CITY OF ROSEVILLE
DESIGN STANDARDS
January 2025

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SECTION 1: PURPOSE AND DEFINITIONS

1-1 PURPOSE

The purpose of City Design Standards is to provide direction in the application of improvements which are to be dedicated to the public and accepted by the City for maintenance or operation, and to provide for coordinated development of those facilities to be used by and for the protection of the public. This includes certain private works, as well as improvements to be installed within existing City right-of-ways and easements. Whereas it is the intent of these Standards to govern all new construction, City staff shall interpret and apply the Standards in a manner which achieves their intent, while encouraging and enabling the redevelopment of infill and vacant parcels especially within the City's Redevelopment Project Area.

These Standards shall apply to, regulate, and guide preparation of traffic impact studies and the design and preparation of plans for construction of streets, highways, alleys, drainage, sewerage, traffic signals, site access, water supply facilities and related public improvements, and shall set guidelines for all private works which involve drainage, grading, trees, and related improvements. The Design Standards have been adopted by the Roseville City Council, and shall be administered by the Development Services, Public Works and Environmental Utility Departments of the City of Roseville.

1-2 DESIGN PRACTICE

Because it is virtually impossible to anticipate all situations that may arise or to prescribe standards applicable to every situation, any items or situations not included in these Design Standards shall be designed in accordance with accepted engineering practice, the City of Roseville Construction Standards, the State of California "Highway Design Manual", the State Standard Plans, the State Standard Specifications, and the "California Manual on Uniform Traffic Control Devices", and as specified by the City Engineer.

The City Engineer may require additional standards and/or regulations not inconsistent herewith when deemed necessary to protect the health, safety, and welfare of the public. Questions regarding the Design Standards should be directed to the appropriate engineering staff of the Development Services, Public Works or Environmental Utilities Departments. The City Engineer, Public Works Director or Environmental Utilities Director shall make all interpretations of the Standards. Appeals to the direction of the City Engineer shall be made to the Development Services Director and the City Council.

1-3 DEFINITIONS

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

A. Applicant: Shall mean the same as the Developer or his Consulting Engineer working on his behalf.

B. Building Division: Shall mean the Building Division of the City of Roseville.

C. Cadastral Surveys: Originating with the Land Ordinance of 1785, cadastral surveys create, define, mark, and re-establish the boundaries and subdivisions of the public lands of the United States. (The word "cadastral" is derived from cadastre, meaning a public record, survey, or map of the value, extent, and ownership of land as a basis of taxation.) These surveys provide public land managers and the public with essential information needed to correctly determine ownership rights and privileges and facilitate good land management decisions.

D. City: Shall mean the City of Roseville and its applicable Departments.

E. City Engineer: Shall mean the City Engineer, Public Works Director, or Environmental Utilities Director of the City of Roseville, or their designees.

F. Community Design Guidelines: Shall mean the latest edition of the "Community Design Guidelines" adopted by the Roseville City Council, as may be supplemented by Design Guidelines for a given Specific Plan Area.

G. Construction Standards: Shall mean the latest edition of the "Design & Construction Standards" adopted by the Roseville City Council and any amendments thereto governing the construction of roads, streets, sanitary sewers, storm drainage, concrete structures, water supply, traffic signals, street lighting and other facilities within the City of Roseville.

H. Consulting Engineer: Shall mean any person or persons, firm, partnerships or corporation legally authorized to practice civil, mechanical, or electrical engineering in the State of California who prepares or submits improvement plans and specifications to the Development Services Department of the City of Roseville for approval.

I. Contractor: Shall mean any person or persons, firm partnership, corporation, or combination thereof, licensed to perform the type of work involved, who has entered into a contract with any person, corporation or company, or his or their legal representatives, for the construction of any improvement or portions of any improvement within the City of Roseville.

J. Department of Environmental Utilities: Shall mean the Department of Environmental Utilities or Environmental Utilities Department of the City of Roseville.

K. Department of Public Works: Shall mean the Department of Public Works or Public Works Department of the City of Roseville.

L. Developer: Shall mean any persons, firm, partnership, corporation, or combination thereof, financially responsible for the work involved.

M. Development: Shall mean the act or process of any construction on properties as well as subdivision improvement.

N. Development Services Department: Shall mean the Development Services Department of the City of Roseville.

O. Engineering Division: Shall mean the Engineering Division of the City of Roseville, Development Services Department.

P. Environmental Utilities Director: Shall mean the Environmental Utilities Director of the City of Roseville acting either directly or through the staff of the appropriate Divisions of the Environmental Utilities Department or their authorized representatives.

Q. Fire Apparatus Access Roads: Shall mean roads, either public or private, which serve to provide direct access to buildings or portions of buildings hereafter constructed. Said roads shall be designed to the minimum requirements of Roseville Fire Code and chapter 5 and these Standards.

R. Fire Department: Shall mean the Fire Department of the City of Roseville.

S. Fire Flow: Shall mean the required flow rate of a water supply, measured at 20 pounds per square inch residual pressure that is available for firefighting. The procedure determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with Roseville Fire Code Appendix III-A.

T. Fire Prevention Standards: Shall mean the latest edition of the "Fire Prevention Standards" enforced by the Fire Department in accordance with the Roseville Fire Code, Section 101.4.

U. Grading Ordinance: Shall mean the "Grading Ordinance" of the Roseville Municipal Code, Chapter 16.20, as adopted by the City Council of the City of Roseville.

V. Improvements: Refers to street work, sidewalk, curb, gutter, driveways, water mains, sanitary sewer, storm drainage, street lighting, traffic signals, public utilities, landscaping, irrigation, parks, fences and other facilities to be constructed or installed by the Developer within an existing or future public right of way or easement and other improvements which the Development Services Department is responsible for performing plan check or inspection.

W. Laboratory: Shall mean any testing agency or testing firm which has been approved by the Department of Public Works or Development Services Department.

X. California MUTCD: Shall mean the "California Manual on Uniform Traffic Control Devices" as adopted by the California Department of Transportation, latest edition.

Y. Soils Reports: Shall mean a report as prepared by any person or persons, firm, partnership, or corporation legally licensed to prepare "Soils Reports" in the State of California.

Z. Standard Drawings: Shall mean the standard drawings as set forth in the Design Standards and Construction Standards as included herein, approved by the City Engineer and as amended.

AA. State: As used in State Specifications shall mean the City of Roseville.

BB. State Highway Design Manual: Shall mean the "Highway Design Manual" of the State of California, Department of Transportation, and latest edition.

CC. State Standard Plans: Shall mean the Standard Plans of the State of California, Department of Transportation, latest edition.

DD. State Standard Specifications: Shall mean the "Standard Specifications" of the State of California, Department of Transportation, and latest edition.

EE. State Traffic Manual: Shall mean the "California Manual on Uniform Traffic Control Devices" of the State of California, Department of Transportation, and latest edition.

FF. Subdivision Ordinance: Shall mean the "Subdivision Ordinance" of the City Municipal Code, Chapter 18, as adopted by the City Council of the City of Roseville.

GG. Traffic Plans (Signal Plans): Shall mean those plans accepted by the City Engineer for the construction of new or for the modification of existing intersection traffic signals.

HH. Water Efficient Landscape Requirements: Shall mean the "Water Efficient Landscape Requirements" of the City Code as adopted by the City Council of the City of Roseville and any amendments thereto.

II. Zoning Ordinance: Shall mean the "Zoning Ordinance" of the City Code as adopted by the City Council of the City of Roseville.

JJ. Trench Cut Ordinance: Shall mean the "Trench Cut Ordinance" of the City Code as adopted by the City Council of the City of Roseville.

SECTION 2: GENERAL REQUIREMENTS

2-1 PLANS BY AN APPROPRIATE ENGINEER

All plans and specifications for improvements, private and public, which are to be accepted for maintenance by the City, and plans and specifications for private on-site drainage, sewer, water, and grading, shall be prepared by an engineer licensed in the State of California, of the appropriate branch of engineering covering the work submitted.

2-1 ACCEPTED PLANS – Complete plans and specifications for all proposed streets, street names, bikeways, grading, drainage facilities, sewerage, traffic signals, water distribution systems, industrial developments, commercial developments, and subdivisions, including any necessary dedications, easements, and rights of entry, shall be electronically submitted to the Development Services Engineering Division for approval. This approval shall be substantiated by the signature of the required City representatives and issuance of a permit and to the beginning of construction of any such improvements. The City Engineer shall order any contractor to cease work on any project if said contractor does not have properly approved plans in possession.

The public roadway infrastructure improvements shall be designed and constructed in accordance with these Design and Construction Standards and the latest edition of the City's Americans with Disabilities Act (ADA) Transitions Plan. Should there be any discrepancy between these Standards and the ADA Transition Plan with respect to accessibility, the ADA Transition Plan shall have precedence.

2-2 REFERENCE TO CITY SPECIFICATIONS AND STANDARDS – The following note shall be included on all Improvement Plans:

> "All construction and materials shall be in accordance with the latest edition and amendments of the City of Roseville Design & Construction Standards."

2-3 WORK IN CITY RIGHT OF WAY AND EASEMENTS – The following shall govern work done within the City right of way and easements:

A. No work shall be performed within the City right of ways and easements without approved plans and/or an encroachment permit issued by the Development Services Engineering Division. All necessary bonds and insurances shall be approved prior to the approval of the plans or the issuance of an encroachment permit.

B. In lieu of obtaining an encroachment permit, work may also be performed under the conditions of a subdivision agreement.

2-4 SUBMISSION OF IMPROVEMENT PLANS – The following are the

procedures and requirements when submitting Improvement Plans to the City of Roseville for review. Incomplete submittals will not be accepted.

Improvement Plans will be accepted only after the following conditions are met:

A. Development Projects – The projects, which have been approved by the appropriate City Commission and are not proceeding under appeal or normal process to the City Council, may be submitted after the meeting of Commission which approved the project and after the Conditions of Approval are available from the Planning Division.

B. Subdivision – Rough Grading Plans or Improvement Plans, and Parcel Maps or Subdivision Maps may be submitted after approval of the Tentative Map by the approving body and after the Conditions of Approval are available.

The Development Services (DS) Engineering Division shall act as the lead agency in the submittal process for Improvement Plans. Upon approval of a Tentative Map, initial submittal packages shall be submitted directly to the DS Engineering Division:

The submittal package shall be electronically submitted as a whole directly to the DS Engineering Division, per the latest edition and amendments of the Electronic Plan Review Document Submittal Requirement Procedures at: https://permitsonline.roseville.ca.us/OPS/

New street names, if any, shall be approved by Development Services Business Services Division. Approved street names shall be shown on the plans and a copy of the Approved Street Name Exhibit will be included no later than the second submittal of improvement plans. Failure to submit the approved Street Name Exhibit by the second submittal may delay final plan approval. The street naming process and Street Name Application may be found at: https://www.roseville.ca.us/government/departments/development_services/addressing___street_names/

Once the submittal has been deemed complete by the DS Engineering Division, the packets will be distributed by the Engineering Division to the appropriate departments. Each department will then review the Improvement Plans and forward comments to the Engineering Division. The time required for each department's review of the plans is dependent on the department's work load at the time of the submittal.

The Developer or his Engineer shall respond directly to the Engineering Division to address each department's comments. The City Engineer will

not accept the plans as complete until all other departments have accepted the plans as complete, and not until this occurs will construction be permitted to begin.

2-5 SUBMISSION OF DEVELOPMENT PLANS – The following are the Engineering Division's requirements for submittal of Development Plans for residential subdivision, commercial, industrial, and multi-family projects. These plans shall be submitted to the Engineering Division at the time the application is made for a construction permit.

A. Apply and upload application packet online any time using the City's Online Permitting Services (OPS) Portal.
https://permitslonline.roseville.ca.us/OPS/

OR

Bring application packet to the Permit Center during normal business hours on CD/DVD or USB drive. Place all files on the root folder, do not use sub-folders.

Each submittal shall include the following:

B. One (1) copy of the Soils Report for the project (see Section 2-10).

C. An itemized Engineer's cost estimate for all improvements to be constructed within public right of ways or easements, or any other improvements for which the Development Services Department provides plan check and inspection services (i.e. grading, water, sewer, and stormwater.) All cost estimates shall include a ten (10) percent contingency. The cost estimate shall also include all public landscaping improvements.

D. Payment of fifty (50) percent of plan check and inspection fee deposit, plus the Technology Fee. Fees are based on the engineer's cost estimate in accordance with the Development Services Department Engineering Division's established fee schedule. The fee schedule may be found at: http://roseville.ca.us/UserFiles/Servers/Server_7964838/File/Government/Departments/Development%20Services/Engineering/Applications%20Forms%20and%20Handouts/Fees/Engineering%20Fees.pdf

E. One (1) copy of the drainage report indicating method of calculation, the Stormwater Quality Design and Maintenance Plan, site water shed map, and the 10 and 100 year storm drain calculations based on Placer County's Storm Drain Manual and the City of Roseville Design and Construction Standards.

F. An electronic copy of the Clerk's Notice of approval for the Use Permit

and list of the Conditions of Approval.

G. An electronic copy of the approved Tentative Map and/or site plan.

H. For projects with a total disturbed area of less than one (1) acre; submit an erosion and sedimentation control plan in accordance with Section 11 of the Design & Construction Standards. In lieu of providing a separate plan, this information may be shown on the improvement plan.

I. For projects with a total disturbed area equal to or greater than one (1) acre; submit the State WDID associated with the project's Storm Water Pollution Prevention Plan (SWPPP). Ensure the WDID status is active and accessible within the State Water Resources Control Board's SMARTS system.

J. An electronic AutoCAD file of the project improvements submitted per the "Digital Submission of Utility Composites".

The initial submittal of the AutoCAD file will occur during the 2nd plan check submittal. The file will be reviewed for content and format. Each subsequent submittal shall include and updated AutoCAD file for review.

The final submittal of the AutoCAD file will occur after the final plan check, prior to DS signing off the approved plans.

Failure to submit the AutoCAD file per the submission document may delay final plan approval.

For tenant improvement projects, plans shall be routed through the Building Division. Any improvements within the public right of way, easements, or any construction that would require temporary placement of equipment or material within the public right of way or easements shall require the Developer or his Contractor to obtain an encroachment permit from the Development Services Department.

2-6 SUBMISSION OF ROUGH GRADING PLANS – Rough grading plans shall be submitted similar to the submission of Development Plans, see Section 2-6 for submittal requirements.

SUBMISSION OF ELECTRICAL DESIGN, LANDSCAPING AND IRRIGATION PLANS –

A. Plans shall be submitted similar to the submission of Development Plans, see Section 2-6 for submittal requirements. Electrical design and landscaping plans shall be submitted with the first submittal of the improvement plans for non-residential projects and shall be submitted

prior to underground only approval for residential projects.

B. The approved electrical design and landscaping plans shall be considered as part of the approved improvement plans and it is the responsibility of the Consulting Engineer to insure that the design of the improvements shown on both plans are consistent and compatible.

2-7 SUBMISSION OF FINAL AND PARCEL MAPS – Final and Parcel maps may be submitted for review upon the approval of the tentative map by the City and only after the Conditions of Approval are available. Maps conditioned to construct improvements requiring civil design cannot be electronically submitted until the improvements plans have been submitted for review.

New street names, if any, shall be approved by Development Services Business Services Division. Approved street names shall be shown on map and a copy of the Approved Street Name Exhibit will be included no later than the second submittal of the Final or Parcel Map. Failure to submit the approved Street Name Exhibit by the second submittal may delay the final plan approval. The street naming process and Street Name Application may be found at:
https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=10388959

Submittal Requirements :

A. An electronic copy of the final or parcel map (with Planning Division's File #)

B. Payment of map checking fees ($2500 + $10/lot for a final map or $1250 + $50/lot for a parcel map unless otherwise specified, plus Technology Fee equal to three (3) percent of the total map checking fee.

C. Boundary, Centerline, and parcel survey closure calculations that include error of closure.

D. An electronic copy of the Planning Division's "Notice of Applicant," list of Conditions of Approval and approved Tentative Map.

E. Preliminary Title Report dated within six months.

F. One (1) AutoCAD file of the parcel or final map submitted per the "Digital Submittal of Cadastral Surveys"

The initial submittal of the AutoCAD file will occur with the 2nd plan

check submittal. The file will be reviewed for content and format. Each subsequent submittal shall include and updated AutoCAD file for review, until such time the file is considered acceptable.

The final submittal of the AutoCAD file will occur immediately following approval of the final or parcel map by the Engineering Division. A .pdf formatted version map shall accompany the AutoCAD electronic copy.

Failure to submit the AutoCAD file per the submission document may delay final map approval.

G. Any additional information/documentation as required by Section 3-6 of the Improvement Standards.

2-8 SOILS REPORTS – An electronic copy of the Soils Reports shall be submitted as specified herein. The analysis shall, as a minimum, include a map of the subject area showing proposed and existing streets, contours and location of type of soils obtained. The results of all field data and laboratory tests shall be included. Design for street sections shall be a part of the report. Street structural section design shall include recommendations for natural sub grade, geotextile fabric, sub base, base and pavement compaction and thickness to achieve design strength. For commercial, industrial and multi-family projects, the report shall contain recommendations for on-site pavement sections. Traffic Index values (TI) shall be in accordance with Section 7-4 and Table 7-2 of these Design & Construction Standards.

2-9 RESUBMITTAL REQUIREMENTS – All resubmittals shall be electronically uploaded directly to the Development Services Engineering Division. All resubmittals shall include the following:

A. Responses to comment sheets; All comments shall be either addressed on the plans along with acknowledgment of the correction, or if a comment is not specifically addressed on the plans, a written explanation shall be provided stating why the comment was not addressed.

B. Any additional materials or documentation as requested in the current plan review comment letter.

C. Any materials which were previously returned to the Consulting Engineer as a result of the plan check.

D. An electronic copy of the latest plan submittal in .pdf format. Each subsequent submittal shall include an updated pdf file for review.

E. One (1) AutoCAD file of the project improvements submitted per the

"Digital Submission of Utility Composites" The file will be reviewed for content and format. Each subsequent submittal shall include an updated AutoCAD file for review.

Plans being resubmitted that contain alterations or revisions other than those required by the City shall require the Consulting Engineer to bring those revisions or alterations to the attention of the City. Failure to do so may cause delays in the review of the plans.

2-10 PLAN CHECK AND INSPECTION FEES – When Improvement Plans are initially submitted to the Development Services Department, Engineering Division for review, an initial plan review and inspection fee deposit is required to initiate City plan review (see Section 2-6.D). Prior to approval of the plans, payment of the remaining balance of the fees shall be made.

For subdivisions and certain site development projects where conditioned, the Developer shall be responsible for payment of actual costs incurred by the City in providing plan check and inspection services, as determined by the City Engineer. Actual costs will be determined prior to acceptance of the improvements by the City Engineer and additional payment by the Developer shall be made if actual costs exceed the deposit, or a refund will be provided by the City if actual costs are less than the deposit. The Developer shall notify the Development Services Engineering Division in writing of any change of billing address.

2-11 PLAN ACCEPTANCE – Acceptance for construction will be given to a plan set after the Consulting Engineer preparing the plans has made the necessary changes, corrections, or additions required by the City, the Owner/Developer has paid the remainder of the total plan check and inspection fee, and posted all required bonds and insurances, and the permit has been issued.

The Consulting Engineer shall deliver to the Development Services Engineering Division a minimum of three) sets of 24 x 36 prints from the accepted plan file for permit issuance prior to scheduling a pre-construction meeting. Additional sets may be required depending on the limits or types of improvements being constructed with the plans.

No plans will be considered approved nor will construction be authorized until the plan set has received the City construction stamp and is accompanied by an appropriate permit.

2-12 EXPIRATION OF PLANS – Every permit issued under the requirements of these Standards shall, at the discretion of the City Engineer, become null

and void if the construction of work authorized by such permit is not commenced within six (6) months from the date of such permit, or if the construction of work authorized by such permit is suspended or abandoned for a period of six (6) months at any time after the work is commenced. At such time, the plans shall be subject to review by City staff to determine conformance with current City Standards.

Plan reviews that remain inactive for six (6) months may be deemed expired by the Engineering Division. A notice letter will be sent to the applicant and owner/developer after six (6) months of inactivity, requesting a status of the project. The project may, at the discretion of the City Engineer, be granted a six (6) month extension or deemed expired. A maximum of one (1) extension may be granted. Any project that was inactive for a twelve (12) month period shall be deemed expired and will need to be resubmitted per Section 2-6.

2-13 IMPROVEMENT PLAN REVISIONS DURING CONSTRUCTION – Should changes to the Improvement Plans become necessary during construction; such changes shall be subject to approval by Development Services Department Engineering Division, or other affected department.

The procedure for obtaining approval shall be as follows:

A. The consulting Engineer shall electronically upload the proposed change(s) with clouded notation or denoted by delta revision symbol(s). The Engineering Division shall route the proposed revision to all applicable City Departments for review.

B. Following review and approval of the proposed change, the Engineering Division, will electronically upload stamped revision for the Consultant Engineer to distribute to the contractor and owner.

After receiving approval, actual revisions shall be made in accordance with the following:

A. The original design shall not be eradicated from the plans but shall be lined out.

B. In the event that eradicating the original design is necessary to maintain clarity of the plans, approval must first be obtained from the Development Services Department, Engineering Division.

C. The changes shall be clearly shown on the plans with the changes and approval noted on a revision signature block.

D. The changes shall be identified by the revision number in a triangle

delineated on the plans adjacent to the change and on the revision signature block.

Minor changes during construction which do not affect the basic design of the improvements may be made upon authorization of the Development Services, Engineering Division without formally revising the plans. These changes shall appear in the record drawings.

The City Engineer may order changes in the plans in order to complete the necessary facilities or to conform to these Design & Construction Standards or accepted engineering standards. The procedure for making changes in the plans ordered by the City Engineer shall conform to the above outlined procedure and standards.

2-14 RECORD (AS-BUILT) PLANS – The Contractor/Developer shall keep an accurate record of all approved deviations from the plans and shall provide a .pdf electronic file, full size, and 11 x 17 bond copies of the as-built plans prior to final acceptance of the completed improvements. Each sheet of the plans shall be marked "AS-BUILT" or "RECORD DRAWING." "As-Built" or "Record Drawings" of signal plans, water, sewer and storm drain composite in plan view only, and parcel and final maps shall also be submitted in AutoCAD format.

2-15 CONFLICT, ERRORS, AND OMISSIONS – Excepted from approval are any features of the plans that are contrary to, in conflict with, or do not conform to these Design & Construction Standards, any California State Law, City Ordinance or Resolution, conditions of approval, or generally accepted good engineering practice, in keeping with the standards of the profession, even though such errors, omissions or conflicts may have been overlooked in the Development Services Engineering Division's review of the plans. The responsibility of accurate plans which provide for a safe and proper design rests with the Consulting Engineer, not the City.

2-16 CHANGE IN CONSULTING ENGINEER – If the developer elects to have a registered Civil Engineer or Licensed Surveyor other than the engineer who prepared the plans provide the construction staking, the Developer shall provide the City Engineer, in writing, the name of the individual or firm one week prior to the staking of the project for construction. The Developer shall then be responsible for providing all necessary construction documents, the preparation of revised plans for construction changes, and the preparation of "as-built" plans upon completion of the construction.

In the Developer's notification of change in the firm providing construction staking, the Developer shall acknowledge that he/she accepts responsibility for design changes and "as-built" information as noted above.

2-17 OTHER AGENCY NOTIFICATION – The Owner/Developer is responsible for obtaining required approvals and permits from all other governmental agencies, as required, prior to issuance of any City permits.

2-18 INSPECTION REQUIREMENTS – Any improvement constructed in conformance with these Design & Construction Standards for which the City is intended to assume maintenance responsibility, shall be inspected during construction by the City Engineer. Each phase of construction shall be inspected and approved prior to proceeding to subsequent phases. Private on-site grading and drainage shall also be inspected during construction by the City Engineer. Requests for inspections shall be given 48 hours in advance.

Any improvement constructed without inspection as provided above or constructed contrary to the order or instructions of the City Engineer will be deemed as not complying with the Design & Construction Standards and will not be accepted by the City for maintenance purposes. The Contractor shall then notify the City Engineer prior to staking.

2-19 FINAL INSPECTION – Upon completion of any improvements which are constructed in conformance with these Design & Construction Standards and prior to requesting final inspection, the area shall be thoroughly cleaned of all rubbish, excess material and equipment, and all portions of the work shall be left in a neat and orderly condition satisfactory to the City Engineer.

Within ten (10) days after receiving the request for final inspection, the City Engineer shall inspect the work. The Contractor will be notified in writing as to any particular defects or deficiencies to be remedied. The Contractor shall proceed to correct any such defects or deficiencies at the earliest possible date. At such time as the work has been completed, a second inspection shall be made by the City Engineer to determine if the previously mentioned defects have been repaired, altered, and completed in accordance with the Design & Construction Standards. At such time as the City Engineer approves the work, a recommendation will be made to the City Council for final acceptance.

On assessment districts and projects where the City of Roseville participates in the costs thereof, quantities will be measured in the presence of the City Engineer, and Contractor and witnessed accordingly.

2-20 ACCEPTANCE OF IMPROVEMENTS – No improvements will be accepted by the City until all improvements required of the subdivision or development project have been completed and approved by the City Engineer. Acceptance of improvements associated with a subdivision will be signified by notification, in writing, from the City Engineer. Acceptance of all other improvements will be signified by completion of work of the

encroachment or improvement permit by the City Engineer.

Prior to acceptance of improvements required of subdivisions and the approval of occupancy of buildings associated with site development for commercial, industrial, or multi-family dwellings, the Consulting Engineer shall certify, in writing, that all on-site grading was performed in accordance with the approved grading plan, including minimum pad elevations. Also required prior to acceptance of subdivision improvements are letters from each utility company indicating that all required utility work has been completed to the satisfaction of the company.

2-21 SPECIAL NOTICES AND PERMITS – The Consulting Engineer shall be responsible for advising the contractor to give the following notices and have in his possession the following permits and plans:

A. Contractor shall be in receipt of official City approved plans prior to construction.

B. Contractor shall notify the Development Services Department and all utility companies involved in the development at least 48 hours prior to beginning of work.

C. Contractor shall notify "Underground Service Alert" and have construction area marked at least 2 working days prior to any digging.

D. Contractor shall be responsible for the protection of all existing monuments and/or survey monuments.

E. Contractor shall be responsible for conducting his operation entirely outside of any prohibited area. These areas shall be clearly delineated in the field prior to construction.

F. Contractor shall provide copies of any and all required EIR mitigation studies or reports prior to construction.

2-22 GRADING PERMITS, ENCROACHMENT PERMITS, IMPROVEMENT PERMITS, AND SUBDIVISION AGREEMENTS – No work of any type shall be performed within the City right-of-ways or easements without approved plans and an encroachment permit, improvement permit or subdivision agreement. The certificate of insurance and all necessary bonds shall be posted and approved prior to approval of the plans and the issuance of any permits. This section contains the City's requirements for each of these permits.

A. Grading Permits – The City Grading Ordinance requires that a grading permit be obtained from the City prior to beginning any grading

activities greater than the movement of 50 cubic yards of material or as otherwise exempt as specified in the Grading Ordinance. See Section 2-7 for plan submittal requirements. NOTE: Unless prohibited by a condition of approval, a developer may obtain a grading permit to rough grade the project site prior to obtaining approval of the project's civil improvement plans. In the event the plans show work on private property not owned by the developer, the developer shall submit to the Engineering Division a notarized right-of-entry from the owner of said property prior to plan approval.

1. **Fees** – For the most current fee schedule, please visit the City of Roseville website at: http://roseville.ca.us/UserFiles/Servers/Server_7964838/File/Government/Departments/Development%20Services/Engineering/Applications%20Forms%20and%20Handouts/Fees/Engineering%20Fees.pdf

2. **Bond** – A grading performance bond shall be submitted for all activities requiring a grading permit. The amount of the bond shall be equivalent to 10 percent of the valuation of the grading and erosion and sediment control measures. Minimum bond amount shall be $500.00. A cost estimate shall be provided to the Engineering Division for review and approval as part of plan submittal.

3. **Insurance** – Insurance is not required where the proposed grading is not within existing City right-of-ways and easements. Where grading is proposed within City right-of-ways and easements an encroachment permit shall be issued concurrently with the grading permit. See "B" below for information regarding encroachment permit requirements.

4. **Release of Bond** – The bond shall be released immediately following completion of the grading permit to the satisfaction of the City.

B. Encroachment Permit – An encroachment permit is required for any work performed within the City's right-of-ways and/or public easements.

1. **Fees** – Plan review and inspection fees (combined into one fee) for Encroachment permits are based on the value of the public improvements to be constructed within existing and proposed City right-of-ways and easements. A cost estimate for the improvements, including construction staking, shall be provided to the Engineering Division for review and approval. All cost estimates

shall include a 10 percent contingency. The fee schedule shall be as adopted by City Council resolution. Contact the Engineering Division for the current schedule in effect. Where grading is proposed in conjunction with the improvements a grading permit shall be issued concurrently with the encroachment permit. See "A" above for information regarding grading permits. A Technology Fee of three (3) percent shall be applied to all plan review and inspection fee deposits. Trench Cut Recovery Fees as specified in the Trench Cut Ordinance will be collected for all utility cuts into existing streets as specified in the Ordinance. Trench Cut Recovery Fees are based upon the extent of trenching proposed and present condition of the street's pavement prior to trenching. Fees will be calculated prior to issuance of an encroachment permit by the Engineering Division.

2. **Bond** – An encroachment permit faithful performance bond shall be submitted prior to the issuance of an encroachment permit. The bond shall be equal to 100 percent of the value of the improvements in the existing city right-of-ways and easements. Those improvements to be constructed within future City right-of-ways and easements are not required to be bonded for under an encroachment permit. A cost estimate for the improvements, including any required construction staking, shall be provided to the Engineering Division for review and approval. All costs shall include a 10 percent contingency. A bond shall be approved by the City Attorney prior to issuance of the Encroachment Permit.

3. **Insurance** – A Certificate of Insurance evidencing certain insurance coverage is required for all work within City right-of-ways and easements. Contact the Risk Management Department for information regarding minimum insurance coverage requirements.

4. **Release of Bond** – The encroachment permit faithful performance bond shall be released 180 days (six months) after all conditions of the encroachment permit have been completed to the satisfaction of the City or projects valued less than $25,000. For projects valued greater than $25,000, as determined by the City Engineer, the warranty period shall be 365 days (one year). In the case of subdivision improvements being constructed under an encroachment permit, the encroachment permit faithful performance bond shall be released as specified above unless, prior to the completion of the improvements, a subdivision agreement is executed for the improvements. In such case, the encroachment permit faithful performance bond shall be released immediately following execution of the subdivision agreement.

C. Improvement Permits – An improvement permit is required for the approval of improvement plans and the commencement of construction on a development project. This permit covers all construction activity, including grading and encroachment, and has the same bond and insurance requirements as a grading and encroachment permit as listed in Sections 2-24.A and 2-24.B. See Sections 2-5 and/or 2-6 for plan submittal requirements. In lieu of an improvement permit, work may also be performed under the conditions of a subdivision agreement. See Section 2-24.D below for information regarding subdivision agreements.

1. **Fees** – Plan review and inspection fees (combined into one fee) for improvement permits are based on five (5) percent of the value of the engineer's cost estimate for all proposed improvements. A cost estimate for the improvements, including construction staking, shall be provided to the engineering division for review, approval. All cost estimates shall include a ten (10) percent contingency. A Technology Fee of three (3) percent of the calculated plan review and inspection fee shall be applied to all plan review and inspection fee deposits. Trench Cut Recovery Fees as specified in the Trench Cut Ordinance will be collected for all utility cuts into existing streets as specified in the Ordinance. Trench Cut Recovery Fees are based upon the extent of trenching proposed and present condition of the street's pavement prior to trenching and are separate from the plan review, inspection, and technology fees. Fees will be calculated prior to issuance of an improvement permit by the Engineering Division.

2. **Subdivision Maintenance Agreement Required** – Where all improvements required of a subdivision are completed under an encroachment permit prior to final map approval, a one year subdivision maintenance bond equal to ten (10) percent of the valuation of the public improvements shall be posted with and for the duration of the one year Subdivision Maintenance Agreement prior to recordation of the final map and acceptance of the improvements as complete. In such cases, the developer shall provide written proof that his/her contractors and suppliers have been paid.

D. Subdivision Agreement – In lieu of constructing public improvements under an improvement permit, the work may be performed under the conditions of a subdivision agreement.

1. **Final or parcel map – The final or parcel map of the project shall be approved by the Engineering Division**

prior to entering into a Subdivision Agreement.

2. **Fees** – Plan review and inspection fees (combined into one fee) shall be paid prior to execution of the subdivision agreement or approval of the improvement plans. Said fees are based on the value of the public improvements to be constructed within existing and proposed City right-of-ways and easements. A cost estimate for the improvements, including any required construction staking, monumentation and landscaping shall be provided to the Engineering Division for review and approval. All cost estimates shall include a ten (10) percent contingency. The fee schedule shall be as adopted by City Council resolution. Contact the Engineering Division for the current schedule in effect.

3. **Bonds** – A subdivision payment bond, and subdivision faithful performance bond, and subdivision maintenance bond shall be submitted prior to execution of the subdivision agreement. The payment and performance bond amounts shall each be equal to one hundred (100) percent of the total cost of said public improvements within existing and future public right-of-ways and easements. A subdivision maintenance bond shall be submitted prior to the Notice of Completion being filed for the subdivision. The maintenance bond shall be equal to ten (10) percent of the total cost of said public improvements. A cost estimate for the improvements shall be provided to the Engineering Division for review and approval. All cost estimates shall include construction staking and a ten (10) percent contingency. All three (3) bonds require approval by the City Attorney.

4. **Insurance** – A Certificate of Insurance evidencing certain insurance coverage is required for all subdivision agreements. Contact the **City Risk Management Division** for information regarding minimum insurance coverage requirements.

5. **Release of Bonds** – Both the subdivision payment bond and faithful performance bonds shall be released at such time as all conditions of approval for the subdivision have been completed to the satisfaction of the City and a Notice of Completion filed for the subdivision improvements. Then maintenance bond shall remain in place for a period of one year subsequent to the notice of completion.

2-23 SUBMISSION OF LOT LINE ADJUSTMENTS – The following shall be submitted to the Engineering Division prior to recordation of a lot line adjustment:

A. An electronic copy of the property boundary description with an exhibit

map. These sheets must have at least a ½ inch margin along all sides to meet the conditions of the County Recorder's Office.

B. One (1) AutoCAD file of the property boundary description per the "Digital Submittal of Cadastral Surveys".

C. An electronic copy of the boundary survey closure calculations for the resulting lots. These items shall be stamped and signed by a California Licensed Land Surveyor or Registered Civil Engineer authorized to practice land surveying.

D. A completed Owner Consent Form. Forms are available on the City of Roseville's website: https://www.roseville.ca.us/UserFiles/Servers/Server_7964838/File/Government/Departments/Development%20Services/Engineering/Applications%20Forms%20and%20Handouts/Forms/Lot%20Line%20Adjustment%20Owner%20Consent%20Form.pdf

E. Deed(s) to convey interest in the affected properties.

F. Preliminary title report no older than six (6) months for all properties involved.

G. One (1) copy of the Conditions of Approval.

2-24 SUBMISSION OF DEDICATION BY SEPARATE INSTRUMENT – All easements dedicated by separate instrument shall conform to the requirements outlined in the "Policy and Procedure for Processing Grant of Easements through the City of Roseville." A copy of this document is contained within the easement package which is available at the Engineering, Electric, and Environmental Utilities department counters. The easement package contains the following:

A. The Policy and Procedure for Processing Grant of Easements through the City of Roseville.

B. Easement Review Application form.

C. A standard Grant of Easement form with notary acknowledgement.

D. Subordination Agreement.

The completed application form with the required documents shall be submitted for review to the City Department that requested the easement. If errors, corrections, or questions arise, the applicant or the applicant's engineer shall resolve them. Once all concerns or questions have been

resolved the entire easement package will be forwarded to the City Attorney for review and approval.

After the City Attorney has approved the easement package, a resolution accepting the grant of easement will be prepared and all documents will be forwarded to the Placer County Recorder for recording until conforming copy containing the recording information is returned by the County Recorder to the City Clerk's Office, the City has no authority to proceed with construction or entry on the area being granted.

2-25 BRIDGES AND OTHER STRUCTURAL ITEMS – The following is the City's procedure for plan checking and construction inspecting of structural items such as bridges, retaining walls, non-standard culverts, etc.

A. Private Improvements – Where structural items are to be constructed on private property which is intended to remain privately owned, the design engineer shall submit a letter along with the plan submittal which certifies that the item has been designed in accordance with accepted engineering practice. Said letter shall be wet stamped with the design engineer's RCE stamp and wet signed by the design engineer. The City will not plan check the design of the item as related to structural integrity. The responsibility for ensuring said integrity rests with the design engineer.

For inspection of private structural items, the design engineer shall submit a letter to the Engineering Division certifying that the item has been constructed in accordance with accepted test methods. Said letter shall be wet stamped with the design engineer's RCE stamp and wet signed by the design engineer. It shall be the Developer's responsibility to make arrangements, as necessary, with the design engineer to enable said engineer to provide said letter as described above. The City will not inspect the construction of the item as related to structural integrity. The responsibility for ensuring said integrity rests with the design engineer.

NOTE: The above is not to be confused with private on-site retaining walls, buildings, etc., as these items require a building permit and therefore are plan checked and inspected by the Building Division. the structural items addressed in this section primarily pertain to improvements associated with private roadways.

B. Public Improvements – Where structural roadway items are to be constructed on public property, public right-of-way, or on private property which is intended to become public property or right-of-way, improvement plans shall be submitted to the Engineering Division for plan check along with the roadway improvement plans. The City will forward plans of the structural roadway item to the City's consultant for

plan checking. The consultant's comments will be forwarded to the City for incorporation with City comments to the design engineer.

For inspection of public structural roadway items, the Engineering Division will provide inspection services similar to typical roadway inspection which may include retaining a consultant for inspection services.

2-26 DEVIATION FROM STANDARDS – All requests for approval of exceptions from the design requirements contained within these Design Standards shall be submitted in writing to the Engineering Division. Approval for exceptions shall be sought as early as possible in the project development process, particularly where the project concept and/or cost estimate depend on the proposed design exceptions.

Requests for design exceptions shall include the following:

1. A statement of the specific standard for which a design exception is requested.

2. A thorough but brief description of the reason for the request for the design exception.

3. A description of any non-standard safety enhancements to be provided such as median barriers, guardrail updates, etc.

4. An estimate of the additional cost required to conform to these Design Standards.

The approval of all deviations from these standards shall be by the City Engineer.

SECTION 3: PLAN SHEET REQUIREMENTS

3-1 GENERAL

Public Improvement Plans shall be prepared for public improvements required of subdivisions and all other work performed within City right-of-ways or easements that is in excess of minor work. For the purposes of this section, minor work shall consist generally of the construction, or the removal and replacement of curbs, gutters, sidewalks or driveways, minor street widening, connections to existing water, sewer or storm drainage facilities adjacent to site development and utility related work.

The following requirements apply to the form of Public Improvement Plans:

3-2 PLAN AND PROFILE SHEETS

All improvement plans shall be clearly and legibly drawn in ink on engineering mylar, or approved equal, 24 inches by 36 inches in dimension ("D" size). Sheets shall have a 1 1/2 inch wide clear margin at the left edge and a 1 inch wide margin on all other edges, or as otherwise approved by the City Engineer.

A. Drafting Standards: All line work shall be neat, clearly legible, and opaque to light. Letters and numerals shall have a minimum height of 1/8 inch and be well formed and sharp. Numerals showing profile elevations shall not be bisected by station grid lines. Dimension lines shall be terminated by sharp, solid arrowheads.

B. Scale: Horizontal scale shall be 1 inch = 20, 40, or 50 feet and shown as a scale bar beneath north arrow. Vertical scale shall be 1 inch = 2, 4, or 5 feet.

C. Title Block: A title block must be shown on each sheet within the set of drawings and shall show the subdivision or project name, sheet title, sheet number, date, scale and Consulting Engineer's name, signature and license number. The title block shall be placed along the lower edge or right side of the sheet.

D. Orientation: All plan sets shall be oriented with the North arrow pointing either to the top or the right edge of the plan sheet.

3-3 TITLE OR GENERAL INFORMATION SHEET:

Each set of Improvement Plans shall have a Title or General Information Sheet. This sheet shall be sheet 1 of the plans and shall include the following:

A. *A vicinity map drawn to a convenient scale, preferably not less than 1 Inch = 2000 feet. The North arrow must point to the top of the sheet.

B. *A North arrow and scale.

C. *Sewer and storm drainage network.

D. *Index of sheets.

E. *A signature block for the City Engineer.

CITY OF ROSEVILLE

DEPT. OF DEVELOPMENT SERVICES	
ACCEPTED BY:	
CITY ENGINEER	DATE

F. *Utility information block.

G. *Block for Roseville Planning Project Number and Date Improvements Completed.

H. The entire subdivision or parcel drawn to a scale not less than 1 inch = 200 feet, or as approved by the City Engineer. The map shall provide the following:

1. Streets and street names of all streets within or contiguous to the project.

2. Adjacent subdivisions or parcels properly identified including names, lot lines and lot numbers.

3. All property lines.

4. City limit line (if applicable).

I. Legend of symbols conforming to the Standard Drawings. (See figure 3-1).

J. All of the Development Services General Notes, shown verbatim. The General Notes are available on the City of Roseville's web site at: https://www.roseville.ca.us/government/departments/development_services/engineering_land_development/plan_review/standard_notes

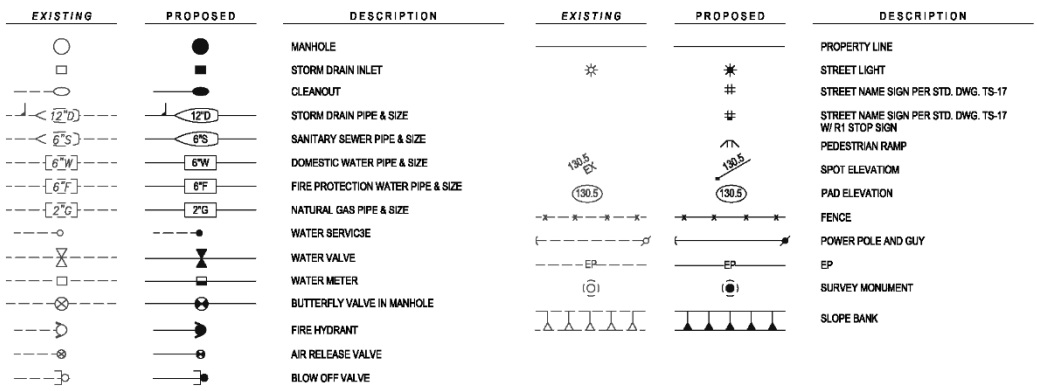
K. Typical street sections including TI and R values.

L. Temporary and permanent benchmarks with description. The Consulting Engineer shall contact the Development Services Department for the location and elevation of the nearest official benchmark.

M. Any California Environmental Quality Act (CEQA) Mitigation Measures that apply to the project.

Improvement Plans consisting of fewer than 4 sheets, except traffic signal plans, shall not include at Title Sheet, but instead shall show all of the above information on the plans. If a title sheet is not required, those items shown with an (*) shall be shown on the first sheet.

FIGURE 3-1
STANDARD LEGEND



3-4 STREET PLAN AND PROFILE SHEETS

The following requirements are for all plans submitted to the City of Roseville for review and approval:

A. Plan View: The plan view of each street to be improved shall be shown on separate sheets and shall include existing improvements and contours/elevations within 100 feet of the project boundary, proposed improvements and future improvements if known. Proposed improvements shall include sidewalks, curbs, gutter, driveways, sewer mains, water mains, sewer lateral locations, storm drains, manholes, valves, fire hydrants, fencing, barricades, monuments, survey stationing, signal pull boxes, signal poles, hardscape features, curve data for all curves along centerline and curb returns and distinct elevations along the face of curb at all beginning and ends of curves and at all curb returns. In additions, right-of-way lines, easement lines, and City limit lines (if applicable) shall be shown. Call-outs on the plans to City Design and Construction Standards ("Type C D.I.", "Type 2 curb", etc.) shall reference the Standard Drawings where these are shown. Callouts for non-standard improvements shall reference the detail, including sheet number, which provides the construction specifics. Other data may be required as specified by the City Engineer. The survey stationing shall normally read from left to right with the North arrow pointing either to the top or right edge of the sheet.

All stationing shall be a continuation of that used for the design of existing improvements where possible.

B. Profile View: The profile view of each street shall be shown immediately below its plan view. The profile shall include existing and proposed street centerlines, sewer mains, storm drains, water mains, public utility mains, all utility crossings and gutter flow lines. Distinct elevation shall be shown on the street centerline and gutter flow line at 50-foot stations and grade break points, manhole and catch basin inverts and elevations and water main crossings with other utilities. Rates of grade shall be shown on all profile lines. Elevations of hydraulic grade line for the 10 year frequency storm shall be shown at all storm drain manholes, catch basins and drain inlets where located above the top of the pipe. Elevations of the hydraulic grade line for 100 year frequency storms shall be shown at all crossings of arterials, culverts and where determined necessary by the City Engineer. Storm drain manhole and inlet identification numbers from drainage study shall be shown at all storm drain manhole and inlet locations.

C. Signing and Striping Plans: All existing and proposed traffic signing and striping shall be shown on a plan view and on separate sheets from all other improvements. The scale shall be 1 inch = 40 feet, or as otherwise approved by the City Engineer. Signing and striping to be shown shall include all existing and proposed traffic striping, pavement markings, pavement markers, regulatory signs and warning signs. All existing signing and striping within at least 200 feet of the project limits shall be shown.

D. Rough Grading and Finished Grading Plans: Rough Grading and Finished Grading Plans shall conform to the requirements of these Design Standards. (See Section 11).

E. Other Plans: Other plans that shall be incorporated in the public Improvement Plans include, but are not limited to, landscaping and irrigation, dry utilities, retaining and decorative soundwalls, and traffic signals. The layout of meandering sidewalks, soundwalls, pedestrian pass-throughs, etc., shall be shown on the Improvement Plans along with any grading associated with these improvements in addition to being shown on the landscaping plans. Public improvements built under the landscaping plans shall be included in the cost estimate submitted with the Improvement Plans in order that they may be properly bonded for and inspections costs covered.

3-5 DETAIL SHEETS

Detail sheets, if necessary, shall delineate special details, structural designs, etc., for which no Standard Detail exists, and when space is not available on the plan and profile sheets.

Plan views of the structure, for which details or design are to be provided, shall be shown on the detail sheet depicting the location of said structure in relation to street centerlines, stations, bearings, skews, grades, etc.. Structural details shall be delineated at a scale that will clearly define all facets of the design. Standard Details shall not be delineated on detail sheets or any other sheet unless reproduced in full.

3-6 PARCEL AND FINAL MAPS

The parcel or final map shall be prepared by or under the direction of a Civil Engineer registered in the State of California authorized to practice land surveying or licensed land surveyor in the manner required by the State Subdivision Map Act, Chapter 18 of the Roseville Municipal Code, and these Design & Construction Standards.

A. Preparation and Form: The general form and layout of the map, including size and type of lettering, drafting and location acknowledgements, etc., shall be as approved by the City Engineer. Parcel and final maps shall conform to the following:

1. Survey information shall generally read from left to right and orientated perpendicular or parallel with the northerly direction. North shall be oriented to either top or right edge of the sheet.

2. Large lot final maps or large lot parcel maps shall not be more than 1 inch = 100 feet, unless otherwise permitted by the City Engineer. The scale of residential final maps shall not be more than 1 inch = 50 feet. All maps shall clearly show all details of the subdivision.

3. All dimensions shall be shown in feet and hundredths of a foot. No ditto marks shall be used.

4. If more than 2 sheets are necessary to show the entire subdivision, a graphical index shall be included.

5. The subdivision designation, tract number, other numbers assigned by the City Engineer, scale and North arrow shall be shown on each sheet.

6. A title sheet, designated as page number 1 of the final map, shall be provided. Where the size of the subdivision permits, in lieu of a separate title sheet, the information required may be shown on the same sheet as the map of the subdivision.

7. The final map shall be legibly drawn in accordance with the requirements of the Subdivision Map Act and as directed by the City Engineer. The parcel or final map, when filed, must be in such condition that legible prints and negatives can be made there from.

8. All text height, found or set monuments and line weights shall more or less conform to figures 3-2A, 3-2B and 3-2C.

FIGURE 3-2A
SCALE AT 1"=40'

TEXT HEIGHT =4.0

Ø4.00" ○ .....DIMENSION POINT, NOTHING FOUND OR SET
Ø4.00" ∅ .....SET MONUMENT SYMBOL
Ø4.00" ◎ .....SET MONUMENT SYMBOL FOR MONUMENT BOX
Ø4.00" ⌑ .....SET STREET CENTERLINE MONUMENT SYMBOL
Ø4.00" ◉ .....FOUND MONUMENT SYMBOL FOUND MONUMENT BOX
Ø4.00" ● .....FOUND MONUMENT SYMBOL
Ø4.00" ■ .....FOUND STREET CENTERLINE MONUMENT SYMBOL

FIGURE 3-2B
SCALE AT 1"=20'

TEXT HEIGHT =2.0

Ø2.00" ○ .....DIMENSION POINT, NOTHING FOUND OR SET
Ø2.00" ∅ .....SET MONUMENT SYMBOL
Ø2.00" ◎ .....SET MONUMENT SYMBOL FOR MONUMENT BOX
Ø2.00" ⌑ .....SET STREET CENTERLINE MONUMENT SYMBOL
Ø2.00" ◉ .....FOUND MONUMENT SYMBOL FOUND MONUMENT BOX
Ø2.00" ● .....FOUND MONUMENT SYMBOL
Ø2.00" ■ .....FOUND STREET CENTERLINE MONUMENT SYMBOL

FIGURE 3-2C

——————— .....BOUNDARY LINE (Weight =.70mm)
——————— .....INDIVIDUAL PROPERTY LINE (Weight =.40mm)
——————— .....ADJACENT PROPERTY LINE (Weight =.20mm)
– – – – – – – – – .....EASEMENT LINE (Weight =.30mm, LT Scale=0.1)

B. Certificate Sheet: The Certificate Sheet shall contain the following information:

1. The title followed by the words, "Subdivision No. (Insert Planning Department's file number)." "City of Roseville, Placer County, California."

2. Below the title shall be a subtitle, consisting of a description of all property being subdivided with reference to such map or maps of property shown thereon as shall have been last previously recorded or filed in the County Recorder's Office, or shall have been previously filed with the County Clerk pursuant to a final judgment in any action in partition, or shall have been previously filed in the office of the County Recorder under authority of the Subdivision Map Act or by reference to the plat of any United States survey.

The Title shall also include the Section(s), Township, and Range of the Mount Diablo Meridian.

3. The subtitle of maps filed for the purpose of reverting subdivided land to acreage shall consist of the words, "A reversion to acreage of …" (insert description as required herein).

4. Reference to tracts and subdivisions in the description must be worded identically with original records. Reference to book and page of record must be complete.

5. Affidavits, certificates, acknowledgements, endorsements, acceptances, dedications and notary seals as required by law including, but not limited to, the Subdivision Map Act and City Ordinance.

C. Information: The parcel or final map shall substantially conform to the City approved or conditionally approved tentative map including all approved modifications, and shall contain the following information:

1. All areas shown on the map which do not constitute a part of the subdivision shall be labeled "Not a part of the subdivision," or, "N.A.P.O.T.S." All lines delineating such areas shall be dashed.

2. The following survey data and information shall be shown on the Final Map:

a. Corners Stakes, monuments (together with their precise position) or other evidence found on the ground, to determine the boundary of the subdivision.

b. Corners of all adjoining properties identified by lot and block numbers, subdivision names, numbers and pages of record, or by section, township and range, or other proper designation.

c. All information and data necessary to locate and retrace any point or line without reasonable difficulty.

d. The location and description of any required monuments to be set after recording of the parcel map, and the statement that they are "to be set."

e. Bearings and lengths of each lot line, centerline, block line and boundary line, and each required bearing and distance. All line annotation shall be located adjacent to the described line. Curve and line tables can be used to avoid crowding and conflicts with line work or other information shown on the map; however, the use of annotation tables shall be kept to a minimum and located on the same sheet as the line work.

f. Details shall be located on the same sheet as the line work being depicted in the detail.

g. Chord length, chord bearing, radius, arc length, and central angle of each curve.

h. The survey center lines of any street or alley in or adjacent to the parcel together with reference to a field book or map showing such center line and the monuments which determine its position. If the monuments are determined by ties, that fact shall be so stated.

i. Sheet numbering shall be located in the lower right hand corner of each sheet.

j. Such other survey data or information as may be required to be shown by the City or by the provisions of Chapter 18 of the Roseville Municipal Code.

3. All resulting lots or parcels being subdivided for the purpose of sale, lease, or financing, excluding those exempted by law, and all parcels offered for dedication to the City or any other public agency, for any purpose, with all dimensions, boundaries and courses clearly shown and defined. Dimensions of lots shall be as total dimensions corner-to-corner, in addition to point-to-point dimensions.

4. All lots shall be numbered consecutively, without omissions or duplication, throughout the subdivision, starting with the number 1, except units of a total development which shall be numbered consecutively throughout the development. Lot numbering shall be consistent with that of the approved or conditionally approved tentative map or as approved by the City Engineer. Only parcels offered for dedication other than for streets or easements shall be designated by letters. However, in single-family divisions, the parcels intended for other than single-family use may be designated by letters. Each numbered lot shall be shown entirely on one sheet. The text height of a lot number or designated lettered lot shall be a minimum of 1.5 times larger than the surrounding line annotation.

5. The square footage (to the nearest foot) shall be shown on the map directly under the lot number. Lots one acre or greater shall be shown with the net acreage (to the nearest one hundredth of an acre).

6. The location and total width of all public streets, alleys, pedestrian ways, equestrian and hiking trails and biking paths, and rail road rights-of-way; the names of public streets, and the width on each side of the center line of each public street; the width of the portion of the street, alley, pedestrian way, equestrian and hiking trail and bike path being dedicated, and the width of the existing dedication, public or private, if any, within the subdivision.

7. All necessary data, including width and sidelines of all proposed and existing public utility easements to which the lots of the subdivision are subject. Each easement shall be clearly labeled as to nature and purpose and, if already of record, its recorded reference given. If an easement of record cannot not be plotted on the map because its location is not defined or indefinite, an attempt shall be made to have the easement extinguished and removed from title. Easements shall be denoted by fine dashed lines.

8. All limitations on rights of access to and from streets and lots and other parcels of land.

9. The lines of any natural watercourse, channel, stream, creek or body water in or adjacent to the subdivision and/or officially adopted floodplain lines, which constitute parcel boundary lines or easement lines.

10. Any City boundary crossing or adjoining the subdivision clearly designated and tied in.

11. Total acreage within the subdivision.

12. The basis of bearings used in the field survey, making reference to some recorded subdivision map or other source acceptable to the City Engineer.

D. Additional Data Required: The following statements, documents and other data, and as many additional copies thereof as may be required shall be filed with the parcel or final map:

1. On the application form, the names, addresses, and telephone numbers of the record owners and subdivider and persons preparing the Parcel or Final Map.

2. A guarantee of title or letter from a title company, certifying that the signatures of all persons whose consent is necessary to pass a clear title to the land being subdivided and all acknowledgements thereto, appear and are correctly shown on the proper certificates, and are correctly shown on the final map; both as to consents for the making thereof and the affidavit of dedication.

3. A traverse computations sheet in a computerized form approved by the City Engineer; giving bearings, distances and coordinates, and showing the mathematical closure. No manual computations will be accepted. All lots must close to within 0.02 feet or as specified by the City Engineer. Each sheet of survey closures shall be numbered sequentially.

4. All protective covenants, restrictions, or affirmative action obligations in the form in which the same are to be recorded when approval thereof by an officer of the City has been required as a condition of approval of the Tentative Map.

5. All offers of dedication by separate instrument shall conform to Section 2-11 of the Design Standards; and any offer of dedication by separate instrument for fee title shall conform to Chapter 18.16.060F and Chapter 18.16.100 of the Roseville Municipal Code.

Whenever an offer of dedication by a separate instrument accompanies a Parcel or Final Map, the Parcel or Final Map shall not be accepted for filing by the City Engineer until he first approves the instrument of recordation.

6. All other data required by law as a condition of approval of the Tentative Map, including plans, reports, agreements, permits, fees security or other requirements.

E. Subdivision Agreement- If the required improvements for the subdivision have not been completed to the satisfaction of the City Engineer and accepted by the City Council prior to recording of the Parcel map or Final Map, the Subdivider shall enter into a Subdivision Agreement with the City. The form of the agreement shall be as approved by the City Attorney, and said agreement shall be approved by the City Council and recorded concurrent with the Parcel or Final Map. See Section 2-25C for more information on subdivision agreements.

3-7 PROPERTY OF CITY OF ROSEVILLE

All plans, maps, reports and any other items submitted to the City shall become the property of the City. The City shall not be responsible for the return of these items once they are submitted.

SECTION 4: VMT AND TRAFFIC IMPACT STANDARDS

4-1 GENERAL

The City of Roseville has established the following guidelines for the preparation of Traffic Impact Studies and VMT Impact Studies to ensure consistency of analysis and adequacy of information to aid City staff and decision makers in the consideration of project approval with regard to impacts to the City's transportation system.

4-2 PURPOSE OF TRAFFIC IMPACT STUDIES

Traffic impact studies are an important tool in the overall development planning process (residential, commercial, industrial, institutional, etc.) for the City. They provide the necessary information to allow an assessment of the potential traffic impacts associated with proposed projects as they relate to transportation policies established by the City. Traffic impact studies are also used to identify appropriate mitigation and/or recommendations where practicable to offset project impacts.

4-3 RESPONSIBILITY FOR TRAFFIC IMPACT STUDIES

The City utilizes on-call transportation services with approved transportation Consultants for the preparation of all city-required transportation studies. Traffic impact studies, when required by the City, shall adequately assess the impacts of a development proposal on the existing and/or planned street system.

Applicants should contact the Planning Division as early as possible and provide a site plan with proposed land use and associated square footages prior to submitting an application so that the City can evaluate the traffic study requirements. Should it be determined that a traffic study will be required, the City will provide an estimated cost, scope and scheduled for the study, and the project applicant will be required to authorize the City to proceed with the traffic study and deposit the necessary funds prior to the City commencing with the study.

Note: The City will not accept traffic studies prepared directly by an applicant's traffic/transportation Consultant.

4-4 TYPES OF TRAFFIC IMPACT STUDIES

The flow chart shown in Figure 4-1 shall be used to determine when and what type of traffic study may be required for proposed development projects. The City utilizes both short-term and long-term traffic studies for assessing the potential impacts of a proposed project.

Short-Term Traffic Studies: The primary purpose of a short-term traffic study is to identify the project's impact to the roadway network under existing and/or near-term conditions and to evaluate proposed site access. Where access points are not defined at the time the traffic study is prepared, additional analysis may be required when the access points are defined.

When only short-term traffic studies are prepared, they shall include an explanation as to why the future scenario need not be analyzed (e.g., the proposed land use is consistent with the

General Plan, therefore the project's long term traffic impact is already accounted for via the City's Capital Improvement Program which was derived from the City-wide traffic model).

Long-Term Traffic Studies: Long-term traffic studies are generally required when a proposed project will generate greater than 50 p.m. peak hour trip ends and the land use is not consistent with the assumptions of the City's travel demand forecasting model, with regard to intensity of development and/or type of use.

Cumulative traffic impacts are evaluated using the latest version of the City's CIP travel demand model. A LOS comparison of with and without project conditions for all signalized intersections (existing & future) is reported and intersections that degrade from acceptable to unacceptable (per the City's current LOS policy) shall be identified and appropriate mitigation identified where feasible. The term "impact" in this case refers to violation of the City's intersection LOS policy as described below: Maintain a level of service (LOS) "C" standard at a minimum of 70 percent of all signalized intersections and roadway segments in the City during the p.m. peak hours or causing an intersection operating at LOS "C" to operate at worse than LOS "C". Exceptions to the LOS "C" standard may be considered for intersections where the city finds that the required improvements are unacceptable based on established criteria identified in the implementation measures. In addition, Pedestrian Districts may be exempted from the LOS standard.

Both short-term and long-term traffic analysis shall include graphics that show traffic volumes for private access points, study intersections and roadway segments, as required:

1. Existing P.M. peak hour directional roadway traffic volumes including turning movements at intersections. (Short-Term).

2. The data in item 1 above plus projected site traffic volumes for the development scenario being analyzed. Include projected turning movements at driveways. It is acceptable to combine items 1 and 2 into one graphic. (Short-Term).

3. Future P.M. peak hour directional roadway traffic volumes including turning movements at intersections without the project. (Long-Term).

4. The data in item 3 above plus projected site traffic volumes. Include projected turning movements at driveways. It is acceptable to combine items 3 and 4 into one graphic (Long-Term).

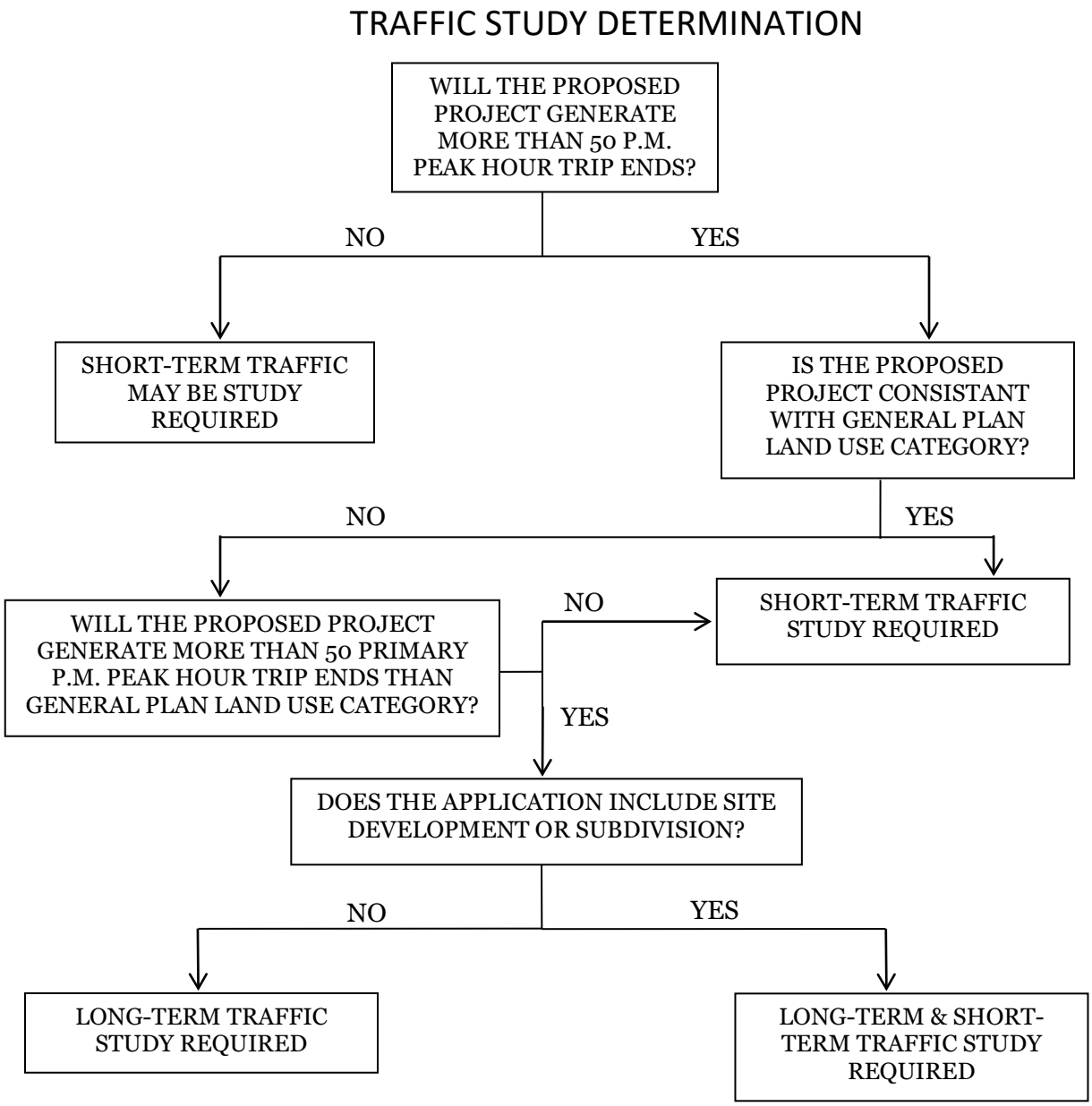


FIGURE 4-1

Other peak hours that are determined by the City to be critical to site traffic and the street system in the study area shall be included and shall show the same information as is provided for above. Examples of other peak hours are A.M. peak, noon peak, and project peak.

Note: All previous traffic studies that are more than two years old will generally be required to be updated unless the Development Services Engineering Division determines that conditions have not changed significantly.

4-5 TRAFFIC STUDY FORMAT

In order to provide consistency and to facilitate staff review, the following format shall be used in the preparation of such studies by transportation consultants:

A. Introduction: The introduction of the report shall contain the following:

1. Project Location and Study Area: A brief description of the location within the City and the region shall be included in the section. In addition, roadways that afford access to the site and those that are included in the study area shall be identified. General terrain features within the study area should also be described.

2. The exact limits of the study area should be based on engineering judgment and an understanding of existing traffic conditions surrounding the site. In all instances, however, the study area limits shall be subject to approval of the Development Services Engineering Division. A vicinity map that shows the site and the study area boundaries in relation to the surrounding transportation system shall be included.

3. Existing and Proposed Site Uses: The existing and proposed uses of the site shall be identified in terms of the various zoning categories of the City. In addition, the specific use for which the request is being made shall be identified, if known, since a number of uses may be permitted under existing zoning. Parcels in the vicinity of the site shall also be identified with respect to the zoning, land use and specific uses. This information shall include square footage of the various uses or the number and size of the units proposed. All driveways in the vicinity of the project that could affect operations of any proposed driveways shall also be shown.

4. It shall be the intent of the traffic study to evaluate the worst-case impacts for the proposed development allowed by zoning unless a specific use/users is identified by the applicant. If several different uses are permitted by the zoning, the land use with the greatest overall traffic impact shall be assumed for the study.

5. Study Area Conditions: Within the study area, the traffic study shall describe and provide volumes for existing roadways, intersections and driveways including geometric and traffic signal control as well as improvements that have been proposed by government agencies and other development projects. The study shall identify roadway improvements within the study area that are planned to be constructed by the City as part of the City's Capital Improvement Program.

Note: The City will provide copies of current traffic count information, where available; however, the Consultant is ultimately responsible to provide up-to-date traffic volume count information for all study locations. Traffic count information for many locations are available on the City's website. Please visit the following link for more information: http://www.roseville.ca.us/pw/engineering/traffic_engineering/default.asp

B. Project Trip Generation: A summary table listing each specific use, the size involved, the trip generation rates used (total daily traffic and A.M. /P.M. peak hours) and the resultant total trips generated shall be that of a typical weekday and shall coincide with the peak hour of the roadway system (not the peak hour of the project). However, there may be instances where a unique project use requires an analysis during different time frames; such as a weekend.

This section shall also include a discussion on how the project's trip generation rate compares with typical trip generation rates for the site's existing General Plan land use category. If the proposed project represents only a portion of a larger overall site, such as a phased project, then the traffic study shall discuss the degree to which both the initial phase and the ultimate development impact the roadway network.

Trip generation shall be calculated based on data contained within the latest edition of the Institute of Transportation Engineer's (ITE) Trip Generation Manual approved for use by the City or more appropriate local data as approved by the Development Services Engineering Division. Any internal trip reductions or modal split assumptions will require analytical support to demonstrate how the figures were derived.

Pass-by trip factors may be used to reduce the estimated additional traffic to streets serving a proposed development. However, the percentage of pass-by traffic shall be documented and referenced as to the source of the assumptions (e.g., ITE Trip Generation Manual, ITE Journal article, local study, etc.). Pass-by rates are not to be applied to reduce turning movement volumes at driveways serving the proposed development.

C. Trip Distribution: The directional distribution of trips entering and departing the proposed project site shall be clearly identified on a figure. The methodology of distribution shall be discussed in the study.

D. Traffic Assignment: The assignment of site-generated traffic onto the area's street system shall be clearly depicted on a map/figure. The traffic assignment shall consider the general trip distribution, logical routing, turn movement restrictions, available and projected roadway capacities and travel times. The technical analysis steps, basic methods, and assumptions used in this work shall be clearly stated.

E. Level of Service: The traffic study report shall include appropriate tables indicating the LOS and volume/capacity (V/C) of all study intersections and roadway segments, comparing with and without project scenarios. Signalized intersections shall be evaluated using the Transportation Research Board (TRB) Circular 212 planning methodology, or Highway Capacity Manual methodology, as determined by the Development Services Engineering Division, with the City-approved critical capacity adjustments. There may be instance where the City desires to evaluate signalized intersections utilizing the "operations methodology" as

described in the latest edition of the Highway Capacity Manual. In such instances, the City will provide direction to the Consultant in the development of the scope of the traffic study. Unsignalized intersections shall be analyzed using the latest version of the Highway Capacity Manual, or other appropriate methodology as approved by the Development Services Engineering Division.

A minimum intersection Level of Service "C" shall be the peak hour design objective. If the proposed project is shown to cause degradation of intersection LOS to worse than "C" (or whichever LOS has been approved by the City Council for a particular intersection) after considering any improvements already planned by the City, then the traffic study shall recommend feasible mitigation measures to bring the intersection Level of Service within acceptable standards in accordance with the City's LOS policy. The Consultant shall inquire with the Development Services Engineering Division as to planned roadway and intersection improvements.

The report shall include a discussion of assumptions made in the above calculations, such as saturation flow rates, peak hour factors and lane configurations. Full documentation of the LOS calculations shall be provided in an appendix.

F. Site Access: A short-term traffic study shall discuss how the proposed site access compares with the City's access standards as described in this section and in Section 5 of these Design Standards entitled "Site Access." Some of the topics that must be included in the traffic study are: number of driveways serving a parcel or site, right turn deceleration lane or right turn curb flares for driveways, left turn deceleration lane for driveways, storage requirements for turn lanes, minimum offset for opposing driveways, restricted turning movements for driveways and sight distance. Each site access point shall be discussed separately. If the proposed site access does not meet the City's standards, then the traffic study shall identify what modifications to the proposed site access would be necessary to meet City standards and explain why these modifications are not proposed.

1. Driveways: Minimum Required Throat Depth (MRTD): The traffic study shall evaluate the Minimum Required Throat Depth (MRTD) needed on-site for each access point for the proposed development. The MRTD, as illustrated in Figure 4-2 entitled "MINIMUM REQUIRED THROAT DEPTH", is measured from the back of sidewalk to the first drive aisle or parking stall. The purpose of the MRTD is to allow enough stacking distance for egressing vehicles so that the first drive aisle or parking stall is not blocked. This minimizes the possibility of incoming vehicles queuing out into the traveled way of the main street thereby creating a safety concern as shown in Figure 4-2.

The MRTD shall be measured in car length increments of 25 feet and rounded up to the nearest division of 25 feet. In no case will the City allow a MRTD of less than 25 feet for any project. Throat depths greater than the calculated MRTD are encouraged. On-site parking shall not be permitted within the MRTD area.

Note: The MRTD requirement does not apply to single family residential or duplex uses.

Figure 4-2 illustrates that the MRTD is a function of the length of the queue of vehicles waiting to exit the driveway. The length of this queue is a function of two variables: the number of vehicles desiring to egress during a given time period versus the number of vehicles that can enter the traffic stream of the main road during that same time period.

