED
16	1	1-1/2" x 90° ELBOW, PVC
17	1	2" X 1-1/2" REDUCER, PVC
18	1	3" X 2" FLEX COUPLING
19	1	3" PIPE, PVC, LENGTH AS REQUIRED
20	1	3" x 90° ELBOW, PVC
21	1	3" PIPE, PVC, PERFORATED TOP HALF ONLY
22	1	3" TEE, PVC
23	2	3" PIPE, PVC, PERFORATED TOP HALF ONLY
24	2	3" CAP, PVC
25	1	CONCRETE SLAB AROUND ENCLOSURE

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

STANDARD SEWER AIR RELEASE VALVE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	SS - 9

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SECTION 6

STORM DRAINAGE (SD)

6-1 GENERAL - Drainage improvements include, but are not limited to, culverts, drainage inlets, lined channels, manholes, outlet and inlet structures, and storm drain pipe. These improvements shall be installed in accordance with the approved Improvement Plans, these Construction Standards and the latest edition of the State Standard Specifications. These Standards shall apply to the public right of way and easements.

6-2 CONSTRUCTION STAKING - the Developer for all drainage improvements shall provide Construction staking. Such staking shall provide the station and offset, as well as the cut to the nearest hundredth of a foot (0.01 feet). Stakes shall be provided at a minimum of every fifty (50) feet in tangent sections and every twenty-five (25) feet in curved sections. Cut sheets shall be on site and shall be furnished to the Public Works Inspector upon request.

6-3 DRAINAGE INLET INSTALLATION - Drainage inlets shall conform to the provisions and details of the State Standard Specifications and Standard Plans, and these Construction Standards. The interior of the drainage inlet shall have a troweled finish; rock pockets shall be grouted and brushed; exposed top surfaces shall have a Class I Surface Finish. Within all City streets and easements and within all commercial sites and private residential subdivisions, a City approved fish stamp, "No Dumping, Drains to Creek," shall be placed adjacent to all drainage inlets. If the storm drain system is active and open to discharges, then immediately following installation, all storm drain inlets shall be protected with sediment control protection until construction no longer poses a risk of sediment discharges.

6-4 MANHOLE INSTALLATION -

A. Bases -

1. Precast - Precast bases shall be placed on a foundation of ½-inch minus crushed rock, a minimum of 4 inches thick, compacted to 90 percent relative compaction. Elevation differentials of inlets and outlets shall conform to the approved improvement plans. Openings in the base shall align true with all inlet and outlet pipes. Stub-out or couplings provided in precast bases shall be of the same material as the pipe to which they connect, unless otherwise approved by the Public Works Inspector.

2. Cast-in-Place Base - The cast-in-place base portion shall not be placed higher than six (6) inches above the outside tops of the main incoming and outgoing pipes.

The wall thicknesses for the top of the cast-in-place base sections shall conform to the following table:

Manhole Diameter	Minimum Wall Thickness
48"	5"
60"	6"
72"	7"
84"	8"
96"	9"

Inside diameters of cast- in- place base portions shall equal the inside diameter of the manhole specified. Standard precast manhole riser sections and/or cones shall be placed above the cast-in- place section to bring the manhole rim to finish grade. Upon pouring the concrete base, the top surface of the cast in place base barrel shall be stamped with a rigid impression ring in order to match it up with the above, precast barrel section. As an alternate, a maximum one-foot barrel section may be stacked when it is determined that the concrete for the base is adequately stiff. A 24 hour minimum curing time is required before manhole stacking is allowed.

All inlets and outlets with a 30 inch inside diameter or smaller, connecting to existing manholes, shall be core bored.

Concrete, in the cast-in-place portion, shall be placed against undisturbed earth or upon a base of crushed rock or sand. All loose material shall be removed from the excavation prior to installation.

B. Cones - Cone tops shall be placed within 7 to 18 inches of final street grade. Where depth is insufficient for cones, flat slab tops shall be used. Lifting rings in precast cones shall be plugged with dry packed mortar.

C. Joints - Joints in precast manhole sections shall be made with either mortar or plastic sealing compound.

1. Mortar Application - All joint surfaces and the face of the manhole base shall be thoroughly cleaned and wetted before applying mortar. Both the inside and outside of mortared joints shall be plastered with mortar, and the inside surfaces brushed to a smooth finish with a wet brush. Special precautions shall be taken to ensure that the entire joint space is filled with mortar and is watertight.

2. Plastic Sealing Compound Application - All joint surfaces and the face of the manhole base shall be thoroughly cleaned before applying plastic sealing compound. The sealing compound shall be protected from dirt during application. Ends of the compound shall be joined end-to-end and not joined by overlapping. Sufficient compound shall be used to cause a visual "squeeze-out" of the compound material when adjacent sections are seated. Squeeze-out material on the inside of the manhole shall be neatly trimmed flush with the inside surface.

D. Connections - Pipe connections to drainage manholes shall be made so that the pipe is flush with the inside face of the manhole. These connections shall be finished so that entrances are smooth. Unless the manhole is cast around the pipe, connections shall be made with dry packed cement mortar. Pipe connections shall not be made into the cone section of the manhole unless shown on the approved plans.

E. Grade Rings - Grade adjustments shall be made using precast grade rings. Precast rings shall be a minimum of one (1) inch in height. The total height of the grade rings, frame, and cover casting shall not exceed eighteen (18) inches.

F. Frames and Covers - The tops of frames and covers shall be set flush with finish grade pavement in the street, six inches above finish grade in landscape areas, and 12 inches in unimproved, isolated areas, unless otherwise shown on the approved plans. Covers outside of paved area shall be bolt down. Per the “Standard Precast Drainage Manhole” detail, a 12- inch deep by 12- inch wide

concrete collar shall be placed around the casting, covered by two inches of asphalt concrete paving in street areas. All joints between the frame, grade rings, dome, barrels and base shall be sealed with non-shrink mortar, or an approved plastic sealing material. Inside the manhole, all joints where the sealing material is not flush with the inside wall shall be grouted with non-shrink mortar and finished/wet-brushed.

G. Adjusting Existing Manhole Frames - The frame shall be supported above the grade ring or dome by spacers. After the concrete collar is poured, any space between the frame and grade ring and dome shall be filled with non-shrink mortar, and the inside wall of the riser finished/wet-brushed.

H. Manhole Backfill - Structural backfill shall be Class 2 Aggregate Base to a minimum of five (5) feet surrounding all sewer manholes, extending from the pipe bedding zone to the top of the overlying asphalt concrete pavement. Backfill shall be installed per the requirements of the "Streets" section of these Construction Standards.

6-5 JUNCTION BOXES / VAULTS - Manholes shall not exceed 96 inches in diameter. Where the number of pipes and/or pipe diameters requires a larger structure than a 96 inch diameter manhole, junction boxes or vaults are required. Vaults shall be deigned by a registered Civil Engineer. Shop drawings shall be submitted and approved by the City Engineer.

6-6 AREA DRAINS - Area drains may be used for the collection of stormwater in landscaped areas. Area drains shall conform to the details shown on the approved plans or as approved by the City Engineer.

6-7 TRENCHING AND BACKFILL - Construction of drainage pipes and appurtenances shall be performed to the lines and grades shown on the approved project plans, as specified in the Streets section of these Construction Standards, and in conformance with the following requirements:

A. Excavation - Pipeline excavations shall be open-cut trenches, unless otherwise specified on the approved improvement plans, with vertical sides to the pipe crown as specified on the "Utility Trench Bedding, Backfill and Paving" detail. Excavations shall conform to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities, or adjoining property.

B. Pipe Support - Pipes shall be placed on a firm bed of imported granular material conforming to the "Utility Trench Bedding, Backfill and Paving" detail. Bedding shall provide uniform and continuous support along the barrel of the pipe. The minimum depth of bedding material shall be provided under the bell. Blocking of the pipe is not permitted. Loose material shall be removed from the trench bottom and replaced with imported material.

C. Trench Backfill and Compaction - Initial backfill material shall be placed immediately after pipe joints have been completed, inspected and passed by the Public Works Inspector. The material shall be carefully placed, consolidated around the pipe zone and shall be brought up evenly on both sides. Sufficient care shall be taken to prevent movement or damage to the pipe during shovel slicing. Shovel slicing shall be witnessed by the Public Works Inspector prior to shading the pipe.

Trench backfill shall be placed and compacted in accordance with the "Streets" section of these Construction Standards. Compaction equipment shall not make direct contact with the pipe.

6-8 PIPE INSTALLATION - Drainage pipe shall be installed in accordance with the following provisions:

A. Laying Pipe - Corrugated dual wall HDPE pipe shall be the preferred pipe material for storm drain conduit. The pipe shall be laid upstream with the bell end of the pipe placed upstream. The interior of the pipe shall be kept clean as the work progresses. There shall not be a change in pipe material between storm drain structures.

1. Laying and backfill shall conform to State Standard Specifications, the manufacturer's recommendations, ASTM D- 2321 and the Standard Details, with the following modifications:

a. Due to the lightweight characteristic of the pipe, extreme care shall be taken to avoid displacing the pipe during the backfilling operation. Following placement of the pipe on the required bedding and to the required grade, the pipe shall be stabilized in place with ballast. At a minimum, this shall be accomplished by loading the pipe down slowly and carefully with small piles of embedment material to a minimum of one foot above the pipe on each joint and midway on each length. The pipe shall be kept centered in the trench during this operation. Every precaution shall be taken to avoid flooding the trench prior to placing backfill. The Public Works Inspector may require dewatering of the trench to confirm pipe grade, and to retest the integrity of the pipe following trench flooding.

b. The trench shall be backfilled with embedment material 6 to 12 inches above the pipe, prior to continuing with the trench backfill.

c. Pipe material shall not change between manhole structures or between the last structure and the discharge/inlet opening.

d. No pipe, conduit or any other appurtenance shall be located within any existing or newly constructed storm drainpipe or culvert. Each run of storm drain pipe and culvert shall be 100% clear and unobstructed the total length.

B. HDPE Pipe Testing - A mandrel test shall be conducted following completion of subgrade processing and compaction for curb, gutter and sidewalk, and asphalt concrete pavement. Placement of curb, gutter and sidewalk, and asphalt concrete pavement (and related aggregate base) shall not occur until the Public Works Inspector has approved the mandrel test. The Public Works Inspector shall be present through the duration of the mandrel testing.

The allowable deflection (reduction in vertical inside diameter) for all non-rigid pipes shall be 7.5% maximum. The deflection shall be tested by pulling a mandrel, which is 92.5% of the inside pipe diameter, through all installed pipe. The mandrel shall be the "go/no-go" type and shall be pulled per the manufacturer's recommendations without mechanical assistance. Prior to the mandrel test, the pipe shall be thoroughly flushed and cleaned, (See Subsection “J” below). Obstacles in the pipe shall be removed. At each location in which the mandrel cannot pass, the cause shall be ascertained. If it is found the deflection exceeds 7.5%, or that a gasket has been mis-installed, or that the pipe has been damaged due to construction activities, then the respective section of pipe shall be repaired and retested. Pipe section repair operations may require rebedding pipe, replacing pipe, or both as needed to properly repair pipe sections. Watertight repair couplings shall be used in repair. A passing mandrel retest is required.

At the Contractor's discretion, any sections of non-rigid pipe, not passing the mandrel test, may be televised to evaluate the problem.

C. Pipe Laying Tolerances - The pipes shall be laid true to line and grade with allowed tolerances of 0.05 foot above or below the design grade and 0.15 foot left or right of the design alignment.

D. Reinforced Concrete Pipe - Reinforced concrete pipe shall conform to provisions of the "Reinforced Concrete Pipe" section of the State Standard Specifications. Where excavations for other utilities undermine installed concrete pipe, that excavation shall be backfilled to the spring line of the cast-in-pipe with two sack slurry per these Standards.

E. CMP Pipe - CMP pipe may be allowed on a case by case basis upon approval of the City Engineer. CMP pipe shall conform to the provisions of the "Corrugated Metal Pipe" section of the State Standard Specifications.

F. Pavement Cutting and Repaving - When the trench line is in an existing pavement area, the pavement shall be sawed or scored and broken ahead of trenching operations in accordance with the "Streets" section of these Construction Standards.

G. Cleaning of Storm Drain System - The storm drain system shall be cleaned to the satisfaction of the Public Works Inspector upon completion. If flushing is utilized, then the discharge shall not be routed into the existing City system. The downstream manhole shall be plugged and the discharge fluid shall be disposed of in a manner satisfactory to the Public Works Inspector. Flushing shall comply with requirements of these Standards.

6-9 CHANNEL LINING INSTALLATIONS - Channel lining installations shall conform to the "Lined Channel Section" detail and to the following specifications:

A. Surface Preparation - The surfaces of the areas to be lined shall be evenly graded to the lines, and grade, and sections as indicated on the approved plans. The surfaces shall be moistened thoroughly to prevent moisture from being drawn from the freshly placed lining.

All surfaces on which lining is to be placed shall be free from water, mud and debris and shall be firm enough to prevent contamination of the fresh lining by earth or other foreign material. Prior to placing any lining, the Contractor shall verify line and grade of the excavated channel.

B. Reinforcement - Welded wire fabric shall be embedded in the concrete so that it will be a minimum of one (1) inch clear from either face of the concrete, unless otherwise noted.

C. Joints - Construction joints shall be square and edged with a ¼ inch radius-edging tool. The edge shall be thoroughly wetted before the next section of lining is placed. Construction joints shall be constructed whenever the operation is halted for a period exceeding 30 minutes. Welded wire fabric reinforcing shall extend through the construction joint.

Transverse deep tool joints deep tool joints shall be constructed at 10- foot intervals. The aggregate shall be separated with the joint tool a minimum of two inches deep. Immediately following application of the deep tool, a 1/4- inch grooving tool shall be applied to the surface to seal the joint.

D. Weep Holes - On channels with side lining extending more than 18 inches vertically above the channel toe, weep holes shall be constructed at intervals of ten (10) feet, midway between contraction joints on each side of the channel. The weep hole elevation shall be twelve (12) inches above the adjacent toe of slope.

The holes shall be backed by a minimum of 1 cubic foot of aggregate material tied in a burlap bag.

The aggregate shall extend at least 6 inches above and below and to each side of the weep hole, and at least 10 inches into the side slope. The side and back of the burlap sack shall be protected from being coated by mortar or concrete during the lining placing operation.

On the day following the lining placement, each weep hole shall be rodded to assure it has not been blocked. The weep hole shall then be cut to fit the channel slope.

E. Cutoff Walls - Cutoff walls shall be constructed around the perimeter at each end of the channel lining and at all locations where the new lining meets structures or existing lining, and at all other locations shown on the approved plans. The cutoff walls shall be a minimum of six (6) inches thick and eighteen (18) inches in depth, as measured from the surface of the lining. The welded wire fabric shall be bent down into the cutoff walls.

6-10 MATERIALS -

A. Backfill Material - All drainpipe backfill material shall conform to "Utility Trench Bedding, Backfill and Paving" detail.

B. Drainage Inlets - All drainage inlets shall conform to the State Standard Plans and the following.

1. Drainage inlets located in gutter pans shall be Caltrans Type G5, or as approved by the City Engineer.

2. All drainage inlets shall be equipped with bicycle proof grates, regardless of inlet location.

3. Inlets shall have plastic steps when grate to floor height is greater than three (3) feet.

C. Manholes - All precast manhole barrels, risers, cones, flat tops and grade rings shall conform to ASTM Designation C478 and the Standard Details.

1. Bases - Bases shall be either precast or cast-in-place. Cast-in-place bases shall shall contain not less than 6 sacks of cementitious material per cubic yard. Cementitious material shall be "Type II Modified" Portland Cement Concrete and mineral admixture, or as otherwise approved by the City Engineer, and shall conform to the provisions in Section 90 of the State Standard Specifications..

Slump shall not exceed 4 inches as determined by the slump cone method of ASTM Designation C143 or an equivalent slump as determined by Test Method No. California 533.

2. Barrels - Manhole barrels shall conform to dimensions of Teichert Precast Products or Jensen Precast or approved equal.

3. Cones - Cones shall be eccentric when rim to floor height is less than three (3) feet, unless otherwise shown on the approved improvement plans. Eccentric cones shall be used, and plastic steps installed, when rim to floor height is greater than three (3) feet. Cones shall be Teichert Precast Products or Jensen Precast, or approved equal.

4. Joints/Mortar **-** Joints shall be made with either non-shrinking mortar or with a plastic sealing compound conforming to Federal Specification SS- S- 002- 10. Mortar shall consist of one cubic foot of Portland Cement Concrete to two cubic feet of concrete sand.

5. Manhole Frames and Covers - All manhole frames and covers shall be of cast iron or ductile iron and conform to ASTM Designation A48, C478 or ASTM A536 for Ductile Iron or, Class 30 and shall be the following or approved equal for the indicated size and application:

a. 24 inch frame and cover: D&L Supply #A-1021 (standard 6-5/8 inch high) or South Bay Foundry #D1920; "D" shall be embossed in center.

b. 36 inch frame and cover: D&L Supply #A-1462 or South Bay Foundry #D1907; "D" shall be embossed in center.

c. 24 inch frame and slotted cover: D&L Supply #C- 2660 (#A-1021 with slotted cover), or South Bay Foundry #1920 (specify slotted cover).

d. Short 24 inch frames and covers: D&L Supply #A-1022 (5 inch) and #A-1023 (3 inch); Southbay Foundry #1922 (5 inch) and #1923 (3 inch).

e. Rexus Manhole Cover: Saint-Gobain Pam, CDRU60EHDRA, 24-inch round lightweight hinged, ductile iron manhole cover.

Note: Covers for all 24-inch frames are interchangeable.

D. Storm Drain Pipe - Storm drain pipe shall conform to the following:

1. High Density Polyethylene Pipe (HDPE) - HDPE shall be Type "S", conforming to Section 64 of the State Standard Specifications. Joint connections shall be water tight, rubber ring gasketed.

HDPE shall be Hancor Sure-Lok ST or Hi-Q, ADS, Inc. (N-12 WT (watertight)), or approved equal.

2. Reinforced Concrete Pipe (RCP) - RCP shall conform to ASTM Designation C76 for Class I, II, III, IV or V. The class of pipe shall be based on the designation conforming to the approved plans.

Joints for RCP shall be bell and spigot with rubber gasket. The gasket shall conform to Section 65 of the State Standard Specifications.

E. Stormwater Treatment Devices - Devices to be used shall provide hydrodynamic separation of oil, fine sediment and debris from stormwater. Treatment devices must provide for easy inspection and unobstructed maintenance. Approved units include the following:

1. Contech - Vortechs, CDS, Vortsentry, Vortsentry HS.

2. Stormceptor - STC Systems

F. Slurry Cement Backfill - Slurry cement backfill shall conform to the requirements of Section 19 of the State Standard Specifications.

G. Lined Channels - All lined channels shall conform to Standard Details and the following:

1. Air Blown Mortar - Air blown mortar shall conform to provisions in Section 53 of the State Standard Specifications.

2. Concrete - Concrete shall be either shall be a 6 sack mix with "Type II Modified" Portland Cement Concrete and mineral admixture, sacked concrete, or doweled and sacked concrete. The minimum weight of sacked concrete shall be 60 pounds per sack.

3. Curing Compound - Curing Compound shall conform to provisions in Section 90- 7.01B of the State Standard Specifications.

4. Grouted Cobbles - Grouted cobbles shall be set in six inches of shall be a 6- sack mix with "Type II Modified" Portland Cement Concrete and mineral admixture. The top surface of the concrete shall be flush with adjacent finish grade. Cobbles shall be four to ten inches in size, with 1/3 exposed above the concrete surface, per State Standard Specifications. Base for concrete shall be undisturbed native soil. If the soil is disturbed or undercut, it shall be processed to 90% relative compaction.

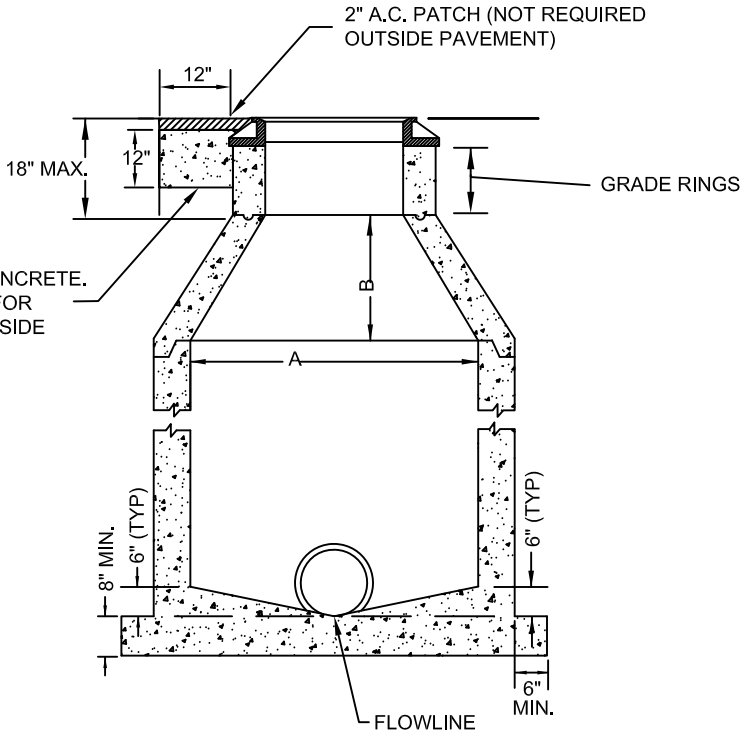
5. Weep Holes - All weep holes shall be two (2) inches in diameter and made of galvanized steel pipe, schedule 40 or better; PVC pipe, schedule 40 or better; or, ABS pipe, schedule 40 or greater.