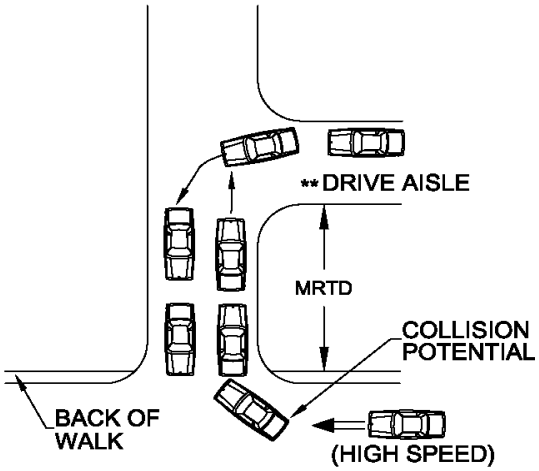
If the proposed project represents only a portion of a larger overall site, or if it is expected that vehicles generated by other than the project will use the access under study, then the total expected turning movement volumes at the subject access location shall be used in determining the MRTD.

As shown in Figure 4-2, there are cases when a MRTD of 25 feet is acceptable. This is when the first drive isle is "one way only" to the right in the figure. Another scenario where a MRTD of 25 feet is acceptable is when a raised center median is constructed in the driveway throat from the back of sidewalk to the calculated MRTD distance. In this case, the nearest drive aisle can be two-way, but turning movements into and out of the drive aisle are restricted by the raised median, thereby mitigating the concern as shown in Figure 4-2.

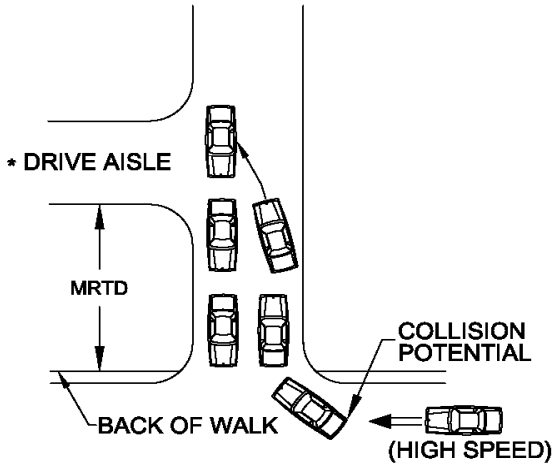
If the calculated MRTD is physically or unreasonable too long for the proposed development, then the traffic study shall suggest ways to reduce the MRTD by either reducing the egressing demand volume, or by increasing the movement capacity. Examples of reducing the egressing demand volume at an access location would be to suggest additional egress locations, cause a different distribution of vehicles by modifying the on-site design, or somehow reduce the site's trip generation. Examples of increasing the movement capacity at an access location would be to suggest additional egress lanes or, in the case of an unsignalized access location, suggest fewer allowed turning movements onto the roadway. In any case, the traffic study shall fully evaluate the impacts of any such modifications.

MRTD lengths at **unsignalized** project driveways shall be based on a series of regression equations that the City uses to predict maximum queue lengths at minor stop-controlled intersections. These equations are based on the methodology presented in *Estimation of Maximum Queue Lengths at Unsignalized Intersections (*ITE Journal, November 2001). Exhibit 4-1 presents the methodologies used for calculating the MRTD for various unsignalized driveway conditions. Major street volumes shall be based on projected future traffic volumes from the latest version of the Citywide traffic model. Alternative methodologies for calculating unsignalized MRTD lengths may be considered, but shall first be approved by the Development Services Engineering Division prior to incorporation into traffic studies.

MINIMUM REQUIRED THROAT DEPTH (MRTD)



MAIN ROAD



MAIN ROAD

* NOTE: IF THE DRIVE AISLE IS "ONE-WAY ONLY" TOWARDS THE DRIVEWAY THROAT, THEN A MRTD OF 25' IS ACCEPTABLE.

** NOTE: IF THE DRIVE AISLE IS "ONE-WAY ONLY" AWAY FROM THE DRIVEWAY THROAT, THEN A MRTD OF 25' IS ACCEPTABLE.

FIGURE 4-2

MRTD lengths at **signalized** project driveways are a function of egressing traffic volumes, lane geometrics and traffic signal timing. Typically, signalized access locations will have more than one approach lane for egressing vehicles; therefore, the MRTD shall be determined from the lane with the longest queue. The MRTD should be based on the Operational Analysis methodology contained in the latest version of the Highway Capacity Manual, or other methodology as approved by the Development Services Engineering Division. Major street volumes shall be based on projected future traffic volumes from the latest version of the Citywide traffic model. For existing traffic signals, the Consultant is recommended to discuss likely signal timing parameters with City staff. There may be some restrictions to signal timing parameters for existing signals due to progression, etc.

2. "Drive-Thru Service" Uses: On-Site Storage Requirements for traffic studies evaluating "drive-thru service" type land uses, the study shall evaluate vehicle storage requirements to ensure that vehicles will not queue out into the public right-of-way. Such types of uses/conditions include, drive-thru restaurants, drive-thru pharmacies, carwash facilities, gated communities, gated self-storage facilities, parking garages etc. The required storage length shall be determined based on expected arrival rates and service rates using accepted statistical practices. The distance is measured from the back of sidewalk at the street driveway to the service point in increments of 25 feet. All supporting assumptions and calculations shall be provided in the appendix.

3. Left-Turn Ingress Storage Requirements: Left-turn ingress lanes serving the proposed project shall be evaluated with respect for turn lane storage/deceleration lengths. The left-turn storage shall be based on the regression equations that the City uses to predict maximum queue lengths at left-turn lanes based on the methodology presented in *Estimation of Maximum Queue Lengths at Unsignalized Intersections* (ITE Journal, November 2001). Table 4-1 presents the regression equation for approximating left-turn storage requirements for major-street left-turn movements. Major street through volumes shall be based on projected future traffic volumes from the latest version of the Citywide traffic model. Alternative methodologies for calculating storage lengths may be considered, but shall first be approved by the Development Services Engineering Division prior to incorporation into traffic studies.

G. Traffic Signals: The need for new traffic signals shall be based on warrants contained in the latest edition of the California Manual of Uniform Traffic Control Devices (California MUTCD), or other approved source identified by the Development Services Engineering Division.

Where intersection controls are warranted on a two or four lane roadway, and at the direction of either the Public Works Director or the City Engineer, a formal evaluation shall be completed by the developer to identify the feasibility and operating benefits of a roundabout. The evaluation shall analyze space requirements and whether the installation of

a roundabout would perform better than other control modes by reducing delay, improving safety, or solve other operational issues.

If a new traffic signal is being proposed which is not already a part of the City's Capital Improvement Program, and the signal installation would result in less than 1, 320 feet between signals, then the study shall include a signal progression analysis. The section of roadway to be analyzed for signal progression shall be determined by the Development Services Engineering Division and will include all existing and planned future signalized intersections.

The progression pattern calculations shall use a cycle consistent with current signal timing policies of the City. A desirable bandwidth of 50 percent of the signal cycle shall be used where existing conditions allow. Where intersections have no existing signals presently, but are expected to have planned future signals, typically a 60 percent mainline, and 40 percent cross street cycle split should be assumed. Cycle split assumptions shall relate to volume assumptions in the capacity analysis of individual intersections, and, where computerized progression analysis techniques are used, they shall be of the type which utilizes turning movement volume data and pedestrian clearance times in the development of time/space diagrams.

Those intersections that would reduce the optimum bandwidth if a traffic signal were installed may be required to remain unsignalized and have turning movements limited by access design or median islands.

Traffic studies for proposed projects located along a corridor that either currently has or is proposed to have coordinated traffic signals shall provide a new or updated traffic signal coordination plan along the entire section of coordinated roadway. This plan shall be created and modeled with the latest version of traffic signal optimization software used by the City. City staff shall be allowed to review and comment on the proposed coordination plan and staff suggestions shall be included in the final plan submitted with the traffic study. The coordination plan shall consider, at a minimum, the A.M., mid-day and P.M. periods of the day. More periods may be necessary if determined by staff to be relevant. The electronic coordination file shall be delivered along with the paper coordination plans contained in the traffic study and they shall become the property of the City.

H. Traffic Accidents: Traffic accident data for affected street corridors may be required in the study as required by the City. The study period will normally be three years. The locations shall be specified by the Development Services Engineering Division and the Public Works Department. Accident data is on file in the Public Works Department. It shall be the Consultant's responsibility to make copies of the data.

Estimates of increased or decreased accident potential shall be evaluated for the development, particularly if the proposed development might impact existing traffic safety problems in the study area. Safety improvements shall be recommended where necessary.

I. On-Site Circulation: Where applicable, the Consultant shall review and evaluate the site plan with respect to vehicular and non-vehicular circulation and safety. All recommendations shall be clearly documented in the report.

J. Report Documentation: The analysis conducted for traffic studies shall be documented in a report for review by the City, with supporting tables and figures.

An executive summary shall be provided that clearly and concisely describes the project scope and purpose, findings, conclusion and mitigation measures and recommendations. Technical publications, calculations, data reporting and detail design shall not be included in the executive summary. The executive summary should be short, complete in itself and not dependent on supplementary data included by reference.

A table of contents, list of tables & figures and an appendix with supporting data, calculations, etc., should also be included, when appropriate to produce a professional and readable document.

4-6 TRAFFIC IMPACT STUDY PREPARATION AND SUBMITTAL REQUIREMENTS

The following requirements shall pertain to all traffic studies, unless otherwise directed by the City staff.

1. Traffic studies shall be prepared and stamped by a Registered Traffic Engineer or a Registered Civil Engineer with demonstrated competence and adequate experience in Transportation Engineering.

2. Initially, **five (5)** hard copies and **one (1)** electronic version of the Draft traffic study shall be submitted to the Development Services Engineering Division for review and comment. The City will forward one hard copy to the applicant for the review.

3. Upon completing their review, the City will provide the Consultant with comments and discuss revisions to be incorporated into the final report.

4. The Consultant shall submit **three (3)** hard copies and **one (1)** electronic version of the Final traffic study.

5. All copies of the traffic study submitted to the City shall become the property of the City.

6. Traffic studies that are not in compliance with the requirements set forth in these Design Standards may be rejected until corrected to the satisfaction of the City.

Exhibit 4-1
Minimum Required Throat Depth Regression Equations
(Unsignalized Project Driveways)

Regression Equations		
Movement	**Condition**	**Equation**
Major-street left turn	Approach volume ≤ 100 VPH/PHF	Max. Queue = -2.042 + 1.167 In(AppVol) + .0975*TS
	Approach volume > 100 VPH/PHF	Max. Queue = +4.252 – 1.23*Lanes + 0.07996*Speed + 1.412*TS – 374.028/AppVol + 0.00001144*AppVol *ConflVol
Minor-street left turn	Approach volume ≤ 100 VPH/PHF	Max. Queue = +0.958 + 0.00111*(AppVol)^2 + 0.000333* (ConflVol)
	Approach volume > 60 VPH/PHF	Max. Queue = +6.174 – 2.313*TS + 0.03307*Speed – 1201.644/ConflVol + 0.00006549 (AppVol)^2
Minor-street right turn	**See Graph on Exhibit 4-2**	
Minor-street shared Left/through/right	All conditions	Max. Queue = -12.916 + 3.225ln(AppVol) + 0.00569*(ConflVol for LTs & THs) – 0.000177*(ConflVol for Rts) – 2.109*(RT%) – 3.157*TS

Source: Fehr & Peers, Transportation Consultants. Based on the methodology presented in *Estimation of Maximum Queue Lengths at Unsignalized Intersections* (ITE Journal, November 2001).

AppVol = hourly traffic volume divided by peak-hour factor (PHF) for subject movement;

ConflVol = hourly traffic volume divided by PHF that conflicts with subject movement (refer to the *Highway Capacity Manual 3 to identify movements that conflict with subject approach);*

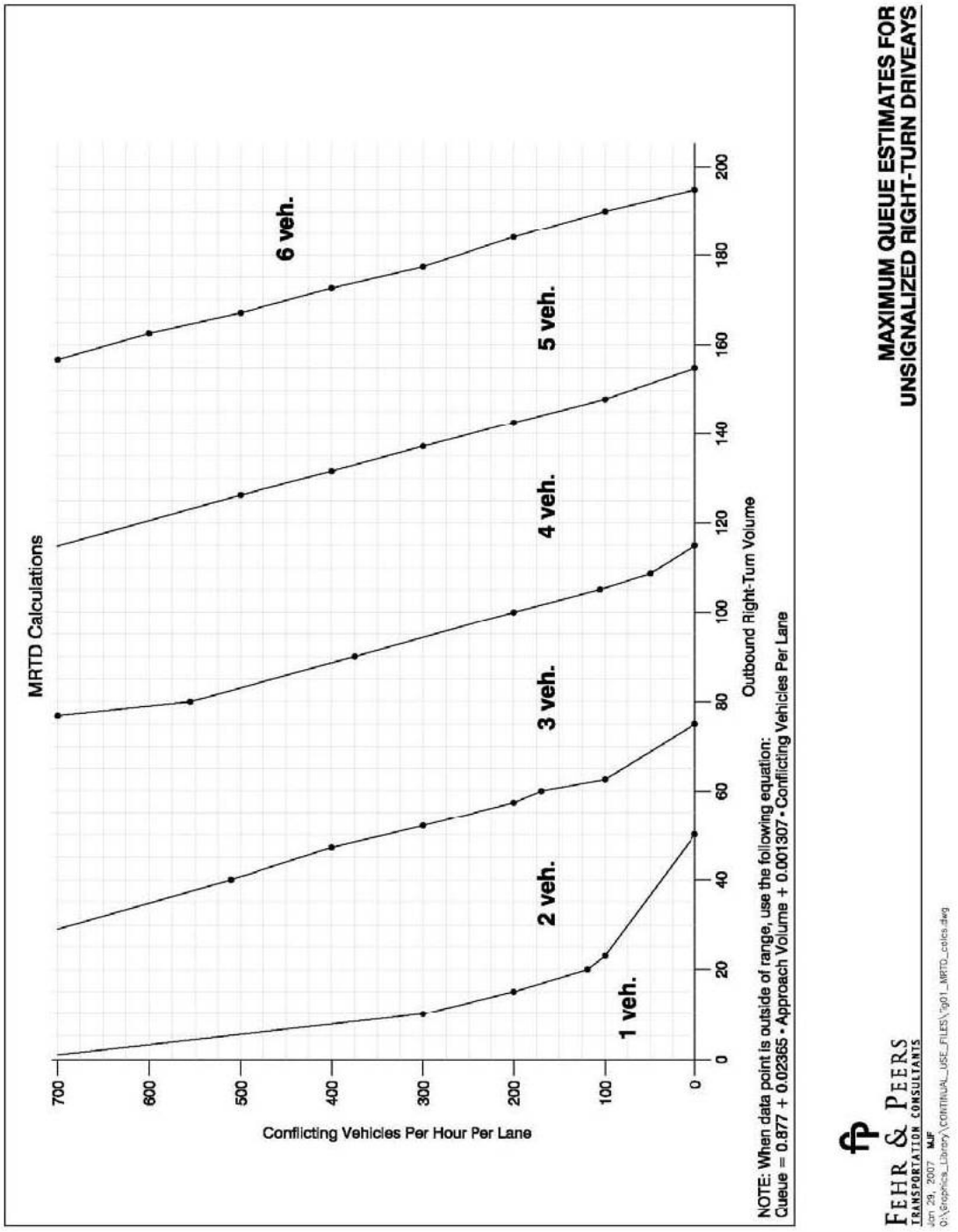
TS = a dummy variable with a value of 1 if a traffic signal is located on the major street within one-quarter mile of the subject intersection and 0 otherwise;

Lanes = number of through lanes occupied by conflicting traffic;

Speed = posted speed limit on major street (in miles per hour); and

RT % = Percentage of vehicles on shared left/through/right minor street approach that turn right.

Exhibit 4-2
Minimum Required Throat Depth
For Right-Turn Only Movements (Unsignalized Project Driveways)



4-7 PURPOSE OF VMT IMPACT STUDIES

VMT impact studies are an important tool in the overall development planning process (residential, commercial, industrial, institutional, etc.) for the City. They provide the necessary information to allow an assessment of the potential VMT effects associated with proposed projects as they relate to circulation policies established by the City. VMT impact studies are also used to identify appropriate mitigation and/or recommendations where practicable to offset project impacts.

4-8 RESPONSIBILITY FOR VMT IMPACT STUDIES

The City uses on-call transportation services with approved transportation Consultants for the preparation of all City-required VMT studies. VMT impact studies, when required by the City, shall adequately assess the VMT impacts of a development proposal.

Applicants should contact the Planning Division and Engineering Division as early as possible and provide a site plan with proposed land use, associated square footages, and any relevant proposed transportation programs (e.g., transit passes) prior to submitting an application so that the City can evaluate the VMT study requirements. Should it be determined that a VMT study will be required, the City will provide an estimated cost, scope, and schedule for the study, and the project applicant will be required to authorize the City to proceed with the VMT study and deposit the necessary funds prior to the City commencing with the study. The VMT study may be combined with a circulation and/or traffic impact study.

Note: The City will not accept VMT studies prepared directly by an applicant's traffic/transportation Consultant.

4-9 VMT IMPACT STUDIES

VMT impacts may be determined by screening, if a project meets any of the screening criteria discussed below, or by a full VMT analysis with comparison to the appropriate threshold if no screening criteria are met.

A. Screening: A project may be screened from additional VMT analysis if it meets one or more of the following criteria. These criteria are based on the Governor's Office of Planning and Research (OPR) *Technical Advisory on Evaluating Transportation Impacts in CEQA* (December 2018)[1]:

1. **Within Scope of Prior CEQA Analysis**: The VMT generated by the project is within the scope of a prior California Environmental Quality Act (CEQA) analysis and is therefore covered by a prior analysis. Prior analysis includes analysis performed for the General Plan.

2. **Small Projects**: Absent any information to the contrary, projects that generate 110 trips per day or less may be assumed to cause a less-than-significant VMT impact.

[1] https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

3. **Projects Near Transit Stations**: Projects located within ½ mile of an "existing major transit stop" or an "existing stop along a high-quality transit corridor" pursuant to Public Resources Code 21155 (as it may hereafter be amended) may be assumed to have a less-than-significant impact on VMT.

4. **Affordable Residential Development**: Affordable housing may be assumed to cause a less-than-significant transportation impact on VMT because it may improve jobs-housing balance and/or otherwise generate less VMT than market-based units.

5. **Redevelopment Projects**: If a proposed redevelopment project leads to a net overall decrease in VMT (when compared against the VMT of the existing land uses), the project would lead to a less-than-significant transportation impact.

6. **Local-Serving Retail Projects**: Trip lengths may be shortened and VMT reduced by adding "local-serving" retail opportunities that improve retail destination proximity. A retail building that is 50,000 square feet or less may be considered local-serving; larger retail buildings may still be considered local-serving pursuant to Item 7, below.

7. **Other Local-Serving Development:** Other development that will improve destination proximity may also be considered to have a less-than-significant transportation impact, at the discretion of the City.

8. **Development in Low VMT Areas**: The project is within a low VMT area of the City which is defined as a project located in a travel analysis zone (TAZ) in the Roseville travel forecasting model which has VMT performance that meets the thresholds described in Section 4-10 below.

9. **Transportation Projects Not Generating New VMT**: The project is a transportation project not expected to induce additional vehicle travel. The OPR *Technical Advisory* provides a list of such projects on pages 20–21.

A study using screening shall include a justification statement supporting the use of the screening criteria and evidence supporting its conclusions.

B. VMT Analysis: VMT analysis is required if the project does not meet any of the conditions for screening. For residential projects, analysis should be based on VMT per capita. For non-residential projects, analysis should be based on VMT per service population, where service population consists of the total number of residents and employees. The per capita methodology is based on home-based production VMT, which includes VMT for trips produced by a home's residents, such as to work, school, or shop, and with one end of the trip at the home. The service population methodology includes home-based production VMT and VMT from all other sources, including trips attracted from homes outside of the area into the area for work, shopping, or other purposes and trips with neither end at the home (such as from work to shopping). VMT is based on the full length of each trip, including distance outside of the City. VMT estimates are to be produced using the City of Roseville

travel demand model.

Projects that feature a mix of complementary land uses on-site should be analyzed using a technical approach geared toward the specifics of the project. The *Technical Advisory* describes two possible approaches: (1) analyze (considering internal trips) and determine significant impacts of each project component separately, or (2) consider significant impacts based on the project's dominant land use.

Alternative metric (e.g., VMT/employee) may be used provided it relies on the data and analysis of the current citywide VMT analysis and is reviewed and approved by the City.

Forecasting or other models and methods used to prepare the analysis shall follow best practice methodology and should ensure high confidence in the results. The City recognizes that different projects will require a somewhat different methodology, depending on factors such as project size and type of use. For example, a land use amendment or rezone which only slightly increases trip generation may not require extensive modeling in order to demonstrate the VMT increase is minor or absent.

The proposed scope and justification of the proposed methodology shall be reviewed and approved by the City prior to initiation of the VMT study. The completed study shall include a detailed explanation and justification of the methodology employed.

Factors to convert Roseville travel forecasting model inputs to residents and employment as used in development of the General Plan in 2020 are shown in Table VMT-1 below. If these factors are not used, justification should be provided.

Table VMT-1 City of Roseville Travel Forecasting Model Conversion Factors for Residents and Employees		
Model Land Use	**Conversion Factor**	**Units**
Single Family Dwelling Units (DU)	2.68	Residents per DU
Multi-Family DU	2.32	Residents per DU
Age-Restricted DU	1.47	Residents per DU
Retail	2	Employees per Thousand Square Feet (KSF)
Mall	2	Employees per KSF
Office	3	Employees per KSF
Industrial	1	Employees per KSF
High Tech Industrial	2	Employees per KSF
Church/Worship Center	1	Employees per KSF
Medical Office	3	Employees per KSF
Hospital	2	Employees per KSF
Convalescent Home	3	Employees per KSF
Hotel	0.5	Employees per Room
Public/Quasi-Public Low	3	Employees per KSF
Public/Quasi-Public High	3	Employees per KSF

4-10 VMT THRESHOLDS

A project would have a significant impact if it would substantially interfere with achievement of VMT reductions consistent with the OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA*. A project would have a significant impact if it exceeded a threshold of 15 percent below baseline VMT per capita (residential projects) or service population (non-residential projects). Alternatively, if a proposed project can be shown to result in a net overall decrease in total City VMT when compared to baseline VMT, the project would lead to a less-than-significant VMT impact. Table VMT-2 (derived from Table 4.3-5 of the General Plan Update EIR, certified on August 5, 2020), below, reports the City's current VMT thresholds. These thresholds are based on analysis with the Roseville travel forecasting model. Table VMT-2 may be updated on an as-needed basis as the City develops and travel patterns change.

Table VMT-2 City of Roseville VMT Thresholds		
	Non-Residential Projects: Service Population Methodology	**Residential Projects: Per Capita Methodology**
VMT Produced	5,459,700	1,822,100
# of Residents	120,812	120,812
# of Employees	67,530	--
Service Population	188,342	--
Baseline VMT Metric	29 VMT/service population	15.1 VMT/capita
TVMT Threshold	**24.5 VMT/service population**	**12.8 VMT/capita**

4-11 VMT STUDY FORMAT

The analysis conducted for VMT studies shall be documented in a report for review by the City, with supporting tables and figures. It shall be the intent of the VMT study to evaluate the reasonable worst-case impacts for the proposed development allowed by zoning unless a specific use/user/s is identified by the applicant.

A. In order to provide consistency and to facilitate staff review, the following format shall be used in the preparation of such studies by transportation consultants: **Table of Contents –** A list of tables & figures, and when appropriate an appendix with supporting data, calculations, etc., to produce a professional and readable document.

B. Executive Summary: This section shall clearly and concisely describe the project scope and purpose, findings, conclusion, and mitigation measures and recommendations. Technical publications, calculations, data reporting and detailed design shall not be included in the executive summary. The executive summary should be short, complete in itself and not dependent on supplementary data included by reference.

C. Introduction: The introduction of the report shall contain the following:

1. Project Location: A brief description of the location within the City and the region shall be included in the section. In addition, roadways that afford access to the site and those that are included in the study area shall be identified. General terrain features within the study area should also be described.

2. Existing and Proposed Site Uses: The existing and proposed uses of the site shall be identified in terms of the various zoning categories of the City and the physical conditions of the property. In addition, the specific use for which the request is being made shall be identified, or if the request is for a land use change, a reasonable assumption for the use or uses likely on the site (because a number of uses may be permitted under existing zoning).

D. Methodology: A detailed description and justification of the methods used to determine VMT impacts. If screening is used, an explanation of why screening is appropriate and the screening criteria that are used shall be provided.
If screening is not used, explanation should be provided on how VMT metrics were calculated. This should include a description of metrics, models and tools, inputs for the analysis, and thresholds used.

E. Results: Conclusions of the analysis, supported by discussion, figures, and tables.

For screened projects, this section should summarize how the screening criteria are met.

For projects where full VMT analysis is performed, this section should compare the results

to the significance threshold.

F. Mitigation Measures: This section is required if the conclusion determines the project exceeds the significance threshold. A list of feasible mitigation measures[2] which would either reduce impacts to below the threshold or reduce impacts to the extent feasible shall be provided, beginning with on-site measures. The VMT-reducing effects of each measure shall be quantified to the extent feasible.

G. Conclusion: This section should summarize the analysis and indicate whether VMT exceeds the threshold, including the effects of any applied mitigation measures.

4-12 VMT IMPACT STUDY PREPARATION AND SUBMITTAL REQUIREMENTS

The following requirements shall pertain to all VMT studies, unless otherwise directed by City staff.

1. VMT studies shall be prepared and stamped by a Registered Traffic Engineer or a Registered Civil Engineer with demonstrated competence and adequate experience in Transportation Engineering.

2. An electronic version of the Draft VMT study shall be submitted to the Development Services Engineering Division for review and comment. The City will forward a copy to the applicant for the review.

3. Upon completing their review, the City will provide the Consultant with comments and discuss revisions to be incorporated into the final report.

4. The Consultant shall submit an electronic version of the Final VMT study and the model results.

5. All copies of the VMT study submitted to the City shall become the property of the City.

VMT studies that are not in compliance with the requirements set forth in these VMT Impact Study Standards may be rejected until corrected to the satisfaction of the City.

[2] Using the "Travel Demand Management" and "Air Quality and Climate Change" sections of Appendix A of the General Plan.

SECTION 5: SITE ACCESS

This section establishes requirements for site access and driveway locations.

5-1 GENERAL

Driveways shall meet sight distance requirements as discussed in Section 7-12 of these Design Standards for both ingressing and engressing movements. Driveway width, type and design shall conform to Section 7-14 of these Design Standards.

Backing of vehicles out of driveways onto the roadway shall only be permitted for single family residential or duplex land use. Other land uses shall be designed so both ingressing and engressing vehicles are traveling forward.

Driveways shall be located to provide at least five (5) feet between the driveways's traveled way and appurtenances such as fire hydrants, poles, and drop inlets.

The City recognizes that infill projects (projects within older, previously developed areas) may have certain constraints such as lot size, existing driveways near the property line on adjacent parcels, etc. which may deem it impractical to achieve the requirements contained in these Design Standards for site access. Infill projects such as these will be evaluated on a case-by-case basis by the City. However, the goal will be to achieve the requirements contained herein to the extent practicable.

NOTE: ***Distances discussed below are measured to driveway centerlines. Where distances refer to an intersection, the intersection point of reference is the near curb return.***

5-2 DRIVEWAY LOCATIONS ON MINOR AND PRIMARY RESIDENTIAL STREET

A. For single family residential or duplex, the following shall apply:

Driveways shall be at least ten (10) feet apart as measured edge to edge, except in cul-de-sac bulbs and the outside portion of elbows, where the minimum shall be five (5) feet. For corner parcels, the driveway shall front whichever street is projected to have a lower traffic volume, and the driveway shall be located as far from the curb return as possible, i.e., at the far end of the lot.

B. For Land uses other than single family residential or duplex, the following shall apply:

Driveways shall be at least 100 feet apart. There shall be no driveways within 100 feet of an intersection. Where residential streets intersect collector or arterial streets there shall be no driveways on the residential streets within 150 feet of said intersection.

5-3 DRIVEWAY LOCATIONS ON COLLECTOR OR ARTERIAL STREETS

There shall be no driveways along collector or arterial streets serving single family residential or duplex land uses. Driveways fronting roadways which have been classified in the General Plan as expressways shall be at least 500 feet apart, shall be right-turn-in, right-turn-out only, and shall have a standard right turn deceleration lane. No portion of a driveway shall be allowed within the straight portion of an acceleration or deceleration lane, however, driveways are permitted within acceleration and deceleration lane tapers. No portion of a driveway shall be allowed within a separate bus turnout, including tapers.

Driveways shall be at least 200 feet apart on collector streets and at least 250 feet apart on arterial streets. Driveways on collector streets shall be at least 150 feet from a collector/collector or a collector/arterial intersection or per standard drawing ST-46 if the collector has a right turn lane. Driveways on arterial streets near an arterial/collector or arterial/arterial intersection shall be located and restricted per standard drawing ST-46.

5-4 NUMBER OF DRIVEWAYS SERVING A PARCEL OR SITE

For single family residential or duplex land uses, only one (1) driveway per parcel will be permitted, except where circular drives are proposed and approved by the City Engineer.

For other land uses, the number of driveways shall be minimized, but not to a point that could cause local congestion within the public right-of-way. Consolidation of driveways with adjacent parcels shall occur whenever possible. Where driveway location standards cannot be met for a parcel, the City may require the only access to that parcel be achieved via cross access over an adjacent parcel. This shall satisfy legal requirements for access to a parcel, and the City therefore shall not be required to permit direct access to any parcel via a driveway along the parcel's frontage.

Where land uses other than single family residential or duplex are adjacent, the City typically requires cross access to minimize motorists having to use the street to get from one development to another.

For projects requiring a Traffic Study, the study shall evaluate the proposed site access for the project (see Section 4-5 (F), "Site Access"). The study shall discuss balancing the number of driveways for the project so the number of driveways is minimized, while still providing a sufficient number of access points to minimize congestion and delay.

5-5 RIGHT TURN DECELERATION/ACCELERATION LANES FOR DRIVEWAYS

A right turn deceleration lane shall be provided for a driveway if all of the following conditions are met:

A. The driveway is located on an arterial or expressway.

B. Right turn ingress volume is expected to exceed fifty (50) during peak hour flows on the roadway. For right turn ingress volumes between ten (10) and fifty (50) a right turn curb taper shall be constructed in conformance with the Standard Drawings.

C. There is ample room and frontage to fit a deceleration lane as determined by the City Engineer.

D. The travel speed of the roadway, as determined by the City Engineer, equals or exceeds 45 mph.

There may be cases where some of the above criteria are not met, but City staff may still require a deceleration lane in the interest of safety.

There may be cases where it will be necessary to merge a deceleration lane with an existing acceleration lane. Where the beginning of a deceleration taper will be within 100 feet of the end of acceleration taper, then the deceleration and acceleration shall be merged to form a continuous auxiliary lane.

There may be cases where it is desirable to provide room for right turn deceleration, but an entirely separate deceleration lane is either too difficult to install, due to design constraints, or is not reasonable. In these cases, a right turn curb taper shall be provided in accordance with the Standard Drawing.

Right turn acceleration lanes for driveways shall not be provided.

5-6 LEFT TURN DECELERATION/ACCELERATION LANES FOR DRIVEWAYS

Left turn deceleration lanes (left turn pockets) are not required on collector or residential streets.

On arterials and expressways and where left turns in will be permitted, a left turn deceleration lane shall be provided. This may be in the form of a separate left turn pocket on a six (6)-lane road, or a continuous two (2)-way-left-turn-lane on a four (4)-lane road. The minimum left turn pocket length shall be 200 feet plus a 120 foot entry taper. Longer left turn pockets may be required if a Traffic Study demonstrates the need.

Separate left turn acceleration lanes are not typically required.

5-7 MINIMUM OFFSET FOR OPPOSING DRIVEWAYS

For land uses other than single family residential or residential duplex, the centerline of driveways on opposite sides of the street shall either be in direct line, or have a minimum offset distance as listed below (measured from the centerline of the driveways):

A. For driveways on minor and primary residential streets the minimum offset shall be 150 feet.

B. For driveways on collectors the minimum offset shall be 200 feet.

C. For driveways on arterials and expressways the minimum offset shall be as specified in detail ST-47.

Where a raised median is provided along the center of the street separating conflicting turning movements, the offset requirements as stated above will not apply.

5-8 RESTRICTED TURNING MOVEMENTS FOR DRIVEWAYS

Turning movement restrictions shall apply to unsignalized driveways and side-streets on arterial and expressway streets as listed below:

A. Left turns out of driveways and side-streets onto six (6)-lane roads shall be prohibited.

B. On six (6)-lane roads, driveways within 400 feet of an intersection containing left turn pockets shall be right turn-in, right turn out only. No driveways will be permitted in Zones One (1) and Six (6) as shown in detail ST-46.

C. On 6-lane roads, left turns into driveways may be allowed if all of the following conditions are met:

1. The standard left turn lane length and bay taper can be achieved.

2. Opposing traffic will not queue-up to the point of blocking the left turn in movement. Such a queuing calculation shall be provided by the Consultant preparing the Traffic Study for the project, and the analysis shall use the City's projected modeled traffic volumes for the model's horizon year.

3. The driveway is at least 400 feet downstream and 600 feet upstream of an intersection containing left turn pockets.

D. On four (4)-lane roads, see detail ST-46 for permitted turning movements.

E. Turning movements may be restricted for any driveway where deemed necessary by the City Engineer because of safety concerns.

5-9 SIGNALIZED DRIVEWAYS

The need for signalized driveways shall be based on warrants contained in the latest edition of the Caltrans Traffic Manual. Any such evaluation shall be performed by the Consultant as part of the Traffic Study for the project. For a more detailed description of a traffic signal that needs assessment, refer to Section 4-5 (G) (Traffic Impact Studies) of these Design Standards. Attention is directed to signal spacing requirements as discussed in that section. The City will typically deny a request for a new signal if spacing requirements cannot be met.

Attention is also directed to Section 4-5 (F) for Minimum Required Throat Depth (MRTD) for signalized access locations.

The City does not share in the cost of design and construction of traffic signals which solely serve private property (i.e. a "tee" intersection where the driveway is situated as the "stem" of

the "tee"). The Developer shall bear all costs of providing signalization at the private access point, including design and construction. In the case where a private access point comprises the fourth (4th) leg of an intersection where the other three (3) legs are public streets, the Developer shall ultimately be 100% financially responsible for the private leg (or approximately one-fourth the cost of signalizing the intersection). The obligation is in addition to sharing in the cost of the remaining signal via payment of the City's Traffic Mitigation Fee.

See Section Six (6) of these Design Standards for more information on traffic signals.

The interconnect shall connect the subject signal with at least one existing traffic signal. If the subject signal is between two existing signals, the interconnect shall connect all three signals.

If a City Parcel is adjacent to a new fiber run, a fiber stub shall be provided.

Unless specified otherwise on the plans, six (6) feet of copper and/or fifteen (15) feet of fiber optic cable slack shall be provided in each pull box. Fifty (50) feet of copper and/or one hundred (100) feet of fiber optic cable slack for each signal interconnect cable run shall be provided in the dedicated communications Home Run pull box in front of each signal controller or the last pull box before the controller if a dedicated communications Home Run pull box is not available.

Signal interconnect cable (SIC) shall be 9/125 μm wavelength, 72 to 216 strand, single mode, indoor/outdoor, loose tube, all-dielectric fiber optic cable as specified on the plans. 24 strand fiber shall be allowed where the majority of a pre-existing SIC conduit run's pull boxes are smaller than No. 6.

5-10 MINIMUM REQUIRED THROAT DEPTH

Driveways shall meet the Minimum Required Throat Depth (MRTD) requirements as discussed in Section 4-5 (F) of these Design Standards. In the case of "drive-thru" facilities, attention is directed to the latter part of Section 4-5 (G) for minimum on-site storage distances for ingressing vehicles.

On-site parking shall not be permitted within the MRTD area. The MRTD requirement does not apply to single family residential or duplex land uses.

In cases where a Traffic Study is not required or in cases where there is insufficient data available to calculate the MRTD in accordance with Section 4-5 (F), Exhibit 4-2 shall be used to determine Minimum Required Throat Depth for access points for the site. In cases where a traffic study will be provided, but the access points have not yet been determined for a site, Exhibit 4-2 shall be used to estimate the MRTD during the site design process. In these cases, the final MRTD requirements shall be determined by the Traffic Study via the methodology in Section 4-2 (F). The distances shown in Table 5-1 represent vehicle storage equivalents, which means the total required distance may be achieved by summing the throat depths for several access points if more that one access point is to serve the site. In these cases, the distance shown in Exhibit 4-2 shall be prorated to each access point to the nearest 25 feet based on the estimated relative percent usage of each access point.

TABLE 5-1
MINIMUM THROAT DEPTH

Land Use	Size	Street Right of Way		
		<60'	60'	>60'
Apartment, Condos, Mobile Homes, Planned Unit Development	0 – 80 units	25'	50'	50'
	81 – 160 units	50'	50'	50'
	>160 units	50'	50'	100'
Quality Restaurant	0 – 15,000 SF	25'	25'	25'
	> 15,000 SF	25'	25'	50'
High Turnover/Sit Down Restaurant	0 – 8,000 SF	25'	25'	25'
Drive-Thru Restaurant	0 – 2,000 SF	25'	25'	25'
	2,001 – 3,000 SF	25'	50'	100'
	3,001 – 5,000 SF	50'	75'	150'
	> 5,000 SF	75'	100'	225'
Motel	0 – 150 rooms	25'	25'	25'
	151 – 400 rooms	25'	75'	125'
	> 400 rooms	25'	100'	175'
Convention Hotel	0 – 150 rooms	50'	50'	100'
	151 – 400 rooms	50'	150'	250'
	> 400 rooms	50'	250'	350'
Office Park	0 – 20,000 SF	25'	25'	25'
	20,001 – 50,000 SF	25'	50'	75'
	50,001 – 100,000 SF	25'	75'	175'
	100,001 – 150,000 SF	75'	125'	250'
	150,001 – 300,000 SF	125'	250'	500'
	> 300,000 SF	200'	400'	825'
General Office	0 – 50,000 SF	25'	25'	50'
	50,001 – 100,000 SF	25'	50'	100'
	100,001 – 150,000 SF	50'	75'	175'
	150,001 – 200,000 SF	50'	100'	225'
	200,001 – 300,000 SF	75'	175'	350'
	300,001 – 400,000 SF	125'	225"	450'
	> 400,000 SF	150'	275'	575'

TABLE 5-1 (cont.)
MINIMUM THROAT DEPTH

Land Use	Size	Street Right of Way		
		<60'	60'	>60'
Light Industrial	0 – 100,000 SF	25'	25'	50'
	100,001 – 200,000 SF	25'	50'	100'
	200,001 – 300,000 SF	50'	75'	150'
	300,001 – 400,000 SF	50'	100'	200'
	> 400,000 SF	75'	125'	250'
Industrial Park	0 – 500,000 SF	25'	25'	50'
Discount Store	0 – 30,000 SF	25'	25'	25'
	30,001 – 50,000 SF	25'	50'	75'
	50,001 – 75,000 SF	50'	50'	125'
	> 75,000 SF	50'	75'	175'
Shopping Center	0 – 10,000 SF	25'	25'	50'
	10,001 – 20,000 SF	25'	50'	125'
	20,001 – 30,000 SF	50'	100'	175'
	30,001 – 40,000 SF	75'	125'	225'
	40,001 – 100,000 SF	75'	150'	250'
	100,001 – 150,000 SF	100'	175'	375'
	150,001 – 200,000 SF	125'	250'	500'
	200,001 – 250,000 SF	150'	300'	625'
	250,001 – 600,000 SF	175'	375'	750'
	600,001 – 700,000 SF	200'	375'	750'
	700,001 – 800,000 SF	225'	425'	875'
	800,001 – 900,000 SF	250'	500'	975'
	900,001 – 1 million SF	275'	550'	1,075'
	> 1 million SF	425'	825'	1625'
Drive-In Bank	0 – 10,000 SF	25'	25'	50'
	10,001 – 20,000 SF	50'	50'	200'
	20,001 – 30,000 SF	75'	150'	300'
	30,001 – 40,000 SF	100'	200'	400'
	> 40,000	150'	250'	500'
Supermarket	0 – 20,000 SF	25'	25'	50'
	20,001 – 30,000 SF	25'	50'	75'
	30,001 – 40,000 SF	25'	50'	100'
	> 40,000	25'	75'	150'
Medical Clinic	0 – 100 employees	25'	25'	50'

SECTION 6: TRAFFIC SIGNALS, SIGNS, AND STRIPING

6-1 TRAFFIC SIGNAL NEEDS ASSESSMENT

The need for new traffic signals shall be based on warrants contained in the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD). For a more detailed description of a traffic signal needs assessment, refer to Section 4-2H of these Design Standards.

6-2 DESIGN STANDARDS

Traffic signals, striping, and signage shall be designed and constructed in accordance with these Design Standards and the latest editions (English units) of the following listed in order of precedence:

- City of Roseville Standard Notes as published on the City's Web site at: https://www.roseville.ca.us/government/departments/development_services/engineering_land_development/plan_review/standard_notes

  - City of Roseville Design & Construction Standards.

  - Caltrans Standard Specifications and Caltrans State Standard Plans, including all standard symbols contained therein.

  - California Manual on Uniform Traffic Control Devices (CAMUTCD).

  - Attention is directed to the following from the CAMUTCD:

    1. Table 4D-101. Suggested Detector Setbacks from Limit line.

    2. Tables 4D-108 and 4D-109 for conduit sizing. The 26% fill limit shall apply to new installations.

  - A copy of the Traffic Signal Inspection Check list is included on Detail TS-22 as a reference of required inspections during construction.

A. Signal Standard Types: Traffic signal standards, posts, and mast arms shall be of the types listed in Table 6-1:

TABLE 6-1

STANDARD/POST	MAST ARM	LUMINAIRE ARM
Ped. Push Button (2.5")	None	None
7 to 15 foot 1-B	None	None
Type 15	None	6-15 foot
Type 15 TS (7.2' foundation)	None	6-15 foot
16-2-100	20 foot	None
17-3-100	20 foot	6-15 foot
18-4-100	25-30 foot	None
19-4-100	25-30 foot	6-15 foot
23-4-100	35 foot	None
24-4-100	35 foot	6-15 foot
26-4-100	40-45 foot	6-15 foot
27-4-100	40-45 foot	None
28-5-100	50-55 foot	None
29-5-100	50-55 foot	6-15 foot
60-5-100	60-65 foot	None
61-5-100	60-65 foot	6-15 foot

The typical luminaire arm length used is 15 feet. Signal mast arms and luminaire mast arms shall be within 2 degrees of perpendicular to the centerline of the roadway. Type 15TS pole above shall be used in conjunction with IISNS installations.

1B poles for four section and five section heads shall be 13 feet and 14 feet tall respectively.

Poles (except 1-B's) shall be permanently labeled with the pole size, manufacturer, and serial number below or above the hand hole.

Coupling nuts shall be used on all 1-B poles,Ped. Push-button posts, and traffic service and controller cabinet foundations. Refer to Caltrans 2018 Standard Plans ES-7B for typical nut thickness.

Signal pole and arm welding shall be performed by individuals certified by the pole manufacturer and shall not limit the original manufacturer warranty.

Foundation locations must be verified by Engineering prior to installation.

B. Vehicle and Pedestrian Signal Types: Vehicle signals and pedestrian signals shall be of the following types:

- MAT (3 section only)
- MAS
- MAS 4B
- SV-1-T

- SV-2-TB
- SV-3-TB
- TV-1-T
- TV-2-T
- TV-3-T
- SP-1-CS
- SP-2-CS

The MAT mounting shall only be used for 3 section vehicle signals for protected left turn movements. All other mast arm mounted vehicle signals shall be MAS mounted. All MAT and MAS mounts shall use six (6) set screws.

All signal faces shall be aluminum. Mountings for MAT and MAS signal sections shall be bronze metal.

Signal faces shall have 12-inch LED displays, unless otherwise specified.

All signal sections shall be 12-inch mold-cast aluminum with aluminum, perforated louver backplates.

Pedestrian heads shall be mounted on the intersection side of the signal pole unless otherwise directed by the Engineer and shall be clam shell type with bronze mounting hardware.

Protected left turn signals shall be all arrow.

Programmed visibility vehicle signals shall not be used without prior approval of City engineering staff and shall not be constructed of plastic.

Any 1B standard having a signal head display, 4 sections or larger, shall be installed under the following criteria:

1. Four (4) section displays will be side (SV-1-T or SV-2-T) mounted. The 1B standard shall be 13 feet in height. A PVC cap shall be provided as a pole cap.

2. Five (5) section display shall be side (SV-1-T or SV-2-T) mounted. The 1B standard shall be 14 feet in height. A PVC cap shall be provided as a pole cap.

3. The extra support method shall consist of a 1" stand off w/ ¼" X 20 threaded hole. The stand-off shall be banded to the signal standard, 3" below the bottom of the top slip fitting of the displays' 1 ½ inch riser. A ¼ inch hole shall be drilled in the center of the 1 ½ 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.

C. Vehicle Signal Alignment: The following vehicle signal alignments are typical. Variations may be required on a case by case basis.

1. For single left turn lanes with protected left turn movement, the left turn signal shall line up with the center of the left turn lane as close as possible.

2. For dual left turn lanes (which shall have a protected movement), the left turn signal shall line up with the line between the two left turn lanes as close as possible.

3. Through movement signal indications shall align as follows:

- 1 travel lane – the center of the lane.
- 2 travel lanes, the lane line in-between the two lanes.
- 3 or more travel lanes – one signal indication shall be provided on each lane line between through lanes.

4. For one through lane with permissive left turn, the MAS signal shall line up as close as possible with the center of the through lane. Far left permissive signal indication shall not be used.

5. When a 4 section MAS (MAS-4B) signal is used, it shall line up with:

- The lane line between the through and the left turn, or
- The lane line between dual left turn lanes at a "T" intersection, or
- The center of a single left turn lane at a "T" intersection, or
- The center of a split phase shared through/left turn lane at a "T" intersection.

D. Number of Vehicle Signal Indications: Typical indications are as follows:

1. For protected left turn movements: one 3-section all arrow MAT and one 3-section all arrow far left side pole-mounted signal.

2. For through movements (with protected left turns): one 3-section MAS, one 3-section far right side pole-mounted signal, and one 3-section near right side or top pole-mounted signal.

3. For through movements (with permissive left turns): one 3-section MAS, one 3-section far right side pole-mounted signal, and one 3-section near right side pole-mounted signal. Far left permissive signal indications shall not be used.

4. For split phased situations: one 4-section MAS (MAS-4B w/GA), one 3-section far left side pole-mounted signal, (all Arrow), one 3-section far right side pole-mounted signal, and one 3-section near right side pole-mounted signal.

5. For right turn arrow overlap situations: same as above except the far right side and near right side pole-mounted signals shall be 5-section with green and yellow arrows. Right turn arrow overlaps shall not be provided without prior approval of the City Engineer. Where right turn arrow overlaps are provided, the conflicting U-turn shall be prohibited via signage.

6. For Bike exclusive signal phasing, turns are restricted during bike phase. Blank out sign required to prohibit right turns on red during bike phase activation.

E. Signal Phasing: Signal phasing shall start with phase 2 northbound and proceed in a clock wise direction unless directed otherwise due to coordinated corridor restrictions.

F. Permissive Left Turn Phasing: Permissive left turn phasing shall only be considered under the following conditions:

1. Minor side street approach.

2. Single approach lane (excluding right turn lane).

3. Low vehicular (less than 45 cars over the peak hour) and pedestrian volumes.

4. The approach does not service a park or school.

5. The approach is not a main school pedestrian route.

G. Vehicle Detector Layout and Inputs: Typical vehicle detector layout and inputs shall be as follows (see Details TS-9 and TS-10):

1. For permissive or protected left turn situations, the left turn lane shall have four loops with the first and second loops spaced 8 feet apart, the second and third loops spaced 9 feet apart, and the third and fourth loops spaced

2. 10 feet apart. The fourth loop shall have counting ability. The other three loops can share one input.

3. Each through lane shall have two call loops spaced 8 feet apart with one count loop spaced 9 feet behind the second call loop and one advanced loop placed per the CMUTCD.

4. Each right turn only lane shall have one loop placed 30 feet behind the stop bar in line with the through lane count loops. The loop shall be used for counting and may be used for detection following a 10 second minimum delay.

5. For the stem of a "tee" intersection, each left turn lane shall have four loops with the first and second loops spaced 8 feet apart, the second and third loops spaced 9 feet apart, and the third and fourth loops spaced 10 feet apart. The fourth loop shall have counting ability. The other three loops can share one input. No intermediate or advanced loops will be required on "tee" stems.

6. For split phase signals with a shared through/left turn lane, the shared lane shall have four loops with the first and second loops spaced 8 feet apart, the second and third loops spaced 9 feet apart, and the third and fourth loops spaced 10 feet apart. The fourth loop shall have counting ability. There shall also be one advanced loop placed per the CMUTCD.

7. 30' of slack for each loop shall be provided in the adjacent pull-box for stop bar and advance loops

Front vehicle loops shall be Type D or a "Quadra Circle". Vehicle count and extension loops shall be Type A. The loops nearest the stop bar shall be placed 1 foot from the stop bar. Where a loop is designated to have counting ability as discussed above, the loop shall not share an input with any other loop. Loop wire shall terminate in the nearest pull box and not the hand hole.

Bicycle detection loops shall be Type D or a "Quadra Circle" except that their size shall be modified as follows:

- The loop size shall be decreased such that it is 1 foot narrower than the bike lane. A 6 foot bike lane shall have a 5 x5 foot loop, a 5 foot bike lane shall have a 4 x 4 foot loop, etc.

- The front of the loop shall be 6" back of the stop bar.

- The center of the loop shall be 3 feet back of the crosswalk/stop bar.

- Each bicycle loop shall have its own detector lead-in cable and shall be spliced in the pull box not the handhole.

- Each loop shall consist of five turns of 14 AWG with XLLP insulation.

Detector lead-in cables shall be Type B and shall not be spliced between the termination point (pull box adjacent to detector loop) and the controller cabinet terminals. Tinned copper shall be permitted. There shall be a spare DLC in each advance loop pull box with 20' of spare cable.

Type GO5 detector hand holes shall be placed so they line up with roadway stripes to minimize the frequency of vehicle tires driving over the handhole covers. A sufficient number of handholes shall be placed so that detector loop saw cuts shall not cross adjacent lanes of travel.

Signal loops installed in new asphalt concrete (AC) pavement shall be placed in the lift of immediately below the final lift. The new bottom lift of AC shall be a minimum of 3 inches thick (5' back of advance loop) where the traffic signal loops will be installed. New loops that will be buried under AC shall be installed with a saw cut depth as required to maintain a minimum of 1/2" coverage of loop sealant. Loops installed in the top lift of AC will be saw cut to a depth required to maintain 1" of sealant coverage. Refer to City detail TS-31 for typical loop connection details.

Signal loops installed in new concrete pavement shall be placed immediately below the concrete and shall be preformed loops conforming to the Traffic Signal Approved Equipment List.

Signal loops shall be protected from damage before and during pavement placement.

Loops installed in existing pavement where existing loops are surface cut on that same approach may also be surface cut per the State of California Standard Plans unless otherwise directed by the Engineer. Vehicle loops shall have four (4) turns of wire in the slot.

Existing buried loops damaged by construction shall be reinstalled as if in new pavement per the above paragraph. The contractor shall grind 1½ inches of asphalt concrete pavement from lane line to lane line and at least 1 foot outside the limits of work required to install the entire loop wire. The loops shall then be covered by an asphalt concrete overlay per City Standards. Should the AC thickness be insufficient to install the loops as specified above, the contractor shall complete any additional grinding, excavating, or paving necessary to install the loops.

Loop Home Run slots shall be double cut to accommodate the twisted pair (3-turns/foot), or as directed by the Engineer. Sealant for filling slots shall be Hot Melt Rubberized Asphaltic Sealant or equivalent as approved by the Engineer. All excess sealant shall be squeegeed off after application. All loops shall be wound in a clockwise rotation.
All loops shall be wound in a clockwise rotation

Where the approved plans call for preformed detector loops, the following shall apply:

1. The conduit shall be sealed to prevent the entrance of water and the movement of wires within the conduit.

2. The loop wires from the performed loop to the adjacent pull box or hand hole shall be twisted together into a pair (at least two turns per foot) and encased in Schedule 40 or Schedule 80 PVC or polypropylene conduit (⅜ inches minimum diameter). The lead-in conduit shall be sealed to prevent the entrance of water at the pull box or hand hole end.

3. The preformed loop and lead-in conduits shall be placed prior to placing final concrete. In new roadways the top of the conduit shall be placed flush with the top of the base course. For other roadways the top of the conduit shall be between 2 and 3 inches below top of finished surface. Where the concrete is steel reinforced, the preformed loops may rest on the steel.

4. All detector loop shields shall not be grounded to the ground bus in the controller cabinet. 6" of the shield wire will be wound around the DLC'S then insulated with heat shrink tubing.

Loop locations must be verified by Engineering prior to installation. The contractor shall give 48 hours notice prior to loop verification request date.

H. Traffic Signal Conductors: New traffic signal and SIC conductors shall be installed per the following guidelines:

1. New wire may be pulled through existing conduits without removing conductors if based on common conditions:

a. There are a maximum number of four, ninety degree by twenty-four inch radius bends in one conduit run between pull boxes or termination points, and

b. Conductors, conduit, number of bends and length of the pull are within reasonable limits (under 175 feet for signal wiring and under 400 feet for signal interconnect wiring), and

c. Ratio of the conduit (inside diameter) to the combined diameter of both the new and existing conductors or cables (outside diameter), otherwise known as conduit fill, does not exceed 40 percent.

2. All existing conductors shall be removed from conduits, the conduit proven, existing wires inspected, and the new wires added and re-pulled along with the wires previously removed if:

a. Items a and b under number 1 above are met but the ratio of the conduit (inside diameter) to the combined diameter of both the new and existing conductors or cables (outside diameter), otherwise known as conduit fill, is greater than 40 percent but less than or equal to 60 percent, or

b. Items a through c under number 1 above are met but jamming occurs.

3. New conduit shall be installed per City of Roseville Construction Standards if more than four ninety degree radii exist, the length of the pull exceeds Item #1b above, or the ration of the conduit (inside diameter) to the combined diameter of both the new and existing

conductors or cables (outside diameter), otherwise known as conduit fill, exceeds 60 percent.

4. The new wire shall be pulled as follows:

a. Conductors shall be pulled into conduits by hand

b. Only Polymer Based pulling compounds such as Aqua-Gel by Ideal or equivalent shall be used

c. Lubricants shall be forcefully injected into the conduit system

d. Only fiberglass fish tape or polyester measure tape may be used

e. When pulling in multi conductor cable there shall be three spare conductors to each pole. When pulling individual conductors there shall be three spares at each pull box tied to a signal crossing.

It is assumed that all existing conductors and cables are undamaged unless inspected, documented, and reported to the inspector prior to the contractor starting that section of the work. Otherwise, any damage to City facilities shall be repaired by the contractor at the contractor's cost in conformance with City standards.

Conductor installation in new conduits shall be limited to 26 percent fill of the conduit maximum.

Three (3) shielded OSP category 6E cables (from the City approved equipment list), or City approved equivalent, and one (1) power cable (IMSA 14-3/20-1-STR 600V, Belden part number 601195) or City approved equivalent to top of designated poles with 10 feet of slack for each cable at the top of the pole and 40' of slack in the pull box adjacent to the pole.

In order to reduce strain on the shielded OSP CAT6E cabling, all cables shall be adequately supported by feeding them through a Kellems grip which is attached to and suspended from the pole cap.

The hole drilled for the CAT6E cabling shall be drilled on the back side of the pole three feet from the top in order to minimize the camera view obstructed by the cable and shall be threaded for a straight ¾" strain relief cord connector. At least four feet of cable shall be pulled through and secured by the strain relief cord connector. The cables shall be looped together, adequately secured to the pole to prevent movement, and sealed on the ends to prevent moisture exposure.

All new and replacement traffic signal phase wiring shall be multiple circuit conductors. Unique color coding shall be provided for each wire within the cable. The number of wires per

cable shall be the next common size up from that required to provide the necessary wires as specified on the plans.

At new and remodeled traffic signals, a three inch, two cell "MAX CELL" or equivalent product shall be provided in all street crossing traffic signal conduits.

Equipment grounding conductors shall be # 6 stranded copper with THW green insulation, see Details TS-25.

The grounding electrode rod in the Service shall be paralleled with the grounding electrode rod in an adjacent pull box that is no less than 20 feet from service electrode. This connection shall consist of a continuous stranded #6 insulated conductor. The ground connection shall be on the line side of the electrical entrance terminal block. The continuous #6 stranded and insulated green copper conductor shall connect the ground bus in the electrical service, grounding electrode in the service.

I. Traffic Signal Interconnect (SIC): Traffic signal interconnect shall be provided for new signal installations, and for modifications of existing signals which currently do not have interconnect. The interconnect cable shall have its own conduit and shall not share conduit with service conductors, signal conductors, or lead-in cables.

The interconnect shall connect the subject signal with at least one existing traffic signal. If the subject signal is between two existing signals, the interconnect shall connect all three signals.

If a City Parcel is adjacent to a new fiber run, a fiber stub shall be provided.

Unless specified otherwise on the plans, six (6) feet of copper and/or fifteen (15) feet of fiber optic cable slack shall be provided in each pull box. Fifty (50) feet of copper and/or one hundred (100) feet of fiber optic cable slack for each signal interconnect cable run shall be provided in the dedicated communications Home Run pull box in front of each signal controller or the last pull box before the controller if a dedicated communications Home Run pull box is not available.

Signal interconnect cable (SIC) shall be 9/125 µm wavelength, 72 to 216 strand, single mode, indoor/outdoor, loose tube, all-dielectric fiber optic cable as specified on the plans. SIC shall have a footage marking every 4 feet. This marking may be on the outside of the cover or on the inside insulation jacket.

At the discretion of the City, existing SIC may be disconnected by the City and moved out of the work area by the contractor during construction. However, the SIC must be reinstalled by the contractor within seven days of its disconnection. Otherwise, all SIC must remain operational.

Existing copper SIC damaged during construction shall be replaced at the contractor's cost from controller cabinet to controller cabinet on either end of the damage. Splicing of copper

SIC is not allowed. Damaged copper SIC shall be replaced with **fiber optic** SIC, including cable, conduit, splices, terminations, patch panels, and pull boxes conforming to current City standards. The contractor shall also be responsible, at the contractor's cost, to make any additional repairs needed to install the new cable from controller to controller.

Existing fiber optic SIC damaged during construction shall be repaired.

Damage

1. Fiber Optic Cable and related facilities damaged during construction shall be replaced/repaired to current City standards and as specified below at the contractor's cost. This work shall include fiber optic cable, conduit, pull boxes/vaults, trenches, concrete, asphalt, traffic control, pull tape, splices, splice enclosures, terminations, labor, etc, as required.

2. Damage is described as a breach in the fiber optic cable jacket, a kink, a break of the cable, or any other condition that causes a reduction in the capacity of the cable.

3. Should fiber optic cable facilities be damaged during construction without visible damage to the cable, the cable shall be tested by a certified fiber optic technician provided by the contractor at the contractor's cost to ensure that there is no internal damage. Should the test show internal damage, the cable shall be replaced as specified below. Otherwise, the cable shall be protected and the facilities repaired to current City standards.

Repair

1. Fiber optic cable running between and terminating at adjacent traffic signals or devices shall be replaced from termination to termination:

- All new cable and terminations shall be acceptance tested as required elsewhere in the City standards.

- If the new cable must be pulled through conduits that contain traffic signal phase wiring, then a "MAX CELL" or equivalent sleeve, per City standards, shall be installed in the conduit prior to the installation of the new fiber optic cable

a. Pull box adjacent to the damage to controller cabinet.

1) No more than 5 feet of slack may be used out of any one pull box.

2) Pull boxes where new splices shall occur will be replaced with Fiberlyte FL36 24" deep vaults as specified in the City standards

3) At least 50 feet of slack must be provided in the new splice vault.

4) The slack shall be provided in even amounts on either side of the splice enclosure.

5) Only fusion splicing meeting City standards by a certified fiber optic technician will be allowed.

6) All new cable, splices, and terminations shall be acceptance tested as required elsewhere in the City standards.

7) The average optical loss of each splice shall not exceed 0.10 dB. The average is determined by measuring the splice loss in both directions with an OTDR, adding the two readings, and dividing by two. Testing should be performed for both the 1310 and 1550 nm wavelengths.

8) Splicing will not be allowed in pull boxes or vaults shared with non signal interconnect cables.

9) If the new cable must be pulled through conduits that contain traffic signal phase wiring, then a "MAX CELL" or equivalent sleeve, per City standards, shall be installed in the conduit prior to the installation of the new fiber optic cable.

2. Fiber optic cable running continuously past multiple traffic signals or devices may be repaired by splicing at adjacent pull box locations.

a. A single splice location may be appropriate if the damage is close enough to the adjacent pull box that the repair may be accomplished by using some of the slack in the existing cable.

1) No more than 5 feet of slack may be used out of any one pull box.

2) Pull boxes where new splices shall occur will be replaced with Fiberlyte FL36 24" deep vaults as specified in the City standards

3) At least 50 feet of slack must be provided in the new splice vault.

4) The slack shall be provided in even amounts on either side of the splice enclosure.

5) Only fusion splicing meeting City standards by a certified fiber optic technician will be allowed.

6) All new cable, splices, and terminations shall be acceptance tested as required elsewhere in the City standards.

7) The average optical loss of each splice shall not exceed 0.10 dB. The average is determined by measuring the splice loss in both directions with an OTDR, adding the two readings, and dividing by two. Testing should be performed for both the 1310 and 1550 nm wavelengths.

8) Splicing will not be allowed in pull boxes or vaults shared with non signal interconnect cables.

b. Two splices may be necessary if the damage is not near an existing pull box. In this case, a splice shall be provided on either side of the damage and a new length of cable meeting City standards shall be installed between the splices.

1) Pull boxes where new splices shall occur will be replaced with Fiberlyte FL36 24" deep vaults as specified in the City standards.

2) At least 100 feet of slack must be provided in each vault.

3) The slack shall be provided in even amounts on either side of the splice enclosure.

4) Only fusion splicing meeting City standards by a certified fiber optic technician will be allowed.

5) All new cable, splices, and terminations shall be acceptance tested as required elsewhere in the City standards.

6) The average optical loss of each splice shall not exceed 0.10 dB. The average is determined by measuring the splice loss in both directions with an OTDR, adding the two readings, and dividing by two. Testing should be performed for both the 1310 and 1550 nm wavelengths.

7) Splicing will not be allowed in pull boxes or vaults shared with non signal interconnect cables.

8) If the new cable must be pulled through conduits that contain traffic signal phase wiring, then a "MAX CELL" or equivalent sleeve, per City standards, shall be installed in the conduit prior to the installation of the new fiber optic cable.

3. Repair work must **begin within 24 hours** and be **completed within 48 hours** of the damage occurring irrespective of weekends and holidays.

4. Should the contractor be unable to make the repairs within this time frame, the City will complete temporary repairs and bill the contractor for their time and materials at the City's billable rate. The temporary repair shall be treated with the same restrictions,

requirements, and care as the original cable. The contractor will still be required to make the permanent repairs prior to completion of the project.

Temporary copper SIC repairs must be made within 48 hours of the damage and provide sufficient bandwidth and reliability for the intended purpose of the copper SIC. Permanent Repairs shall be completed within 30 days of the damage. The City may make the repairs and bill the contractor for the work should the contractor be unwilling or unable to meet these requirements.

Should copper SIC installation be required by the city, the contractor shall test all copper SIC prior to installation:

a) For continuity of each wire pair. Resistance shall be consistent.
b) For high resistance (meggar) testing (250v setting):

1) Each wire pair to ground

2) Each wire pair to the cable shielding

3) Each wire pair to wire pair

c) The test may be in the field or shop

d) A city technician does not need to be present

e) The contractor shall be liable for all inspection costs related to the removal and re-installation of new cable if the untested cable is found to be faulty after installation.

Fiber optic cable shall be acceptance tested, every strand, both before and after installation at both 1310 and 1550 nm wavelengths. All testing shall be documented on OTDR Acceptance Test and Splice Loss Record forms. Losses shall not exceed 1.85 dB per mile of cable including patch panels and splices.

J. Traffic Signal Conduit: All new conduit placed in existing roadways shall be buried at a minimum depth of 15" for double conduits and 18" for single conduits below finished grade. All new conduit placed in new roadways shall be installed prior to any paving operations and be buried at a minimum of 18" below finished subgrade with the exception of conduit between detector hand holes and the first pull box which shall be buried a minimum of 18" below finished grade. New conduit installed outside of the roadway and sidewalk shall be installed at a minimum depth of 36" below finished grade.

Unless otherwise specified, all signal interconnect (SIC) conduit shall be 2-3" schedule 40 gray PVC conduit with 3 foot radius 90 degree sweeps into each number 6 pull box.
All traffic signal and SIC conduit shall have a DLC taped with a 5" green band and labeled with "locate".

Signal conduit diameter sizes shall be 2 inches minimum and 3 inches maximum except conduit runs to pedestrian push button posts shall be one (1) inch. At four-legged intersections, traffic signal conduit shall cross all legs i.e. all the way around the intersection.

Existing conduits not to be reused shall be removed from existing pull boxes and the ends shall be plugged solid with grout. Existing conductors shall be removed form said conduits prior to plugging.

Abandoned conduits deemed reusable shall have the line blown out, existing conductors removed, No. 10 green pull wire installed, and the ends of the conduits sealed.

All pull tape shall be a minimum of 250 feet in length without splicing where possible. All pull tape splices shall have the ends knotted together in the pull box and all splices shall be made using 3M scotchlok connectors (models UR or UY) or approved equal to ensure a continuous connection from signal controller to signal controller. Once pull tape is installed and all splices are completed, the City signal technician shall ground the tracer wires in the signal cabinet and test the wires for continuity before accepting the work. Should the pull tape tracer wire fail the continuity test, the Contractor shall repair or replace as necessary to achieve continuity.

K. Traffic Signal Pull Boxes: All pull boxes shall be No. 6 Fiberlyte FL36 with Penta Head Bolts per the City's Construction Standards except as modified by the plans or the provisions below:

1. Advance loop pull boxes shall be No. 6 and shall have a minimum of 20 feet of detector lead-in cable (DLC) and 20 feet of extra loop cable spooled in the pull box.

2. The "Home Run" and "Communication Home Run" pull boxes (typically adjacent to the controller) shall be Fiberlyte FL36 24" deepboxes with 12 inch extensions (double stack). Detector loop splicing is not allowed in the "Home Run" pull boxes. The "Home Run" pull box shall be located a minimum of eight (8') from the service and controller pad ground rods (See Detail TS-25).

3. Fiberlyte (FL36) + 24 in extension vaults shall be installed at all new locations and at every fiber optic cable splice point unless otherwise specified on the plans.

4. Pull boxes shall not be placed within the area of an access ramp unless directed by the Engineer. Pull boxes should be installed a minimum offset of 1' from, back of walk when within the sidewalk, and from any score or expansion joint. The bottoms of pull boxes shall be bedded in 6 inches of clean crushed rock. Grout in the bottom of pull boxes is not required. The pull box rim and lid shall be flush with surrounding surface. In unpaved areas, the pull box rim and lid shall be 1 inch above the finish grade. Pull boxes located outside of the sidewalk or planter area behind a sidewalk shall be of the Caltrans traffic rated pull box design.

All pull boxes and lids shall be #6 Fiberlyte (FL36) boxes unless otherwise directed by the Engineer. If an "in planter" type box is used, it must have a concrete collar.

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 replace.

Pull box covers shall read "TRAFFIC SIGNAL", except for pull boxes and vaults used solely for traffic signal interconnect. Pull boxes and vaults used solely for copper traffic signal interconnect shall read "SIGNAL INTERCONNECT". Should the signal interconnect pull box or vault contain any fiber optic cable, the cover shall read "TRAFFIC SIGNAL FIBER OPTICS" instead.

L. Pedestrian Push Button (PPB): Pedestrian push buttons shall be aluminum Type "B" with metal international symbol signs. Push buttons shall meet all Americans with Disabilities Act guidelines and be placed 36 inches above the grade of the closest edge of sidewalk and shall require a reach of no more than 18 inches outside the closest edge of sidewalk. Pedestrian push buttons shall be within five (5) feet of the edge of the crosswalk line (extended) farthest from the center of the intersection (CMUTCD Figure 4E-3). Audible pedestrian signals shall be installed at all new and modified traffic signals. The contractor shall provide a city approved wave file. All other buttons shall be solid state, two tone audible, momentary LED type. . See the City's website for a list of approved models.

M. Intersection & Arterial Roundabout Safety Lighting: Illumination provided by intersection safety lighting at signalized intersections & arterial roundabouts shall meet the following criteria:

At Signalized Intersections:

1. A minimum of .15 footcandles throughout the crosswalks.

2. A minimum of .6 footcandles at the center of intersection.

3. Uniformity = avg/min = 3.0

4. The lowest wattage fixture per the City Approved Equipment List that meets the above safety lighting requirements shall be used.

At Arterial Roundabouts, the following table (taken from Design Guide for Roundabout Lighting by IES) shall be used:

Illumination for Roundabouts				
Functional Classification	**Maintained Average Horizontal Illuminance in Lux/FC on the Pavement based on Pedestrian Area Classification**			**E avg/Emin**
	High	Medium	Low	
Major/Major	34.0/3.4	26.0/2.6	18.0/1.8	3:1
Major/Collector	29.1/2.9	22.0/2.2	15.0/1.5	3:1
Major/Local	26.0/2.6	20.0/2.0	13.0/1.3	3:1

*Recommended Illuminance for Roundabouts based on IES Roadway lighting for Roundabouts

**The average vertical illuminance for a series of points 5 ft. in height along the centerline of the crosswalk extending to the edge of the roadway, spaced at 1.65 ft, for each driving direction, be equal to the required horizontal illuminance and uniformity for the roundabout as described in the above Table.

Luminaries shall be 250 and/or 400-watt equivalent LED and labeled as such. See the City's website for a current list of approved materials. The luminaire equivalent wattage shall be called out on the plan sheet.
Luminaries shall be medium cutoff, Type II or III lighting distribution (MSII or MSIII)

For 400-watt luminaries, two separate 120-volt circuits shall be provided to equally split the power load.

Photoelectric controls shall be Type II and pole top mounted. Wiring from the photoelectric cell assembly to the electrical service shall be #14.

N. Controller/Service Pad: 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. Masonry blocks (not gravity type blocks) may be utilized to achieve the required 2:1 slope. The Contractor shall be responsible for acquiring engineering for retaining walls if the wall is greater than four feet from base of footing to top of wall. Refer to Detail TS-4 through TS-8 for further details.

The service pedestal shall be installed a minimum of six (6) feet from the controller cabinet.

A City of Roseville Encroachment Permit is required for every traffic signal installation and/or modification. The project address for the permit shall be the service pedestal address. This address should be noted on the plans but is obtainable from the City in its absence. Minor modifications by City forces not involving the service pedestal are exempt from the encroachment permit requirement. Should a traffic signal be a part of a larger project, there

may be an encroachment permit for the entire larger project and one or more permits for each and every signal installation/modification.

On 332 cabinets, the field wire entrance section of the controller shall face the intersection or as directed by the Engineer.

O. Traffic Signs: Sign codes shall be per the CMUTCD unless denoted otherwise. Typical signs include the R-73 (CA) series mast arm mounted signs, R3-18 mast arm mounted signs, R9-3 and R9-3b signs (where crossing the street is restricted), W3-3 Signal Ahead roadside signs (pavement markings are only necessary where visibility of the signal is limited or where the signal may be unexpected by motorists), and R3 series roadside signs on the stem of a "tee" intersection.

As a minimum, all signs shall be the common size as shown in the Standard Highway Signs manual. On collector and arterial streets, the minimum size of type R1 stop signs shall be 36 inches. If the intersection has more than three lanes (including turn lanes) in each direction, a supplemental 24" STOP sign is required in the median. Retro reflective red tape is also required for both unistruts. If the median is too narrow for supplemental signage, a 36" LED flashing STOP sign is required from the approved City equipment list. Type R1 stop signs on other streets shall be 30 inches. Type R1 stop signs installed on bike trails may be either 24 inches or 18 inches as approved by the Engineer. On all arterial/minor arterials with three or more lanes of traffic (including turn lanes), that a 36" solar-powered flashing STOP sign shall be installed on the right side of the road.