6. Welded Wire Fabric - Welded wire fabric shall be sized per the plans and shall conform to ASTM Designation A 185.

TABLE OF DIMENSIONS

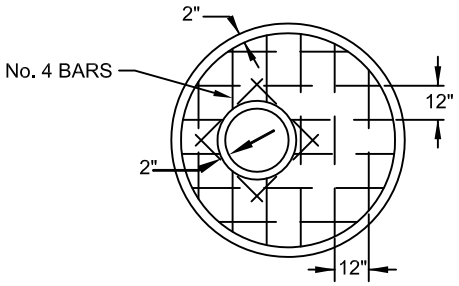
A	B	T MIN.
48"	18"	6"
60"	30"	8"
72"	42"	8"
84"	54"	12"
96"	12" (FLAT)	12"

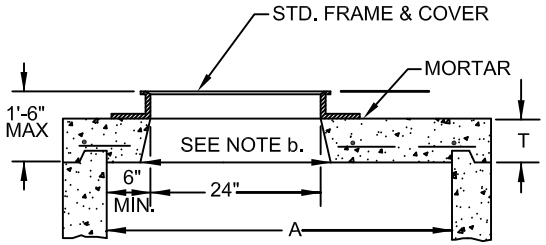
DIMENSION "B" IS A MINIMUM DIMENSION AND MAY BE GREATER IF DEPTH PERMITS. RISER SECTIONS. CONES, AND ADJUSTING RINGS SHALL CONFORM TO ASTM DESIGNATION C-478



NOTES

1. ECCENTRIC CONES SHALL BE USED WHERE SPECIFIED ON THE PLANS.
2. JOINT MAY BE EITHER KEYED OR TONGUE AND GROOVE.
3. SEE SECTION 6-10 FOR JOINT COMPOUND. (ALL MANHOLE JOINTS)
4. TOP OF FRAME SHALL BE 1/8 INCH BELOW ADJACENT PAVEMENT
5. 0.20 FOOT MINIMUM FALL THROUGH MANHOLE.
6. O.D. OF PIPE SHALL NOT EXCEED I.D. OF ITS MANHOLE BARREL
7. IRON TO BE SET 1/4 INCH BELOW FINISHED GRADE





NOTES

1. A FLAT TOP SLAB SHALL BE USED WHEN A SHALLOW LINE DOES NOT PERMIT USE OF A TAPERED DOME.
2. IF THE BOTTOM, INSIDE DIAMETER OF THE FLAT TOP OPENING IS 28 INCHES OR MORE, THE THICKNESS OF THE SLAB MAY BE DISREGARDED IN COMPUTING THE MAXIMUM 18 INCH HEIGHT OF THE OPENING.

FLAT TOP SLAB

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

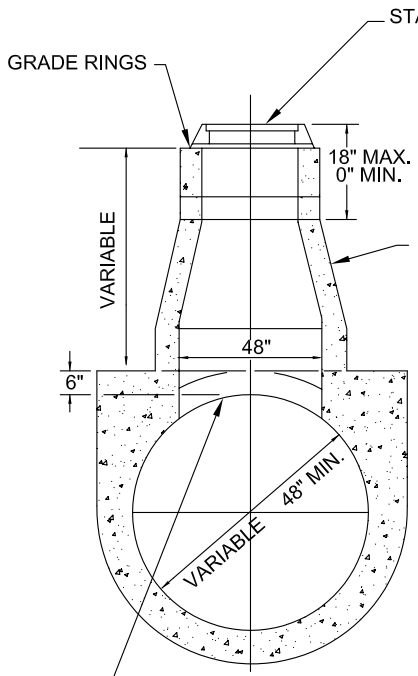
STANDARD PRECAST DRAINAGE MANHOLE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

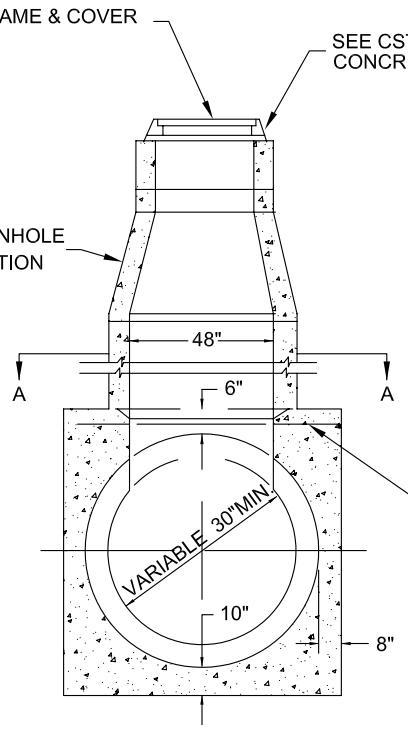
SCALE:	DRAWN BY:	DATE:	
NONE	TMT	FEB 25, 2014	**DR - 1**

H:\STANDARDS\Standard Details\5_Drainage\DR - 1.dwg

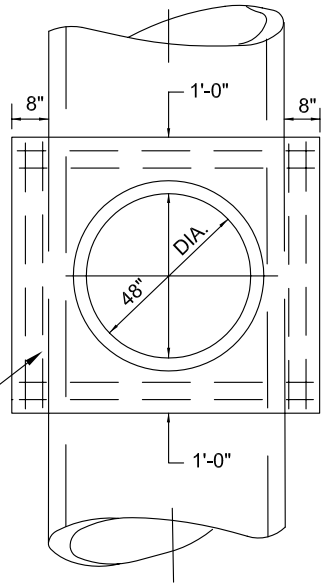


TYPE A

CAST-IN-PLACE PIPE ONLY



TYPE B



SECTION A-A

NOTES:

1. REMOVE CONCRETE IN MANHOLE OPENING AND CONSTRUCTION RISER BASE WHILE CONCRETE IS STILL FRESH.
2. PLACE RISER SECTION AFTER CONCRETE HAS SET.

NOTES

1. ALL PIPE OTHER THAN CAST-IN-PLACE PIPE.
2. CAST-IN-PLACE PIPE LESS THAN 48" DIA.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TYPE A & B
SADDLE MANHOLE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**DR - 2**

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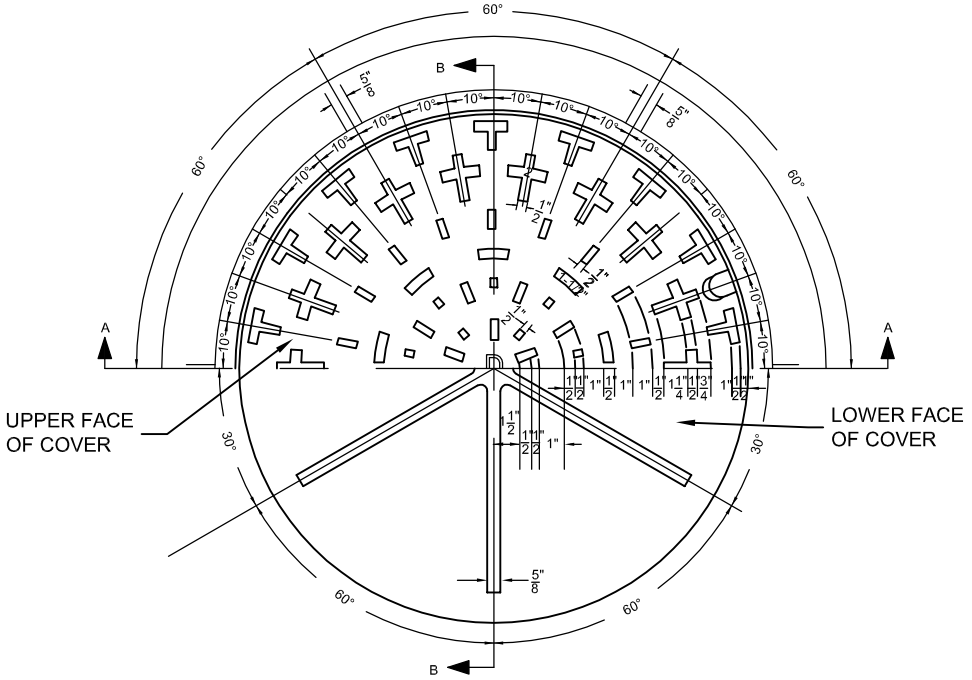
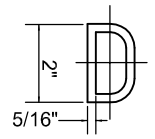
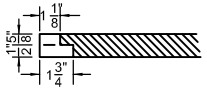


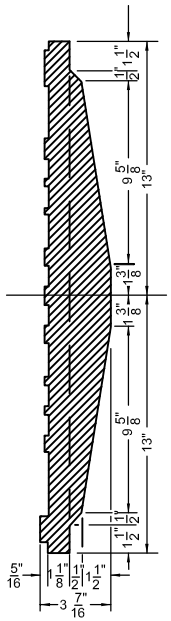
HALF PLAN OF HEAD AND COVER



LETTER 'D' AT
CENTER OF COVER

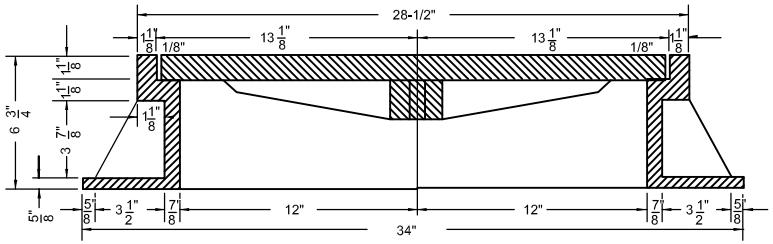


SECTION THROUGH
CENTER OF PICK HOLE



SECTION B-B

NOTE:
A SHORT FRAME REQUIRES APPROVAL
OF THE PUBLIC WORKS INSPECTOR.



SECTION A-A

CITY OF GRASS VALLEY NEVADA CO. CALIF.	PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	STANDARD DRAINAGE MANHOLE FRAME & COVER		
APPROVED BY: PUBLIC WORKS DIRECTOR / CITY ENGINEER			
SCALE: NONE	DRAWN BY: EAD	DATE: MAY 12, 2016	**DR - 3**

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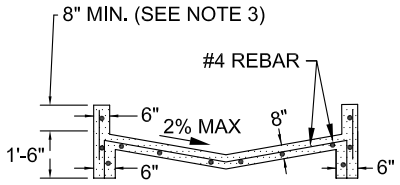
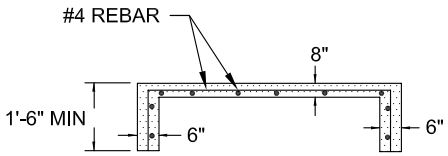
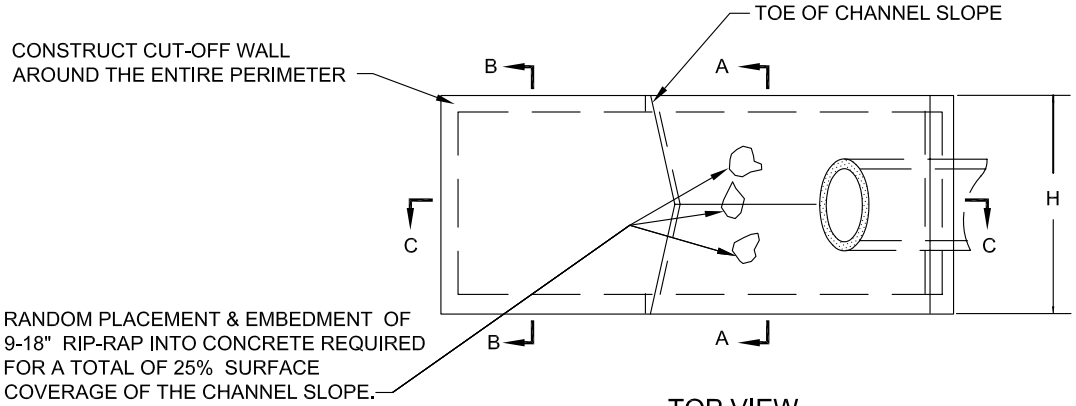


SECTION A-A



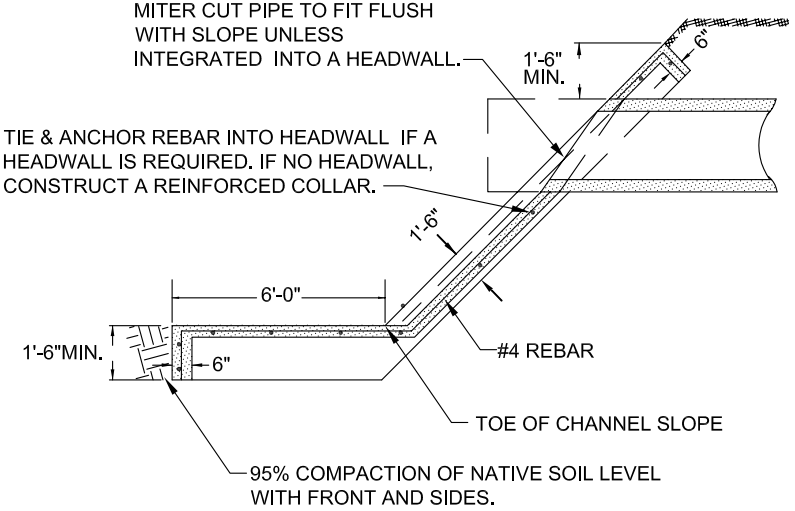
SECTION B-B



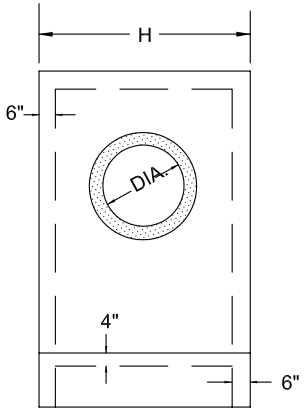
TOP VIEW

MITER CUT PIPE TO FIT FLUSH
WITH SLOPE UNLESS
INTEGRATED INTO A HEADWALL.

TIE & ANCHOR REBAR INTO HEADWALL IF A
HEADWALL IS REQUIRED. IF NO HEADWALL,
CONSTRUCT A REINFORCED COLLAR.



SECTION C-C



FRONT VIEW

NOTES:

1. EROSION CONTROL PIPE DISCHARGE TO BE INSTALLED AS NEEDED BASED UPON PIPE DIAMTER AND VELOCITY, AS REQUIRED BY THE CITY ENGINEER.
2. USE CLASS 'A' CONCRETE, 6 SACK AND COBBLES AS SPECIFIED.
3. #4 REBARS 12" O.C. EACH DIRECTION.
4. H= 4 x PIPE DIA. (6-FT MINIMUM).
5. WALL HEIGHT VARIES AS REQUIRED BY CUT SLOPE.
6. HYDROSEED ALL DISTURBED AREAS.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

EROSION CONTROL PIPE DISCHARGE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**DR - 4**

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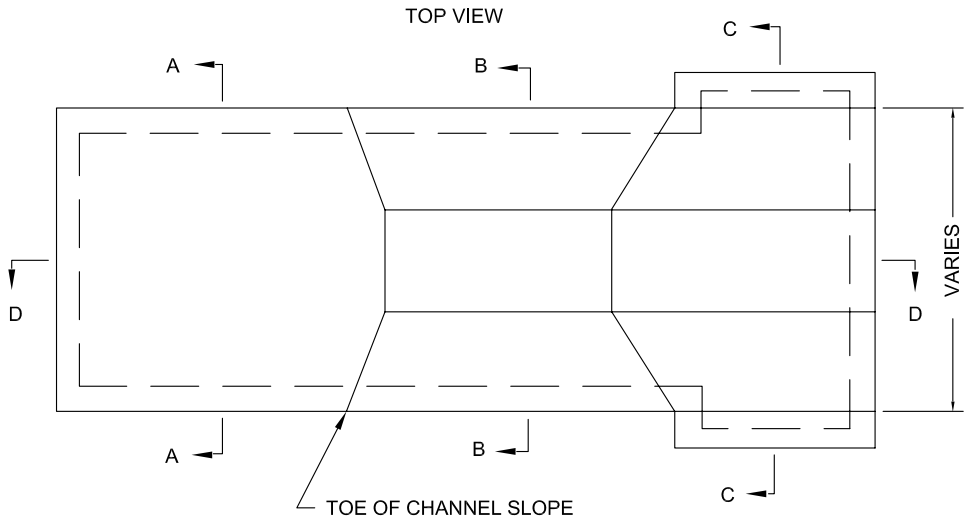
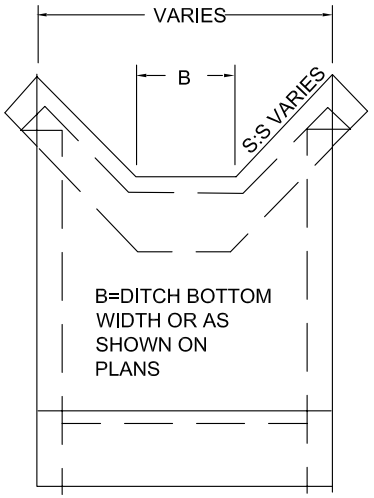
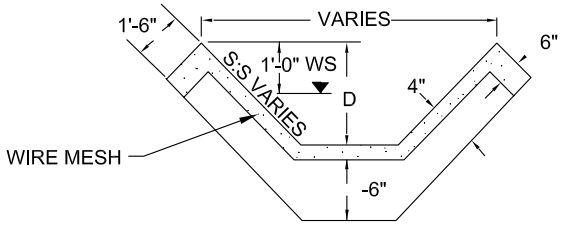
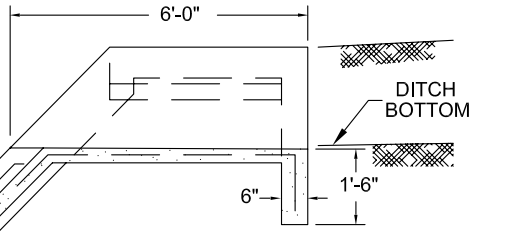


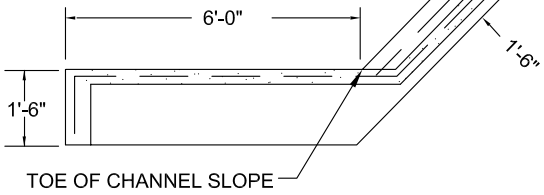


FRONT VIEW

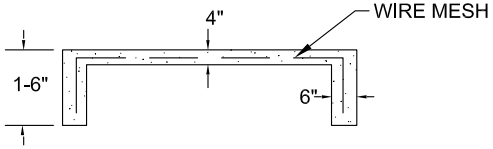


SECTION C-C

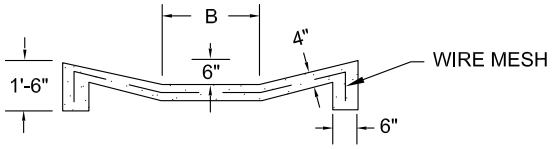




SECTION D-D



SECTION A-A



SECTION B-B

NOTES:

1. USE CLASS "A" CONCRETE OR GROUTED COBBLES AS SPECIFIED.
2. 6X6X10 GA WIRE MESH THROUGHOUT CONCRETE
3. ON LINED CHANNELS APRON SHALL CONNECT TO SIDE LINING

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

EROSION CONTROL DITCH DISCHARGE

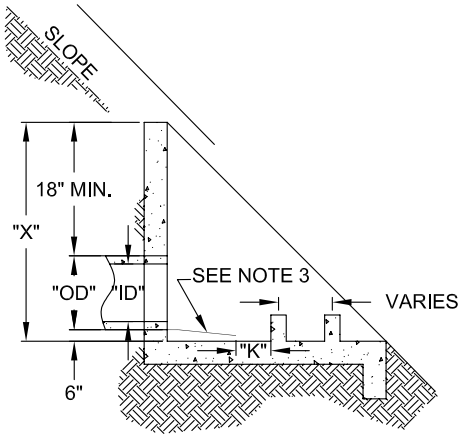
APPROVED BY:

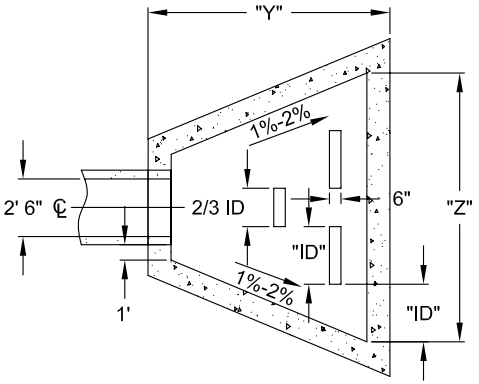
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**DR - 5**

H:\STANDARDS\Standard Details\5_Drainage\DR - 5.dwg

PIPE ID	PIPE OD	ACCESS CONTROL RACK		VARIABLE DIMINSIONS															
				SLOPE = 1:1				SLOPE = 1.5:1				SLOPE = 2:1				SLOPE = 3:1			
(INCHES)	(INCHES)	W	H	X	Y	Z	K	X	Y	Z	K	X	Y	Z	K	X	Y	Z	K
12	16.5	12	12	4'-6"	4'-6"	4'-8"	6"	3'-0"	4'-6"	4'-8"	6"	2'-10"	5'-9"	4'-8"	1'-2"	2'-10"	8'-8"	4'-8"	2'-6"
15	19.5	15	15	5'-0"	5'-0"	5'-10"	6"	3'-4"	5'-0"	5'-10"	6"	3'-2"	6'-3"	5'-10"	1'-2"	3'-2"	9'-4"	5'-10"	2'-8"
18	23	18	18	5'-6"	5'-6"	7'-0"	6"	3'-8"	5'-6"	7'-0"	6"	3'-6"	6'-8"	7'-0"	1'-2"	3'-6"	10'-3"	7'-0"	2'-10"
21	27	21	21	6'-0"	6'-0"	8'-2"	6"	4'-0"	6'-0"	8'-2"	6"	3'-9"	7'-6"	8'-2"	1'-3"	3'-9"	11'-3"	8'-2"	3'-2"
24	31.5	24	24	6'-6"	6'-6"	9'-4"	6"	4'-4"	6'-6"	9'-4"	6"	4'-2"	8'-3"	9'-4"	1'-4"	4'-2"	12'-4"	9'-4"	3'-5"
27	35	27	27	7'-0"	7'-0"	10'-6"	6"	4'-8"	7'-0"	10'-6"	6"	4'-9"	8'-10"	10'-6"	1'-5"	4'-9"	13'-3"	10'-6"	3'-8"
30	38.5	30	30	7'-6"	7'-6"	11'-8"	6"	5'-0"	7'-6"	11'-8"	6"	5'-3"	9'-6"	11'-8"	1'-6"	5'-3"	14'-2"	11'-8"	3'-10"
36	45.5	36	36	8'-5"	8'-5"	14'-0"	6"	5'-8"	8'-5"	14'-0"	6"	8'-5"	10'-7"	14'-0"	1'-7"	8'-5"	15'-10"	14'-0"	4'-2"
42	52.5	42	42	9'-6"	9'-6"	16'-4"	6"	6'-4"	9'-6"	16'-4"	6"	5'-10"	11'-9"	16'-4"	1'-8"	5'-10"	17'-8"	16'-4"	4'-6"
58	59	48	48	10'-6"	10'-6"	18'-8"	6"	7'-0"	10'-6"	18'-8"	6"	6'-6"	12'-10"	18'-8"	1'-8"	6'-6"	19'-3"	18'-8"	4'-10"
54	66	60	60	11'-6"	11'-6"	21'-0"	6"	7'-8"	11'-6"	21'-0"	6"	7'-0"	14'-0"	21'-0"	1'-9"	7'-0"	21'-0"	21'-0"	5'-3"
60	72	60	60	12'-6"	12'-6"	23'-4"	6"	8'-4"	12'-6"	23'-4"	6"	7'-6"	15'-0"	23'-4"	1'-9"	7'-6"	22'-6"	23'-4"	5'-6"
66	78	66	66	13'-6"	13'-6"	25'-8"	6"	9'-0"	13'-6"	25'-8"	6"	8'-0"	16'-0"	25'-8"	1'-9"	8'-0"	24'-0"	25'-8"	5'-9"
72	84	72	72	14'-6"	14'-6"	28'-0"	6"	9'-8"	14'-6"	28'-0"	6"	8'-6"	17'-0"	28'-0"	1'-9"	8'-6"	25'-6"	28'-0"	6'-0"