Fluorescent Yellow Green (FYG) background colored signs shall be installed for the following sign types: S1-1, S3-1, S4-3, W11-1, W11-2, and W16-7p and W16-9p when used with one of the previously listed signs.

Where crossing the street is restricted at signalized intersections, R9-3 and R9-3b signs shall be installed on the signal pole in the place of the pedestrian signal indication.

In the case of R73 (CA) series of mast arm mounted signs, a common question is whether or not to allow U-turns. This determination is a function of whether or not there is sufficient room for turning radius. The guideline used by the City is that U-turns shall be restricted where less than 44 feet exists between the right lane line of the left turn lane and the face of curb for the opposing direction of travel for single left turn lanes, where less than 36 feet exists between the left edge of the inside left turn lane to the face of curb for the opposing direction of travel for dual left turn lanes, or as required by the Engineer (Detail TS-15). If U-turns are to be restricted at permissive or no left turn intersections, R3-4 or R3-18 signs shall be installed on the mast arm.

A bicycle signal actuation sign, R10-22, shall be installed in conjunction with bicycle detection. The sign shall be placed adjacent to the bicycle loop on the nearest signal pole or on a sign post per City standards as directed by the Engineer.

W3-3 Signal Ahead signs shall be installed on all approaches to a signalized intersection on the day of signal activation and before the signal is activated. The signs shall be installed prior to the left or right turn pocket bay tapers at a minimum and shall be mounted on street light poles when possible. Please see Detail TS-16 for additional placement information. Immediately prior to the activation of a new traffic signal. The contractor shall install two (2) orange flags on the "Signal Ahead" signs. The flags shall remain in place for two weeks prior to removal by the contractor.

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 Engineer shall make the final decision if a question arises as to what represents said conflict.

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 nor shall they impair the visibility of the traffic signal.

1. Internally Illuminated Street Name Signs (IISNS) shall require a City Traffic Engineering accepted stamp for all approved proofs matching existing City LED IISNS's prior to ordering. Only products with prior approval from the City shall be allowed. Refer to City of Roseville Construction Standards Section 56 "Signs" for IISNS specifications.

2. Courts

Install a type W53 "Not a Through Street" sign at the entrance to all Courts or Cul-de-Sac's when you cannot see the end of the roadway from the last intersection. Place the sign on the nearest street light pole when possible.

3. Intersections within Subdivisions

- All four-way intersections shall have right-of-way controls established on the minor street. Install type R1-1 "Stop" signs, bars and legends on the minor street.

- Install R26 (CA) "No Parking Anytime" signs at the entrance to subdivisions that have a median island just off an arterial or collector.

P. Striping: All painted traffic stripes, arrows, and pavement markings shall be constructed with thermoplastic material to the specifications set forth in Section 84 of the Caltrans Standard Specifications & Plans (latest edition) or as directed by the city engineer.
All striping details shall use retroreflective variants with thermoplastic and type C red-clear retroreflective markers. The following details shall be used unless otherwise directed by the city engineer: 2, 6 ,9A, 12A, 16, 19, 22, 25, 26, 27B, 29, 32, 34, 35, 36, 36B, 37, 38, 39, 39A, 40, 41, 42, 43, 44, 45

Any updates to striping with existing ceramic pavement markers shall be replaced in kind, unless the project limits extend to the two nearest adjoining signalized intersections and

include all lane lines in both directions, or unless otherwise directed by the City Engineer. Non reflective pavement markers shall consist of ceramic markers only conforming to section 85.104A of the same standards. The following permanent traffic lane striping shall be raised pavement markings, and placed as one of the following types: Detail 4, 7, 10, 13, 17, 20, 23, 25, 26, 30, 33, 37C, or Detail 38. Thermoplastic striping is also required for placement of Detail 25 and 38.

On asphalt surfaces, Detail 26 markers shall be placed 2 inches from the face of the median curb. On concrete surfaces, Detail 25 shall be used.

At all fire hydrant locations, a blue reflective pavement marker shall be installed one foot off paved centerline or median on the hydrant side of the roadway.

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 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. Conflicting striping shall be removed completely. Type II slurry of conflicting striping is required when it crosses the new traveled lane. When this occurs, the entire lane shall be slurried from lane line to lane line over the entire length of the conflicting striping. This requirement will not apply to ceramic markers unless specified on the plans.

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

The following shall apply when installing traffic stripes and pavement markings:

1. In addition to locations as shown on the plans, bike lane signs and pavement markings shall be installed at no more than one half-mile intervals and following every break in the bike lane striping. The BIKE LANE legend shall be centered in the lane to ensure the legend does not run into the lane striping.

2. A bicycle detector pavement marking shall be installed in conjunction with each bicycle detector per CMUTCD Figure 9C-7 and shall be placed starting 6 inches back of the crosswalk/stop bar.

3. Unless otherwise specified on the plans, crosswalks shall be eleven (11) feet wide, measured from the centerline of the stripe.

4. Traffic stripes and pavement marking shall not be placed over utility covers including, but not limited to, manhole covers, utility boxes, hand holes, or water valve covers.

5. STOP legend pavement marking and limit lines are required with stop signs. YIELD legend pavement marking are required with yield signs. The yield limit line shall be per the CMUTCD (24" by 36" triangles).

6. Pavement arrows shall be one of the following types unless otherwise directed by the Engineer: Type II (L, R or B), Type III (L, R, or B), Type VI, or Bike Lane Arrow.

7. At signalized intersections with left turn lanes longer than 150 feet the Type II, or Type III arrows shall be placed 20 feet behind the limit line. Where there are dual left turn lanes with staggered limit lines, the arrows in the number 1 left turn lane (closest to the median) shall be placed 15 feet behind the limit line, and the arrow in the number 2 left turn lane shall be placed 20 feet behind the limit line. The intent is to have the two arrows line up side by side, even though the limit lines are staggered.

8. All turn lanes shall have a Type II or Type III arrow at the beginning of the turn lane such that the tail of the arrow lines up with the beginning of the Detail 38 striping. All turn lanes 150 feet or longer shall have a minimum of two Type II or Type III arrows (one arrow for every 150 feet of turn lane).

9. All traffic lane striping shall be discontinued through any four way public intersection from crosswalk, marked or unmarked. Striping shall be continuous through private intersections unless there is a striped left turn lane and/or traffic signal. For non-signalized public "T" intersections, the through and bike lane striping shall be continuous for the non-intersection direction, i.e. "across the top of the T". However, there shall be no striping within the limits of the crosswalks.

10. At locations where bike lane striping is parallel striping used to channelize traffic, right turn acceleration/deceleration lanes and bus turnouts, both stripes shall be detail 38. Reflective pavement markers shall be placed to the outside of the bike lane.

11. Bike lane striping shall be continuous except at right turn bay tapers, intersections with City streets, and driveways where the centerline/median is broken. See Detail TS-18 for examples.

12. Lanes designated by the Engineer as auxiliary shall be striped as directed by the Engineer. Examples of typical auxiliary lane striping can be seen on Detail TS-19. Bike lane striping along auxiliary lanes shall be modified Detail 38 with 4 foot stripes at 10 feet on center.

13. Left turn arrows shall not be placed in Two Way Left Turn Lanes unless otherwise directed by the Engineer.

14. Stop and yield bars shall be 7 feet back from the center of the pedestrian access ramp unless directed otherwise by the Engineer. Where a stop sign is installed with a yellow

school crosswalk, a supplemental white stop bar shall be installed 4 feet back from the crosswalk line.

15. Lane line extensions for dual turning lanes shall be placed on a continuous arc as appropriate for a turning 40 foot bus. Triple turning lanes shall be placed to accommodate the turning of a 65 foot total length (California legal) tractor truck-semitrailer (Detail TS-20).

Type K-4 (Type Q in the CalTrans Traffic Manual) markers (aka: Superducks) shall be 36 inches tall and have 3 bands of reflective sheeting per Section A73C of the CalTrans Standard Plans.

Type K-4 markers mounted between two lanes of opposing traffic shall be yellow with yellow reflectorized sheeting. Type K-4 markers mounted between two lanes of traffic traveling in the same direction shall be white with white reflectorized sheeting.

At median curb noses, a yellow Type K-4 marker shall be mounted on top of the curb. A white Type K-4 marker shall be mounted at the nose for a Right turn 'pork chop' island. At entrances to subdivisions, the median shall have 3 yellow reflective markers. One on the median nose and one on either side (end of radius).

Additional City striping guidelines can be found in Section 7, Streets, of these standards and Sections 82, 84, and 85 of the City's Construction Standards.

Q. Right Turn Lanes: Right turn lanes shall be provided at signalized intersections:

1. On all main street approaches.

2. On all minor street or driveway approaches with peak hour approach volumes of 60 vehicles or more.

R. City Supplied Equipment: City supplied equipment shall be picked up by the contractor at the City's corporation yard (2005 Hilltop Circle, Roseville) upon 10 calendar day's notice to the City's inspector. The contractor is responsible to provide all labor and equipment necessary to load, transport, and install the equipment. Equipment provided by the City typically includes:

1. Traffic signal cabinet (fully equipped)

2. Type 27-22 electrical service with battery backup system

3. Traffic signal controller

4. Communications equipment

5. EVP equipment with the exception of the cable from the detector to the discriminator

6. CCTV camera

7. Connected vehicle roadside unit (RSU)

S. Contractor Supplied Equipment: Attention is drawn to the following contractor supplied and installed materials:

1. Equipment grounding conductors shall be AWG #8 bare solid copper wire minimum.

2. Three (3) shielded OSP category 6E cables (Mohawk Lan-Trak OSP, part number M58790), or City approved equivalent, and one (1) power cable (IMSA 14-3/20-1-STR 600V, Belden part number 601195) or City approved equivalent to top of designated pole with ten (10) feet of slack for each cable at the top of the pole.

3. 16" countdown pedestrian heads. Contact the City for approved vendors and models.

4. Audible pedestrian or solid state, two tone audible, momentary LED pedestrian push buttons. See the City's website for a list of approved models.

5. Internally Illuminated Street Name Sign (IISNS) Mast Arms shall be per TS-11 and TS-12 and have a permanent name plate identifying compatible pole model number. The loading of the mast arms and the signal pole to which the sign mast arm is attached shall be approved in writing by the manufacturer or a licensed Structural Engineer.

6. Slim profile, LED IISNS's with City Logo. Contact the City for approved vendors and models. Sign proofs must be approved by the City prior to ordering equipment.

T. Salvaged Equipment: Salvaged equipment shall become property of the City and shall be delivered by the Contractor upon 24 hours notice. The Contractor shall deliver salvaged equipment to the City's Corporation Yard located at 2005 Hilltop Circle, Roseville, following at least 48 hours advance notice of delivery.

Where signals are being modified or relocated, existing emergency preemption equipment shall be relocated to the new signal poles.

Damaged conduits deemed to not be reusable shall be removed from existing pull boxes and 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.

U. Traffic Control: Construction area traffic control shall be installed in accordance with the City accepted projects specific traffic control plan, the approved improvement plans and specifications, the Construction Standards, the City Design Standards, The current California Manual on Uniform Traffic Control Devices (CAMUTCD), The State of California Standard Plans, and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the Cal Trans Standard Specs and as follows:

1. Construction that inhibits free flow traffic shall not occur between the hours of 4 p.m. to 6 p.m. on Monday through Friday without prior written approval of the Engineer. Traffic control lasting more than one hour will be subject to additional time restrictions set by the City's Traffic Section in order to minimize the impact to the public.

2. At least one lane in each direction shall remain open to traffic unless otherwise approved by the Engineer.

3. Turning movement restrictions require prior approval of the City. A changeable message sign (CMS) shall be posted in the direction of travel affected by the restriction a minimum of three days prior to the implementation of the traffic control at the contractor's expense. Wording and placement of the CMS shall be "ACCEPTED" by the City's Traffic Section prior to installation.

4. Traffic control hours are subject to limitation by the City.

5. Lane closures that affect traffic flow may require night work, changeable message signs, and/or certified flaggers at the contractor's expense. The contractor should consider traffic control included in their cost of work and may contact the City's Traffic Section for requirements prior to bidding a job.

6. Approved road closures require 72 hour advance notification to the City, the public and emergency services. Changeable message signs (CMS's) shall be posted in the directions of travel affected by the closure a minimum of 1 week prior to the implementation of the traffic control at the contractor's expense. Wording and placement of the CMS's shall be "ACCEPTED" by the City's Traffic Section prior to installation.

7. A Red Flash Request form must be submitted 48 hours prior to the time the red flash is needed. Allowable hours of flashing operation will be set by the City's Traffic Section and will require early morning, evening, or night work unless otherwise approved in writing by the City's Traffic Section. The Red Flash Request form is on Detail TS-21.

8. Special events shall go through the City's special event process (Contact the City of Roseville's Parks & Recreation Dept. for a Special Events packet). Changeable message signs placed in advance of the event may be required depending upon the size of the event and its impact on traffic movement. Contact the City's Traffic Section for requirements.

9. Special holiday traffic control restrictions are in place from one week prior to the Thanksgiving holiday through January 3rd each year for various roads throughout the City (Detail TS-23).

TRAFFIC CONTROL PLANS:

All traffic control plans (including signage) shall be per the current CAMUTCD (California Manual on Uniform Traffic Control Devices).

The City's Construction Inspector or Engineer shall determine the necessity of a formal traffic control plan (TCP) submittal based upon the following guidelines:

A TCP submittal will be required if the TCP is anyone of the following:

1. Complicated (to be determined by the City's Construction Inspector)

2. Involves a signalized intersection

3. Longer than 12 hours

4. Not detailed in the CAMUTCD

5. Involves road closure or detours

If significant detours, lanes closures, and/or signal modifications (including but not limited to loop disruption, the need for a temporary signal, etc.) are needed, a separate Traffic Handling Plan from that of the Traffic Control Plan may be required. The Traffic Handling Plan will require review and approval by Traffic Engineering and will require additional review time for submittals.

Traffic Control Plans require responsible party contact information, hours of operation (which may be restricted by the City), and duration of work.

TCP submittals require the following minimum review times **per** submittal:

Type of TCP	Minimum Review Time
Lane Closure	2 days
Intersection Signal Flash	2 days
One-way traffic control	2-4 days
Detour/Road Closure	3-4 weeks

Note that complicated TCP's may require more review time. Traffic control review time should be included in the contractor's work schedule.

The traffic control plan submittal process is as follows:

1. Three copies of the TCP must be submitted to the inspector.

2. The TCP is reviewed by the City Traffic Section and corrections/modifications are made by the contractor as necessary.
3. The City Traffic Section will stamp the TCP as "ACCEPTED" once the plans are to the City's satisfaction.

4. Two copies of the "ACCEPTED" TCP are returned to the inspector – one copy each for the inspector and contractor.

5. The contractor must have a copy of the "ACCEPTED" TCP on site during the entire time the TCP is in place.

Any deviation from the "ACCEPTED" TCP shall be approved by the inspector and may require re-submittal of the TCP for City review. Failure to maintain the TCP may result in shutdown of the project, suspension of inspection services, correction by the City at the contractors expense, or any combination of the before mentioned.

V. Signal Activation: Functional testing per Caltrans Standard Specification 86-2.14C shall be performed for 5 working days prior to signal activation. All systems shall be in place before functional testing can begin.

On the day of signal activation, the contractor shall be required to have in his possession at the job site all tools, equipment and parts necessary to repair a signal malfunction. These items shall include, but not be limited to, a bucket truck, replacement LED's, wire, etc.

Immediately prior to the activation of a **NEW** traffic signal, the contractor shall install two (2) orange flags on the "Signal Ahead" signs. Flags shall remain in place for two (2) weeks.

Prior to activation of a **NEW** traffic signal, the contractor shall provide a minimum of two flaggers per intersection to control traffic. The number of flaggers may be increased at the request of the City's inspector for large intersections. Each flagger shall wear appropriate safety gear and carry a stop paddle for controlling traffic. The flaggers shall completely stop traffic prior to the signal changing from red flash to full operation. Signal Activation will not be permitted on Friday's or before a designated City Holiday.

W. Roadway Improvements: The designer should be aware of the following requirements regarding civil improvements when working in the roadway:

1. If delay to motorists will not exceed 10 minutes, conduit may be installed as allowed by "Trenching in Pavement Method" as provided in Section 86-2.05C of the Caltrans Standard Specifications and these requirements.

2. The conduit trenches shall be a maximum of six inches wide and two inches wider than the outside diameter of the conduit to be installed. There shall be one inch minimum clearance between the conduit and the trench wall. The trench shall be crumbed clean prior to placement of conduit.

3. Aggregate material in concrete shall be pea gravel. Concrete shall be thoroughly consolidated around the conduit filling all voids.

4. roadways shall be located along the centerline of the bike lane stripe or stop bar/crosswalk striping. All trench cut shall be hidden by the stripe where applicable. Pre-existing improvements requiring deviation from the centerline of the stripe shall be accomplished within 20 feet from the beginning to the end of deviation. Deviations along bike lane lines shall be to the curb side of the stripe unless directed otherwise by the City. Deviations greater than 20 feet shall require asphalt concrete repair per Item #6 below.

5. Rock wheel trenching parallel to the roadway centerline across acceleration, deceleration, or bus turn out openings that cannot be completed per TS-13 upon the same day shall be filled with concrete to the top of the trench and the contractor shall return to complete an 18 inch "T" grind and overlay per CST-TB-1

6. Saw cutting in the street other than rock wheel trenching will require pavement repair per CST-TB-1 or TB-3 and/or grinding between lane lines per City Standards found elsewhere in this document and the Construction Standards.

7. Should the contractor fail to install the conduits in NEW asphalt roadways roadways prior to the bottom lift of asphalt concrete, the City will require the installation of a Tensar GlasGrid 8502 or equivalent matt prior to the final lift of pavement.

8. Should the contractor fail to install the conduits in NEW Portland cement concrete roadways prior to the placement of concrete, the City will require the conduits be installed by horizontal direction drilling or the contractor shall place the conduit per TB-1 or TB-3a.

9. The contractor is solely responsible to provide all labor and equipment necessary to locate existing underground facilities beyond the information provided by the U.S.A. markings including, but not limited to, metal detectors, wire locating equipment, and potholing.

10. Where combinations of sidewalk or curb and gutter are poured contiguous to existing, all adjoining existing concrete vertical faces shall be doweled per City Standards found elsewhere in this document and the Construction Standards.

11. Curb ramps conforming to the latest ADA, Title 24 requirements, and the City Construction Standards shall be installed at all pedestrian crossing locations within the

project area. Existing ramps that do not meet these requirements shall be removed and replaced.

6-3 PREPARATION OF PLANS

Traffic signal plan sheets shall conform to the provisions of Sections 2 and 3 of these improvements standards, including submittal requirements, AutoCAD files, etc. Traffic signal plans shall have one title sheet followed by separate signal and lighting, lighting diagram/photometric analysis, interconnect, and signing and striping sheets for each intersection. Signing and striping sheets shall be submitted concurrent with signal and lighting sheets for review. Signal and striping plan sheets must be stamped and signed by a licensed Civil Engineer.

A. Title Sheet

The title sheet shall include the following:

1. Title of project, which shall include the location.

2. A vicinity may with north arrow showing the limits of work. The location map is not required to be to scale.

3. Pertinent signature blocks, and revision block.

4. A legend for symbols not found in the Standard Plans (e.g., utility lines, etc.). Below the legend, place the following note: NOTE: SEE STATE STANDARD PLANS ES-1A, ES-1B and ES-1B FOR EXPLANATION OF OTHER SYMBOLS.

5. Controller/Service foundation detail (TS-4 through TS-8), loop layout detail (TS9 and TS-10), and other special details. The service pedestal address shall be place adjacent to these details in large, bold letters.

6. Applicable City of Roseville Standard Notes as published on the City's Web site at www. roseville.ca.us/engineering.

B. Signal and Lighting Sheet: The signal and lighting sheet shall be drawn at a scale of 1 inch equals 20 feet, and shall include the following:

1. A north arrow.

2. Existing and proposed field conditions which include, but are not limited to, the following: underground and overhead utilities (including height of lines near signal poles), driveways, fire hydrants, poles, signs, fences, street lights, edge of pavement, curb and gutter, sidewalk, right-of-way line, P.U.E.'s, roadway striping, medians, centerline, pull boxes, curb ramps, trees (particularly those needing trimming), adjacent topography, etc.,

Existing field conditions, appurtenances, etc, shall be dashed and screened. Proposed shall be solid and bold.

3. Pole and equipment schedule (TS-2).

4. Conductor and conduit schedule. The schedule shall include rows showing "percent fill" values, and conduit quantity/size (TS-3).

5. Complete traffic signal design, including but not limited to, the following: conduit runs, detector loops (with input designations), detector handholes, vehicle and pedestrian signals (with phase designation), luminaries, pedestrian pushbuttons (with phase designation), controller, service pedestal, service point, emergency vehicle detectors, signing, striping, interconnect, CCTV Camera, and WiFi equipment.

6. Phasing diagram. Designate type of flashing operation below the phasing diagram.

7. Phasing for emergency vehicle preemption. Typically, protected left turn phases are combined with the concurrent through movement during EV preemption.

C. Interconnect Sheet: The interconnect sheet may be drawn at a scale of 1 inch equals 20 feet or 1 inch equals 40 feet and shall include a north arrow.

D. Signing and Striping Sheet: The signing and striping sheet shall be drawn at 1 inch equals 40 feet, and shall include the following:

1. A north arrow.

2. Existing signing and striping – dashed or screened.

3. Proposed signing and striping where line types shall closely approximate striping proposed.

4. Centerline stationing with either begin and end modification stationing or lineal feet of modification specified along with the detail.

E. Intersection Lighting Sheet – The Intersection Lighting sheet shall be drawn at 1 inch equals 40 feet, and shall include the luminaire diagrams, luminaire wattage equivalent, and min, max, and average illuminance.

SECTION 7: STREETS

7-1 STREET CLASSES AND DESIGN WIDTHS

For purposes of geometric and structural design of all new public streets, streets shall be classified according to the following requirements, the appropriate Standard Drawings, and Table 7-1. Under certain circumstances, particularly within the infill areas of the City, changes to the standards can be made at the discretion of the City Engineer.

A. 20-Foot Street (Alley): A Street depressed in the center with a right-of-way and surface width of 20 feet. Alleys are not permitted unless specifically approved by the City Council. STD DWG #ST-1A

B. Residential Streets: Where residential streets serve Low Density Residential (LDR) and Medium Density Residential (MDR) subdivisions, the following standards apply. In the case of High Density Residential (HDR) and (MDR) condominium development, please refer to City of Roseville Fire Department for minimum street sections.

LDR	MDR		HDR
	Fee Lot	Condo Style	
Design & Construction Standards	Design & Construction Standards	Fire Department Standards	Fire Department Standards

1. **Minor Residential with Attached Sidewalks**: A residential street servicing 100 or fewer lots shall be classified as a minor residential street. Minor residential streets shall have a right-of-way width of 42 feet, and back of curb to back of curb width of 34 feet. STD DWG #ST-2

2. **Minor Residential with Detached Sidewalks**: A residential street servicing 100 or fewer lots shall be classified as a minor residential street. Minor residential streets shall have a right-of-way width of 54 feet and a back-of-curb to back-of-curb width of 34 feet. STD DWG #ST-3

3. **Primary Residential with Attached Sidewalks**: A residential street servicing more than 100 lots or along which schools or parks are proposed to front, shall be classified as a primary residential street. Primary residential streets shall have a right-of-way width of 46 feet, and back of curb to back of curb width of 38 feet. STD DWG #ST-4

4. **Primary Residential with Detached Sidewalks**: A residential street servicing more than 100 lots or along which schools or parks are proposed to front, shall be classified as primary residential. Primary residential streets shall have a right-of-way width of 58 feet and back-of-curb to back-of-curb width of 38 feet. STD DWG #ST-5

C. Collector/Industrial: A Street serving an industrial/commercial subdivision or a residential subdivision along which no home frontage is allowed shall be classified as a

collector/industrial street. Collector/industrial streets shall have a right-of-way width of 58 feet, and back-of-curb to back-of-curb width of 48 feet. Additional right-of-way and pavement shall be provided at intersections for deceleration lanes, bus turnouts, and turn lanes, as specified by the City Engineer. STD DWG #ST-7 (58' R/W – Attached sidewalk); STD DWG #ST-6 (48' R/W – Detached sidewalk)

D. Minor Arterial: Those roads specified in the City's Capital Improvement Program as requiring a four-lane roadway shall be classified as minor arterials. Minor arterial shall have a right-of-way and back-of-curb to back-of-curb width of 76 feet, and shall provide a center 2-way left lane or raised landscape median as specified by the City Engineer. Additional right-of-way and/or pavement may be required for bus turnouts and at intersections and driveways for acceleration lanes, deceleration lanes, and multiple left turn lanes, as specified by the City Engineer. Additional right-of-way shall also be provided if sidewalks are not part of a landscape/pedestrian corridor adjacent to the back of curb. STD DWG #ST-8. Minor arterials shall accommodate U-turns unless justified through an engineering study or an exception is granted by the City.

E. Major Arterial: Those roads specified in the City's Capital Improvement Program as requiring a six-lane roadway shall be classified as major arterials. Major arterials shall have a right-of-way width of 100 feet and back-of-curb to back-of-curb width of 100 feet. Additional right-of-way and/or pavement may be required for bus turnouts and at intersections and driveways for acceleration lanes, deceleration lanes, and multiple left turn lanes, as specified by the City Engineer. Additional right-of-way shall also be provided if sidewalks are not part of a landscape/pedestrian corridor adjacent to the back of curb. STD DWG #ST-9

F. Cul-de-Sac: The length of cul-de-sac streets as measured from the centerline of the intersecting street to the center of the bulb, shall not exceed 500 feet, unless a secondary emergency vehicle access is provided to the rear of the cul-de-sac bulb area, in which case the length of the cul-de-sac may be increased to maximum length of 1000 feet with the approval of the Fire Chief and City Engineer.

In the case of stub streets associated with phased development, the combined street lengths as measured from the dead-end to the nearest through street shall be in accordance with the requirements for cul-de-sacs. Stub streets shall be terminated with a temporary bulb or a hammerhead conforming to the Standard Drawing. A barricade conforming to the Standard Drawings shall be installed at the end of all streets that are proposed for future extension. For cul-de-sacs greater than 200 feet or where the end of the cul-de-sac is not visible from the centerline intersection of cross street, a "NOT A THROUGH STREET" sign shall be installed at the beginning of cul-de-sacs. STD DWG #ST-14 & #ST-15

G. Partial Width Streets: At the discretion of the City Engineer, partial width streets may be permitted along the boundary of a subdivision of other private development where the full right-of-way width cannot be dedicated. For collector and arterial streets, the developer shall, as a minimum, dedicate sufficient right-of-way and construct 32 feet width of pavement with

full frontage improvements along the developing property and a two-foot wide gravel shoulder on the opposite side. Street centerline and pavement crown shall be placed at the ultimate location. Partial streets will not be permitted for residential streets.

H. Private Streets: Private streets shall be designed to the same structural and geometric requirements as those for public streets. Minimum pavement widths shall be 28-feet, and curb and gutter sections shall have a 3-foot minimum width. Sidewalks on one side of the street can be eliminated at the discretion of the City Engineer.

I. Gated Entryways: Gated entryways are allowed in private subdivisions. Gate access must be provided in accordance with Fire Department requirements. They shall be designed per the standard drawing and shall be privately maintained. See STD DWG #ST-25

TABLE 7-1
STREET GEOMETRIC REQUIREMENTS

CLASS	Right of Way Width	Back of Curb to Back of Curb Width	Radius of Curb Return at Right of Way & Back of Curb		No. of Travel lanes	Minimum Centerline Radius for Horizontal Curve
			ROW	BOC		
Minor Residential Attached Sidewalk	42 feet	34 feet	22 feet	26 feet	2	250 feet
Minor Residential Detached Sidewalk	54 feet	34 feet	16 feet	26 feet	2	300 feet
Primary Residential Attached Sidewalk	46 feet	38 feet	22 feet	26 feet	2	300 feet
Primary Residential Detached Sidewalk	58 feet	38 feet	16 feet	26 feet	2	500 feet
Collector/ Industrial Attached Sidewalk	58 feet	48 feet	26 feet	31 feet	2	500 feet
Collector/ Industrial Detached Sidewalk	48 feet	48 feet	26 feet	31 feet	2	500 feet

Minor Arterial	76 feet	76 feet	**Residential** 26 feet **Collector/ Industrial** 26 feet **Arterial w/o Accel Lane** 50 feet **Arterial w/ Accel Lane** 62 feet	31 Feet 31 feet 50 feet 62 feet	4	1000 feet
Major Arterial	100 feet	100 feet	**Residential** 26 feet **Collector/ Industrial** 26 feet **Arterial w/o Accel Lane** 50 feet **Arterial w/ Accel Lane** 62 feet	31 Feet 31 feet 50 feet 62 feet	6	2000 feet

7-2 RIGHT-OF-WAY WIDTH

Right-of-way widths shall be in accordance with these standards for the street classification under consideration or as determined by the City Engineer. In no instance, without approval of the City Engineer, shall a street have a right-of-way width that is less than the street of which it is a continuation. Right-of-way requirements for widening at intersections shall be as specified by the City Engineer.

Building setbacks, landscaping requirements, and parking requirements shall be based on the ultimate right-of-way, regardless of the location of public street improvements.

A minimum 12.5-foot public utility easement (P.U.E.) shall be dedicated adjacent to all public and private streets and shall include traffic control appurtenances. Additional easement for sewer, water, storm drainage, landscaping, fencing, and all other public utilities shall be provided as required by the utility companies, these Design Standards, and as specified by the City Engineer.

Along the frontage of collector and arterial roadways, the right-of-way dedication shall include the landscape corridor adjacent to parcels zoned single-family residential (SFR).

7-3 ROADWAY SIGNAGE AND STRIPING

Signing and striping shall conform to the latest edition of the California Manual of Uniform Traffic Control Devices, (CMUTCD), unless modified by these standards, the Construction Standards, or in writing by City Engineer.

7-4 STRUCTURAL SECTION

All roads, both public and private, to be constructed within the City of Roseville shall be one of the following:

1. Asphalt concrete over aggregate base and, if necessary, aggregate sub-base.

2. Portland Cement Concrete over cement treated base, aggregate base or native subgrade

For asphalt concrete arterial roadways it's desirable to the City to have them designed and constructed with the two-inch top lift of asphalt concrete, rubberized asphalt concrete material.

Asphalt concrete collector, residential and alley ways shall be designed and constructed with Type A, 1/2 –inch maximum medium asphalt concrete mix as described in the City's Construction Standards.

Portland Cement Concrete roadways shall be designed and constructed with the Portland cement concrete mix described in the City's Construction Standards

All pavement sections shall be designed on the basis of the resistance R-value as determined in accordance with the State of California, Department of Transportation design method and appropriate traffic indices (TI). For subgrade with R-values less than or equal to 10, Geogrid or other subgrade treatment will be required per the recommendation of a geotechnical engineer. The resulting structural section shall be no less than City standards from Tables 7-2.A or 7-2.B.

Minimum TI values shall be as specified in Tables 7-2.A and 7-2.B or as determined by City Engineer. At the discretion of the City Engineer, design traffic indexes (TI's) may be revised to reflect designated truck routes and/or where projected future traffic volumes, based upon the City's Travel Demand Forecast Model, indicate increased or reduced trip. Pavement sections shall be designed by a Registered Geotechnical Engineer.

TABLE 7-2.A

Minimum Asphalt (AC) Pavement Structural Sections*						
Street Type	**Minimum Traffic Index (TI)**	**Subgrade Design R-Values**				
		10**	**20**	**30**	**40**	**50**
Alley	-	-	-	-	-	2.0" AC 6" AB
Minor Residential	6	3.5" AC 12" AB	3.5" AC 10" AB	3.5" AC 8" AB	3.5" AC 6" AB	3.5" AC 6" AB
Primary Residential	7	4.0"AC 14" AB	4.0"AC 12" AB	4.0"AC 10" AB	4.0"AC 7" AB	4.0"AC 6" AB
Collector	8	4.5" AC 17" AB	4.5" AC 14" AB	4.5" AC 11" AB	4.5" AC 9" AB	4.5" AC 6" AB
Industrial	9	5.5" AC 19" AB	5.5" AC 16" AB	5.5" AC 13" AB	5.5" AC 10" AB	5.5" AC 7" AB
Minor Arterial	10	6.0" AC 22" AB	6.0" AC 18" AB	6.0" AC 15" AB	6.0" AC 11" AB	6.0" AC 8" AB
Major Arterial	11	7.0 " AC 24" AB	7.0 " AC 20" AB	7.0 " AC 16" AB	7.0 " AC 12" AB	7.0 " AC 8" AB

**This table is to be used a reference for expected minimum structural sections. Actual designed structural sections shall be determined by a registered geotechnical engineer.*
*** For subgrade with R-values less than or equal to 10, Geogrid or other treatment will be required per the recommendation of a geotechnical engineer.*
****Minimum AC section at signalized intersections, where traffic loops are anticipated, shall be 5".*

TABLE 7-2.B

Minimum Concrete (PCC) Pavement Structural Sections				
Street Classification	**Minimum Traffic Index**	**Minimum Structural Section (Assumes R=50)**	**Max Joint Spacing**	**PCC Pavement Surface Treatment**
Alley-Way	-	5"	8.5'	Trowel and Broom finish
Minor Residential	6	5.25"	11'	Trowel and Broom finish
Primary Residential	7	6"	12'	Trowel and Broom finish
Collector	8	7.75"	12'	Traveled Lanes: Diamond Grind Bike Lanes: Trowel and Broom Finish
Industrial	9	7.75"	13'	Traveled Lanes: Diamond Grind Bike Lanes: Trowel and Broom Finish
Minor Arterial	10	8"	13'	Traveled Lanes: Diamond Grind Bike Lanes: Trowel and Broom Finish
Major Arterial	11	8.25"	13'	Traveled Lanes: Diamond Grind Bike Lanes: Trowel and Broom Finish

A. Structural Street Sections at Signalized Intersections –Where traffic signals loops are anticipated as identified in individual Specific Plan and General Plan Circulation Element Exhibits, the minimum structural section shall include 5" of AC (3" bottom lift, 2" top lift) on the minimum required AB for a length 5' beyond the furthest loop on all intersection approaching lanes. There is no change required for Portland Cement Concrete roadways. At the option of the Developer, (For constructability purposes), both approaching and downstream lanes may have thickened HMA sections as identified in Table 7-2 above. When "cutting" in signal loops, the slot depth shall be cut to achieve a minimum of 2 inch cover over the loops.

7-5 CURB AND GUTTER REQUIREMENTS

Curb and/or gutter are required adjacent to all public and private streets. All sidewalk, curb and gutter shall be constructed of minor concrete conforming to the provisions in Section 71-5 (B) "Minor Concrete.

A. Type 1 Roll Curb and Gutter: Type 1 roll curb and gutter shall be installed adjacent to all single-family residential and duplex developments, poured monolithically with sidewalk. STD DWG #ST-17

B. Type 2 Vertical Curb and Gutter: Type 2 vertical curb and gutter shall be installed adjacent to all multiple residential, industrial/commercial developments, school and park sites, poured monolithically with sidewalk or as specified by City Engineer. STD DWG #ST-17

C. Type 6 Modified V-Gutter: Type 6 modified V-gutter may be used for alleys and parking lots. Type 6 modified V-gutter shall not be used in either public or private streets.

D. Cross Gutters: Cross gutters shall not be installed unless the intersection cannot be drained by an underground system. Installation of cross gutters shall be subject to the approval of the City Engineer.

7-6 SIDEWALK REQUIREMENTS

Sidewalks shall be constructed adjacent to all public streets. All sidewalks shall be Minor Concrete as specified in section 71-5B of the Construction Standards and shall conform to the provisions of Section 90 of the Caltrans Specifications. All sidewalks shall have a minimum thickness of six (6) inches on native soil, at 95% relative compaction, or four (4) inches thick with four (4) inches of AB at 95% relative compaction, and shall meet the following requirements:

A. Width: The required minimum width of sidewalks shall be as listed in Table 7-3 unless the project is located within a Specific Plan area. In such case, the sidewalk width shall conform to the appropriate Specific Plan Landscaping Guideline, which may be obtained from the City of Roseville Planning Department. The width of the curb shall not be considered as included in the width of the sidewalk.

TABLE 7-3

Street Classification	Sidewalk Width
Minor Residential – Attached Sidewalk	4 feet
Primary Residential – Attached Sidewalk	4 feet
Minor Residential – Detached Sidewalk	5 feet
Primary Residential – Detached Sidewalk	5 feet
Collector / Industrial – Attached / Detached Sidewalk	5 feet
Minor Arterial	8 feet
Major Arterial	8 feet
Road w/ Paseo / Multi-model Path	10 feet

B. Slopes: Detached sidewalks shall have a maximum slope in the direction of travel of 5.0 percent unless otherwise approved by the City Engineer. If the longitudinal street grade is greater than 5.0 percent, the slope of the sidewalk shall not exceed the longitudinal slope of the street. Cross slope shall be a minimum of 1.0 percent and maximum of 2.0 percent sloped downwards towards the gutter.

C. Radius: Detached meandering sidewalks shall have a minimum radius of 50 feet.

D. Pedestrian Curb Ramps: Pedestrian curb ramps shall be provided at all intersections and Type A-7 driveways. All curb ramps shall conform to the requirements of these standards and the City's Construction Standards for slope criteria and standard design. It is the design engineer's responsibility to ensure that the intersection slopes designated on the improvement plans allow for the construction of pedestrian curb ramps that meet the above criteria.

At "T" intersection located at signalized intersections, ramps shall be constructed in the appropriate position on the side of the through street, directly opposite the ramps at the curb return of the "T" intersecting street. Such ramps are not required on the side of the through street on residential streets unless the distance to the next available street crossing is greater than 500 feet.

E. Sidewalk Barricades: Sidewalk barricades shall be required where satisfactory provisions cannot be made for pedestrians to safely continue beyond the terminus of the sidewalk. Where sidewalks end in fill area, the fill shall be extended beyond the end of the sidewalk for a minimum distance of six feet.

7-7 PEDESTRIAN WALKS AND BIKE PATHS

Pedestrian walks within a development shall have a minimum easement width of 8 feet and sidewalk width of 5 feet. All walks shall conform to the requirements of Title 24. Walks shall be constructed with a minimum thickness of six inches of Portland cement concrete, Minor Concrete as specified in Section 71-5B of the Construction Standards.

Bike paths design shall conform to Section 13 of these Standards. Combined pedestrian/bike paths (See Class 1A Bikeways within Section 13) shall be a minimum of 12 feet wide. The structural section for the bike path shall conform to Section 13 of these Standards.

Pedestrian walks and Class 1A bike paths, if situated between lots, including paseos, shall be fenced with chain link fencing or other material as approved by the City of Roseville Development Services Department and shall extend from the street right-of-way to the back lot line. These fences shall be 6 feet high from the building setback line to the back lot line and 3 feet high from the building setback line to the street right-of-way line. Collapsible bollards shall be placed at both ends of all these pedestrian walks/Class 1A bike paths.

See Section 13 for other requirements for bike paths.

7-8 ROADWAY PROFILE STANDARDS

The following standards shall apply to the design of roadway profiles. Also refer to Section 3 of these Design Standards.

A. Grades: The minimum centerline (longitudinal) grades on new streets and gutter flow lines shall be 0.35 percent. The maximum street slope shall limit 5 percent except where a steeper street is determined necessary by the City Engineer due to existing topographical features. The minimum grade of gutter sections constructed along existing streets shall be 0.20 percent.

B. Cross Slopes: Standard cross slopes shall be 2.0 percent on all roadways. Certain roadways may require super elevations as directed by the City Engineer. Cross slopes on widened existing streets shall be a minimum of 1.5 percent and maximum of 3.0 percent. Where a street constructed with a super elevation is to be widened, the cross slope shall be as specified by the City Engineer.

C. Vertical Curves: The minimum allowable vertical curve length at the intersection of two grades shall be 50 feet; however, vertical curves may be omitted where the algebraic difference in grades does not exceed 2.0 percent. When vertical curves are required, they shall provide for adequate sight distance based on the minimum design speeds specified in Table 7-4. The vertical curve data shall be computed and shown on the plans and shall call out the tangent gradient length of curve, the elevations and stationing points of the beginning of vertical curve (BVC), end of vertical curve (EVC), PI, high and low points and along 25 foot intervals.

7-9 INTERSECTIONS

Street centerlines shall intersect one another at an angle as near to a right angle as is possible by tangents not less than 100 feet in length. In unusual circumstances the City Engineer may waive this requirement. Refer to Standard Drawings for required rights-of-way, pavement, taper lengths, etc. for intersections involving minor and major arterials.

At intersections, where two streets intersect, the centerline grade of the major street shall have a maximum centerline (longitudinal) grade of 2.0 percent for a minimum distance of 40 feet measured from the curb line of the intersecting street, except in unusually rough terrain, as determined by the City Engineer. The centerline of the minor street shall meet the crown slope at the projected lip of gutter. Crown slope may be reduced to 1.0 percent within the intersection if necessary.

7-10 OFFSET INTERSECTIONS

The following requirements apply to all offset intersections. Any variation to these requirements shall be subject to the approval of the City Engineer. **Distances are measured from centerline to centerline.**

A. Residential streets intersecting another residential street from opposite sides shall have their centerlines meet, or the offset between intersections shall be a minimum of 150 feet.

B. Minor and primary residential streets intersecting collector streets from opposite sides shall have their centerlines meet or the offset between the intersections shall be a minimum of 200 feet.

C. Minor and primary residential streets, and collector/industrial streets intersecting minor or major arterial streets from opposite sides, shall have their centerlines meet or the offset between the intersections shall be as shown on standard drawing ST-47. This condition shall not apply where a raised center median is provided on the major street separating conflicting turning movements.

D. Intersections between two arterials shall have their centerlines meet, or the offset between the intersections shall be a minimum of 1320 feet.

7-11 ELBOW INTERSECTIONS

Use of expanded corners shall be limited to projected low volume residential, commercial and industrial streets and conditions where conformance to minimum horizontal length of centerline radius is not practical, and shall be subject to approval of the City Engineer.

7-12 DESIGN SPEED SIGHT DISTANCES

A. Stopping Sight Distance: The minimum stopping sight distance over any segment of roadway shall be designed for the vehicle speeds listed in Table 7-4 unless specific approval for a lesser design speed is received from the City Engineer. Minimum stopping sight distance shall be consistent with that specified in the latest edition of Caltrans Highway Design Manual, Section 201.1. The design stopping sight distance requirement is based on 3.5-foot height of eye and a 6-inch height of object.

TABLE 7-4
ROADWAY DESIGN SPEEDS

Street Classification	Roadway Design Speeds	Required Stopping Sight Distance
Minor Residential	**30** mph	**200** feet
Primary Residential	**35** mph	**250** feet
Industrial/Collector	**45** mph	**360** feet
Minor Arterial	**55** mph	**500** feet
Major Arterial	**60** mph	**580** feet

B. Sight Distances for Cars Entering Side Streets or Driveways via Left Turn in: The design of left turns from public and private roadways entering streets and driveways (as shown in Exhibit 7-1) shall provide minimum sight distance in accordance with Table 7-5 (single family residential exempt).

TABLE 7-5
SIGHT DISTANCE FOR CARS ENTERING STREETS/ DRIVEWAYS BY LEFT TURN

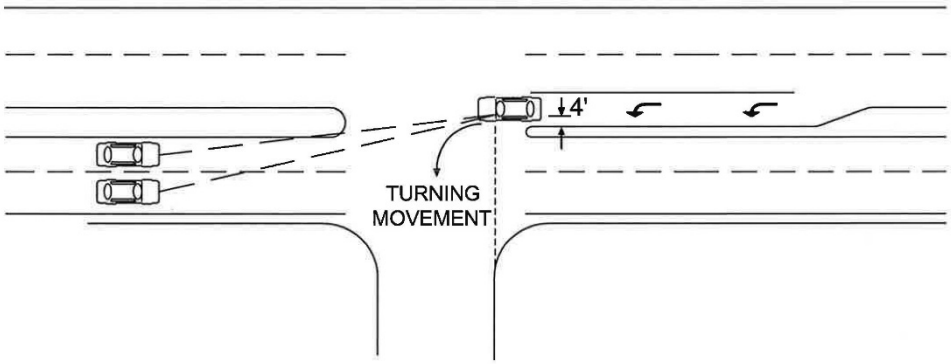
Street Classification	Required Sight Distance
Industrial/Collector	410 feet
Minor Arterial	530 feet
Major Arterial	695feet

Taken from the 2004 AASHTO Geometric Design of Highways and Streets

EXHIBIT 7-1

LEFT TURN SIGHT DISTANCE:

SIGHT DISTANCE FOR CARS ENTERING SIDE STREETS OR DRIVEWAYS VIA LEFT TURNS.



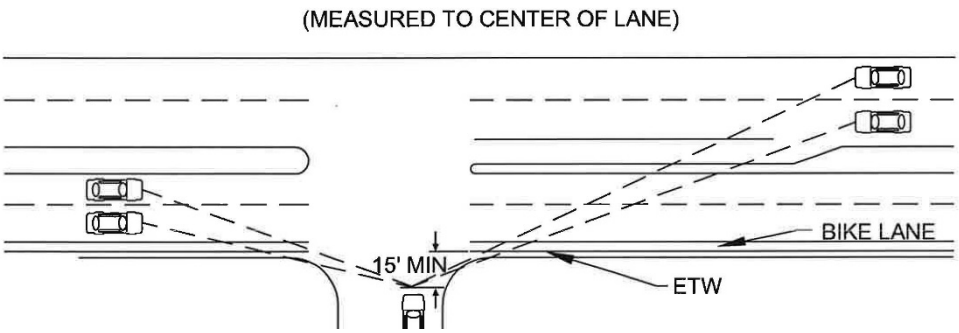
Sight Distance is based on a 3.5 foot height at the location of the driver and a 3.5 foot object height in the center of the approaching lane of the major road. The left turn driver measurement is taken 4 feet from the left edge of the turn lane at the projected edge of the curb return (as shown above). If the major road is a multi-lane road, the controlling measurement for sight distance shall be based on the approach lane that is the worst case scenario.

C. Corner Sight Distances for Cars Exiting at Intersections and Driveways: The design of all public streets, private streets, and major non-residential driveways (as shown in Exhibit 7-2) shall provide minimum sight distance in accordance with the following requirements. Design speeds and the corresponding minimum required corner sight distance shall be as specified in Table 7-6. Minimum corner sight distance shall be consistent with that specified in the latest edition of Caltrans Highway Design Manual, Section 405.1A.

TABLE 7-6
DESIGN SPEEDS FOR CORNER SIGHT DISTANCE

Street Classification	Corner Sight Distance Design Speed	Required Corner Sight Distance
Minor Residential	30 mph	330 feet
Primary Residential	35 mph	385 feet
Industrial/Collector	45 mph	495 feet
Minor Arterial	55 mph	605 feet
Major Arterial	60 mph	660 feet

EXHIBIT 7-2
CORNER SIGHT DISTANCE:



Setback for the driver of the vehicle on the crossroad shall be a minimum of 10' from the edge of travel way plus the shoulder width of the major road, but not less than 15 feet as shown above. Line of sight for corner sight distance is to be determined from a 3.5 foot height at the location of the driver of the vehicle on the minor road to a ~~4.25~~ 3.5 foot object height in the center of the approaching lane of the major road. (Highway Design Manual section 405.1(2)(a)). If the roadway being entered is a multi-lane road, the controlling measurement for sight distance shall be based on the approach lane that is the worst case scenario.

D. Landscape within Corner Sight Distance Triangle: Trees shall be spaced and offset to prevent a fencing effect that impedes visibility from turning vehicles. Ground cover and shrubs shall be designed such that they do not exceed a maximum height of 12-inches at maturity.

7-13 CENTERLINE RADII

The curve data (delta angle, length, tangent and radius) for all centerline curves shall be computed and shown on the plans. The minimum centerline curve radii shall be as specified in Table 7-1. Special consideration may be given by the City Engineer for unusually difficult alignment problems.

7-14 DRIVEWAYS

When driveways are abandoned or relocated, the driveway section shall be removed and replaced with curb, gutter, and sidewalk conforming to these standards. Parking is restricted within the throat depth of all driveways. All new driveways shall conform to the following requirements:

A. Types, Widths and Grades

1. Single Family Residential and Duplex Driveways shall have a minimum throat width of 16 feet and maximum throat width of 32 feet.

Lot pads shall be graded to accommodate maximum driveway slopes of 14 percent from back of right-of-way. Unusual terrain conditions may warrant waiver of this design subject to the approval of the City Engineer. Number of driveways accessing a single parcel is defined in Section 5-4 "Site Access" of these Design Standards.

2. Multi-Family/Office Commercial/Industrial Driveway main entrances shall have a minimum throat width of 35 feet. The minimum throat width may be reduced to 25 feet if the driveway is a secondary access or restricted to right turn movements. If a raised median is provided in the driveway throat, the driveway width shall be widened as necessary to accommodate the number of ingress and egress lanes required, with a minimum ingress lane width of 18 feet. The minimum driveway median width shall be 4 feet and the maximum width shall be 10 feet. The nose of the median shall be no less than 7 feet and no more than 15 feet from the gutter flow line.

Driveways located on collector streets shall be standard commercial driveways per the Standard Drawings unless the City Engineer deems a Type A-7 driveway appropriate for a particular project. Driveways on arterial streets shall be either at grade with appropriate drainage collection facilities or "Type A-7" per these Standards.

Driveway slopes shall have a maximum grade of 10 percent except from the edge of pavement to a distance 15 feet within the project. This area shall have a maximum slope of 2 percent. Unusual terrain condition may warrant waiver of this requirement subject to the approval of the City Engineer. If the driveway is other than a "Type A-7" driveway that provides cross gutter, a traffic control sign shall be provided.

B. Location: All aspects of site access (location of driveways, number of driveways allowed, spacing of driveways, etc.) are addressed in Section 5 of these Design Standards.

C. Sight Distance: Sight distance at driveways shall be as specified in Section 7-12.

7-15 BUS STOPS AND TURNOUTS

Bus turnouts and shelter pads shall be required at locations specified by the City Engineer. All bus turnouts shall conform to the STD DWG #ST-29. The size and location of bus shelter pads, whether existing or proposed, shall conform to STD Drawing ST-28 and shall be shown at all bus turnouts.

"Bus stops with or without shelters, shall have a concrete bus stop pad, with minimum dimensions of 8-ft long as measured perpendicular from the face of curb and 5-ft wide as measured parallel to the curb. Bus stop pads are to be kept clear of bus shelters and other street furnishings including bike racks, trash cans, street lights, and other vertical objects."

7-16 DEVELOPER RESPONSIBILITY FOR IMPROVEMENTS TO STREETS

The following requirements apply to private development project adjacent to existing and proposed streets.

A. The Developer shall be responsible for upgrading streets within and adjacent to the developer's project where the pavement section of an existing street does not meet the structural section and/or the centerline grade and alignment requirements specified in these Design Standards for those streets.

Where the design centerline grade is to be higher than the existing, the Developer shall extend the overlay beyond the centerline of the street and shall neatly conform to the existing surface grade on the other side. The Developer shall also be responsible for overlaying any low areas where the new pavement is proposed to meet the existing pavement to maintain a uniform cross slope.

B. When making a connection to an existing stub street, the Developer shall be responsible for removing and reconstructing up to a maximum of twenty feet of the existing roadway to make a satisfactory connection as required by the City Engineer.

C. When widening to complete an existing partial street along a development project, or when removing existing curb and gutter, 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 pavement section for constructing against.

For asphalt concrete roadways grinding of existing pavement (1½-inch minimum) shall be made to the next nearest edge of lane line. The width to be removed shall be determined by the City Engineer. In the case of curb and gutter removal adjacent to asphalt concrete roadways, minimum width of pavement cut shall be 2 feet.

For Portland cement concrete roadways PCC pavement may be placed against the existing pavement if the City's Construction Inspector determines the pavement edge is flawless, otherwise the existing pavement width to be removed shall be determined by the City Engineer. In the case of curb and gutter removal adjacent to Portland cement concrete roadways, minimum width of pavement cut shall be to the bike lane stripe.

D. All temporary approaches to existing roadways required as a result of the development shall be at the Developer's expense. The temporary approaches shall be paved with the structural section to be determined individually for each situation.

E. The Developer shall be responsible for relocating existing traffic signals and streetlights, and installing new traffic signals and street lights as necessary for new street and driveway locations. The Developer shall also be responsible for relocating existing traffic signals and street lights as necessary for the installation of new curbs or new curbs and sidewalks at locations where there are no existing curbs or curbs and sidewalks, or, where existing improvements do not meet current standards. Traffic signals must remain operational during all construction within signalized intersections.

F. The Developer shall be responsible for constructing or modifying median island curbs where required by these standards, or when required for traffic control as a result of the development, as determined by the City Engineer.

G. The Developer is required to provide frontage improvements along existing and proposed roadways at the Developer's expense. Frontage improvements include, but are not limited to, sidewalk, curb and gutter, center median, 18 feet pavement width, additional pavement width beyond the 18–feet for intersection widening (including acceleration and deceleration lanes, bus turnouts, widening for dual left turns, etc.), drainage system, landscaping, soundwalls, street lighting, roadway signing and striping, and all utilities (including traffic signal interconnect if applicable). For minor residential, primary residential, collector and industrial streets, the Developer shall provide the full right-of-way improvement.

H. For development within the "infill" areas of the City, the level of improvements to public streets adjacent to the development site shall be determined on a project specific basis at the discretion of the City Engineer.

I. The Developer shall be responsible for all drainage facilities (bridges, pipes, culverts, and appurtenances) crossing new streets within or adjacent to the project.

J. The Developer shall be responsible for all necessary modifications within the public right-of-way and the project site to comply with state and federal standards for access for disabled, including but not limited to sidewalk ramps.

7-17 TRENCHING IN EXISTING PAVED ROADWAYS

All trenching in existing roadways shall conform to the Standard Drawings and the Construction Standards. The Developer may be required to coordinate trenching work schedules to avoid cutting pavement where repaving is planned by the City. All cuts within a paved street shall be subject to the City's Trench Cut Ordinance. The Trench Cut Ordinance fee shall be paid prior to the approval of any plans. In no case will trenching be permitted on any street that has been constructed, overlayed, or resurfaced within the last five years or has a PQI of 8.5 or greater (Moratorium Streets – see Section 7-21). The City Engineer under unusual circumstances may give special consideration to allow use of the Moratorium Street Emergency Use Trench Restoration Detail TB-6.

7-18 STREET NAMES AND STREET NAME SIGNS

Street names shall be proposed by the Developer and shall be shown on the tentative map when submitted. These names shall be subject to approval by the City Council. No duplication of names already in use or previous proposed or sound alike names will be permitted. Street name signs shall be furnished and installed by the Developer. The requirements for location of signs do not apply to signalized intersections since signals will have their own street name signs. Street name signs shall conform to City of Roseville Construction. Refer to Roseville Construction Standards Section 56 "Signs".

A. Location and Number Required: The required number of street name signs installed and location, depends upon the width of street right-of-way and shall conform to the following:

Case 1: Two street name sign installations (with four sign plates on each post) are required at each intersection where one or both of the intersecting streets are a collector or arterial street. At a four-way intersection, the installations shall be located on both far right hand corners of the intersection relative to the direction of travel on the street having the greater right-of-way width or on the major street if right-of-way widths are equal.

At a "T" intersection, one sign shall be installed on the far right hand corner of the intersection relative to the direction of travel on the through street and the other shall be installed along the left side of through street relative to the direction of travel at a point directly opposite the centerline of the "T" intersecting street. One sign plate should be omitted from the standard four-plate installation at the "T" intersection sign locations where an approach street does not exist.

Street name signs shall be located adjacent to the major street at the end of the curb return.

Case 2: One street name sign installation (with four sign plates on each post) is required at each intersection where both intersecting streets are residential streets. At a four-way intersection, the installation shall be located at one of the far right had corners of the intersection relative to the direction of travel on the street having the greater right-of-way width or on the major street if the right-of-way widths are equal.

At a "T" intersection, the installation shall be located on the far right hand corner relative to the direction of travel on the through street.

Street name sign shall be located at the midpoint of the curb return.

Case 3: For arterials with frontage roads, the street name sign installations shall be located in the divider strip between the frontage road and the main traveled way of the highway at the near side of the intersection. All other requirements shall be as outlined above, except that only one sign will be required (in the divider strip in line with the centerline of the minor street) when there is no opening in the divider strip for access to main highway.

7-19 SURVEY MONUMENTS

The consulting engineer shall place survey monuments at the following locations:

A. At the intersection of street centerlines.

B. At the beginning and end of curves on the street centerline.

C. At the center of all cul-de-sacs and elbow points.

D. At the subdivision boundary corners and at such other locations so as to enable any lot or portion of the improvements to be retraced or located, as directed by the City Engineer.

The above-described monuments shall be as follows:

1. Subdivisions boundary monuments except those in street pavement shall be not less than 1-inch solid steel or 1-¾ inch galvanized iron pipe 30 inches in length, capped and tagged.

2. Subdivision monuments in street pavements shall be no less than a ¾ inch galvanized iron pipe, 18 inches in length. Top of pipe shall be driven flush with surface pavement.

3. All monuments in street pavement shall be monument wells, conforming to the standard drawing and shall be Detail ST-36 and shall be placed at all street intersections, centers of street cul-de-sacs and elbow points. In addition, monument wells shall be required on street centerlines and located such that there will be a clear line of sight distance between the two monuments within the street right-of-way. These will normally be located at points of curvature not exceed 1000 feet.

4. Lot corners shall have a ½ inch rebar at rear corners. Front corner and side lot lines shall be projected and marked twelve six inches to center from the back of sidewalk (or 3" from back of curb to center of marker when no sidewalk is present), with a permanent disc survey marker between ¾"–1 1/4" diameter with a minimum of one-inch deep knurl shank anchor drilled and epoxied into sidewalk or curb with expansion plug, flush with concrete surface. Survey markers shall be stamped as specified in the Professional Land Surveyors Act. Article 5, Section 8772. Use Berntsen BP2-BP copper disc with expansion anchor with countersink drill bit, or approved equal. Epoxy as specified in Section 71-5.G.2. Where survey markers cannot be installed as described above, surveyor to recommend alternate method of placement to City Engineer prior to placement.

5. Permanent survey monuments shall be placed by the Consulting Engineer at all section and quarter corners within the development. The section corner monuments shall be Minor Concrete, Per Caltrans Section 90-2, poured in place, with minimum dimensions of 6" diameter x 24" deep, with a brass cap in accordance with Bureau of Land Management Standards.

All such monuments shall be referenced to permanent objects located nearby and all ties shall be furnished to the City Engineer for general public use. Final acceptance of the public improvements will not be made until such ties have furnished to the City Engineer.

The Consulting Engineer shall also place a note on all construction plans stating that the Contractor is responsible for the protection of all existing monuments and other survey markers.

7-20 BENCHMARKS

All new improvement plan projects shall tie into the approved City of Roseville North American Vertical Datum (NAVD 88) to establish the vertical datum. Conversions to NAVD 88 from NGVD 29 will not be accepted.

In locations where a new benchmark will be required, as determined by the City Engineer, the Consulting Engineer's Land Surveyor (L.S.) will set in concrete a 3¼ inch brass cap, provided by the City Engineer. Survey for establishing the new benchmark must meet or exceed Federal Geodetic Control Committee (FGCC) Second-order class II survey requirements, and must be conducted within the City Control Network established by Record of Survey #ESD19-00096, filed in Book 24 of Surveys, at Page 23 of Official Placer County Records. This Record of Survey was conducted to establish a Control Network within the City for the purpose of replacing benchmarks due to their destruction or the setting of new benchmarks. It is recommended using at the minimum, three benchmark control points for any GPS survey. If the HPGN points that were used as the survey Basis of Bearings as shown on sheet 1 of 12 (24 ROS 23) are used on any GPS survey, it is recommended the PID DH6533 "Industrial" be used as the elevation control. The level notes shall include the new benchmark elevation in North American Vertical Datum of 1988 (NAVD 88) and National Geodetic Vertical Datum of 1929 (NGVD) vertical datum. The survey shall also include the California II State Plane Coordinate values if the new benchmark in North American Datum (NAD 83). All new benchmarks shall have a NGS stability rating of A or B. The survey notes shall be submitted to the City Engineer for review and approval.

Licensed Surveyors recovering existing benchmarks for use in their work and for work with Consulting Engineers shall provide the City Engineer with the elevation of the recovered benchmarks in NAVD 88 and NGVD 29 vertical datum. The L.S. shall also provide the City Engineer with the California II State Plan Coordinate values for recovered benchmarks.

After approval of the notes, the new benchmark will be assigned a number that the developer's engineer will mark on the brass cap, along with the date, and R.C.E. or L.S. number of the person certifying the level notes.

Benchmarks shall be provided where specified by the City Engineer and at all culverts 60-inches or greater, bridge crossings passing a 100 year flow of 250 cfs or greater, and within subdivisions that are greater than 60 lots.

7-21 MORATORIUM STREETS

Streets that have a pavement quality index of 8.5 or greater; or were surfaced or resurfaced within the previous five years. A map of current moratorium streets is available on the City website at www.Roseville.ca.us/Resurfacing. "Pavement Quality Index" or "PQI" is the value given the quality of the pavement surface of a street. Newly constructed and recently re-surfaced streets are generally rated at 10. As streets age the PQI will also be reduced.

SECTION 8: DOMESTIC WATER SUPPLY SYSTEM DESIGN

8-1 INTRODUCTION

These improvement standards shall govern the engineering design of all domestic water systems intended for operation and maintenance by the City of Roseville.

8-2 DESIGN CRITERIA

These criteria shall apply to the engineering design of all water systems intended for operation and maintenance by the City of Roseville. The intent of these criteria is to provide a water system that will dependably and safely convey high quality water throughout the distribution system.

8-3 CURRENT STANDARDS

Pertinent and current requirements of the following agencies or standards shall be complied with. In case of conflicting design criteria, standards set forth by the City of Roseville, as established herein, shall govern.

A. United States Environmental Protection Agency (EPA) Drinking Water Regulations.

B. Laws and Standards of the State of California, Department of Public Health Services relating to Domestic Water Supply.

C. City of Roseville Design Standards.

D. City of Roseville Industrial Waste Regulations (Cited in Section 9.2E)

E. Rules for installation of individual water services (Cited in Section 9.10C)

F. City Code for taps to water system

G. Title 17, Chapter V, Sections 7583-7622, California Administrative Code regarding cross-connections and backflow prevention

H. Roseville Fire Code

I. Latest Edition of the American Water Works Association (AWWA) Standards.

8-4 WATER SUPPLY QUALITY

The quality of water supplied to the City's distribution system shall conform to the Environmental Protection Agency Drinking Water Act, and the State Department of Health Services Drinking Water Standards.

8-5 WATER SUPPLY PRESSURE

Normal-operating pressures of not less than 50 PSI nor more than 100 PSI shall be maintained at service connections to the distribution system, except that during periods of peak domestic and fire demand, the pressure shall not be less than 20 PSI.

8-6 FLOW DETERMINATION

Determination of flow volumes required for a specific land use category shall consider maximum day domestic demands occurring in conjunction with an emergency fire flow demand. For design of the distribution system, the following unit demand factors shall be assumed.

Land Use Category		**Average Day Unit Water Demand Factors**
Residential	LDR (<3.5 DU's/Ac)	***728 gpd/DU***
	LDR (3.5 to 5.0 DU's/Ac)	***600 gpd/DU***
	LMDR (>5.0 to 6.0 DU's/Ac)	***521 gpd/DU***
	LMDR (>6.0 to 8.0 DU's/Ac)	***430 gpd/DU***
	MDR (>8.0 to 12.0 DU's/Ac)	***323 gpd/DU***
	HDR (>12.0 to 16.0 DU's/Ac	***288 gpd/DU***
	HDR (>16.0 DU's/Ac)	***177 gpd/DU***
Commercial/Other	Commercial/Retail	***2,598 gpd/ac***
	Business Professional	***2,598 gpd/ac***
	Light Industrial	***2,598 gpd/ac***
	Industrial	***2,562 gpd/ac***
	Railroad Yard	***109 gpd/ac***
	Elementary Schools	***3,454 gpd/ac***
	High Schools	***4,068 gpd/ac***
	Public (Fire Station, etc)	***1,780 gpd/ac***
	Park/Recreation	***2,988 gpd/ac***
	Open Space/Major ROW	-
	Vacant/Unassigned	-

*Factors assume a 30% F.A.R. 50% F.A.R. for senior living.

8-7 PEAKING FACTORS

The average day demand to maximum day demand peaking factor shall be 2.0. The maximum day demand to peak hour demand peaking factor shall be 1.7 (3.4 average day to peak hour).

8-8 REQUIRED FIRE FLOWS

For areas of the general type noted below, the indicated water supply for fire flows shall be provided with the initial development. Expansion or change in zoning of the development shall be subject to the requirements of the California Fire Code (CFC hereafter) as adopted by the Roseville Fire Department (RFD hereafter). The RFD shall determine all fire flows.

A. Residential Areas: The fire flow demand for detached single family dwelling units shall be a minimum of 1,500 gallons per minute (gpm) in accordance with the CFC as adopted by the RFD. For fire flow greater than 1,500 gpm, each fire hydrant shall maintain 1,000 gpm or fraction thereof based on the provisions of the CFC.

Note: Automatic Fire Sprinklers: Single-family homes equipped with automatic fire sprinklers systems shall require a minimum 1-inch water service and meter as determined by the RFD. The minimum 1-inch water line shall start from the public main to the required water meter. Service and meter size shall be approved by the RFD.

B. Multi-Family Areas: For attached multi-family units, the fire flow shall be determined by the Roseville Fire Department. The maximum fire flow however shall not exceed 4,000 gpm provided the building is fully sprinklered in accordance with the CFC as adopted by the RFD. For buildings that are not sprinklered, contact the RFD. For fire flow demand greater than 1,500 gpm, each fire hydrant shall be 1,000 gpm or fraction thereof based on the provisions of the CFC.

C. Commercial, Business, Industrial or School District Areas: The maximum fire flow shall be determined by the Roseville Fire Department. The required fire flow however shall not exceed 4,000 gpm, provided all the buildings are fully sprinklered in accordance with the CFC as adopted by the RFD. For buildings that are not sprinklered, contact the RFD. For fire flow greater than 1,500 gpm, each fire hydrant shall be 1,000 gpm or fraction thereof based on the provisions of the CFC.

8-9 LOCATION IN EXISTING STREETS

Where water mains or services are to be located in an existing street, factors such as curbs, gutters, sidewalks, traffic conditions, traffic lane conditions, pavement conditions, future street improvement plans, and existing utilities shall be considered. The approval of the Environmental Utilities Director and City Engineer shall be obtained in every instance.

8-10 LOCATION IN UNPAVED AREAS

All mains in unpaved areas shall be ductile iron pipe and marked every 150 feet with a blue 5-foot 6-inch composite utility marker. A decal shall be placed on the marker stating "CAUTION WATER MAIN." Utility markers shall be Carsonite or approved equal with anchor barb kit. The first utility marker shall be placed within 20 feet of the public roadway.

8-11 TRANSMISSION SYSTEM DESIGN

Transmission mains are 16 inches in diameter or larger. Standard transmission main sizes are 16-, 24-, 30-, 36-, 42-, 48- and 54- inches in diameter. Sizing and layout of transmission mains shall conform to the Master Water Supply Plans of the City of Roseville Environmental Utilities Department. Technical specifications for water transmission mains shall be a requirement of the proposed improvements plans. Under no circumstances shall fire hydrants or water services be directly connected to a transmission main, with the exception of hydrants that are acting as blow-offs.

A. Transmission Main Location: All transmission mains shall be installed within public rights-of-way and easements.

1. Mains shall be located 3 feet from the lip of gutter on the northerly and westerly side of the street. If conflicts exist at this location, then the main may be installed within an easement immediately adjacent to and behind the property line fronting the public right-of-way, subject to approval of the Environmental Utilities Director.

2. A minimum horizontal separation of 10 feet shall be maintained between sanitary sewer and recycled water mains. A minimum cover of 48 inches shall be maintained at all locations.

3. Transmission mains shall maintain a minimum vertical clearance of 1 foot from all other utilities.

B. Transmission Main Appartenances

1. Valves shall be spaced no more than 2,000 feet apart.

2. Inspection manholes shall be placed every 1,500 feet. A minimum of one inspection manhole shall be located between two valves unless otherwise approved by the Environmental Utilities Director.

C. Corrosion Protection: A corrosion protection study shall be included with improvement plan submittals. Corrosion protection facilities shall be identified from the roadway with the curb stamp "CP-W".

D. Insulating Flange Test Station: An insulating flange test station shall be used between dissimilar metals per the standard details.

8-12 DISTRIBUTION SYSTEM DESIGN

Standard distribution main sizes are 6-, 8-, and 12- inches in diameter. Sizes of mains shall be such that the stated normal pressures, as specified in Section 8-5, and the minimum requirements for main spacing, specified below, are maintained. The distribution system shall be designed in grid form to provide equalized pressures throughout the system equalized under varying rates and location of demand. The minimum pressures and flows specified in these design standards shall govern the design. The following shall be considered during system design:

A. Hydraulic Analysis: A Hardy-Cross network hydraulic analysis shall be provided to the Environmental Utilities Department upon request.

1. The hydraulic analysis submitted shall include two copies of the following items:

a. The data input files, as well as the analysis results in electronic format.

b. Information on the proposed development (e.g. type of development, number of acres, number of units, fire flow requirements, etc.).

c. Data sheets outlining all assumptions (e.g. method used to assign demands to corresponding junction nodes and source HGL's used).

d. Map identifying pipe and node numbers and their locations.

e. Fire hydrant locations.

f. The name and version of software used for the analysis.

g. Elevations of junction and source nodes. The elevations used in the network hydraulic analysis shall be based on a project grading plan or the anticipated final elevations. If the final grading plan deviates significantly from the elevations used in the analysis, a revised analysis will be required.

h. Staging or phasing of the development.

i. Appropriate off-site demands.

2. The Hazen-Williams formula shall be used in the analysis of the system. The roughness factor shall be as follows:

a. C=130 for all new cement-line, PVC C-900, and ductile iron pipes

b. C=130 for all existing pipes greater or equal to 16 inches in diameter

c. C=120 for all existing pipes less than or equal to 12 inches in diameter

3. When identifying the fire flow available in a network analysis, use the hydrant located at the development's weakest point (highest point in the development and/or last hydrant on a dead-end main). Also verify the hydrant is located at a junction node. The maximum delivery from any hydrant of the type conforming to current City Standards shall be limited to 1,000 gallons per minute.

B. Pipe Sizes: The minimum pipe size for residential development shall be 6 inches in diameter for cul de sac's and 8" inches for all other streets. For commercial developments, the minimum pipe size shall be 8 inches in diameter.

C. Stubs: Stubs for future developments shall be a minimum 18 feet fully restrained ductile iron pipe originating from the water main. High Density Residential and commercial parcels should have 2 water stub for future development.

8-13 WATER MAIN LOCATION

Water mains shall be installed in public rights-of-way or easements granted to the City.

A. Location: The following horizontal and vertical criteria shall be used to locate water mains:

1. Mains shall be located 3 feet from the lip of gutter on the northerly or westerly side of the street. If conflicts exist, then the main may be installed immediately adjacent to and behind the property line fronting on the public right-of-way, subject to approval of the Environmental Utilities Director. Arterial streets may require dual mains, one on each side of the street, as approved by the Environmental Utilities Director.

2. If it is necessary to install a water main outside of the public right-of-way, an easement dedication to the City shall be required. Water mains shall be centered within their easement. Easements shall be located completely on one side of a property line or fence. Dedicated easements shall be clear of all permanent structures, building eaves, roof lines and the future trunks of large tree species. Temporary construction easements of adequate size shall also be provided. The easement width shall be the greater of the following:

a. Minimum width of easement shall be 15 feet.

b. All easements shall have a minimum width equal to the required trench width according to the standard detail for trench backfill plus 2 additional feet of width for every foot of depth of the pipe as measured from the bottom of the pipe to finished grade. All water mains shall be centered within their easement.

c. Water mains located outside of paved area shall be ductile iron.

3. Water mains located between lots shall require an access easement or pedestrian walkway as determined by the Environmental Utilities Director.

4. Separation between potable water mains and pipes conveying non-potable fluids shall comply with the requirements of the State Water Resources Control Board, Division of Drinking Water (DDW). When the basic separation requirements from California Code of Regulations (CCR) Title 22 Section 64572 cannot be met, and all reasonable alternatives have been exhausted, Contractor shall work with City to obtain a waiver from the DDW. Refer to City of Roseville Standard Detail W-39 and Section 8-13.C of this document.

a. In addition to CCR requirements, the City requires a minimum 5 foot separation between potable water mains and all pipelines containing disinfected tertiary recycled water (defined in section 60301.230 of CCR Title 22), and storm drainage.

b. For information on City of Roseville Recycled Water Supply Quality, see Section 14-4.

B. Vertical Elevation Change: Mains designed with a vertical elevation change using angle fittings shall use a segment of ductile iron pipe with an approved restraint system between the two angle fittings. Maximum vertical angle fitting allowed is a 45.

C. Main Separation Alternative Request: These guidelines are for projects that are required to obtain Pipeline Separation Variance Waivers from the State Water Resources Control Board's Division of Drinking Water (SWRCB DDW) per City Standard detail W-39.

- These waivers shall be obtained prior to project approval.
- Projects that require a Separation Variance Waiver and do not follow the process below to obtain said waiver, shall not be approved by the City for construction.
- These waivers are issued by the SWRCB DDW to Water Purveyors only.
- A construction waiver-compliance certification is required by the Project Applicant's Engineer.
- The Project Applicant should anticipate that this process could add as significant amount of time to the project approval process.

For projects where there are constraints that make it infeasible to meet the SWRCB DDW minimum requirements for pipeline Separation Variance Waiver shall be obtained from the SWRCB DDW prior to installation of the facilities.

Submittal Process - The Project Applicant shall evaluate all reasonable options (including the possibility of relocating existing facilities if feasible), to achieve the minimum separation requirements as stated by the SWRCB DDW requirements. If upon completion of the options evaluation, the project applicant is unable to meet the separation requirements, the Project Applicant shall submit the information below (for City review) to begin the process of obtaining a waiver from the SWRCB DDW.

1. **Step 1** – The Project Applicant should evaluate all available design options to meet the SWRCB DDW's separation requirements. If the Project Applicant has exhausted all reasonable options, and cannot meet the separation requirements, proceed with the next step.

2. **Step 2 –** The Project Applicant should submit a Separation Variance Waiver request to the Development Services Department (DSD). The request shall include the following:

    a. Submittal showing all reasonable options that were evaluated in an effort to meet the separation requirements (Note: provide very detailed information to allow DSD engineering staff to conduct an independent evaluation of the options. Submittal shall be returned if insufficient information is provided).

b. A technical Memo (TM) that outlines the analysis conducted, the options evaluated and conclusions stating that all options evaluated do not meet separation requirements and therefore a Separation Variance Waiver is required.

c. The TM shall demonstrate the recommended project option presented, and as designed includes mitigation measures that ensure that the proposed alternative would provide at least the same level of protection to public health.

d. The TM shall include a section that identifies variance location(s) and shall be shown on the design plans submittal as part of this package.

e. The design plans and the TM shall be stamped and signed by a Professional Civil Engineer licensed in the state of California.

3. **Step 3 –** The DSD will review the submittal and provides comments as follows:

   a. Revise and Resubmit: If DSD engineering staff determine that other options are available to consider, the project applicant will be notified to evaluate those additional options and resubmit: or

   b. Approved: Move to next step.

4. **Step 4 –EU Department Review**
   a. Environmental Utilities Department must review and approve all applicants for Separation Variance Waiver Requests prior to submittal to DDW.

5. **Step 5 –** The Project Applicant shall prepare and submit a Separation Variance Waiver Request to the DSD, stamped and signed by a Professional Civil Engineer license in the state of California. This shall include the SWRCB DDW Waterworks Standards Main Separation Alternative Request Checklist which can be found at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Publications.html

6. **Step 6 –** The DSD will submit a Separation Variance Waiver Request on behalf of the Project Applicant to the SWRCB DDW. This includes:

   a. A written concurrence from DSD stating that the selected project alternative is the preferred alternative.

   b. The SWRCB DDW Waterworks Standards Main Separation Alternative Request Checklist (submitted by the applicant in step 4).

c. The technical Memo with the alternatives evaluation that shows how the project constraints make it infeasible to obtain the minimum SWRCB DDW pipeline separation requirements (submitted by the applicant in step 2).

7. **Step 6 –** Responses from the SWRCB DDW shall be communicated to the Project Applicant to determine next steps.

D. Cover: A minimum cover of 36 inches and a maximum cover of 60 inches shall be maintained as measured from the outside bell of the pipe to gutter flow-line for distribution mains. A minimum cover of 48 inches as measured above shall be maintained for transmission mains.

E. Dead-End Mains: Dead-end mains shall be eliminated wherever possible by looping the system. Dead-end hydrants conforming to the Construction Standard details shall be installed on all permanent or temporary dead-end mains. Removal of the dead-end hydrant at the end of cul-de-sacs and service connection to the end of the main is not permitted without prior approval by the Environmental Utilities Director.

On transmission mains that are being extended, all appurtenances downstream of existing transmission main (i.e. reducer, insulating flange, etc.) shall be removed. Upon approval of serviceability by Water Utility and Development Services Inspector, dead-end hydrant and breakoff check valve may be reused.

F. Warranty Inspection of Water Main Stubs: As a requirement, water stubs are provided to subdivisions as a courtesy by developers during the construction of backbone infrastructures in streets to prevent cutting up the newly paved streets when the subdivisions are ready to develop. These stubs become an integral part of the water system and subsequently the responsibility of the developers of the subdivision and are therefore imperiled to both construction and warranty inspections. This practice saves future developers construction time and cost that would have otherwise been spent on tie-ins and street repairs and in some instances prevents delays in the event a street has a moratorium. Since these stubs are provided at no cost to future developers, it is our position, hence our policy, that it is the responsibility of the contractors to test and repair these stubs, if found damage, prior to tie-ins. A note to this effect shall be placed on the improvement plans.

G. Chlorine Flushers: To ensure adequate water quality in new developments, one automatic flusher shall be installed if more than 500 feet of main is constructed per City Standard detail W-42. A second automatic flusher shall be installed if more than 5000 feet of water main is constructed and for every 5000 feet of main afterwards. Dead end water mains or variances to these guidelines must be submitted in writing and approved by the Environmental Utilities Director.

H. Public Lines in Commercial Developments: Water mains shall be located within drive aisles unless otherwise approved by the Environmental Utilities Director. The Design Engineer shall minimize the length of publicly-owned mains where on on-site water loop is required.

8-14 VALVES

Sufficient valves shall be provided on water mains to minimize customer service interruptions and sanitary hazards during repairs and future development.

A. Locations: Valves shall be generally located as follows:

1. No single shutdown will result in shutting down a transmission main.

2. At minimum intervals of 500 feet in school, commercial, industrial, or multi-family residential developments.

3. In residential areas, valves shall be spaced such that no single shutdown will result in shutting off water to more than 20 services or 800 feet of water main, whichever occurs first.

4. Valves shall be located such that any section of main can be shut down without going to more than three valves to shut down the section main.

5. All tees shall have a minimum of two valves. Commercial services 6 inches and greater shall have a valve on each leg of the tee for a total of three valves.

6. All crosses shall have a minimum of three valves.

7. Valves shall not be located in street gutters, valley gutters, or driveways.

8. A valve shall be installed on each side of a creek bridge, major highway, or as required by the Environmental Utilities Director.

B. Removal and Abandonment: Any valve outlet installed prior to lot development and subsequently not required shall be removed in its entirety. If removal is not practical, the valve shall be abandoned in the closed position and the lateral shall be cut, capped, and finished with an adequate thrust block. The lid shall be welded shut and painted red. The following note shall appear on the construction drawing:

The Contractor shall cut the existing pipe where shown on the drawing and install a restrained cap complete with thrust block. Where a joint or coupling in the existing pipe is uncovered at the cut and cap locations, the installation of a plug may be permitted with approval from the Environmental Utilities Director.

C. Valve Extension Stems: Valve extension stems are required where the distance from the top of the valve box to the top of the operation nut exceeds 40 inches. The valve extension stem shall be a minimum of 24 inches long and shall be within 24 inches of the surface.

D. Air Relief Valves: In the absence of services to relieve air trapped in high points of the water main, air relief or air vacuum relief valves are required on pipeline high points and changes in grade.

8-15 HYDRANTS AND BLOW-OFFS

A. Location: Hydrants and blow-offs shall adhere to the following criteria:

1. Fire hydrants shall be placed at street intersections wherever possible. Hydrants located at intersections shall be installed at the curb return on the opposite side of the water main connection.

2. Fire hydrants and blow-offs not located at intersections shall be installed on property lines between lots.

3. Not more than three hydrants shall be installed on an 8-inch main between intersecting 12-inch mains. The pipeline connecting the hydrant and the main shall be a minimum of 6 inches, with a gate valve flange connected to the main.

4. A dead-end hydrant assembly shall be installed on all permanent and temporary dead-end runs. In no case shall the location be such that there is a possibility of back-siphonage into the distribution system.

5. Blow-off assemblies shall be located at low points along transmission mains.

B. Spacing: Fire hydrants and blow-offs shall have a maximum spacing of 500 feet measured along the street frontage in residential areas and a maximum spacing of 350 feet in all other areas. Where new water mains are extended along streets where hydrants are not needed for protection of buildings or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards. Refer to Roseville Fire Code for the number and distribution of fire hydrants served by private fire service water systems.

C. Cul-de-sacs and Dead-end Streets: Hydrants shall be required within a cul-de-sac or dead-end street measuring more than 250 feet as measured from the curb return of the intersecting street and the end of the bulb or street. A minimum 8-inch water main shall extend up to the hydrant tee.

D. Valves: Hydrant valves shall be placed with a minimum separation of 15 feet from the hydrant.

8-16 WATER SERVICE

Water services shall be installed at the time the water main is constructed. Service stubs 2 inches and smaller shall be copper. Service stubs 3 inches and larger shall be fully restrained ductile iron

pipes. Services from mains installed in private roads shall be extended 1-foot beyond the edge of pavement. Water services shall also conform to the following requirements:

A. Location: Water services for residential subdivisions shall be located 54 inches from the property line per these Construction Standards (Detail W-9). The building service shall be located to provide the most direct connection to the main. Every effort shall be made to pair services. Water service lines shall not cross lots they do not serve.

B. Curb Stamp: The curb shall be stamped with a "W" at all service locations.

C. Sizing: The standard size of a single-family residential service line shall be a minimum 1- inch service or as determined by Roseville Fire Department. Schools, commercial, industrial, or a multi-family residential developments shall loop the domestic water with 2 domestic services. In infill areas where 2 stubs are not provided, must be reviewed and approved by the Environmental Utility Department. City may require calculations supporting sizing of water service lines.

D. Spacing: For service lines 2 inches in diameter or smaller, service saddles shall be a minimum of 12 inches from the end of the main and 24 inches to any other service saddle or pipe joint.

E. Separation: Service line separation shall adhere to the following criteria:

1. For service lines 2 inches in diameter or smaller, a minimum of 6 inch vertical clearance is required when crossing any non-potable facility.

2. Separation requirements for any service lines larger than 2 inches shall meet the separation requirements for water mains, as outlined in Section 8-13.A.4.

F. Depth of Cover: Required depth of cover for all service lines to finished grade is a minimum of 18 inches. Other depth of cover requirements are shown in Standard Water Details.

G. Service Taps: The Environmental Utilities Department reserves the right to make all water service taps onto existing mains upon application for a service tap and authorization for payment. Work by the City shall be performed on a time and materials basis. A note to this effect shall be placed on the plan sheet which shows a detail of the area that requires such tapping. The service tap application shall be made to the Environmental Utilities Department a minimum of two weeks in advance of the time the tap is desired. All connection fees must be paid prior to the time of application. All excavation, backfill and the installation of the remainder of the water service shall be performed by the Contractor.

H. Water Meters: Water meters shall be installed on all water services. Meters shall be purchased through the City and installed by City forces upon plan approval and payment of the connection fees.

8-17 RESTRAINT

Joint restraint shall be achieved by means of a mechanical joint restraint device. All fittings shall maintain a minimum of 18 feet of restrained pipe into the fitting in all directions. Full pipe restraint shall be required within bridges, casings, dead end runs, temporary dead end runs, and as determined by the Environmental Utilities Director. Restrained pipe within casings or bridges shall be fully extended or "stretched out" to remove the slack between the joints the entire length of the structure. A note shall be placed on the plans. Thrust blocks shall not be used unless specifically called out on the plan set and approved by the Environmental Utilities Director. In the case of hydrant runs and dead-ends, thrust blocks shall be used in addition to mechanical restraints as a redundant feature. Restraint calculations shall be submitted with the plan review. Restraint calculation parameters are as follows: soil type ml, granular fill, 1.5 to 1 safety factor, trench type 4, and minimum test pressure of 150 psi.

8-18 WORK NEAR EXISTING WATER MAINS

Existing transmission water mains shall be clearly shown on the plans. The plans shall have a caution note on the cover sheet, plan/profile sheets, and grading sheets where the transmission main is shown as existing. The notes shall read as follows:

CAUTION EXISTING (name size) WATER MAIN.

No construction shall be permitted within the water main easement without the presence of the Environmental Utilities inspector. Prior to start of construction, 48-hour notice shall be given. Heavy equipment and vibratory equipment may cross designated segments of the water main with a minimum of 10 feet of cover or approved equivalent. The City shall inspect the condition of the existing main prior to paving. Request for inspection shall be made one week in advance.

A. Water Mains 16 Inches and Larger:

1. The Environmental Utilities Department shall inspect the interior of the existing water transmission main prior to paving. If damage to the pipe resulting from construction activities is discovered, the Contractor shall be billed for repairs. A minimum of 1 week advance notice is required prior to inspection.

2. The Contractor shall provide the City with a construction schedule, and a list of equipment proposed to be used within the water main easement.

3. A plastic mesh fence shall be installed on both sides of the water main a minimum of 10 feet from the centerline prior to the start of construction and/or grading operations.

8-19 WATER IMPROVEMENT PLAN REQUIREMENTS

Plans for the construction of water infrastructure, whether in conjunction with other improvements or for a water project only, shall conform to these standards, the Construction Standards, and meet the following requirements.

A. Water Study: A water study or water master plan as determined by the Environmental Utilities Director may be required prior to review of the water design if there is a possibility that adjacent areas might require service through the subject property.

B. General Requirements: Plans for the water improvement project shall include a layout sheet, plan and profile of each public water line, and necessary detail drawings. Reference to the Construction Standards shall be made for all standard details.

C. Layout Sheet: Improvement plans shall include an overall map which shows the project boundaries, water mains, valves, services, and other important items of the work.

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

D. Plan and Profile Sheets: Water lines to be maintained by the City of Roseville shall be shown on both plan and profile. The following standards, with respect to drafting and the information to be included on the plan and profile sheets, generally apply to project in developed areas.

1. Water lines to be constructed shall be indicated on profile by parallel lines spaced to show the pipe diameter to scale. The length, size, and type of pipe material shall be printed parallel to the horizontal grid lines and approximately halfway between the ground surface and pipe line. The profile shall note all proposed appurtenances. Existing facilities shown on the profile shall be dashed or distinguishable from proposed improvement. Manhole identification on the plan view may be oblique. Stationing shall appear at the lower edge of the profile grid directly under the appurtenance.

2. Proposed water services shall be indicated on the plans per the Construction Standards details.

3. Improvements or lots shown on a plan sheet but served to a line shown on another plan sheet shall have the direction of service shown by a small triangle and letter “W.”

4. Both permanent and working easements shall be shown to scale and dimensioned on the plans.

5. Proposed water lines shall be adequately dimensioned from street centerline. If the water line is to be located in an easement, sufficient dimensions and bearings from physical features to locate the line in the field shall be shown on the plans.

6. Existing gas, sewer, storm drains, and all other utility lines above or below ground shall be shown on the plans.

7. Trees and other objects within 10 feet of the construction centerline shall be dimensioned on the plans relative to the construction centerline. The diameter of tree trunks and interfering heavy tree branches shall be noted. Removal of a tree or object, or other special handling shall be noted. Written documentation of any special arrangements regarding preservation of property shall be provided to the Environmental Utilities Director if no easement document is involved. If an easement is negotiated, all special arrangement shall be included in the easement document. Tree removal must be approved by the Planning Department.

8. Culverts shall be shown on both plan and profile when crossed by the construction or when parallel and within 20 feet of the construction line. Type, size, and invert elevation shall be called out.

9. No trees or permanent structures shall be placed within water easements without the approval of the Environmental Utilities Director.

E. Detail Drawings: Details not covered by the Construction Standard Detail sheets shall be shown on the plans.

8-20 RECORD (AS-BUILT) PLANS

The Contractor/Developer shall keep an accurate record of all approved deviations from plans and shall provide a PDF electronic, full size bond and 11 x 17 copy of the as-built plans prior to final acceptance of the completes improvements. Each sheet of the plans shall be marked "AS-BUILT" or "RECORD DRAWING". "AS-BUILT" or "RECORD DRAWING" of signal plans, water, sewer and storm drain composite in plan view only, and parcel and final maps shall also be submitted on computer disk in DXF or DWG format.

SECTION 9: SANITARY SEWER DESIGN

9-1 DESIGN CRITERIA

These criteria shall apply to the engineering design of any sanitary sewer system to be maintained by the City of Roseville, or with those exceptions as noted, within private multiple ownership residential or multi-parcel commercial and industrial developments. Private onsite sewer systems are only allowed on sites that have shared sewer mains within commercial and multifamily developments and that are owned and maintained by an association. Shared sewer mains that serve more than one property owner are required to be public mains.
The following requirements apply to all private onsite sewer systems:

- The onsite sewer system must be designed to the City of Roseville design standards pertaining to pipe sizing and slope.
- In the event a public utility easement is granted within the site that contains a private onsite sewer system, a note is required on the easement noting the easement does not apply to the sewer system.
- The delineation between the Public and private onsite sewer systems shall be a standard City sewer manhole that will be part of the public sewer system. Normally the first manhole on the site that is within the public utility easement.
- Applicants may choose to keep the onsite sewer system public if all standards are met regarding design and construction of the onsite sewer system including the dedication of a public utility easement.

Sites that do not clearly meet the conditions described above will be evaluated on a case by case basis by the City Wastewater Utility.

9-2 AVERAGE FLOW DETERMINATION

The determination of average dry weather flows for design purposes shall be based upon the best available information concerning land use and density as determined by the Environmental Utilities Director. This information may include approved land use and density in accordance with current zoning in the absence of more specific information pertaining to expected development. Average dry weather flow factors are listed in Table 1.

Table 1 – Average Dry Weather Unit Flow Factors

Land Use Designation	Units	Flow Factor (gpd/unit)[1,3]
Commercial	gpd per acre	850
Heavy Industrial	gpd per acre	850
Light Industrial	gpd per acre	850
Mixed Use	gpd per acre	2,300
Public/Quasi-Public	gpd per acre	660
Schools	gpd per acre	170
Residential 1 DU	gpd per DU	190
Residential 2 DU	gpd per DU	190
Residential 3 DU	gpd per DU	190

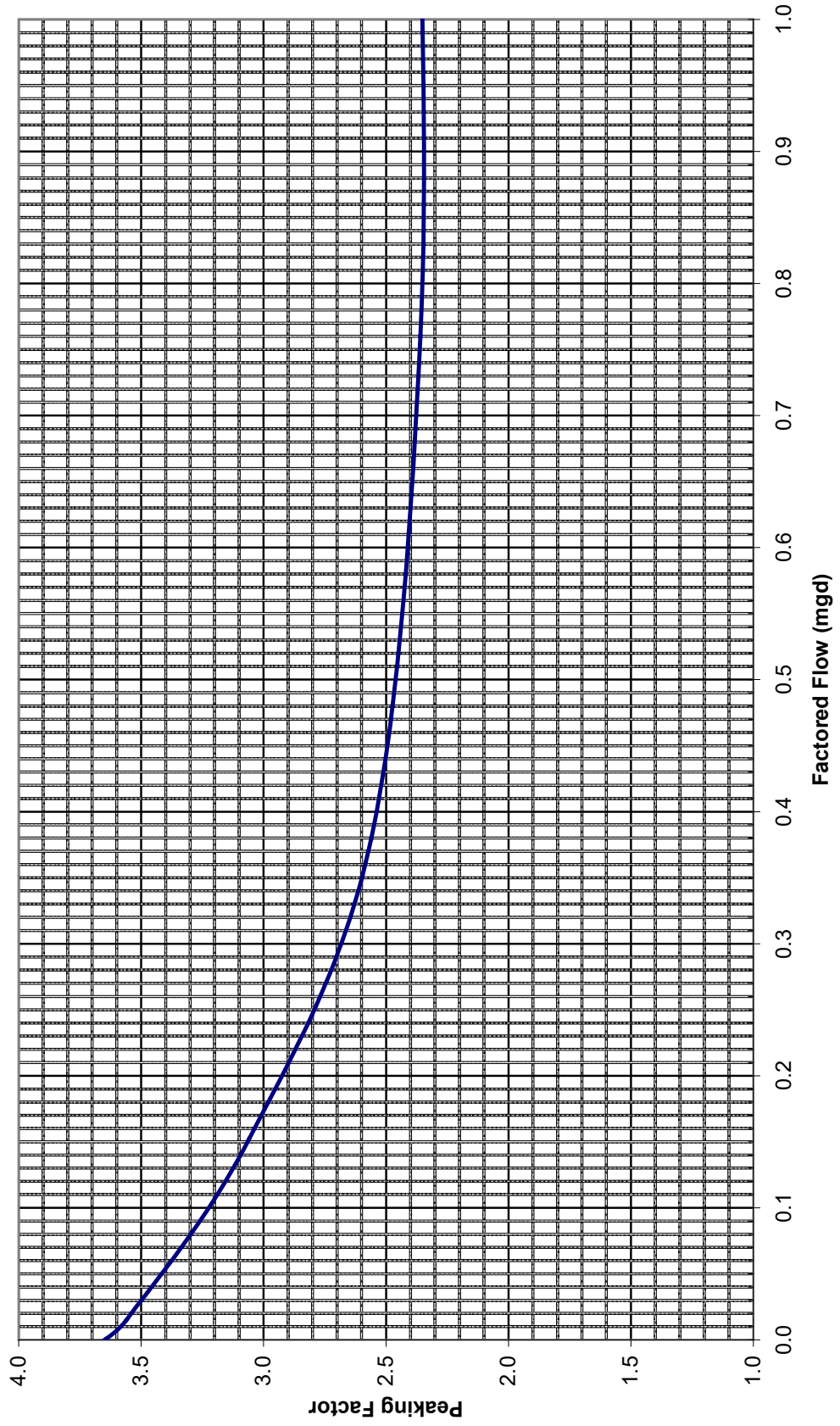
Residential Multiple DU[2]	gpd per acre *or* gpd per DU	2,040 *or* 130
Open Space	gpd per acre	0
Parks> 10 Acres	gpd per acre	10
Vacant	gpd per acre	0

[1]Includes allowances for dry season groundwater infiltration (GWI)
[2]Future development projects should use the factor that results in the highest flow.
[3]factor flow assumes a 30% F.A.R. 50% for senior living

9-3 DESIGN FLOW

Design flow sizing of infrastructure 15 inches in diameter and smaller shall be calculated by using the average dry weather unit flow factor(s) listed in Table 1 for the upstream service area along with a safety factor of 2.0 and the appropriate peaking factor listed on Figure SS-1. Attachment A located at the end of this section provides a sample calculation. For sizing trunk sewers 18 inches in diameter and larger, utilize the hydraulic model of the collection and conveyance system and consult with Environmental Utilities Department staff.

Figure SS-1
Peaking Factor Curve



9-4 PIPE CAPACITY, SLOPE, VELOCITY, SIZE, DEPTH AND MATERIAL Design criteria for the pipe system are as follows:

A. Main Sizes: The minimum size sewer main within a residential development shall be 8 inches in diameter. The minimum size sewer main for commercial and industrial developments shall be 8 inches in diameter.

B. Slope and Velocity: Manning's formula shall be used to determine the relation of slope, design flow, velocity, diameter, and "n" value. The "n" value shall not be less than 0.013 for all pipe materials.

1. Table 2 provides minimum slopes and design flow capacities for various pipe diameters. Pipe slopes less than those listed in this table shall not be used without the approval of the Environmental Utilities Director. The slopes indicated are based on a velocity of two feet per second with the pipe flowing full.

Table 2 – Minimum Slopes and Flow Capacities

PIPE DIAMETER (IN)	SLOPE (ft/ft)	CAPACITY AT 0.7 DEPTH	CAPACITY FLOWING FULL
6	0.0050	0.22 MGD	
8	0.0035	0.38 MGD	
10	0.0025	0.58 MGD	
12	0.0020	0.85 MGD	1.00 MGD
15	0.0015	1.32 MGD	1.60 MGD
18	0.0012	1.95 MGD	2.35 MGD

2. The maximum depth of flow at design conditions in any lateral 10 inches in diameter or less shall be 70 percent of pipe diameter. Lines 12 inches in diameter or larger may be designed to flow full unless direct sewer connections are planned, in which case the 70 percent pipe diameter maximum depth of flow shall govern.

3. All sanitary sewer pipe shall be designed for a minimum scour velocity of 2 feet per second at peak flows. The volume of wastewater within the pipe system as determined above shall be used when designing pipe slopes.

4. Maximum design velocity shall not exceed 10 feet per second.

C. Capacity: Pipe capacity, in all cases, shall be adequate to carry the Peak Wet Weather Flow (PWWF) from the entire tributary shed area even though said area may not be within the project boundaries.

D. Hydraulic Grade Line: The hydraulic grade line shall be determined from the design flows, based upon 100 percent development of the tributary area. Hydraulic grade line calculations must be submitted for the design of all lines 12 inches in diameter or larger.

E. Depth: Sewer mains with service lateral shall not exceed a depth of 15 feet. The system shall be designed to provide a minimum slope for sewer services of ¼ inch per foot with a minimum cover of 12 inches at any buildable location within the properties to be served. Proposed building pad elevations shall be a minimum six inches above the lowest upstream manhole rim. Where the building pad does not meet the elevation requirement, a backwater valve for the building shall be required. The backwater valve shall be noted on the improvement plans and building plans. Installation shall be made during construction of the underground improvements. Deed restrictions shall be put in place which hold the City harmless for failure of the backwater valves on such lots.

F. Material: Refer to Section 91 of the construction standards.

9-5 SEWER LOCATION AND ALIGNMENT REQUIREMENTS

Location and alignment criteria are as follows:

A. General: All sanitary sewers shall be placed in rights-of-way dedicated for public streets or within easements approved by the Environmental Utilities Director. Developments with deep sewer mains or with trunk mains may require dual sewer mains. There shall be a minimum horizontal clearance of 10 feet between parallel water, recycled water, and sanitary sewer mains. A minimum horizontal clearance of 5 feet shall be maintained between sewer mains, parallel storm drains, and other utilities. On crossings, water and recycled water lines shall be a minimum of 12 inches above the sewer line. If a sanitary sewer force main must cross a water or recycled water line, refer to sections 8 (Domestic Water Supply System) and 14 (Recycled Water Supply System) of these standards.

B. Location in New Subdivisions : In new subdivisions, sewers shall be located 5 feet south or east of street centerlines within minor and primary residential streets, or as approved by the Environmental Utilities Director.

C. Location in Existing Streets: When sanitary sewers are to be installed in an existing street, factors such as curbs, gutters, sidewalks, traffic conditions, traffic lane conditions, pavement conditions, future street improvement plans, and existing utilities shall be considered. The approval of the Environmental Utilities Director and City Engineer shall be obtained in every instance.

D. Location in Unpaved Area: All mains in unpaved areas shall be marked every 125 lineal feet maximum between manholes with a green 5-feet 6-inch composite utility marker. A decal shall be placed on marker stating "CAUTION SEWER PIPE." Utility marker shall be Carsonite or approved equal with anchor barb kit.

E. Easement Sewer Lines: Easement sewer lines outside of the public right-of-way, or within a narrow right- of-way shall require an easement dedication to the City. Sewer lines shall be centered within their easement. Easements shall be completely on one side of the property line of fence. The easement shall be clear of permanent structures, building eves, roof lines, and the future trunk of large tree species. Temporary construction easements of adequate size shall also be provided. The proposed easement shall be the greater of the following:

1. Minimum width of easement shall be 15 feet.

2. All easements shall have a minimum width equal to the required trench width according to the standard detail for trench backfill, plus 2 additional feet for every 1 foot of depth of the pipe as measured from the bottom of the pipe to finished grade. All sewer lines shall be centered within their easement.

3. No trees or permanent structures are allowed within the sewer easement except with the approval of the Environmental Utilities Director.

F. Public Lines in Commercial Developments: Sewer mains shall be located within drive aisles unless otherwise approved by the Environmental Utilities Director.

G. Water Well Clearance: Sewer lines shall maintain a minimum 100-foot separation from all public or private wells. (Properly abandoned wells are not included.) If a clearance of less than 100 feet is approved, the pipe material shall be approved by the Environmental Utilities Director. In no case shall the clearance be less than 50 feet.

H. Lines in Drainage Swales: Sewer lines, public or private, shall not be located within a drainage swale. The horizontal distance between the sewer line and the top of the bank shall be sufficient to maintain the integrity of the drainage swale and provide access for maintenance to the sewer line.

I. Alignment: Sewer lines and structures shall be designed to provide a minimum 12-inch vertical clearance from all utilities and/or improvements, unless otherwise approved by the Environmental Utilities Director.

1. Horizontal alignment shall be parallel to the street centerline. Minimum radius for sanitary sewers 6 inches through 12 inches in diameter shall be 200 feet. For pipe 27 inches in diameter or larger, mitered joints, fittings, or other methods as specified in the Standard Construction Specifications may be utilized to accomplish alignment changes.

2. Vertical alignment shall provide a constant slope between manholes. If a change in grade is necessary, construction of a manhole shall be required unless the use of a vertical curve is approved by the Environmental Utilities Director. In such case, elevations shall be

shown at 10-foot intervals throughout the length of the vertical curve. The maximum deflection permitted shall be two percent for each 10-foot interval.

J. Sewer Main Stub: Sewer main stubs for future development which are perpendicular to the sewer main shall be vitrified clay pipe (VCP) originating from the manhole. The stub shall be within 150 feet of the manhole and terminate 5 feet into the future development. Green Carsonite marker shall be installed at the end of the stub.

9-6 TRENCH LOADING CONDITIONS AND PIPE DESIGN

The loading condition and pipe design criteria for conduits are as follows:

A. Rigid Conduit Loading: On rigid conduits, Marston's formula shall be used to determine the load placed on the pipe by backfill. The procedure for rigid pipe is described in the ASCE Manual and Report of Engineering Practice No. 60, the Clay Pipe Engineering Manual, and in similar handbooks. In the absence of specific soils data, as determined by the soils engineer, a soil weight of 120 p.c.f. and a Ku factor of 0.110 shall be used. Minimum strength requirements for vitrified clay pipe shall be shall be as specified per ASTM C-700 "extra strength" VCP.

B. Safety Factor: On rigid conduits, a safety factor of 1.5 shall be used for all pipe. The three edge bearing strength of the pipe shall be used in the computation for rigid pipe.

C. Bedding and Initial Backfill: Unless otherwise noted on the plans, bedding and initial backfill shall be per the Construction Standards. Special backfill requirements shall be noted on the plans.

D. Special Pipe Strength Requirements: For sewer mains greater than 20 feet deep or mains requiring extra support strength, pipe material shall be approved by the Environmental Utilities Director. Ductile iron pipe shall be used if cover is less than three feet or insufficient clearance exists between the sewer pipe and the rigid load transmitting structures. Such structures include large diameter storm drains and other structures subject to settlement. The ductile iron pipe shall extend 5 feet each side of the structure crossing.

9-7 MANHOLE CRITERIA

The design criteria for manholes are as follows:

A. General: Manholes shall be placed at the intersection of all sanitary sewer lines, at the upstream end of a pipe run, and at the end of any temporary line more than 200 feet in length. No more than three lines may enter a manhole with one line exiting. Medium-density single-family subdivisions may enter a manhole with up to 4 services with one exiting main line upon approval of the Environmental Utilities Director. Summit manholes are not permitted.

B. Spacing: Maximum spacing of manholes shall be 500 feet for all straight lines of 10 inches in diameter or less. Manhole spacing for mains 12 inches and larger shall be considered on a

case by case basis. A line with a radius greater than 400 feet shall be considered as straight for purposes of this section. Manhole spacing on curved lines of 200-feet radius (minimum allowable) shall be 200 feet. Manhole spacing on curved lines of radii between 200 and 400 feet, or where only a portion of the line is curved, shall be adjusted proportionately. Reverse curves require a manhole at the point of tangency of the curves or as determined by the Environmental Utilities Director. A manhole shall be required at any change in vertical alignment unless use of a vertical curve is approved by the Environmental Utilities Director.

C. Invert Elevations: The invert elevation for pipe of the same diameter entering a manhole shall have a 0.10-foot drop between the entering and exiting pipe. Under special circumstances, the 0.10-foot drop may be waived with the approval of the Environmental Utilities Director. Invert elevations for pipe of different diameters shall match crown of exiting pipe. The crown of the entering pipe shall be at the same elevation or higher than the exit pipe. Mains with 10 or fewer services shall enter manholes at an invert to crown match with the exit pipe. Lateral mains entering trunk mains, as defined by the Environmental Utilities Director, shall enter manholes at an invert to crown match with the exit pipe.

D. Manhole Sizing: A standard 48 inch manhole with a 24 inch access opening shall be used for sewer mains 12 inches and smaller, and not exceeding 20 feet depth. A 60 inch manhole with a 36 inch opening shall be used for sewer trunk mains 15 inches to 36 inches in diameter. The design of larger trunk mains shall be approved on a case-by-case basis.

E. Manhole Coatings: Manholes coatings shall be required in areas determined to have a potential of generating excessive sulfide gases. Such manholes shall include, but are not limited to, all manholes on trunk mains 15" in diameter or larger, the first manhole originating from a sewer trunk main 15 inches in diameter or larger. Force main transition manholes, and manholes designed with inside drops, are to be constructed using precast polymer concrete or as determined by the Environmental Utilities Director.

F. Manhole Access: Provisions must be made to prevent vegetation from overgrowing the manholes. An all-weather 10-ton vehicular access shall be provided to each manhole as required by the Environmental Utilities Department. Turning radii of 30 feet inside and 45 feet outside, and a vertical clearance of 14 feet are required.

G. Connection to City Mains: Improvement plans which require a connection to an existing City of Roseville sewer main or structure shall specify that such connection be performed by City forces on a time and materials basis.

9-8 DROP CONNECTION CRITERIA

Drop connections shall be permitted under special conditions and with the approval of the Environmental Utilities Director. There shall be no more than two inside drop connections into a 4-foot diameter manhole. If an elevation difference of at least 3 feet is not available, the slope of the incoming line shall be increased to eliminate the need for the drop. All inside drop manholes, regardless of size, shall be of precast polymer concrete construction.

9-9 MAINLINE AND DIP TRANSITIONS

Mainline transitions shall be made at a sewer manhole. Transitions for services may be made at a manhole or with the use of a specially fitted DIP piece with a VCP "speed seal" spigot. Arrangements for the special spigot shall be coordinated with the Environmental Utilities Department.

9-10 SEWER SERVICE DESIGN

The design criteria for sewer services are as follows:

A. General: Services shall be designed and constructed perpendicular to the main or as approved by the Environmental Utilities Director. The service shall extend from the main to the edge of the public right-of-way or easement. The cleanout shall be constructed per the Construction Standards 2' outside of the sewer easement. The cleanout indicates the separation between private and public for the purpose of maintenance. In cases where there is no cleanout, the sewer service is considered private all the way to the main, including the wye. For private laterals, maintenance of the wye fitting at the main, and any portion of the private lateral upstream of it, is the responsibility of the private owner. Any work the City performs on private laterals, including the wye fitting that connects the private lateral to the main, shall be billed to the private owner on a time and materials basis. Services shall extend two feet beyond edge of pavement of private roads. Easements of adequate width to accommodate the service shall be obtained. A plan and profile of services shall be supplied to the Environmental Utilities Director on request.

1. Cleanouts shall be designed and constructed to grade with subdivision improvements or at the time connection is made to the building sewer. Unless otherwise noted on the plans, construction of the cleanout to grade is the responsibility of the contractor for the subdivision improvements. If installation of the cleanout is deferred, the plans shall call for the placement of a 4-inch by 4-inch post at the end of the service sewer extending from the flow line to not less than 12 inches above ground surface.

B. Sizing: The minimum size service for single-family developments shall be 4 inches in diameter. Services greater than 100 feet in length shall be 6 inches in diameter. Schools, commercial, industrial and multiple residential properties shall be served by a minimum 6-inch diameter service.

1. **Connection to Sewer Mains**: Residential services shall connect to the sewer main by means of a factory fitting. Properties with services located at the end of cul-de-sacs shall enter a manhole. A 6-inch service shall enter a 6-inch main by means of a manhole. A 6-inch service entering an 8-inch or larger main must either be connected with a manhole or by means of a factory fitting with a manhole placed at the property line. Services 8 inches in diameter and larger shall be connected to the main by use of a manhole. Connection to trunk mains shall be approved by the Environmental Utilities Director. In no case shall a service connection be made with the use of a tee.

2. **Connection to Existing Sewer Mains**: The Environmental Utilities Department reserves the right to make all sewer service taps onto existing mains upon completing an application for a permit and payment of the required connection fees. Proposed work by the City shall be performed by City forces and payment made to the City for such work will be on a time and materials basis. A note to this effect shall be placed on the plan sheet which shows a detail for the area that requires such tapping. The application shall be made to the Environmental Utilities Department. Connection fees shall be paid prior to submittal of the application. All excavation, backfill, and the installation of the remainder of the sewer service or stub shall be performed by the Contractor.

3. **Connection Limitations**: Sewer services shall connect to 12-inch diameter and larger pipe or to lines more than 15-feet in depth at a manhole. Direct connection to trunk mains shall only be with the approval of the Environmental Utilities Director.

4. **Material**: The service shall be of the same material as the lateral to which it connects or as specified by these standards.

5. **Location**: A sewer service shall be constructed to each lot. In new subdivisions or developed areas, unless specifically requested otherwise in writing, sewer services shall be placed on the low side of a typical subdivision lot or similar parcel with 2 percent or greater slope across the front, or shall be placed in the center of lots of lesser slope. Under no circumstances shall a sewer service be placed less than 14' from the property line. Trees, improvements, etc., are to maintain a minimum of 5' from the sewer service, including the cleanout and where the sewer service is extended to service the house.

   If the property is located such that service is available both to a line located in an easement and also in a right-of-way, service shall be at the latter location unless otherwise approved by the Environmental Utilities Director. No sewer service shall be located such that future on-site construction will result in the line being is such proximity to a water well or water main or service that applicable health standards will be violated.

C. Depth: Adequate depth of sewer service at the edge of easement or right-of-way to service the intended parcel shall be verified. A depth of 3 to 4 feet to crown of pipe, measured from existing ground surface or edge of adjacent roadway, whichever is lower, shall be considered the standard for service sewer depth, except where the water main is to be installed at back of sidewalk as part of the subdivision improvements. In such cases, service shall have a minimum depth of cover of 4-feet 6-inches at the property line and the service shall be extended to a minimum of 7 feet back of sidewalk with the cleanout to grade remaining within 2 feet of back of sidewalk. When greater depth is required, the invert elevation of the service sewer at the edge of the right-of-way or easement shall be noted on the improvement plans. If a joint trench is being utilized for other utilities, the plans shall indicate that a joint trench will exist and service elevations shall be adjusted accordingly.

Sewer service connection to the main 14 feet or deeper, shall place concrete around the haunch of the "wye". Sewer service connection to the main shall not exceed 15 feet.

D. Special Requirements in Developed Areas: In developed areas, a sewer service shall be provided to each parcel participating in the project which contains a source of sewage less than 200 feet from a lateral. A property owner's request for service location shall be honored whenever practical. Parcels which have two or more sources of sewage must have an independent sewer service provided for each sewage source which can be separated from the rest of the parcel and sold. A service shall be provided to each lot. During the design period, each property owner affected by the proposed work shall be contacted in writing to determine the preferred sewer service location. In absence of a response, a sewer service shall be provided in accordance with these standards. In addition, upon staking the location of the proposed sewer services prior to construction, each property owner shall be given a final opportunity to approve the proposed sewer service location. Compilation of this information shall be furnished to the Environmental Utilities Director.

E. Warranty Inspection of Sewer Main Stubs: As a requirement, sewer stubs are provided to subdivisions as a courtesy by developers during the construction of backbone infrastructures in streets to prevent cutting up the newly paved streets when the subdivisions are ready to develop. These stubs become an integral part of the sewer system of the subdivisions and subsequently the responsibility of the developers of the subdivisions and are therefore imperiled to both **construction and warranty inspections**. This practice saves future developers construction time and cost that would have otherwise been spent on tie-ins and street repairs and in some instances prevents delays in the event a street has a moratorium. Since these stubs are provided at no cost to future developers, it is our position, hence our policy, that it is the responsibility of contractors to test and repair these stubs, if found damage, prior to tie-ins. A note to this effect shall be placed on the improvement plans.

F. Abandoning Existing Sewer Stubs: Existing sewer stubs to be abandoned shall be abandoned per Section 91 of the Construction Standards.

G. Grease Interceptor: A grease interceptor shall be required for any business having the potential of producing grease as specified in the Roseville Municipal Code. Minimum size of the interceptor shall be 1000 gallons for precast concrete tanks, buried outside of the building and it must have three access points with a minimum diameter of 24 inches each, as shown in Detail SS-6. Sizing of the interceptor shall be based on the current edition of the California Plumbing Code adopted by the City.

1. General Commercial/Retail buildings shall require dedicated grease lines for future use. A location for the future grease interceptor shall be identified on the improvement plans.
2. Grease removal devices shall be hydromechanical grease interceptors and shall comply with the requirements of the City of Roseville.

3. Hydromechanical grease interceptors shall be designed, tested, and certified in accordance with ASME A112.14.3, CSA B481.1, or PDI G101.
4. Hydromechanical grease interceptors shall be made from materials that are compatible with a low pH environment. Thermoplastic construction or lined stainless steel are allowed. Metal is not allowed. Acid Resistant Enamel (A.R.E.) coatings are not allowed.
5. Existing hydromechanical grease interceptors shall be maintained in efficient operating condition.
6. Hydromechanical grease interceptors shall be maintained free of all food residues and any FOG waste removed during the cleaning and scraping process.
7. Grease interceptors shall be installed with a separate sampling manhole directly downstream of the grease interceptor and prior to the introduction of other flows.

H. Hydromechanical Grease Interceptors. Shall be inspected periodically to check for leaking seams and pipes, and for effective operation of any baffles and/or flow regulating device (if required). Automatic grease removal devices and Hydromechanical grease interceptors shall be maintained free of all caked-on FOG and waste including on any internal baffling and/or inlet/outlet fittings. Removable baffles shall be removed and cleaned during the maintenance process.

I . Oil/Sand Interceptor: An oil/sand interceptor shall be installed for any business having the potential of producing oil and sand waste resulting from routine maintenance as specified in the Roseville Municipal code. Minimum size shall be 450 gallons. Sizing of the interceptor shall be based on the current edition of the California Plumbing Code adopted by the City. Sand/oil interceptors shall be installed with a separate sampling manhole directly downstream of the grease interceptor and prior to the introduction of other flows

J. Automatic Car Wash: An oil/sand interceptor or an approved clarifier shall be installed for an automatic car wash as specified in the Roseville Municipal Code. The car wash shall recycle a minimum of 75% of the water used prior to discharging into the City's sewer system. Minimum size of oil/sand interceptor shall be 450 gallons. Sizing of the oil/sand interceptor shall be based on the current edition of the California Plumbing Code adopted by the City.

K. Dental Practices: Dental practices that generate amalgam wastes shall install an amalgam separator on the effluent line of the vacuum system(s) serving the facility prior to discharge to the sanitary sewer system.

8. The amalgam separator shall meet the ISO 11143 standards that are effective at the time of installation.
9. Dental practices may be exempt from this requirement providing the City receives written assurance that removal or placement of amalgam fillings occurs at the facility no more than three (3) days per year and the type of practice is restricted to one of the following, which are considered to be of negligible mercury discharge risk:
    i. Orthodontics
    ii. Periodontics

iii. Oral and maxillofacial surgeon
iv. Radiology; oral pathology of oral medicine
v. Endodontics and prosthodontics

L. Industrial Wastewater Monitoring Station: A monitoring station is required for industrial wastewater dischargers permitted under the City's Industrial Pretreatment Program. The monitoring station shall be installed at a location approved by the Industrial Waste Division. The monitoring station shall be located after final wastewater treatment measures and prior to the introduction of other diluting waste streams, if possible. A monitoring station shall be located in an area that is always available to City staff during regular business hours. Monitoring Stations shall possess the following instrumentation or more if found necessary by the Industrial Waste Division:

a. **Continuous flow monitoring:** Including analog or digital totalizer in gallons and active flow monitor display in gallons per minute. Flow sensor must be readily extractable for routine maintenance. Flow meter make and model to be approved by the Industrial Waste Division.

b. **Continuous pH monitoring:** Digital or paper chart display with data logging capabilities. pH probe must be readily extractable for routine maintenance. pH monitor make and model to be approved by the Industrial Waste Division.

c. **Composite sampler: P**rogrammable peristaltic pump that has the capability of drawing samples in both time and flow based methods. Sampler must feed into a refrigerated unit that can hold a temperature of no higher than 6 degrees Celsius. The refrigeration unit must contain a sample vessel no less than 10 liters in size. Sampler and refrigeration unit must have the capability to be locked out by City staff.

d. **Sewer access:** The monitoring station must have direct access to the associated sewer line. Using either a vault door or manhole there must be the capability to obtain direct grab samples for sensitive testing such as Oil & Grease without running the sample through plastic tubing.

9-11 SIPHON AND CREEK CROSSING DESIGN

Advance approval of the Environmental Utilities Director, City Engineer, and other appropriate agencies is necessary to initiate design. The criteria for creek crossings are as follows:

A. General: In all cases, the proposed future creek bed elevation shall be used for design purposes. Crossing details of pipe, piers, anchorage, transition couplings, etc., shall be shown on a detail sheet of the plans. The top of pipe shall have a minimum 3 feet of cover at the shallowest point of the crossing.

B. Gravity mains: For line sizes 10 inches and smaller, ductile iron pipe shall be used under the full creek width plus 10 feet each side. For line sizes 12 inches and larger, pipe used shall be as determined by the Environmental Utilities Director. The ductile iron pipe shall be supported by steel I-beam piles. The steel I-bean pile shall be installed to a yielding depth as

recommended by the soils engineer. Each stick of pipe shall be supported by a least one pile or as approved by the Environmental Utilities Director. A steel plate shall be welded on top of the I-beam. A ½-inch thick polyethylene plane shall be installed on top of the steel plate for the pipe to rest on. The pipe shall be held by two 2-inch wide galvanized steel straps, with galvanized bolts attached through the steel plate and polyethylene plate. An insulating material shall be used between the pipe and the section of strap coming into contact with the pipe. All exposed surfaces shall be coated with coal tar epoxy. A layer of 4-inch to 8-inch cobbles shall be placed and compacted on the top surface of the trench area for the full width of the creek. A trench plug shall be required at the top of the pipe at the downstream side of the crossing. The plug shall be a minimum of 4 feet in length, and shall extend 24 inches beyond the width and depth of the trench.

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

D. Siphon: ductile iron pipe shall be used under the full creek width plus 10 feet each side. Pipe shall be concrete encased per detail W-24. A layer of 4-inch to 8-inch cobbles shall be placed and compacted on the top surface of the trench area for the full width of the creek. A trench plug shall be required at the top of the pipe at the downstream side of the crossing. The plug shall be a minimum of 4 feet in length, and shall extend 24 inches beyond the width and depth of the trench.

1. Condensate Stations for air jumpers shall be designed per the City Process Control Standards.

9-12 BORING AND JACKING REQUIREMENTS

The requirements outlined in the Construction Standards shall be followed.

9-13 PUMP STATION AND FORCE MAIN REQUIREMENTS

Every phase of pump station design, including force main design, shall be closely coordinated under the direction of the Environmental Utilities Director. The pump station and force main shall be designed and submitted concurrently. The plan sheets will show the general layout and control system required for a typical acceptable sewage pump station. The plans shall call out the testing required for acceptance of the pump station. The lift station shall be designed per the City Process Control Standards.

A. Location: The pump station and facilities shall maintain a minimum 100-foot separation from existing and proposed residential and commercial structures. Adequate maintenance access shall be provided to the pump station. The access design shall consider requirements for the removal of pump station equipment.

B. Capacity: The pump station shall be designed to accommodate ultimate buildout flows as well as initial flows. Allowances for larger or additional pumping equipment must be made for future requirements. If the design capacity is in excess of anticipated initial flow, the effects of the minimum flow condition must be estimated to prevent excessive retention of sewage in the wet well, to prevent septic conditions, and to determine whether the pumping equipment will operate within the manufacturer's guidelines. Table 3 provides planning level criteria for sizing and configuration of pump station and force main facilities.

Table 3 – Planning Level Criteria for Pump Stations and Force Mains

Pump Stations	
Capacity	PWWF (hydraulic modeling required for pipes 18 inches and larger)
Storage	4 hours
Operation	Lead/lag for duty pump(s), plus 1 standby pump
Maximum Pump Cycles	6 cycles/hour (3 cycles per pump)
Force Mains	
Headloss	Hazen-Williams roughness coefficient (C-factor) of 120
Maximum Velocity	7-10 feet per second
Minimum Velocity	3.0 feet per second

C. Wet Well: The wet well design and detention time shall be such that the deposition of solids is minimized and the sewage does not become septic. Provisions for 4 hour storage capacity shall be provided. Wet well material shall be Armorock Polymer Concrete or approved equal. Maximum depth of wet well shall not exceed 35'.

D. Pumps: Pumping equipment shall consist of centrifugal pumps. Pump suction and discharge size shall be a minimum of 4 inches in diameter. Pump drive units shall be electric. A sufficient number of pumping units shall be installed such that station capacity can be maintained with any one unit out of service. Pump manufacture is to be Flygt or approved equal. Provisions for telemetry shall be included in the station control system as directed by the Environmental Utilities Director.

E. Station Piping: Suction, discharge, and header piping within the station shall be sized to adequately handle flows. Piping less than 4 inches in diameter shall not be used for conveying sewage. Valves shall be located to allow proper equipment maintenance and operation. The design shall provide a bypass configuration back to the wet well.

F. Odor Control: If required, the station shall have equipment and/or space provided for the purpose of introducing odor control chemicals into the wet well, upstream gravity line, and/or force main. Adequate provisions shall be made for the safe handling and storage of chemical containers. The force main shall be designed to maintain a continuous uphill grade, or, as a minimum be level. All force mains shall have provisions for introduction of either air or odor control chemicals.

G. Force Mains: Force Mains: Force mains shall be designed such that velocities normally fall within a range from 3 to 5 feet per second.

For larger capacity Lift Stations, force main designs may consider velocities up to 7 feet per second. This will be handled on a case-by-case basis. The project applicant should submit the request, along with the justification, for the higher velocity criteria this criteria to EU staff for review and approval prior to proceeding with the higher velocity range design.

The design shall consider the feasibility of installing dual force mains to address the following:

- If initial capacity of the station is considerably less than ultimate, consideration should be given to the prevention of septic conditions due to extensive detention time within the force main. The design approach shall utilize dual force mains to accommodate initial and ultimate flows.

- Provide redundancy for the system by utilizing adequately sized dual force mains where one main can serve as a backup in the event that the other main is taken out of service.

Provisions shall be made introducing a “cleaning pig” into all force mains. The design shall also include facilities to eliminate or sufficiently dampen transient forces and/or surging in the event of an immediate station shutdown. Details shall be included in the improvement plans. The maximum angle allowed on force mains is 22.5 degrees.

A corrosion protection study shall be included with the improvement plan submittals. Corrosion protection facilities for the force main shall be identified from the roadway with a curb stamp labeled “CP – FM”.

H. S.C.A.D.A.: SCADA requirements for pump stations shall be provided by the Environmental Utilities Department. The submittal shall be included along with the improvement plans for such facilities.

I. Valves: Valves on pressurized sewer systems shall be Crispin plug valves.

9-14 SEWER IMPROVEMENT PLAN REQUIREMENTS

Plans for the construction of sanitary sewers, whether in conjunction with other improvements or for a sewer project only, shall conform to these standards, the Construction Standards, and meet the following requirements.

A. Sewer Study: A sewer study or sewer master plan as determined by the Environmental Utilities Director may be required prior to review of the sewer design if there is a possibility that upstream or adjacent areas might require service through the subject property. The map shall show the entire area including upstream tributary and adjacent areas, and all other data necessary to determine anticipated sewage flows. The method of providing service to the entire service area, including pipe sizes and slopes, shall be shown to the extent necessary to determine the requirements within the subject property.

B. General Requirements: Plans for sewer improvement projects shall include a layout sheet, plan and profile of each public sewer line, and necessary detail drawings. Reference to the Construction Standards shall be made for all standard details.

C. Layout Sheet: Improvement plans shall include an overall map which shows the project boundaries, sewer lines, manholes, backwater valves, and other important items of the work.

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

D. Plan and Profile Sheets: Sewer lines to be owned and maintained by the City of Roseville shall be shown on both plan and profile. The following standards, with respect to drafting and the information to be included on the plan and profile sheets, generally apply to projects in developed areas.

1. Sewer lines to be constructed shall be indicated on profile by parallel lines spaced to show the pipe diameter to scale. Manholes shall also be indicated by parallel lines spaced according to scale. Slope shall be printed 1/8-inch above, and preferably parallel to, the pipe line, or between the parallel lines. The length, size and type of pipe material between each manhole shall be printed parallel to the horizontal grid lines and approximately halfway between the ground surface and pipe line. Pipe inverts, "IN and OUT," at manholes and other structures shall be indicated on the profile. The invert elevations shall be printed parallel to the horizontal grid lines and shall be underscored by a line which then runs at a 45-degree angle to the corresponding pipe invert. Rim elevation for all manholes shall be labeled. The profile shall note all proposed manholes, special connections, and other appurtenances. Existing facilities shown on the profile shall be dashed or distinguishable from proposed improvements. Manhole identification on the

plan view may be oblique. Stationing shall appear at the lower edge of the profile grid directly under the manhole. Each manhole shall be assigned a number that will appear in both plan/profile and the cover sheet.

2. Proposed sewer services shall be indicated on the plans by stationing, or an approved reference point such as a property line. The invert elevation of the service at its upstream end shall be shown on the plans whenever the standard depth is inadequate to serve the property. Standard depth shall conform to the conditions set forth in the Construction Standards.

3. Improvements or lots shown on a plan sheet but served to a line shown on another plan sheet shall have the direction of service shown by a small triangle and letter "S." "As Built" plans shall also show the service sewer location measured from the nearest downstream manhole.

4. Both permanent and working easements shall be shown to scale and dimensioned on the plans.

5. Proposed sewer lines shall be adequately dimensioned from street centerline. If the sewer is to be located in an easement, sufficient dimensions and bearings from physical features to locate the line in the field shall be shown on the plans.

6. Existing gas, water, storm drains, and all other utility lines above or below ground shall be shown on the plans.

7. Trees and other objects within 10 feet of the construction centerline shall be dimensioned on the plans relative to the construction centerline. The diameter of tree trunks and interfering heavy tree branches shall be noted. Removal of a tree or object, or other special handling shall be noted. Written documentation of any special arrangements regarding preservation of property shall be provided to the Environmental Utilities Director if no easement document is involved. If an easement is negotiated, all special arrangements shall be included in the easement document. Tree removal must be approved by the Planning Department.

8. Culverts shall be shown on both plan and profile when crossed by the construction or when parallel and within 20 feet of the construction line. Type, size, and invert elevations shall be called out.

9. No trees or permanent structures shall be placed within sewer easements without the approval of the Environmental Utilities Director.

E. Detail Drawings: Details not covered by the Construction Standard Detail sheets shall be shown on the plans.

F. Connection to Existing Facilities Where Bypassing or Stoppage of Existing Flow Will be Required: Upon approval of the application to connect to an existing sewer main by the Environmental Utilities Department, a coordination meeting to discuss the work plan shall be organized by the contractor a minimum of seven days prior to the proposed connection or as permitted by the City's work schedule. Should the Environmental Utilities Director determine that such work be performed by City forces, the work shall be performed on a time and material basis.

9-15 MULTI-PARCEL COMMERCIAL AND INDUSTRIAL DEVELOPMENTS

"On-site" sewer mains for new commercial and industrial developments containing more than one parcel, shall be designed in accordance with the requirements contained in these standards or as approved by the Environmental Utilities Director. The sewer main shall be installed within a dedicated public sewer easement in accordance with these standards. Each separate parcel within a multi-parcel commercial or industrial development shall have a separate connection to the public sewer line(s).

9-16 RECORD (AS-BUILT) PLANS

The Contractor/Developer shall keep an accurate record of all approved deviations from plans and shall provide a PDF electronic, full size bond and 11 x 17 copy of the as-built plans prior to final acceptance of the completes improvements. Each sheet of the plans shall be marked "AS-BUILT" or "RECORD DRAWING". "AS-BUILT" or "RECORD DRAWING" of signal plans, water, sewer and storm drain composite in plan view only, and parcel and final maps shall also be submitted on computer disk in DXF or DWG format.

ATTACHMENT A

Example Design Flow Analysis for Sewers 15 Inches and Smaller

Example calculation for application of safety factor and peaking factor curve for 400-unit single family subdivisions:

ADWF[i]: (400 DUs)(190 gpd/DU) =* ***76,000 gpd = ADWF***

Factored Flow: (ADWF)(2.0) = (76,000gpd)*(2.0) =* ***152,000 gpd = Factored Flow***

PWWF: (Factored flow)(3.05[ii]) = (152,000)*(3.05) =* ***464,000 gpd = PWWF***

Size sewer for this flow based on Section 9-4.

For example, per City of Roseville Improvement Standards, Section 9-4, a 10-inch sewer line at minimum slope is adequate for this PWWF.

[a] Based on ADWF unit flow factors shown in Table 1
[b] From Figure SS-1

SECTION 10: DRAINAGE

10-1 GENERAL

This Section is formulated to clearly define acceptable drainage analysis and design criteria for development in the City of Roseville. Drainage facets not covered in this Section shall conform to the Placer County Flood Control and Water Conservation District "Stormwater Management Manual" (SWMM), latest edition, and good engineering practice.

The City of Roseville has adopted storm water quality design standards to reduce water pollution generated by urban runoff, including trash capture requirements. These design standards are detailed in the West Placer Storm Water Quality Design Manual. This Manual is available on-line at the City of Roseville's website https://roseville.ca.us Storm water design calculations and an operations and maintenance plan shall be made a part of the drainage report.

10-2 CITY POLICIES AND REQUIREMENTS

All residential lots shall have minimum pad elevations of one foot above the 100 year water surface elevation and all commercial sites shall have minimum finished floor elevations of one foot above the 100 year surface elevation assuming failure of the drainage system. This requires the Consulting Engineer to provide an overland release for all projects or provide storage for the 100-year storm frequency.

The overland release path shall be constructed in a manner to transport the peak rate runoff from the 100-year storm frequency through the site assuming all storm drains are inoperative, all upstream areas are fully developed, and that antecedent rainfall has saturated the tributary watershed. Streets, parking lots, playgrounds, pedestrian areas, pedestrian walkways, utility easements, and other open space areas may be considered compatible uses within the overland release path.

Except for single family or duplex residential lots, site drainage shall be collected on-site and conveyed via an underground storm drain system to approved existing storm drainage system without flowing into existing street gutters or existing roadside ditches.

Unless regional storm water mitigation devices are available specific mitigation shall be required for the project, shall be located on-site, and shall be maintained by the landowner.

10-3 DEVELOPMENT IN OR ADJACENT TO A REGULATORY FLOODPLAIN

The City's Regulatory Floodplain boundaries are defined in the City's General Plan – Safety Element. They are not the same as the flood hazard area shown on FEMA's Flood Insurance Rate Map (FIRM). For the most part the Regulatory Floodplain is the land inundated by the 100-year flood event, assuming build-out of the drainage basin. Precise boundaries shall be as approved by the Public Works Director. Development within the Regulatory Floodplain boundary is generally not permitted outside of the Infill planning area.
Residential lots developed in or adjacent to the City's Regulatory Floodplain and within the Infill planning area shall have pad elevations a minimum of two feet above the City's 100-year flood

elevation. Non-residential projects shall have finished floor elevations a minimum of two feet above the City's 100-year flood elevation. A Letter Of Map Amendment (LOMA), a Letter Of Map Revision (LOMR) or LOMR based on fill (LOMR-F) is required for any development in or adjacent to the flood hazard area as shown on a Flood Insurance Rate Map. Elevations Certificates are required for such non-residential structures. In areas where the 100-year flood depths (measured at centerline of creek) are less than eight feet within the Infill planning area on Cirby Creek, Strap Ravine, and Pleasant Grove Creek South Branch Sierra View Tributary, the above freeboard requirements ~~will be~~ is increased to a minimum of three feet.

In the case of no-grade or contour grade lots, located adjacent to the City's Regulatory Floodplain, and where a portion of the lot may become inundated with the 100-year storm event, a standard Guarantee letter or FEMA Elevation Certificate shall be submitting to the Engineering Division prior to plan approval, or issuance of a building permit. The Guarantee letter or FEMA Elevation Certificate shall be submitted by a Registered Civil Engineer or Land Surveyor licensed in the State of California and confirm that the lowest ground elevation adjacent to the building foundation meets the minimum requirements for pad elevations as described above.

If a tentative project is submitted which shows fill or other significant improvements within the Regulatory Floodplain, a hydraulic study shall be required to determine the effect of the encroachment. Encroachment shall not result in any off-site increase in water surface elevation. The Consulting Engineer should contact the City of Roseville's Floodplain Management Division to ascertain what existing studies, if available, should be used as a base model for the proposed development. The Consulting Engineer is responsible for assembling the necessary data and presenting the study to the City for review. The study should reflect ultimate build-out conditions of the watershed. When submitting plans that show improvements in the floodplain, the Consulting Engineer must submit a "Compliance Statement", stating that the proposed improvements shown on the plans are accurately reflected in the approved hydraulic study. A sample of the "Compliance Statement", the hydraulic study submittal requirements, and sample Hydraulic Study Worksheets are provided in the attachments at the end of this section.

Parking lots and storage areas shall be no more than 1.5 feet below the 100-year water surface elevation.

When developing property inundated by the City's Regulatory Floodplain, the portion of property that extends into the floodplain shall be dedicated to the City in fee or as a Flood Water Conservation Easement as determined by the Engineering Division. In areas where the floodplain has been dedicated as part of a Specific Plan but the 100-year flood levels are shown to extend slightly outside this dedicated floodplain area, the development shall fill the property located outside the dedicated floodplain to an elevation that is a minimum of two feet higher than the 100-year flood elevation, or incorporate that area into the floodplain.

All development in the City's Regulatory Floodplain shall comply with the regulations of the City's Flood Damage Prevention Ordinance and the City's General Plan.

NOTE: Design requirements for bike paths within the floodplains are provided in the section entitled "Bikeways" of these Design Standards.

10-3A DEVELOPMENT WITHIN CREEK CHANNEL OR ALONG CREEK BANK

When designing projects that will result in any disturbance of an undeveloped creek bank, specific developer engineer provided data is required to ensure proper consideration of potential effects of new development and disturbance.

Two developer engineer findings are required for determining level of consideration required. They are 1) the undeveloped creek corridor width on both banks – measured from both sides of channel as the distance from top of bank to closest instance of infrastructure or private property, and 2) a rapid assessment of the Geomorphic stability of the local reach (defined as 500' upstream and 500' downstream of the furthest points of disturbance with the project).

The rapid assessment is performed by determining any bank erosion within the local reach (extents, height and severity), bank protection installations (extents, heights, material and level of engineering), other channel engineering measures present (including but not limited to culverts, weirs, bed armoring, pipe crossings, etc), historical bank migration via review of available dated imagery, and overall geomorphic process regime, stage of channel evolution and perceived channel stability. All findings are subject to review and acceptance by the City's Public Works Department.

A. Where the undeveloped creek corridor width is greater than 100' on both banks, and the channel is considered Geomorphically Stable within the local reach, documentation of the rapid geomorphjc assessment is required.

B. Where the undeveloped creek corridor width is greater than 100' on both banks, and the channel is considered to be actively adjusting within the local reach, a technical memorandum from a qualified professional engineer with background in geomorphology is required to document channel width and activity and provide design alternatives for proposed channel engineering measures to reduce the magnitude or likelihood of identified risks shall be implemented.

C. Where the undeveloped creek corridor width is less than 100' on both banks, and the channel is considered Geomorphically stable within the local reach, a technical memorandum from a qualified professional engineer with background in geomorphology is required to document channel width and activity, and provide design alternatives for proposed channel engineering measures to reduce the magnitude or likelihood of identified risks shall be implemented.

D. Where the undeveloped creek corridor width is less than 100' on both banks, and the channel is considered to be actively adjusting within the local reach, a widespread geomorphic analysis from a qualified professional engineer with background in geomorphology is

required to document channel width and activity and provide design alternatives for proposed channel engineering measures to reduce the magnitude or likelihood of identified risks shall be implemented.

10-4 FEDERAL FLOOD PROGRAM

The City of Roseville is a participant in the National Flood Insurance Program (NFIP) and all development in the City shall comply with the regulations of the Federal Emergency Management Agency (FEMA) and the City's Flood Damage Prevention Ordinance.

Amendments of the FEMA flood maps will be required of all new developments located in a FEMA flood zone. Petitions for Letter of Map Amendment, including any fee required by FEMA, shall be submitted to the Public Works Department prior to approval of the improvement or site plans. For further information regarding these requirements, contact the City of Roseville's Floodplain Management Section.

10-5 DRAINAGE DIVERSIONS

The diversion of natural drainage is allowable only within the limits of the proposed improvement. All drainage must enter and leave the improved area at its original horizontal and vertical alignment unless an agreement, approved by the City Attorney, has been executed with the affected property owners. Temporary drainage diversions during construction shall be approved by the City Engineer and shall be located and constructed in such a fashion as to permit their removal when necessary for the prevention of damage to adjoining properties.

10-6 DRAINAGE EASEMENTS

Publicly owned drainage conduits and channels will not be allowed on private property unless they lie within a dedicated public drainage easement. Where minor improvement of an existing channel falls on adjacent property (such as day lighting a ditch profile) a notarized right-of-entry from the property owner(s) for such construction shall be required. A copy of the document, which grants such approval, shall be submitted to the City Engineer prior to the approval of the improvement plans.

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

1. All easements for closed conduits shall have a minimum width in feet equal to the required trench width according to the standard detail for unshored trenches and excavation backfill plus two (2') additional feet of width for every foot of depth as measured from the bottom of the pipe to finish grade. All conduits shall be centered within their easements.

2. Minimum width of any easement for closed conduit shall be 15 feet.

3. Easements adjacent to property lines shall be located entirely on one parcel.

B. Drainage easements for open channels shall have significant width to accommodate the following criteria:

1. Contain the channel and channel slopes.

2. Provide for fencing, where required.

3. A 15-foot wide service road and maintenance access ramps. A service road may not be required where the channel bottom is lined and a suitable access ramp is provided. Dedication of easements shall be completed and submitted to the City Engineer with copies of deeds or title reports for the affected properties before improvement plans will be approved.

C. Open channels (natural or man-made) with a drainage area that exceeds 300 acres shall have the 100-year water surface elevation limits dedicated to the City in-fee or as Flood Water Conservation Easement.

10.7 DRAINAGE CAPACITY/DESIGN

All drainage systems shall be designed to accommodate the ultimate development of the entire upstream watershed. The 10-year peak storm discharge shall be used in the design of local drainage systems. In addition, other facilities such as streets, bridges, open channels, and buildings have requirements that relate to the 25 and 100-year peak storm discharge. The Consulting Engineer shall calculate the 10, 25, & 100-year peak discharge and submit these calculations along with the plans for all proposed drainage systems.

10-8 DESIGN PEAK DISCHARGE METHODS

The acceptable methods for the determination of runoff quantities for the 10, 25, & 100-year peak discharge are specified in the most recent edition of the Placer County Flood Control and Water Conservation District's (PCFCD) "Stormwater Management Manual" (SWMM). The SWMM allows for the "Unit Peak Discharge" method which is based on the relationship between the characteristic watershed response time and peak flow per unit area from precipitation patterns typical for the region, and provides a rapid evaluation of the peak flow rate from small watersheds (less than 200 acres). This method is presented in this section.

The SWMM also allows a HEC (Hydraulic Engineering Center) hydraulic analysis for watersheds larger than 200 acres. The HEC analysis must conform to the requirements of the most recent edition of the SWMM. All HEC analysis shall have the City's "HEC Hydraulic Study" Worksheet completed and included with the study. Sample worksheets and submittal requirements are provided at the end of this section.

10-9 UNIT PEAK DISCHARGE METHOD

A. Criteria: Peak flow is a product of watershed area and peak discharge per unit area, which, in turn, is a function of a completed response time.

$$Q_p = qA \qquad \text{[Equation 10-1]}$$

Where: Q_p = peak discharge (cfs)
q = unit peak discharge (cfs/acre)
A = area (acres)

B. Response Time: Response time (t_r) an indication of the response time of the watershed to intense precipitation. It is determined as the sum of separate response times for a path consisting of the initial, overland sheet flow and succeeding collector flows from the most hydraulic remote location in the watershed to the watershed outlet.

1. Overland Flow: Overland flow includes flow over planar surfaces such as roofs, streets, lawns, parking lots and fields. The overland flow length is not always well defined in natural areas, but usually becomes concentrated in shallow rivulets or swales within no more than 300 feet. In areas with development, the point at which the overland flow is concentrated in a collector, such as a gutter or pipe, is usually identifiable. Acceptable overland flow response times for various land uses are as follows. These times should be reduced to 0.90 * t_{ro} in 25 year events and 0.70 in a 100 year events.

OVERLAND RESPONSE TIME: Table 10-1

LAND USE	OVERLAND RESPONSE TIME
Low Density Residential	15 minutes maximum
Medium or High Density Residential	10 minutes maximum
Commercial / Industrial	10 minutes maximum

Equation 10-2 is used to estimate the overland flow component of response time.

$$t_{ro} = \frac{.355(nL)^{0.6}}{s^{0.3}} \qquad \text{[Equation 10-2]}$$

Where: t_{ro} = overland response time (minutes)
n = Manning's roughness coefficient (Table 10-2)
L = flow length (feet)
s = slope of surface (feet/feet)

MANNING'S ROUGHNESS COEFFICIENT: Table 10-2

SURFACE	n
Smooth surfaces (concrete, asphalt, or bare soil)	.011
Grass: Short Grass Prairie Dense Grasses Bermuda Grass	0.15 0.24 0.40
Poor grass cover on moderately rough surface	0.40
Woods with underbrush	0.40 – 0.80

2. Collector Flow – Manning's equation shall be used for estimating collector response time (t_{rc}). The velocity computed for open channel flows using Manning's equation shall be increased by an adjustment factor as follows to account for celerity:

CELERITY FACTOR: Table 10-3

CHANNEL SECTION	CELERITY FACTOR
Triangular	1.33
Wide Rectangular	1.67

In natural watersheds, it may be appropriate to use higher values of Manning's "n" for the initial collector where the flow is shallow.