NOTES:

1. STRUCTRUAL CALCULATIONS SHALL BE SUBMITTED FOR HEADWALL.
2. ALL CONCRETE TO BE CLASS "A" 6-SACK.
3. REFER TO "PIPE INLET/OUTLET STRUCTURE AND TRASH RACK" DETAIL FOR ACCESS CONTROL RACK.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

HEADWALL

APPROVED BY:

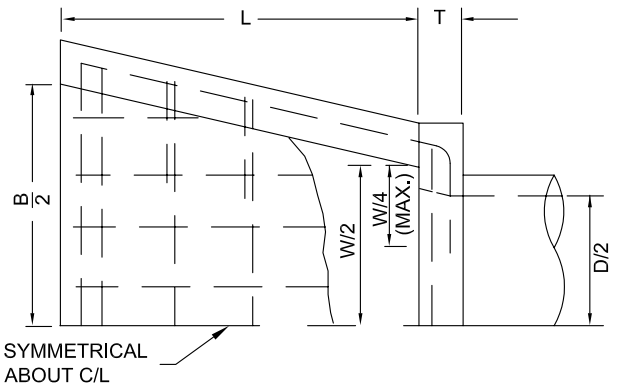
PUBLIC WORKS DIRECTOR / CITY ENGINEER

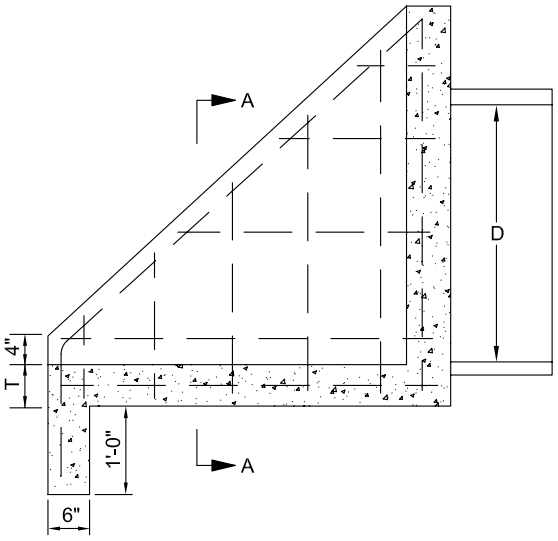
SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**DR - 6**

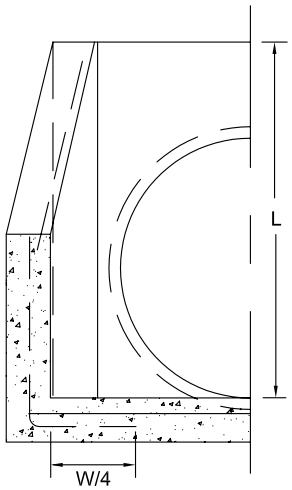
H:\STANDARDS\Standard Details\5_Drainage\DR - 6.dwg

DIMENSIONS & REINFORCING

D	W	B	L	T	ALL REINFORCING
33"	3'- 5"	5'- 3"	4'- 0"	6"	# 5 @ 12"
36"	3'- 8"	5'- 8"	4'- 2"	6"	# 5 @ 12"
42"	4'- 4"	6'- 4"	4'- 8"	6"	# 5 @ 12"
48"	4'-10"	7'- 2"	5'- 2"	8"	# 6 @ 12"
54"	5'- 4"	8'- 0"	6'- 0"	8"	# 6 @ 12"
60"	6'- 0"	8'-10"	6'- 6"	8"	# 6 @ 12"







HALF SECTION A-A

NOTES:

1. "B" MAY BE REDUCED IF REQUIRED BY CHANNEL DIMENSIONS
2. REINFORCING BAR SPACING SHOWN IS MAXIMUM SPACING.
3. USE CLASS 'A' CONCRETE, 6 SACK.
4. SEE CST, DR-13 FOR TRASH RACK

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

PIPE INLET STRUCTURE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**DR - 7**

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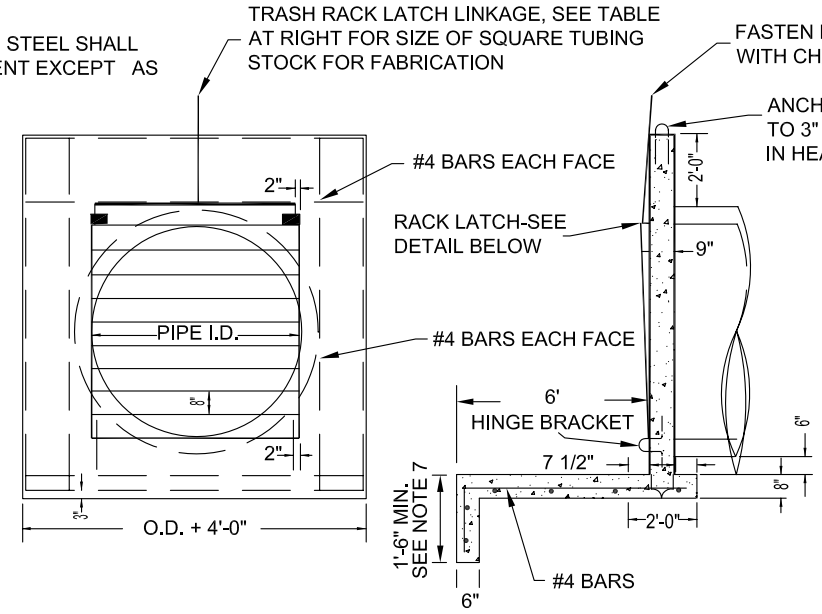
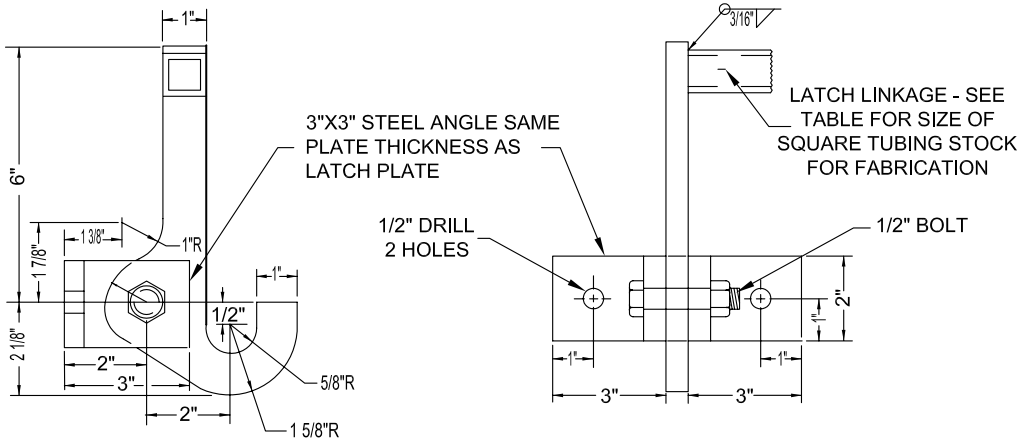
NOTE:
ALL REINFORCING STEEL SHALL HAVE 2" EMBEDMENT EXCEPT AS NOTED



PIPE SIZE	RACK BAR SIZE	LATCH PLATE THICKNESS	LATCH LINKAGE SIZE
21"	#4	1/4"	1", .095" THICK
24"	"	"	"
27"	#5	"	"
30"	"	3/8"	"
33"	#6	"	"
36"	"	"	1", .133" THICK
42"	#7	"	"
48"	"	1/2"	"
54"	"	"	"
60"	#8	"	"
66"	"	"	"
72"	"	"	"
84"	"	"	"



NOTE:

FABRICATE LATCH FROM STEEL PLATE, THICKNESS SHOWN IN TABLE

NOTES:

1. ENTIRE RACK TO BE WELDED REINFORCING STEEL OR ROUND BARS OF EQUAL DIA. WITH HORIZONTAL BARS BEING 8" CENTER TO CENTER.
2. USE CLASS "A" CONCRETE, 6 SACK.
3. ROOM SHALL BE PROVIDED DOWNSTREAM TO LAY RACK FLAT.
4. FASTEN LATCH BRACKET TO HEADWALL WITH 1/2" X 6" BOLTS WITH HEX NUTS, OR 1/2" EXPANSION BOLTS.
5. WHEN RACK IS IN THE CLOSED POSITION, THE BOTTOM RACK BAR SHALL BE TIGHT AGAINST THE TOP OF THE HINGE BRACKET SO THAT THE RACK CANNOT BE LIFTED OFF THE LATCH.
6. FABRICATE HINGE BRACKET FROM #4 RE-BAR.
7. CUTOFF WALL NOT REQUIRED IF HEADWALL IS TIED TO DETAIL DR-11.
8. SITE CONDITIONS MAY DICTATE THE USE OF A MODIFIED DESIGN. ALL VARIATIONS TO BE APPROVED BY THE CITY ENGINEER.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

PIPE INLET/OUTLET STRUCTURE AND TRASH RACK

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**DR - 8**

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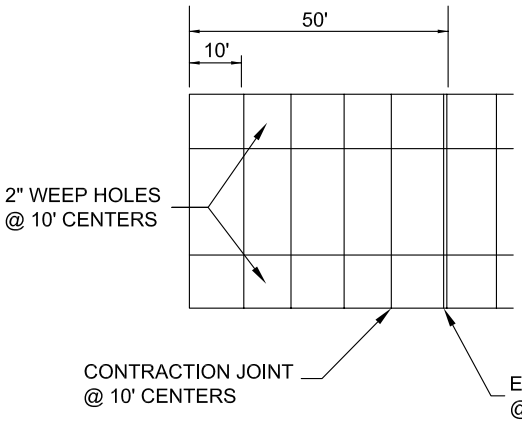
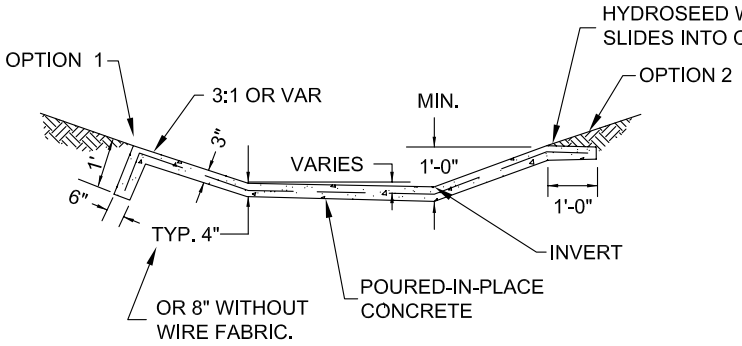
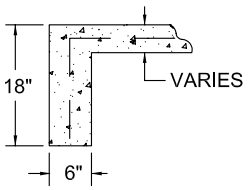


PLAN

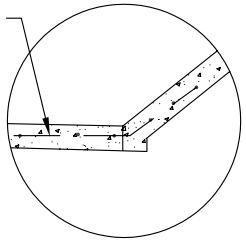


ALTERNATE "A"

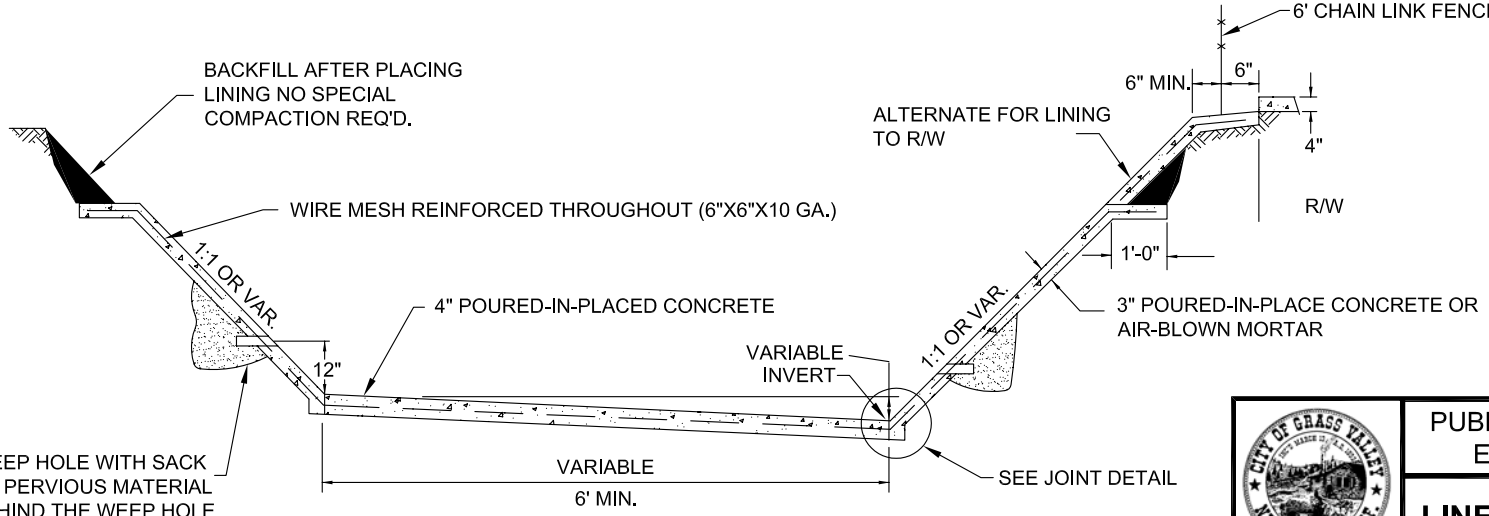


CUTOFF WALL

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



JOINT DETAIL



SECTION

NOTE: SEE SECTION 101-8 FOR MATERIALS

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

LINED CHANNEL SECTION

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	DR - 9

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MAXIMUM TRENCH DEPTH MEASURED SURFACE TO BOTTOM OF TRENCH IN FEET

DIAMETER	REINFORCED CONCRETE PIPE -CLASS-					CAST IN PLACE
	I	II	III	IV	V	
10	NOT PERMITTED				NO LIMIT	NO LIMIT
12		8	12	30		
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	
48		15	19	30	60	
54		16	20	31	58	
60	14	16	21	31	57	45
66	15	17	22	32	56	35
72	15	18	23	33	56	30

MINIMUM COVER
MEASURED SURFACE TO
TOP OF PIPE IN INCHES

TYPE	CLASS	MIN. COVER	
		STREET	OFF ST.
REINFORCED CONCRETE	I	27	12
	II	24	12
	III	18	12
	IV	12	12
	V	12	12
CAST PLACE CONC. PIPE	——	24	12
CORRUGATED DUAL WALL HDPE PIPE		36	24

NOTES:

ALL DEPTHS SHOWN ARE FLEXIBLE PAVEMENT AND TRENCH WIDTH EQUAL TO O.D. OF PIPE PLUS 16" FOR PIPE 33" AND SMALLER IN INSIDE DIAMETER. TRENCH WIDTH EQUALS O.D. OF PIPE PLUS 24" FOR PIPE 36" AND LARGER IN INSIDE DIAMETER. TRENCH WIDTH MEASURED AT TOP OF PIPE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TRENCH DEPTH & MINIMUM COVER REQUIREMENTS

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	DR-10

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SECTION 7

GRADING (GR)

7-1 GENERAL - Grading improvements shall include: excavation and embankment work for channels, pads and roadways, erosion control measures and retaining walls. These improvements shall be installed in accordance with the approved improvement plans, these Construction Standards, the latest edition of the California Building Code (CBC), and the latest edition of State Standard Specifications.

7-2 CONSTRUCTION STAKING - Construction staking shall be provided by the Developer for all grading improvements as indicated below, including adjacent to wetlands. Cut sheets shall be on-site and shall be furnished to the Public Works Inspector upon request.

A. Channels - Channel staking shall provide the station and offset, as well as the cut to the nearest tenth of a foot (0.1 foot). Stakes shall be provided at a minimum of every fifty (50) feet in tangent sections and every twenty-five (25) feet in curved sections.

B. Erosion Control Measures - Erosion control measures shall be staked per the approved plans. Erosion control requirements shall apply to all construction sites regardless of size, which involve disturbed soil. Sites exceeding one (1) acre of disturbed surface area are subject to the State Water Board's Construction General Permit Storm Water Pollution Prevention Plan (SWPPP) requirements. Owner's SWPPP must be accepted by the City prior to the commencement of grading operations.

C. Pads - Pad staking shall provide the station and offset, as well as the cut to the nearest tenth of a foot (0.1 foot). Stakes shall be provided at each property corner, front and rear.

D. Retaining Walls - All retaining walls shall be staked for line and grade to the nearest tenth of a foot (0.1 foot).

E. Roadways - Roadway excavation staking shall provide the station and offset, as well as the cut to the nearest tenth of a foot (0.1 foot). Minimum staking intervals shall be fifty (50) feet in tangent sections and twenty-five (25) feet in curves. Stakes shall also be placed at curve beginnings, ends, points of reverse curvature, points of compound curves, horizontal angle points and at changes of grade.

7-3 INSTALLATION - All grading improvements shall be installed in accordance with provisions in the CBC, recommendations of site specific geotechnical reports and Geotechnical Engineer, provisions in the Caltrans Standard Specifications, the approved improvement plans and per the following specifications:

A. Channels - All fill areas in channels shall receive suitable fill material to be compacted to a minimum of 90 percent relative compaction. The Developer's Geotechnical Engineer will determine suitable fill material. Unsuitable subgrade materials shall be removed from the channel and replaced with suitable backfill material based on recommendations provided by a State of California licensed Geotechnical Engineer.

B. Storm Water Pollution Prevention Plan (SWPPP) - If required, a copy of the filed Notice of Intent (NOI) and acceptable SWPPP with WDID number shall be available on site at all times.

C. Erosion Control Measures - Construction sites shall have required erosion and sediment control measures in place between October 15 and April 15, inclusive. All projects adjacent to creeks, wetlands, vernal pools, drainage ditches, and stormwater drain inlets shall have adequate sediment

control measures in place prior to ground disturbance regardless of time of year. The Contractor shall ensure that the construction site is prepared prior to the onset of any storm with all applicable Best Management Practices (BMP's). For stormwater quality compliance information, refer to the latest edition of the Caltrans Construction Site BMPs Manual and the California Stormwater Quality Association Stormwater BMP Handbook, Municipal. Waterways under the jurisdiction of governmental agencies other than the City of Grass Valley may be subject to additional erosion control measures or criteria and is the responsibility of the Developer/Owner. The City of Grass Valley erosion control provisions shall include, but are not limited to:

1. **Broadcast Seed** - Where required, broadcast seed shall be applied as follows:

Brando Brome	12 lbs/acre
Rose Clover	9 lbs/acre

Areas with sandy, dry soil shall receive:

Zorro Annual Fescue	6 lbs/acre
Rose Clover	9 lbs/acre

A fertilizer consisting of 16-20-0 shall be applied at a rate of 500 pounds per acre. If hydroseeding/mulching is used, seed quantities shall be increased by 30 percent.

Seed for creek banks shall conform to the latest requirements of the California Department of Fish and Game.

2. **Drainage Areas** - All bare areas, regardless of slope, within 50 feet of natural drainages and active stormwater collection systems shall be covered with straw, erosion control blankets, hydromulch, or other types of soil stabilizers suitable for eliminating soil migration. The Public Works Inspector may require additional control measures be installed if deemed necessary.

   a. No grading or trenching, except as required for erosion or sediment control, shall occur within 35 feet from the centerline of perennial and intermittent drainage swales between October 15 and April 15, inclusive, unless approved by the City Engineer, as well as any other governmental agency which may have additional jurisdiction and/or requirements.

3. **Dust/Mud Control -**

   a. Construction Access - Where construction traffic accesses a project, on or off public streets, the Contractor shall have in place prior to the start of grading, construction access conforming to the Caltrans Construction Site BMP Manual. Alternate tracking control measures will be considered provided they are equally or more effective than specified. Construction access locations shall be maintained during the coarse of construction.

   b. Adjacent Streets - Adjacent street frontages shall be kept clean at all times. When tracking has occurred, the Contractor must clean immediately, or as directed by the Public Works Inspector.

   c. Construction Vehicles - The Contractor is responsible for cleaning construction vehicles leaving the site to prevent dust, silt, mud and dirt, from being released or tracked offsite. See the Caltrans Construction Site BMP Manual for information on vehicle and equipment cleaning requirements, and instructions concerning concrete washout areas.

d. Grading Spoils - Dry stock piles of soil shall be watered, covered with tarpaulins, or stabilized to prevent the generation of airborne dust. Trucks transporting dry soil shall be covered with tarpaulins. Stockpiling of spoils during the wet season, (October 15 to April 15, inclusive), should be avoided. If unavoidable, spoil stockpiles shall be covered with plastic, or adequately stabilized by other BMP's, with a perimeter sediment barrier installed at all times. The Public Works Inspector may require additional control measures depending on the proximity of the stockpile to any sensitive areas and/or drainage systems.

e. Dust Control - Water shall be sprayed on all exposed earth surfaces during clearing, grading, earth moving and other site preparation activities. The exposed earth shall be watered throughout the day to minimize dust. Care must be taken to ensure that excessive water use doesn't create a sediment-laden discharge. Water from City hydrants is usually available to supply water; however, a temporary meter from the City of Grass Valley Water Division must be obtained prior to use.

f. Wind Allowances - Grading activities shall be restricted or halted when winds exceed 15 miles per hour as deemed necessary by the Public Works Inspector. In addition, Northern Sierra Air Quality Management District may issue enforcement actions for air-borne migration violations, per their guidelines.

4. Drain Inlet Protection - Drain inlet filters must be employed whenever there is risk of sediment-laden water entering the City's storm drain system. This applies to both existing and newly constructed drain inlets. If the storm drain system is active and open to discharges, then immediately following installation, all drop inlets shall be protected with silt and gravel bags until construction no longer poses a risk of sediment laden discharges. Only high flow volume bag type filters, or other devices that have been approved of by the Public Works Inspector shall be used.