C. Unit Peak Discharge: Unit peak discharge is computed from the response time, t_r and equation 10-3 as follows:

$$qu = c_o t_r^{\,C1} \quad \text{[Equation 10-3]}$$

Where: qu = peak unadjusted unit discharge (cfs/acre)
$t_r = t_{ro} + t_{rc}$ = response time (minutes)
C_o, C_1 = coefficient from Table 10-4

COEFFICIENT FOR UNIT PEAK DISCHARGE: Table 10-4

Return Period (Yrs)	t_r<20 minutes C_o	C_1	t_r>20 minutes C_o	C_1
10	5.80	-0.50	17.80	-0.87
25	7.54	-0.50	23.14	-0.87
100	9.28	-0.50	28.48	-0.87

D. Infiltration Factor: The effect of infiltration is reflected in the infiltration factor F_i. F_i is found from the infiltration rate and Equation 10-4 as follows:

$F_i = 1.7I$ [Equation 10-4]

Where: F_i = infiltration factor (cfs/acre)
I = infiltration rate (inches/hour, Table 10-5)

INFILTRATION RATES FOR URBAN COVERS: Table 10-5

COVER TYPE	QUALITY OF COVER	SOIL GROUP A	B	C	D
Residential or Commercial Landscaping	Good	.48	.25	.16	.12
Open Space	Poor	.26	.09	.06	.04
	Fair	.31	.16	.09	.07
	Good	.41	.22	.12	.09
Streets and Roads:	Poor	.07	.06	.03	.02
Paved with open ditches	Fair	.11	.06	.04	.03
Gravel, Dirt	Good	.14	.08	.05	.04

Most soils within the City of Roseville are of Soil Group D. If the Consulting Engineer feels that the soil group in the area of development is of a different group, he must supply additional information to substantiate his assumption.

Soil Groups: The Soil Conservation Service (SCS) classifies soil into four hydrologic soils groups. Soils maps and soil surveys of the City are available for inspection at the Placer County Resource Conservation District and the Flood Control District.

Group A: Low runoff potential. Soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B: Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately course textures. These soils have a moderate rate of water transmission.

Group C: Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.

Group D: High runoff potential. Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

E. Connecting Separately Connected Areas: When both pervious and connected, impervious overland flow areas are present, the estimate of combined flow is computed as a weighted adjustment to the peak unit runoff as follows in Equation 10-5:

$$Q_p = A(qu - pF_i) \quad \text{[Equation 10-5]}$$

Where:
Q_p = peak flow(cfs)
A = total watershed area (acres)
qu = unit peak unadjusted runoff (cfs/acre)
F_i = infiltration factor (cfs/acre)
P = percent of pervious area (%)

F. Procedure: The following procedures shall be used in determination of design runoff:

1. Determine the typical pervious and connected impervious flow paths with the longest response time.

2. Determine the total response time for the shed being analyzed combining the overland flow elements and their common collector.

3. Determine unit peak unadjusted runoff (qu) for the shed area using Equation 10-3.

4. Determine the pervious infiltration factor using Equation 10-4.

5. Complete the total peak flow using Equation 10-5.

EXAMPLE OF UNIT PEAK DISCHARGE METHOD

For this example, the following assumptions were made:

1. Lots have constant slope of one percent.

2. Lots have a Bermuda grass ground cover.

3. Average elevation of subdivision is 200 feet.

4. Class D soils.

5. Area = 65% impervious, 35% pervious.

See Figure 10-1 for a typical lot detail. A sample computation sheet is provided the end of this Section.

Step 1 Determine overland response time t_{ro} as follows: $t_{ro} = \frac{.355(nL)^{0.6}}{s^{0.3}}$

Overland flow length = 160'
Bermuda grass cover, n= 0.24
Slope = 1%

Equation 10-2 gives: t_{ro} = 12.6 minutes

Step 2 Determine collector flow, t_{rc}, as follows:

Collector flow to inlet is assumed to be gutter flow. Gutter flow velocity = 2.0 fps.

t_{rc} = 420 ft / 2 fps = 3.5 minutes
Response time $t_r = t_{ro} + t_{rc}$ = 16.1 minutes

Step 3 Determine the unit peak discharge for 10-year storm from Equation 10-3

$qu = c_o t_r^{C1}$ [Equation 10-3]

t_r = 16.1 minutes
C_o = 5.8
C_1 = -0.50
qu = 1.45 cfs/acre

Step 4 Determine infiltration factor:

Elevation = 200 feet
Class D soils, residential landscaping with good cover.
Infiltration factor = .12 (Table 10-5)

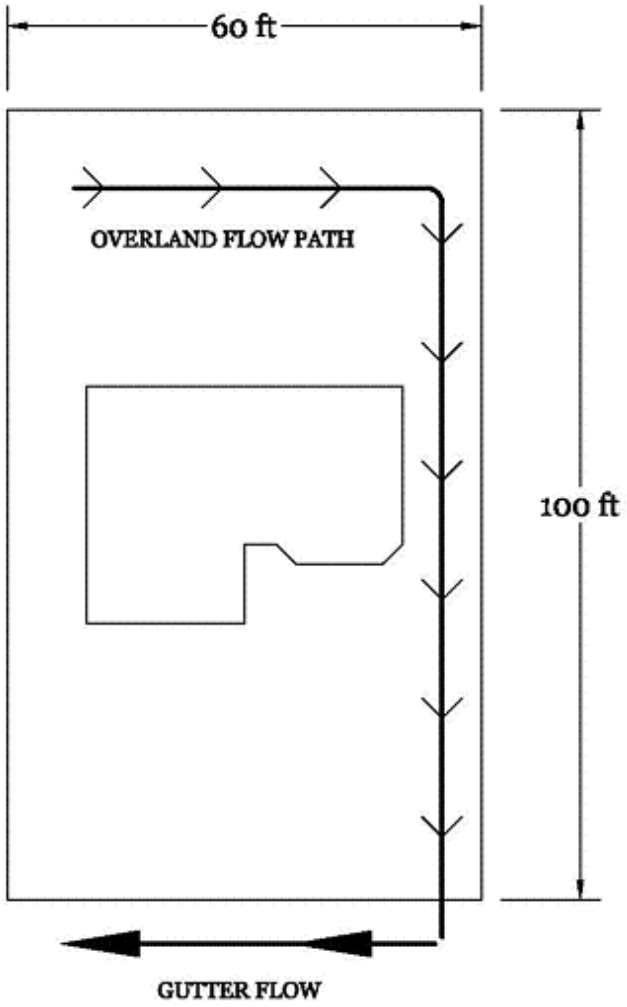
From Equation 10-4, $F_i = 1.7*1$
F_i = 0.21

Step 5 Compute total peak flow:

Pervious area = (.035)(1.4) = .49 acres
Q_p = 1.4(1.45) - .49(.21) = 1.93 cfs

This establishes flow into the drainage system. From this point, the time within the conduit is added to both the impervious response times and conduits are sized appropriately.

EXAMPLE PROBLEM



OVERLAND FLOW LENGTH = 160ft TO GUTTER
GUTTER FLOW LENGTH = 420ft TO INLET
SHED AREA TO INLET = 1.4 ACRES
35% OF SHED AREA PERVIOUS

FIGURE 10-1

10-10 HYDRAULIC STANDARDS FOR DRAINAGE SYSTEMS

All storm drain pipelines and open channels shall be designed to convey the design peak runoff calculated per Section 10-8 and shall conform to the following requirements:

A. Hydraulic Grade Line: The grade line for the 10-year discharge shall be a minimum of one foot below all inlet grates, manhole covers, and all other drainage structures in the system. The hydraulic grade line shall be shown on the plans when it is above the top of the pipe.

B. Manning's Formula: The "n" value used in Manning's formula shall conform to the following:

1. Manning's formula shall be used to compute capacities of all open and closed conduits other than culverts.

2. A minimum "n" value of 0.015 shall be used for sizing conduits.

3. Minimum velocity in closed conduits shall be 2 feet per second. Maximum velocity shall be 12 feet per second. Velocities shall be based on full flow conditions.

10-10 STREET INUNDATION REQUIREMENTS

City streets are allowed to convey runoff for storm events larger than the 10-year. The standards for street inundation are specified in Table 10-6. The Consulting Engineer shall provide calculations and an exhibit showing that these standards are met. Street inundation calculations will assume the pipe system is fully functional.

ALLOWABLE STREET INUNDATION: Table 10-6

STREET	10-YEAR STORM	25-YEAR STORM	100-YEAR STORM
LOCAL At continuous grade, uphill, and downhill At Sag Points	Traveled lanes remain clear and do not carry storm water. Storm water elevation does not exceed top back of curb or back of sidewalk. Maximum depth in traveled way is 6". Centerline shall be dry	Maximum depth at gutter flow line shall not exceed top-back-of-S/W (if no S/W, or S/W is offset) or a max. of 6". Centerline of street shall remain dry. Storm water elevation does not exceed 4" above the top back of curb. Maximum depth in traveled way – 6".	Maximum depth at gutter flow line shall not exceed 4" above the top –back-of-curb or a max. of 10". Max. depth at centerline is 4" Storm water is a maximum of one foot below building pads. Ponding does not exceed more than 120' from inlet along any street
COLLECTOR At continuous grade, uphill and downhill At Sag Points	Traveled way remains clear and does not carry storm water. Storm water elevation does not exceed top back of curb or sidewalk. Maximum depth in traveled way – 6". Centerline shall be dry.	Maximum depth at gutter flow line shall not exceed top-back-of-curb or max. of 6" Storm water elevation does not exceed 4" above the top back of curb. Maximum depth in traveled way – 6".	Storm water flow is contained within the right-of-way. The center 12 feet of roadway shall remain clear of storm water. Storm water flow is contained within the right-of-way. The center 12' of roadway shall remain clear of storm water. **Note:** If the roadway is separated by a median, then each half of the roadway shall maintain a 12' clear path of travel.
ARTERIAL & EXPRESSWAY At continuous grade, uphill and downhill, or at sag points			All travel lanes are clear of storm water flow. Bike lanes are allowed to be inundated. Storm flow contained within the right-of-way.

10-11 CLOSED CONDUITS

The specific type of pipe or alternate pipe to be used in any development shall be shown on the approved plans. If the Consulting Engineer proposes to use any type of pipe not shown on the approved plans, the plans shall be resubmitted to the City Engineer for approval.

A. Size and Material: Drainage systems to be maintained by the City shall have a minimum pipe diameter of 12 inches. Private, onsite drainage systems that are reviewed by the City shall have a minimum pipe diameter of 8 inches. The types of pipe materials that are allowed are stated in the City of Roseville's Construction Standards, Section 101-8 D.

B. Cover Requirements: See details DR-19 and TB-2 for minimum pipe cover requirements.

In fill areas, or in areas with poor soil conditions where it is anticipated that a good, firm, vertical-walled trench cannot be constructed, the Consulting Engineer shall design the pipe structural requirements in accordance with good engineering practice. If trench conditions are uncertain, a note shall be placed on the plans making it the Contractor's responsibility to work with the Consulting Engineer to determine and place the proper strength pipe if poor trench conditions are encountered.

C. Alignment: Pipelines for storm drainage shall have a constant slope between manholes, junction boxes, and/or catch basins. Minimum radius of horizontal curvature shall be 200 feet. In no case shall the radius of curvature be less than the manufacturer's recommendations for the particular pipe size under consideration.

Drainage pipelines shall be located in the street whenever possible. The location of storm drainage pipelines in the streets shall be 5 feet north or west of and parallel with the street centerline. A minimum angle of 90 degrees shall be accommodated for downstream flow around bends, tees, and connection points.

When storm drainage lines are to be placed in existing streets, factors such as curbs, gutters, sidewalks, traffic conditions, pavement conditions, future street improvement plans, and existing utilities shall be considered.

Open ditches, lined channels, swales, and floodplain areas shall be maintained as nearly as possible in their existing alignment. When an open ditch is to be constructed parallel to an existing roadway, the ditch shall be constructed outside the proposed right-of-way of the ultimate street development.

10-12 MANHOLES

Standard precast concrete manholes shall be constructed as required. Where special manholes or junction boxes are required, the City Engineer must accept the design. In no case will junction boxes or manholes be allowed which are smaller than 48 inches inside diameter. Manholes shall be located at junction points, angle points, changes in gradient, changes in conduit size, end of curves and beginning of curves. Manholes or junction boxes will not be required for reach of pipe

less than 80 feet in length that is to be connected to a 36 inch or larger diameter pipe, subject to approval of the City Engineer. For straight alignment, the spacing of manholes shall not exceed 500 feet. The spacing of manholes shall be nearly equal whenever possible. On curved pipe, spacing of manholes shall be as specified in Table 10-7:

MANHOLE SPACING: Table 10-7

RADIUS	PIPE DIAMETER	SPACING
400' OR LESS	ALL	300'
GREATER THAN 400'	24" OR LESS	400'
GREATER THAN 400'	GREATER THAN 24"	500'

A. Saddle Manholes: Saddle manholes may be constructed on storm drain conduit 36 inches or greater in diameter provided that no junction exists with any other storm drain conduit as determined by the Director.

B. Covers: All manholes and junction boxes, other than inlets, shall have standard manhole covers per the Standard Drawings. No pipe will be allowed to enter a manhole into the transition portion of the manhole cone. Manholes will not be allowed in gutter flow line except where approved by the City Engineer. Slotted manhole covers may be used to pick up minor drainage in non-traffic areas.

10-13 INLETS

Drop inlets in streets shall be located on property lines in residential subdivisions except at intersections, where they shall be placed at curb returns. Inlets shall be such that the length of the flow in the gutter does not exceed 500 feet. The depth of flow in the gutter at the inlet shall not exceed 4.0 inches in a 10-year storm and shall not encroach into the traveled ways as specified in Table 10-6 for other design storms. The runoff volume shall include any flow that bypasses upstream inlets.

All inlets located with the right-of-way or easements shall conform to the City of Roseville's Construction Standards. Inlets may be modified for use without curb sections for on-site drainage. Where an inlet is proposed in public streets and sidewalk is not constructed adjacent to the back of curb, a concrete collar shall be placed behind the inlet. Type C inlets may be used as junction inlets if the flow line is 4 feet or less below the grate elevation.

Drop inlets draining public streets may be connected directly to a trunk line 36 inches in diameter or larger by means of a lateral not exceeding 15 inches in diameter and 80 feet in length.

10-14 JUNCTION BOXES

The requirement for junction boxes are as follows:

A. Junction boxes shall be constructed of reinforced concrete or fabricated from reinforced concrete pipe section where size limitations permit. Structural calculations shall be provided for all junction boxes.

B. Minimum wall thickness for reinforced concrete junction boxes shall be 6 inches.

C. The inside dimension of junction boxes shall be such as to provide a minimum of three inches of clearance on the outside diameter of the largest pipe in each face. All junction boxes shall be rectangular in shape unless otherwise approved by the City Engineer. Junction boxes deeper than 4 feet shall have a minimum inside dimension of 48 inches.

10-15 INLET AND OUTLET STRUCTURES

The requirements for these facilities are as follows:

A. Headwalls, Wingwalls, and Endwalls: All headwalls, wingwalls, endwalls, preformed end sections, guard rails and bank protection shall be considered individually and shall be, in general, designed in accordance with the Standard Specifications and Standard Plans of the California Department of Transportation and City of Roseville, Construction Standards.

Metal beam guardrails or chain link fencing may be required by the City Engineer at culverts, headwalls, box culverts, and steep side slopes.

B. Trash Racks and Access Control Racks: Trash racks will be provided where they are necessary to prevent clogging of culverts, storm drains, and to eliminate hazards. Access Control Racks shall be required on all pipes, 24 inches or larger in diameter.

10-16 DRAINAGE PUMPS

Drainage pumps shall be avoided whenever possible, and used only with specific approval of the City Engineer. If the use of drainage pumps is permitted, the drainage system shall be designed so as to provide for gravity outfall during the summer months and other periods of low water stages. If a low stage gravity outfall is impossible or impractical, an alternative pump of a smaller capacity for low stage flow may be used provided the City Engineer grants specific approval.

A. Design Requirements: Pumping installations shall be designed to accommodate a design storm as specified by the City Engineer. When a station contains a gravity discharge, pumping capacity must be equal to the design inflow. When the station does not have a gravity discharge, pumping units must be designed to furnish 100 percent capacity with any one pump out. Any deviation from this criteria must receive the specific approval of the City Engineer.

Pumping stations shall be designed so that gravity flow does not pass through the pump pit. No motor overload condition shall exist at any sump or flow condition. This does not preclude high sump design if low sump condition does not create an overload.

Each pumping station shall receive separate approval for the electrical system, piping system, housing installation and other miscellaneous design features. The electrical system for

drainage pumps shall conform to the electrical code and the State Department of Transportation Standards.

A detailed Operation and Maintenance Plan (O&M Plan) shall be submitted to the Engineering Division for approval prior to the approval of the pumping station.

B. Maintenance Requirements: Adequate access shall be provided for cleaning the pump sump. Trash racks shall be provided upstream from the pumping plant. Provisions shall be made for easy cleaning of the trash racks. Hatch covers, where used, shall be of raised pattern aluminum floor plate, or other approved lightweight cover. Dissimilar metals shall be insulated from each other when necessary. Ladder rungs, where used, shall be of non-slip variety. All drainage pumping plant sites shall be fenced with 6-foot chain link fence with barbed wire extensions arms.

10-17 CHANNELS AND OUTFALL DESIGN

Drainage shall be conveyed in an open channel if the drainage area exceeds 300 acres. Residential lots adjacent to open channels shall have minimum pad elevations of two feet above the 100-year water surface elevation. Non-residential lots shall have the lowest ground elevation adjacent to the building foundation at least two feet above the 100-year water surface elevation.

A. Open Channel Design Requirements: Channels shall be constructed to a typical cross section. Fully lined channels shall be designed with side slopes of 1:1 or flatter. Channels with unlined sides shall be designed with side slopes of 3:1 or flatter, or as specified by the Geotechnical Engineer based on existing soil conditions. Lined channels shall have a minimum bottom width of 6 feet. Lined channels shall be finished concrete, sacked concrete, or doweled and sacked concrete. The minimum weight of sacked concrete shall be 60 pounds per bag. Unlined channels shall be designed with a minimum "n" value of 0.085.

All open channels shall be designed to carry the 100-year frequency design storm. The hydraulic grade line of the 10 and 100-year storms shall be calculated and plotted on all channel profiles. Freeboard shall be a minimum of one foot for the 100-year event and two feet when the drainage area exceeds 300 acres. The velocity range shall be 2.5 to 6.0 feet per second in unlined open channels and 3.0 to 12.0 feet per second in lined open channels. All computations shall be clearly documented and submitted to the City Engineer for approval.

For all channels, either realigned or natural, the following shall be shown on the improvement plans in addition to the information heretofore required:

1. The profile of existing channels shall be shown for a minimum of 1000 feet at each end of the development on the construction plan to establish a minimum profile grade.

2. Typical sections and cross sections.

B. Interceptor Ditches: Interceptor ditches or approved alternates shall be placed at the top of the cut or bank where deemed necessary by the City Engineer to prevent erosion of the channel bank. Runoff shall not be allowed to sheet flow over the top of banks.

C. Outfall Profiles: All drainage outfalls shall be shown both in the plan and profile view, on the improvement plans for a distance of 1000 feet or until a definite "daylight" condition is established. All drainage ditches upstream of the improvement shall be shown on the plan and profile sheets for a distance of at least 500 feet or until an average profile grade through the improvement is established. The profiles shall include ditch flow line and top of bank elevations.

When improvements have more than one unit, the drainage outfall shall be shown as extending to the property boundary and beyond if required, although it may not be constructed with the current unit development. All temporary outfalls shall be shown both in plan and profile view, on the improvement plans.

D. Fencing: Channels exceeding three (3) feet in depth and with side slopes steeper than 3:1 shall be fenced with six(6) foot high chain link fence per Section 80-4 of the Caltrans Standard Specifications. In all other areas, fencing shall be placed as specified the City Engineer. Fences shall be located 6 inches inside the drainage easement lines and a minimum of 12 inches from the top bank. No fencing shall be allowed within the floodway of an open watercourse without the approval of the City Engineer. Special requirements shall be specified by the City Engineer for fencing within the 100-year floodplain of any open watercourse.

Drive gates shall be provided with a minimum width of 12 feet. A minimum 4-foot wide walk gate shall also be provided.

E. Access Roads: An all-weather access road consisting of six (6) inches of compacted AB shall be provided adjacent to all channels and outfall ditches to the satisfaction of the City Engineer. Access roads shall have a minimum width of 12 feet and shall provide a bulb at end for turning movements.

10-18 CROSS CULVERTS AND BRIDGES

This section specifies criteria for relatively short circular or box culverts and bridges for transverse crossings (typically road or railroad embankments). Cross culverts shall be of the same material as allowed for closed conduits. (See Section 10-11).

Cross culvert profiles will be determined on an examination of the channel for a minimum distance of 1000 feet on each side of the installation.
Driveway culverts shall be approved by the City for size, grade, alignment and type. Driveway culverts will not be allowed unless the City has agreed to deter the construction of the curb and gutter unless it is for the temporary construction access.

New culverts or bridges for roadways that cross the City's Regulatory Floodplain shall incorporate provisions for the installation of permanent stream measuring equipment. This shall of a 10' x 10' flat pad near the 100-year water surface elevation with vehicle access. A two(2) inch diameter electrical conduit from the pad to the flow line of the channel will be installed, (see detail DR-21 of the City of Roseville Construction Standards).

A. Design Storm: Cross culvert size shall be determined on the basis of runoff as specified in the hydrology portion of this section. Cross culverts, in general, shall be designed for a 25-year storm event with no head on the inlets. They shall also be sized such that no serious damage will be incurred due to ponding as a result of a 100-year event. A flood easement shall be provided for all areas impacted due to upstream ponding in the 100-year event. Culverts across arterials shall be sized for the 100 year storm with a minimum of one foot of freeboard below the lowest travel lane. Minimum diameter of cross culverts shall be 18 inches.

To account for debris collection, a clogging factor of 150% shall be applied to all storm frequencies (up to and including the 100 year storm) in the design of bridges or culverts that cross a channel or stream with a drainage area that exceeds 300 acres. This calculation is intended as a design check to ensure the resultant non-regulatory floodplain does not adversely impact (e.g. now overlay) private property and/or remains within the flood easement or open space preserve.

Note: New bridges along planned bike trail corridors need to be designed so that the head clearance on the trail will meet the standards of Section 13-5 and may be designed to be submerged pursuant to Section 13-6.

B. Computation of Flow: Inlet or outlet conditions control flow in transverse culverts. In culverts operating under inlet control, the cross-section area of the culvert barrel, the inlet geometry and the amount of headwater at the entrance are primary importance. Outlet control involves the additional consideration of the elevation of the tail water in the outlet channel and the slope, roughness and length of the culvert barrel.

Anticipated downstream flow depth and allowable headwater depth govern the available head on culverts. The type of flow under which a culvert will operate may be determined from a given set of conditions. This may be avoided by computing headwater depths from the charts in this section for both inlet and outlet control and then using the higher value to indicate the type of control and to determine the headwater depth. This method of determining the type of control is accurate except for a few cases where the headwater depth is approximately the same for the both types of control. The monographs provided in this section shall be used for culvert design with uniform barrels. Where barrel sizes or entrance configurations differ between barrels, written calculations shall be provided to the satisfaction of the City Engineer.

The roughness coefficient, "n", can be adjusted for the monographs by use of the following equation:

$$L_1 = L^* \left[\frac{n_1}{n} \right]^2$$

10-19 DETENTION AND RETENTION BASINS

If detention or retention basins are required for peak flow reduction, the design of the basin must conform to the latest addition of the Placer County Flood Control District's "Stormwater Management Manual". The basin layout and design shall minimize its maintenance time and cost. The basin should be designed to allow for the 2-year storm event flows to bypass the basin. This will be key factor in the approval of the basin's O&M Plan by the Engineering Division.

10-20 ACCESS FOR MAINTENANCE

A. All Facilities: These facilities may include, but are not limited to bridges, culverts, headwalls, lined and unlined channels/ditches, sand/oil separators, manholes, retention basins and drain inlets. The access way shall be a minimum 12 feet wide and include six(6) inches of ¾ inch aggregate base (95% relative compaction) over six(6) inches of processed, native soil (95% RC). Upon the City Engineer's request, four (4) inches of asphalt concrete shall be added to the section and/or a cul-de-sac with a minimum diameter of 75 feet.

STANDARD HYDRAULIC CALCULATIONS SHEET

TO	FROM	AREA	CUMU. AREA	T_r	q	F_i	Q_p	STORM DRAIN PIPE							HYD GRADE LINE		
								DIA	SL	L	Qmax	VEL	Tc	SL	UMH	LMH	

CITY OF ROSEVILLE – ENGINEERING DIVISION

SUBMITTAL REQUIREMENTS FOR ALL HEC – 1 STUDIES

Submit the items listed under each category that applies to each HEC – 1 model run that is submitted.

1. Hec-1 print out with summary tables.

The following information shall be on the cover of the print out:
- Name of engineering firm who performed the study
- Name of the project
- Version of HEC-1 program
- Date & time that the model was run
- A statement if the model is pre-project or post-project

2. The computer model disk.
- Disk must be clearly labeled
- If more than one model file is on the disk, a listing and description of all files shall be included with the disk in an envelope
- HEC-1, HEC-2 or HEC-RAS files shall be submitted on separate disks

3. City of Roseville's "Model Summary Worksheet" Pages 1-3 completed out for each HEC-1 run submitted and attached to the printout.

4. Drainage Shed map showing the following:
- Outline of all subsheds used in the HEC-1 study
- The label of each subshed as modeled in the HEC-1 study
- The area of each subshed as used in the HEC-1 study
- The location where each subshed merges with the next clearly marked

5. If the study compares pre-project to post-project HEC-1 models, the City's summary sheets shall include a listing of all the types and the locations of changes made in the model

CITY OF ROSEVILLE
HEC -1 MODEL SUMMARY WORKSHEET **Page 1 of 3**
GENERAL INFORMATION

Name of project:_____

Name of engineering firm who performed the study:_____

Contact person _____Ph#_____

If this replaces a previously submitted study, what is the name of that study?

_____

This study reflects: ____Existing conditions ____Post-development conditions

If this HEC-1 study is used to compare pre-project to post-project runoff, what is the name of the study that you are comparing it with? _____ Run date_____

Has the pre-project study been approved by the city? ____ **YES** and when _____

____ **NO**

BASIN INFORMATION

Total area of the basin studied (sq. mile)_____ Number of sub-sheds _____

Elevation of shed: High point _____ Low point _____ Ave. _____Used_____

The method used to determine the design storm used in the model:

_____ P.C. Flood Dist. manual _____ HEC-1 synthetic storm
_____ P.C. Flood Dist. PDP program _____ Rain gauge data

Duration of design storm: 1 hr 2 hrs 3 hrs 6 hrs 12 hrs 1 day other _____

Design storm frequency: 2 yr 5 yr 10 yr 25 yr 50 yr 100 yr other _____

Base flow (cfs / sq mile): _____ Infiltration (in/hour) _____

Response time of entire basin _____

Detention Basins Give location and size of all detention basins that were modeled:

Provide topo or grading plans used to calculate storage volume for each detention basin.

Location in model	Amount of storage resulting from each design storm	Storm frequency	Max. Stage Height (ft.)	Freeboard to Spill Point (ft.)
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

CITY OF ROSEVILLE
HEC-1 MODEL SUMMARY WORKSHEET **Page 2 of 3**

SUBSHED INFORMATION

The total number of subsheds in the model: _____

Provide an assumed "N" factor used most often for the following surfaces:

Overland swales _____ Concrete gutters _____ Drainage Pipes _____

Earth-lined channels _____ Streams _____ Other _____

TITLE OF SUBSHED OR ROUTING LEG IN MODEL	PRIMARY LAND USES OF SUBSHED residential, open space, commercial, etc.	AREA OF SUBSHED (SQ ML)	METHOD USED IN ROUTING EXAMPLE: Kinematic wave, Muskingum	WAS DETENTION MODELED (YES OR NO)

CITY OF ROSEVILLE
HEC-1 MODEL SUMMARY WORKSHEET **Page 3 of 3**

PRE-PROJECT TO POST-PROJECT CHANGES

This sheet shall be completed if this HEC-1 study is used to compare pre-project to post-project runoff.

Name of pre-project HEC-1 study : _____

Run date_____

Basin's peak flow rate: Existing conditions _____

Post-development conditions _____

Has the pre-project study been approved by the City? _____ **YES** If yes, when?_____
_____ **NO**

Locations in	Types of change made
Example Shed-2S	Change earth-lined channels to drainage pipes and increased sub-shed area

CITY OF ROSEVILLE - ENGINEERING DIVISION
SUBMITTAL REQUIREMENTS FOR ALL
HEC-2 or HEC-RAS STUDIES

SUBMIT THE ITEMS LISTED UNDER EACH CATEGORY THAT APPLY TO EACH **HEC-2 or HEC-RAS** MODEL RUN THAT IS SUBMITTED.

1. HEC-2 or HEC-RAS print out with summary tables.
The following information shall be on cover of the print out:
Name of engineering firm who performed the study
- Name of project
- Version of HEC-2 or RAS program
- Date & time that the study was run
- Statement if the study is pre-project or post-project and, if applicable, if the study is a Duplicate Effective Model, Corrected Effective Model, Existing or Pre-Project Conditions Model, and/or Revised or Post-Project Conditions Model

2. Provide the computer model on a new USB flash drive (Sandisk, PNY, or Kingston) or CD/DVD disk.
Flash Drive/Disk must be clearly labeled.
- If more than one model file is on the flash Drive/disk, a listing and description of all files shall be included with the flash Drive/disk in an envelope.
- HEC-1, HEC-2 or HEC-RAS files needs to be submitted in separate folders within flash drive/disk(s).

3. City of Roseville's "Model Summary Worksheet" pages 1-3 filled out for each HEC-2 or HEC-RAS run that is submitted

4. Water course map showing the following:
- Lay out of the route of all water courses used in the HEC-2/RAS study.
- All man-made structures with their type and size will be clearly marked and labeled (bridges, culverts, storm drain pipes, man-made channels, etc.).
- Map of the locations and number of all cross-section used in study.
- The starting HGL and peak flow rate for all storm frequencies modeled.
- The location of where the flow rate changes and what the new flow rate is.

5. If the study compares pre-project to post-project HEC-2/RAS models, you shall include a summary sheet listing the locations and types of changes made between the models.

CITY OF ROSEVILLE **Page 1 of 3**
HEC-2 / HEC-RAS MODEL SUMMARY WORKSHEET

Name of project:_____

Name of engineering firm who performed the study: _____

Contact person _____ Phone # _____

If this replaces a previous study, what is the name of that study_____

This study reflects: ☐ Existing conditions ☐ Post-development conditions

If this HEC-2/RAS study is used to compare pre-project to post-project runoff what is the name of the study that you are comparing it with _____ Run date_____

Has the pre-project study been approved by the city ☐ **yes** ☐ **no**
If yes, name and when
_____

Total length of water course (miles)_____ Total number of cross-sections _____

Name of Hydrology study used to get peak Discharge? _____

Design storm frequency: ☐2 yr ☐5 yr ☐10 yr ☐25 yr ☐50 yr ☐100 yr ☐Other_____

The starting HGL _____ _____ _____ _____ _____ _____ _____

Starting flow rate _____ _____ _____ _____ _____ _____ _____

How was the starting HGL determined:
_____
_____
_____
_____

Give location of cross-sections where the flow rate changes and what the new flow rate(s) are.

START	10 YEAR	50 YEAR	100 YEAR

CITY OF ROSEVILLE **Page 2 of 3**
HEC-2 / HEC-RAS MODEL SUMMARY WORKSHEET

CHANNEL REACH INFORMATION

Give the total number of reaches in the Model _____

Provide assumed "N" factors used most often for the following surfaces:

Overland swales_____Concrete Gutters_____Drainage Pipes_____

Earth-lined channels_____Streams Channel_____Main channel_____

Over Bank _____other_____

Are the assumption used in hydrology study's routing section to determine peak discharge, in line with those used in this hydraulic study for the same segment of channel (channel length ,"N" factor , etc.) ☐ **yes** ☐ **no** If **no** explain why _____
_____

BRIDGE OR CULVERT MODEL INFORMATION
Provide the following Information for all Bridge and Culvert crossings:

DOWN STREAM X-SEC. AT BRIDGE OR CULVERT	METHOD USED TO MODEL (special culvert, bridge, etc.)	IS STRUCTURE OVERTOPED example (2.1 ' in 50 yr, 3.4' in 100 yr)	WAS DETENTION MODELED (YES OR NO)

CITY OF ROSEVILLE **Page 3 of 3**

HEC-2 / HEC-RAS MODEL SUMMARY WORKSHEET

PRE-PROJECT TO POST-PROJECT CHANGES

Name of pre-project study: _____

Run date_____

Name of post-project study: _____

Run date_____

Do you plan to place any improvements in, or change the Floodway ☐ **yes** ☐ **no**
If **yes**, explain.

Provide the following Information for all changes between studies:

Location	Types of changes (added, deleted, changed)
Xsec-252	Added xsec. to reflect encroachment, changed right overbank "N" to 0.04

Floodplain Encroachment Compliance Statements

Improvements are being proposed within the 100-year floodplain of the City of Roseville.

These improvements are shown on the plans for:

The proposed plans for: _____

Designed by: _____

Dated: _____

A hydraulic study has been completed to show the hydraulic impacts of all of the improvements proposed within the floodplain shown on these plans. The title of this study is:

Title of hydraulic study: _____

Prepared by: _____

Dated: _____

I certify that I have looked at both the plans and the study and found that the improvements that are within the 100-year floodplain shown on the plans listed above are in conformance with the hydraulic study listed above and are accurately represented in the study.

_____
Signed

R.C.E Lic. Number _____ Expires _____

SECTION 11: GRADING

11-1 INTRODUCTION

The City's authority to regulate grading on private property varies depending on the property's location. For properties located within specific plan areas of the City, the authority is provided by the zoning ordinance for the specific plan area. For properties which are not located within a specific plan area, the City's authority for regulating grading is provided by Chapter 33 & 18 of the California Building Code (CBC). The CBC requires that a Grading Permit be obtained from the City prior to beginning any grading work unless the work meets certain exemptions specified in the CBC. This is necessary to ensure that on-site drainage adequately accommodated, off-site drainage is conveyed through the project, the proposed grading is compatible with adjacent property topography and adequate erosion and sedimentation control measures are addressed.

This section specifies design and plan submittal requirements of Grading Plans for private developments. It includes items pertinent for the City's review and reflects established professional engineering practice for preparation of Grading Plans. Questions and clarifications regarding this Section should be directed to the Engineering Division of the Development Services Department.

The City of Roseville has adopted Stormwater quality design standards to reduce water pollution generated by urban runoff. These design standards are detailed in the Stormwater Quality Design Manual for the Sacramento and South Placer Regions. This manual is available on-line at the City of Roseville website, https://www.roseville.ca.us/cms/One.aspx?portalId=7964922&pageId=8754136

Two (2) types of Grading Plans are reviewed by the City: Finished Grading Plans and Rough Grading Plans.

Finished Grading Plans shall be submitted as part of the Improvement Plans for a project. Finished grading requirements shall be specified in Section 11-4.

Rough Grading Plans are submitted separately from and may be accepted prior to Improvement Plans. The plans should detail only preliminary grading of a site. The design shall not allow for construction of any improvements (storm drains, streets, curbs, gutters, etc.) and shall indicate positive drainage flow except in those instances provided on the plans for erosion and/or sedimentation control. Rough grading requirements shall be as specified in Section 11-5.

11-2 FEES AND BONDS

Plan review and permit fees for grading shall be in accordance with Chapter 33 of the California Building Code (latest edition as adopted by the City). 100 percent of the plan review fees will be required at the time of submittal. See section 2-7 for Grading Permit fee schedule. The amount of the bond shall be equivalent to ten (10) percent of the cost of the grading and all erosion and sediment control measures, but not less than $500.00.

11-3 PREPARATION

All Grading Plans shall be prepared by or under the direction of a Registered Civil Engineer. All Sheets shall be stamped and signed by a Registered Civil Engineer licensed in the State of California.

11-4 FINISHED GRADING PLAN REQUIREMENTS

Grading Plans for subdivisions and all developments located within Planned Development zones shall be submitted as part of the Improvement Plans and shall detail the following:

A. Slope symbols for all slopes 4:1or steeper.

B. Typical lot grading details.

C. Proposed spot and/or pad elevations. All lot corner elevations shall be shown on the Grading Plan.

D. Flow directional arrows both on-site and off-site and perimeter elevation at the property line.

E. Existing spot elevations and or contour lines on-site and off-site around the perimeter of the development. Where the existing terrain is not relatively flat, contour lines shall be shown. Contour lines shall be in maximum increments of two (2) feet. The spot elevations or contour lines shall be extended off-site for a minimum distance of 25 feet (flat terrain-50 feet minimum).

F. Existing trees (variety, size and elevation at the base of all tress six (6) inches in diameter or larger). For native oak trees, the plan shall show the protected zone and the approved protective fencing locations. Encroachments into the protected zone require tree permit approval.

G. A Certificate of Compliance of Grading with signature blocks for both the Registered Civil Engineer and the Geotechnical Engineer licensed in the State of California shall be provided stating the following:

CERTIFICATE OF COMPLIANCE

I hereby certify that the grades shown on these plans and approved by the Development Services Department have been constructed to withing 1/10th of one (1) foot of their indicated elevation for all lot pads and improvements shown.

_____	_____	_____
Project Engineer	PE Number	Date

I hereby certify that the pads for the following lots for this project have been tested for compaction in accordance with generally accepted test methods and based upon the resultsof these tests the compaction of said pads conforms to the recommendations of this projects geotechnical report:

Lots: _____

I also state that our firm observed the grading operation to a sufficient extent to evaluation conformance with the project's geotechnical report as approved by the City, and further state that based upon our observations, the grading for this subdivision conforms with the recommendations of said soil report.

_____	_____	_____
Geotechnical Engineer	PE Number	Date

H. Back of sidewalk elevations at property lines, curb returns, high and low points, and other areas deemed necessary by the City Engineer.

I. All existing and proposed surface and subsurface drainage facilities including drain inlets, underground pipes, surface swales, and any other drainage improvement proposed to be constructed with, or as a part of, the proposed work.

J. Location of existing and proposed buildings or structures on the site, including proposed pad and/or finished floor elevation. Proposed residential plot plans should not be shown on the Grading Plans.

K. Location of existing and proposed buildings or structures on the land of adjacent owners which are within fifteen (15) feet of the property and which may be impacted by the proposed grading operations.

L. Location of all existing and proposed retaining walls.

M. Typical sections across side yard property lines where the difference in finish pad elevations exceeds on (1) foot.

N. Names of adjacent subdivisions.

O. Off-site intersecting property lines.

P. For all projects involving the export of soil material:

1. Location of spoiled disposal. If spoil area is within a Specific Plan area of the City, a separate Conditional Use Permit is required for that site.

2. Spoil areas shall meet all the requirements of these standards.

Q. Silt retention and erosion control details as necessary and specified in these Design Standards.

R. Location of temporary protective fencing for environmentally sensitive areas such as: creeks, wetlands, vernal pools, perennial streams, and preserve areas.

11-5 ROUGH GRADING PLAN REQUIREMENTS

Grading Plans for subdivisions and all developments located within Planned Development zones shall conform to the same requirements as those specified for Finished Grading Plans excepting the following:

A. Improvements: Only existing improvements such as utilities, curbs, gutters, etc. shall be shown. Utilities and streets to be constructed with the Improvement Plans shall not be shown as part of the Rough Grading Plans.

B. Drainage: All rough plans shall provide for positive surface drainage flow except in those instances provided on the plans for erosion and/or sedimentation control.

11-6 DESIGN REQUIREMENTS

A. Rolling Terrain Grading: Grading of rolling terrain shall be accomplished in a manner whereby the effect of the rolling terrain is maintained as close to that which exists, to the extent practicable. Every effort shall be made to keep grading of rolling terrain to an absolute minimum.

B. Boundary Grading: Special attention shall be given to grading adjacent to the exterior perimeter property line of a development. All adverse effects to off-site properties adjacent to new developments shall be kept to an absolute minimum. Fills and cuts adjacent to the exterior perimeter property line shall be designed in accordance with the following:

1. When grading along existing residential property, the grade should be, if at all possible, held equal to or lower than the existing property grades. When grades are to be raised higher than existing adjacent residential lots, a masonry retaining wall shall be used, regardless of the difference in elevation. The wall shall be located as close to the property line as is feasible for construction. If permission can be obtained from the adjacent property owner(s), the wall should be placed on the property line or onto the lower lot and the fence relocated to the top of the wall.

2. If possible, all exterior slopes, fill or cut, shall be constructed off-site, with the property line being situated a minimum of two (2) feet inside the higher elevation. If a right of entry cannot be obtained, a retaining wall shall be placed as near to property line as practicable.

3. A recorded notarized right of entry shall be required for all off-site fills and grading prior to plan approval.

4. Fill slopes adjacent to designated open spaces shall have a maximum slope of 3:1. Exceptions to this specification may be made where physical constraints restrict the use of 3:1 slopes, at the discretion of the City Engineer. Maximum slope of all other boundary grading shall be 2:1 or as specified by the Geotechnical Engineer.

5. All slopes steeper than 4:1 adjacent to the public right-of-way and private streets shall be protected with permanent erosion control measures.

6. All fill material shall achieve 90 percent relative compaction certified by a Registered Geotechnical Engineer.

7. When a drainage swale or ditch is proposed to run adjacent to the property line, a level area, minimum width of five (5) feet is required between the property line and the top of the slope bank.

8. A specific haul route shall be approved by the City Engineer when a large quantity of imported or exported soil is required. Where a haul route has not been determined at the time of plan approval, the permit shall be conditioned stating that no grading activities shall occur until a haul route has been approved by the City Engineer.

C. Interior Grading: Differences in elevations across interior property lines within a development, such that slopes or retaining walls are required, shall conform to the following:

1. Cross lot drainage is not allowed unless specifically approved by the City Engineer for tree preservation. All single-family residential lots shall have Class 1 grading as per the Standard Drawings unless approved otherwise by the City Engineer. When a Class 2 or Class 3 lot grading plan is proposed as part of a tentative map application for a single-family residential subdivision, the tentative grading plan showing rear lot drains shall be supplemented with an alternative plan showing the effect on the subdivision if rear lot drains are not utilized.

2. Retaining Walls shall be required whenever adjacent side lot elevations differ by more than ½ foot. In such cases, a minimum three (3) foot wide walk path shall be maintained adjacent to all side property lines. Where the Consulting Engineer feels that this path will be maintained without the use of a retaining wall, application for a waiver may be made by preparing and submitting a site plan scale on 8-1/2" X 11" reproducible paper for each lot which is requested to be exempted, or by submitting a standard Lot Grading and

Setback Guarantee. The Lot Grading and Setback Guarantee shall specify which lots for which a waiver of the retaining wall requirement is requested, shall state the minimum setback of the proposed structure from the toe of slope, and shall state that should the minimum setback not be possible during construction, a retaining wall shall be constructed to the requirements of these Design Standards. Upon approval, a copy of these will be given to the Building Division to utilize in their review. Any deviation to these plans will be subject to the approval by the Engineering Division.

3. Property lines shall be situated a minimum of 1.0 foot inside the top of fill or cut slopes when pad elevations differ by ½ foot or less. When retaining walls are used, the property lines shall be situated on the high side of the retaining wall with a minimum setback of one (1) foot from the property line to the retaining wall. Where pad elevations differ by more than ½ foot and waiver of placement of retaining walls is required per the requirements stated above, property lines shall be situated a minimum of two (2) feet inside the top of fill or cut slopes.

4. The maximum earth slopes allowed shall be 2:1 (horizontal to vertical). Minimum asphalt concrete surface slopes shall be 1% and minimum concrete cement surface slopes shall be 0.25%. All proposed slopes that are 3:1 or steeper shall be shown on the plans by some type of slope symbol delineation.

5. Lots on the low side of streets at sag points shall have pad elevations a minimum of one (1) foot above the 100 year water

Surface elevation assuming failure of all subsurface drainage systems.

D. Retaining Walls: Retaining walls, when required, shall be shown on the plans and shall include all necessary information and details for construction. All retaining walls adjacent to the public right-of-way or along the exterior boundary of the project shall be masonry. Other retaining walls less than or equal to 2’ -6” in height may be redwood conforming to the Standard Drawings except as specified in Section 11-6. Walls higher than 2’ -6” shall be masonry. All walls higher than four (4) feet as measured from base of foundation to top of wall shall be substantiated with structural calculations stamped by a Registered Civil Engineer licensed in the State of California and a Building Permit shall be obtained from the Building Division.

E. Grading near Trees: No person shall conduct any activity within the Protected Zone of a Native Oak Tree or Landmark Tree without approval of a Grading Permit issued conformance with the Tree Permit Conditions. Great care must be exercised when work is conducted upon or around Protected Trees. The purpose of this section is to define procedures necessary to protect the health of the Protected Trees. The policies and procedures described in this section apply to all encroachments into the Protected Zone of Protected Trees. All Tree Permits shall be deemed to incorporate the provisions of this section except as the Tree Permit may otherwise specifically provide.

1. General

a. Trenching within the protected Zone of a Protected Tree, when permitted, may only be conducted with hand tools, in order to avoid root damage.

b. Minor roots less than one (1) inch in diameter may be cut, but damaged roots shall be traced back and cleanly cut behind any split, cracked or damaged area.

c. Major roots over one (1) inch in diameter may not be cut without approval of an Arborist. Depending upon the type of improvement being proposed, bridging techniques or a new site design may need to be employed to protect the root and the tree.

d. If any Native Ground Surface Fabric within the Protected Zone must be removed for any reason, it may be protected within 48 hours.

e. An independent low-flow irrigation system may be used for establishing drought-tolerant plants within the Protected zone of a Protected Tree. Irrigation shall be gradually reduced and discontinued after two (2) years.

f. Planting Live material under native Oak Trees is generally discouraged and it will not be permitted within six (6) feet of the trunk of a Native Oak Tree with a DBH of eighteen (18) inches or less, or within ten (10) feet of the trunk of a Native Oak Tree with a DBH of more than eighteen (18) inches. Only drought tolerant plants will be permitted within the Protected Zone of Native Oak Trees.

g. A minimum of four (4) foot high protective fence shall be installed at the outermost edge of the Protected Zone of each Protected Tree or group of Protected Trees. The fence shall not be removed until written authorization is received from the Planning Director. Exceptions to this policy may occur in cases where Protected Trees are located on slopes that will not be graded. However, approval must be obtained from the Planning Department to omit fences in any area of the project. The fences must be installed in accordance with the approved fencing plan prior to the commencement of any grading operations or such other time as determined by the approving body. The Developer shall call the Planning Department and Engineering Division for an inspection of the fencing prior to grading operations.

Signs must be installed on the fence in four (4) locations (equidistant) around each individual Protected Tree. The size of each sign must be a minimum of two (2) feet by two (2) feet and must contain the following language:

WARNING:
THIS FENCE SHALL NOT BE REMOVED
OR RELOCATED WITHOUT WRITTEN
AUTHORIZATION FROM THE
DEVELOPMENT SERVICES

h. Once approval has been obtained, the fences must remain in place throughout the entire construction period and may not be removed without obtaining written authorization from the Planning Department.

i. A minimum of $10,000 deposit, or amount deemed necessary by the approving body, shall be posted and maintained to insure the preservation of Protected Trees during construction. The deposit shall be posted in a form approved by the City Attorney prior to any grading or movement of heavy equipment onto the site or issuance of any permits. Each violation of any Tree Permit condition regarding Tree Preservation shall result in forfeiture of a portion of the deposit, in the discretion of the approving body.

j. In cases where a Tree Permit has been approved for construction of a retaining wall(s) within the Protected Zone of a Protected Tree, the Developer will be required to provide for immediate protection of exposed roots from moisture loss during the time prior to completion of the wall. The retaining wall shall be constructed within 72 hours after completion of the grading.

k. If required, preservation devices such as aeration systems, Oak Tree wells, drains, special paving and cabling systems must be installed per approved plans and certified by the Developer's Arborist.

l. Every effort should be made to avoid cut and/or fill slopes within or in the vicinity of the Protected Zone of any tree.

m. No grade changes are permitted which cause water to drain to within twice the longest radius of the Protected Zone of any Protected Tree.

n. Certification letters are required for all regulated activity conducted within the Protected Zone of Protected Trees. The Developer's Arborist will be required to submit a certification letter to the Planning Department within five (5) working days of completion of such regulated activity attesting that all of the work was conducted in accordance with the appropriate permits and requirements of this section.

o. The following information must be located and permanently retained in the construction trailer starting at the site planning meeting:

1) *Arborist's* report and all future modifications.

2) Tree location map with a copy of the tree fencing plan.

3) Tree permit and inspection card.

4) Approved Construction Plans.

5) Tree Preservation guidelines.

6) Approved Planting and Irrigation Drawings.

2. Tree Permit Construction Phase

a. All work conducted within the Protected Zone of any Protected Tree shall be performed as required by this section and as required in project approval.

b. As a condition of the Tree Permit, the Developer will be required to submit a utility trenching-pathway plan for approval following approval of the project Improvement Plans. The trenching-pathway plan shall depict all of the following systems; storm drains, sewers, easements, water mains, area drains, and underground utilities. Except in lot sale subdivisions, the trenching-pathway plan must show all lateral lines serving buildings. To be completely effective, the trenching-pathway plan must include the surveyed locations of all Protected Trees on the project as well as an accurate plotting of the Protected Zone of each Protected Tree.

The trenching-pathway plan should be developed considering the following general guidelines:

i. The trenching-pathway plan must be developed to avoid going into the Protected Zone of any Protected Tree on its path from the street to the building.

ii. Where it is impossible to avoid encroachment, the design must minimize the extent of such encroachment. Encroachments and mitigation measures must be addressed in supplemental Arborist's report.

c. All of the tree preservation measures required by the conditions of the discretionary project approval, the Arborist's report and the Tree Permit, as applicable, shall be completed and certified by the Developer's Arborist's prior to issuing an Occupancy Permit.

F. Stormwater Pollution Prevention Plan (SWPPP): A site specific SWPPP shall be submitted concurrently with the Improvement and /or Grading Plans when a project disturbs land. For information concerning the preparation of a SWPPP, the Project Engineer should refer to the City of Roseville's "Stormwater BMP Guidance Manual for Construction", the California Stormwater Quality Association (CASQA). "Stormwater BMP Handbook/

Construction", and the State of California NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.

The SWPPP shall match identically to that of the SWPPP submitted to the State Water Resources Control Board via their electronic SMART system, up until the time improvement plans are approved, encroachment and/or grading permits are issued, and construction commences.

SWPPPs are not required for projects under one acre, unless they are part of a larger development encompassing over one acre. For projects less than one-acre, an erosion and sediment control plan shall be submitted with the improvement plans to the City for approval. This is generally part of the Grading Plan for the development. The Development Services Department, Engineering Division will accept the erosion and sediment control plan upon review of the project. All erosion and sediment control devices shall be identified and implemented in the same fashion as projects with SWPPPs over one acre. Enforcement will be conducted similarly, with exception to SWPPP administrative requirements.

1. Criteria

The purpose of the SWPPP is to ensure protection of the following:

a. Water Quality: Measures shall be provided to prevent siltation of streams, rivers, etc; avert in stream degradation due to turbidity and pollutant load; and prevent toxic materials from leaving construction sites.

b. Collection System: Methods shall be provided to prevent sediment from entering the storm drainage system.

c. Adjacent Properties: Methods shall be employed to prevent any damage to adjacent properties.

2. SWPPP Site Plan Requirements

SWPPP site plan(s) shall be submitted along with other SWPPP State permit required documents.

The discharger shall ensure that the SWPPP for the project site is developed and amended or revised by a Qualified SWPPP Developer (QSD). The SWPPP shall be designed to address the following:

a. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;

b. Where not otherwise required to be under Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

c. Site BMP's are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;

d. Calculations and design details as well as BMP controls for site run-on are complete and correct, and

e. Stabilization BMP's installed to reduce or eliminate pollutants after construction are completed.

f. Phasing of Erosion Control Measures - The Engineering Division may require phasing of the SWPPP plan(s) to ensure that all necessary erosion control measures are taken during separate phases of construction. As an example, this may require the Developer to construct sediment traps and basins during the first phase of grading operation.

g. To demonstrate compliance with requirements of the SWPPP, the QSD shall include information in the SWPPP that supports the rational used in selecting BMP's including supporting soil loss calculations, if necessary, conclusions, selections, use, and maintenance of BMP's

h. The discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by State or City inspectors. When the original SWPPP is retained by a crew member in a construction vehicle and is not currently at the construction site, current copies of the BMP's and map/drawing will be left with the field crew and the original SWPPP shall be made available via request by radio/telephone.

3. SWPPP Control Measures Requirements: The following is a list of requirements for erosion and sediment control measures, also referred to as BMPs (Best Management Practices). The following erosion and sediment control requirements shall be part of site specific SWPPP.

a. All sediment control measures (drain inlet protection, perimeter protection, stabilized construction access, etc.) shall be implemented prior to the commencement of grading operations or other construction activities or as approved by the City Engineer. Grading during the wet season should be minimized.

b. An adequate supply of erosion and sediment control materials (fiber rolls, blankets, mats, straw bales, silt fencing, etc.) shall be stored onsite throughout the course of construction and made available for maintenance and repair work.

c. Straw, when used, shall be broadcasted, or hand distributed, at a rate of 4000 pounds per acre. Straw shall be anchored to soil surface by "punching", "pressing", or by tacking down using a tackifier.

d. Slopes steeper than 4:1 and adjacent to the City right-of-way, flood plains, natural drainages, park land or designated open space shall be broadcast seeded and covered with a blanket material grade appropriate to the steepness and length of the slope. Alternative methods shall be approved by the Engineering Division.

e. All areas of disturbed soil, regardless of slope, shall be protected for erosion control. For measures approved by the City for erosion control, see the City of Roseville's Stormwater BMP Guidance Manual for Construction, and the State of California NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.

f. Where required, broadcast seed shall be applied as follows:

Blando Brome	12lbs/acre
Rose Clover	9lbs/acre

Areas with sandy, dry soil shall be:

Zorro Annual Fescue	12lbs/acre
Rose Clover	9 lbs/acre

16-20-0 fertilizer or equivalent shall be applied at the rate of 500 pounds per acre. If hydro-seeding/mulching is used, seed quantities shall be increased by 30 percent.

For areas adjacent to City designated open space, perennial streams, creeks, or environmentally sensitive areas, native seeds shall be used. Approved seed blends are listed below.

Seed blends and proposed alternate seed blends shall be submitted to the stormwater or construction inspector for approval prior to application.

Dry Mix

Botanical Name (Common Name)	Ecotype/Orgin	Approximate Live Seeds/Bulk Lb.	Approximate Live Seeds/Sq. foot	Bulk Lb/Acre
Nassella pulchra (purple needlegrass)	Yolo County: Stone Ranch	50,000	14.9	13.00
Nassella cernua (nodding needlegrass)	Tehama County: Inks Creek	115,000	15.8	6.00
Bromus carinatus (California brome)	Amador County: Sierra Nevadas	47,000	5.4	5.00
Poa secunda (one sided bluegrass)	Yolo County: Fiske Creek	500,000	11.5	1.00
Vulpia microstachys (three weeks fescue)	Yolo County: Fiske Creek	350,000	16.1	2.00
Melica californica (California melic)	Yolo County: Fiske Creek	240,000	16.5	3.00
		Total:	63.7	30.0

Swale/Wet Mix

Botanical Name (Common Name)	Ecotype/Orgin	Approximate Live Seeds/Bulk Lb.	Approximate Live Seeds/Sq. foot	Bulk Lb/Acre
Nassella pulchra (purple needlegrass)	Yolo County: Stone Ranch	50,000	9.2	8.00
Bromus carinatus (California brome)	Amador County: Sierra Nevadas	47,000	5.4	5.00
Vulpia microstachys (three weeks fescue)	Yolo County: Fiske Creek	350,000	8.0	1.00
Elymus glaucus (blue wildrye)	Butte County: Ilano Seco Ranch	120,000	11.0	4.00
Leymus triticoides (creeping wildrye)	Yolo County: Yolo Bypass	125,000	11.5	4.00
Hordeum brachyantherum (meadow barley)	Yolo County: Yolo Bypass	75,000	6.9	4.00
Elymus trachycaulus (slender wheatgrass)	Yolo County: Willow Slough	69,000	6.3	4.00
		Total:	52.0	30.0

h. All erosion and sediment control measures shall be checked prior to, and following all storms to ensure that all measures are functioning properly.

i. Sediment and trash accumulated on-site, in drainages, or detention basins shall be removed and properly discarded as soon as possible.

j. Construction activities throughout the year shall have erosion and sediment control measures in place or capable of being placed within 24 hours. The Contractor shall ensure that the construction site is prepared prior to the onset of any storm. Per the States General Construction Permit, a Rain Event Action Plan (REAP) shall be reviewed and completed by a qualified SWPPP practitioner (QSP) 48 hours prior to a rain event.

k. The Contractor shall establish a specific site within the development for maintenance and storage of equipment or any other activity that may adversely contribute to the water quality of the runoff. This area shall include secondary containment measures such as, but not limited to weather protected bins, awnings, tubs for liquid pollutant containers, and spill kits, etc. This area shall be managed to prevent spills and storm water from coming into contact with pollutants, and shall be restored to an acceptable condition upon completion of project.

l. Hydro-seeding and hydro-mulching may be considered as an alternative to broadcast straw subject to the Engineering Division's approval based on a review of the existing site conditions (location, slopes, proximity to streams) and time of year.

m. SWPPP shall define erosion and sediment control measure objectives, and clearly identify control measure selections.

G. Mitigation Monitoring Requirement: All mitigation measures and mitigation monitoring measures as required to mitigate environmental impacts shall be complied with. The Developer is responsible for monitoring all mitigation measures and shall submit to the Planning Department a letter certifying compliance with such measures.

H. Certifying Pad Elevations: Upon completion of the grading and prior to acceptance of the subdivision improvements or issuance of building permits by the City, the Consulting Engineer shall verify the final pad elevations. The elevations shall be verified at the center and the corners of each pad. Pad grades shall be certified to an accuracy of 0.10 feet.

A signature block (see Section 11-4G), certifying that final graded elevations in the field are the same as those shown on the plans, shall be included on the tracings of the subdivision grading plans. The Consulting Engineer shall sign the signature block, certifying to the above, record (as-built) Grading Plans to the City Engineer.

I. Maintenance of Access to Utility Facilities: Continuous, suitable access shall be maintained during all stages of construction to any facility owned or operated by a utility/district providing essential services (i.e. sanitary sewer, water, drainage, electricity, gas, telephone, etc.).

SECTION 12: SOUND BARRIER DESIGN

12-1 GENERAL

Existing and projected noise levels adjacent to new residential developments shall not exceed 60 dba at a point (4) feet above finished floor level. Sound barriers shall be constructed, if necessary, to achieve this level.

12-2 SOUND STUDIES

When required by the City Engineer, a Sound Study, prepared by an Acoustical Consultant, shall be submitted to the Development Services Department prior to approval of the Improvement Plans. Submission of this study may be required when installation of a sound barrier is required as a condition of approval of a project or when the City Engineer feels that existing or projected noise levels may necessitate the installation of such a barrier. The Sound Study shall include technical information and computations to support the recommendation.

12-3 LOCATION REQUIRMENTS

Sound barriers shall be located along the rear and side property line of residential developments adjacent to freeways, arterials, collectors, and industrial streets. The wall shall be located in the public easement or right-of-way.

12-4 DESIGN REQUIREMENTS

Sound barriers shall be designed in accordance with landscaping requirements for the area in which the project is located. Walls shall be designed for a minimum longevity of 50 years. Walls shall have a minimum height of six (6) feet measured from the highest adjacent grade elevation. Footings and reinforcing steel shall be designed for a height of six-feet in height plus the retaining wall height, as applicable. All soundwalls shall be designed for 75 MPH wind loads at exposure Level C. Structural calculations shall be provided to the Development Services Department for all proposed soundwalls. All construction details for sound barriers, including locations and limits, shall be shown on the improvement plans.

Anti-graffiti coating shall be applied to the City side of the soundwall. Coating shall be as specified in the Construction Standards 71-5F.

SECTION 13: BIKEWAYS

13-1 GENERAL

The City of Roseville bikeway standards are designed to insure that transportation and recreational bikeways are constructed in a manner that would provide a safe and comfortable use by both bicycles and pedestrians. Bikeways shall be designed to enhance safety and reduce maintenance.

13-2 DESIGN CRITERIA

All bikeway design shall conform to the latest editions of the following documents:

- The American Association of State Highway and Transportation Officials "Guide for the Development of Bicycle Facilities
- The State of California Department of Transportation (Caltrans) Highway Design Manual Chapter 1000, "Bikeway Planning and Design"
- The latest editions of the California Manual on Uniform Traffic Control Devices (California MUTCD) for Streets and Highways (FHWA's MUTCD, as amended for use in California)
- These standards and any applicable Specific Plan guidelines which pertain to various areas of the City. Specific Plan Guidelines are available from the Planning Department.

All Bikeway improvement plans shall be prepared per the requirements of Section 3, "Plan Sheet Requirements", of these standards and shall be drawn at a scale no smaller than 1 inch = 40 feet. The plans shall show all existing and proposed grades, sidewalks, landscaping, fences, guardrails, utilities, street lights, traffic signs, and any other structure which may be impacted by revisions to grading.

13-3 PLAN ACCEPTANCE

Prior to construction of any bikeway related improvements, a complete set of bikeway improvement plans must be accepted by the Development Services Engineering Division. See Section 2, "General Requirements", of these standards for submittal requirements of bikeway improvement plans.

13-4 CLASS I BIKEWAYS (Bike Paths)

Class I bike paths are facilities located in separate right-of-way, for the exclusive use of bicycles and pedestrians with minimal cross flow by motor vehicles. Sidewalks are not considered Class I facilities. Sidewalks, including Class IA Sidewalks, Bikeways, are not subject to this Standard. See Section 7, "Streets", of these Standards for design requirements of sidewalks and pedestrian walks.

A. Width: The minimum paved width for a two-way bike path shall be 10 feet. The minimum width of a one-way bike path shall be 5 feet. In each case, per BK-1, a minimum of 2 feet wide graded shoulders shall be provided adjacent to the pavement. One shoulder shall consist of Class 2 Aggregate Base material and one shoulder shall consist of decomposed granite. Where profile grades are 4% or more, the decomposed granite may be stabilized with lime/fly ash or cement treatment. Otherwise, Class 2 Aggregate Base material may be considered for both shoulders.

B. Clearance to Obstructions: A minimum of 3 feet of horizontal clearance to obstructions, including post and cable fencing, retaining walls, buildings, and other permanent improvements, shall be provided adjacent to the pavement where the downgrades are less than 4% and a minimum of 5 feet from the edge of pavement where downgrades exceed 4%. If a bike path is paved contiguous with a continuous fixed object, such as a block wall, a 4-inch white edge line, 2 feet from the fixed object, is required.

Manhole covers shall be located within the bike path's shoulder area, with preference given to the Class 2 Aggregate Base shoulder. The Class 2 Aggregate Base or decomposed granite material shall be extended 1 foot beyond the rim of the manhole cover.

In conditions where the bike path is located adjacent to creeks, ditches, or down-slopes greater than 3 feet horizontal to 1 foot vertical, a minimum shoulder width of 5 feet from the edge of pavement to the top of the slope is required.

The clear width on structures between railings shall be not less than 12 feet, with a preferred width of 14 feet.

The vertical clearance to obstructions across the clear width of the bike path shall be a minimum of 12 feet when Fire Department access is required, otherwise 9 feet, including bike paths placed beneath bridge structures. The minimum elevation of the path shall coincide with the 2-year water surface elevation.

C. Signing and Delineation: For applications and placements of signs, see the California Manual on Uniform Traffic Control Devices (California MUTCD) for Streets and Highways, Section 9B.01 and figure 9B-101. For pavement markings guidance, see section 9C.03.

The sign sizes for shared-use paths shown in Table 9B-1 of the California MUTCD are preferred for all Class I bike paths. The minimum sign sizes for shared-use paths shall be used only for signs installed specifically for bicycle traffic applications. The minimum sign sizes for bicycle facilities shall not be used for signs that are placed in a location that would have any application to other vehicles.

All Class I bike paths shall be striped per BK-2 or at intervals determined by the City Engineer.

Guide signs to roadways, parks, and other points of interest shall be provided at trail junctions and as determined by the City Engineer.

All stripes and pavement markings for Class I bike paths shall be constructed with paint per Section 84-3 of the CalTrans Standard Specifications.

D. Intersections with Roadways: Bicycle path intersections and approaches should be on relatively flat grades. Stopping sight distances at intersections shall be met for vehicle traffic per section 7-12, Design Site Distances, of these design standards and adequate warning should be given to permit bicyclists to stop before reaching the intersection, especially on downgrades. Curb ramps shall be installed with the same widths as the bicycle path.

When crossing an arterial roadway, the crossing should either occur at the pedestrian crossing or at a location completely out of the influence of any intersection to permit adequate opportunity for bicyclists to see turning vehicles.

Mid-block crossing shall be considered on a case by case basis by the City Engineer. In these instances, right-of-way should be assigned by devices such as stop signs or traffic signals which can be activated by bicyclists. Grade separations shall also be considered at the discretion of the City Engineer.

E. Entry Control: Entry points to bike paths shall be designed to prevent unauthorized vehicle entry. The approach to prevent unauthorized vehicle entry is:

1. At a minimum, post signs identifying the entry as a bicycle path with regulatory signs prohibiting motor vehicle entry per Section 9B of the California MUTCD, or as approved by the City Engineer.

2. Design the path entry so it does not look like a vehicle access and makes Intentional access by unauthorized users more difficult. Dividing a path into two one-way paths prior to the intersection, separated by low plantings or other features not conducive to motor vehicle use, can discourage motorists from entering and reduce driver error.

3. If installation of a bollard is deemed warranted by the City Engineer then a flexible, spring loaded bollard shall be used. The flexible bollard shall be a Tuff Post 3" Flexible Post manufactured by Impact Recovery Systems or approved equal. The flexible bollard shall meet the following specifications:

- Height: 28"
- Post Type: 3" post
- Post color: Yellow
- Post Top: Short Squeeze (when installed, the flat side of the squeeze is to face traffic)
- Sheeting: White, 3M Diamond Grade
- Sheeting Quantity: Two (std. tubular)
- Base: Surface Mount Fixed

- Base Color: Black

F. Separation Between Bike Paths and Roadways: Bike paths immediately adjacent to roadways and within medians are not recommended. Bike paths closer than 5 feet from back of curb shall include a physical barrier to prevent bicyclist from encroaching onto the roadway. Suitable barriers could include dense shrubs or other materials approved by the Development Services, Planning and Parks and Recreation Departments.

G. Design Speed: The minimum design speed for bike paths is 20 mph. When a downgrade exceeds 4%, the minimum design speed for the section of bike path is 30 mph.

H. Grades: The maximum grade rate recommended for bike paths is 5%. However, steeper grades can be allowed for short segments.

When using grades steeper than 5%, the following grade restrictions and grade lengths are required:

- 5-6% for up to 800 feet
- 7% for up to 400 feet
- 8% for up to 200 feet

The bike path segment immediately following a positive grade of 8% is required to have a maximum grade of 5%. All bike paths segments with grades steeper than 5% shall be posted with the appropriate warning signs.

Any bike path segments designed with a grade greater than 8% will require approval by the City Engineer and Parks and Recreation Director.

I. Horizontal Alignment and Super elevation: A 2% cross slope is required on tangent sections. Bike paths super elevations rates may vary from a minimum of 2% to ensure drainage to a maximum of 5%.

The minimum distance for a transition from a 2% cross slope is 75 feet per one percent change in superelevation.

The minimum radius of curvature can be derived from figure 1003.1C of the CalTrans Highway Design Manual. The minimum radius with any given combination of design speed, rate of superelevation, and friction factor shall not be less than 30 feet. The minimum radius of curvature may be increased to 45 feet if the bikeway will also serve to function as a utility maintenance access.

J. Stopping Sight Distance: The minimum stopping sight distances for various design speeds and grades can be determined from figure 1003.1D of the CalTrans Highway Design

Manual. For two-way bike paths, the descending direction grade and design speed will control the design.

K. Lateral Clearance on Horizontal Curves: The minimum clearances to line of site obstructions for horizontal curves can be determined from the figure 1003.1F of the CalTrans Highway Design Manual.

Bicyclist frequently ride abreast of each other on bicycle paths, and on narrow bicycle paths, bicyclists have a tendency to ride near the middle of the path. For these reasons, and because of the serious consequences of head-on bicycle accident, lateral clearances on horizontal curves should be calculated based on the sum of the stopping sight distances for bicyclist traveling in opposite directions around the curve. Where this is not possible or feasible, consideration should be given to widening the path through the curve, installing a solid yellow centerline, installing a curve warning sign, or combination of these alternatives.

L. Vertical Curves: The minimum allowable vertical (sag or crest) curve length at the intersection of two grades shall be 50 feet; however, vertical curves may not be omitted where the algebraic difference in grades does not exceed 2.0 percent. The minimum lengths of crest vertical curves can be determined from figure 1003.1E of the CalTrans Highway Design Manual. When vertical curves are required, they shall provide for adequate sight distance based in the minimum design speeds specified in paragraph 13-4F of these standards.

M. Structural Section: Bike path structural section shall be a minimum of 2 inches of Type A asphalt concrete on 4 inches of class 2 aggregate base or 5 inches of Portland Cement Concrete on compacted native soil. In those cases where Class 1 bikeways will be accessed by maintenance and/or emergency response vehicles the bikeway shall be capable of supporting a minimum gross vehicular weight of 30,000 pounds. Based on an assumed Traffic Index equal to 4.0 for Class 1 bikeways the table shown below identifies the appropriate structural sections to support a gross vehicular weight of 30,000 pounds:

R-value Range	Asphalt Concrete Bikeway Structural Section	Portland Cement Concrete Bikeway Structural Section
25<	2" AC/8" AB	5" PCC
25-40	2" AC/6" AB	5" PCC
>40	2" AC/4" AB	5" PCC

If soils analysis along the bike path identifies an R-value less than 10, the structural section shall be modified as necessary, by the recommendation of a geotechnical engineer, to support 30,000 pounds and meet the Traffic Index Requirement 4.0. Soils tests shall be taken every 1,000 feet along the bike trail alignment or as directed by City Engineer.

N. Drainage: Bike paths constructed within cut-slopes shall have a drainage ditch of suitable dimensions along the uphill side to intercept the hillside drainage. Where necessary, drain inlets and drain pipes or other acceptable conveyance systems shall be provided to carry intercepted water across the bike path. Bike paths constructed on top of fill slopes shall have drainage ditch of suitable dimensions along the downhill side to intercept the trail's drainage. Where necessary, drain inlets and drain pipes or other acceptable conveyance systems shall be provided to carry the intercepted water over the fill slope as to control erosion of the slope.

O. Access Points: Access points with a width of 20 feet shall be placed in minimum intervals of 750 feet and the cable must be coated with yellow plastic to designate access. A Roseville Parks and Recreation Department padlock must be placed on both ends of access.

P. Temporary Bike Path Closures: Should a bike path need to be closed temporarily, at a minimum the following measures shall be taken: Signage warning users of the trail shall be provided on each side of closure. Safety cones and orange safety fencing shall be provided as appropriate. Other measures may be taken as determined by the Public Works and Parks and Recreation Departments.

Q. Bike Bridges: Bridge design shall conform to the requirements for pedestrian and bicycle bridges within the latest edition of the California Department of Transportation (CalTrans) Bridge Design Specifications.

The minimum width of a bike path bridge is 12 feet with a minimum vertical clearance of 12 feet when Fire Department access is required, otherwise 10 feet. A straight-line approach of 35 feet is required on each side of the bridge.

All bicycle bridges shall be designed for a fire access use and maintenance vehicles, capable of supporting a minimum gross vehicular weight of 30,000 pounds. All bicycle bridges shall have the maximum gross vehicular weight rating posted on each approach.

Bicycle bridges may be designed to support a gross vehicular weight of less than 30,000 pounds but shall include maintenance vehicle traffic loading with the approval of the Fire Department and City Engineer. In cases where the bike trail is not required for fire access use and bridge loading is less than 30,000 pounds, the bike trail shall be designed to accommodate a fire vehicle turn-around area on each side of the bridge and/or provisions for alternative access.

R. Lighting: Lighting is not required along bike trails. However, lighting may be required through underpasses, tunnels, roadway intersections, mid-block crossings, and whenever security could be a problem and at the City's discretion.

Depending on the location, average maintained horizontal illumination levels within underpasses and tunnels of 50 foot-candles should be considered. Where special security

problems exist, higher illumination levels may be considered. All lighting shall be designed with appropriate shielding to prevent unnecessary glare and resistant to vandalism.

Light standards should meet the recommended horizontal and vertical clearances as specified within Section 13-4B of these standards. Luminaries and standards should be at a scale appropriate for a pedestrian on bicycle path.

13-5 BIKE PATHS IN FLOODPLAINS

When a bike path is to be located in the City's Floodplain, the path shall be designed to be no more than one (1) foot below the 10-year storm event water surface elevation (10-WSE). Exceptions to this requirement may be allowed where the path goes under existing bridges to accommodate minimum vertical clearance. At these crossings, the path shall have an elevation at least as high as the 2-year storm event water surface elevation (2-WSE). All segments of the path that are below the 10-WSE shall be Portland Cement Concrete, or other approved material, with toe protection to prevent the path from being undermined during flood events. All segments of the path that are more than 45 degrees to the directional flow of the water shall be Portland Cement concrete, or other approved material, and shall have armored embankments with toe protection to prevent the path from being undermined during flood events.

13-6 BIKE BRIDGES IN FLOODPLAINS

When a bike or pedestrian bridge is to be placed in the City's Floodplain, the minimum elevation of the bridge deck shall be at or above the 10-WSE. Bridge railings shall be designed to sustain the 100-year flood event without damage and without human intervention. Hydraulic and structural calculations shall be based on the assumption that the bridge (with railings) is solid, not assuming that water will pass through the rails.

Bridge railings shall be a minimum of 54" high, and shall have a toe board at the base of the guardrail.

All material used on the bridge shall be water resistant.

A letter of map revision (LOMR) may need to be submitted to FEMA for approval, as determined by the Department of Public Works.

Approach ramps to the bridge shall be armored to allow for cross flow around the bridge with out damage to path. Where feasible, the approaches to the bridge shall contain a dip in the profile (lower than the bridge) to facilitate the water to flow around the bridge instead of directly over it. All portions of the path that are more than 45 degrees to the flow path, shall be Portland Cement Concrete, or other approved material, and shall have armored embankments with toe protections to prevent the path from being undermined during flood events.

13-7 CLASS IA SIDEWALK BIKEWAYS

Class IA sidewalk bikeways are typically located along major streets and separated from the normal vehicle lanes. They are primarily sidewalks, paseos, etc, that are wider than normal to accommodate both pedestrians and bicycles.

The design of Class IA sidewalk bikeways shall follow the design standards for pedestrian walk construction located within Section 7-7 of these standards. The location and width of Class IA sidewalk bikeways shall follow the applicable Specific Plan guidelines which pertain to various areas of the City. Specific Plan Guidelines are available from the Planning Department.

13-8 CLASS II BIKEWAYS

Class II bikeways (bike lanes) shall be provided within all collectors and arterial roadways as shown per the cross sections for various roadways within these Design Standards.

A. Signing and Pavement Markings: Details for signage and pavement markings for Class II bikeways are found in the California MUTCD, and within the standard drawings for streets within these Design Standards.

B. At-grade Intersection Design: Details for design of Class II bikeways at intersections are found within the standard drawings of these Design Standards.

Bicycle-sensitive detectors, signs, and pavement markings for traffic signal actuation shall be included within the traffic signal design for all intersections requiring traffic signals and at the discretion of the City Engineer per Sections 4D.104 &105 of the California MUTCD.

13-9 CLASS III BIKEWAYS

Class III Bikeways are on-street routes designated by signs or permanent markings per the California MUTCD, and are shared by motorists. The locations of Class III bikeway route shall follow the Bicycle Master Plan and applicable Specific Plan guidelines which pertain to various areas of the City. Specific Plan Design Guidelines are available from the Planning Department.

SECTION 14: RECYCLED WATER INFRASTRUCTURE DESIGN

14-1 DETERMINATION OF USE

The City shall determine whether a given parcel or site will be furnished with recycled water or potable water for non-potable use. The determination shall be in accordance with the standards of treatment and water quality requirements for the proposed use. Guidelines are set in Title 22, Chapter 4 of the California Administrative Code, with the intent of the City to protect the public health, and with the availability and/or feasibility of making recycled water available.

14-2 DESIGN INFORMATION

Before design, the Developer, or his representative, should obtain the following from the City of Roseville Environmental Utilities Department:

A. Approval to use recycled water for the proposed system, as stated in the previous section.

B. Determination of on-site storage of recycled water will be required for peak demand use.

C. Verification of locations and size of proposed points of connection.

D. Design pressures and available flow to the proposed facilities.

14-3 CURRENT STANDARDS

Pertinent and current requirements of the following agencies or standards shall be complied with. In case of conflicting design criteria, standards set forth by the City of Roseville, as established herein, shall govern:

A. City of Roseville Rules and Regulations for use of recycled water.

B. City of Roseville Design and Construction Standards

C. Title 22, Chapter 4 of the California Administrative Code regarding recycled water use.

D. Title 17, Chapter 5, Subchapter 1 of the California Administrative Code regarding cross-connections and backflow prevention.

E. Guidelines for Use of Recycled Water, State of California Department of Health Services.

F. Guidelines for Distribution of Non-potable Water, California – Nevada Section, American Water Works Association (AWWA).

G. Manual of Cross Connection Control, State of California Department of Health Services.

H. Placer County Department of Environmental Health – regulations pertaining to recycled water.

14-4 RECYCLED WATER SUPPLY QUALITY

The City of Roseville produces disinfected, tertiary-treated recycled water consistent with Title 22, Chapter 4 of the California Administrative Code.

14-5 OFF-SITE RECYCLED WATER FACILITIES

Normally consists of those facilities which are or will be owned, operated, and maintained by the City of Roseville.

14-6 PRIVATE ON-SITE RECYCLED WATER FACILITIES

Facilities downstream of a recycled water meter owned, operated, and maintained by the property owner. The on-site recycled water facilities shall be subject to rules and regulations set forth by the City for recycled water.

14-7 WATER SUPPLY PRESSURE

Minimum operating pressure of 50 PSI shall be maintained at service connections to the distribution system.

14-8 TRANSMISSION SYSTEM DESIGN

Sizing and layout of transmission mains shall conform to the Recycled Water Master Plan of the City of Roseville and as outlined herein.

A. Hydraulic Analysis: A Hardy-Cross network hydraulic analysis shall be provided to the Environmental Utilities Department upon request.

1. The hydraulic analysis submitted shall include two copies of the following items:

a. The data input files, as well as the analysis results on electronic format.

b. Information on the development (e.g. type of development, number of acres, number of units, etc.).

c. Data sheets outlining all assumptions including, but not limited to, method used to assign demands to corresponding junction nodes, proposed irrigation demands, and source HGLs used.

d. Map identifying pipe and node numbers and their locations.

e. The name and version of software used for the analysis.

f. Elevations of junction and source nodes. (The elevations used in the network hydraulic analysis shall be based on a project grading plan or the anticipated final elevations. If the final grading plan deviates significantly from the elevations used in the analysis, a revised analysis will be required.)

g. Staging or phasing of the development.

h. Appropriate off-site demands.

2. The Hazen-Williams formula shall be used in the analysis of the system. The roughness factor shall be as follows:

a. C=130 for all new cement-line, PVC C-900, and ductile iron pipes.

b. C=130 for all existing pipes greater or equal to 16 inches in diameter.

c. C=120 for all existing pipes less than or equal to 12 inches in diameter.

B. Specifications: Technical specifications for transmission mains shall be submitted with improvement plans.

C. Transmission Main Size: All transmission mains shall be sized to provide total peak demand of all customers served. Peak demand flow is determined as follows:

1. Peak day demand for irrigation customers shall be determined as a July day demand.

2. Peak demand flow for customers with on-site storage shall be peak day as a constant flow rate over a 24-hour period

3. Peak demand flow for customers without on-site storage shall be no less than peak day as a constant flow rate over a 9-hour period. Maximum design velocity in the transmission and distribution systems shall not exceed 5 feet per second. Standard acceptable pipe sizes are 6, 8, 12, 24, 30, 36, 42, 48, and 54 inches.

D. Transmission Main Location: All transmission mains shall be installed within public rights-of-way and easements. In every instance where a recycled water main is to be installed in a public right-of-way or easement, the Environmental Utilities Department Director shall be contacted for preferred location.

1. Mains shall be located 3 feet from the curb and gutter on the southerly and easterly side of the street. If conflicts exist at this location, then the main may be installed within an easement immediately adjacent to and behind the property line fronting the public right-of-way, subject to approval of the Environmental Utilities Department Director.

2. If it necessary to install a recycled water main outside of the public right-of-way, an easement dedication to the City shall be required. Recycled water mains shall be centered within their easement. Easements shall be located completely on one side of a property line or fence. Dedicated easements shall be clear of all permanent structures, building eaves, roof lines and the future trucks of large tree species. Temporary construction easements of adequate size shall also be provided. The easement width shall be the greater of the following:

a. Minimum width of easement shall be 15 feet.

b. All easements shall have a minimum width equal to the required trench width according to the standard detail for trench backfill plus 2 additional feet of width for every 1 foot of depth of the pipe as measured from bottom of the pipe to finish grade. All recycled water lines shall be centered within their easement.

3. Recycled water mains located between lots shall require an access easement or pedestrian walkway as determined by the Environmental Utilities Department Director.

4. Recycled water mains shall maintain a minimum horizontal separation of 10 feet between sanitary sewer lines and potable water mains. Recycled water mains shall be higher than sewer mains and below water mains. On crossings, the recycled water line shall be a minimum of 1 foot above the sewer line and l foot below water mains. In cases where the recycled water main must cross under the sewer main or service, or over water mains, the recycled water line shall be ductile iron to a point 5 feet each side of crossing and be concrete-encased.

5. When crossing a sanitary sewer force main, the recycled water main shall be installed a minimum of 1 foot above the sewer line, and be of ductile iron a minimum of 5 feet on each side of the force main.

6. No parallel utilities shall be placed within 5 feet of each side of a recycled water line.

7. Mains shall maintain a minimum cover of 48 inches and a maximum depth of 60 inches as measured from gutter flowline, unless otherwise specified by the Environmental Utilities Department Director.

8. Recycled water mains shall maintain vertical separation of 12 inches between storm drains and other dry utilities. The vertical clearance may be reduced to 6 inches with the approval of the Environmental Utilities Director.

9. Recycled water mains under large structures such as culverts and large diameter storm drains shall be ductile iron and installed within a casing per these standard. The casing shall extend beyond the structure a minimum of 5 feet or the depth of the water main on each side.

E. Main Line Fittings and Connections: Recycled water transmission and distribution systems shall be designed with mechanical restraint systems to prevent thrusting forces. All fittings shall maintain a minimum of 18 feet of restrained pipe into the fitting in all directions. Thrust blocks shall only be used in special cases where approved by the Environmental Utilities Department Director. All restrained joint systems shall be shown in plan and profile and on the master recycled water plan. Design of restrained systems shall follow standard engineering practice. The Environmental Utilities Department Director shall approve the

design prior to installation. Any deviation from these requirements will not be permitted without approval of the Environmental Utilities Director.

F. Recycled Water Transmission Main and Appurtenances

1. **Valves**: The distribution system shall be equipped with a sufficient number of valves so that no single shutdown will result in isolating a transmission main. Valves shall also be spaced at intervals no greater than 2,500 feet for pipe 16" and larger. Valves shall be spaced no greater than 500' for pipe sizes of 12" or less. Valves shall be located such that any section of main can be shut down without going to more than three locations to close valves. All tees shall have three valves and all crosses shall have four valves. A valve shall be installed on services immediately off the main and on the transmission main immediately downstream of the service.

2. **Inspection Manholes**: Inspection manholes shall be placed every 2,000 feet. A minimum of one inspection manhole shall be located between two valves unless otherwise approved by the Environmental Utilities Director. Inspection manholes on Ductile Iron Mains are not required.

G. Booster Pump Stations: All booster pumps stations shall be subject to criteria established and approved by the Environmental Utilities Department Director.

H. Air and Vacuum Valves and Blow-Offs: Air and vacuum valves shall be installed at all localized high points in the transmission main per standard drawings. A blow-off assembly, conforming to the Standard Drawings, shall be installed on all permanent and temporary dead-end runs, as well as each local low point on the transmission main. Wherever possible, the blow-off shall be installed in the street right-of-way a minimum of 5 feet from the curb and gutter. In no case shall the location be such that there is a possibility of back-siphon into the distribution system. A 2-inch blow-off shall be used on mains 12 inches and smaller. A 4-inch blow-off shall be used on lines 16 inches and larger. Blow-offs shall be located within 100 feet of a sewer manhole for discharging during servicing.

I. Corrosion Protection: A corrosion protection study shall be included with improvement plan submittals. Corrosion protection facilities shall be identified from the roadway with the curb stamp "CP-RW"

J. Insulating Flange Test Station: An insulating flange test station shall be used between dissimilar metals per the standard details.

K. Warranty Inspection of Recycled Water Stubs: As a requirement, recycled water stubs are provided to subdivision, existing lots, or parcels, as a courtesy by developers during the construction of backbone infrastructures in streets to prevent cutting up the newly paved streets when the subdivisions are ready to develop. These stubs become an integral part of the recycled water system of the subdivisions, existing lots, or parcels, and subsequently the

responsibility of the developers of the subdivisions, existing lots, or parcels, and are therefore imperiled to both construction and warranty inspections. This practice saves future developers construction time and cost that would have otherwise been spent on tie-ins and street repairs and in some instances prevents delays in the event a street has a moratorium. Since these stubs are provided at no cost to future developers, it is our position, hence our policy, that it is the responsibility of contractors to test and repair these stubs, if found damage, prior to tie-ins. A note to this effect shall be placed on the improvement plans.

14-9 SERVICE LINES

Service lines from the recycled water main to the property line or edge of easement shall normally be installed at the time the main is constructed. Services from mains installed in private roads shall extend 2 feet beyond the edge of the pavement. Service line criteria shall be as follows:

A. For customers with on-site storage, service lines shall be sized to provide peak day demand as a constant flow rate over a 24-hour period. Service size subject to approval of the Environmental Utilities Department Director.

For customers where no on-site storage is required (as determined by the Environmental Utilities Department Director), larger service lines shall be provided subject to approval of the Environmental Utilities Department Director.

Maximum design velocity in service lines larger than 4 inches shall not exceed 5 feet per second.

B. All services shall be installed with a corporation stop at the main and a curb stop at the property line. A gate valve shall be used when the service is larger than 2 inches.

C. The Environmental Utilities Department reserves the right to make all recycled water service taps into existing mains upon application for a permit and payment of the required fees. A note to this effect shall be placed on the plan sheet, which details the area that requires such tapping. Application shall be made to the Environmental Utilities Department at least two weeks in advance of the time the tap is desired. All fees shall be paid prior to application. The Contractor shall do all excavation, backfill and the installation of the remainder of the recycled water service.

D. Location of each service line will be determined on a case-by-case basis by the Environmental Utilities Director.

E. Separation of recycled water services, sanitary sewer lines, and potable water lines are described in these standards.

F. Meters shall be installed on all recycled water services. City staff shall install meters after permits are processed, testing has been completed per the construction standards, and fees are paid.

G. The curb shall be stamped with a "RW" at service locations.

H. Concrete mow strip shall be used to separate potable and non-potable landscaping unless otherwise approved by the Environmental Utilities Department.

14-10 ON-SITE RECYCLED WATER FACILITIES DESIGN

On-site recycled water facilities are defined as those facilities which are owned and operated by private entities. All potential on-site uses of recycled water shall be reviewed by the City of Roseville Environmental Utilities Department. If recycled water is to be used, the facilities shall be designed and constructed in accordance with the provisions set forth herein (Sections 14-10 through 14-23) for on-site recycled water facilities. Where a unique situation exists on-site that is not covered by on-site specifications, off-site specifications may apply as determined by the Environmental Utilities Department Director. In addition, all state and county regulations regarding recycled water use shall be incorporated. Potential uses of recycled water are outlined in Title 22, Chapter 4 of the California Administrative Code. The following notes shall be placed on the improvement plans, and landscape design plans:

City of Roseville Recycled Water Special On-Site Irrigation Notes

1. The installation of the recycled water system shall conform to the regulations for the construction of recycled water systems within the City of Roseville and the accompanying plans and specifications.

2. All on-site recycled and potable water piping installed on this project shall be identified in accordance with the City of Roseville Construction Standards for recycled water infrastructure and the irrigation specifications.

3. City of Roseville Environmental Utilities Department shall be notified two days prior to the start of construction at (916) 774-5750 and each workday thereafter until completion of project for commercial irrigation systems. City of Roseville Parks Department shall be notified two days prior to the start of construction at (916) 746-1758 for landscape corridors and parks. A pre-construction materials inspection must be arranged prior to the start of construction.

4. No facility is to be backfilled until inspected by the City of Roseville Environmental Utilities Department and /or Parks Department Inspector.

5. All recycled water infrastructure, both on-site and off-site, shall be inspected by City of Roseville Development Services Department. For inspection of recycled water system contact Development Services forty-eight (48) hours in advance. Points of inspection are:

a. Pre-construction materials inspection.

b. Irrigation system installation before lines are covered.

c. Pressure testing.

d. System cross connection control test.

e. System coverage test.

f. Signage.

6. All recycled water piping shall be purple colored PVC unless otherwise specified. Where purple PVC is not used, pipe shall be identified (marked) in accordance with the City of Roseville Construction Standards.

7. Marking on the purple colored PVC pipe shall include the following:

"RECYCLED WATER- DO NOT DRINK" in English and "NO BEBER" in Spanish

Nominal pipe size. PVC-1120. Pressure rating in pounds per square inch at 73 degrees. ASTM designations such as 1785, 2241, 1672, 3139. Printing shall be placed continuously on two sides of the pipe.

8. All recycled water sprinkler control valves, valve risers, sprinkler risers, and swing joints shall be tagged with identification tags or adhesive labels.

a. Tags shall be weatherproof plastic, 3" x 4", purple color with the words "RECYCLED WATER - DO NOT DRINK" imprinted on one side, and "AGUA Reciclada on the other side. Imprinting shall be permanent and black in color. Use tags as manufactured by T. Christy Enterprises or approved equal.

b. One tag shall be attached to each valve as follows:

1) Attach to valve stem directly or with plastic tie-wrap; or,
2) Attach to solenoid wire directly or with plastic tie-wrap.

c. Recycled water warning labels or stickers that are consistent with City of Roseville Construction Standards for recycled water infrastructure and the irrigation specifications must be attached to all piping not in compliance.

d. All sprinkler heads must be designed for recycled water usage, with purple recycled water warning caps.

e. Sprinkler risers and swing joints shall be identified with purple adhesive 3" x 3" labels. Each label shall state "Recycled Water – Do Not Drink" in English and Spanish.

9. All recycled water control valve boxes shall be purple and have a warning label permanently molded into or affixed onto the lid with rivets, bolts, etc. Warning labels shall be constructed of a purple weatherproof material with the warning permanently stamped or molded into the label. The warning shall contain the following information in English and Spanish:

"RECYCLED WATER".
"DO NOT DRINK" in English and
"NO BEBER" in Spanish.

10. Recycled water quick coupling valves shall have a purple rubber or vinyl cover. The cover shall be of a locking type and have a warning permanently stamped or molded as follows: "RECYCLED WATER – DO NOT DRINK" in English and "NO BEBER" in Spanish.

11. Plastic warning tape shall be used on all potable water piping; potable water warning tape shall be a minimum of 3 inches wide and shall run continuously for the entire length of each line. The tape shall be attached to the top of the pipe with nylon tie-wrap banded around the warning tape and the pipe every five feet on center. Warning tape for the potable water piping shall be blue in color with words "CAUTION: POTABLE WATER LINE BURIED BELOW" imprinted in minimum 1-inch high letters, black in color. Imprinting shall be continuous and permanent.

12. All pressure main line piping from the recycled water system shall be installed to maintain 10 feet minimum horizontal separation from all potable water piping. Where recycled and potable water pressure main line piping cross, the recycled water piping shall be installed 12" below the potable water piping OD to OD. Where the recycled water pressure main line must pass above potable water piping, the recycled water piping shall be installed in a class 200 purple colored PVC sleeve which extends a minimum of five feet on either side of the potable water piping. A 12" vertical separation OD to OD must be maintained. Conventional (white) PVC pipe may be used for sleeving material if it is taped with three-inch wide purple warning tape, which reads "RECYCLED WATER-DO NOT DRINK" in English and "NO BEBER" in Spanish.

13. All pressure main line piping from the recycled water system shall be installed to maintain a ten foot minimum horizontal separation from all sanitary sewer lines. Where recycled and sewer cross, the recycled water piping shall be installed a minimum of one foot above sewer.

14. For on-site recycled water piping, the minimum depth from finish grade to top of pipe shall be as follows:

a. Intermittent pressure lines (All sizes) ..... 12"

b. Constant pressure lines 2.5" and smaller ..... 18"

c. Constant pressure lines 3" and larger.....24"

15. Pressure and cross connection testing for On-Site Recycled water systems:

a. All testing of recycled water systems must be performed utilizing a potable water source via a construction water connection per City of Roseville Construction Standards. No recycled water may connect to a recycled water system until all testing is successfully complete.

b. The source of potable water used for testing must have a meter and an approved back flow prevention device. These can be obtained through the City of Roseville.

c. The contractor shall provide a means to plumb in pressure and cross connection testing apparatus at the point of highest elevation, for both potable and constant pressure recycled water systems.

d. The constant pressure recycled water system including all appurtenances shall be tested at 125 PSI at highest point of elevation for 1 hour with no detectable leakage.

e. Pressure testing must be successfully completed prior to cross connection testing.

f. The recycled water system shall be tested for cross-connection in accordance with Uniform Plumbing Code Appendix J prior to use.

g. For projects being performed in phases, a cross connection test shall be performed on each phase independently before it is put into service. The potable water source used for testing each phase must be independent of other previously completed phases.

h. At the time a cross connection test is to be performed, construction on both the potable and the recycled water systems being tested must be complete, and both systems fully operational and functioning as designed.

i. Cross connection testing shall be performed on the system by City forces with the assistance of the Contractor. The test will be coordinated through the Environmental Utilities or Parks Department inspector. Two (2) business days advance notice is required for the test. Depending on the complexity of the site, a preliminary field meeting may also be required.

16. Coverage test

a. Adjust spray heads to eliminate overspray onto native oak areas and into areas not under the control of the customer such as pool decks, private patios, streets, sidewalks, and other similar facilities.

17. Meter Installation

a. Once the on-site recycled water system has been properly inspected and passed pressure and cross connection testing, a meter may be installed. The meter must be purchased from the City of Roseville and installed by city forces. Coordinate meter purchase and installation with the Environmental Utilities or Parks Department inspector.

18. No connection shall be made to the City's existing recycled water system until the new facilities have been successfully pressure and cross connection tested. Taps to the existing recycled system will be made by City forces only.

19. Failure to comply with the above guidelines violates the City of Roseville design and construction standards for recycled water infrastructure and will result in termination of service until the appropriate corrective steps have been taken.

14-11 DETERMINATION TO USE RECYCLED WATER OR POTABLE WATER

The City shall determine whether a given parcel or site will be furnished with recycled water or potable water for non-potable use. The determination shall be in accordance with the standards of treatment and water quality requirements for the proposed use. Guidelines are set in Title 22, Chapter 4 of the California Administrative Code, with the intent of the City to protect the public health, and with the availability and/or feasibility of making recycled water available. Additionally, a determination will be made whether the proposed use falls within the guidelines of the City's Master Reclamation Permit.

14-12 DESIGN OF RECYCLED WATER FACILITIES WITH TEMPORARY POTABLE WATER SERVICE

Where recycled water is not immediately available for use when the design area is ready for construction, and if the City of Roseville Environmental Utilities Department has determined that recycled water will be supplied in the future, the on-site facilities shall be designed to use recycled water. The on-site system shall be designed and constructed to the Environmental Utilities Department construction specifications as set forth herein. Provisions shall be made as directed by the Environmental Utilities Department and these specifications followed to allow for connection to the recycled water facilities when they become available. In the interim, potable water will be supplied to the recycled water facilities through a temporary potable water connection. Until recycled water is available, potable water rates will be charged as set forth in Section 14 of the Roseville Municipal Code. A backflow prevention device acceptable to the local Health Department and the Environmental Utilities Department will be required as long as the on-site facilities area uses potable water. The backflow prevention device shall be downstream of the meter and a part of the on-site facilities. When recycled water becomes available, the backflow prevention device will be removed and the recycled water connection to the on-site facility made.

14-13 BACKFLOW PREVENTION DEVICES

Single check valve backflow preventors shall be required on all recycled water services 1-1/2 inches in diameter and larger. The backflow preventor shall be installed per City standards

downstream of the meter. Backflows are not required on recycled water services utilizing booster pumps which incorporate a backflow preventor.

14-14 PROHIBITION AND LIMITATIONS

Design of on-site recycled water facilities shall conform to the following:

A. The recycled water systems shall be separate and independent of any potable water system. Cross-connections between potable water facilities and on-site recycled water facilities are forbidden.

B. Hose bibs on recycled water facilities are forbidden.

C. Drinking fountains shall be protected from the spray of recycled water in a manner approved by the Environmental Utilities Department Director prior to installation.

D. Overspray and run-off shall be limited or prevented.

E. Potable and recycled lines are not to be installed in the same trench.

F. Recycled water shall not be used for any purpose other than the approved uses as set forth herein.

G. The system shall be designed to irrigate the design area within the allowable time periods as set forth herein.

14-15 CONTROL OF RUN-OFF AND APPLICATION AREAS

The City encourages new and innovative methods of irrigation. The use of drip or subsurface irrigation may prove effective in the reduction of total water consumption and control of unnecessary run-off by containment of the water to the design area. In accordance with these requirements for control of run-off and for control of the areas to which recycled water is applied, the design of irrigation systems shall conform to following:

A. The on-site recycled water facilities shall be designed to meet the peak moisture demand of all plant materials used within the design area. The use of moisture sensors is encouraged.

B. On-site recycled water facilities shall be designed to prevent discharge onto areas not under control of the customer. Semi-circular sprinklers shall be used adjacent to roadways and property lines to confine the discharge from sprinklers to the design area.

C. The design of the on-site recycled water irrigation facilities shall provide for watering during periods of minimal use of the service area. All on-site recycled water irrigation systems shall be designed to operate between the hours of 9:00 PM and 6:00 AM unless otherwise directed by the Environmental Utilities Department Director.

D. The total time required to irrigate the design area shall not exceed nine hours in any 24-hour period. Irrigation systems shall be designed to operate within this time requirement.

E. Recycled water shall be applied at a rate that does not exceed the percolation rate of the soil. Where varying soil types are present, the design of the recycled water facilities shall be compatible with the lowest infiltration rate present. Copies of the Developer's soils test reports shall be made available to the Environmental Utilities Department upon request.

14-16 MINIMUM DEPTH TO TOP OF ON-SITE RECYCLED WATER PIPING

For on-site recycled water piping, the minimum depth from finished grade to top of pipe (minimum cover) shall be as follows:

A. Constant pressure lines 3 inches and larger: 24 inches

B. Constant pressure lines 2-1/2 inches and smaller: 18 inches

C. Intermittent pressure lines excluding drip tube: 12 inches

Where piping is under paved areas, these dimensions shall be considered below sub grade.

14-17 DATA REQUIRED ON PLANS

The following information shall be included on all improvement plan sets for projects with recycled water facilities:

A. Meter Data: All recycled water services shall be metered. The following information shall be supplied for each recycled water meter desired; information is to be provided and shown at each meter location.

1. The meter location (distance from property lines) and size (inches); meter address.

2. The peak flow through the meter (gpm).

3. The (static) design pressure at the meter (PSI).

4. The total area served through the irrigation meter in square feet or acres.

5. An estimate of the yearly water requirement through the meter (acre-feet).

B. Drinking Fountains: Exterior drinking fountains must be shown and called out on the recycled water system plans. If no exterior drinking fountains are present in the design area, it must be specifically stated on the plans that none exist. The potable water lines supplying the drinking fountain must have an identification tape installed as provided in the Construction Standards. All existing and proposed potable water lines within the area of recycled water lines must be shown on the recycled water system plans calling out all required separations. Drinking fountains must be protected from the direct spray of recycled water

either by proper placement of the drinking fountain within the design area or the use of a covered fountain approved for this purpose.

C. Irrigation Equipment Legend: For irrigation systems, a legend showing the pertinent data for the materials used in the system shall be recorded on the plans. The legend shall include a pipe schedule listing pipe sizes, a listing of valve types including quick-coupling valves, and the following information for each type of sprinkler head:

1. Sprinkler radius (feet).

2. Operating pressure (PSI).

3. Flow (gpm).

4. Sprinkler pattern.

D. Recycled Water Warning/Information Sign: Recycled water warning/information signage locations shall be shown on the recycled water system plan. Signs shall be located at all access points to the area of recycled water use. Signs shall also be placed along frontage roads at intervals of every 500 feet or less. The signs shall be installed in accordance with the Construction Standards herein and as required by the Environmental Utilities Director.

14-18 LOCATION

All pressure main line piping from the recycled water system shall be installed to maintain a 10-foot minimum horizontal separation from all potable water piping. Where recycled and potable water pressure main line piping cross, the recycled water piping shall be installed below the potable water piping in a Class 200, purple-colored PVC sleeve which extends a minimum of 5 feet on each side of the potable water piping. Provide a minimum vertical clearance of 12 inches.

All pressure main line piping from the recycled water system shall be installed to maintain a 10-foot minimum horizontal separation from all sanitary sewer lines. Where recycled and sewer lines cross, the recycled water piping shall be installed a minimum of 1 foot above the sewer.

14-19 PLAN SUBMITTAL AND APPROVAL

Plans with recycled water systems, public and private, shall be submitted to the Environmental Utilities Department for review and approval prior to construction.

14-20 INSPECTION

The Environmental Utilities Department shall inspect the construction of on-site facilities per the Construction Standards for recycled water. Notification shall be made two working days in advance of construction by the applicant, owner, or customer. The Environmental Utilities Department shall be called for inspection at (916) 774-5750.

14-21 RECORD DRAWINGS

Record or "As Built" drawings shall be prepared and shall show all changes in the work constituting departures from the original contract drawings including those involving both constant-pressure and intermittent-pressure lines and appurtenances. All conceptual or major design changes including any changes that may be affected by the requirements of these standard specifications shall be approved by the Environmental Utilities Department before implementing the change in the construction contract. Failure to receive prior approval may result in termination of service.

Upon completion of each increment of work, all required information and dimensions shall be transferred to their record drawings. Facilities and items to be located and verified on the record drawings will include, but are not limited to the following:

A. Point of connection.

B. Routing of sprinkler pressure lines.

C. Routing of all potable water lines both existing and proposed.

D. Gate valves.

E. Sprinkler control valves.

F. Quick-coupling valves.

G. Routing of control wires.

H. Other related equipment as specified by the Environmental Utilities Department or the owner.

I. Sprinkler head manufacturer and model number.

Changes and dimensions shall be recorded in a legible and workman-like manner. Record construction drawings shall be maintained at the job site during construction. The applicant, owner, or customer shall provide a complete set of as-built ~~mylar~~ drawings to the Environmental Utilities Department upon completion of construction. The applicant will also provide as-builts in .DWF or .DWG electronic format upon request.

Prior arrangements must be made with the Environmental Utilities Department if water service is to be provided prior to as-built blue line submittal. Failure to provide record drawings will result in termination of service.

14-22 CONTROLLER ACCESS

The City of Roseville Environmental Utilities Department reserves the right to have complete access to the controller clocks, for reasons of monitoring and controlling system failures. The applicant, owner, or customer shall provide the Environmental Utilities Department with two sets of all keys necessary for access to the controller clocks within the design area. The keys will then

become the property of the Environmental Utilities Department. The Environmental Utilities Department is not responsible for loss or damage to any controller.

14-23 BLOW-OFF HYDRANTS AND OTHER POINTS OF PUBLIC ACCESS

All on-site recycled water facilities shall be restricted from public access so that the general public cannot draw water from the system. Facilities, blow-offs on strainers, and other such facilities, shall be restricted from public access.

These facilities, both above and below grade, shall be housed in an approved lockable container colored purple. A sign reading "CAUTION: RECYCLED WATER – DO NOT DRINK" shall be installed in accordance with the Construction Standards herein. The Environmental Utilities Department shall approve its size. An alternative acceptable means of restricting public access is the use of valves that operate by means of a recessed key slot or by means of hexagonal heads (such as those typically found on fire hydrants). Other means of restricting public access must be approved by the Environmental Utilities Department.

14-24 Detail Drawings

Details not covered by the Construction Standard Detail sheets shall be shown on the plans.

SECTION 15: SOLID WASTE DESIGN

15-1 INTRODUCTION

These Design Standards shall govern the engineering design of all solid waste (trash) enclosures intended for service by the City of Roseville.

15-2 CURRENT STANDARDS

Pertinent and current requirements of the following agencies or standards shall be complied with. In case of conflicting design criteria, standards set forth by the City of Roseville, as established herein, shall govern:

A. Construction Standards of the City of Roseville, Department of Development Services Department.

15-3 DESIGN CRITERIA

The intent of these criteria is to provide for the serviceability of trash enclosures for commercial and multi-family areas.

A. General: A standard trash enclosure must be provided for each building or business. If a building is to have more than one solid waste customer, then a standard trash enclosure must be provided for each customer. Projects with more than one enclosure must number the enclosures and provide a map of the project showing the location of the enclosures. The type and number of the enclosures will be determined by their intended use (i.e., restaurant, office building, shopping center or small business).

Businesses served by compactors shall have an additional enclosure for recycling.

B. Walls: The trash enclosure shall have walls on three sides without a cover or roof. Walls must be six feet in height and shall be constructed as shown on Detail SW-1 or Detail SW-2. Structure calculations required for enclosure design.

C. Gates: Gates are required on any trash enclosure in line of sight of the public. Gates shall be constructed to provide a minimum 12' opening and shall align with the wall of the enclosure as shown on Detail SW-1. Gates must be designed to open from the front of the enclosure and shall be equipped to be held in an open position with pins in the ground while the dumpster is being serviced. The pin hole shall be a 2 inch pipe, 6 inches deep flush to the ground. Bollards must be installed to prevent gates from opening into any parking spaces or adjacent structures.

D. Vehicle Approach and Floor: The vehicle approach apron and the enclosure floor shall be reinforced concrete a minimum of 6 inches thick. Rebar shall be #4 at 12" on center. Both the approach and the enclosure floor shall be level.

E. Signs and Striping: **"**No parking" signs shall be placed on the gates as well as painted on the approach area per details.

F. Location: The enclosure shall be located with the most direct path of travel and access for refuse vehicles. Path of travel shall have minimal conflict with on-site vehicle and pedestrian circulation patterns. Consideration should also be made on increasing the structural section of the on-site pavement along the path of travel of refuse vehicles. The path of travel requires any over head structures to be a minimum of 16' above grade. The trash enclosure shall be located to allow refuse vehicles a straight approach to the enclosure. A 65-foot clear area in front of the enclosure is required. Every effort should be made to prevent locating trash enclosures under overhead power lines. When it is not possible to avoid overhead power lines, then overhead power lines over the bin dumping areas must be a minimum of 26' above grade. The enclosure area shall be located away from service areas and "Loading" zones. Unobstructed access to the trash enclosure shall be provided.

G. Path of Travel: The improvement plans shall provide a map showing the proposed path of travel for refuse vehicles to and from the trash enclosure originating at the public roadway. The inside turning radius of the refuse/recycle vehicle is 25-feet and the outside radius is 45-feet.

H. Back-Up Lengths: Back-up lengths are limited to no more than 100 feet measured from the gate entry of the trash enclosure.

I. Frontloading Compactor Enclosure: A frontloading compactor enclosure shall be used by businesses in lieu of the standard trash enclosure. If so desired the approved Frontloading Compactor models shall be Harmony- Power Packer 200 (P200), Marathon's Untouchable VIP (Vert I Pack), or approved equal.

J. Detail Drawings: Details not covered by the Construction Standard Detail sheets shall be shown on the plans.

K. Organics: A separate enclosure for organics is required for all apartments, senior living and buildings with a potential food service. Organics enclosure shall be located within 100' of building. Organics bins will be rolled out for pick up.

1. For the organics truck, the inside turning radius is 30-feet and the outside turning radius is 50-feet.

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CITY OF ROSEVILLE
CONSTRUCTION STANDARDS - CST
January 2025

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SECTION 11: PURPOSE AND DEFINITIONS

11-1 PURPOSE

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

11-2 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 latest edition of the State of California Department of Transportation Standard Specifications and Standard Plans, hereinafter referred to as the Caltrans Standards Specification. Caltrans Standard

Specifications shall apply where not superseded by these Construction Standards. The Contractor shall follow all applicable City, County, State and Federal laws and regulations relating to construction of the improvements or as directed by the City Engineer.

Should conflicts arise between documents, specifications in these Construction Standards or the approved improvement plans, they shall take precedence over the State of California Department of Transportation Standard Specifications.
The City Engineer may require additional specifications and/or regulations consistent herewith when deemed necessary to protect the health, safety and welfare of the public.

11-3 DEFINITIONS

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

A. Applicant: Shall mean the same as the Developer or his/her consulting engineer working on his/her behalf.

B. Approved Plans: Shall mean all plans prepared for construction of improvements, reviewed, approved and signed by the necessary Departments within the City of Roseville.

C. City: Shall mean the City of Roseville and its applicable Departments.

D. City Construction Inspector: Shall mean the Development Services Inspector representing the City Engineer for all infrastructure improvements within City right of way.

E. City Engineer: Shall mean the City Engineer of the City of Roseville, acting either directly or through the staff of the appropriate Divisions of the Development Services Department or their authorized representatives.

F. Construction Standard Details: Shall mean the standard construction drawings as set forth in these Design & Construction Standards and included herein, approved by the City Engineer and as amended.

G. Consulting Engineer: Shall mean any person or persons, firm, partnerships or corporation legally authorized to practice civil, mechanical, geotechnical, electrical engineering, or other engineering discipline in the State of California who prepares or submits improvement plans and specifications to the Development Services Department of the City of Roseville for approval.

H. Contractor: Shall mean any person or persons, firm, partnerships, corporation or combination thereof, licensed to perform the type of work involved, who has entered into a contract with any person, corporation or company, or his/her or their legal representatives, for the construction of any improvements, or portions of any improvements, within the City of Roseville.

I. Development of Services Department: Shall mean the Development Services Department of the City of Roseville.

J. Department of Public Works: Shall mean the Department of Public Works or Public Works Department of the City of Roseville.

K. Developer: Shall mean any persons, firm, partnership, corporation, or combination thereof, financially responsible for the work involved. For City projects, the term Developer shall refer to the Contractor contracted with the City.

L. Development: Shall mean the act or process of any construction on properties as well as subdivision improvements.

M. Electrical Utilities Director: Shall mean the Electrical Utilities director of the City of Roseville, acting either directly or through the staff of the appropriate Divisions of the Electric Utilities Department or their authorized representatives.

N. Environmental Utilities Director: Shall mean the Environmental Utilities Director of the City of Roseville, acting either directly or through the staff of the appropriate Divisions of the Environmental Utilities Department or their authorized representatives.

O. Geotechnical Engineer: Shall mean a professional engineer, licensed by the State of California to practice soils engineering.

P. Improvements: Refers to street work, bridges, sidewalk, curb, gutter, driveways, water mains, sanitary sewer mains, reclaimed water mains, 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 and other improvements which the City of Roseville is responsible for inspection and future maintenance.

Q. Laboratory: Shall mean any testing agency or testing firm which has been approved by the Development Services Department.

R. Notice of Completion: Shall mean the acceptance of the constructed improvements by the City Council of the City of Roseville.

S. Parks and Recreation Director: Shall mean the Parks and Recreation Director of the City of Roseville, acting either directly or through the staff of the appropriate Divisions of the Parks and Recreation Department or their authorized representatives.

T. Planning Manager: Shall mean the Planning Manager of the City of Roseville, acting either directly or through the staff of the appropriate Divisions of the Development Services Department or their authorized representatives.

U. Director: Shall mean the Development Services Department Director of the City of Roseville, acting either directly or through the staff of the appropriate Divisions of the Development Services Department or their authorized representatives.

V. 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 compaction). All relative compaction testing shall reference ASTM D1557-12e1 test methods.

W. Soils Report: Shall mean a report as prepared by any person or persons, firm, partnership, or corporation legally licensed to prepare "Soils Reports" in the State of California.

X. State: As used in State Specifications shall mean the City of Roseville.

Y. State Highway Design Manual: Shall mean the "Standard Plans" of the State of California, Department of Transportation, (the latest edition which specifies U.S. Customary Units of ounces and inches, currently 2015) and as specified by the City Engineer.

Z. State Standard Specifications: Shall mean the "Standard Specification" of the State of California, Department of Transportation, latest edition, including amendments.

AA. State Traffic Manual: Shall mean the "California Manual of Uniform Traffic Control Devises".

BB. Subdivision Ordinance: Shall mean the "Subdivision Ordinance" of the City Code as adopted by the City Council of the City of Roseville.

1. **Substantial Completion**: Shall mean when the approved and permitted project has been constructed in accordance with Section 21-5 MINIMUM REQUIREMENT FOR PRODUCTION HOME BUILDING PERMITS, Items A-K.

2. **Technology Fee**: This fee is to fund the City's permitting system and make the technology improvements needed to support the Development Services Department in the processing of building plans, fire permits, improvement plans, maps and entitlements.

CC. Zoning Ordinance: Shall mean the "Zoning Ordinance" of the City Code as adopted by the City Council of the City of Roseville.

SECTION 12

CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

12-1.01 DESCRIPTION- Construction area traffic control shall be installed in accordance with the City accepted project specific traffic control plan, the approved improvement plans and specifications, these Construction Standards, the City Improvement Standards, The California Manual on Uniform Traffic Control Devices (CMUTCD), The State of California Standard Plans, and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the Cal Trans Standard Specs and as follows:

1. At least one lane in each direction shall remain open to traffic unless otherwise approved by the Engineer.

2. Turning movement restrictions require prior approval of the City. A changeable message sign (CMS) shall be posted in the direction of travel affected by the restriction a minimum of 3 days prior to the implementation of the traffic control at the contractor's expense. Wording and placement of the CMS shall be "ACCEPTED" by the Public Works Department, "Traffic Engineering Section" prior to installation.

3. Traffic control hours and lane restrictions are subject to limitation by the City.

4. Lane closures that affect traffic flow may require night work, changeable message signs, and/or certified flaggers at the contractor's expense. The contractor should consider traffic control included in their cost of work and may contract the City's Traffic Section for requirements prior to bidding a job.

5. Approved road closures require 96 hour advance notification to the City, the public and emergency services. Changeable message signs (CMS's) shall be posted in the directions of travel affected by the closure a minimum of 1 week prior to the implementation of the traffic control at the contractor's expense. Wording and placement of the CMS's shall be "ACCEPTED" by the City's Traffic Section prior to installation.

6. A Red Flash Request form must be submitted 48 hours prior to the time the red flash is needed. Allowable hours of flashing operation will be set by the City's Traffic Section and will require early morning, evening, or night work unless otherwise approved in writing by the City's Traffic Section. The Red Flash Request form is on Detail TS-21.

7. Special holiday traffic control restrictions are in place from 1 week prior to the Thanksgiving holiday through January 3rd each year for various roads throughout the City (Detail TS-23).

8. Traffic Control (whether on private property or in the public right of way) that impacts traffic within the public right-of-way (including pedestrian and bicyclist pathways) shall require an encroachment permit. Traffic control shall not impact traffic flow and/or operations in the public right-of-way unless traffic control is setup per approved traffic control plan.

Traffic Control Plans:

All traffic control plans (including signage) to be per the most current CMUTCD (California Manual on Uniform Traffic Control Devices).

The City Construction Inspector or Engineer shall determine the necessity of a formal traffic control plan (TCP) submittal based upon the following guidelines:

A TCP submittal will be required if the TCP is any one of the following:

1. Complicated (to be determined by the City Construction Inspector)
2. Involves a signalized intersection
3. Longer than 12 hours
4. Not detailed in the CMUTCD
5. Involves road closures or detours

Traffic Control Plans require responsible party contract information, hours of operation (which may be restricted by the City), and duration of work.

TCP submittals require the following minimum review times per submittal:

Type of TCP	Min. Review Time
Lane closure	5 days
Intersection Signal Flash	5 days

One-way traffic control	5 days
Detour/Road Closure	3-4 weeks

Note that complicated TCP's may require more review time. Traffic control review time should be included in the contractor's work schedule.

The Contractor must have a copy of the "ACCEPTED" TCP on site during the entire time the TCP is in place.

Any deviation from the "ACCEPTED" TCP shall be approved by the inspector and may require re-submittal of the TCP for City review. Failure to maintain the TCP may result in shutdown of the project, suspension of inspection services, correction by the City at the Contractors expense, or any combination of the before mentioned.

SECTION 21: CONTRACTOR'S AND DEVELOPER'S RESPONSIBILITIES

21-1 GENERAL

All improvements within City of Roseville rights-of-way, and easements, and onsite private drainage improvements shall be installed in accordance with the approval improvement plans and specifications, the City of Roseville Design and Construction Standards, the Stormwater Quality Design Manual for the Sacramento and South Placer Regions, the City of Roseville Stormwater Quality BMP Guidance Manual for Construction, and the State of California Department of Transportation Standard Specifications, hereinafter referred to as the Caltrans Standard Specifications. The latest Caltrans edition which specifies U.S. Customary Units of ounces and inches shall apply to these Construction Standards with the exception of Traffic Sections 56, 82, 84, 85 and 86, which will conform to the latest edition of the Caltrans Standard Specifications. The public roadway infrastructure improvements shall be designed and constructed in accordance with these Design and Construction Standards and the latest edition of the City's American Disabilities Act (ADA) Transitions Plan. Should there be any discrepancy between these Standards and the ADA Transition Plan with respect to accessibility, the ADA Transition Plan shall have precedence. Caltrans Standard Specifications shall apply where not superseded by these Construction Standards. The Contractor shall follow all applicable City, County, State and Federal laws and regulations relating to construction on the improvements.

21-2 CONTRACTIOR'S RESPONSIBILITY

It shall be the Contractor's responsibility for:

A. Plans: Perform construction per plans signed and approved by all required City of Roseville Departments. Any additions, deletions or changes to the approved plans shall be submitted to Said departments for review and approval prior to construction.

B. Notification: The Contractor shall schedule a preconstruction meeting with the Development Services Department (DSD), the Environmental Utilities Departments (EUD) and any other departments reviewing and inspecting the improvements. The meeting shall take place a minimum of two (2) working days prior to the start of construction. The preconstruction meeting shall not be scheduled prior to the City departments' receipt of approved plans.

Minimum advance notice to the City's Construction Inspector for inspection shall be two (2) working days. The City's Construction Inspector shall have the opportunity to inspect all underground/subsurface improvements prior to backfill or cover. The scope of various inspection parameters and participation of contracted special inspection duties shall be identified at this time.

The developer/contractor is responsible for completing the project per the approved plans and specifications. Once deemed complete at the discretion of the City Inspector, it shall be the developer's responsibility to notify the City Inspector to commence City procedures to establish a project punch list prior to City acceptance.

C. U.S.A. Markings: White paint shall be used to indicate areas to be marked by Underground Service Alert (U.S.A.). Any areas not marked shall not be included in the U.S.A. and the Contractor shall not excavate in these areas. The Contractor will be responsible for any damage resulting from excavation in unmarked areas. The Contractor or Applicant who requested the USA markings shall be responsible for the removal of the USA markings upon completion of the work, at the discretion of the City Engineer.

The location of storm drain lines is not included within the USA markings. The Contractor shall take routine precautions to ascertain the location of storm drain pipes prior to excavating around them. Contractor shall notify the City's Construction Inspector when the storm drain system is affected.

D. Testing: Constructed utilities shall be tested in accordance with these Construction Standards.

E. Cultural Resources: The Contractor shall stop construction if cultural resources are discovered during excavation operations. It is possible that previous activities have obscured surface evidence of cultural resources.

If signs of 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 within 100 feet of the find and the Roseville 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.

F. Hazardous or Toxic Materials and Contaminated Soils: Should the Contractor encounter hazardous or toxic materials, or contaminated soils, or materials which the Contractor believes may be hazardous waste during any and all excavation or grading operations, as defined in Section 25117 of the Health and Safety Code, which require them to be moved to a Class I, Class II or Class III disposal site in accordance with provisions of existing law, the City of Roseville Fire Department shall be contacted immediately. The area which contains the hazardous or toxic materials or contaminated soils shall be marked off until an investigation by a member of the Fire Department is conducted. The cost for remediation and/or removal of soil shall be bourn solely by the Contractor/Property owner. The parties intend that this provision be broadly construed.

G. Working Hours: In accordance with the City of Roseville's noise ordinance, the hours of project construction shall be limited to the following:

7:00 a.m. to 7:00 p.m., Monday through Friday
8:00 a.m. to 8:00 p.m., Saturday, Sunday, and Holidays

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

H. Emergency Contact person: Prior to the commencement of project construction, the City's Construction 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.

I. Traffic Control: A traffic control plan (TCP) shall be submitted and approved, whenever required by the City's Construction Inspector or when the activities (whether on public or private property) impacts traffic within the public right-of-way (including pedestrian and bicyclist pathways).

Traffic control plans may not be required, when in the opinion of the City's Construction Inspector, the situation is adequately covered by the State of California Manual on Uniform Traffic Control Devices (latest edition). When the City's Construction Inspector has determined a TCP is required, the Contractor shall submit the plan to the City for acceptance. The plan shall include: The project title, the encroachment permit number if applicable, the requested traffic alteration specifics and the requested working hours., 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.

Temporary signals require design submittal from a registered PE or TE.

If significant detours, lanes closures, and/or signal modifications (including but not limited to loop disruption, the need for a temporary signal, etc.) are needed, a separate Traffic Handling Plan from that of the Traffic Control Plan may be required. The Traffic Handling Plan will require review and approval by Traffic Engineering and will require additional review time for submittals.

1. **Start of Construction**: Construction within City right-of–ways shall not start until all equipment required by the California MUTCD Part 6 has been erected, all required permits from other agencies have been obtained and the Contractor has obtained approval from the City's Construction Inspector. Parties not obtaining prior approval shall be subject to a stop-work order from the City. The TCP shall be the primary governing traffic document. All residences and businesses shall be notified by the Contractor 48 hours prior to site access being affected.

2. **Lane Changes and Closures and Street Closures**: Lanes shall be closed or transitioned conforming to the California MUTCD, or the approved TCP. See Detail ST-40 for the standard lane closure. Lane closures shall not be allowed when the visibility is less than ¼ 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 ½ hour after sunset to ½ hour before sunrise.

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. When pedestrian routes are impacted, the approved traffic control plan should include an access plan to accommodate pedestrians and bicycles.

The worker who places the cones or delineators should be accompanied by a helper to watch on-coming traffic. The reverse should apply upon removal of the equipment.

Street closures shall be subject to the approval of the Traffic Engineering Section. Appropriate traffic control and detour plans shall be submitted to the Traffic Section via the City's Construction Inspector 96 hours prior to the proposed closure. The closure shall not be scheduled until plan approval is received. Notification of all concerned agencies including City Public Information, Fire, Police, Refuse, school and public bus systems and ambulance services shall be the responsibility of the Contractor, a minimum of 48 hours in advance of the closure.

3. **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, flaggers' stations shall be illuminated per the California MUTCD.

4. **Adjacent Roadway Excavation**: Where excavation adjacent to an existing roadway results in an elevation difference of greater than 0.16 foot, the excavated area shall be filled with compacted aggregate base (3/4 inch minus), flush with the adjacent roadway at a slope not to exceed 4:1 (horizontal to vertical) prior to the end of each workday. Native fill may be used with the approval of the City's Construction Inspector. Delineators shall be placed 2 feet off the edge of pavement. The spacing (in feet) of the delineators shall correspond to the speed limit.

   Where concrete forms are placed within 3 feet of the existing pavement edge, the preceding requirement may be exempted overnight upon the placement of appropriate delineation and the approval of the City's Construction Inspector. Unless construction is prohibited by rain, the Contractor shall be aggressive in completing work in the City right of way following excavation and/or removal of existing improvements for same and in opening the thoroughfare up to the public as soon as is practically possible.

5. **Steel plates**: Every effort shall be made to assure the excavation in existing street is backfilled, compacted and cut-backed at the end of each work day. Plates shall be pinned at the discretion of the City's Construction Inspector.

Steel plates shall not be used over trench areas without the approval of the City's Construction Inspector. Steel plates shall have an ante-skid surface.

All excavations covered by steel plates shall be shored. Adequate temporary pavement (cut-back) shall be used to secure the plate and as a traffic transition. Grade differences between the plate and the existing pavement may require notching of pavement for acceptable transitions.

A W-33 (Rough Road") or W-37 ("Bump") sign shall be installed 200 feet ahead of the steel plate. The sign may be mounted to an operable, lighted barricade for a maximum of 24 hours. The sign shall be mounted to a 4"x4" post for a period exceeding 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 City's Construction Inspector.

7. **Barricades**: Barricades shall be Type II 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 City's Construction Inspector. Barricades placed in an excavated street section adjacent to a traffic lane shall be placed at a maximum 50 feet interval.

8. **Temporary Fencing**: Any excavation exceeding 2 feet in depth, left unattended outside project work hours, within a close proximity to or within a City right-of-way or easement shall be enclosed with a 6 foot high temporary fence.

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

   If fencing prohibits pedestrian or vehicle access (closure of sidewalks, driveways, etc), fencing shall be shown on traffic control plans to be submitted to the City for acceptance.

9. **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 2 flags each, fully exposed above the sign. The sign shall only be metal, fabric or as approved by the City's Construction Inspector. The top of the sign shall be a minimum 6 feet high. No sign shall be placed on a barricade unless specifically allowed by the City's Construction Inspector or specified by the Traffic control Plan.

   Upon the approval of the City's Construction Inspector, signs may be placed on a 4x4 wooden post for long durations. Clearance shall be 7 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 6 inch black letters shall be employed on a clean, traffic orange background. The signs shall be approved by the Traffic Engineering Section prior to erection.

10. **Cones and Delineators**: Cones shall be a minimum 28 inches in height and delineators a minimum 36 inches high by 3 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.

J. 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.

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

L. 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. This applies to the traveled way and any work area adjacent to the traveled way.

M. Trenching Safety: Prior to excavation of trenches 5 feet or deeper, the Contractor shall submit the following to the City's Construction Inspector:

1. A copy of the company's annual CALOSHA T-1 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 prior to trenching within any City street right-of-way or easement, an encroachment permit shall be obtained from the Development Services Department, Engineering Division.

In unimproved areas, the maximum length of open trench (5 feet in depth or more) shall be that which can be trenched and backfilled in one day. Any trench left open overnight and the method of protection thereof shall be approved by the City's Construction Inspector.

In existing streets, following trenching and pipe laying, backfill shall be accomplished immediately unless approved otherwise by the City's Construction Inspector. No excavation which is larger than necessary to leave the end of the pipe exposed for the next work day shall remain open at the end of the day. The excavation shall be plated and/or fenced, subject to the approval of the City's Construction Inspector and in accordance with the City's Trench Cut Ordinance.

N. Trailer and Material Storage: Dumpsters, construction materials or equipment shall not be placed in the City of Roseville right-of-way without first obtaining an Encroachment Permit from the DSD. As a minimum, 2 operable, Type II, lighted barricades shall be place at each end of the obstacle. The Encroachment Permit conditions may indicate additional reflectorization requirements.

Use of the City right of way should not be requested if there is adequate storage space on-site. Construction offices or material trailers shall not be placed within the City right-of-way with one exception. A trailer with a current California license may be parked along the edge of the street within a subdivision for a period of 72 hours, provided the travel ways are unobstructed and 2 operable, lighted barricades are placed at each end of the trailer.

O. 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 City's Construction 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 City's Construction Inspector. Any mud displaced into the City storm drain system by the Contractor shall be removed at the discretion of the City's Construction Inspector.

P. Interruption of Parking Areas: Where parking needs to be interrupted by construction work, the Contractor shall place Type II barricades with "No Parking" notices behind the curb, adjacent to the respective parking area, a minimum of 24 hours prior to the start of construction. For more information on street cleaning, see Roseville's Stormwater BMP Guidance Manual for construction.

Information on the notice shall include the date and times that parking is prohibited and shall be legible from a distance of 25 feet. Barricades/notices shall be placed at a minimum interval of 1 per parking space.

Q. 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.

R. Construction Safety: Construction safety within the City of Roseville shall be governed by the Construction Safety Orders of the Occupational Safety and Health Standards of Title 8 of the California Code of Regulations.

S. 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, and a City of Roseville Business License. Additionally, the Contractor shall obtain a City of Roseville "Explosives Application/Permit" from the City's Fire Department prior to any and all blasting within the limits of the City of Roseville. The Contractor shall have on file, and keep current, the required insurance documents established by the Risk Manager's Office. 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.):

Police Dispatch:	916-774-5117
Public Information Office	916-774-5201
Development Services Engineering:	916-774-5339

T. 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). A W8-8 ("Rough Road") or W8-1 ("Bump") sign shall be installed 200 feet ahead of the pavement milled location. The sign may be mounted to a metal flag tree stand for a maximum of 24 hours. The sign shall be mounted to a wooden 4" X 4" post for a period exceeding 24 hours.

U. Discharge Fluid from Boring Operations: Utilizing the City's drainage system for residual discharge from boring equipment without the required measures is prohibited. This discharge is a violation of the Clean Water Act. Discharging into an open area without the approval is also not allowed.
All street boring shall include adequate measures to mitigate muddy 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. For more information concerning discharge fluid from boring operations, see Roseville's Stormwater BMP Guidance Manual for construction.

V. 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. The washout area shall be confined to respective site. For more information concerning concrete truck washout areas, see Roseville's Stormwater BMP Guidance Manual for Construction at:

https://www.roseville.ca.us/UserFiles/Servers/Server_7964838/File/Government/Departments/Development%20Services/Engineering/Stormwater%20Design%20Inspection/Stor

mwater%20Quality%20Maintenance%20Program/Stormwater%20Quality%20BMP%20Guidance%20Manual%20for%20Construction.pdf

21-3 DEVELOPER'S RESPONSIBILITY

It shall be the Developer's responsibility for:

A. Record Drawings: PDF electronic, two sets of blue line prints (1 set of 24"x36" and 1 set of 11"x17") and one (1) georeferenced electronic ArcGIS or AutoCAD file containing pre- and post-project delineated floodplain boundaries as prescribed in project conditions shall be submitted to City's Construction Inspector as a condition of the Certificate of Completion. ArcGIS files containing pre- and post- project delineated floodplain boundaries shall include the following metadata, as applicable:

- Thumbnail
- Tags
- Summary
- Description
- Credits
- Use Limitations
- Metadata Contacts (consulting firm or project owner)

21-4 MINIMUM REQUIREMENTS FOR MODEL HOME BUILDING PERMITS

Model home building permits will be issued upon the City's satisfaction of all requirements specified in the "Model Home Complex application and building permit submittal and development department inspection checklist, issued by the Permit Center. This includes the following Development Services Department requirements:

A. The pad grades for the model home lots have been certified for compaction by a geotechnical engineer and for conformance to the grading plan elevations by a registered Civil Engineer. Original stamped certifications are required prior to formal City acceptance per Section 21-5.E.

B. All property corners for each of the model home lots shall be staked with permanent markers to the satisfaction of the City Engineer. If curb, gutter and sidewalk has been placed at the time for which model home permits are applied, the front property corners shall be marked per Section 71-4 F. of the Standards.

C. All utilities, utility crossings and utility extensions to each model home lot, located within the roadway, and Public Utility Easement (PUE) shall be installed and tested. All utility water valves and manholes shall be raised and paved.

Utilities include, but are not limited to: natural gas, electric, cable, telephone, water, sewer and storm drain.

D. Access to the model homes from future streets within the subdivision or from approved alternative access does not cross the alignment of any future utility to be installed with the Subdivision Improvements, as determined by the City Engineer.

E. Fire hydrants must be located within 500 feet of all combustible materials and be capable of delivering adequate fire flows to the satisfaction of the Fire Marshall.

For every issuance of model permits access to the model homes must be paved and connected to a maintained public street to the satisfaction of the City Engineer.

If the sub divider intends to obtain an alternative access to the model homes from an adjacent maintained public street, the sub divider shall obtain approval from the City Engineer and Fire Marshal.

The City Engineer may require all work and construction on the model homes to cease at any time until all or additional portions of the subdivision improvements are finished in order to protect the health, safety or welfare of the public and workers.

21-5 MINIMUM REQUIREMENT FOR PRODUCTION HOME BUILDING PERMITS

Production home building permits may be issued once the subdivision improvements are substantially complete.
The subdivision shall be deemed substantially complete by the Development Services Inspector when the following items are completed or verified:

A. All surface street improvements (sidewalks, curbs, gutters, ramps, driveways and street paving) are installed.

B. Raise and pave all manholes, water valves, including survey monuments.

All water, sewer and storm drainage components shall be tested, approved and operational. This includes conformance to the City of Roseville Fire Department's minimum flows for all fire hydrants.

C. Ball and flush all sewers.

D. Install all underground gas, electric, telephone and TV cable facilities and backfill trenches.

E. Submit lot pad certifications for grade and compaction. Electronic signature pad certification submittal with original wet signature pad certification follow up prior to City acceptance is authorized. Original stamped certifications required prior to formal City acceptance.

In the case where a significant lapse in time has occurred between the original pad certification date and City acceptance date, at the discretion of the City Engineer, the City will honor past dated pad certifications provided the Developer's geotechnical engineer re-submits a current

wet stamped letter acknowledging the previous certifications are still valid despite the lapse of time.

F. Mark lot corners in City sidewalk or curb and gutter and at the back of lots.

G. Install erosion and sediment control measures, including storm water outfalls as shown on the approved plans and fully implement Stormwater Pollution Protection Plan, (SWPPP).

H. Install street name and traffic signs and striping.

I. Construct all common lot retaining walls per the improvement plans.

J. Assure final subdivision map is recorded.

K. Completion of sound walls, open space and post & cable fencing shall be a condition of building permit issuance, only where the sound wall, open space and post & cable fencing backs up to existing, adjacent residences, or open spaces.

21-6 MINIMUM REQUIREMENT FOR CONSTRUCTION WITHIN THE FLOODPLAIN

Refer to the City of Roseville, CA Flood Damage Prevention Ordinance Section 9.80.160 – **Standards of Construction** – through section 9.80.190 for special construction standards for development within the City's Regulated Floodplain.

Building permits will be issued for construction within the floodplain upon the City's satisfaction of all requirements specified in the "Existing Buildings in Special Flood Hazard Areas/Regulatory Floodplain Substantial Improvement/Substantial Damage Worksheets" application and building permit submittal, issued by the Permit Center. This includes the following Development Services Department and Floodplain Management Section submittal requirements:

A. Current photographs of the exterior (front, rear, sides)

B. If your building has been damaged, include photographs of the interior and exterior; provide pre-damage photos of the exterior, if available

C. Detailed description of the proposed improvement (rehabilitation, remodeling, addition, etc.) or repairs

D. Cost estimate of the proposed improvement or the cost estimate to repair the damaged building to its before-damage condition

E. Elevation certificate or elevation survey

F. You may submit a market value appraisal prepared by a licensed professional appraiser or we will use the tax assessment value of the building

G. Owner's affidavit (signed and dated)

H. Contractor's affidavit (signed and dated)

The construction within the floodplain shall be deemed substantially complete by the City Floodplain Manager when the following items are completed and verified:

A. Post-construction (FEMA-compliant) Elevation Certificate, wet-signed

B. Floodproofing documentation, as required

C. A deed restriction that limits use of the part of the structure that is below the base flood elevation, as required

21-7 REQUIREMENTS FOR SUBDIVISION NOTICE OF COMPLETION (N.O.C)

Prior to acceptance of public improvements by the Roseville City Council, the following items must be completed and provided to the City's Construction Inspector:

The Contractor or Developer shall request a final inspection and punch list for the constructed improvements from the City Development Services Engineering Division, upon the completion of the improvements as shown on the approved plans. As each department approves the completion of punch list items and appropriate conditions of approval, and acknowledges department acceptance in the City's electronic database system. Upon receipt of all applicable approvals, Engineering will consolidate the N.O.C. package and forward it to City Council for approval.

A. PDF Electronic version on portable device (eg. CD or USB thumb drive), 2 sets of blue line prints (1 set of 24"x36" and 1 set of 11"x17").

B. Lot pad elevation and compaction certifications, (original stamped documents).

C. Payment of all outstanding plan check and inspection fees.

D. Maintenance Bond to cover one year construction maintenance warranty period.

E. Written certification from the applicating Contractor that anti-graffiti coat has been placed on all sound and retaining walls conforming to the Roseville Construction Standards and manufacturer's recommendations.

F. Per Roseville Municipal Code, Section 19.64.050 P., where model home complex trap fencing is used, it shall be placed behind the City sidewalk.

G. Annual Stormwater Maintenance Agreement.

Completion of the public infrastructure improvements as specified in Section 21-5, including the street lighting system.

21-8 RESIDENTIAL OCCUPANCIES DURING RESIDENTIAL BUILDING

Upon the occupancy of 1 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, applying to newly constructed streets within the subdivision extending to the closest existing street. The following minimum standards are to be met:

A. Streets shall be thoroughly cleaned, back of walk to back of walk at the end of each work day.

B. No building materials, portable toilets or construction equipment shall be stored within the street right-of-way. Portable toilets shall be a minimum of 50 feet from drain inlets.

C. 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.

D. Erosion control materials at drain inlets such as straw bales and gravel bags shall be removed. Silt bags which are in drain inlets fronting homes with completed landscaping shall be removed.

E. 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.

F. Unoccupied cul-de-sacs or other section 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.

G. Completion of the street lighting system shall be a condition of Noticeof Completion (N.O.C) and not a condition of building permit issuance, temporary occupancy of model complexes, and/or subdivision occupancies.

H. All other requirements within the Subdivision Ordinance and Building Division regulations for approval of occupancy shall apply.

21-9 GUARANTEE AND WARRANTY

The Contractor shall guarantee and warrant all materials supplied as being fit for the purposes intended. The Contractor shall guarantee and warrant all work performed as having been accomplished in a proper and workman-like manner.

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 unrepaired, 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 thereof.

In emergency cases, where in the opinion of the City Engineer (provided a reasonable attempt has been made to notify the Contractor) 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, and the Contractor shall pay the entire cost thereof.

The procedures for review, repair and release of guarantee and warranty obligations shall be as follows:

A. Subdivision Improvements: The guarantee and warranty shall continue for a period of one year after Notice of Completion for all public improvement work installed under any Subdivision Agreement. The Subdivision Agreement shall be binding in its entirety.

The following procedures shall be followed for completion of the guarantee and warranty for subdivision improvement:

1. All necessary City departments shall complete their guarantee and warranty inspections during approximately the tenth month following the Notice of Completion and prepare and deliver a final punch list to the Contractor by approximately the end of the tenth month.

2. Within 30 days of receipt of the final punch list (during the eleventh month), the Contractor shall repair or address all items indicated. All City departments issuing a punch list shall then be notified for re-inspection of repairs.

3. Within 30 days of notifying the Contractor (by the end of the eleventh month), the City departments shall re-inspect the repaired improvements.

Upon the City's approval of the repairs, the maintenance bond will be allowed to expire, at the conclusion of one year following the Certificate of Completion. 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.

Any subdivision improvement work subject to the 1 year warranty shall require the issuance of an encroachment permit.

B. Encroachment Permit Improvements: The guarantee and warranty shall continue for a period of 180 days after approval from all City departments affected, for all work installed and completed under an Encroachment Permit for projects valued less than $25,000.00. For projects valued greater than $25,000.00, as determined by the Director, the warranty period shall be 365 days. Upon the permittee's request, the performance security shall be replaced with a warranty security equal to 10 percent of the project costs. Upon final inspection following the warranty period all securities will be released. The Encroachment Permit Shall be binding in its entirety. The following procedures shall be followed for completion of the guarantee and warranty for encroachment permit improvements:

1. All necessary City departments shall complete their guarantee and warranty inspections during the last two weeks ~~of the fifth month~~ following the date of the City's acceptance of the work.

2. The Contractor shall be issued a punchlist upon the conclusion of the two week inspection period.

3. The Contractor shall complete the required repair work by the end of the ~~sixth~~ month following the initial approval of the work.

4. Within 30 days of notification, the City departments shall re-inspect repaired improvements, and upon approval of the repaired improvements, shall notify the City Clerk's office for release of the Encroachment Bond.

C. Underground Warranty Work within City Street Right-of-Way: All underground work done as a result of the one-year warranty inspection shall comply with the following:

1. All backfill in City streets shall be two sack, slurry cement.

2. The pavements patch shall conform to Construction Standard Details TB-1, TB-1A, TB-3. Or TB3A and the Trench Cut Ordinance. Determination of Detail TB-1 or TB-3 shall be at the developer's discretion.

3. Depending upon the extent of pavement patching necessary on asphalt concrete roadways and at the discretion of the City's Construction Inspector, a CalTrans Type II slurry seal or one inch asphalt concrete overlay of the entire street width in the area of the patches may be required.

4. Pavement cracking: Depending upon the extent of cracking and at the discretion of the City's Construction Inspector, cracks in AC roadways shall be sealed per Section 71-4 D (Asphalt Concrete Paving) or Section 71-D (Portland Concrete Paving) of these Standards.

Crack sealing on AC roadways shall be followed with a slurry seal or one inch asphalt concrete overlay which shall be applied to the entire street width in the area of the cracks as required by the City's Construction Inspector.

D. EUD's Policy on Warrant Repairs on Sewer Stub and Services

1. Sewer Services to residential and commercial subdivision lots under warranty: Where a project inspection identifies defects in a sewer service and the sewer main is still within the warrant period, the responsibility to repair the service rests solely on the developer who installed the sewer main.

2. Sewer services to residential and commercial subdivisions outside of warranty: Where a project inspection identifies defects in a sewer service and the sewer main is no longer under warranty, the responsibility to repair the defects shall rest on both the developer and the City as follows:

a. The developer shall be responsible to repair defects found in any sewer service from the first joint downstream of the sewer cleanout to the commercial or residential building (that portion of the sewer services that is considered "private").

b. The City shall be responsible to repair defects found in any sewer service from the first joint downstream of the sewer cleanout to the sewer mainline (that portion of the sewer service that is considered "public").

3. Sewer stubs to residential and commercial subdivisions: Where sewer stubs have been constructed on sewer mains, these sewer stubs become an integral part of the sewer system of the proposed residential or commercial subdivision they were designed and built to serve. The developer of the subdivisions shall be required to test and repair these stubs, if found damaged, prior to tie-ins. A note to this effect shall be placed on all Building and improvement plans to ensure the developer is aware of this requirement prior to initiating construction.

21-10 MATERIALS

A. Approved Equal: The words "approved equal" shall mean any public works material deemed by the EUD or DSD to be acceptable for use within the City rights-of-way or property as compared to products of specified manufacturers. Contactors proposing to use materials which are not specifically named shall submit all necessary documentation to allow use of said material as an approved equal.

The submittal shall include a letter with:

1. Product: A description of the product and the appropriate materials specification section number.

2. Contact: The name and telephone number of the contact person for the proposed product.

3. Reference: A list of other agencies that are using the proposed product including names and telephone numbers.

For water, sewer, reclaimed water, surface improvements and storm drain related materials, address the letter to:

The City of Roseville
Development Services - Construction Management Section
ATTN: Senior Engineer DSD
311 Vernon Street
Roseville, CA 95678

The Contractor shall allow 8 to 10 weeks review time by the City staff.

B. Unapproved Materials
Materials not approved for use on the project shall be removed from the site within 24 hours if requested by the DSD Inspector.

SECTION 31: TRENCH BACKFILL

31-1 GENERAL

All trench backfill shall be mechanically compacted native soil, mechanically compacted imported fill, mechanically compacted aggregate base or slurry material, as required on the Construction Standard Details. All trenching within City Streets shall conform to the City's Trench Cut Ordinance Numbers 3524 and 3602. These ordinances represent a comprehensive pavement protection program incorporating a trench cut cost recovery fee. The trench cut fee provides funds to repair the actual accelerated street damage caused by trenching and is an incentive to promote better trench cut coordination among utility companies.