5. Perimeter Protection - Silt fences, fiber rolls and straw bales are commonly used as perimeter sediment control BMP's. Proper installation of these is critical for their effectiveness.

6. Slope Protection - Disturbed, exposed slopes pose the highest risk of erosion and shall be protected as required. BMP's such as blown or broadcast straw, erosion control blankets, plastic sheeting, and soil stabilizers shall be employed to minimize or eliminate erosion.

7. Straw Bales - Straw bales should be strategically stockpiled on the site at a rate of 1.5 bales per acre during the "Wet Season" for the purpose of immediate broadcasting prior to storm events. Measures shall be provided to keep straw dry. Refer to the project's SWPPP or erosion control plan for proper stockpiling of BMP's.

8. Alternative Control Devices - Use of alternative sediment control devices will be approved at the discretion of the Public Works Inspector.

D. Pads - All pads shall be compacted to a minimum of 90 percent relative compaction. Unsuitable materials shall be removed from the pad areas per the recommendations of the Developer's licensed Geotechnical Engineer. The Developer shall submit a letter from the Geotechnical Engineer stating that the grading was performed in substantial conformance with the geotechnical report (and subsequent updates).

E. Retaining Walls -

1. **Concrete/Masonry/Rock Walls -** All concrete, masonry, or rock walls shall be installed per the manufacturers' instructions or Design Engineer's recommendations.

2. **Wood Retaining Walls** - All wood retaining walls shall be installed in accordance with the approved plans and Caltrans Standard Plans and Specifications.

F. Roadways -

1. **Compaction** - Relative compaction of not less than 95 percent shall be obtained for a minimum depth of 0.5 feet below the subgrade grading plane for the width between the outer edges of shoulders, including curb and gutter areas, whether in excavation, embankment or at original ground level. All other material shall be compacted to a relative compaction of 90 percent or as recommended by the project Geotechnical Engineer.

2. **Grade Control** - When the next layer to be placed on the subgrade is an asphalt concrete pavement, asphalt concrete base, or asphalt concrete subbase, the subgrade grading plane at any point shall not vary more than 0.05 foot above or below the grade established by the project surveyor.

3. **Stability Testing** - The Contractor shall proof roll the subgrade areas with a full, 3,000 gallon water truck, prior to placement of aggregate base or aggregate subbase. The Public Works Inspector shall approve the equipment used for proof rolling. The Developer's Geotechnical Engineer shall provide testing for compaction per Caltrans standards.

4. **Unsuitable Materials** - Any unsuitable material encountered within two (2) feet below subgrade or two (2) feet below original ground shall be removed and replaced with a suitable backfill material.

   Suitable backfill materials and methods for placement are to be reviewed and approved by the Geotechnical Engineer. Other methods for subgrade stability may be used upon review and approval of the project Geotechnical Engineer.

5. **Straw Wattles or Fiber Rolls** - Fiber rolls shall be a premanufactured roll filled with rice or wheat straw, wood excelsior or coconut fiber. Fiber roll must be covered with biodegradable (non-plastic) fiber netting secured tightly at each end. Fiber rolls must be at least 1.1 lb/ft for diameters 8 to 10 inches or at least 3 lb/ft for diameters 10 to 12. Fiber rolls shall have a functional longevity of 1 year and are considered construction materials to be removed upon completion of the project.

G. Trees -

1. **Removal** - Those trees which are to be removed and disposed of shall be so designated on the plans. A Tree Removal Permit shall be obtained from the Public Works Department, Engineering Division, prior to any tree removal. Prior to the clearing and grubbing operation on a particular property, the Engineer will designate to the Contractor those trees and shrubbery that may be removed.

2. **Protection** - Trees and shrubbery which are not to be removed shall be protected from injury or damage by the Contractor's operations. Tree protection fencing shall be installed around the drip line of all trees to be saved as shown on the Tree Protection detail.

3. **Preservation** - Trees and shrubs which are to be removed and not specifically designated for disposal, shall be preserved by removing in a ball of natural material and the roots wrapped in burlap and kept moist until the work has progressed enough for the replanting of the tree or shrub. The replanting shall be performed in a careful and professional manner.

4. **Roots 2 inches to 4 Inches in Diameter** - Roots two (2) inches to four (4) inches in diameter which are severed during the course of the excavation shall be neatly trimmed and coated with a heavy coat of approved tree seal compound. If roots greater than four (4) inches in diameter are severed during the course of the excavation, it shall immediately be brought to the attention of the Public Works Inspector. At the discretion of the Public Works Inspector, the Contractor/Developer may be required to consult with an arborist to determine how best to alleviate the damage.

5. **Roots Greater than 4 Inches in Diameter** - Roots greater than four (4) inches in diameter encountered in the course of excavation for underground facilities which do not interfere with the pipe grade shall be exposed but not severed and shall be wrapped in burlap and kept moist until the backfilling operation is completed.

6. **Grading within Driplines** - Grading or excavation within the driplines of trees will not be permitted unless specifically shown on the plans or authorized in writing by the City Engineer.

7. **Trenching within Driplines** - No trenching whatsoever shall be allowed within the driplines of trees. If it is absolutely necessary to install underground utilities within the dripline of an oak tree, the excavation shall be bored.

8. **Trimming** - Tree branches which extend over the roadway shall be trimmed to provide a minimum clearance of 14 feet above the shoulder point of the roadbed unless specifically permitted otherwise in writing by the City Engineer. The tree branches or shrubbery branches removed shall be cut off close to the bole of the tree in a smooth, neat, manner, and the cut treated with a heavy coating of an approved tree seal compound. The Contractor shall remove other branches at the direction of the City Engineer in such a manner that the tree or shrubbery will present a uniform, balanced appearance.

H. Grading Adjacent to Wetlands - Grading activities adjacent to sensitive wetland or creek areas shall be conducted under the conditions set forth under the Grading Permit. These conditions shall also include:

1. Prior to construction within any phase of the project, high visibility temporary construction fencing, shall be installed along the parcel adjacent to the wetland or creek. Fencing shall be maintained daily until permanent fencing is installed, at which time the temporary fencing shall be removed from the project site.

2. With the exception of access required for maintenance and/or emergency vehicles, the project shall be designed to prevent vehicle access into the wetland area. Post and cable fencing or other improvements shall be utilized to meet this requirement.

3. Landscaping adjacent to the wetland area shall be California native, drought-tolerant groundcover, shrubs, plants and trees.

4. The pre-construction meeting shall address the presence of the wetland area, the sensitive habitats present and minimization of disturbance to the wetland area. During grading and construction the wetland area shall be avoided and shall not be used for parking, storage, or project staging. The contractor shall remove all trash blown into the wetland from adjacent construction on a daily basis. After construction is complete, the temporary fencing shall be removed from the wetland area, along with all temporary erosion control measures

7-4 MATERIALS -

A. Wetland Preserve Fencing -

1. Signs – Signs shall be installed at a maximum of fifty (50) foot intervals on wetland preserve fencing. The size of each sign shall be a minimum of two (2) feet by two (2) feet and shall contain the following language:

WARNING
THIS FENCE SHALL NOT BE REMOVED
OR RELOCATED WITHOUT WRITTEN
AUTHORIZATION FROM THE
CITY OF GRASS VALLEY

7-5 SOIL TESTING PROCEDURES AND FREQUENCIES

A. Field Testing -

1. Field Density Testing - Field density testing for earthwork and backfill will be performed by either the Developer's Geotechnical Engineer, or the City's Geotechnical Engineering Consultant, at the discretion of the City Engineer as follows:

a. Private property building areas, including the area within 10'-0" outside the exterior building lines, shall be tested by the developer's Geotechnical Engineer with proper written pad certifications submitted to the City Building Official prior to foundation placement.

b. All grading operations, which involve revision to existing contours for the purpose of accepting right-of-way improvements, shall require written and stamped certification from a licensed California Geotechnical Engineer.

c. The test method shall be in-place nuclear density testing ASTM D2922 (Method B-Direct Transmission), or as recommended by the Geotechnical Engineer, to check conformance with the requirements of the Geotechnical Report, project plans, specifications, and these Construction Standards. In addition to testing, the field technicians shall observe ALL backfill operations to ensure methods consistent with those that achieved minimum required compaction results are used throughout the backfill process. The field technician shall record these observations in their Daily Field Report (DFR). The field technician shall perform additional testing when the operations deviate from proven practices even if testing at the frequencies required below has already been performed. Samples for compaction curves shall be taken at the discretion of the technician or as directed by the Public Works Inspector.

d. The City expects testing at a higher frequency at the discretion of the field technician or Public Works Inspector if there is any reason to doubt the effectiveness of the operations or the precision of the test results, and when a material change is observed in the soil being compacted. These tests shall be recorded in the DFR.

B. Minimum Reporting Requirements -

1. **Daily Field Reports (DFR) -** All testing and observations shall be recorded in a DFR. The DFR's shall include all field density testing; test tables and/or plans shall show the field-recorded dry density, moisture content, reference laboratory compaction test used, and any moisture offset used, based on supplemental laboratory testing. All test results indicating less than minimum compaction shall be recorded in the DFR along with the observation of corrective operations and retest results. DFR's shall also indicate where observation and soil probing were performed in between nuclear gauge testing.

   All DFR's shall be made available to the City upon request, within one working day.

2. **Mass Grading Minimum Testing Frequencies -** Density testing for mass grading operations shall consist of one (1) test per 500 cubic yards or each 5,000 square feet of fill, or as required by the City Engineer. A separate compaction certification report is required for testing within the City right-of-way limits.

C. Trench Backfill Testing Frequencies -

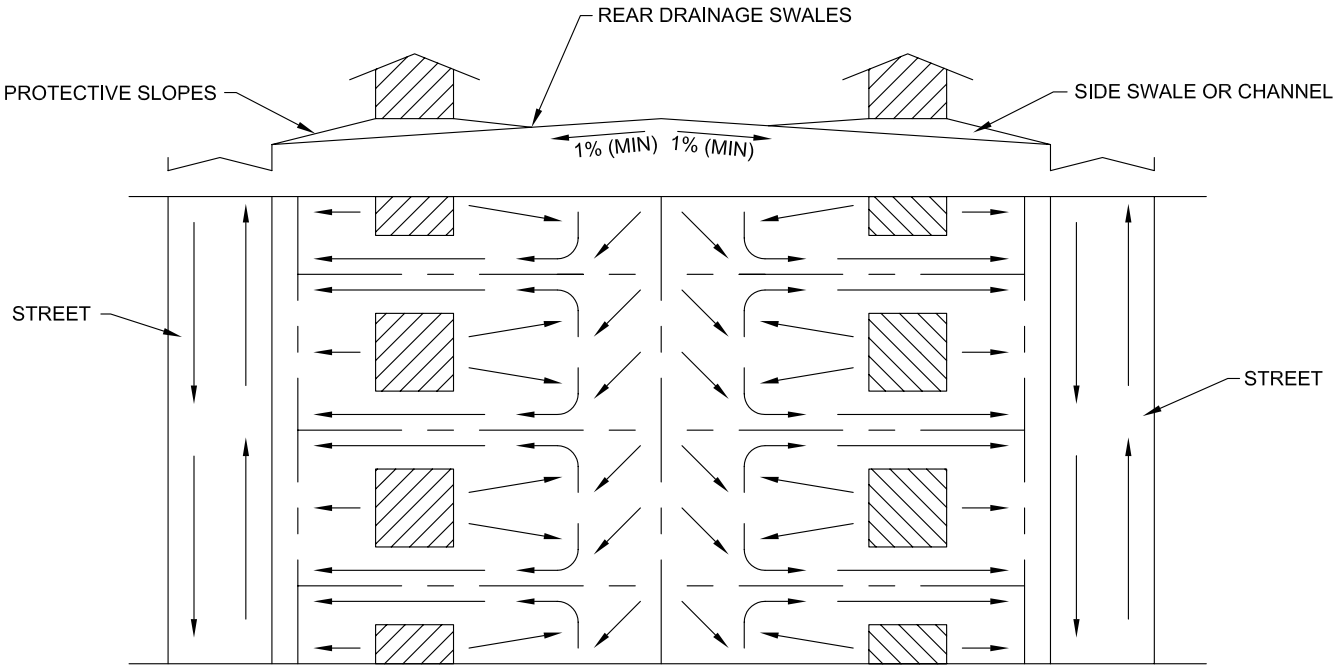
1. **Utility Installations** - Observe all bedding, shading, shovel slicing, and filter fabric installation procedures for compliance with City Standards and project plans and specifications. Observations shall be documented in DFR's along with measures taken to correct complaint items.

2. **Compaction Testing** - By Nuclear Gauge Method, tests shall be taken at a minimum frequency of one test per lift per 200 lineal foot of backfill, testing pattern should be staggered such that the location of test varies with each lift of backfill. The testing laboratory shall submit copies of the field technician's DFR's and testing logs on a weekly basis to the City Public Works Inspector for review.

3. **Performance Specification Observation** - (Deep Trenches or Rocky Material), Performance specifications shall be used to verify compaction efforts where vertical cuts or other issues prevent safe entry for nuclear gage density testing. A series of tests shall be performed at the beginning of the backfill operations in a protected area of the trench to determine the minimum number of passes, acceptable equipment, moisture conditioning, and maximum loose lift thickness. Once the procedure is approved, full-time observation will be performed to check that operations comply with the approved performance specifications. The field technician shall require the contractor to provide access for further testing by the field technician if, in the opinion of the Public Works Inspector, conditions change such that observation alone will not suffice to verify compliance or if the material or equipment used to backfill the trench changes such that re-evaluation or compaction procedures are required. Adequate compaction of material containing more than 30 percent rock larger than ¾ inch shall be verified via performance specification. The project Geotechnical Engineer shall develop the performance specification, if none exists, and perform full-time observation of the operations to verify compliance. Field observations shall be recorded in the field technician's DFR as described above. The DFR shall clearly reference approximate stations and elevations over which the observation of performance specification was performed.

4. **Manholes** - Areas around manholes shall be tested every vertical foot. Testing methods and recordings shall be as described above.

5. **Utility Services to Residences** - Test at least every other lift on a minimum of 50 percent of the services.



NOTES:

1. LOTS CAN BE GRADED AS A PAD WITH A MINIMUM 1% GRADE TORWARD THE STREET
   -OR-
2. LOTS CAN BE GRADED FLAT WITH DRAINAGE DITCHES EXTENDING THE LENGTH OF THE SIDE LOT LINE WITH A MINIMUM 1% GRADE TOWARD THE STREET.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

CLASS 1
LOT GRADING

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**GR - 1**

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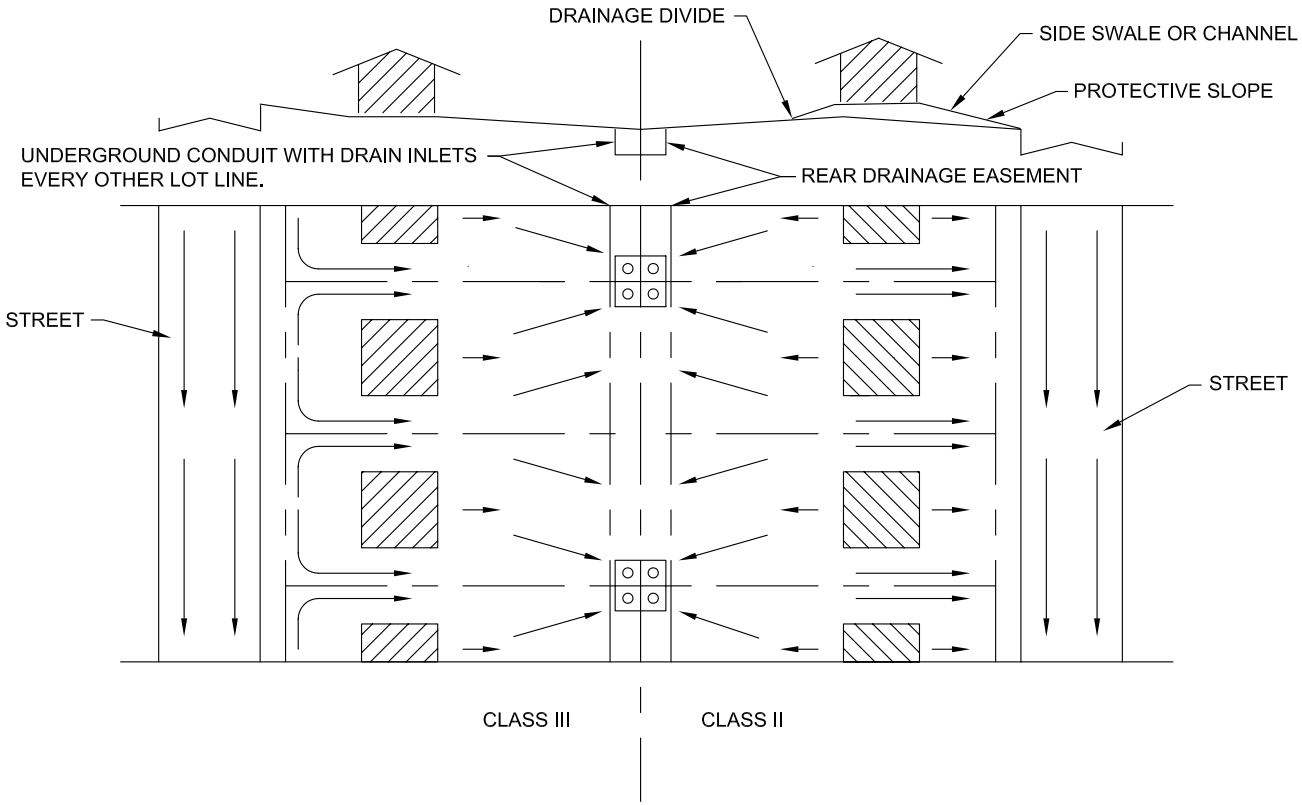

NOTES:

1. THOSE LOTS WHICH DO NOT DRAIN TOWARDS EXISTING OR FUTURE LOTS MAY ELIMINATE THE USE OF REAR LOT DRAINS PROVIDED ADDITIONAL EROSION CONTROL MEASURES ARE IMPLEMENTED SUBJECT TO APPROVAL OF THE CITY ENGINEER.
2. EACH LOT TO HAVE IT'S OWN INLET.
3. STORM DRAIN SYSTEM SHALL BE LOCATED IN A PRIVATE DRAINAGE EASEMENT AND MAINTAINED BY PROPERTY OWNER.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

LOT GRADING
CLASS II AND III

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**GR - 2**

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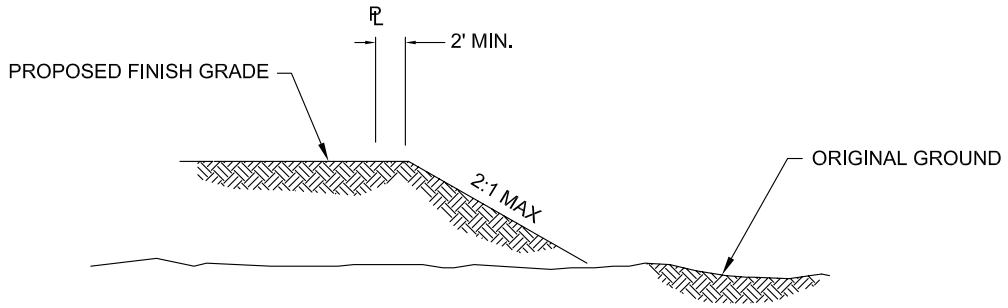
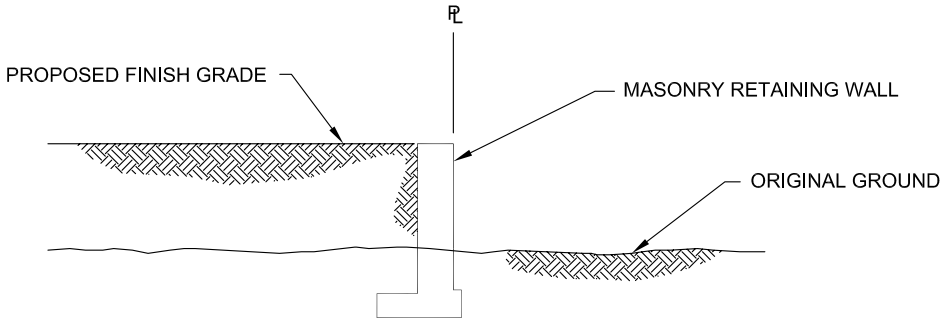


OPTION 1



OPTION 2

NOTES:

1. A RECORDED SLOPE EASEMENT IS REQUIRED FROM ADJACENT PROPERTY OWNER FOR OPTION 1.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

EXTERIOR PERIMETER PROPERTY LINE GRADING

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**GR - 3**

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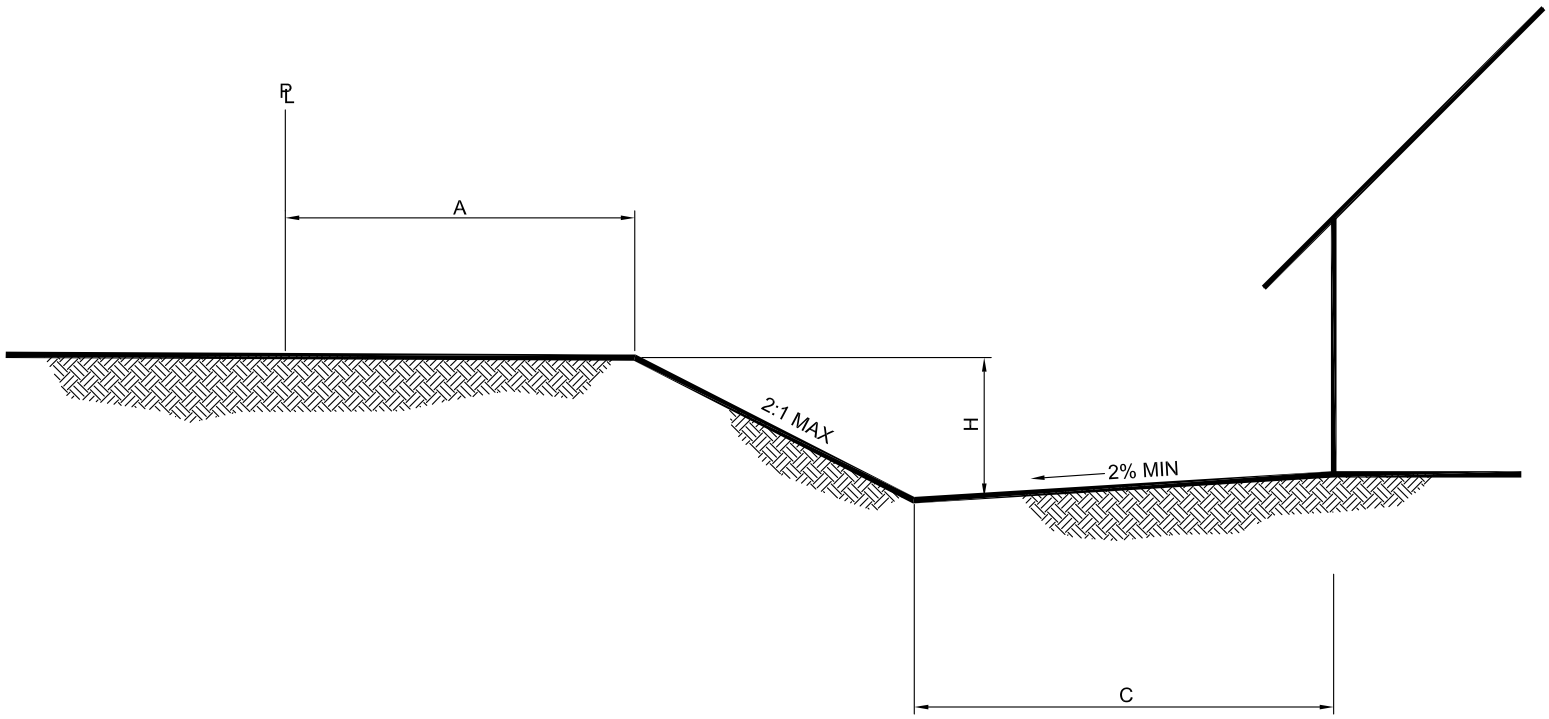

NOTES:

1. WHEN "H" IS LESS THAN OR EQUAL TO 1.0 FOOT, "A" = 1.0 FOOT MIN.
2. WHEN "H" IS GREATER THAN 1.0 FOOT, A RETAINING WALL IS REQUIRED OR A STANDARD LOT SETBACK GUARANTEE PROVIDED. IN SUCH CASE, "A" SHALL EQUAL 2.0 FEET MIN. AND "C" SHALL BE A MINIMUM OF H/2 (3' MIN, 15' MAX).

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

INTERIOR PROPERTY LINE GRADING

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**GR - 4**

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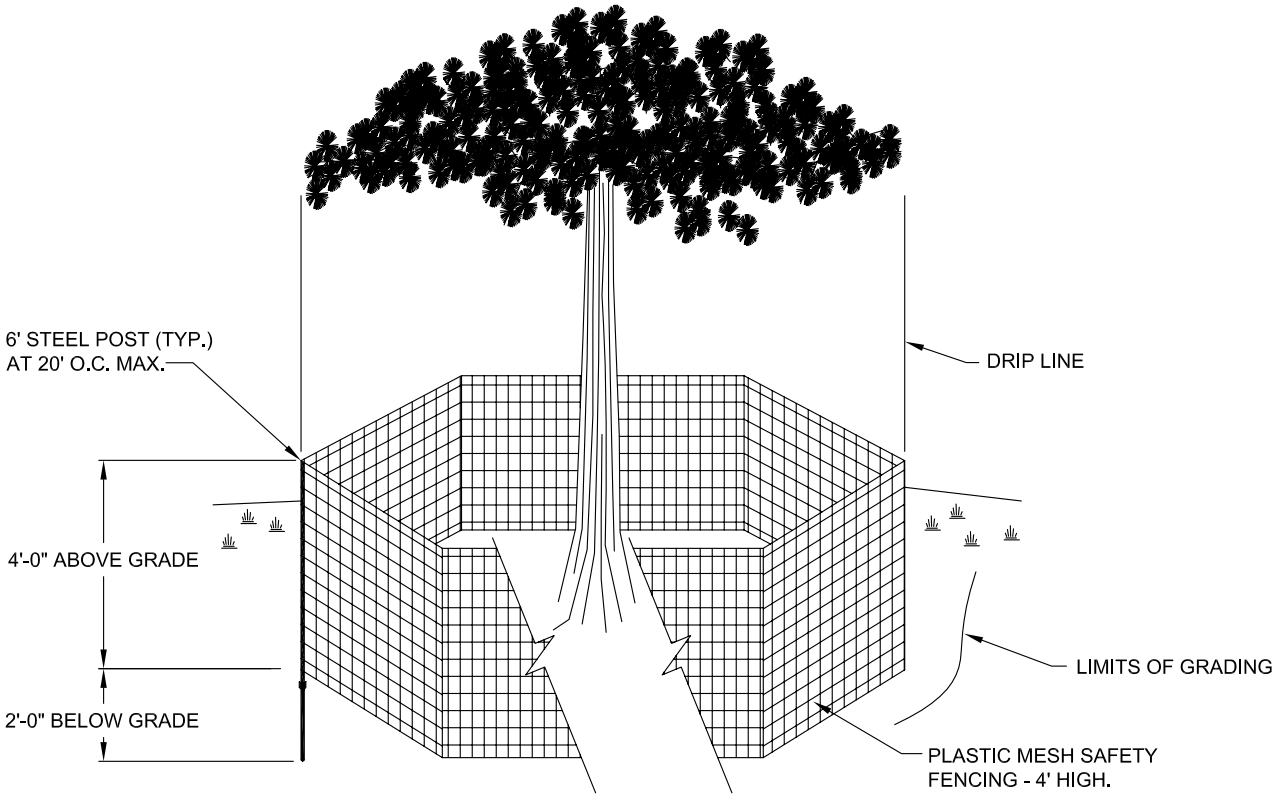

NOTES

ALL EXISTING TREES OR GROUPINGS OF TREES SHALL BE FENCED PRIOR TO ANY CONSTRUCTION ACTIVITIES. FENCING SHALL BE AS FOLLOWS:

1. BRIGHTLY COLORED PLASTIC MESH SAFETY FENCING SHALL BE TIED SECURELY TO 6' STEEL POSTS, 15' ON CENTER MAXIMUM.

2. FENCING SHALL BE PLACED AT THE APPROXIMATE DRIP LINE OF THE TREES' CANOPY OR THE LIMIT OF THE GRADING, WHICHEVER IS APPROPRIATE.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TREE PROTECTION

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**GR - 5**

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SECTION 8

LANDSCAPING & IRRIGATION (LS)

8-1 GENERAL - All landscaping and irrigation improvements shall be installed in accordance with the approved project improvement plans, these Construction Standards, the latest edition of Caltrans Standard Specifications, as recommended by the manufacturer and as specified by the City Engineer. These Construction Standards and the manufacturer's guidelines shall be present at the construction site at all times.

8-2 IRRIGATION INSTALLATION - It is the intention of these standards to establish the specifications and work required for the installation of a sprinkler system, which will operate in an efficient manner and provide adequate coverage over the entire irrigated area. These specifications and the standard details indicate the general arrangement of piping and equipment, and do not necessarily detail all offsets, fittings and accessories that may be required. The Contractor shall furnish incidental materials and labor required to complete the work to the satisfaction of the City Engineer.

A. Trenching - Trench excavation shall be open vertical construction, sufficiently wide to provide free working space around the work to be installed, and to provide ample space for backfilling and compacting. Trenches for pipe shall be cut to required grade-lines, and the trench bottom shall be compacted to provide an accurate grade and uniform bearing for the full length of the line.

1. When two pipes are to be placed in the same trench, the trench shall be wide enough to allow for 6-inches of separation between the pipes and/or conduits.

2. The excavation required for the installation of conduit, foundations and other appurtenances shall be performed in such a manner as to cause the least possible damage to the streets, sidewalks and other adjacent improvements.

3. The minimum cover requirements above the conduit or wiring are:

a. 12- inches over non-pressure, lateral lines.
b. 18- inches over pressurized main lines.
c. 24- inches over pipe crossing underneath pavement.

B. Backfill - Backfill material in non-paved areas shall be native material free from lumps or stones and placed in six (6) inch layers thoroughly compacted by mechanical tamping.

C. Control Wiring - Connections between the automatic controllers and the electric control valves shall be made with direct burial copper wire AWG-U.F. 600 volt.

1. Two spare wires of different colors shall be run from the valve furthest from the controller, back to the controller. Pilot wires shall be of a different color for each automatic controller.

2. Common wires shall be white with different color stripes for each automatic controller. Installations to be made in accordance with the valve manufacturer's recommendations and wire chart. Wire size shall be no less than #14.

3. Wiring shall occupy the same trench as pressure supply or lateral lines. The wiring shall be the same elevation as the supply or lateral lines.

4. When more than one wire is placed in a trench, the wiring shall be taped together at intervals of four (4) feet to six (6) feet.

5. Wires installed in conduits shall not be taped together to facilitate replacement of individual wires.

6. An expansion curl should be provided within three (3) feet of each wire connection and at least every 100-feet of wire length. Expansion curls shall be formed by wrapping at least five (5) turns of wire around a one-inch diameter pipe, then withdrawing the pipe.

7. Field splices between the automatic controller and electric control valves will not be allowed without the approval of the City Engineer.

D. Irrigation Controller - The controller shall be a solid-state unit capable of fully automatic or manual operation of the system. Placement of the controllers will be coordinated with the Public Works Inspector. All local and applicable codes shall apply in installing the 120-volt electrical service to the controller. The Contractor shall provide the electrical service connections from the power service point to the controller. Adequate coverage and protection of the 24-volt service wire leading from the controller shall be maintained from the bottom of the controller.

E. Conduits - Interconnect conduit and fittings shall be PVC schedule 40.

1. Conduit runs shall be installed as shown in the approved plans. Any changes shall be approved by the City Engineer prior to installation.

2. The ends of the conduits, whether shop or field cut, shall be reamed to remove burrs and rough edges. Cuts shall be made square and true.

3. Conduit bends, except factory bends, shall have radii of not less than six times the inside diameter of the conduit.

4. Conduit shall be installed at a depth of not less than 18-inches below finished grade.

5. Conduit shall be free of soil and debris.

6. A nylon or polypropylene pull rope with a minimum tensile strength of 500 pounds shall be installed in all conduits, which are to receive future, interconnect cable. At least 2 feet of pull rope shall be extended beyond each end of the conduit run and secured.

7. Conduit placed under pavement shall be installed in a schedule 40 PVC sleeve sized as required.

F. PVC/Brass Pipe - All irrigation pressure lines shall be appropriately sized PVC or brass pipe.

1. PVC pipe shall be cut with a fine-toothed hacksaw or approved cutting tool and any burrs shall be removed. The outside of the pipe and the inside surface of the fittings shall be wiped with a clean cloth and then primed to remove all dirt and moisture prior to applying cement solutions.

2. Joining of PVC pipe shall be accomplished by brushing the cement solution uniformly around the pipe and fitting socket. Immediately after the cement application, the pipe shall be inserted into the fitting with a twisting motion to the full depth of the fitting socket. Any excess cement shall

be thoroughly wiped from the pipe and fitting. The joined members shall be allowed to cure for at least 5-minutes before they are handled. An additional fitting or pipe section may be added to the completed joint within 3-minutes if care is exercised in handling so that a strain is not placed on the previous joint.

3. Except as shown on the approved plans, PVC pipe shall be laid in a level trench on compacted or undisturbed earth and solvent-weld pipe shall be placed from side to side in the trench at intervals of approximately fifty (50) feet.

4. Brass pipe joints shall be threaded couplings, rated at 150-psi. Threaded joints shall be made by placing Teflon tape on the male threads only. Use of thread cement or caulking to make the joints tight is not permitted. All cut ends shall be reamed to full pipe bore before assembly. Brass pipe fittings shall be joined to the pipe in the same manner as specified for pipe joints.

5. All main lines shall have a bare copper trace wire installed, running the entire length of the main.

6. All taps on main lines three (3) inches or larger shall be made with saddle taps.

7. All piping under pavement shall be installed in a schedule 40 PVC sleeve twice the diameter of the water line.

G. Sprinkler Heads - Sprinkler heads shall be set perpendicular to finished grade and shall be installed as indicated on the approved plans and as shown in the Standard Details. Nozzles on stationary sprinklers shall be securely tightened after installation, and sprinklers having an adjustment stem shall be adjusted for proper radius and throw.

H. Valves - All valves shall be installed as indicated on the approved plans and as shown in the Standard Details. Each valve assembly shall have its own outlet; multiple assemblies are not allowed.

I. Valve Boxes - All gate valves, manual angle or globe valves shall be installed in a plastic valve box as shown in the Standard Details, complete with cover, unless otherwise specified on the approved plans.

1. All valve boxes shall be set ¼-inch above finish grade in lawn areas and two (2) inches above finish grade in ground cover areas. Valve boxes in athletic field areas shall be set twelve (12) inches below grade.

2. Valve boxes located near walks, curbs, header boards or paving shall be installed in such a way as to allow for valve boxes to abut those items with top surface matching planes.

3. All valve boxes shall be blocked for support with brick or concrete block.

8-3 IRRIGATION TESTING - All irrigation lines shall be pressure tested prior to trench backfill.

A. Service Lines and Irrigation Main - Upon completion of the main line distribution system, lateral lines and installation of the electric control valves, the system shall be flushed and then capped. After notifying the Public Works Inspector 72-hours in advance, the system will be pressure tested by applying a continuous static water pressure and shall meet the these conditions:

1. Main lines to hold 150-psi for four (4) hours.

2. Lateral lines to hold line pressure for four (4) hours.

B. Leak Repair - Repair any leaks resulting from the pressure tests. Pressure testing shall continue until no leakage or loss of pressure is shown over the entire prescribed test period. At the conclusion of the pressure tests, the heads shall be installed and tested for operation in accordance with design requirements under normal operating pressures.

C. Electrical System - Prior to the acceptance of the improvements, the Contractor shall pass the following tests to the electrical system:

1. Continuity of each circuit.

2. Grounds in each circuit.

3. A functional test in which it is demonstrated that each and every part of the system functions as specified or intended herein.

8-4 PLANTING INSTALLATION -

A. Soil Preparation - Prior to any planting, finish grade all planting areas, filling as needed or removing surplus dirt. Float areas to a smooth, uniform grade and slope to drain as indicated on the approved plans. Roll, scarify, rake and level as necessary to obtain true, even planting surfaces and thoroughly wet down the soil. After allowing to dry the planting area shall be cultivated to a depth of twelve (12) inches and allowed to dry out.

B. Soil Conditioning - Soil amendment and fertilizers shall be spread evenly over all areas. Fertilizer and soil amendment shall be applied per the soils fertility analysis and incorporated into the top twelve (12) inches of soil by repeated rotary-hoe cultivation.

C. Fine Grading - All planting areas shall be finish graded to a smooth even plane with no abrupt change of surface. Tops and toes of slopes shall be rounded to produce gradual transitions.

1. Planting areas, including lawns, shall be true to grade within one (1) inch tested in any direction with a ten (10) foot straightedge.

2. Finished grades of all shrubs, annuals and ground cover areas shall be one (1) inch below top of adjacent structural elements unless otherwise indicated on the approved plans.

3. Finished grades of lawn areas shall be ½-inch below top of adjacent structural elements.

D. Tree, Shrub, and Ground Cover Planting - Trees, shrubs, and ground cover shall be planted per the approved plans and the following:

1. Locations - Tree and shrub locations shall be approved by the Public Works Inspector prior to plant holes being dug.

2. Pit Digging - Dig circular pits, 3 times the diameter of the planting can.

3. Root Balls - Plants are to be lifted so that the root ball is supported from the underside. Plants that do not have a satisfactory root system will be rejected. If plants do not have young feeder roots showing at the edge of the container, loosen their roots and cut in several places to

encourage new feeder root development along the perimeter of the root ball. Root balls are to be checked for girdling roots around the stems.

4. **Planting plants** - All plants shall be planted immediately after the containers are cut and containers shall be immediately removed from the site. Ground cover shall be installed at spacing indicated on the approved plans and shall be evenly spaced and staggered in rows. Place each plant in a pit so the root system lies free without doubling and so the roots are planted vertically. Firm the soil around each plant and water the area immediately to avoid drying out.

5. **Planting trees** - All trees shall be planted in an upright position on a packed mound, with the crown of the tree two (2) inches above grade at the time of planting. Place approved fertilizer tablets and backfill until the hole is one half (½) full, thoroughly water, then complete backfilling. Place a three (3) inch high berm outside the excavated area, and fill the watering basin with water. Basins are not required if plants are in a lawn area or are watered by an emitter system. Mulch is not to be placed within the basin areas, or within six (6) inches of the stems for areas without basins.

6. **Fertilizers** - Apply fertilizer consisting of a mixture of 16% nitrogen, 6% phosphorous, 8% potassium (16-6-8) at a rate of five (5) pounds per 1,000 square feet, uniformly over area to receive ground cover.

7. **Supporting trees** - After pruning off any suckers as needed, place stakes along the side of the root ball and two (2) feet into undisturbed soil. Trees are to be tied to the stakes per the Standard Details. No mulch is to be placed within the tree basin, or within six (6) inches of the stem, if a basin is not required.

E. Hydromulch Seeding -

1. **Preparation** - The slurry preparation shall take place on site. When the water level in the tank has reached the height of the agitator shaft and good circulation has been established the seed shall be added. Fertilizer shall then be added, followed by wood pulp. The wood pulp shall be added to the mixture after the seed and only when the tank is at least one-third filled with water. All the wood pulp shall be added by the time the tank is 2/3 to 3/4 full. Spraying shall commence immediately when the tank is full.

2. **Application** - Areas to receive hydromulch shall be sprayed with a uniform, visible coat by using green color wood pulp as a guide. The slurry shall be applied in a sweeping motion, in an arched stream, allowing the wood fibers to build on each other until a good coat is achieved. Application rates shall be based on site conditions and season. Hydromulch shall not be allowed to fall on the ground cover and shrub areas.

3. **Time Limit** - Any slurry mixture which has not been applied to the slope within four (4) hours of mixing will be rejected by the Public Works Department and shall be removed from the project at the Contractor's expense.

F. Seeding - Installation of all plants and ground cover shall be complete prior to seeding operations. Just prior to sowing, areas to be seeded shall be made sufficiently loose and friable to receive the seed.

1. **Application** - Seed shall be sowed evenly using a mechanical spreader at the rate specified on the approved plans. One-half the seed shall be sowed in one direction, and the remaining one-half

sowed in a direction 90 degrees to the first during a windless period. Turf seed shall be applied with an implant seeder that implants the seed into the soil. Broadcast seeding is not allowed for turf seed. Apply fertilizer (16-6-8) at a rate of five (5) pounds per 1,000-square feet uniformly over seeded areas. Lightly rake surface to cover seed and to mix with fertilizer and then compact with a 200 pound roller. Soil shall be kept moist but not saturated until the seed has germinated.

2. **Protection** - Protect grass areas with temporary fencing as necessary. Barriers shall be maintained by the Contractor and kept in orderly condition at all times until work has been accepted by the City. Any damage to turf shall be repaired at the expense of the Contractor.

G. Sod Planting -

1. **Application -** Unroll the sod, fitting each strip tightly to the preceding strip. Do not stretch the sod. Stagger the strips of sod to prevent the seams on adjacent rows from matching. Care shall be taken to prevent heel or foot prints in the grade as the sod is being placed.

2. **Rolling -** As soon as the sod is placed, roll it with a light roller, making certain that no air space is left under the sod. After the first rolling, moisten the sod lightly and then allow the grass to dry before the second rolling. The second rolling should be at a cross angle to the first rolling.

3. **Maintenance** - Upon completion of the rolling, apply sufficient water to wet the sod and soil to a depth of six (6)inches. Sod shall be kept moist for the next ten (10) days. The grass is to be mowed to a height of two (2) inches at the end of the ten (10) day period. Care shall be taken to leave no footprints in the sod.

8-5 MAINTENANCE PERIOD -

A. Preliminary Inspection - Upon completion of all irrigation and planting work, the Contractor shall notify the City that the landscaping is ready for preliminary inspection. The approval of the completed work will establish the beginning of the maintenance period.

B. Maintenance Period - The maintenance period shall be 90-calendar days from the approval of the constructed improvements. A longer period may be required at the discretion of the City Engineer.

C. Overall Maintenance Requirements - During the maintenance period the Contractor shall be responsible for all watering, weeding, mowing, fertilizing, cultivation, spraying and pruning necessary to keep the plant material in a healthy, growing condition and to keep the planted areas neat and attractive in appearance. Maintenance shall also include responsibility for maintaining adequate protection for all landscaped areas.

During the maintenance period, any plants that are vandalized, diseased, dead or in an unhealthy condition shall be replaced by the Contractor at his own expense within two (2) weeks after notification from the City Engineer, at no additional cost to the City. At the end of the maintenance period, all plant material shall be in a healthy, growing condition and free of physical injury of any kind. All items and equipment shall be maintained in an optimum working condition.

D. Watering - All plants shall be watered not less than twice a week. Each watering shall be of such quantity as to provide optimum growth conditions.

E. Lawn Maintenance - Lawn areas which fail to germinate shall be re-seeded at maximum ten (10) day intervals until a vigorous, uniform stand of turf is established. Lawn areas shall be kept free of

weeds, by hand pulling, or they may be sprayed with an approved selective chemical herbicide before the weeds exceed two (2) inches in height.

Lawns shall be mowed for the first time after establishment of a vigorous, uniform stand of turf has reached three (3) inches. Lawns shall be trimmed at the edges of curbs, walks, paving and other surface improvements. Lawn shall be mowed a second time when it again reaches a three (3) inch height, except that the second cutting shall be performed no sooner than ten (10) days after the first. Mowing shall then take place at maximum one (1) week intervals until final acceptance. After the second mowing, apply the second application of fertilizer. Apply fertilizer (16-6-8) at the rate of five (5) pounds per 1,000-square feet uniformly over the turf area.

8-6 FINAL INSPECTION AND ACCEPTANCE -

A. Final Inspection - Acceptance of the project by the City will be contingent upon proper maintenance and the establishment of a vigorous, uniform stand of turf, healthy plants, weeded site, repair of any damaged surface improvements, repair of any damaged irrigation components and a thorough cleaning of the site. The final inspection will be conducted at the end of the maintenance period. Just prior to final inspection, Contractor shall apply fertilizer (16-6-8) to the areas as follows:

15 g.c. plants	1- cup
5 g.c. plants	½- cup
1 g.c. plants	1/4-cup
Ground cover	10-pounds per 1,000-square feet
Lawn areas	5-pounds per 1,000-square feet

B. Corrective Work -

1. Turf - Any portion of turf which does not show a vigorous, uniform stand shall be replaced and all lawn areas subject to continued maintenance at the Contractor's expense for an additional thirty (30) days.