31-2 TRENCH BACKFILL

Trench backfill within the City of Roseville street right-of-ways shall conform to Construction Standard Details TB-1, TB-2, TB-3, TB-3aTB-4 and TB-5. Moisture content shall be controlled to obtain the optimum density for the native soil type encountered. All compaction testing shall conform to ASTM D1557-78 test methods. Trench backfill compaction shall be tested and certified by a licensed geotechnical engineer at the Developer's expense. Certification shall be provided to the City Engineer prior to the construction of surface improvements.

Backfill for joint utility trench shall be sand compacted 85% relative compaction (TYP), above the 4 utilities occupying the joint trench. Then backfill with native material free of all deleterious materials, rocks or boulders compacted to 90% within 1 foot of final grade and 95% the last foot. Sand Shading material to be, screened free, No. 4 sieve, 4mm maximum particle size, free of sharp edges, and approved by each utility trench Inspector. (DG will not be approved).

Following paving operations and where water utility valve clusters are present, standard mechanical compaction efforts and equipment may have limited access to achieve adequate compaction per these Standards. In these cases, it is authorized that 2-sack flowable concrete slurry backfill material (Per Section 71-5.K) may be used within the water valve excavation area to just below the required concrete collar height. Once cured, placement of concrete collar and/or HMA paving operations may progress.

A. Existing Streets: Trench backfill in existing asphalt concrete streets shall conform to Construction Standard Detail TB-1, TB-2, TB-3, TB-4 and TB-5 and the City's Trench Cut Ordinance. Longitudinal trenches for dry utilities (CATV, telephone, gas, electric, traffic signal and signal interconnect cable) shall be excavated 6 inches clear from the gutter lip, conforming to Details TB-1 or TB-3. (For Detail TB-3, the 18 inch key nearest the gutter for the asphalt concrete patch shall be modified to 6 inches.) 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 (usually 4 feet wide). If the bike lane stripe is obliterated in any manner by the construction process, it shall be replaced with thermoplastic per these Construction Standards.

Trench backfill in existing Portland cement concrete streets shall conform to Construction Standard Detail TB-1, TB-2, TB-3a, TB-4, TB-5, and ST-54 and the City's Trench Cut Ordinance. Longitudinal trenches for dry utilities (CATV, telephone, gas, electric, traffic signal

and signal interconnect cable) shall be excavated 6 inches clear from the gutter lip, conforming to Details TB-1 or TB-3. (For Detail TB-3a, the 18 inch key nearest the gutter for the concrete patch shall be extended to the nearest concrete joint.) Following the patching of the trench with Portland cement concrete, the street surface shall be finished in a manner similar to the surrounding pavement, i.e. diamond ground, troweled, or natural. If the bike lane stripe is obliterated in any manner by the construction process, it shall be replaced per these Construction Standards.

B. Jetting: Compaction of trench backfill by jetting methods is NOT allowed in City of Roseville right-of-way areas or over dedicated reclaimed water, storm, sewer or water easements or mains. 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's Construction Inspector and the Geotechnical Engineer.

C. Material: Material for backfilled trenches shall contain no organic material and no rocks or soil lumps exceeding 4 inches in diameter with the following qualifications:

1. Cobbles in the initial backfill (the first 1 foot above the pipe bedding covering the pipe) shall be 3 inch maximum diameter.

2. An exception to the 4 inch maximum diameter cobble is where cobbles exceed 4 inches in diameter and are predominant (as determined by the City's Construction Inspector and Geotechnical Engineer). In this condition, 8 inches in diameter is the maximum size cobble allowed.

3. The maximum cobble size shall not be greater than that of the depth of the maximum compaction lift, for the type of equipment used.

Slurry cement backfill, controlled low-strength material or dry mix "Popcorn" may be used on a case by case basis. The Contractor shall submit a proposed design mix to the City Construction Inspector for review and approval prior to placement.) See Section 71-5.K.

Native soil shall not be used for bedding for utility conduits or chases within the City right-of-way, but only select bedding materials such as sand, pea gravel, and ½ inch (minus) crushed rock or 2-sack cement slurry.

D. Placement of Material: Equipment shall be a size and type satisfactory to the on-site geotechnical engineer or City's Construction Inspector. Impact-type pavement breakers or compactors (hydro-hammers) shall not be used within 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 soil conditions and 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.

E. Typical Compaction Equipment and Maximum Lift Depths Achieved by Proper Compaction

Maximum lift depth of 4 inches, equipment type:

- Portable, engine driven pneumatic type (wacker)
- Portable vibratory plate

Maximum lift depth of 12 inches, equipment type:

- Backhoe mounted sheep-foot
- Vibratory smooth wheeled roller
- Vibratory smooth wheel roller with pneumatic tires

Maximum lift depth of 18 inches, equipment type:

- Impact, free-fall or stomping equipment (hydro-hammer)

F. Pipe Bedding References:

- See W-1 and SS-1 for water and sewer pipe bedding requirements.
- See TB-2 for non-rigid storm drain pipe bedding.

SECTION 56: SIGNS

56.1.01 GENERAL

General Construction and Installation

Signs shall be constructed and installed in accordance with the approved improvement plans and specifications, these Construction Standards, the City Design Standards, the California Manual on Uniform Traffic Control Devices (CMUTCD), and the Standard Highway Signs manual. All signs shall have messages and sheeting on one side only.

Certification and Warranty

Prior to City acceptance, the Contractor shall submit a letter of authenticity from the manufacturer or a certification from 3M (or approved equal) to the City Construction Inspector, confirming material compatibility and manufacturer warranty.

Material Requirements

The following materials shall be used in the construction of signs, adhering to the specified standards:

- **Sign Sheeting and Protective Film:**
  - All signs shall have 3M 1160i/1170C protective film or approved equal.
  - All traffic signs shall be 0.080 inch thick aluminum.
  - Stop Signs, Speed Limit Signs, shall have a 3M #4090 DG3 or approved equal White reflective sheeting.
  - School and Pedestrian Signs shall have a 3M #4083 DG3 or approved equal Florescent Yellow Green sheeting.
  - All other Warning Signs shall have a 3M #4081 DG3 or approved equal Florescent Yellow sheeting.
  - All other signs shall have 3M #3930 High Intensity Prismatic or approved equal reflective sheeting.
- **Manufacturer Compatibility:**
  - All sign materials, including sheeting and electronic cut-films, shall be produced by the **same manufacturer** to ensure compatibility (e.g., 3M HIP sheeting and 3M electronic cut-films, including 1170C).
  - No mixing of diamond, high intensity, or engineering grade sheeting is permitted on the same panel.
- **Date Card Sticker:**
  - Each sign shall have a **weather-resistant punched date card sticker** on the back, printed on **Engineer Grade Film**, indicating the month and year of installation.

Sign Sizes and Specific Requirements

- Sign sizes shall conform to the Standard Highway Signs manual unless otherwise specified. Specific minimum sizes include:
  - **Type R1 Stop and R1-2 Yield signs:**
    - 36 inches on collector and arterial streets, along with residential streets entering arterial streets.

        - 30 inches on other streets.
        - 24 or 18 inches on bike trails and 24 inches in alleys, as approved by the Engineer.
    - At intersections with more than three lanes (including turn lanes) per direction:
        - A supplemental 30-inch Stop sign, equipped with retroreflective red tape, is required in the median. Additionally, all other Stop sign posts must be fitted with retroreflective red tape.
        - If the median is too narrow, install a 36-inch LED flashing Stop sign from the approved City equipment list.
- **Guide signs (Advance D3 and Overhead Signal-Mounted):**
    - Shall have a 1-1/4 inch white reflective border per CalTrans Sign Specifications Code 67-1, unless Detail 17-B of these standards specifies otherwise, subject to Engineer approval.
- **Signalized Intersections:**
    - At signalized intersections restricting pedestrian crossing, install R9-3 and R9-3bP signs on the signal pole in place of the pedestrian signal indication.
- **U-turn Restrictions:**
    - U-turns are restricted where:
        - Single left turn lanes have less than 44 feet between the right lane line and the opposing curb face.
        - Dual left turn lanes have less than 36 feet between the inside left turn lane's left edge and the opposing curb face, or as directed by the Engineer (TS-15).
- **W3-3 Signal Ahead Signs:**
    - Shall be installed on all approaches to signalized intersections on the day of activation, prior to left or right turn pocket bay tapers, and mounted on street light poles when possible (see Detail TS-16).
    - At activation, the Contractor shall install two orange flags on each sign, removing them after two weeks.
- **Bicycle Signal Actuation Sign (R10-22):**
    - Shall be installed with bicycle detection, placed adjacent to the bicycle loop on the nearest signal pole or sign post per City standards, as directed by the Engineer.

Subdivision Signage Requirements:

1. Entrances

   a. Install R2-1 "25 mph Speed Limit" signs at all entrances off collectors or arterials.
   b. At the first 4-way intersection (less than 200 feet separation from a collector or arterial), install R1-1 Stop signs, bars, and legends on minor streets.
   c. At the first Tee intersection off a collector or arterial, install an R1-2 Yield sign on the stem.
   d. Install R26 (CA) "No Parking Anytime" signs at entrances with a small median/island off an arterial or collector.

2. Courts
   a. Install W14-2 "No Outlet" signs at entrances to courts or cul-de-sacs where the end is not visible from the last intersection, placed on the nearest street light pole (left or right side acceptable).
3. Intersections
   a. At all four-way intersections, establish right-of-way controls on minor streets with R1-1 Stop signs, bars, and legends. If all approaches are stop controlled install R1-3P signs under R1-1 signs.

The Contractor shall remove and return to the City any existing traffic signs conflicting with the proposed work, as determined by the Engineer.

OVERHEAD SIGN STRUCTURES (Signal Mounted)

56.1.02 MATERIAL

D3 and G-8 (CA) signs shall use white HIP Federal Highway Series C lettering (8-inch uppercase, 6-inch lowercase). If text exceeds one line, lettering may use Series B (or larger) with Engineer approval. Sign heights:

- 1 line of text: 24 inches.
- 2 lines of text: 36 inches.

All white symbols and arrows on G-8 (CA) signs shall be reflectorized.

Internally Illuminated Street Name Signs (IISNS) require a City-approved layout proof matching existing City LED IISNS prior to ordering. Only pre-approved products are permitted. IISNS name panels shall be:

- Clear (not opaque) polycarbonate, 3.5–6.0 mm thick.
- Background sheeting: 3M DG3 (Diamond Grade) series 4090, white.
- Etched sheeting (street name and City of Roseville logo): 3M EC 1177c, green.
- Double-sided with street names on both sides.
- Suffixes: Way, Blvd, Pkwy, Rd, or Ave.
- Manufacturer warranted against chemical reactions between sheeting components.

56.1.06 SIGN PANELS & FASTENING HARDWARE

Overhead signs shall be attached to signal mast arms per CalTrans Standard Detail ES-7N or as directed by the Engineer. D3 street name signs shall be fixed (not swinging), attached to the signal pole in at least two places and to the mast arm, with fasteners passing through panels and stiffening braces unless otherwise noted. All signal mast arm-mounted signs shall include back stiffening braces.

ROADSIDE SIGNS

56.2.02 MATERIAL

D3-2 and G-8 (CA) signs at non-signalized intersections shall conform to Detail TS-17A and have heights of:

- 1 line of text: 18 inches.
- 2 lines of text: 24 inches.

56.2.02A SIGN POSTS

All roadside signs shall use metal poles (wood posts prohibited) per TS-17A, constructed and installed as follows:

- Material: Cold-rolled carbon steel (ASTM A-446) or hot-rolled carbon steel (ASTM A-570-90, A-653-94, structural grade 50).
- Shape: 12-gauge (0.105" USS) square tube, 1-3/4" x 1-3/4", weighing 2.06 lbs/ft, with a maximum twist of 0.062" over 3 ft.
- Dimensions: 10', 12', or 14' (max) lengths, or as approved per 56-2.04.
- Holes: 7/16" ± 1/64" diameter, 1-inch centers on all four sides, aligned for sleeve installation.
- Finish: Hot-dipped galvanized steel (1.40 oz/ft² zinc, ASTM A-653 G-140), with Polyester TGIC powder coating (white high-gloss). Corner welds zinc-coated after scarfing.

INSTALLATION

- Embedded in a concrete sleeve (per TS-17A) with two holes above finished grade; below-grade holes taped closed.
- If a sign is to be installed in existing concrete, the concrete shall be cored with a 6-inch diameter hole.
- If a sign is to be placed where new concrete is to be poured, a 6-inch diameter PVC sleeve shall be used.
- Solid embedment of sign posts in concrete is not permitted.
- Any voids around sign posts passed through sleeves in concrete shall be backfilled with soil and thoroughly compacted to the satisfaction of the City.

56.2.02B Sign Mounting Hardware

All mounting hardware shall be zinc coated, galvanized, or stainless. Banding shall be ¾ inch wide stainless steel. All signs shall be mounted using bolts. Hose clamps, rubber washers and rivets are not permitted.

Poles shall be straight, smooth, and burr-free, with a squareness tolerance of ±0.010" and corner radius of 5/32" ± 1/64". Supports shall resist eccentric wind force, with a 10-ft pole rotating no more than 2 degrees under 50 ft-lbs torque.

56-2.04 SIGN PANEL INSTALLATION

Signs in medians or shoulders shall avoid landscaping or objects impairing visibility. Minimum mounting heights from sidewalk grade (or traveled way if no sidewalk) are:

- General roadside signs: 7 feet.
- R4-7, W1-6, W1-7: 5 feet.
- R6-1 (median): 18 inches.
- W1-8 (outside sidewalk areas): 3 feet.
- Street name signs at residential intersections: 8 feet.

Signs with a surface area greater than 9 square feet require back bracing from the post to the panel to prevent flexing.

SECTION 81: DOMESTIC WATER SUPPLY SYSTEM CONSTRUCTION

81-1 GENERAL

All potable water pipe, fittings, gate valves, fire hydrants, blow-offs and other appurtenances shall be installed in accordance with the requirements of the American Water Works Association (AWWA), these Construction Standards, and as recommended by the manufacturer. These Construction Standards and manufacturer's guidelines shall be present at the construction site at all times.

81-2 CONNECTION TO EXISTING FACILITIES

Connection to existing City water facilities may be made upon approval from the Environmental Utilities Department.

A. The Environmental Utilities Department will perform all taps unless specifically authorized in writing for contractor to preform. For services 2" and smaller, the City may allow a hot tap. Should the Environmental Utilities Department elect to perform the tap, 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 Environmental Utilities Department:

1. Coordinating the work requested with the Water Division and the Development Services Construction Inspector a minimum of 2 business days in advance of any work. This shall include discussions on provisions for materials and equipment required to complete the work.

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

3. Excavating the work area, as agreed upon by the Development Services Construction Inspector.

4. Sheeting, shoring, and bracing as required.

5. 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. The Contractor shall tie-in the new system to an existing stub under the following conditions:

1. Under no circumstances shall anyone other than an Environmental Utilities Water Division representative or Development Services Construction Inspector operate an existing water valve. All water main shutdowns and valve turning operations on existing facilities shall be approved by Environmental Utilities Water Division. All existing water mains returned to service and valve turning operations after tie-ins shall be performed by an Environmental Utilities Water Division representative.

2. With specific approval of the Development Services Construction Inspector.

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

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

5. All material used in the tie-in shall be clean and swabbed with chlorine to the satisfaction of the Development Services Construction Inspector.

6. All tie-ins shall take place in the presence of the Development Services Construction Inspector.

7. 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 Development Services Construction Inspector.

8. After system tie-in or system pressure loss to less than 5 psi, additional bacteriological samples shall be collected that represent the water quality in the affected portions of the system.

9. If tie-in requires the interruption of water service to residences and/or businesses, the Contractor will be responsible for the notification to the residences and/or businesses of the interruption. A minimum of two (2) business days prior to the start of the tie-in will be required. Notification plan must be approved by Environmental Utilities Water Division and Development Services Construction Inspector.

81-3 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 0.1 foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections, every 25 feet in curved sections, and every 10 feet in approved vertical curve sections.

81-4 EARTHWORK

Earthwork required to construct water facilities and appurtenances shall be performed to the lines and grades shown on the approved project plans and as specified below:

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 Construction Standard Detail W-1. Excavations shall conform to all applicable Federal and State safety requirements. The contractor shall appoint a designated “competent person” during construction.

B. Trench Width: The trench bottom width to 6 inches above top of pipe shall comply with Construction Standard Detail W-1 or as approved by the Environmental Utilities Department.

C. Compaction: Compaction of the trench shall conform to Construction Standard Detail W-1. Compaction test results shall be supplied to Environmental Utilities Department upon request. Jetting of trenches is not allowed.

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

E. Existing Roadways: Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated and backfilled as approved by the Development Services Construction Inspector and the Public Works Department.

F. Excess Material: Excess material and materials determined unsuitable for backfill by the Development Services Construction Inspector shall be removed from the project site.

81-5 DEWATERING

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 measures shall be used to eliminate sediment-laden discharges in accordance with the approved SWPPP.

81-6 PIPE BEDDING

Pipe bedding shall conform to Detail W-1 and the following:

A. 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.

B. Loose material shall be removed from the trench bottom and replace with imported material.

C. Where rocky, unyielding, or unsuitable foundation material is encountered, the subgrade shall be excavated a minimum of 12 inches below the pipe and the trench width shall be increased a minimum of 12 inches. The over-excavation shall be replaced with imported material.

D. Where the trench bottom is soft, yielding or unstable, the trench bottom shall be over-excavated. ¾" 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.

E. 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.

81-7 CONCRETE CRADLES, ARCHES ENCASEMENTS AND TRENCH DAMS

Concrete cradles, arches and encasements shall conform to Construction Standard Details W-23, W-24, and the following:

A. 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. 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 1/3 and 1/2 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.

C. Restrained pipe within casings, bridges, shall be fully extended or "stretched out" to remove the slack between the joints the entire length of the structure.

D. Water shall not be permitted to enter, seep or run onto the concrete while curing.

E. Trench dams shall be constructed of controlled density fill or clay as shown on the drawings or as directed by the Development Services Construction Inspector. Trench dam excavations shall be made into native earthen materials to the dimensions shown on the drawings or as directed by the Development Services Construction Inspector. Clay materials shall be moisture conditioned to near-optimum moisture content prior to placement in the excavation and compacted to the required relative compaction.

81-8 PIPE ZONE BACKFILL

Pipe zone backfill shall conform to Construction Standard Detail W-1 and the following:

A. Extreme care shall be taken when consolidating the backfill around the pipe zone. For pipe 12 inches in diameter and smaller, no more than 1/2 of the pipe shall be covered prior to shovel slicing the haunches of the pipe. For pipe greater than 12 inches in diameter, no more than the lesser of 6 inches or 1/3 of the pipe shall be covered prior to shovel slicing. Sufficient care shall be taken to prevent movement of the pipe and damage to the polyethylene encasement during shovel slicing. Shovel slicing shall be witnessed by the Development Services Construction Inspector prior to shading the pipe.

B. Compaction equipment shall not make direct contact with the pipe.

81-9 PIPE INSTALLATION:

Water pipe shall be installed in accordance with the following provisions:

A. 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.

1. Trenches shall be in a reasonably dry condition when pipe is laid.

2. 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.

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

4. No facility is to be backfilled without inspection by the Development Services Construction Inspector. Improvements installed without proper inspection shall be exposed and inspected as required by the Development Services Construction Inspector.

5. 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.

6. Pipes shall be mechanically restrained to the length specified in the approved plans, using materials specified herein.

7. Thrust blocks shall only be used where specifically shown on the plan /profile sheets and/or standard detail sheets. All fittings and appurtenances shall maintain a minimum of 18 feet of restrained pipe into the fitting from all directions. Plans should reflect the restraint lengths required for each segment and transition.

8. A continuous number 12 blue insulated tracing wire (81-16,G.36) shall be attached to mains, service lines and appurtenances per the Construction Standard Details and the following:

i. 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.

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

iii. Tracing wire in manholes and vaults shall be attached inside the facility within 1 foot of the rim.

iv. Wire splices shall be located above ground and inside of valve boxes, per Details W-16, W-17, and as follows:

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

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

c. Solder all connections with electrical solder.

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

9. A 12 inch wide, blue plastic non-detectable water pipe marking tape, marked "Buried Water Main Below," shall be placed in all main line trenches, 12 to 24 inches from the surface. Where a water main and recycled water main intersect, the plastic marking tape shall also be attached to the top of the pipe with nylon tie-wrap banded around the warning tape and the pipe every 5 feet on center. The warning tape shall extend to the nearest valves located on each side of said intersection.

10. 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 Roseville Water Main."

11. All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 8 mil minimum thickness polyethylene encasement (81-16,G.26) with ends taped off with vinyl pipe wrap tape (81-16,G.25).

B. 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 5 feet.

C. 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 (81-16,G.26) 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).

Polyethylene-encased pipe shall be bedded and backfilled with 3/8" pea gravel to 4 inches above the crown of pipe.

2. At the direction of the Environmental Utilities Department 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 Environmental Utilities Department Director. Each joint shall have 2 individually welded wires. Exothermic welds shall be installed per Detail W-20 and as follows:

a. Weld only against bare metal adjacent to both bell and spigot ends of pipe.

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

c. Correct horizontal molds must be used for pipe diameters from 4 to 24 inches in diameter. Pipes 30 inches and larger may use flat mold.

d. After a solid weld is made, coat the bare metal with an acceptable bituminous coating material and cover with a exothermic weld cap (81-16,G.8.d).

e. 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. Minimum length of pipe for installation shall be 2 feet.

D. Ductile Iron Pipe Fittings: In addition to requirements set by these standards, fittings shall be constructed per the following requirements. Flanged and mechanical joint fitting bolt threads and nuts shall be coated with an approved bituminous material (81-16,G.24).

1. Transitions between DIP and PVC shall be made as follows:

a. 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 1/2-inch taper. A Development Services Construction Inspector shall be present to witness this process.

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

E. Boring: Borings for installation of water lines shall be made per Detail W-22 and as follows:

1. The equipment, method and sequence of operation and casing pipe grades shall be approved by the Environmental Utilities Department. A minimum of 2 business days shall be given prior to the start of work. 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.

2. **Casing**: Welded steel casing pipe shall have a minimum wall thickness of a ¼ inch for pipe 24 inches in diameter and smaller, and 5/16 inch for pipe 27 inches through 36 inches in diameter. Casing material larger than 36 inches shall be engineered on a case by case basis. The inside diameter of the casing shall be a minimum of 10 inches larger than the outside diameter of the pipe bell or joint, as approved by the Environmental Utilities Department. A minimum of 4 inches clearance shall be required between the conducted pipe and the casing taking the skids into consideration.

3. **Installation of Casing**: The casing shall closely follow the boring operation. The bored hole shall not be more than 0.10 foot larger in diameter than the outside diameter of the casing. Guide rails shall be accurately set to line and grade to insure installation of the casing within allowable limits.

4. **Placing Pipe in Casing**: Pipe shall be fully restrained ductile iron pipe and shall be supported by a minimum of 2 sets of synthetic skids per stick of pipe, or as required by the Environmental Utilities Department. Skids shall be tightly banded to pipe with steel straps. 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.

   The space between the conducted pipe and casing shall be completely filled with clean, dry silica sand, blown into place. First, both ends of the casing shall be plugged with non-shrink grout a minimum of 12 inches into the casing. Both ends shall have a pipe of sufficient diameter placed through the mortar plug and parallel with the conducted pipe. One pipe shall be used for blowing the sand into the annular space. The other pipe shall remain open for venting. Prior to starting, the method of placing sand in the void shall be approved by the Environmental Utilities Department.

5. **Backfill of Voids**: When in the opinion of the Developer's design engineer or 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 casing 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 casing.

   The jacking head shall cover the upper 2/3 of the casing and project not more than ½ inch beyond the casing 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 Environmental Utilities Department. Where voids are suspected, the design or geotechnical engineer may direct the Contractor to drill the casing, to pressure

inject grout to refusal and repair the drilled hole. Grouting pressure shall not exceed 50 pounds per square inch at the nozzle.

6. Utilizing the City's drainage system for residual discharge from boring operations without the required measures 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 borings 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.

F. 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 2 angle fittings.

1. The Contractor shall follow the City of Roseville design standards and the California Code of Regulations (CCR) Title 22 Section 64572 Water Main Separation Requirements. Refer to the City's Design Standards Section 8-13.C and Standard Detail W-39.

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

81-10 SERVICE INSTALLATION

Water services shall be installed in accordance with manufacturer's recommendations, the Construction Standard Details and with the following provisions. Refer to the Table 1 or "Meter Application Table" for meter lay lengths.

A. Services shall be continuous from the main line to the service box. Bends in copper tubing shall be made in a manner that does not crimp or flatten the tubing.

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

C. 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 lines shall be encased in 8-mil minimum thickness poly tubing and backfilled with clean washed well graded sand (100% passing #4 sieve and less than 10% passing #100 sieve). Use pipe wrap tape to secure and seal the polyethylene wrap.

E. 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 Construction Standard Detail W-15. 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 Development Services Construction 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. Service lines and manifolds 3 inches and larger shall be ductile iron.

3. No water shall be drawn through a service prior to installation of the water meter and certification of the backflow prevention assembly.

F. A backflow assembly shall be required for construction and sales trailers having a landscape irrigation system or a septic holding tank.

G. Backflow assemblies shall be covered with a freeze protection insulated bag (81-16,G.10) per these Construction Standards.

H. The curb in front of residential water services shall be stamped with a "W."

I. Service saddles shall be installed with zinc caps (81-16,G.43) on all bolts, per these Construction Standards.

81-11 ABANDONMENT OF SERVICES AND MAINS

All water services up to and including 2", on water mains that are to remain active, annotate to remove the corporation stop and saddle and install a full circle stainless steel clamp on the main under City inspection.. Mainline stubs shall have the valve removed and replaced with a blind flange or as approved by the Environmental Utilities Department. The abandoned piping shall be removed or left in place as approved by Environmental Utilities Director.

81-12 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. All valves, fittings, DIP, copper and underground brass shall be wrapped and sealed in an 8-mil minimum thickness clear polyethylene encasement (81-16,G.26). Use 10 mil pipe wrap tape (81-16,G.25) 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 Development Services Construction Inspector prior to wrapping. Otherwise, the damaged valve shall be replaced with a new valve.

B. Gate valves shall be centered in a one-piece 8" riser stock (81-16,G.31). Riser stock shall be PVC C-900. An operator nut extension shall be installed on valves where the operation nut exceeds 40 inches in depth from final grade. Valve extensions shall be continuous and within 24 inches of finished grade.

C. Buried nuts and bolts shall be coated with a bituminous material (81-16,G.24). This includes exposed bolts found on a manufactured appurtenance (i.e., valve bonnets, etc.) "T" bolt heads do not require coating.

D. Fire hydrants shall be marked with a blue 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. Fire hydrants shall be painted with 1 coat primer and 2 coats safety yellow gloss enamel paint (81-16,G.12). When used as blow-offs, the top 2 inches shall be painted white and marked with an "X" with black gloss enamel paint. Private hydrants shall be painted gloss white.

F. Dead-end lines, permanent and temporary, shall have a Hydrant Assembly constructed per Construction Standard Detail W-4. Temporary Hydrant Assemblies upon inspection and approval of a Development Services Construction Inspector may be re-used in permanent or temporary applications.

G. Insulating kits (81-16,G.11.d) shall be installed at transitions between dissimilar metal pipes per the Construction Details (W-21) and as required by the Environmental Utilities Department.

81-13 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 inspections, the recycled water system has passed testing 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 Development Services Construction Inspector. The new system shall be filled with potable water through an approved backflow device.

A. Hydrostatic Test

1. Contractor shall verify with the Development Services Construction Inspector that all system valves are open prior to testing.

2. The Development Services Construction Inspector will be present during the duration of the test.

3. Hydrostatic Test shall be conducted for 2 hours at a minimum of 150 pounds per square inch or at 1 1/2 times the operating pressure, 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. Service lines 2" and smaller after the backflow should hold a running pressure test for

minimum one (1) hour, and be flushed per the Development Services inspector's discretion.

4. If at any time during the test the pressure drops to 5 psi below the test pressure, repressurize the pipe by pumping in potable water in sufficient quantity to bring the pressure back to the original test pressure.

5. Accurately measure the amount of water required to repressurize the system to the test pressure, compare to the Maximum Allowable Leakage Rates in the table below and, if the average measured leakage per hour exceed the allowable rate, repair and retest the water main.

Table 81-13: Maximum Allowable Leakage Rate at 150 psi

Pipe Diameter (inches)	Allowable Leakage Rate (gallons/hour/1,000 feet of pipe)
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99
14	1.16
16	1.32
18	1.49
20	1.66
24	1.99
30	2.48
36	2.98

Source: AWWA C600 Installation of Ductile Iron Mains and Their Appurtenances

B. Topside Improvements: When all water, recycled water and sewer infrastructures have passed air, vacuum, pressure, continuity and CCTV inspection the Development Services Inspector shall notify Water Asset Gathering indicating that the project is ready for road bases and top side improvements. This does not constitute approval for use of the infrastructure.

C. Chlorine Disinfection: Chlorine disinfection shall comply with the American Water Works Association Standard for Disinfection of Water Mains (C651-14) 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 Development Services Construction 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 Development Services Construction Inspector will verify that a minimum chlorine content of 25 ppm remains in the system.

5. Upon approval by the Development Services Construction 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 1 ppm chlorine residual or less prior to discharge. Discharge location and neutralization methods shall be documented in the SWPPP and coordination with and approved by the Development Services Construction Inspector.

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

Prior to discharging into the sewer system, the Contractor shall sign a form authorizing the Environmental Utilities 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 Development Services Construction Inspector shall prepare a bill for water usage based on the meter reading. This bill must be paid before the project is signed off by EUD.

The discharged chlorinated water shall be classified as "low-strength metered commercial users" under Title 14.16.220 of the City of Roseville Municipal Code. The sewer unit for low-strength metered commercial users shall be one sewer unit per 1,000 cubic feet. The Environmental Utilities 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.

D. 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 initial set of samples shall be collected by the Development Services Construction Inspector and taken to the City's laboratory. Then 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 by the Development Services Construction Inspector for testing by the City's laboratory.

3. The laboratory will require a minimum of 48 hours to complete total coliform and total plate count tests. Actions allowed based on test results are as follows:

Pass Coliform Test		
(Coliform not present?)	**Plate Count Results**	**Action**
Yes	0-1,000	Connect to City
Yes	1,000-1,250	Flush water system and re-test
Yes	1,250+	Flush and re-chlorinate water system and retest
No		Flush and re-chlorinate water System and retest

4. For new mains, sets of samples shall be collected every 1,200 feet (370 meters) of the new water main, plus one set from the end of the line and at least one from each branch greater than one pipe length.

If trench water has entered the new main during construction or if, in the option of the City, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 feet (61 meters), and the sampling location shall be identified (see Sec. 5.1.3 for sampling location details). Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.

E. Tying onto the City System: A tie-in procedure shall be submitted and approved by the Environmental Utilities Department prior to the proposed work. The Contractor shall allow for up to 7 days review of the procedures by the Environmental Utilities Department. The water system shall be tied into the City system within 10 working days upon completing and

passing all the testing procedures. Tie-ins shall be conducted a specified in Section 81-2 of these Construction Standards. After the tie-in has been made, the Contractor shall flush the segment tied-in to the approval of the Development Services Construction Inspector.

1. If the new water system cannot be tied into the City system within 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 Development Services Construction 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.

3. New water mains that are equal to or less than one pipe length (20'), the new pipe, fittings, and valves required for the connection may be spray disinfected or swabbed with a minimum of 1 percent solution of chlorine just before being installed. For new or replacement water mains that are greater than 1 pipe length (20'), the pipe must be set up for disinfection and bacteriological samples taken.

F. Continuity Testing: The Environmental Utilities 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 the pavement is placed. Final continuity testing will take place after the pavement 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 Environmental Utilities Department as an official record.

G. 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 Development Services Construction Inspector. A report showing the test results shall be submitted to the Environmental Utilities 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.

81-14 REPAIRING INSTALLED IMPROVEMENTS

All PVC and DIP water mains shall be repaired per the following procedures:

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

B. After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified. The repairs shall then be retested per these Construction Standards.

C. 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.

81-15 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 Development Services Construction Inspector and Water Distribution Division. The cost of generating the punchlist shall be borne by the Contractor/Developer.

A. Pre-final Requirements
In order for Environmental Utilities Department to install meters to any new residential buildings (model or production homes), the following requirements must be met:

1. The meter box must be set to finished grade. The contractor shall make sure that debris is not entering the meter box.

2. The meter box must be squared to adjacent sidewalk or property line.

3. The meter box must be in a structurally sound condition (no cracks or visible damage).

4. The box shall be cleaned and free of debris.

81-16 MATERIALS

A. Approved Equal: The words "approved equal" shall mean any material deemed by the Environmental Utilities Department to be acceptable for use within the City's water system as compared to products of specified manufacturers. Contractors proposing to use materials which are not specifically named shall submit all necessary documentation to allow review of said material for use as an approved equal. The submittal shall include a letter with:

1. Product: A description of the product and the appropriate materials specification section number. A sample of the product may be required for review and testing.

2. Contact: The name and telephone number of the contact person for the proposed product.

3. Reference: A list of a minimum of 3 agencies that are using the proposed product (include names and telephone numbers).

4. Performance: Information and reference for 3 locations with a performance record of 3 years in operation of the installation.

5. Address the letter to the Environmental Utilities Department Engineering Division at 2005 Hilltop Circle, Roseville, CA 95747 Attn: EUD, Chairman of METAC. City staff may request a sample of the product for review.

6. The contractor shall submit all material for review 35 days prior to contract award. All submittals shall include documentation verifying contract award date. Contractors shall allow 2 to 4 weeks review time by the Environmental Utilities Department.

B. Conditionally Approved Material: Materials or products that have met the reference and performance requirements shall be conditionally approved for a minimum trial period of 2 years. Upon completion of the 2 year period, the product may be approved, the evaluation period may be extended, or the product may be denied approval as determined by the Environmental Utilities Director. A list of conditionally approved products may be obtained from the Environmental Utilities Department.

C. Material Defects and Failures: Defective material and failures shall be reported immediately. The date of sale, manufacturing dates, lot numbers, and all other identifications shall be provided to the Environmental Utilities Department.

D. Unapproved Materials: Materials not approved for use on the project shall be removed from the site within 24 hours as requested by the Development Services Construction Inspector.

E. Water Main: Unless noted on the approved plans, all water mains shall be 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 or white 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 Development Services Construction 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: Westlake-Aquaspring C900 Certa-Lok, Diamond Plastics Corporation, J-M Manufacturing, Pacific Western Pipe, Vinyl Tech-White Knight, Pressure-Flex Pipe, PW-Eagle, North American Pipe Corporation, or approved equal.

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: McWane, Tyler, US Pipes, Griffin, American, Electrosteel USA, or approved equal.

3. Concrete Cylinder Pipe- CCP shall be manufactured to conform to the standards AWWA C-303:

a. Approved CCP manufacturers include: Ameron or approved equal.

F. Services

1. Brass Material: In compliance with California State Assembly Bill 1953 and any amendments thereto, all brass components and pipe in contact with potable water intended to convey or dispense water for human consumption through drinking or cooking shall contain a maximum of 0.25% lead by weight. Compliant brass product shall be marked indicating the product is manufactured from a low-lead alloy. Non-compliant product shall be immediately removed from the construction site.

a. Brass pipe: Brass pipe shall conform to ASTM B-43 standards. A listing of approved pipe include: Hallstead ¾" 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.

c. Brass fittings for Copper Tubing: An approved listing for brass fittings for copper tube includes: Jones, Mueller, Ford or approved equal. Parts reference numbers are shown below:

1. Jones (¾through 2):
- Jones Super Grip CTS x CTS E-2609SG
- Jones Super Grip CTS x MIP E-2605SG
- Jones Super Grip CTS x GIP E-2607SG
- (2 Compression x Compression)

2. Mueller (¾through 2):
- Mueller-110-CTS H-15403N
- Mueller-110-CTS H-15428N
- Mueller-110-CTS H-15451N

3. Ford (¾ inch through 2 inch):
- ¾ inch"- - Ford Quick Joint CTS x CTS C44-33-Q-NL
- 1– Ford Quick Joint CTS x MIP C84-44-Q-NL
- 2– Ford Quick Joint CTS x FIP C14-77-Q-NL
- (2 Compression x Compression)

2. **Copper Tubing**: Copper tubing shall be seamless, annealed copper tube and shall conform to ASTM B88 "Standard Specification for Seamless Copper Water Tube" and shall be Type K. Copper shall be grade UNS-C12200. For diameters ranging from ¾ to 1" inch, use Type K Roll Soft Copper. For diameters ranging from 1 ¼ to 2" inch, use Type K Soft 20Sticks. Approved tubing includes: Cambridge Lee, Mueller Streamline, Aqua Shield or approved equal.

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

   - Jones:
     - Part #E-1935SG (¾ inch to 2 inch)
   - Mueller:
     - Part #B-25028-MIPTXCTS-110N (Compression ¾ inch to 2 inch)
     - Part #N-35028-MIPTXCTS-110N (Compression ¾ inch to 1 inch)
   - Ford:
     - Part # FB1100-x-Q-NL (¾ inch to 2 inch)
   - AY McDonalds Mfg. Co. Brass 74704BQ 1 inch corp stop

4. **Curb Stops**: Approved curb stop manufacturers include: Jones Mueller, Ford, or approved equal. Part reference numbers are shown below:

   - Jones: Part #E1921WSG (¾ inch to 2 inches)
   - Mueller: Part #B-25172-FIPTXCTS-110N (Compression ¾ inch to 2 inches)
   - Ford: Part # B41-xxx-Q-NL (¾ inch to 2 inches)
   - AY McDonalds Mfg. Co. Brass 76102Q 1 inch curb stop

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, Mueller, Ford, or approved equal. Part reference numbers are as indicated below:

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

   - Mueller:

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

12 inch	H-13494

- Ford:

Saddle Size	Part#
1 inch	S912

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

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

- 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*

*the last three numbers denote tap sizes (0.75”=075, 1”=100, 1.50”=150, 2”=200)

G. Appurtenances: In compliance with California State Assembly Bill 1953 and any amendments thereto, all brass components and pipe in contact with potable water intended to convey or dispense water for human consumption through drinking or cooking shall contain a maximum of 0.25% lead by weight. Compliant brass product shall be marked indicating the product is manufactured from a low-lead alloy. Non-compliant product shall be immediately removed from the construction site.

1. Air Release Valves: Air release valves shall be vacuum break type with stainless steel body, trim, float and bolts. A listing of approved manufacturers includes: Crispin, Val-Matic, or approved equal. Part reference numbers are as shown below:

2.

Crispin	Part#	Valvematic	Part #
1 inch	UL10	1 inch	201C
2 inch	UL20	2 inch	202C
3 inch	UL31	3 inch	203C
4 inch	UL41	4 inch	204C
6 inch	UL61	6 inch	206C
8 inch	Ul81	8 inch	208C

2. Backflow Assembly – A listing of approved manufacturers and products include:

For domestic and Irrigation services ¾”-2” “Lead Free” Reduced Pressure Principle BPA:

- Watts LF009 and LF909 series
- Wilkins ~~975 Series~~ 975XL2

For domestic and Irrigation services 3"-10" Reduced Pressure Principle BPA:

- Wilkins 375AST and 375 ASTR

For Commercial Fire Service Connections

- Ames 3000SS DCDA Stainless Steel Series (OS&Y)
- Wilkins 350 ASTDAR (OS&Y)
- Wilkins 350 ASTDA(vertical and horizontal installation)(OS&Y)

3. **Backflow Assembly Support Stands**: Placer Waterworks series PW/PS or approved equal.

4. **Backflow Assembly Support Stand Saddles**: Placer Waterworks series PW/SDL or approved equal.

5. **Backflow Assembly Color**: All brass/copper Backflow Preventer Assemblies, including the bypass meter and backflow on a commercial fire backflow, shall be painted a "Forest Green" color to provide a deterrent to theft with the proper outreach to recyclers. The paint color code shall be RAL6004 blue green.

6. **Blocking for Boxes**: A listing of approved materials includes: Slump Block- 4 inch x 4 inch x 15 ½ inch, or approved equal.

7. **Cadwelds**: A listing of approved materials includes:
   - #4 jumper cable, CP cable, 18 inches long with 1 inch bare end
   - #4 cadweld copper sleeve
   - #4 cadweld shot with thermite mastic weld cap-t-cap
   - Exothermic weld caps:
     - Ci thermOcap with thermOprime adhesive
     - Ci thermOcap PC
     - Royston Handy Cap with Roybond 747 Primer
     - Royston Handy Cap IP

9. **Fittings**

   a. PVC: Unless otherwise specified or shown on the approved plans, all fittings to be used with PVC Pressure Pipe shall conform to the standard for "Ductile Iron Compact Fittings for Water and Other Liquids" (ANSI/AWWA C-153/A21.53 for MJ compact fittings; C110 for flange fittings). Approved fitting manufacturers include Sigma, Star, Tyler, Union and US Pipe.

1. 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).

2. All fittings shall be wrapped and sealed in accordance with these Construction Standards.

3. The Contractor may use a ductile iron mechanical joint flange adapter designed for AWWA C-900 pipe with connecting PVC Pressure Pipe to flanged fittings or flanged valves. Pipe ends must be cut smooth and square with no bevel. The joint shall be restrained to the PVC pipe using an approved restraint method.

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 Sigma, Star, Tyler, Union, and US Pipe.

1. 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 – Double thickness mortar).

2. All fittings shall be wrapped and sealed in clear polyethylene encasement in accordance with these Construction Standards (81-16,G.26).

10. **Freeze Protection for Backflow Assemblies**: The backflow assembly freeze protection materials shall be comprised of the following:

a. Laminated forest green fabric conforming to Herculite #10 by Herculite Products (fabric shall be a minimum of 10.6 oz/sq. yd.), or approved equal.

b. Brass Rolled Rim Grommet and spur washer by Astrup, or approved equal.

c. Polyester thread with a minimum strength of 14.2 pounds, Coats American's Star Ultra product line, or approved equal.

d. Fiberglass insulation R-19 rated, 6 inch minimum thickness.

e. 1-inch minimum width Velcro, or approved equal.

f. Black UV rated nylon zip tie, 0.30" minimum width.

11. **Gaskets**: Gaskets shall conform to the following specifications:

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

b. Push On Gaskets: Manufacturers recommendations.

c. MJ Gaskets: Manufacturers recommendation.

d. Insulting Flange Gaskets: Insulating flange gaskets shall be USSO Standard B.16.21 insulation flange kits, Type E Full Face Gasket with 2 sided insulation as manufactured by Calpico, or approved equal as per detail W-21.

12. Hydrants: Hydrants shall be wet barrel type bronze – lead free. Exterior shall be painted with 1 coat primer and 2 coats "safety yellow" gloss oil based enamel paint (e.g. Rust-Oleum HP 7543). Caps shall be cast iron. Approved hydrants (with 6" x 2-1/2" x 2-1/2" x 4-1/2)include: James Jones (Bronze) Part # J3762-Z13, Clow (Bronze) 2060, or approved equal. The Part Number shall contain the letter "NL" to indicate the hydrant is lead free. Example: Part # Jxxx-ZxxNL.

i. All new hydrants to be installed with breakoff check valves. Approved valve: Clow LP619 Hydrant Breakoff Check Valve or equal.

13. Hydrant Bury: Hydrant buries shall be ductile iron mechanical jointed cross flange, cement-mortal lined per AWWA C104. A list of approved hydrant buries include: South Bay Foundry MJ x Size, Clow MJ x Size or approved equal.

14. Hydrant Bury Extensions: Hydrant bury extensions shall be grooved and cement-mortar lined per AWWA C104. A list of approved hydrant bury extensions include: South Bay Foundry, Clow Part # CW-EXT-BO (6 inch x 6 inch through 6 inch x 36 inch), Tyler (6 inch x 6 inch through 6 inch x 32 inch), or approved equal.

15. Location Stakes: A list of approved off-site location stakes include: Carsonite-# CUM375, 4 inch x 5 feet with anchor barb kit, Caution stickers attached-# CW-112 and organization decal # P101, City of Roseville-Call Before Digging-(916) 774-5750, or approved equal.

16. Main Line Valve Lock-Out: A list of approved manufacturers and part reference numbers include: SW Services PC800, DC600, or approved equal.

17. Manholes Cone, and Barrels For listing of approved manufacturers reference City construction standards Section 91-16.E.1

18. Manhole Frame and Cover: A listing of approved manufacturer and part reference number includes: South Bay Foundry (SBF1957-W), GMI Composite Frame and Cover 2600 and 3800 series, or approved equal. Manholes constructed outside of paved area shall use a GMI composite lid and frame.

19. Meters: All meters shall be purchased through the Environmental Utilities Department, Water Division. Call (916) 774-5750 for information.

20. Meter Idlers: A listing of approved meter idler manufacturers include: Ford, Jones, Spears, or approved equal. Part reference numbers are shown below:

Ford	Part #
¾ inch	IDLER #3-NL
1 inch	IDLER #4-NL

¾ inch x 9 inch	884-090-NL
1 ½ inch	IDLER #6-NL

Jones	Part #
5/8 inch x ¾ inch	E-2208
1 inch to 2 inch	E-2208

Spears (no lead/low lead)	Part #
¾ inch x 7 ½ inch	884-075
1 inch x 10 ¾ inch	885-107

20. Meter Setters: Meter setters with dual check valves shall be used unless otherwise approved by the City Water Division. A listing of approved meter setter manufacturers include: AY McDonald, Ford, Jones, Mueller, or approved equal. Part reference numbers are shown below:

Ford 40 Series	Part #
¾ inch	VBHH43-12WH-NL-FP
1 inch	VBHC44-15W-NL-FP
1 ½ inch	VBB76-18HB-11-66-NL-FP
2 inch	VBB77-18HB-11-77-NL-FP

Jones	Part #
¾ inch to 1 inch	E03-B-(C)-MT X MT-BV-SC-12
1 ½ inch	E02E-FIP-FIP-BV-SC-12AS
2 inch	E02F-FIP-FIP-BV-SC-12AS

AY McDonald	Part #
1 inch	718 412JM

Mueller	Part #
¾ inch to 1 inch	B-24118-2N
1 inch	390 B-24118-6A
1 ½ inch to 2 inch	B-2423-99000N

21. Meter Spud Couplers: A listing of approved meter spud couplers manufacturers include: Ford, Jones, Mueller, or approved equal. Part reference numbers are shown below:

Ford	Part #
¾ inch	C38-33-NL (4” and 8-1/2” Spud)
1 ½ inch	CF31-66-NL
2 inch	CF31-77-NL

Jones	Part #

1 ½ to 2 inch	E-129
¾ inch to 12 inch	E-130 (3/4" or 1" use 4" and 8-1/2" Spud)

AY McDonalds	Part #
1 inch	718412JC

Mueller	Part #
1 inch	H-10890N
Size 10	H90-99029N (4 inch and 8 ½ inch Spud)

22. Nuts and Bolts

a. 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. Hydrant Bolts: Hydrant bolts to be Hollow Break Away, 5/8 inch x 3 inch, conforming to ASTM-A307 Grade A & B Low Carbon Steel. Insulating flange bolts, nuts, and washers shall be stainless steel Grade 316.

c. Meter Bolts are to be stainless steel, Grade 316 with brass nuts.

d. Tee Bolt: Steel bolts are to be ¾ inch high strength, low alloy steel with a heavy nut, conforming to AWWA Standard C-111-90.

23. Nylon Bushings: Nylon bushings shall be 76-76R, 2 ½ inch MIPT x 2 inch FIPT.

24. Patching Material: A listing of approved manufacturers and part reference numbers for patching of Dip include: Cop-Coat Carboline Company (Bitumastic No. 50, Coal Tar), Coppers Coat 50, or approved equal.

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

26. 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 A 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.

27. Pressure Regulators: A listing of approved all brass pressure regulator systems include: Watts (¾ inch through 2 inch, UB5-series), Wilkens (¾ inch through 2 inch 600 series, 2 ½ inch through 3 inch 500YSBR), or approved equal.

28. 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.

29. Restraints

a. PVC: Approved restraint systems for PVC Pressure Pipe include: Westlake-Aquaspring C900 Certa Lock (for straight runs only), ROMAC Alpha Restrained Joint, ROMAC Grip Rings, EBAA Iron Series 2000 PV, Sigma One Lok Series "SLC", DR18 JM Eagle Loc, eagle lock, PVC Star Grip 4000 series, (See section 81-16,H for additional conditionally approved options) or approved equal.

b. DIP: Approved restraint systems for DIP include: Field Lock Gaskets (3 inch through 12 inch diameter only), Mega Lug 1100 Series, ~~TR Flex~~, sigma One Lok Series "SLD", Star Grip 3000 series, American Fastite Joint Assembly or approved equal.

30. Riser Aligners: A listing of approved products include: Davis & Associated Riser Aligners 8 inch, or approved equal.

31. Riser Stock For Curb Stops: Riser stock schedule 40 PVC. The riser shall be 4 inch diameter inside meter boxes, and 6 inch diameter for curb stop type valves in valve boxes.

32. Riser Stock for Main Line Valves: Riser stock shall be 8 inch diameter PVC C-900 for all main line valves.

Riser insert/main line valve lock out shall be used where the valve is located in the gutter pan. See section 81-16.G.16

33. Sampling Stations: MX Fusion or approved equal. Model MX3000-H FBE (Wht)

34. Service Boxes and Lids: All box lids are to be permanently marked with the appropriate label (i.e., Water, ARV, Blow-Off, CPT, etc.). Lids shall have a 1 7/8 inch hole offset at upper 1/3 portion of lid measured along the long axis. In commercial project, meter lids shall be stenciled with the number address it serves. The numbers shall be painted using white enamel paint and 2 inch stenciling. A list of approved box manufacturers include: Christy, BES, Armorcast, CDR, Placer Water Works, or approved equal. Part reference numbers are shown below:

Christy	Part #
¾ inch and 1 inch services	N-16 Box (10k load)
	N-30 box (10k load)
	B-16-61DP Cover (10k load)
	B-16CP Cover (10k load)
	FL16P001 (10k load)
	FL 30 cover (10k load)
	Placer Water Works PWW-F16 (20k load)

	(w/ 1 7/8 inch hole, off-set at upper 1/3 portion of lid, measured along the long axis) B-16-12 Box Extension
1 ½ inch to 2 inch services	B-40 Box B-40-61D CoverB-40-61D Cover (w/1 7/8 inch hole, off-set at upper 1/3 portion of lid, measured along the long axis) B-40-10Box Extension
3 inch meter box	B-40 Box
4 inch meter box	B-48 Box B-48-62DP P48-10 Extension
6 inch to 10 inch meter boxes	B-48 Box P48-10 Extension R-17P24 PIT R-17-52DP Lid R-17-24 Extension
6 inch to 8 inch compound meter Box and Extension	R37-54H Lid

Armorcast	Part #
¾ inch to 1 inch	A6000492 Box (20k load) P000492 Box (20k load) A6000489-T-H5 (20k load) A6000489-H5 (10k load) A-6000 489-TI Non Traffic Lid with 2 inch probe hole and metal detection device. Label “RSVL WATER
1 ½ inch to 2 inch services	A-6001 643-TI Non Traffic Lid with 2” probe hole and metal detection device. Label “RSVL WATER”

CDR	Part #
¾ inch to 1 inch services	WB03-1121-12 Box WC00-1121-02RR Lid (10k load)
1 inch services	(For Tiers 15 & 22)*
Quazite Lid	(For Tiers 15 & 22)*

*Tiers 15 & 22: Driveways, parking lot, and off-roadway applications subject to occasional non-deliberate heavy vehicular traffic.

Placer Waterworks	Part #
All sizes	All standard lids listed above (10k and 20k load)

Hubble Meter Box	Part #
1 inch meter	CDR 15 inch X 27 inch straight wall style (stackable assembly) CDR 17 inch X 30 inch straight wall style (stackable assembly)

35. Traffic Boxes: A list of approved traffic box manufacturers include: BES, Christy, or approved equal. Parts reference numbers are shown below:

a. BES
- C-17 inch x 30 inch Box-Full Traffic Concrete
- G-5 Box

b. Christy
- V-64 Box
- V-64 Box x 12 inch Extension
- V-64 Cover Traffic Load
- G-5 Box with D & L Lid # K6004
- G-5C Lid

c. Placer Water Works
- PW/G5 Lid

37. Tracing Wire: Tracing wire shall be light blue in color and minimum 12 gauge solid copper with UF rated plastic insulation.

38. 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.

39. Tracing Wire Mastic Tape Seal: Tracing wire mastic tape shall be 3M Mastic Tape #2229 or approved equal.

40. Valves

a. Butterfly Valves: Butterfly valves to be used on pipe diameters ranging from 16 inch to 72 inch. A list of approved valves include: Standard Pratt Ground Hog, with MDT Traveling Nut Actuator, Mueller Lineseal III, Dezurik butterfly valve with square nut actuator, (LA series) , or approved equal. NOTE: All valves shall be Holiday free epoxy, interior lining and standard black asphalt varnish exterior. 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 Environmental Utilities Department inspector.

b. Gate Valves: Gate valves used on diameters ranging from 3 inch to 12 inch shall be grey cast iron or approved equal. A list of approved valves includes: M & H 4067 RW Gate Valve, Mueller-A-2361 RS Gate Valve, Clow, AFC or approved equal.

c. 2-part epoxy repair kit shall be provided by valve manufacturer.

41. Valve Boxes: All valve boxes in street and other traffic areas shall be designed to H-20 loading conditions. A list of approved manufacturers and part reference numbers include: Christy (Type G5, Type B 17 by 30 H-20), BES, D&L (#K-6004), or approved equal.

42. Valve Extensions: Placer Waterworks extensions model PW/VE or approved equal.

43. Water Pipe Marking Tape-Approved manufacturers and materials include: Cal Pico Inc. (Tracer Tape-non-Detectable 12 inch width), Reef Industries Inc., Terra Tape Extra Stretch 450 Material, or approved equal.

44. Zinc Caps: A listing of approved manufacturers include: Mars, or approved equal. Part reference numbers are shown below:

Mars:

- 7/16 inch to ½ inch— 2.5 ounce weight
- 5/8 inch to 1 inch— 6.0 ounce weight

H. CONDITIONALLY APPROVED

The following products are conditionally approved in the City for a period of 2 years conditional acceptance period, the product may be granted approved equal status and be added to the list of approved products in the City of Roseville Standards.

1. SIP Industries DIP
    a. C153 Compact MJ Ductile Iron Fittings
    b. C110 Full Body Flanged Joint Ductile Iron Fittings
    c. Ductile Iron MJ Restraints for Ductile Iron and PVC Pipes

2. Diamond Plastics Lok 21 Restraint Gasket

3. American Flow Control – Series 2500 Gate Valve (Sizes 2” – 12”) with a single stainless steel fastener

4. Clow LP619 Hydrant Break Check

    ARV - A.R.I, models D-40 and D-46

6. US pipe restraint – HDSS

METER APPLICATION TABLE 1

METER APPLICATION TABLE 1

Size	Class	Meter Type	Meter Length	Meter Box [2]	Top of pipe finish grade	Residential Dom	Commercial Dom	Commercial Irrig	Meter Lid [1]
3/4"	PD	SRII TRC	7 1/2"	NA	Fire bypass				Fire backflow bypass
3/4"	PD	SRII or iPerl	9"	N-16	9"	x	x	x	CI incert/Fibrelyte
1"	PD	SRII or iPerl	11"	N-30	9"	x	x	x	CI incert/Fibrelyte
1 1/2"	C [2]	Sensus omni-Compound	13"	B-40 w/ext	8" - 12"		x		Checker plate
1 1/2"	T [2]	Sensus omni-Turbo	13"	B-40 w/ext	8" - 12"			x	Checker plate
2"	C [2]	Sensus omni-Compound	17"	B-40 w/ext	8" - 12"		x		Checker plate
2"	T [2]	Sensus omni-Turbo	17"	B-40 w/ext	8" - 12"			x	Checker plate
3"	C [2]	Sensus omni-Compound	19"	B-40 w/ext [3]	8" - 12"		x		Checker plate
3"	T [2]	Sensus omni-Turbo	19"	B-40 w/ext [3]	8" - 12"			x	Checker plate
4"	C [2]	Sensus omni-Compound	23"	B-40 w/ext [3]	8" - 12"		x		Checker plate
4"	T [2]	Sensus omni-Turbo	23"	B-40 w/ext [3]	8" - 12"			x	Checker plate
6"	C [2]	Sensus omni-Compound	27 1/8"	B-48 w/ext	8" - 12"		x		Checker plate/Split-lid
6"	T [2]	Sensus omni-Turbo	27 1/8"	B-48 w/ext	8" - 12"			x	Checker plate/Split-lid
8"	C [2]	Sensus omni-Compound	30 1/8"	B-48 w/ext	8" - 12"		x		Checker plate/Split-lid
8"	T [2]	Sensus omni-Turbo	30 1/8"	B-48 w/ext	8" - 12"			x	Checker plate/Split-lid
10"	C [2]	Sensus omni-Compound	41 1/8"	B-48 w/ext	8" - 12"		x		Checker plate/Split-lid
10"	T [2]	Sensus omni-Turbo	41 1/8"	B-48 w/ext	8" - 12"			x	Checker plate/Split-lid

Notes:
[1] Lid shall have probe hole for Ert
[2] Standard meter box for City of Roseville
[3] Recycled meters 3" and larger use B-48

* All meters are ordered in turbo length

SECTION 71: STREETS

71-1 GENERAL

Street surface improvements shall include: barricades, bikeways, bridges, bollards, curb, curb & gutter, driveways, pavement, curb ramps, sidewalk, survey monuments and tunnels. These improvements shall be installed in accordance with the approved improvement plans, these Construction Standards and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the Caltrans Standard Specifications latest edition and as specified by the City Engineer. No Street shall be cut, nor any public improvement disturbed until the Developer/Contractor has obtained an encroachment permit from, and/or entered into a subdivision agreement with the City.

71-2 CONNECTION TO EXISTING IMPROVEMENTS

Connection to existing surface improvements require 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 to complete a 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 pavement section for constructing against. The width from centerline shall be shown on the approved plans or as determined in the field, and verified by the City Engineer. PCC pavement may be placed against the existing pavement if the City's Construction Inspector determines the pavement edge is flawless. Joints for PCC pavement shall be placed along a lane line or in the center of a lane. Following construction of the adjacent curb and gutter, paving shall not commence until the City's Construction Inspector is satisfied that the cross grade between the existing pavement edge and the new gutter lip conforms to or approaches the City's required 2% cross grade. 3% is the maximum cross grade allowed on this AC pavement section unless shown on the approved plans.

C. Sawcutting: When sawcutting within an asphalt concrete street for trenching or other purposes, Contractor shall grind 1-1/2 inches of pavement between the lane lines (from lane stripe to lane stripe). Upon completion of the sawcutting and/or trenching work, where the sawcutting occurs between the curb and gutter and nearest lane stripe (including bike lanes), the same 1-1/2 grind shall be required. Contractor shall place a Petromat fabric or approved equal by the City and overlay from lane stripe to lane stripe, or curb to lane stripe and restripe or replace any delineators removed during the grind.

When sawcutting within a PCC street for trenching or other purposes, the work shall conform to Construction Standard Detail ST-54.

71-3 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 City's Construction Inspector upon request.

The engineer's surveyor shall stake the grades and location for the top and bottom of slope for all curb ramps.

71-4 INSTALLATION

A. Subgrade: Note: The geotechnical engineer shall closely monitor and test subgrade fills to assure the material meets soil 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. Where mehrten (mehrten mudflow breccia and /or mehrten conglomerate), lava cap material, cobbles or other stable native subgrade materials are encountered upon commencement of street grading, the respective material may be substituted for processed subgrade, and/or aggregate subbase and /or aggregate base. This is conditional upon confirmation by the geotechnical and design engineers (and approval of the City Engineer) that the existing subgrade/subbase/base section thicknesses and composition will meet or exceed traffic index and R-Value requirements for the respective street. A minimum of 3 inches of Class II aggregate base shall be required on such substituted material on which to pave.

Soils testing for relative compaction shall reference ASTM D1557-78 test methods.

1. **Subgrade for Sidewalk and Curb Ramps, Curb and Gutter, Driveways and Pavement -** Subgrade shall be processed to 95% relative compaction, minimum 6 inches plus, and shall be tested and certified by a geotechnical engineer, licensed in California. Written certification shall be provided to the City's Construction Inspector prior to the placement of minor concrete (and aggregate base or aggregate subbase for pavements). For meandering sidewalks, Class II aggregate base may be substituted for native subgrade at the Contractor's discretion and shall be processed to 95 % relative compaction.

   Additionally, subgrade stability for curb, gutter and sidewalk and 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 City's Construction Inspector) in the presence of the City's Construction Inspector, the Geotechnical Engineer and the Contractor. The proof roll test shall be repeated following corrective measures. Prior to placement of aggregate base, deflection in the subgrade shall be eliminated. Placement of aggregate base shall not commence without the approval of the City's Construction Inspector.

   Where mehrten (mehrten mudflow breccia and/or mehrten conglomerate), lava cap material, cobbles or other native subgrade material not conducive to the operation of the concrete extruding machine are encountered, that material shall be removed to a depth of 6 inches below top of subgrade, and shall be replaced with native or imported soil (acceptable to the City's Construction Inspector and the geotechnical engineer) compacted as specified above.

Aggregate base is not included in the structural section for monolithic sidewalk and Type 1 or Type 2 curb and gutter. Aggregate base may be used for meandering or otherwise detached sidewalk.

Sidewalk subgrade exposed upon removal of existing sidewalk shall remain intact unless it is determined by the City's Construction Inspector to be unstable. In this event, it shall be processed per the preceding paragraphs.

Deflecting, unstable areas shall be corrected per the recommendation of the Geotechnical Engineer and upon the approval of the City's Construction Inspector prior to placement of aggregate base, or concrete curb, gutter and sidewalk.

ORDER OF WORK: Street subgrade preparation, minor concrete placement and placement of any aggregate base or subbase for pavement within the City right-of-way shall conform to the following sequence of operations, notwithstanding Section B. below. Prior to placement of aggregate base in the City right-of-way, the contractor shall:

a. Complete underground work outlined in Section B, below.

b. Process and compact subgrade for curb, gutter, sidewalk and pavement, back of sidewalk to back of sidewalk.

c. Complete construction of curb, gutter and sidewalk after approval of the subgrade by the City's Construction Inspector.

d. In addition to Section 90-8 Protecting Concrete, the Contractor shall protect newly placed concrete finish from rainy conditions, graffiti, and weather related damage. In addition, all Contractor wheeled equipment shall not travel within 1 foot of the lip of gutter in the first 24 hours following concrete placement. Contractor's vibratory compaction equipment shall not operate within 72 hours and until all adjacent sidewalk, curb and gutter concrete has reached a minimum of 1400 psi compressive strength.

e. Complete finish grading of subgrade for pavement, conduct proof rolling test and begin placement of aggregate subbase and/or aggregate base after approval of the finished subgrade by the City's Construction Inspector.

B. Aggregate Base and Subbase: Roadway aggregate base and subbase, lime/cement treated base and sidewalk, curb and gutter shall not be placed until the following items of construction within the City street right-of-way and Public Utility Easement (PUE) are completed:

1. Installation of underground sewer and water systems and testing or televising, and approval of same by the Development Services Construction Inspector.

Completion of testing for the presence of bacteria and the water system tie-in shall not be requirements for the approval of commencement of surface improvement construction. However, the water main tie-in shall be completed prior to paving. The Contractor shall

schedule operations such that the curb, gutter and sidewalk pour shall not be conducted on the same day as the water tie-in.

2. Installation and mandrelling of the non-rigid underground storm drain pipe and approval of same by the City's Construction Inspector.

Installation of electric, natural gas, telephone, traffic signal (including interconnect) and cable TV, including mandrelling and testing of all conduits, installation of 4x4 markers a minimum of 2 feet high, painted red, buried at the crossing ends (if conduit ends do not extend up from finish grade). This includes all dry utility crossing and longitudinal trenches.

3. Backfill and compaction testing of all trenches related to the above and approval of same by the City's Construction Inspector.

All aggregate base and subbase (AB and ASB) shall be installed per provisions in Sections 25 and 26 of the Caltrans Standard Specifications. AB and ASB shall be compacted to 95% relative compaction. An oil seal is not required on the AB surface. If required by the City's Construction Inspector, AB and ASB shall be tested for compaction and approved by geotechnical engineer, licensed in California. It shall be proof rolled as specified in Section 71-4,A.1 above if requested by the City's Construction Inspector. Written certification of compliance to these requirements shall be provided to the City's Construction Inspector.

Aggregate base shall be installed as a base for pavement where specified on the approved plans including over lime and fly ash or cement treatment is used to stabilize the ASB.

Aggregate base in any thickness determined by the contractor may be used for meandering sidewalk wherever that sidewalk is not connected to the back of curb, or as a base for A-7 driveways outside the sidewalk at the curb returns. All aggregate base shall be compacted to 95%.

Where lone valley gutters are placed within the City pavement as in an alley, the aggregate base section for the gutter shall extend to the same depth as the aggregate base section for the adjacent asphalt concrete pavement.

Prior to paving, deflection in the compacted AB shall be eliminated. Paving shall not commence without the approval of the City's Construction Inspector.

Lime/fly ash or other stabilizers may be permitted for subbase stabilization as recommended by the geotechnical engineer and shall not be used as a substitute for structural section components. The City, following addition and processing of lime/fly ash or cement shall require mandrelling of all non-rigid and shallow rigid underground utilities at the discretion of the Development Services Construction Inspector. All utility systems shall be cleaned as appropriate. In the event a dig up and repair is required following lime/cement treatment of ASB; the entire excavation shall be backfilled with either 2-sack cement slurry to finish subgrade, or dry native material compacted and conforming to the Construction Standards to within two feet of finished subgrade and top of two feet of excavation shall be two-sack cement

slurry. Subgrade stability for roadway and/or concrete curb, gutter & sidewalk shall be reload tested by proof rolling with a loaded 3,000 gallon water truck and approved by the City Construction Inspector prior to the placement of aggregate base.

C. Minor Concrete: All concrete curbs, curb & gutters, sidewalks, curb ramps, driveways, bus stop pads and turnouts shall be installed per provisions in Section 73 of the Caltrans Standard Specifications, and the Construction Standard Details ST-17 through ST-30 and ST-35 and ST-37 including the following provisions:

1. Thickness: All residential and commercial sidewalks shall be either 6" thick, or 4" thick with 4" of compacted aggregate base.

All commercial driveways, round-a-bout centers and bus turnouts shall be 8" thick, with number 4, grade 60 rebar, on 18-inch centers each way. Rebar shall be set on 3 inch concrete dobies/rebar supports at three foot maximum spacing each way. The dobies shall include wire ties. See the Construction Standard Details.

Base for commercial driveways may be processed native subgrade or 3/4–inch aggregate base compacted to 95% relative compaction.

2. 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. A heavy broom finish is not allowed. A concrete finish not conforming to the Caltrans Standard Specifications with regard to blemishes and alignment tolerances shall be cause for rejection of the work.

No stamps advertising construction companies or other private concerns shall be placed in the concrete.

A detectable warning (truncated dome) panel shall be placed at the back of curb line, immediately behind the curb and gutter, centered in the opening to the street (regardless of slope) at every curb ramp (And shall not be sized as shown on the Case C ramp on Caltrans Revised Standard Plan RSP A88A). At minimum, the panel shall consist of a one piece, 4 foot by 3 foot panel but shall be sized according to the path of travel dimension (e.g., 5 foot by 3 foot in the case of an A-7 Driveway (ST-22)). The long dimensions of the panel shall be along the face of curb. The top, flat, dome panel surface (excluding the domes) shall be placed flush with the adjacent top of concrete surface.

Any runoff water standing behind the curb, on the panel, or concrete voids under the panel, shall be cause for replacement of the panel. See Section 71-5 (Materials).

3. **Tool joints and score marks**: Tool joints and score marks shall be placed through the sidewalk, curb and gutter section at the following intervals for the sidewalk widths indicated. All tool joints shall be a minimum 2 inches. There shall be no expansion joint material used in the City right-of-way.

   The purpose of the tool joint is to separate the aggregate and control cracking. During concrete finishing, after placement of a minimum 2 inch deep tool joint, the joint shall be redressed/finished with a 3/8 inch joint tool, per Detail ST-17.

Sidewalk Width (feet)	Deep Tool Spacing (feet)	Score Mark Spacing (feet)
4	12	4
5	10	5
6	12	6
8	12	6
10	10	n/a

   A score mark shall be placed at the back of the curb for the total length of all monolithic curb, gutter and sidewalk including through curb ramps and driveways. The above intervals for perpendicular score marks in sidewalk shall also apply through curb ramps and driveways.

   All barrier curb and valley gutters shall include deep tool joints at 12 foot intervals maximum.

   The use of sawcutting in lieu of deep tool joints is not acceptable.

4. **Grades**: All sidewalks (including portions through driveways and curb ramps) shall be constructed with a minimum cross grade of 1% and a maximum of 2%. Parallel to the street, the grade of the curb ramp landing shall conform to the longitudinal grade of the street.

   The cross-slope of curb ramps shall be 2.0% maximum. At pedestrian street crossing without yield or stop controls and at midblock pedestrian street crossings, the cross slope shall be permitted to equal the street or highway grade. However, the designer should strive to hold the 2.0% cross slope before deciding to match the street or highway grade. In most cases, the 2.0% can be held and a detail would be needed to show the transition and the pavement/sidewalk conformance. To accomplish this, the gutter pan must be warped before additional slope, beyond the 2%, is introduced outside of the curb ramp itself (on the pavement and sidewalk). The cross slope of the curb ramp should also not exceed that of the crosswalk regardless of the roadway profile grade.
   For all curb ramps the maximum of 8.33%.

For the ramp to the lower side of the landing, (where the ramp must be shortened to achieve the minimum 7% grade), 4 feet shall be the minimum length transition allowed.

For meandering sidewalks, the maximum grade in the direction of travel shall be 5% if the street grade allows. If the longitudinal street grade exceeds 5%, the curb side of the meandering sidewalk shall parallel the grade of the back of curb, maintaining a grade of 2% from the edge of sidewalk to the back of curb. For all meandering sidewalks, a minimum cross grade of 2.0% shall be maintained from the edge of sidewalk, across the planter to the back of curb. Where curb ramp landings adjoin the back of curb, the top of curb shall be sloped up from the gutter flow line 1.0% to 2.0% to the back of landing for Type 1 and Type 2, curb and gutter (Detail ST-22).

Gutter slope from lip to flowline shall be as shown on Detail ST-17. The maximum grade shall not be greater than 5%. The minimum shall not be less than 4% for both the Type 1 or 2 curb and gutter.

The preceding slope specification conform to ADA, California Division of the State Architect, and Caltrans Standard Specification requirements. Any finished concrete not conforming to theses slope specification shall be removed and replaced by and at the expense of the contractor.

5. **Monolithic sidewalk, curb and gutter**: All adjoining sidewalk, curb and gutter shall be poured monolithically.

6. **Curb and gutter installation in an existing street**: In an existing asphalt concrete 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.

   In an existing PCC street, if the City Inspector determines the pavement edge is flawless the curb and gutter may be poured against the existing pavement. For streets with bike lanes the existing pavement shall be removed to the bike lane strip and the lip poured against a form board. For streets without bike lanes a minimum width of one-half of the exiting joint spacing of existing pavement shall be removed outside the proposed gutter lip and the lip poured against the form board.

   The resulting patch on all streets between the gutter lip and the existing pavement shall be 6 inches thick minimum, or the thickness of the existing pavement, whichever is greater. The pavement patch shall be placed within 2 weeks of the conclusion of the concrete curb and gutter pour.

7. **Curb Ramps, General**: See Details ST-22, ST-26, and ST-27. Other ramp configurations in the Caltrans Standard Plans may be used upon the pre-approval of the City Engineer only if site conditions prohibit use of Roseville's standard ramps.

All grade changes at the back of walk for curb ramps shall be staked by a licensed surveyor, conforming to these Construction Standards.