2. Plants - Plants, which are missing, vandalized, dead or unhealthy, shall be replaced at the Contractor's expense with the same species and sizes as specified on the approved plans. The Contractor shall make replacements within two (2) weeks after final inspection and maintain the plants for an additional thirty (30) days.

3. Irrigation - The irrigation system shall be repaired to conform to the requirements of the approved plans and associated specifications.

C. Acceptance - Once all project improvements, corrective work and maintenance have been completed as specified and to the satisfaction of the City Engineer the City will assume maintenance responsibilities following the final inspection.

8-7 GUARANTEE -

A. Plants - All trees, shrubs, ground covers and other plant materials shall be guaranteed to take root, grow and thrive for a period of one (1) year after final acceptance of the work. Any trees or other plant materials that die or significantly lose the form, appearance or size as specified on the approved plans shall be replaced at the Contractor's expense. Replacements shall be made to the same specifications and materials as required on the approved plans and shall carry this same guarantee from the time they are replaced.

B. Irrigation - The entire sprinkler system shall be unconditionally guaranteed by the Contractor as to material and workmanship, including settling or backfilling areas below grade, for a minimum period of one (1) year following the date of the final acceptance of the work. Any operational difficulties of the sprinkler system shall be immediately corrected by the Contractor to the satisfaction of the City Engineer at no additional cost to the City.

If, during the guarantee period, settlement occurs, the Contractor shall make any necessary adjustments to pipes, valves, sprinkler heads, or sod, including the complete restoration of all damaged plantings or other improvements, at no additional cost to the City.

8-8 IRRIGATION MATERIALS -

A. Electrical -

1. Control Wire - All wiring to be used for connecting the automatic controller to the electric solenoid actuated remote control valve shall be type UF-600V, solid copper, PVC insulation, single conductor, UL approved underground feeder cable.

2. Splice Kits - All pilot or "hot" splicing wire at the valves or in the field shall be made using a 3M DBR Direct Bury Splice Kit #09053, or approved equal. Field splices between the controller and valves will not be allowed without prior approval of the City Engineer.

B. Pull Box Covers - Pull boxes shall have reinforced concrete covers and shall be inscribed "Irrigation 24 Volt". Covers shall be provided with two (2) 3/8-inch brass hold down bolts, with brass washers and nuts. Nuts shall be recessed below the surface of the cover. Pull boxes set in traffic areas shall have steel covers designed to handle vehicle loading.

C. Irrigation Controller - The irrigation system controller shall be a UL approved microprocessor based, solid-state unit capable of fully automatic or manual operation of the system. It shall be housed in an exterior (16 gauge) weatherproof pedestal mounted lodging case. It shall operate on 117 volts AC, 50/60 Hz power input and be capable of operating 24-volt AC electric control valves. In addition, the controller shall be equipped with or shall be capable of the following:

1. Each station shall have the capability of being individually programmed to operate from one minute to nine hours and 59 minutes, in one-minute intervals.

2. It shall have a quick station function that allows for rapid programming of a block of stations with the same watering period.

3. It shall have three independent programs with four automatic starts per day, per program.

4. Each program shall have its own percentage function which allows the watering length of all stations in the program to be changed from 0% to 300% in 1% increments.

5. Each program shall be capable of being set on either a seven day weekly repeat cycle where the active days are displayed all at once, or on a skip day basis where the user may select the number of days skipped between waterings from one to thirty.

6. The controller shall allow for setting in a "rain mode" for up to seven (7) days, after which it will revert to the "automatic mode".

7. Program may be protected by use of an access code.

8. Controller shall be capable of being operated manually at any time without affecting the original program.

9. The controller shall have a rechargeable battery back up to maintain time and the user's program.

10. The controller shall have a built-in self test which allows the user to check each of the following:

a. LED's for lighting and shorts.
b. The digital display for lighting and shorts.
c. Each key of the keyboard for integrity and proper function.

11. The controller shall be housed in a pedestal type enclosure installed on a Class A Portland Cement Concrete foundation. Enclosure shall be a weatherproof, 16-gauge zinc coated metal locking case to which two (2) keys shall be provided. Enclosure shall be grounded with a minimum 6-foot copper clad ground rod. The enclosure and accessories shall be installed in conformance with the manufacturer's instructions and recommendations.

D. Pipes and Fittings -

1. PVC Pipes and Fittings- All irrigation lines shall be brass or PVC, manufactured of Type 1, Grade I or II, 2,000-psi design stress compound designated as PVC 1120 or 1220, and shall conform to ASTM designation D1784 for rigid PVC compounds. All plastic fittings shall be molded Schedule 40 fittings manufactured of the same material as the pipe and shall be suitable for either solvent weld or screwed connections. Solvent weld type couplings and fittings shall have a pressure rating equal to or greater than that of the pipe and shall be a type recommended by the pipe manufacturer.

2. Mains - Irrigation mains shall be 3/4-inch or larger PVC Class 315. All main lines of three (3) inches or larger shall be constructed using gasketed bell joints.

3. Service Laterals - Laterals shall be ½-inch or larger PVC Class 200.

E. PVC Pipe Cements -

1. Primer - For all sizes of PVC pipe and fittings, primer shall be IPS P-70 PVC, Weld On #P-70 Primer, or approved equal.

2. Cement - For all sizes of PVC pipe and fittings, cement shall be IPS 711, Weld On #711 Glue, or approved equal.

F. Sprinkler Heads - All sprinkler heads shall be constructed of plastic or stainless steel and shall be matched precipitation rate (MPR) nozzles equipped with a Seal-A-Matic (SAM) check valve, or approved equal.

All sprinkler heads of a particular type or function in the system shall be of the same manufacturer and shall be marked with the manufacturer's name and identification in such a position that they can be identified without being removed from the system. All tree bubblers shall be placed below grade in perforated pipe with crushed rock and geotex fabric.

G. Sprinkler Risers - All ½-inch riser nipples shall be threaded Schedule 80 PVC and swing joints shall be Schedule 80 PVC threaded street ells. All 1-inch riser assemblies shall consist of swing joints rated at 200-psi, 2-Schedule 80 PVC nipples and 1-Schedule 80 nipples.

H. Valves and Valve Boxes -

1. **Gate Valves** - Gate valves shall be bronze body, bronze mounted, double disc, parallel seat with non-rising stem. Gate valves shall have "O" ring seals and have hubs suitable for use with the main distribution pipe furnished for the sprinkler system.

2. **Quick Coupling Valves** - Quick coupling valves shall be two-piece, 1-inch diameter Rain Bird 44RC with a coupler key, single lug-Rain Bird 44K or approved equal.

3. **Valve Boxes** - Valve boxes shall be plastic with lock snap cover, green, with the word "Irrigation" embossed on the cover. Valve boxes shall be of the Brooks 1100 series, or approved equal. Valve boxes installed below the finish grades shall also include a 3M Marling Ball, or approved equal.

8-9 PLANTING MATERIALS -

A. Backfill - Backfill used in tree and shrub holes shall be a mixture of soil amendment (one-third) and excavated material (two-thirds), thoroughly mixed.

B. Fertilizer - Fertilizer shall be a commercial fertilizer in the granular or pellet form. Fertilizer shall be delivered to the site in containers labeled in accordance with the applicable State of California regulations, bearing the warranty of the producer for the grade furnished, and shall be uniform in composition, dry and free-flowing.

1. **Turf and Planting Areas** - Pelleted types with analysis of 16-6-8.

2. **Planting Holes** - Tablet types with an analysis of 20-10-5, Agriform Blue-Chip Tablets, 21- gram size, or approved equal.

C. Herbicide - A list of approved products include: Surflan, Ronstat G, Ronstat WP, or approved equal.

D. Hydromulch Seeding -

1. **Seed** - As specified on the approved plans.

2. **Fertilizer** - Rate shall be applicable to site and type of seed used.

3. **Cellulose** - The mulch shall be a green colored, fibrous, wood cellulose mulch containing no growth or germination inhibiting factors. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with fertilizer, seed, water, and other approved additives, the fibers in the material will become uniformly suspended to form a homogeneous slurry; and, that when hydraulically sprayed on the ground, the material will form a blotter-like ground cover impregnated uniformly with seed and mulch.

   After application, this mixture will allow for the absorption of moisture and allow the rainfall to percolate to the underlying soil. Cellulose shall be certified to indicate that laboratory and field-

testing of the product has been accomplished and that it meets all of the foregoing requirements. Weight specification of this material from suppliers, and for all applications, shall refer only to air-dry weight of the fiber material. Cellulose rate shall be applicable to site and type of seed used.

4. **Water** - Water for hydromulching shall be clean, potable and added to the slurry mixture in sufficient amount to uniformly spread the required quantity of hydromulch solids (approximately 3,000 gallons per acre).

5. **Equipment** - Hydromulching equipment used for the application of the seed, fertilizer and slurry shall have a built-in agitation system and operating capacity sufficient to agitate, suspend and homogeneously mix a slurry containing up to 40-pounds of fiber, plus a combined total of 70-pounds of fertilizer solids and seed for each 100-gallons of water. The slurry distribution lines shall be large enough to prevent stoppage. This discharge line shall be equipped with a set of hydraulic spray nozzles which will provide a continuous non-fluctuating discharge and delivery of the slurry in the prescribed quantities uniformly, without misses, waste or erosion. The slurry tank shall have a minimum capacity of 1,000-gallons and shall be mounted on a traveling unit which may be either self-propelled or drawn. The City Engineer may authorize equipment with smaller tank capacity provided that the equipment has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat.

E. Imported Topsoil - Topsoil shall be an imported fertile, friable soil of loamy character containing a normal amount of organic matter. It shall be obtained from well-drained, arable land and shall be free from refuse, roots, heavy or stiff clay and stones larger than 1-inch in size. Soil shall, by particle examination, containing the following percentages: Sand-between 45% and 52%; Silt-between 26% and 50%; Clay-between 6% and 26%. Sands shall range from 2 to 0.05 millimeters in diameter; Silt from 0.05 to 0.002 millimeters in diameter; and Clay less than 0.002 millimeters in diameter.

F. Mulch - Mulch shall be a fibrous, woody bark mixture. A list of approved products includes: Sun-Up Forest Products, "Walk-on-Bark", or approved equal.

G. Plant Stock and Ground Cover - Plants shall be the variety, quantity and size indicated on the approved plans. Quality and size shall conform to the State of California Grading Code of Nursery Stock, No. 1 grade. Nursery grown stock only, shall be used and shall be free from insect pests and diseases. All plants shall comply with Federal and State laws requiring inspection for plant diseases and infestations. Inspection certificates required by law shall accompany each shipment of plants, and certificates shall be delivered to the Public Works Department.

Plants shall be healthy, shapely and well rooted, and roots shall show no evidence of having been root bound, restricted or deformed. Root conditions of plants in containers may be inspected by the Public Works Inspector and the City Engineer reserves the right to reject the entire lot or lots of plants containing defective samples.

Plants shall have straight trunks with the leader intact, undamaged and uncut. Trees shall be well tapered in the trunk so that they will stand alone without the support of the nursery stake. Branching on the main leader shall be in alternate locations and well spaced with no severe crossing of branches. All old abrasions and cuts shall be completely calloused over. All plants shall be measured when their branches are in their normal positions. Height and spread dimensions indicated refer to the main body of the plant, and not from branch or root, tip to tip. Plants shall be pruned prior to delivery except upon approval of the City Engineer.

Ground cover shall be rooted plants, grown in flats unless otherwise approved by the City Engineer.

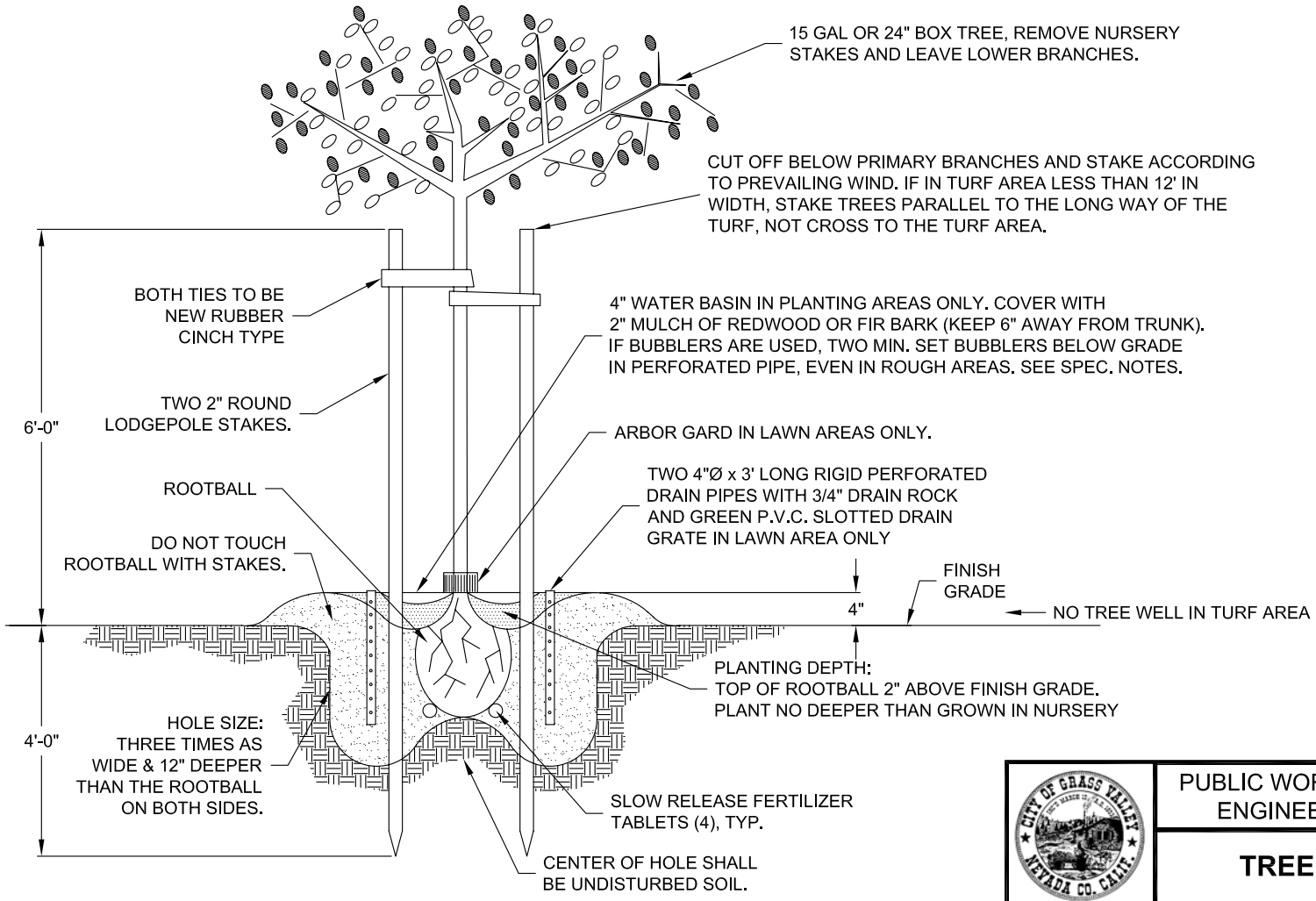
Each plant shall be handled and packed in the approved manner for that species or variety and all necessary precautions shall be taken to ensure that the plants will arrive at the site of the work in the proper condition for successful growth without scarred or broken branches. Trucks used for transporting plants shall be equipped with covers to protect plants from windburn.

Substitutions will not be permitted unless proof is submitted to the City Engineer that any plant specified is not obtainable. The City Engineer will consider on a case by base basis, the use of the nearest equivalent size or variety.

H. Seed - Seed mixture shall be 98% pure, and noxious weed free, with a minimum of 88% Germination. Seed variety or mix shall be as specified on the approved plans. All seed shall be cleaned Grade A "new crop" seed, delivered in the original unopened containers, and shall bear a guaranteed analysis and dealer's label. The dealer may mix the seed provided a guaranteed statement or composition of mixture and percentages of purity, and germination of each variety, is attached to the sealed container. The seed shall be pre-treated with a pre-emergence fungus preventative in accordance with the manufacturer's specifications. The seed containers shall be stored immediately in a dry, weather and damp proof structure. Any seed, which has become wet, moldy or is otherwise damaged in transit or storage, will not be acceptable.

I. Soil Amendment - Soil amendment shall be delivered to the job site bearing the warranty of the producer for the grade furnished and shall be uniform in composition and free flowing. Grade shall be 0 to ¼-inch with 15% maximum proportion of ¼-inch particles. Soil amendment shall be nitrogen stabilized (1-0-0) and shall be Sequia Forest Products' Forest Humas, Mallard Creek Nitro Plus, or approved equal.

J. Tree Stakes - Tree stakes shall be straight, close grained hardwood, and pointed at one end. Stakes shall be pointed prior to treatment with copper naphthalene, which shall penetrate stake surfaces to a minimum depth of ¼-inch. Tree stakes will consist of 2-inch diameter by 8-foot long, round stakes.



PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

TREE PLANTING

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**LSC-1**

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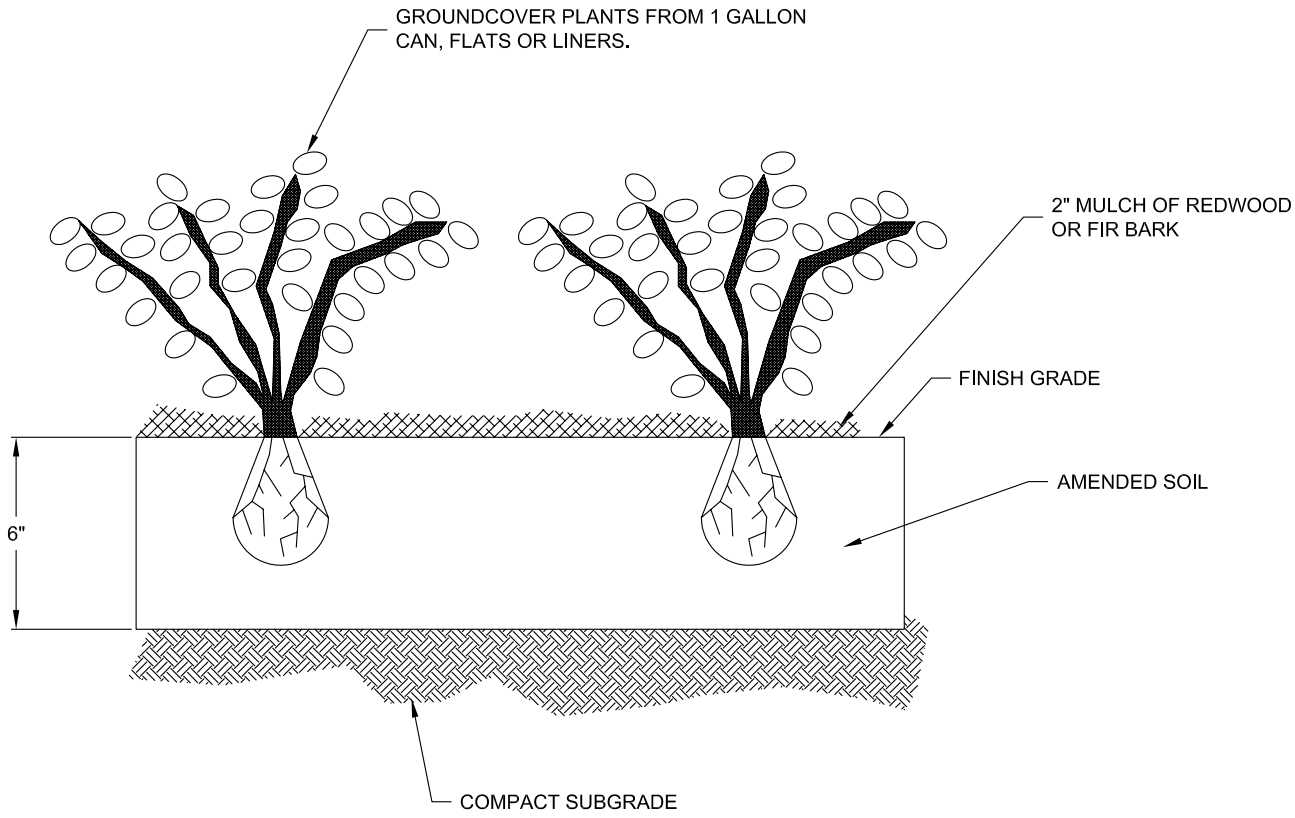

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

GROUND COVER PLANTING

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**LSC-2**

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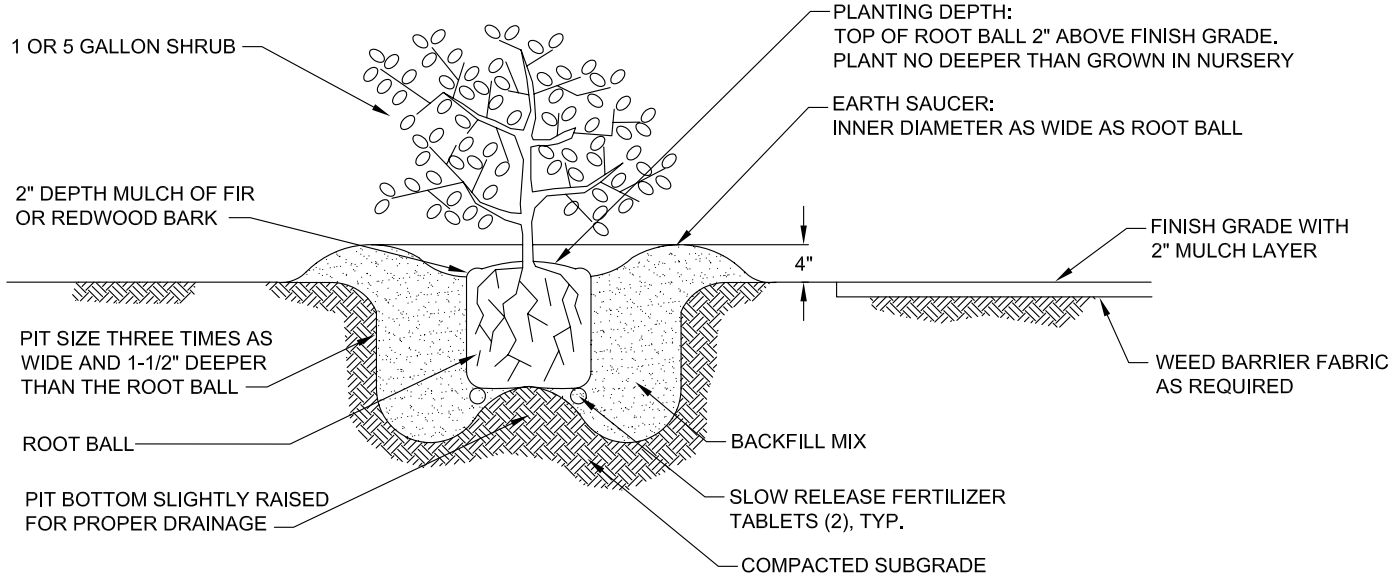

NOTES:

1. PLANTER AREA SHOULD HAVE PRE-EMERGENT HERBICIDE APPLIED BEFORE PLANTING TO PREVENT GERMINATION OF WEED SEEDS.

2. WEED BARRIER FABRIC SHALL BE UTILIZED IN ALL PUBLIC MAINTAINED LANDSCAPE AREAS.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SHRUB PLANTING DETAIL

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**LSC-3**

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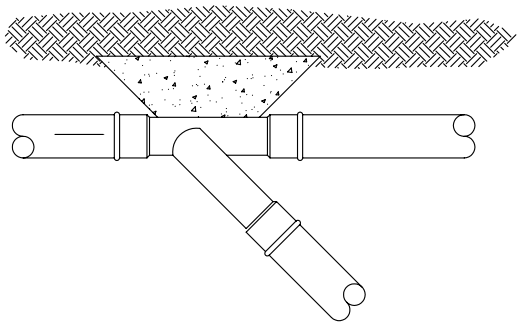

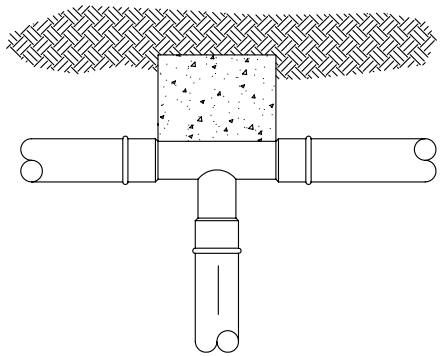

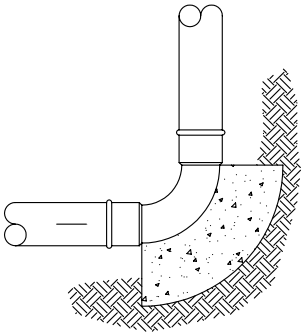

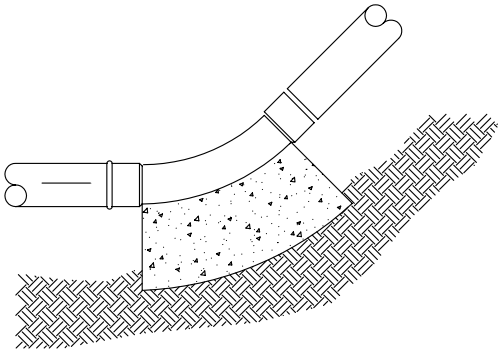

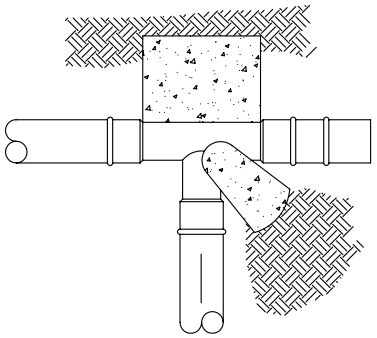

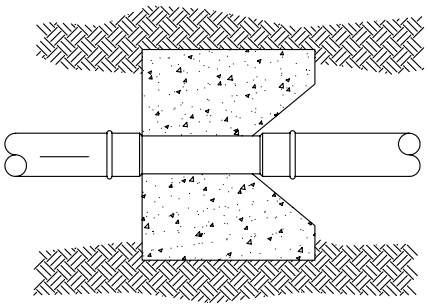

NOTES:

1. DO NOT COVER JOINTS WITH CONCRETE.
2. SIZE THE THRUST BLOCKS AS SPECIFIED BY THE PIPE MANUFACTURER.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

IRRIGATION THRUST BLOCK DETAIL

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**LSC-4**

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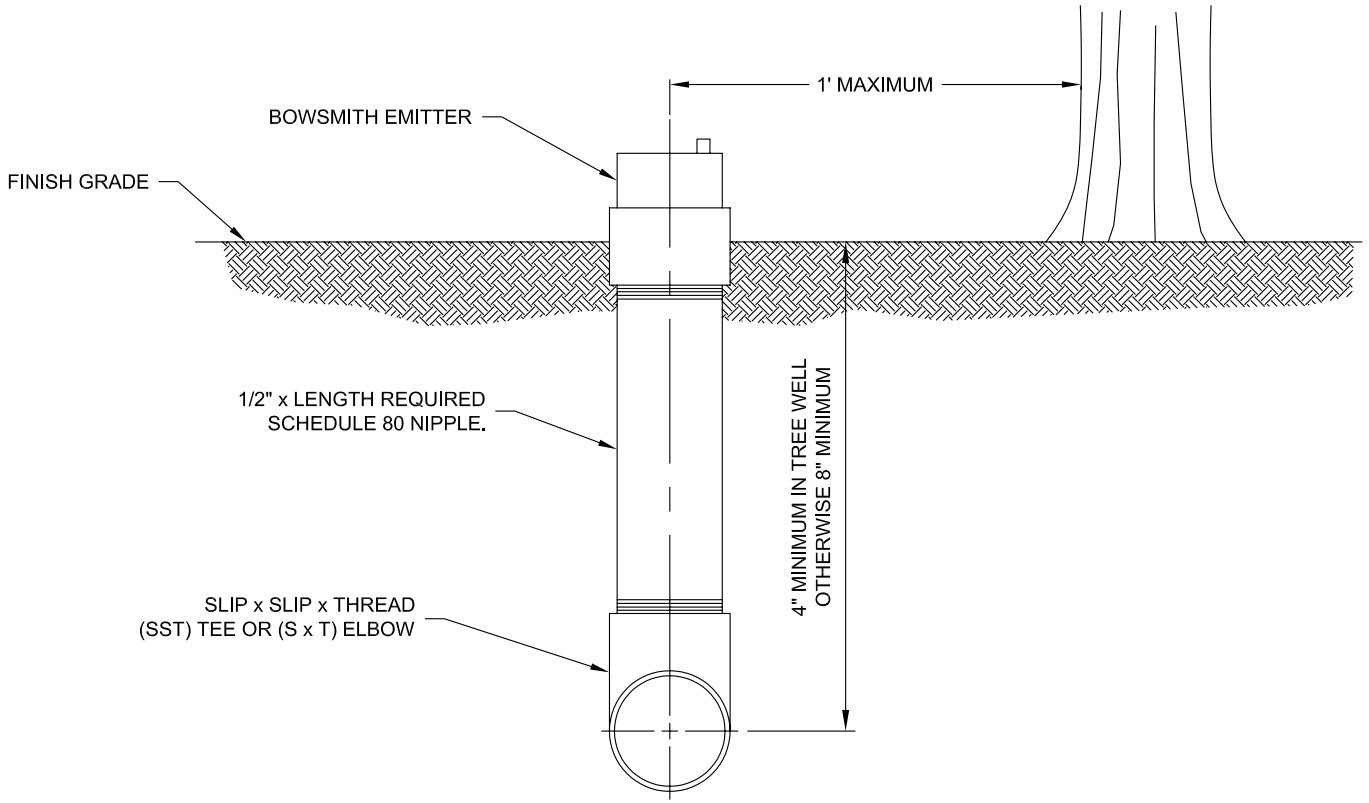

NOTES:

1. LOCATE EMITTER ON UP-HILL SIDE OF THE TREE OR SHRUB.
2. DO NOT TEE STRAIGHT UP OFF LATERAL. TEE HORIZONTAL THEN 90 DEGREES VERTICAL.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

ABOVE GRADE EMITTER

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**LSC-5**

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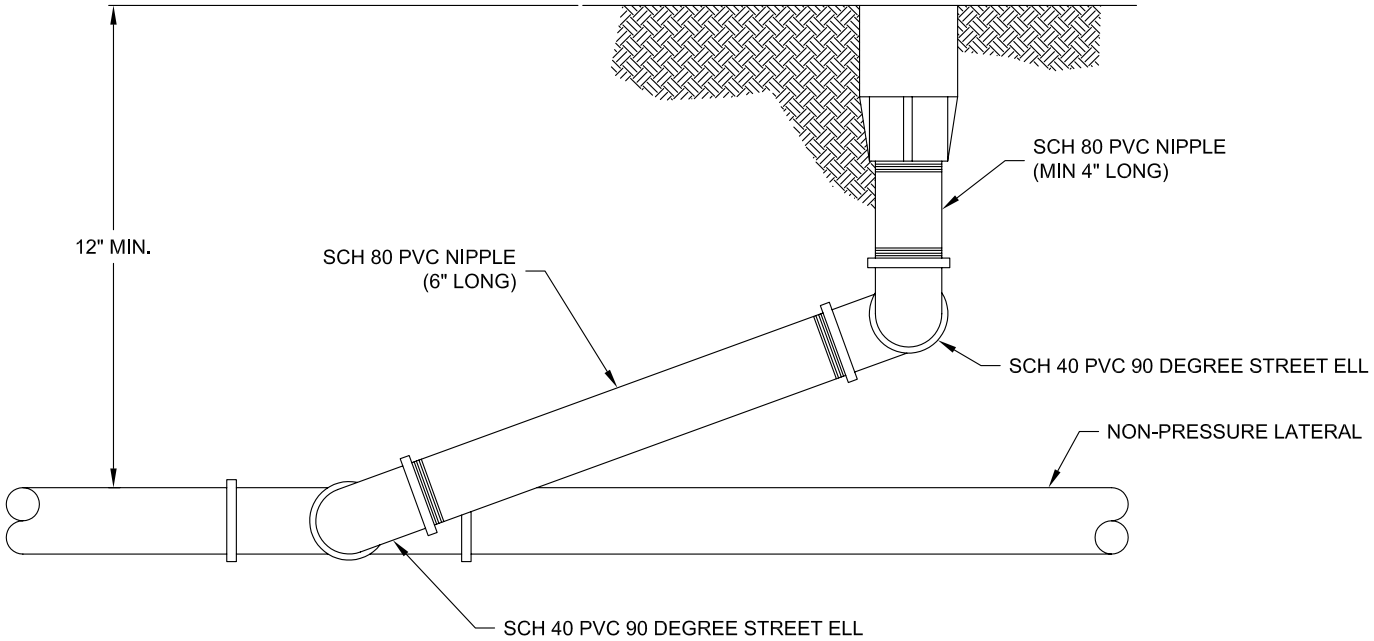

NOTES:

1. LOCATE HEAD 2" FROM WALKS, CURBS, HARDSCAPING, MOW STRIPS, AND HEADER BOARDS.
2. LOCATE STREAM SPRAY/BUBBLERS 6" FROM ALL STRUCTURES, AND SPRAY HEADS 12" FROM ALL STRUCTURES, BUT 6" FROM ALL STRUCTURES IN GROUND COVER AREAS.
3. USE TEFLON TAPE ON ALL THREADED FITTINGS EXCEPT BETWEEN MARLEX FITTINGS.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

POP UP SPRAY HEAD

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**LSC-6**

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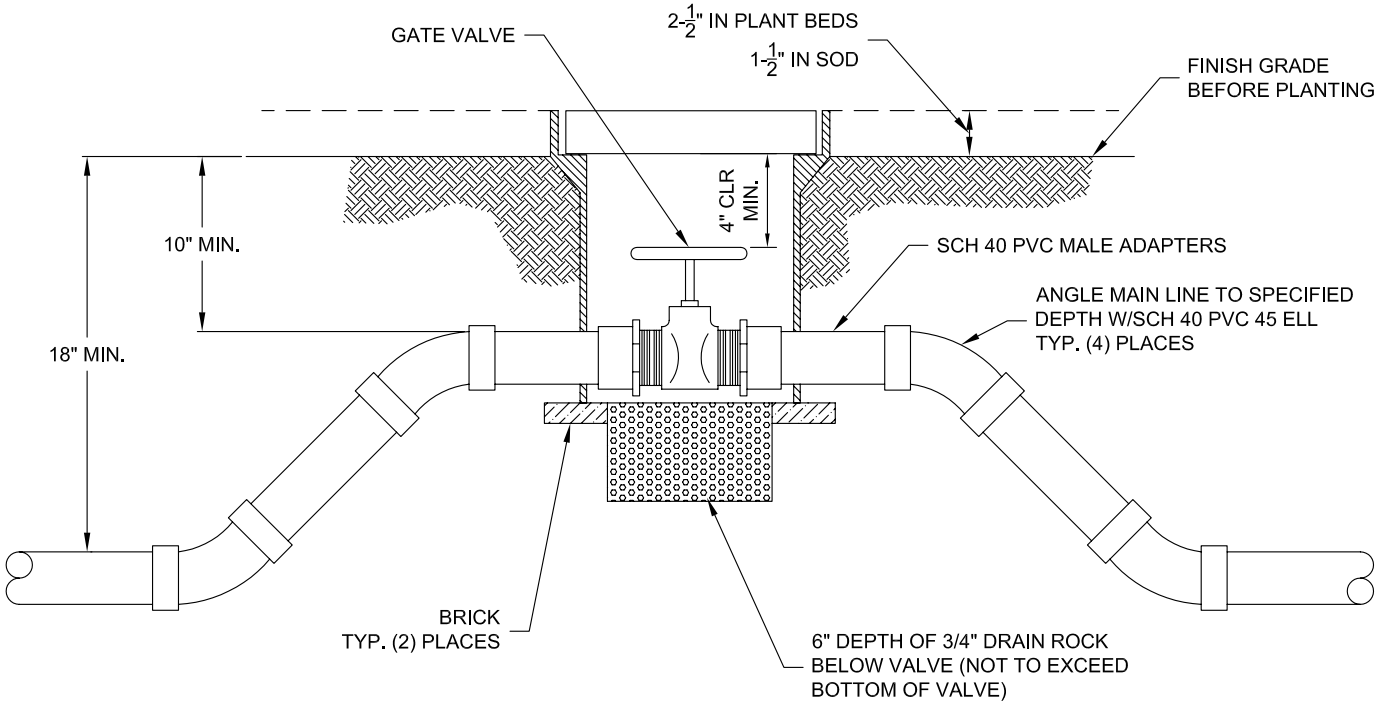

NOTES:

1. PLACE 3/4" DIA. ROCK PRIOR TO INSTALLATION OF VALVE BOX.
2. GATE VALVE AND FITTINGS SHALL BE LINE SIZE UNLESS NOTED OTHERWISE.
3. USE TEFLON TAPE ON ALL THREADED FITTINGS.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

GATE VALVE (3" AND SMALLER)

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	LSC-7

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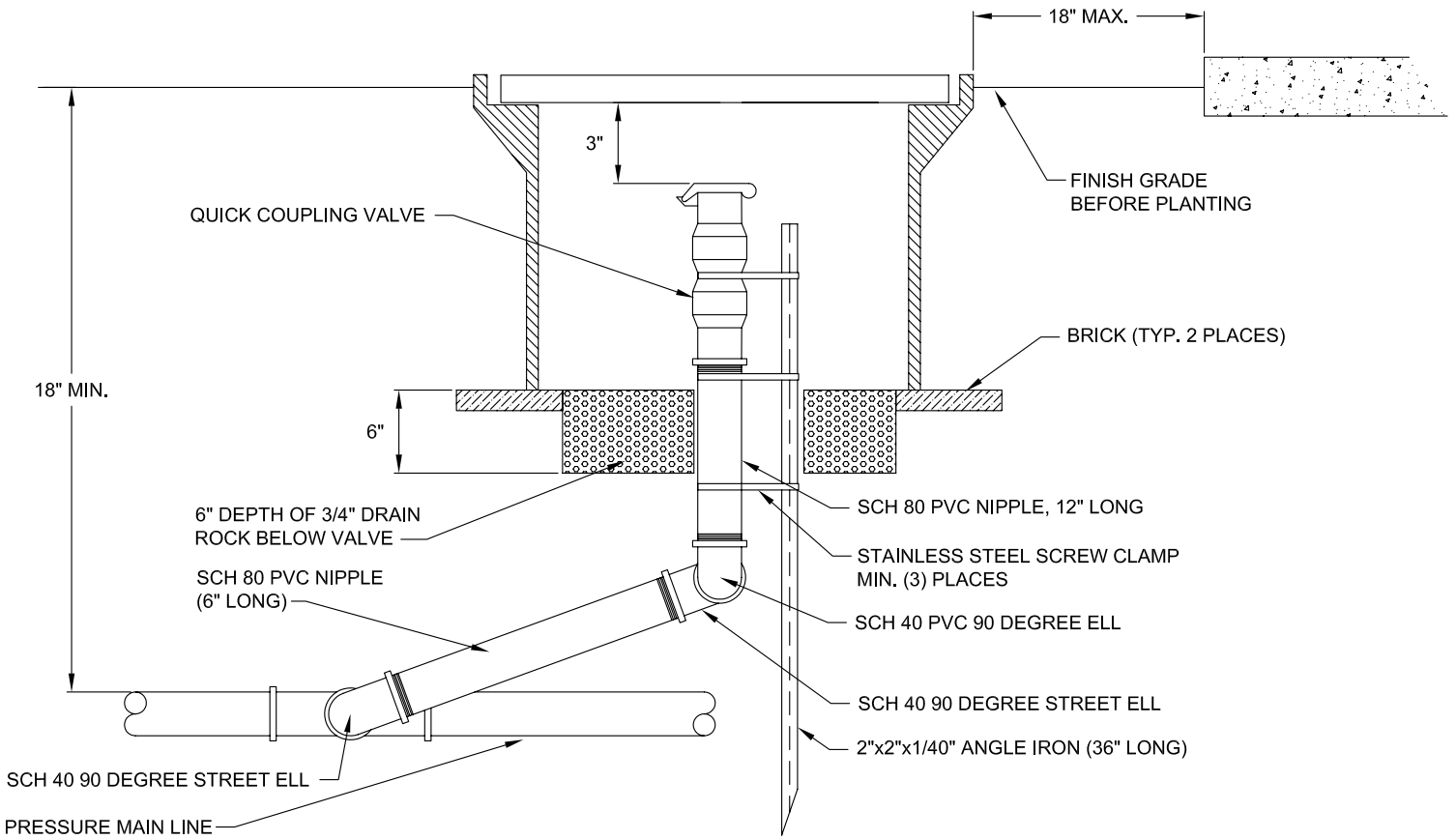

NOTES:

1. USE TEFLON TAPE ON ALL THREADED CONNECTIONS.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

QUICK COUPLING VALVE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	LSC-8

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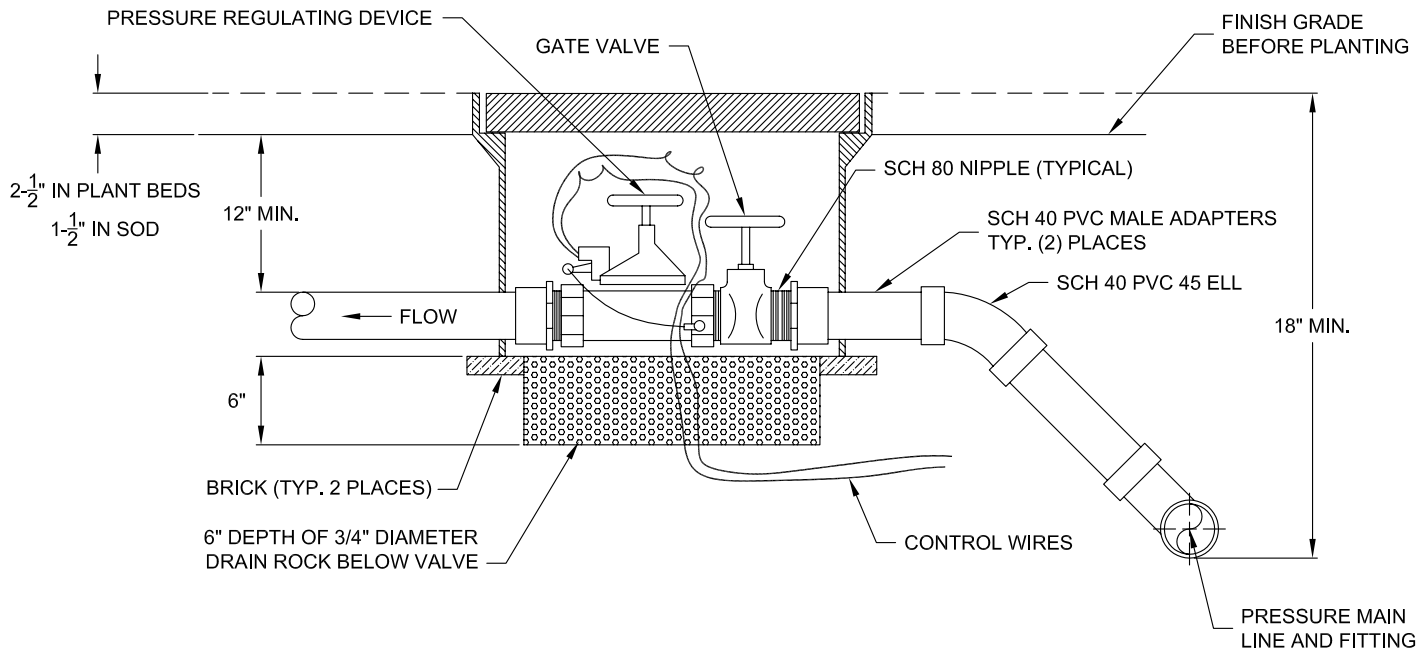

NOTES:

1. INSTALL CONTROL VALVES A MINIMUM OF 12" FROM STRUCTURES OR HARDSCAPING.
2. INSTALL VALVES IN PLANT BEDS WHEREVER POSSIBLE.
3. PLACE VALVE BOX AT RIGHT ANGLES TO STRUCTURES OR HARDSCAPING.
4. USE TEFLON TAPE ON ALL MALE THREADS.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

ELECTRIC CONTROL AND GATE VALVE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	BPJ	MAR 3, 2009	**LSC-9**

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SECTION 9

SIGNALS AND LIGHTING (SG)

9-1 GENERAL - Signals, lighting, and electrical system improvements shall be installed in accordance with the approved project improvement plans, these Construction Standards, the latest edition of Caltrans Standard Specifications, as recommended by the manufacturer and as specified by the City Engineer. These Construction Standards and the manufacturer's guidelines shall be present at the construction site at all times.

All components of signals and street lights shall be powder coated black, where feasible, unless minor modifications are made to existing street lights, where any new components shall be made to match the existing signal or street light.

9-2 FOUNDATIONS - Placement of all foundations shall be verified by the Public Works Inspector prior to installation.

There shall be a minimum 6-inch high curb around the signal controller/service pad, excluding the sidewalk/roadway side of the pad. The minimum curb height shall increase as necessary to ensure no steeper than a 2:1 slope of the native material around the pad.

Signal pole anchor bolts shall be aligned to ensure a maximum mast arm offset of two (2) degrees from perpendicular to the roadway**.**

9-3 STANDARD, STEEL PEDESTAL AND POST - Any 1B standard having a signal head display, four (4) sections or larger, shall be installed under the following criteria:

A. Four Section Displays - 4-section displays will be side (SV-1-T or SV-2-T) mounted and the pole shall be 13 feet in height. A PVC cap shall be provided as a pole cap.

B. Five Section Displays - 5-section displays shall be side (SV-1-T or SV-2-T) mounted and the pole shall be 14 feet in height. A PVC cap shall be provided as a pole cap.

C. Field Welding - Field welding shall not be permitted without the permission of the City Engineer. Only persons certified by the pole manufacturer shall perform any welding on traffic signal or lighting poles in the City's right of way.

D. Future Tenons - All future tenons shall be covered with a plastic cap and a pull wire shall be installed to the tenon.

9-4 CONDUIT MATERIAL - All conduits shall be gray PVC, minimum Schedule 40, two to three inches in diameter.

9-5 CONDUIT INSTALLATION - All trenches in existing streets shall be constructed in accordance with these standards:

A. Depth - All new conduits placed in the roadway, with the exception of the conduit between the detector handhole and the first pull box, shall be buried at a depth of 30-inches below finish grade or 18-inches below finished sub grade.

B. Signal Interconnect - Unless otherwise specified, all signal interconnect shall be installed using 2-inch conduit with 2-foot radius, 90 degree sweeps into number 6 pull boxes. The bell end of the sweep shall be in the pull box.

C. End Sealing - After conductors have been installed, the ends of the conduit shall be sealed with a duct seal type of sealing compound.

D. Trench Width - The trench shall be a maximum of 6-inches wide and 2-inches wider than the outside diameter of the conduit to be installed. There shall be a minimum of 1-inch clearance between the conduit and the trench wall.

E. Trench Backfill - The trench shall be backfilled with class 2 aggregate base or slurry cement backfill per the "Streets" section of these Construction Standards.

9-6 PULL BOXES - All pull boxes shall be installed in accordance with these standards

A. Locations - Pull boxes shall not be placed in an accessible ramp area. The bottom of pull boxes shall be bedded in 6-inches of clean crushed rock. The pull box rim and lid shall be flush with surrounding surface or 1-inch above finish grade in unpaved areas.

B. Conduit - Conduit termination in the pull box shall be a minimum of 2-inches from the sides of the box, 2-inches above the crushed rock, and at least 8-inches below the bottom of the pull box cover. Conduit shall enter and exit the pull box quadrants relative to the direction of the run.

C. Box Type - All pull boxes shall be a minimum of number 5 unless otherwise approved. Pull boxes and covers shall be precast reinforced concrete unless otherwise approved. Covers shall read "TRAFFIC SIGNAL" except pull boxes used solely for traffic signal interconnect which shall read "SIGNAL INTERCONNECT".

D. Abandoned Boxes - All pull boxes to be abandoned shall have conductors removed from the pull boxes and conduits and the pull box shall be removed. The remaining hole shall be backfilled and compacted with similar material as the surrounding material. If within a sidewalk, the entire square of sidewalk shall be removed and replaced.

9-7 CONDUCTORS - Conductor installation in new conduits shall be limited to 26 percent fill of the conduit maximum. Conductors installed in existing conduits shall be limited to 40 percent fill of the conduit maximum.

A. Grounding Conductors - Equipment grounding conductors shall be #8 solid bare copper.

B. Identification - Conductors shall be identified and marked at each terminal point or as directed by the City Engineer. Conductor for each vehicle and pedestrian phase shall be bundled together and banded with plastic tie-wrap labels in all pull boxes and controller cabinet.

C. Signal Interconnect - Signal interconnect cable shall consist of six pairs, number 20 stranded copper conductors. Each pair shall be wrapped with an aluminum polyester shield. No splicing of signal interconnect cable is allowed. Six feet of slack of signal interconnect cable shall be provided at each pull box. Fifty feet of slack shall be provided in the home run pull box.

D. Wiring Installation - Field conductor wiring shall not be doubled up on any single wire connector. For conductor wire sizes larger than number 10, connections shall be spliced by the use of "C" shaped compression connectors as shown in the Standard Plans.

Ends of spare conductors shall be taped and water sealed with Scotch Kote, or approved equal. Grounding conductor splicing shall be water sealed with two (2) applications of Scotch Kote, or approved equal.

9-8 BONDING AND GROUNDING - All signal equipment and electrical systems shall be effectively grounded in accordance with these standards.

A. Grounding Electrodes - Grounding electrodes shall be of copper clad steel rod, not less than 5/8-inch in diameter by 8-feet in length. A grounding electrode shall be installed in all electrical services and controller foundations. They shall be spaced a minimum of 6-feet apart.

The grounding electrode rod in the Controller Assembly shall be paralleled with the grounding electrode rod in the Service. This connection shall consist of a continuous solid #6 bare conductor.

B. Grounding Connections - The ground connection shall be on the line side of the electrical entrance terminal block. A continuous # 6 bare copper conductor shall connect the ground bus in the electrical service, the grounding electrode in the service, the grounding electrode in the controller, and the ground entrance lug in the controller cabinet.

C. Bonding - The equipment bonding conductor for all standards shall be visible and accessible after completion of work.

9-9 TESTING - The contractor shall notify the City Engineer at least five (5) working days prior to installation of a tested controller assembly and/or electrical service.

A. Ground Testing - Before electrical power can be connected, the grounding electrode shall be tested for earth ground resistance. The Contractor shall perform this ground resistance testing in the presence of the Public Works Inspector. The earth ground resistance shall be a maximum of 5-ohms.

B. Functional Testing - Functional testing shall be performed for five (5) working days prior to signal activation. All systems shall be in place before functional testing can begin.

A shutdown of the electrical system resulting from damage caused by public traffic, or from a power interruption, shall not constitute discontinuity of the functional test.

During interconnect cable installation, the Contractor shall, in the presence of the Public Works Inspector, perform a high resistance to ground test, DC resistance test and a dB attenuation loss test. The Contractor shall supply factory specifications prior to the test. The Contractor shall notify the City Engineer at least 48 hours prior to interconnect cable installation.

9-10 EMERGENCY VEHICLE PREEMPTION EQUIPMENT - The Contractor shall supply emergency vehicle preemption equipment for new signal construction as required on the approved plans. Preemption equipment shall be Opticom Priority Control System 722 detectors, Iteris Vantage Edge 2 or approved equals.

A. Existing Signals - Where existing signals are being modified, and said signals are already equipped with emergency vehicle preemption equipment, the Contractor shall perform any necessary remodel and reinstallation of said equipment as required by the plans or as directed by the City Engineer.

B. Labels - Labels shall consist of; banded colored tape visible at the preemption detector, signal standard hand hole, adjacent pull box, and the Controller Cabinet. Cables in the Controller Cabinet shall have tie wrap labels with appropriate phasing descriptions. Preemption cables shall be labeled in the following manner:

1. Phase 2 & 5 - single gray band

2. Phase 4 & 7 - double gray band

3. Phase 1 & 6 - triple gray band

4. Phase 3 & 8 - quadruple gray band

9-11 SIGNAL SECTIONS - Signal sections shall be 12-inch mold-cast aluminum. All signal sections, faces, backplates and components shall be painted black. Signal poles shall be black powder coated.

A. Signal Faces - All signal faces shall be aluminum. Signal faces shall have 12-inch LED displays, unless otherwise specified.

B. Backplates - All vehicle signal sections shall include aluminum backplates with perforated louvers.

C. Front Screen - The front screen shall be plastic.

D. Terminal Compartments - Terminal compartments (TV & SV) and mast arm slip fitters (MAS & MAT) shall be bronze. Where no vehicle or pedestrian display is to be installed on the side of a signal pole, a terminal compartment only shall be installed on the signal pole at the vehicle display position. All signal display wiring from the signal mast arm shall terminate at this location.

E. Extra Support - Extra support shall be incorporated with the use of a SV-3-TA or SV-3-TB display, or if any display on a side mount is larger than a 3-section 12" display. The extra support method shall consist of a 1-inch stand off w/ ¼" X 20 threaded hole. The stand-off shall be banded to the signal standard, 3-inches below the bottom of the top slip fitting of the displays' 1½-inch riser. A ¼-inch hole shall be drilled in the center of the 1½-inch riser to match the position of the thread hole on the stand-off. The riser shall be attached to the standoff with a ¼" X 20 bolt, which shall include a lock washer and flat washer.

F. Sealing - All signal display mounting assembly top members shall be watertight. The watertight sealing method shall be a ½" thick layer of clear silicone around the top jointing member of all displays. Additional sealant shall be installed in the same manner on all plugs installed in the top of any signal display. All MAT and MAS mounts shall be sealed with approved clear silicone around the tenon attachment area, including the through bolt and tenon openings. The sealant shall be 35 year rated. There shall be no substitution for the silicone sealant.

9-12 PEDESTRIAN DISPLAYS AND SIGNALS -

A. Type - All pedestrian displays shall be 16-inch LED countdown type. Pedestrian signals shall be aluminum Type "A" with international symbols.

B. Mounting - Pedestrian heads shall be mounted on the intersection side of the signal pole unless otherwise directed by the Engineer. Pedestrian head mounts shall be clam shell type with bronze mounting hardware. Mounting shall include one Allen head screw for opening and all wiring shall be quick connect type (plug in).

9-13 DETECTION - All signalized intersections shall be provided with thermal or video vehicle detection as determined by the City Engineer. Thermal Detection equipment shall be FLIR FC-T Series. Video detection equipment shall consist of a complete Traficon system, or approved equal.

A. Camera Units - Cameras shall be 1/3-inch Interline Transfer Sony Super HAD CCD type with high sensitivity and 580 TV lines of resolution. The detection needs of the intersection shall determine the total number of cameras required. Cameras shall be pedestal mounted on a manually adjustable swivel head with cable feed through.

B. Detector Boards - Video Image Processor (VIP) detectors shall be provided to monitor all cameras as needed at the intersection. VIP's shall be Type 170 and TS-2 compatible, card rack plug-in modules, capable of monitoring two cameras per unit. The detector shall provide 24 zones per camera and consist of 4-10 detection lines with each zone capable of direction sensitivity. Detector modules shall be PC compatible with graphical software for displaying image requests, freeze frames and for modifying zone layout, and shall be programmable by remote keypad.

C. Video Monitor - Video monitors shall be provided in signal cabinets for displaying camera output and modifying zone layouts and detector settings. The monitor shall be EIA or CCIR Standard (Dual System) with a minimum 9-inch picture display and greater than 1000 TV line horizontal resolution.

9-14 VEHICLE DETECTORS - If vehicle detector loops are permitted they shall be inductive Type "A" loops. The loops nearest the stop bar shall be placed one (1) foot from the stop bar

A. Loop Wire - Vehicle loop wire shall be Type 1, RHW-USE, neoprene-jacketed, cross-linked polyethylene insulated, #12 stranded copper. Lead-in cable shall be Type B copper. Tinned copper shall not be permitted. Lead-in cables shall not be spliced between the termination point (the pull box adjacent to loop detectors) and the controller cabinet terminals. All wires for each detector loop shall terminate in the nearest pull box, not the hand hole.

B. Hand Holes - Detector hand holes shall be Type "B". Hand holes shall be placed so they line up with roadway stripes to minimize the frequency of vehicle tires driving over the hand hole covers. A sufficient number of hand holes shall be placed so that detector loop saw cuts shall not cross adjacent lanes of travel.

C. Verification - The contractor shall give notice to the City Engineer 48 hours prior to saw cutting for loop installation. The Public Works Inspector shall verify all loop locations.

D. New Pavement Installation - Signal loops installed in new pavement shall be placed in the lift of asphalt concrete immediately below the final lift. The bottom lift shall be a minimum of 2-inches thick

where the traffic signal loops will be installed. New loops shall be installed in 1¾" slots cut in the bottom lift.

E. Labels - Labels shall consist of banded colored tape visible in the pull boxes, where the loop wire is spliced to the detector lead-in cable.

1. Loop wires shall be labeled in the following manner:
- **a.** Lane 1 - black
- **b.** Lane 2 - red
- **c.** Lane 3 - blue
- **d.** Lane 4 - white
- **e.** Lane 5 - yellow
- **f.** Right turn lane – orange

2. Loop detectors shall be clearly marked to reference their location in relation to the limit line and lane. The loop closest to the crosswalk in the left most lane, shall be labeled as loop number 1-1. The second loop in the same lane shall be labeled 1-2, and so on.

3. The start and end leads of a loop detector shall be clearly marked by a means of plastic tie wrap labels.

F. Testing - During loop installation, the Contractor shall, in the presence of the Public Work Inspector, perform a high resistance test and an inductive reactance test.

G. Circuitry - Adjacent loops on the same sensor unit channel shall be wound in opposite directions. All loops shall be wound in a manner such that any adjacent loop will be wound in the opposite direction. The loop at the limit line, closest to the center median (lane 1), shall be wound in a clockwise direction. The next loop back in the same lane shall be wound in a counter-clockwise direction and so on. The loop detector in lane 2 closest to the limit line, shall be wound in a counterclockwise direction.

9-15 ACCESSIBLE PEDESTRIAN SIGNALS AND PUSH BUTTON ASSEMBLIES - Pedestrian push buttons shall be Campbell Company AGPS 915 to meet all Americans with Disabilities Act and CA MUTCD guidelines.

A. Pedestrian push buttons shall be within five (5) feet from the edge of the access ramp. They shall be placed 36-inches above the grade of the closest edge of sidewalk and require a horizontal reach of no more than 18-inches outside the closest edge of sidewalk.

B. Wherever a pedestrian push button is attached to a pole, shape the housing to fit the pole curvature and secure using saddles if needed.

C. Wherever a pedestrian push button is mounted on top of 2-1/2-inch-diameter post, fit the housing with a slip fitter and use screws to secure to post.

9-16 EXISTING ELECTRICAL EQUIPMENT - All existing traffic control devices, lighting devices, signs, and equipment to be removed and not reused in the work shall be salvaged, unless otherwise specified or directed by the City Engineer. Salvageable equipment shall remain the property of the City. Equipment determined to be unsalvageable by the City Engineer shall become the property of the Contractor. The Contractor shall deliver salvaged equipment to the City's Corporation Yard or other location as directed by the City Engineer.

Damaged conduits deemed unusable shall be removed from existing pull boxes and the ends plugged solid with grout. Existing conductors shall be removed from said conduits prior to plugging. Contractor shall dispose of said conductors.

Abandoned conduits deemed reusable shall have the line blown out, existing conductors shall be removed, a number 10 green locate wire shall be installed, and the ends of the conduits shall be sealed.

9-17 STREET LIGHT POLES - All street light poles shall be galvanized steel or aluminum, painted black or as shown on the plans. Antique style aluminum poles shall be used in the downtown area or where required by the City Engineer.

A. Galvanized Steel Poles - Type "A" street lights shall use the "A" series poles as shown in the Street Light Pole Details. Galvanizing shall be as provided in the Standard Specifications. Steel poles and arms shall be Ameron Series N-308 with a tapered luminaire arm or equivalent.

B. Aluminum Poles - Antique style aluminum poles shall be Antique Street Lamps number PX/CH16/16/S5/ANBK, with aluminum roadway arm BHC45/1/ANBK, BHC96/2/ANBK or approved equal. Roadway Arms shall be BHC45/1/ANBK for one-way arms and BHC90/2/ANBK for two arms at 180 degrees.

9-18 STREET LIGHT SERVICE - All street light systems shall have underground service provided. Service points shall be provided within a utility easement immediately adjacent to, or within, the right-of-way, and shall be open and easily accessible to the street frontage.

A. Direct Service - A direct underground service consists of one (1) or two (2) lights being served from a single service point. The service point may be in the form of a pull box installed by the developer or a service pedestal provided by the utility district.

B. Multiple Service - Multiple service is three (3) or more lights being served from a single service point. The service point shall be a pull box. Multiple systems shall have a service cabinet normally located adjacent to the service point between the service point and the light system.

9-19 LUMINAIRES - Luminaires shall be LED. Antique, LTL30 octagonal shaped LED lamps shall be used in the downtown area or where required by the City Engineer.

Antique Ordering Information:
LTL30 - K - 32LED 700MA - 4K - ACT - MVOLT - N5 - PEB1 (or PEB2) - ANBK

A. LED Street Luminaires- Luminaires shall be CREE XSP Series LED Street Luminaires:

XSP1 IP66 LED Street Luminaire (Single Module Version A) Part# BXSPA22GA-US
XSP2 LED Street Luminaire (Double Module Version C) Part# BXSP C HT 2ME F 40K-UL SV

B. Photoelectric Controls - Photoelectric controls shall be Type II and shall be pole top mounted.

C. Shielding - Shielding shall be required on the mast arm side of all luminaires installed on same side of the street as residential properties.

9-20 PAINTING - Painting of electrical equipment and materials shall conform to the provisions of the Standard Specifications and these standards.

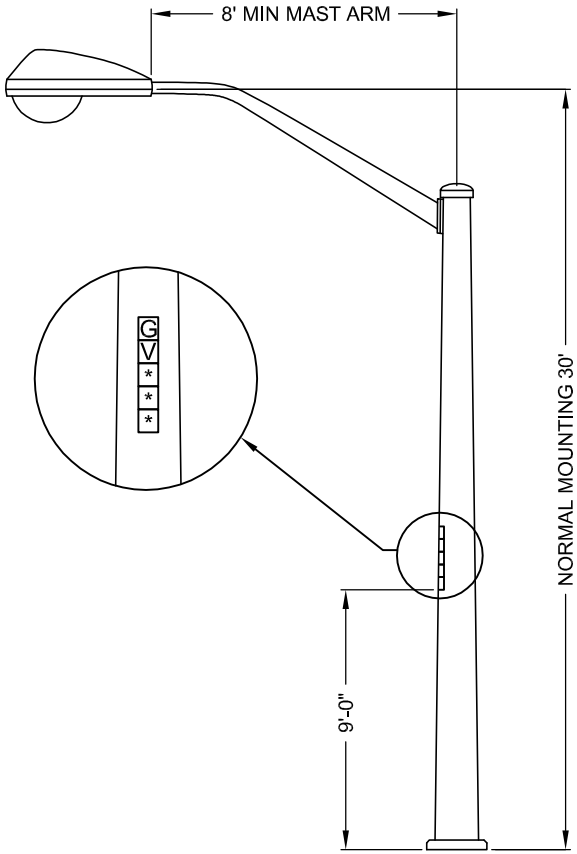
A. Cleaning - All ferrous surfaces to be painted shall be cleaned as provided in the State Standard Specifications prior to applying the vinyl wash primer or prime coat. Blast cleaning of galvanized metal surfaces in good condition, as determined by the City Engineer, will not be permitted.

Existing equipment to be painted in the field shall be washed with a stiff bristle brush using a solution of water containing 2-tablespoonfuls of heavy-duty detergent powder per gallon. After rinsing, all surfaces higher than 8-feet above ground level shall be wire brushed with a coarse, cup shaped, power driven brush to remove all poorly bonded paint, rust scale, corrosion, grease, or dirt. Any dust or residue remaining after wire brushing shall also be removed prior to priming. All surfaces between the ground level and 8-feet in height shall have all paint, rust, scale, corrosion, grease, and dirt removed to bare metal.

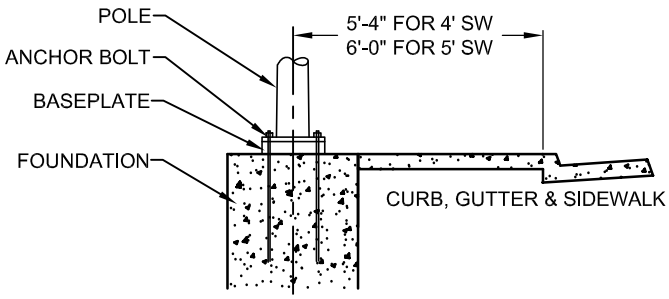
B. Coating - Immediately after cleaning, all bare metal in corrosive atmospheres, all galvanized surfaces, and all nonferrous metal surfaces, shall be coated with Pre-Treatment, Vinyl Wash Primer, followed by two prime coats of Zinc Chromate Primer for metal. Pre-Treatment, Vinyl Wash Primer may be omitted on bare metal surfaces and the prime coats shall be applied immediately after cleaning.

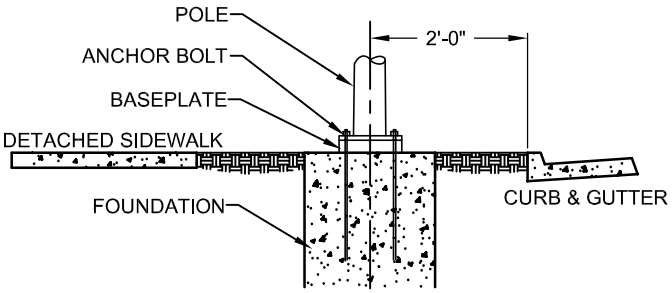
C. Spot Finishing - Equipment previously finished as specified shall be given a spot-finishing coat on newly primed areas, followed by a finishing coat over the entire surface.

D. Painting - All paint coats may be applied either by hand brushing or by approved spraying machine in the hands of skilled operators. The work shall be done in a neat and workmanlike manner. The City Engineer reserves the right to require the use of brushes for the application of paint should the work done by the paint spraying machine prove unsatisfactory.



TYPE "A" STREET LIGHT





NOTES:

1. FOUNDATION AND ANCHOR BOLTS PER APPROVED IMPROVEMENT PLANS.

STREET LIGHT BADGE NUMBER NOTES:

1. STICKERS FACING STREET
2. FONT SIZE : 2"
3. FONT COLOR: BLACK
4. MATERIAL: 3M™ SCOTCHLITE™ REFLECTIVE
5. CONTRACTOR RESPONSIBLE FOR PLACEMENT OF BADGE NUMBERS ON POLE
6. STREET LIGHT NUMBER TO BE ASSIGNED BY CITY

CITY OF GRASS VALLEY NEVADA CO. CALIF.

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

STREET LIGHT POLE

APPROVED BY:

PUBLIC WORKS DIRECTOR / CITY ENGINEER

SCALE:	DRAWN BY:	DATE:	
NONE	EAD	MAY 12, 2016	**SG - 1**

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