Specifications for curb ramps in the Construction Standards take precedence over the Caltrans Standard Plans and Specifications. Where there are discrepancies between details shown on the approval plan sheets and the Construction Standards, the plans shall be revised to conform to the Construction Standards unless specifically approved by the City Engineer.

8. **Epoxy Work**: Epoxy shall be liberally applied to a minimum of 95% of all existing surfaces to be connected. Epoxy shall be two-part and conform to ASTM C 881/ AASHTO M 235, see Section 71-5 (Materials).

9. **No Sidewalk at Back of Retaining Curb**: At any curb ramp, no pedestrian surface (i.e., concrete, asphalt concrete, paving stones, etc.) adjacent to the back of sidewalk, shall be constructed within 3 feet behind the retaining curb. This area shall be finished with landscaping, cobbles or other non-pedestrian surface only. If the occasion arises wherein the City Engineer determines that placing concrete behind the retaining curb is justified, the top and face of the retaining curb shall be painted yellow.

10. **Curb, Gutter and Sidewalk Patching**: Patch material shall conform to Section 71-5 (Materials). A professional concrete mason shall apply the patch. The patch shall be flush with the existing concrete and a similar finish shall be maintained. The City's Construction Inspector shall determine if the damage to the concrete warrants patching. Generally, any conspicuous damage shall be patched.

11. **Dowelling New Concrete to Existing**: When pouring combinations of sidewalk or curb and gutter contiguous to existing, the existing concrete vertical face shall be doweled 3 feet on center with 16 inch long, grade 60, #4 rebar penetrating 4 inches into the existing curb, 4 inches below top of curb. The dowel hole shall be 5/8-inch diameter at a slight angle horizontally. The penetrating portion of the dowel and the entire cleaned vertical surface of the adjoining existing concrete shall be 95% coated with two-part epoxy. All abutting sidewalk shall be doweled mid-section with 2 dowels for 4 through 6 foot wide sidewalk and 3 dowels for wider sidewalk. Abutting curb and gutter ends shall 2 dowels installed, 18 inches apart, centered on the curb and gutter section. See Section 71-5 (Materials) for epoxy.

    Where the street side of the meandering sidewalk meets the back of curb at less than a 90 degree angle, the return to the back of curb shall be a minimum 18 inch radius or 18 inch space shall be provided between the front face of sidewalk and the back of curb.

    Replaced sections shall be removed back to score marks, expansion joints or deep tool joints; or at the discretion of the City's Construction Inspector.

    If the existing edge is damaged during removal, the concrete shall be sawcut again at the City's Construction Inspector's discretion.

12. **Sidewalk, curb and Gutter Replacement**: Where sidewalk and/or curb and gutter is being replaced, the maximum length of sidewalk that may be replaced non-monolithically (without the attached curb and gutter) is 20 feet. If more than 20 feet is damaged continuous, the total sidewalk, curb and gutter section shall be removed and replaced monolithically. Where sidewalk, curb and gutter or curb ramps and driveways with sidewalk, curb and gutter as portions thereof are replaced, all replacement shall conform to the latest Construction Standards. In the case where concrete sidewalk replacement is necessary where either the brass disc or property line score mark is removed, the developer shall be responsible to re-establishment of the surveyor's permanent marker in kind as identified on the Final Map.

13. **Median Islands**: All new roadway median infill areas shall have basket weave pattern stamped concrete with brick red #1117 per Detail ST-37.

    Existing cobble medians in retrofit areas effected by utility cuts or damage will be replaced per the following:

    Cobbles set in 4 inches of pea gravel concrete. The top surface of the concrete shall be flush with the top of curb. Where cobble demolition within a median amounts to 50% of the area or more, all existing cobbles to be removed and replaced with "Ashler Slate" per Detail ST-37, and at the applicant's expense.

    Cobbles shall be 4 to 6 inches in size, with 1/3 exposed above the top of curb, per Caltrans Specifications. Base for concrete may be native soil compacted to 95% or Class II, ¾ inch aggregate base. On existing pavement, the two acceptable alternatives for base are ¾ inch aggregate base or total depth concrete. The surface of all embedment concrete shall be above the top of curb and graded/finished to drain.

    Existing Grey stamped medians in retrofit areas effected by Utility cuts will be replaced per the following: Gray stamped concrete retrofit areas effected as described above shall be replaced in-kind with, 4 inches thick " Ashler Slate" and standard color shall be basalt gray (QC Release Power Colors).

14. **Damaged Gutter Lip**: Gutter lip damaged during the grading and rocking operation shall be patched or replaced. Any spall extending more than 1 inch into the gutter pan from the vertical face of the gutter lip shall be patched at a minimum. See Section 71-5,G.3 (Materials).

15. **Concrete and Asphalt Concrete Saw Cutting – Sawcutting of concrete pavements shall conform to Detail ST-54.** Residual from sawcutting shall be removed by vacuum method and disposed of conforming to local environmental and State Stormwater Pollution Prevention Plan requirements. The downstream drain inlet shall be protected. In no case shall the residual be allowed to enter the storm drain system. The above-specified cleanup shall be the responsibility of the contractor.

16. **Concrete Cure**: All newly placed concrete shall be cured in accordance with the provisions in Section 90-1.03B(3)(b) of the State Standard Specifications and these Construction Standards. See Section 71-5,I. (Materials) of these Standards for curing compound. Exposed surfaces of all concrete sidewalk, curb and gutter, driveways, but turnouts and curb ramps shall be coated with a pigmented curing compound immediately following surface finishing, prior to the moisture sheen disappearing from the surface. Curing compound shall be applied at a rate of 1 gallon per 150 square feet, or per the manufacturer's recommendations, whichever is greater, unless otherwise specified.

D. Asphalt Concrete Paving: All asphalt concrete (AC) shall be installed per provisions in Section 39 of the Caltrans Standard Specifications, except as amended by Section 71 (Streets), of these Construction and Design Standards.

No paving shall occur until all underground work is completed, tested, and subgrade and/or aggregate base and/or lime and fly ash or cement treated base have been accepted by the City's Construction Inspector.

1. **Mix Design**: The Contractor shall provide the asphalt concrete mix design to the Director of Development Services at least 10 working days prior to the start of the work on the project for review and approval. The mix design must be approved prior to commencement of work.

   The asphalt concrete mix design shall indicate the following:

   a. Complete aggregate grading with the percentage of aggregate passing each sieve size per AASHTO T 27.

   b. Percent air voids for each percentage of asphalt binder used in the mix design determination per AASHTO T 269a.

   c. Stability - Per MS-2 Asphalt Mix Design Methods per Sections 3 & 8. Mix design requires Hamburg Wheel (AASHTO T 324) and Moisture Susceptibility (AASHTO T 283) once per project or every 10K tons.

   d. Maximum theoretical density for each percentage of asphalt binder used in the mix design determination per AASHTO T 209, Method A.

   e. Compacted unit weight for each percentage of asphalt binder used in the mix design determination.

   f. Percent asphalt binder recommended. (Optimum bitumen content, OBC), per AASHTO T 308, Method A.

   The actual asphalt cement content may vary up to 0.5% plus/minus from the target optimum bitumen content (OBC). For Job Mix Formula, -0.3 to +0.5%.

2. **Spreading and Compaction Equipment**: Per CalTrans Standards 2015 Section 39-2.01C(2) page 466, Paving equipment for spreading must be:

   a. Self-propelled

   b. Mechanical

   c. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane

   d. Equipped with a full-width compacting device

   e. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope

   Asphalt concrete placed in layers of 0.15-foot and greater in compacted thickness or widths of 5 feet and greater shall be spread and compacted with the equipment and by the methods specified in Section 39, except as amended as follows:

   Per the 2015 CalTrans Standards: 39-2.01C(2)(c) Method Compaction Equipment For method compaction, each paver spreading HMA must be followed by 3 rollers:

   a. One vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.

   b. One oscillating-type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.

   c. One steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons. Each roller must have a separate operator. Rollers must be self-propelled and reversible.

3. **Compacting**: The entire contents of the Caltrans Standard Specifications, “Compacting” is replaced to read:

   (See page 481 in CalTrans 2015 Standards.) Asphalt concrete shall be spread at a temperature of not less than 260 degrees F.

   A pass shall be one movement of a roller in either direction. Coverage shall be as many passes as are necessary to cover the entire width being paved. Overlap between passes during any coverage, made to ensure compaction without displacement of material, and shall be considered to be part of the coverage being made and not part of a subsequent coverage. Each coverage shall be completed before subsequent coverage is started.

Rolling shall commence at the lower edge and shall progress toward the highest portion, except that when compacting layers which exceed 0.25-foot in compacted thickness, and if directed by the Inspector, rolling shall commence at the center and shall progress outwards.

Rolling shall be performed so that tearing, cracking, shoving, or displacement does not occur. Rolling must leave the completed surface compacted and smooth.

When placing asphalt concrete, large aggregate that migrated to the surface during any handwork shall be returned to the pave box, rather than scattered over the surface of the mat.

Finish rolling or final compaction shall be completed while the temperature of the mixture is at or above 150° F. A vibratory roller may be used as the finish roller provided it is operated with the vibratory unit turned off.

Upon completion of rolling operations, if ordered by the City Construction Inspector, the asphalt concrete shall be cooled by applying water.

Asphalt concrete shall be compacted to not less than 92 percent or more than 96 percent of the theoretical maximum density as determined by AASHTO T 209 Method A and shall be finished to the lines, grades, and cross section shown on the Project Plans.

The City Inspector reserves the right to gather samples for material testing at random for the hot mix asphalt (HMA) material from behind the paving machine in accordance with CTM 125 to determine the maximum theoretical density of the HMA mixture in accordance with AASHTO T 209, Method A. The theoretical maximum density results derived from the samples shall be used to determine the relative density achieved for the same 750 ton lot.

The pavement will be accepted for density on a lot basis. A lot will consist of 750 tons or portions thereof. Cores for determining the density of the compacted pavement will be taken on a lot basis. A minimum of three (3) cores shall be taken per lot. The density of each core shall be determined in accordance with AASHTO T 275. In order for a lot to be accepted for density, all core density results shall be between 92 and 96 percent. Averaging core results is not permitted.

The Contractor shall provide daily laboratory results of ASHTOO T 275 and AASHTO T 209, Method A to the City's Construction Inspector.

In-place pavement density will be determined by comparing the density of cores taken from the compacted pavement to the theoretical maximum density as determined by AASHTO T 209, Method A, and as stated in these City Standard Specifications. Pavement cores shall be collected using a 4 to 6 inch diameter core barrel when the pavement has cooled sufficiently to minimize disturbance to the cores at the discretion of the City's Construction Inspector. Cores shall be taken by either the developer's geotechnical

engineer, as proposed at the start of construction, or the City's geotechnical consultant. No third party geotechnical engineer vendor hired by a contractor for quality control purposes shall be considered. For major backbone roadway infrastructure projects funded by community facility districts, (CFD funds), the City's quality assurance geotechnical engineering firm's laboratory testing results shall be utilized in determining acceptance.

Finish, compacted pavement height shall be ¼-inch above and over the gutter lip, except for 6 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.

The horizontal surface of AC paved against an existing AC surface shall be flush with the existing surface.

The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other means approved by the Inspector. The use of any equipment that leaves ridges, indentions or other objectionable marks in the asphalt concrete shall be discontinued, and the Contractor shall furnish acceptable equipment.

Asphalt concrete placed in layers less than 0.15-foot in compacted thickness or widths of less than 5 feet shall be spread and compacted with equipment and by the methods specified in Section 39 of the CALTRANS Standard Specifications.

4. **Miscellaneous Paving Requirements**: When a straightedge 12 feet long is laid on the finished surface and parallel with the centerline, the surface shall not vary more than 0.01-feet from the lower edge of the straightedge. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 0.02-feet are present when tested with a straightedge 12 feet long laid in a direction transverse to the center line and extending from edge to edge of a 12 foot traffic lane.

   If the finished surface of the asphalt concrete does not meet required surface tolerances, as specified above, the Contractor shall, at its own expense, bring pavement surface within tolerance by the following method:

   a. Cold plane asphalt pavement to a minimum depth of 0.15 feet from specified finish surface; (lateral limits shall be from edge of asphalt concrete to edge of asphalt concrete; longitudinal limits shall extend a minimum of 50 feet, starting from the outer edge of tolerance area and extending outward, and as directed by the Inspector). All grindings shall be removed and disposed of in accordance with Caltrans Standard Specifications.

   b. The Contractor shall apply tack coat and place an overlay of asphalt concrete in accordance with the requirements of the City Standard Specifications.

c. The area to which asphalt emulsion has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

Pavement within 50 feet of an approach to a bridge structure or approach slab shall conform to the smoothness tolerances specified in Section 51-1.01D(3)(b)(ii), "Surface Smoothness", of the CALTRANS Standard Specifications."

The surface edges that abut the proposed asphalt concrete shall be clean and free of dirt and dust prior to placing a tack coat. Asphalt emulsion shall be used as a tack coat and/or paint binder on new pavement that is to receive a second lift that has been exposed to traffic or other sources of contaminants or on existing pavements that are to receive an asphalt concrete overlay and also along exposed edges of abutting pavement and concrete curbs and gutters. A tack coat may also be required between subsequent layers of asphalt concrete placed by the contractor when ordered by the City's Construction Inspector. Asphalt emulsion shall conform to Section 92, "Asphalt Binders", of the Caltrans Standard Specifications.

Prior to City acceptance of the improvements (Certificate of Completion), and following the 12 foot straightedge test, and any remove and replace areas with new overlay pavement, streets may be flooded to check for standing water. This procedure may be repeated prior to the expiration of the warranty period. This may be accomplished with a water truck or with rainwater. All low areas in the asphalt concrete pavement holding 0.01-feet for longitudinal and 0.02-feet for transverse depressions or more of water shall be marked by the City's Construction Inspector and milled 0.15-feet and replaced with similar material. A second water test may be necessary at the discretion of the inspector.

A micropave surface treatment or Caltrans slurry seal may be required at the City's Construction Inspector's discretion following cold planing as described above if it is determined the paving surface is sufficiently irregular, boney, discolored, or unsealed to warrant it.

The Contractor shall schedule paving operations such that at the end of each work shift, each layer of asphalt concrete is placed on all contiguous lanes and shoulders of a traveled way to be opened to public traffic

At the end of each work shift, the distance between the ends of the layers of asphalt concrete on adjacent lanes shall not be greater than 10 feet nor less than 5 feet. A drop-off of more than 0.15-foot will not be allowed at any time between adjacent lanes open to public traffic.

Additional asphalt concrete shall be placed along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.

Additional asphalt concrete surfacing material shall be place along the edge of the surfacing at private drives, hand raked, if necessary, and compacted to form smooth tapered conforms.

Longitudinal joints in successive pavement lifts shall be offset from lift to lift a minimum of 1 foot. The surface pass seam shall be located on the lane line. Where extruded concrete curb is removed for pavement widening, Contractor shall grind 1-1/2" of pavement between the nearest lane line and the existing curb and gutter line (including bike lanes). Following placement of the asphalt concrete base lift within the widening section, and 1-1/2" below the new gutter lip, Contractor to replace Petromat fabric or approved equal in grounded area, place asphalt concrete overlay, and restripe and/or replace any delineators removed during the grind.

Prior to permanent patching in a pavement removal area, fresh cut-back (temporary pavement) in a minimum thickness of 2 inches shall be placed as a driving surface.

Whether the surface material is fog sealed or cutback or slurry, the Contractor shall be tenacious in maintaining the surface in a condition and to a grade comparable to the permanent patch. No other materials are allowed as temporary pavement. Placement of steel plates over fresh slurry may be employed per Section 21-2, I. 5 of these Standards.

The temporary surface shall be flush with the surrounding pavement and shall accommodate a smooth drive across it.

Sand and dirt shall not be allowed to accumulate on the slurry surface and adjacent street. It shall be swept daily if necessary.

Utility boxes in asphalt concrete or off-street paths shall include a 12 inch x 12 inch concrete collar of Type II minor concrete as defined in Section 71-5 and W-16 Details of these standards. The top of the collar shall either be 3 inches below the surrounding pavement or flush with the finished surface with medium broom finish. The area shall be patch-paved with asphalt concrete as with manholes, water valves and monuments in the street way.

If a bucket or tank or diesel fuel is carried on the paver for the purpose of cleaning rakes and shovels, a container of grease sweep or equivalent absorbent material shall also be carried on the paver. All diesel spills shall be promptly cleaned up.

Where multiple and grouped HMA cores have been taken from new HMA roadways for the purpose of either additional testing and/or subsurface investigation, permanent patching shall consist of: "Squaring-Up" area to 6 inches beyond outside edge of cores, mill pavement to 0.15 feet deep, place full depth HMA into core holes, then place paving fabric into milled surface, and repave these Standards. Patching limits shall be at the discretion of the City's Construction Inspector.

5. EXISTING PAVEMENT

a. Cut lines made on existing pavement, both longitudinally and transversely, for the placing of new structural section shall be straight and smooth.

b. Edge grinding (Cold Planning) shall be required where existing asphalt is to be overlaid. 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.

c. Existing pavements to be overlaid with asphalt concrete shall include the installation of pavement reinforcing fabric in accordance with CalTrans 2015 Standards section 96-1.02J , Materials of the Caltrans Standard Specifications at the discretion of the City's Construction Inspector.

d. Existing AC surfaces to remain shall be cut in a straight line parallel to the street centerline, and the exposed edge shall be tracked with SS1H emulsion or equivalent prior to paving. For moratorium defined streets, CRAFCO Pavement Adhesive, "Qwik Seal" or approved equal shall be used per manufacturer recommendations. The exposed base material shall be graded and re-compacted per these Construction Standards prior to paving. Graded and re-compacted areas shall be approved by the City's Construction Inspector prior to paving.

e. Where crack sealing is required: Cracks less than ¼ inch in width shall be sealed with SS1-H asphalt emulsion and 30 grit sand. Cracks from ¼ inch to ¾ inch shall be sealed with CRAFCO hot melt rubber sealant or approved equal. Excess sealant shall not extend more than 1 inch outside the crack onto the pavement surface or above the finished surface of the street. Where cracks larger than ¾ inch (or pavement alligator cracks) occur, asphaltic concrete patching may be required at the discretion of the City's Construction Inspector.

f. Where an excavation in the public right of way is backfilled with 2 sack cement slurry per these Construction Standards, the slurry may be brought to the top of the trench until permanent patching. Where rock-saw utility trenching is necessary in the bottom lift of asphalt concrete and prior to placement of top lift of asphalt concrete, the rock saw trench shall be covered with Glasgrid product (8512, with 100X200 KN tensile strength) or approved equal, at the manufacturers recommendations prior to the placement of top lift of asphalt.

g. If the width of existing pavement between the gutter lip and excavated patch/pave area is 3 feet or less, all existing pavement between the patch/pave area and the gutter lip shall be removed or milled 0.15 feet in depth, and patched conforming to the adjacent patch/pave area requirements.

h. Pothole restoration shall be per Detail TB-5 of these Construction Standards. At the discretion of the Development Services Construction Inspector, the top 6 to 8 inches of asphalt may be replaced with concrete colored throughout with lamp black. In the event that an excessive number of potholes are in close proximity to one another, the

Development Services Construction Inspector may require a grind and overlay to reestablish continuity and ride ability to the roadway surface.

E. Portland Cement Concrete Paving: All Portland Cement Concrete (PCC) pavement shall be installed per provisions in Section 40 of the Caltrans Standard Specifications, except as amended by these Construction and Design Standards.

No paving shall occur until all underground work is completed, tested, and subgrade and/or aggregate base and/or lime and fly ash or cement treated base have been accepted by the City.

Raveling shall be defined as: Progressive disintegration of the concrete pavement surface resulting in dislodged aggregate.

1. Mix Design: The Contractor shall provide a concrete mix design to the City at least 10 working days prior to the start of work on the project for review and approval. The City can provide past examples of mix designs as a template. The mix design must be approved prior to commencement of work.

The PCC pavement mix design shall indicate the following:

a. Mix design shall include proportions including all material weights, volumes, density (unit weight), water-cement ratio, and void content. The mix design shall specify an average compressive or flexural strength that meets or exceeds the acceptance criteria for the specified strength.

b. For streets and parking lot pavement the minimum allowable average strength of the concrete per ASTM C 78, or California Test Method 523, is 550 psi at 28 days age. The average must be calculated using at least three replicate specimens.

c. Rapid set concrete pavement shall be tested per California Test Method 524, and sampled per California Test Method 539. The rapid strength concrete must not have an opening modulus of rupture of less than 400 psi and a 3-day modulus of rupture of not less than 500 psi.

d. A correlation curve between flexural strength and compressive strength using the same mix design.

e. Certification that the mix design will meet the requirements for strength, schedule, and road opening.

2. Pre-paving Meeting: The Contractor shall schedule a pre-paving meeting prior to the submission of the Quality Management Plan to discuss the Quality Management Plan and methods of performing each item of the work. Attendees to include:

- Contractor's Project superintendent
- Concrete paving foreman
- Foremen responsible for earthwork and pavement base

- Representatives from subcontractors for adjacent and related work
- Engineer of Record
- City Project Manager
- Testing Laboratory
- Testing staff

3. **Quality Control Plan**: The Contractor shall provide a Quality Control (QC) plan for concrete paving to the City for review at least 10 working days prior to the start of work on the project for review and approval. If the pavement is at least 2,000 cubic yards the contractor shall supply a Quality Control manager. The QC plan shall address the elements affecting concrete pavement quality. The QC plan shall include action and suspension limits and details of corrective actions to be taken if any process if outside those limits

4. **Submittals**: Contractor shall also submit the following to the City at least 10 working days prior to start of work on the project for review and approval:

   a. Construction schedule for all PCC related operations.

   b. PCC production procedures, description of batching or batching and mixing plant used, and also PCC delivery methods. List of all equipment proposed for the use to perform the placement of PCC including paving equipment and compaction equipment.

   The paver and mixing equipment used must match that listed on the submittal, unless a substitution is made, which meets these specifications and is approved by the Engineer.

   c. Outline of procedures for calibrating the mixing plant, if a mobile plant is used, and monitoring materials during construction shall also be submitted.

   d. Complete paving procedures including, but not limited to, line and grade control, direction of paving operations, paving widths, jointing plan for planned longitudinal and transverse construction joints, and curing method.

      1. Spacing between joints shall not exceed 15 feet unless approved by City.

      2. Larger horizontal dimension of each slab panel shall not exceed 150 percent of smaller horizontal dimension, unless approved by the City.

      3. Contraction joint depth shall be 1/3 pavement thickness.

      4. Concrete pavement joints need to mesh with the traffic control plan and final pavement delineation. Joints shall be either coincidental with or bifurcate the final traffic lane lines.

   e. Certification of aggregate source.

f. Certification of Portland cement and supplementary cementing materials.

g. Certification of mixing water for PCC.

h. Certification of chemical admixtures for PCC.

i. Certification of curing compound.

j. Contingency plan, including but not limited to backup paving equipment and backup batching facility.

k. Methods of handling, storing, delivering and mixing of materials.

l. Operating procedures for corrective action(s) necessary to assure a tight, smooth surface on the PCC pavement, free of tears larger than 1/4" width and 1/4" depth and other surface imperfections, including surface pitting.

5. **Construction Equipment**: PCC pavement shall be placed with approved paver or other equipment.

   a. Concrete pavement shall be spread, screeded, shaped, slip formed, and/or consolidated by one or more self-propelled machines. These machines shall perform in a manner so that the completed pavement will conform to the required cross section with a minimum amount of handwork. Consolidate the concrete with internal vibrators or other authorized method.

   b. The equipment shall operate in a manner that will prevent segregation and produce a smooth continuous surface without tearing, pulling or shoving. The spread of the PCC shall be limited to a length that can be placed and finished within the appropriate time limit under the prevailing air temperature, wind, and climatic conditions.

   c. The equipment shall proceed in a steady, continuous manner. Equipment speed during placement operations shall not exceed the speed necessary to ensure that minimum density requirements are met and surface distress is minimized.

6. **Weather Limitations**: Do not place PCC pavement when the ambient temperature is below 45°F, or is expected to fall below 32°F within 48 hours of placement, unless otherwise permitted in writing by the City.

   Do not place PCC pavement when the ambient temperature is above 95°F unless otherwise permitted in writing by the City.

   If you plan to place PCC pavement in the above conditions, submit a plan to the City outlining procedures and methods for curing and weather protection.

   Do not place PCC pavement when the wind, heat or humidity do not allow enough time to place, properly joint, compact, edge, finish and cure before the surface dries.

7. **Condition of the Subgrade/Subbase**: Prior to PCC pavement placement, the surface of the subgrade/subbase shall be clean and free of foreign material, ponded water and frost prior to the placement of the PCC pavement mixture. The subgrade/subbase must be uniformly moist at the time of PCC placement. If sprinkling of water is required to remoisten certain areas, the method of sprinkling shall not be such that it forms mud or pools of free-standing water. Prior to placement of PCC, the subgrade/subbase shall be checked for proper density and soft or yielding areas and these areas shall be corrected per these specifications.

8. **Joints**: The jointing plan shall be consistent with the recommendations and requirements in ACI 325.12R – "Guide for Design of Jointed Concrete Pavements for Streets and Local Roads" in addition to the requirements of these Construction and Design Standards. Prior to placement of the PCC pavement, joint locations shall be marked by the contractor in the field to insure cold joints will align with the jointing plan. Following PCC placement, and before sawcutting the joints, the jointing plan shall be marked on the PCC by the contractor with a temporary marking material to demonstrate to the engineer that the sawcuts are being placed per the plan.

   New joints in plastic concrete or recently hardened concrete shall align with joints in older concrete. Joints abutting curbs and other fixed concrete shall be installed within 10 degrees of perpendicular to the older concrete.

   If joints are to be sealed they shall be clean and dry before joints are sealed. The Contractor shall not place joint sealant or fillers prior to 72-hours after the joint was sawcut. The Contractor shall remove all loose debris from the joints immediately prior to placing joint sealant or filler.

   Expansion Joints shall be placed at intersections of concrete pavement streets.

   Formation of Joints

   a. **Cold Vertical Joints**: Any planned or unplanned construction joints that do not qualify as fresh joints shall be considered cold joints and shall be treated as follows:

      1. Longitudinal and Transverse Cold Joints. Cold joints cut after two hours of placement shall be saw-cut to 1/3 depth of the PCC pavement with the rest removed by hand or mechanical equipment. Any modification or substitution of the saw cutting procedure must be demonstrated to and accepted by the Engineer. All excess material from the joint cutting shall be removed.

      2. Prior to placing fresh PCC mixture against a cold vertical joint, the joint shall be thoroughly cleaned of any loose or foreign material. The vertical joint face shall be wetted and in a moist condition immediately prior to placement of the adjacent lane.

      3. Uneven surfaces or slopes greater than as determined for "Cold Joint Edges" shall be

cut vertically for the full depth of the PCC.

4. The top layer shall be placed so that longitudinal joints in that layer will coincide with joints in the lower layers of the pavement. Transverse joints in the top layer shall coincide with transverse joints in the lower layers of the pavement.

b. Horizontal Cold Lift Joints: For horizontal cold joints the surface of the lift shall be kept continuously moist and cleaned of all loose material prior to placement of the subsequent lift. The use of a cement slurry or mortar grout between lifts is required. If supplementary bonding materials are used, they shall be applied immediately prior to placement of the subsequent lift.

c. PCC Pavement Joints at Structures: The joints between PCC pavement and concrete structures shall be treated as isolation vertical joints.

d. Control Joints: Control joints shall be constructed in the PCC pavement to induce cracking at pre-selected locations. Early entry saws shall be utilized as soon as possible behind the rolling operation and set to manufacturer's recommendations. Saw crack control joints to the interval specified on the plans. The depth of the crack control joints shall be equal to 1/3 of the thickness of PCC pavement. The width of the crack control joints shall be 1/8" maximum. Extend all crack control joints the entire width of paving. When sawing crack control joints, begin as soon as the PCC cuts without excessive raveling along the saw cut and finish before conditions induce uncontrolled cracking, regardless of the time or weather. Control joints shall be sprayed with curing compound immediately.

e. Isolation Joints: Line the perimeter of fixed structures such as manholes, valves, trench drains, and with strips of fiberboard or other approved isolation joint material, as noted in the plan details, prior to paving. Joint filler for isolation joints must be preformed expansion joint filler for concrete (bituminous type) in compliance with ASTM D 994.

f. Expansion Joints: Install expansion joints to the details, dimensions and locations shown on the jointing plan Include width, filler, sealing material, location and/or spacing recommendations in the expansion joint plan, considering thermal effects, regional climatic conditions, PCC coefficient of thermal expansion and expected daily temperature ranges at the time of placement.

9. Curing

a. General: Immediately after final rolling, compaction testing, and finishing use an approved curing method outlined below. Water cure or curing compound shall be applied vertically from above the pavement. Application shall not be allowed from the side of the pavement. During this work the Contractor shall control the work such that it does not result in visible water or curing compound particulate migration. Reapply curing compound to sawcuts and disturbed areas

b. Curing Compound: A clear with sacrificial red dye membrane forming curing compound conforming to ASTM C 309 Type ID Class B shall be applied at a rate of 150 sf / gallon no later than one hour after completion of finishing operations on the surface and edges of RCC. This application must ensure a uniform continuous (free of uncured areas) membrane across the entire RCC pavement. If the application rate is found to be insufficient, the Contractor, with approval of the Engineer, can increase the application rate to a level which achieves a void-free surface without ponding. In case the minimum rate of application is specified otherwise by manufacturer's recommendations, the highest application rate shall govern. After the first coat dries, apply a second coat per the above specifications.

c. Sheet Materials: Curing paper, plastic and other sheet materials for curing RCC shall conform to ASTM C 171. The coverings shall be held securely in place and weighted to maintain a close contact with the RCC surface throughout the entire curing period. The edges of adjoining sheets shall be overlapped and held in place with sand bags, planking, pressure adhesive tape, or other City-approved method. Sheet material shall be provided and kept readily available to cover pavement less than 12 hours old if rainfall occurs.

10. Concrete Pavement Smoothness

The City accepts pavement surfaces for smoothness based on compliance with the smoothness specifications for the type of pavement surface and roadway classification specified.

For areas that require pavement smoothness determined using a 12-foot straightedge, the pavement surface must not vary from the lower edge of the straightedge by more than:

- 0.01 foot when the straightedge is laid parallel with the centerline
- 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
- 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

The Engineer may order you to recalibrate your inertial profiler equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your inertial profiler operator.

The smoothness criteria are shown in Table 7-X.

Table 7-X: Concrete Pavement Roughness Acceptance Criteria

Roadway Classification	Localized Roughness (International Roughness Index)	Mean Roughness Index (per 0.1 mile section)
Alley-way	≤ 190 in/mi	≤ 95 in/mi
Minor Residential	≤ 190 in/mi	≤ 90 in/mi
Primary Residential	≤ 190 in/mi	≤ 90 in/mi

Collector Non-Residential Collector	≤ 160 in/mi	≤ 75 in/mi
Industrial	≤ 190 in/mi	≤ 90 in/mi
Minor Arterial	≤ 160 in/mi	≤ 75 in/mi
Major Arterial	≤ 160 in/mi	≤ 75 in/mi

11. Additional PCC Paving Requirements

a. Lift Thickness: Place PCC in lifts between 4 inches and 9 inches thick. Multiple lifts are not allowed for pavements less than 9 inches thick.

b. Segregation: If segregation occurs in the PCC during paving, operations shall cease until the cause is determined and corrected.

c. Placement: PCC placement shall be done in a pattern so that the curing water from the previous placements will not pose a runoff problem on the fresh RCC surface or on the subbase layer.

d. Restoration After Quality Assurance Testing: The Contractor shall fill the core holes with Portland cement concrete as directed by the Engineer. Concrete shall meet the requirements of Section 25, "Portland Cement Concrete Pavement" of the Standard Construction Specifications. Core holes are to be filled to be flush with surrounding pavement surface.

Thickness requirement shall occur after the required, if any, diamond grinding of the PCC pavement.

Removal of temporary traffic stripes shall not result in difference in pavement surface difference. If difference is visible to City Inspector, the Contractor shall treat the surface to remove the difference.

F. Roller Compacted Concrete Paving: All Roller Compacted Concrete (RCC) pavement shall be installed per provisions for PCC paving in these Construction Standards and in Section 40 of the Caltrans Standard Specifications, except as amended by these Construction and Design Standards. Attention is directed to ACI 327R-14 – "Guide to Roller Compacted Concrete Pavements" for recommendations and best practices for RCC.

1. Proposed mix design(s) shall meet the following minimum strength requirements based on test results of cylinders prepared according to ASTM C1435.

RCC shall have minimum compressive strength of 4,000 psi at 28-days or 5,000 psi at 42-days. In addition, the RCC shall have a minimum compressive strength of 3,000 psi at 3-days.

Consistency and formability of RCC shall be adequate to the methods of its production, delivery, placement and consolidation. The objective consists of proportioning RCC that

contains sufficient volume of paste to coat the aggregates and fill voids between them, is able to produce the required strength and durability, constructs roads that can be open to traffic within 3 days or sooner should the RCC reach the required strength before 3 days, and makes it easy to achieve the maximum density. Contractor submits to the Engineer along with the statement of the proposed mix design data justifying the selected consistency and formability of the mix and method of its control.

2. An independent testing laboratory shall proportion RCC to meet the specified requirements for strength and Contractors requirements for consistency and formability. The laboratory shall demonstrate its compliance with the requirements of ASTM C1077. The mix design backup information shall show the moisture-density curve with associated maximum dry density, wet density and optimum moisture content, details of cementitious materials, 3-day, 7-day and 28-day, or 42-day compressive strengths, including strength gain curve for the proposed mix. The mix design shall identify the quantity and gradation of aggregates, the optimum moisture content, and the amount of Portland cement, other cementitious material(s) and the total cementitious materials required per cubic yard of the concrete. The mix design shall specify the proportions of each material (aggregate, cement, water, and admixtures) in the mix in terms of pounds per cubic yard based on saturated surface dry weights. Any changes to the mix design shall be approved by the Engineer. Should a change in material source be proposed, the Engineer must approve a new mix design.

3. Proportioning of RCC shall be performed in general compliance and in the sequence recommended by ACI 327R-16, Chapter 6 “Mixture Proportioning.”

4. Batching, Mixing and, Transportation of RCC:

The City shall approve the mixing plant before the Contractor begins producing RCC. The mixing plant shall follow ACI 327R-14.

The plant shall be capable of producing an RCC mixture in the proportions defined by the final approved mix design and within the specified tolerances. The capacity of the plant shall be sufficient to produce a uniform mixture at a rate compatible with the placement equipment. The minimum homogeneous production rate of any acceptable plant shall be 300 tons per hour. For batch mixers, the volume of RCC material in the mixing chamber shall not be more than the rated capacity for dry concrete mixtures. Multiple plants shall not be used to supply RCC material to the paver. The Engineer can halt operations if the plant is unable to produce the RCC mixture sufficiently in quality or quantity, until a plant meeting all requirements is obtained.

A pugmill plant is required, it shall be a central plant with a twin shaft pugmill mixer, capable of batch or continuous mixing, equipped with synchronized metering devices and feeders to maintain the correct proportions of aggregate, cement, mineral admixture, and water.

Other types of batching and mixing equipment and configurations other than twin shaft

pugmill mixers may not be used. This includes but is not limited to dry batch plants, central mix tilt drum plants, ready mix truck mixers, volumetric concrete trucks and trailers.

The mixing time shall be pre-established by uniformity studies conducted, as provided in ACI 327R-14, Section 8.2 "Roller-compacted concrete mixing plants."

Locate the mixing plant within 30 minutes hauling time from the construction site. The supplier may request a longer hauling time not exceeding 60 minutes, provided the documentation is submitted evidencing that properties of fresh RCC are suitable and allow for convenient and proper placement and consolidation.

For RCC produced with a mobile pugmill, prior to commencement of RCC production, the Contractor shall carry out a complete and comprehensive calibration of the plant in accordance with the manufacturer's recommended practice. The strength requirements per these specifications or as directed by the Engineer. The new concrete shall be doweled into the existing RCC layer using dowel bars. Please refer to Caltrans Standard Plan P10. – ~~Appendix G.~~

5. Surface Requirements

a. Surface Texture: The final surface texture after rolling and curing shall be smooth and uniform over the entire area of pavement and will reasonably match the surface condition of the test strip. The surface area shall be free of rips, bird baths, areas of loose aggregate, surface pitting, voids or indentations, pockmarks, surface tears greater than 1/4" depth and 1/4" width, check cracking, segregation or rock pockets, pumped areas, aggregate drag marks, and areas where fines have been washed away during the curing process.

b. Defective area Correction for Surface Texture: Correct surface texture deficiencies using an approved grinding device, or removal and replacement.

c. Areas with excessive smoothness and texture issues, as determined by the City when compared to the approved test section, shall be removed and replaced from joint to joint.

6. Density Requirements

a. In-place Wet Mat Density Determination. Determine the In-place Wet Mat Density on pavement that is at least 24 inches from any joint in accordance with ASTM C1040 Direct Transmission mode at 75% of total RCC pavement depth for each lot of RCC pavement per Table 7-X. For pavement placement units consisting of less than one lot of RCC pavement, include the pavement with the previous or next placement unit.

b. In-place Wet Joint Density Determination. Determine the In-place Wet Joint Density on joints at distance 12 inches or greater for free edge and 6 inches or greater for a confined edge accordance with ASTM C1040 Direct Transmission mode for each lot of RCC pavement per Table 7-X. For pavement placement units consisting of less than one lot of RCC pavement, include the pavement with the previous or next placement unit.

c. Defective Area Correction for Density. For In-place Wet Mat Density and In-place Wet Joint Density, full payment will be made for pavement based on the acceptance criteria in Table 7-X. Pavement lots that have density that is less than the required density are subject to further evaluation. Take an additional test within a 5 to 8 foot radius, of the original test (within the same placement unit). If this test is below the acceptance criteria in Table 7-X, additional roller passes shall be made across the full lane width between the last testing location that produced an acceptable reading and the paver. If the additional roller passes does not correct the problem, or causes the density to decrease, the paving operation shall be discontinued until corrections can be made to assure that the specified density can be achieved.

7. Opening to Traffic

Traffic may be allowed on the concrete pavement once the concrete has attained 3,500 psi compressive strength. The Contractor may request early traffic opening for residential light-duty vehicles when the concrete has attained a compressive strength of 2,500 psi with approval by the City. This early opening must not damage the concrete pavement.

8. Pavement Test Section

a. Construct a 150-foot long test section prior to starting construction. Construct the test section using the proposed mixture design, the staff that will be completing the work, and the materials and equipment that are listed in the pavement construction plan and approved by the Engineer. If the pavement placement requires more than one pass of the paver, construct the test section a minimum of two paver widths wide. If the pavement placement requires more than one lift, construct the test section to the required number of lifts. If the pavement placement requires more than one day of paving or longitudinal cold joints, construct the test section over two days and begin paving from a longitudinal cold joint on the second day. Place the test section in a location approved by the City. The test section may be incorporated into the final project pending acceptance by the City.

The City shall evaluate the following criteria from the test section:

- Adequacy of the production method and equipment to meet productivity requirements and produce uniform PCC pavement.
- Maximum density directly behind the paver prior to compaction.
- Suitability of the proposed lift thickness.
- Sequence of primary/secondary roller passes (with and without vibration).
- Maximum density following roller compaction.
- Texture and surface finish acceptability.

- Integrity of both fresh and cold joints (vertical and horizontal).
- Compressive strength of PCC based on molded cylinders and extracted cores tested at 3-days, 7-days, and 28-days.
- Procedures for troweling and finishing PCC surface to meet specification
- Process for applying curing compound at appropriate rate and coverage
- Process for installing saw cuts in pavement

b. Construction (Cold) Joint Edges. The Contractor shall establish the maximum angle for edges to be used in joint faces of construction (cold) joints.

c. If the test area does not meet acceptance requirements, the Contractor shall remove and reconstruct a new test section with corrected procedures. The contractor will be required to provide new test sections, until an acceptable, reproducible test section is achieved.

9. Joints

Formation of Joints

a. Fresh Vertical Joints: Fresh longitudinal joints will only be allowed under special circumstances under the approval of the Engineer. A vertical joint shall be considered a fresh joint when an adjacent RCC lane is placed within 30 minutes of the batch time of the previous lane. This time may be reduced depending on ambient conditions, as well additional precautions may be necessary to avoid excessive moisture loss at the joint such as the use of evaporation retarders, fogging, and curing mats.

1. Fresh longitudinal joints shall be constructed prior to placement of an adjacent lane by leaving the outer 24 inches of the freshly placed lane uncompacted during rolling. Then both edges of the two lanes shall be rolled together within the allowable time.
2. Adjacent lanes shall be placed such that the new lane abuts tightly against the incomplete edge of the prior lane.
3. The joint formed by both lanes shall be compacted by centering the roller drum over the joint and compacting both edges simultaneously.
4. Extra passes of the roller may be required at the joint to achieve the required density.

b. Cold Vertical Joints: Any planned or unplanned construction joints that do not qualify as fresh joints shall be considered cold joints and shall be treated as follows:

1. Longitudinal and Transverse Cold Joints: Formed joints that do not meet

the minimum density requirements and all unformed joints shall be cut vertically for the full depth or produced using an edging shoe. The vertical cut shall be at least 6 inches from the exposed edge and located on a joint identified on the jointing plan. Do not perform this operation any sooner than 2 hours after final compaction. Demonstrate to the Engineer that saw cutting will not cause significant edge raveling and remove all slurry and excess material from the cutting operation.

If the Contractor can demonstrate that he can construct a cold vertical joint that can meet the minimum joint density requirements using an "edge shoe," then the use of the edge shoe in lieu of cutting a cold vertical joint is allowed. The edge shoe should be as close to vertical as possible with the maximum allowable positive edge angle being of 10 degrees from vertical.

c. Fresh Horizontal Joints. For multi-layer construction, a horizontal joint shall be considered a fresh joint when a subsequent PCC lift is placed within 30 minutes of the batch time of the previous lift. This time may be adjusted at the discretion of the City depending on use of retarders or ambient weather conditions. Fresh joints do not require special treatment other than cleaning the surface of all loose material and moistening the surface prior to placement of the subsequent lift.

10. Additional RCC Paving Requirements: Adjacent Lane Placement. All longitudinal joints must be considered a cold joint and shall be prepared in accordance with "Cold Vertical Joints" section found elsewhere in these specifications. Fresh joints will only be allowed under special circumstances at the Engineer's discretion. In that case, the adjacent paving lane shall be placed within 30 minutes and additional precautions may be necessary to avoid excessive moisture loss at the joint such as the use of set retarding admixtures, water misting, and blankets.

G. Groove and Grind Pavement: All grinding of PCC pavements shall be completed in compliance with the provisions in Section 42 of the Caltrans Standard Specifications, except as amended by these Construction and Design Standards.

Prior to diamond grinding, the pavement shall be profiled to ensure the smoothness requirements have been met. The profilograph created shall highlight areas of localized roughness. All grinding to bring the pavement into compliance with the smoothness requirements shall be completed prior to the finish diamond grinding as shown on the plans.

Holidays are areas of unintentional gaps in the grind pattern. All grinding shall result in a consistent surface finishing with no holidays in the grind pattern.

The ground surface will be tested with a 12-foot ±2-1/2 inches long straightedge laid on the pavement parallel with the centerline with its midpoint at the joint or crack. The surface shall not vary by more than 0.01-foot from the lower edge of the straightedge.

Cross-slope uniformity and positive drainage shall be maintained across the entire traveled way and shoulder. The cross-slope shall be uniform so that when tested with a 12-foot ±2-1/2 inches long straightedge placed perpendicular to the centerline, the ground pavement surface shall not vary more than 1/4 inch from the lower edge of the straightedge.

After grinding has been completed, the pavement surface shall be profiled to verify smoothness requirements have been met. Two profiles shall be obtained in each lane approximately 3 feet from the lane lines. The average profile index shall be determined by averaging the two profiles in each lane. Additional grinding shall be performed, where necessary, to bring the ground pavement surface within the Profile Index requirements specified in Section 40-1.03, "Quality Control and Assurance," of the Standard Specifications.

H. Sound and Retaining Walls: Construction of sound and retaining walls shall conform to the approved plans. Either the Developer's geotechnical engineer or the City Construction Inspector shall inspect all sound and retaining walls shown on the approved subdivision grading or improvement plans. Inspection coverage and observation responsibility preference shall be determined at the preconstruction meeting and determined by the Developer. An anti-graffiti coating per Section 71-5 (Materials) and per the manufacturer's recommendations 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 City's Construction Inspector.

The City's Construction Inspector shall be furnished a letter from the applicating 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 epoxied on. The adhesive shall conform to Section 71-5 (Materials) below.

I. Survey Monuments: All survey monuments shall be installed per Detail ST-36.

Survey monument caps shall be peened and stamped and rebar shall be set at the back of lot prior to the Certificate of Completion.

All rear lot property corners shall be marked with a ½" rebar, 12" long, and the top flush with finish grade. All lot corners at the street shall be marked with a 1" brass marker wet set or drilled and epoxied into the back of sidewalk 6" from edge, at the back of the City sidewalk or (absent of sidewalk) back of curb, whichever applies, or as indicated on the recorded parcel or final map.

J. Street Barricades: All street and sidewalk barricades shall conform to Construction Standard Details ST-31, ST-32, ST-33, and ST-34, respectively. Sidewalk barricades are required at the termination of all new sidewalk improvements.

K. 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 Roseville and the County of Placer relation to land grading, flood plains, drainage facilities and disposal of surplus materials.

L. Utility Boxes: Boxes for dry utilities shall not be placed in roadway pavement, the gutter pan, in driveways or in the lower half of the ramped portion of curb ramps. Utility boxes may be placed in City sidewalk only upon the approval of the City's Construction Inspector.

M. Slurry Seal Follow-Up: (For surfacing over asphalt concrete pavement) 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.

N. Detector Loop Related Paving: The minimum total thickness of paving within the area of detector loops is 5". The first lift shall be a minimum 3", and the second lift (covering the loops) shall be a minimum 2".

71-5 MATERIALS

A. Aggregate Base and Subbase: All aggregate base and subbase (AB and ASB) materials shall be Class II as specified on the approved improvement plans and shall conform to provisions in Section 26 of the Caltrans Standard Specifications.

Recycled asphalt concrete material may be used as AB or ASB provided the Contractor supplies the City written documentation and certification that the material meets the State's Class II specifications prior to placement.

B. Minor Concrete: All Concrete curbs, gutters, driveways, island paving, sidewalks, curb ramps, driveways, island and colored concrete, shall be constructed of minor concrete conforming to the provisions in Section 73-1.02A "Concrete Curbs and Sidewalks" of the Caltrans Standard Specifications. The cementitious material content of concrete must be a least 463 lb. /cu yd. for constructing minor concrete as listed above. The aggregate size may range from 3/8" to 1". However, if 3/8" maximum size aggregate is used, cementitious material content must be a least 505 lb. /cu yd.

All other minor concrete for extruded or slip-form curb construction, retaining wall footings, outfall structures and headwalls, utility box collars, rock wheel backfill, trash enclosure slabs and approaches, and miscellaneous footings, shall be constructed of minor concrete conforming to the provisions in Section 90-2 "Minor Concrete", of the Caltrans Standard Specifications . Cementitious material content must be a least 505 lb. /cu yd.

For stamped median concrete color, the standard color shall be Davis Style Tile Red #1117, or Scofield Systems, Chromix C-32 Quarry Red, or as approved equal. Apply 60 pounds per 80 square feet in two hand broadcast applications. Contractor may elect to incorporate approved color into concrete mix at 30 pounds of color (integrated into the mix), per cubic yard.

C. Asphalt Concrete: Shall comply with the provisions of Section 39 of the Caltrans Standard Specifications and as modified herewith. The requirements provided within these provisions shall supersede State Specifications where conflicts or other disparities exist.

Asphalt binder shall be performance grade 64-10 or 64-16 paving asphalt conforming to Section 92, "Asphalt Binders," of the Caltrans Standard Specifications.

Asphalt concrete for alley's residential and collector roadways shall be Type A, ½" Maximum Medium Gradation, conforming to the requirements of Section 39-202A "Type A Hot Mix Asphalt" of the Caltrans Standard Specifications.

Reclaimed Asphalt Pavement (RAP) up to 25% of aggregate blend may be substituted as part of the virgin aggregate for hot mixed asphalt and shall meet the State's quality specifications. RAP not permitted in OGFC or RHMA-G.

RHMA –G (Gap graded RHMA) shall be used for the 2" top lift structural section within Arterial roadways. For rubberized hot mix asphalt, reference the 2015 Caltrans Standard Specifications (Section 39-2.03). A PG64-16 oil shall be used as recommended within the Highway Design Manual Table 632.1 based on location in California.

Asphalt concrete shall be hot plant mixed and shall be furnished from the plant at a temperature not to exceed 325 degrees F.

D. Portland Cement Concrete Pavement: Shall comply with the provisions of Section 40 of the Caltrans Standard Specifications and as modified herewith. The requirements provided within these provisions shall supersede State Specifications where conflicts or other disparities exist.

1. **Cementitious Materials**: The pavement shall contain at least 450 pounds of total cementitious material per cubic yard of concrete. The actual content of cementitious material shall be established by preconstruction mix design studies. Cement shall be Portland cement Type II, Type III, or V conforming to ASTM C150 or portland cement Type IP, IL, or IS conforming to ASTM C595.

   PCC pavement may contain supplementary cementitious materials as shown in Table 7-Y.

Table 7-Y: Allowable Supplementary Cementitious Materials:

Supplementary Cementitious Material	Test Requirement	Allowable Percentage Range
Fly Ash	ASTM C618 / AASHTO M 295, Class F	15% - 35%. (ACI 232.2R)
Ground Granulated Blast-Furnace Slag (GGBFS)	ASTM C989 / AASHTO M 302, Grade 100 or 120	25% - 70%. (ACI 233R)
Metakaolin	AASHTO M 295, Class N	5% - 15%. (ACI 232.1R)
Raw or calcined natural pozzolans	AASHTO M 295, Class N	5% - 15%. (ACI 232.1R)
Silica Fume	ASTM C1240 / AASHTO M 307	5% - 12%. (ACI 234R)

2. **Aggregates for Roller Compacted Concrete Pavement**: The quality of aggregates shall conform to ASTM C33. The aggregate portion passing the No. 40 sieve shall have a liquid limit of not more than 20, and the plasticity index of the aggregate shall not exceed five. Fines shall be non-plastic. Fines shall not be manmade sand. Coarse aggregates must be washed, prior to delivery to the job site, to remove silt and fines. Aggregates may be obtained from a single source or borrow pit, however the coarse and fine aggregate may not be blended prior to entering mixing plant. The combined aggregate shall be well-graded without gaps and conform to the following gradations as per Table 7-Z.

Table 7-Z: Sieve Size Percent passing by weight

Sieve Size	Lower & Upper Specification Limits ½ in Maximum	Lower & Upper Specification Limits ¾ in Maximum
1”		100
3/4”	100	93-100
½”	81-100	70-95
3/8”	71-91	60-85
No. 4	49-70	40-60
No. 8	33-54	30-50
No. 16	24-40	20-40
No. 30	15-30	15-30
No. 50	10-25	10-25
No. 100	2-16	2-16
No. 200	0-8	0-8

Aggregates shall be innocuous, not causing deleterious expansion of RCC. Test individual concrete aggregates in accordance with ASTM C1260. Maximum expansion after 14 days of exposure to the solution of NaOH shall not exceed 0.10%.

If any of individual concrete aggregates do not meet the limit specified in the above paragraph, the aggregates can be tested with the production cementing material (Portland cement and supplementary cementing material proportioned according to the mix design) per ASTM C1567. The Contractor is allowed to test either individual aggregates or their blended proportioned according to the mix design. In either case the expansion in 14 days of exposure to the solution of NaOH shall not exceed 0.10%

3. **Chemical Admixtures for Roller Compacted Concrete**: Chemical admixtures shall conform to ASTM C 494. The contractor is allowed to use proprietary chemical admixtures improving the formability of RCC, provided the record of the previous experience certifying the beneficial use of admixtures is included with the submittal.

For moisture control in RCC, one of the following admixtures, or an approved equal, is allowed, but not required by the City. Please refer to the manufacturer’s recommendations

for dosage rates.

- ACEiT Plus Manufactured by ACEiT Industries
- V-MAR VSC500 Manufactured by Grace Concrete Products

For troweling, the following admixture, or approved equal, is allowed by the City. Please refer to the manufacture's recommendations for dosage rates.

- ACEiT Blue Manufactured by ACEiT Industries

4. **Curing Compound**: Concrete curing compounds shall conform to ASTM C 309 Type ID.

5. **Joint Sealants and Fillers**: Joint filler materials for isolation joints shall be pre-formed expansion joint filler for concrete (bituminous type) in compliance with ASTM D994.

6. **Water**: Water used in the concrete shall conform to the requirements of ASTM C1602. It shall be clean, clear and free of acids, salts, alkalis or organic materials that may be detrimental to the quality of the concrete. Non-potable water may be considered as a source for part or all of the water, providing the mix design indicates proof that the use of such water will not have any deleterious effect on the strength and durability properties of the concrete.

7. **Forms**: Forms shall be of steel or wood capable of resisting deformation during edge compaction and to maintain grade. Wood forms shall have a minimum nominal thickness of 2-inches. Forms shall be clean and free of warp, debris, rust, and hardened concrete. Forms shall be treated with a bond breaker prior to use.

E. Lime/Fly Ash or Cement Treated Subbase: On a case-by-case basis, lime/fly ash or cement treated subbase may be an acceptable substitute for placement of compacted aggregate base material permitted use in subbase stabilization only. Prior to plan approval, the Developer shall submit to the City Engineer for review and approval, a proposal for lime/fly ash or cement treatment sections and compaction procedures, accompanied by recommendations from a California licensed, geotechnical engineer. In no case shall asphalt concrete be placed directly on lime/fly or cement treated bases or shall the recommended structural section be less than the City standard structural section from Table 7-2 in Section 7 "Streets".

F. Truncated Domes: Truncated dome panels shall be of vitrified polymer composite construction, embedded type, or (surface applied for retrofit applications) 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 A88A and Division of the State Architect Accessibility Reference Manual, Figure No. 31-23A. The orientation of the dome pattern for all panels shall be parallel with the panel edges.

G. Graffiti Coating: Blok Guard® (Prosoco), Acryli-Master (Graffiti Master), GCP 1000 (Genesis Coatings Inc.), Prmakote, by Visual Pollution Technologies or approved equal, non-sacrificial type only.

H. Epoxies, Patching Material: Following are products specified for the indicated applications.

1. **Bonding extruded curb to asphalt concrete pavement; bonding concrete to existing during pour; bonding the top course of loose block, sound/retaining wall:** Rezi-Weld 1000, (Supplier: Spec-West), Sealtight Rezi-Weld ER-43 Type I, (Supplier: Spec-West) or Pro-Poxy 200 (available at whitecap) should be added as it meets C881/AASHTO M-235 for old to new concrete.

2. **Anchor Bolts:** Seal Tight Rezi-Weld Gel Paste Unitized Cartridge Epoxy (Supplier: Spec West), Covert Operations CIA Gel 7000 (Supplier: White Cap) or Rebar SETXP (Supplier: White Cap, Home Depot), SpecPoxy 2000 by SpecChem or approved equal. Apply appropriate epoxy product to concrete and/or asphalt as recommended by manufacturer.

3. **Patching:** Patchcrete (Supplier: Spec-West), Emaco R350CI Repair Mortar (Supplier: White Cap), Ardex CP (Supplier: Spec-West) or approved equal.

I. Reinforcement Bar: Rebar shall be grade 60 steel, deformed type. Smooth bar shall not be allowed. All rebar shall be #4 unless otherwise specified on the plans.

J. 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.

K. Slurry Seal: Slurry seal shall conform to Caltrans Standard Specifications, Section 37-2, "Seal Coats" and Type II Aggregate Type. A design mix shall be submitted to the Development Section for approval prior to commencing work.

L. Slurry Cement Backfill: The backfill must contain at least 188 pounds of cement per cubic yard and enough water to produce a fluid workable mix that flows and can be pumped without segregation during placement.

When authorized by the City Construction Inspector, controlled low-strength material (CLSM), per Caltrans Standard Specifications Section 19-3.02G or dry mix "popcorn" backfill may be used with pre-approval. 94 pounds of cement content to the CLSM cement backfill shall be required. A design mix shall be submitted to the City Construction Inspector for approval prior to commencing work. CLSM requires mechanical equipment effort to achieve proper consolidation. Whenever CLSM is placed within the travelled way or covered by paving or embankment materials, the CLSM must achieve a maximum indentation diameter of 3 inches when tested under ASTM D6024 before covering and opening to traffic.

M. Clean Crushed Rock: Shall consists of gravel, crushed gravel, crushed rock, reclaimed aggregate, or a combination of these. All gravel characteristics shall comply with CTM 211 and 227. The percentage composition by weight of clean crushed rock shall conform to the following gradations for the Type specified.

	Type A	**Type B**	**Type C**
	3/8" Crushed (Pea Gravel)	½" Crushed	¾" Crushed
1-1/2"	-	-	-
¾"	-	100	90-100
½"	100	90-100	30-60
3/8"	50-85	20-60	0-20
No. 4	20-60	0-15	0-5
No. 200	0-2	0-2	0-2

SECTION 82: MARKERS AND DELINEATORS

82-1.01 DESCRIPTION

Markers and delineators shall be installed in accordance with the approved improvement plans and specifications, these Construction Standards, the City Design Standards, The California Manual on Uniform Traffic Control Devices (CMUTCD), the State of California Department of Transportation Standard Plans, and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the CalTrans Standard Specs.

82-1.02F REFLECTORS

Type K-4 (Type Q in the CalTrans Standard Plans) markers (aka: Superducks) shall be 36 inches tall and have 3 bands of reflective sheeting per Section A73A of the CalTrans Standard Plans.

Type K-4 markers mounted between two lanes of opposing traffic shall be yellow with yellow reflectorized sheeting. Type K-4 markers mounted between two lanes of traffic traveling in the same direction shall be white with white reflectorized sheeting.

At median curb noses, a yellow Type K-4 marker shall be mounted on top of the curb. A white Type K-4 marker shall be mounted at the nose for a Right turn “pork chop” island.

Medians within and at the entrances to subdivisions shall have 3 yellow reflective markers (Type H) installed on top of the median curb with one at the beginning, center, and end of the median nose radius. The markers should be placed so that they face approaching traffic parallel to the centerline of the median. K-4 markers should not be used unless required by the Engineer.

SECTION 84: TRAFFIC STRIPES & PAVEMENT MARKINGS

84-1.01 DESCRIPTION

Traffic stripes and pavement markings shall be installed in accordance with the approved improvement plans and specifications, these Construction Standards, the City Design Standards, The California Manual on Uniform Traffic Control Devices (CAMUTCD), The State of California Standard Plans, and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the CalTrans Standard Specs.

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 Engineer. Drain inlets adjacent to areas to be ground shall be protected from grindings entering the storm drain system. 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. Conflicting striping shall be removed completely. Type II slurry of conflicting striping is required when it crosses the new traveled lane. When this occurs, the entire lane shall be slurried from lane line to lane line over the entire length of the conflicting striping. This requirement will not apply to ceramic markers unless specified on the plans.

All striping or pavement markings damaged during construction shall be repaired/replaced 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 Construction Inspector.

All pavement markings and 4 inch to 8 inch pavement stripes on concrete surfaces (unless otherwise noted) shall be 3M tape or equivalent in place of thermoplastic material and shall require 1 inch black borders when located on concrete pavement. The 1 inch black borders shall be in addition to required width of the stripe.

84-1.03 TOLERANCES & APPEARANCES

The following clarifications or modifications shall be applied when installing traffic stripes and pavement markings:

1. In addition to locations as shown on the plans, bike lane signs and pavement markings shall be installed at no more than 1/2 mile intervals and following every break in the bike lane striping. The BIKE LANE legend shall be centered in the lane to ensure the legend does not run into the lane striping.

2. A bicycle detector pavement marking shall be installed in conjunction with each bicycle detector loop at signalized intersections per CAMUTCD Figure 9C-7 and shall be placed starting 6 inches back of the crosswalk/stop bar.

3. Unless otherwise specified on the plans, crosswalks shall be 11 feet wide, measured from the centerline of the stripe.

4. Traffic stripes and pavement markings shall not be placed over utility covers including, but not limited to, manhole covers, utility boxes, hand holes, or water valve covers.

5. STOP and YIELD legend pavement markings and limit lines are required with corresponding signs. The yield limit line shall be per the CAMUTCD with CS (24" by 36" triangles).

6. Pavement arrows shall be one of the following types unless otherwise directed by the Engineer: Type II (L, R or B), Type III (L, R, or B), Type VI or Bike Lane Arrow.

7. At signalized intersections with left turn lanes longer than 150 feet, an additional Type II, or Type III arrow shall be placed 20 feet behind the limit line. Where there are dual left turn lanes with staggered limit lines, the arrows in the number 1 left turn lane (closest to the median) shall be placed 15 feet behind the limit line, and the arrow in the number 2 left turn lane shall be placed 20 feet behind the limit line. The intent is to have the 2 arrows line up side by side, even though the limit lines are staggered.

8. All turn lanes shall have a Type II or Type III arrow at the beginning of the turn lane such that the tail of the arrow lines up with the beginning of the Detail 38 striping. All turn lanes 150 feet or longer shall have a minimum of 2 Type II or Type III arrows (one arrow for every 150 feet of turn lane).

9. All traffic lane striping shall be discontinued through any 4 way public intersection from crosswalk to crosswalk, marked or unmarked. Striping shall be continuous through private intersections unless there is a striped left turn lane and/or traffic signal. For non-signalized public "T" intersections, the through and bike lane striping shall be continuous for the non-intersection direction, i.e. "across the top of the T". However, there shall be no striping within the limits of the crosswalk.

10. At locations where bike lane striping is used to channelize traffic, right turn acceleration/deceleration lanes and bus turnouts, both strips shall be detail 38. Reflective pavement markers shall be placed to the vehicle travel lane side of both stripes.

11. Bike lane striping shall be continuous except at right turn bay tapers, intersections with City streets, and driveways where the centerline/median is broken. See TS-18 for examples.

12. Lanes designated by the Engineer as auxiliary shall be striped as directed by the Engineer. Examples of typical auxiliary lane striping can be seen on TS-19. Bike lane striping along auxiliary lanes shall be a modified Detail 38 with 4 foot stripes at 10 feet on center.

13. Left turn arrows shall not be placed in 2 Way Left Turn Lanes unless otherwise directed by the Engineer.

14. Stop bars and yield triangles shall be 7 feet back from the center of the pedestrian access ramp unless directed otherwise by the Engineer. Where the stop sign is installed with a yellow school crosswalk, a supplemental white stop bar shall be installed 4 feet back from the crosswalk line.

15. Lane line extensions for dual turning lanes (right and left) shall be placed on a continuous arc as appropriate for a turning 40 foot bus. Triple turning lanes shall be placed to accommodate the turning of a 65 foot total length (California legal) tractor truck-semitrailer (TS-20).

84-2.03 THERMOPLASTIC TRAFFIC STRIPES & PAVEMENT MARKINGS

The thermoplastic material shall conform to State Specification PTH-02ALKYD:

Thermoplastic Traffic Striping Material, Alkyd Binder, White and Yellow. All thermoplastic must be applied per section 84-2.03C(2)(b)(CalTrans latest edition) Extruded Thermoplastic Traffic Stripes and Pavement Markings.

A. APPLICATION

The Contractor shall apply an adhesive primer base coat prior to the application of any thermoplastic material on treated pavement, stamped pavement, colored pavement, concrete surfaces, or pavement older than 30 days.

As shown on the plans, the following permanent traffic lane striping shall be thermoplastic, and placed as one of the following types: Detail 2, 6 ,9A, 12A, 16, 19, 22, 25, 27B, 29, 32, 34, 35, 36, 36B, 37, 38, 39, 39A, 40, 41, 42, 43, 44, 45

SECTION 85: PAVEMENT MARKERS

85-1.01 DESCRIPTION

Pavement markers shall be installed in accordance with the approved improvement plans and specifications, these Construction Standards, the City Design Standards, The California Manual on Uniform Traffic Control Devices (CAMUTCD), The State of California Standard Plans, and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the Cal Trans Standard Specs.

85-1.04 NON-REFLECTIVE PAVEMENT MARKERS

All non-reflective pavement markers shall be ceramic and only used when replacing striping in kind or as directed by the city engineer.

85-1.05 RETROREFLECTIVE PAVEMENT MARKERS

All reflective lane line pavement markers of 2 and 3 lane arterials shall be Type C Red-Clear retroreflective.

85-1.06 PLACEMENT

As shown on the plans, all striping details shall use retroreflective variants with thermoplastic and type C red-clear retroreflective markers. The following details shall be used unless otherwise directed by the city engineer: 2, 6 ,9A, 12A, 16, 19, 22, 25, 26, 27B, 29, 32, 34, 35, 36, 36B, 37, 38, 39, 39A, 40, 41, 42, 43, 44, 45

Any updates to striping with existing ceramic pavement markers shall be replaced in kind, unless the project limits extend to the two nearest adjoining signalized intersections and include all lane lines in both directions, or unless otherwise directed by the City Engineer. Non reflective pavement markers shall consist of ceramic markers only conforming to section 85.104A of the same standards. The following permanent traffic lane striping shall be raised pavement markings, and placed as one of the following types: Detail 4, 7, 10, 13, 17, 20, 23, 25, 26, 30, 33, 37C, or Detail 38. Thermoplastic striping is also required for placement of Detail 25 and 38.

On asphalt surfaces, Detail 26 markers shall be placed 2 inches from the face of the median curb. On concrete surfaces, Detail 25 shall be used.

At all fire hydrant locations, a blue reflective pavement marker (Type BB) shall be installed 1 foot off paved centerline or median on the hydrant side of the roadway.

All traffic lane striping shall be discontinued through any 4 way public intersection from crosswalk to crosswalk, marked or unmarked. Striping shall be continuous through private intersections unless there is a striped left turn lane and/or traffic signal. For non-signalized public "T" intersections, the through and bike lane striping shall be continuous for the non-intersection direction, i.e. "across the top of the T". However, there shall be no striping within the limits of the crosswalk.

At locations where bike lane striping is used to channelize traffic, right turn acceleration/deceleration lanes and bus turnouts, both stripes shall be detail 38 (A20D). Reflective pavement markers shall be placed to the outside of the bike lane along both stripes

See Section 84 of these Construction Standards for additional striping requirements.

SECTION 86: SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

86-1.01 GENERAL

Signals, lighting, electrical systems shall be constructed/installed in accordance with the following standards listed in priority - the approved improvement plans and specifications, these Construction Standards and the City Design Standards, The California Manual on Uniform Traffic Control Devices (CAMUTCD), The State of California Standard Plans, and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the CalTrans Standard Specs. Note that the more recent of either the City of Roseville Construction or Design Standards shall govern the older of the two.

Signal phasing shall start with phase 2 northbound and proceed in a clockwise direction unless directed otherwise due to coordinated corridor restrictions.

A copy of the Traffic Signal Inspection Check List is included on TS-22 as a reference of required inspections during construction.

Temporary signals require design submittal from a registered PE or TE.

86-1.04.1 EQUIPMENT LIST AND DRAWINGS

The City shall provide, as discussed in these Standards, the following traffic signal equipment and materials listed below unless otherwise specified in the plans. (For signals being installed as a developer obligation, the City shall supply equipment as outlined in the City Standards at the developer's cost. Full payment is required prior to the release of the equipment. The Contractor shall identify the cost of the City furnished equipment as a bid item):

Upon 10 calendar day notice to the City's Construction Inspector, the equipment and materials to be provided by the City will be available for pick-up by the Contractor at the City's Corporation Yard located at 2005 Hilltop Circle, Roseville. The Contractor shall provide all labor and equipment necessary to load, transport, and install the City-provided equipment and materials.

Traffic signal standards, posts, and mast arms shall be of the types listed in Table 6-1.

Table 86-1: Traffic Signal Standards, Posts and Mast Arms

STANDARD/POST	MAST ARM	LUMINAIRE ARM
Ped. Push Button (2.5")	none	none
7 to 15 foot 1-B	none	none
Type 15	none	6-15 foot
Type 15TS (7.2' foundation)	none	6-15 foot
16-3-100	15-20 foot	none
17-3-100	15-20 foot	6-15 foot
18-4-100	25-30 foot	none
19-4-100	25-30 foot	6-15 foot
23-4-100	35 foot	none
24-4-100	35 foot	6-15 foot
26-4-100	40-45 foot	6-15 foot
27-4-100	40-45 foot	none
28-5-100	50-55 foot	none
29-5-100	50-55 foot	6-15 foot
60-5-100	60-65 foot	none
61-5-100	60-65 foot	6-15 foot

The typical luminaire arm length used is 15 feet. Signal mast arms and luminaire mast arms shall be within 2 degrees of perpendicular to the centerline of the roadway. The Type 15TS pole above shall be used in conjunction with IISNS installations. Manufactured date of signal lighting luminaires shall be within 12 months of beginning traffic signal construction.

1B poles for 4 section and 5 section heads shall be 13 feet and 14 feet tall respectively.

Poles (except 1B's) shall be permanently labeled with the pole size, manufacturer, and serial number below or above the handhole. Signal pole and arm welding shall be performed by individuals certified by the pole manufacturer and shall not limit the original manufacturer warranty.

86-1.06 MAINTAINING EXISTING & TEMPORARY ELECTRICAL SYSTEMS

Roadway closures requiring restrictions of turning movements and/or signal red flash operations shall be in accordance with Section 12 of these Construction Standards.

86-2.03 FOUNDATIONS

Placement (location) of all foundations shall be verified by the Traffic Engineer, Development Services Inspector and Signal Tech prior to installation (TS-22).

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. Masonry blocks (not gravity type blocks) may be utilized to achieve the required 2:1 slope. The Contractor shall be responsible for acquiring engineering for retaining walls if the wall is greater than 4 feet from base of footing to top of wall. Refer to TS-4 through TS-8 for further details.

Signal pole anchor bolts shall be aligned to ensure a maximum mast arm offset of 2 degrees from perpendicular to the roadway and shall be verified by the Traffic Engineer, Development Services Inspector and Signal Tech prior to concrete (TS-22).

Unless otherwise directed by the Inspector or Engineer, the Contractor is not required to place Inspection tubes in the foundations per Caltrans Standard Plan ES-7N.

86-2.04 STANDARD, STEEL PEDESTAL AND POST

Any 1B standard having a signal head display, 4 sections or larger, shall be installed under the following criteria:

1. 4 section displays will be side (SV-1-T or SV-2-T) mounted. The 1B standard shall be 13 feet in height. A PVC cap shall be provided as a pole cap. Special mounting instructions as described in these Standards shall apply. (See Section 86-4.06).

2. 5 section display shall be side (SV-1-T or SV-2-T) mounted. The 1B standard shall be 14 feet in height. A PVC cap shall be provided as a pole cap. Special mounting instructions as described in these Standards shall apply. (See Section 86-4.06).

3. Individuals certified by the pole manufacturer shall perform signal standard welding. The contractor shall give 7 days advance notification prior to any welding on existing poles installed in the public right-of-way. The contractor shall certify that any welding of signal standards will not degrade the integrity of the standards. Upon completion of welding on a signal mast arm, the contractor shall replace any existing electrical wires in the arm.

4. All future tenons shall be covered with a plastic cap and a pull wire shall be installed from the tenon to the side vehicle termination.

Internally Illuminated Street Name Sign (IISNS) Mast Arms shall be per TS-11 and TS-12. The loading of the mast arms and the signal pole to which the sign mast arm is attached shall be approved in writing by the manufacturer or a licensed Structural Engineer.

86-2.05A CONDUIT MATERIAL

All conduits shall be gray PVC, minimum Schedule 40. When directional boring has been approved, the use of Schedule 80 HDPE conduit that complies with the UL65IA listing may be used.

86-2.05B CONDUIT USE

All conduits shall be 2 inch to 3 inch in diameter except the run to the pedestrian push button posts shall be 1 inch.

86-2.05C CONDUIT INSTALLATION

All trenches in existing streets shall be constructed per Section 31-2 of these Standards and as required in this section. See TS-13 for trench details.

All new conduit placed in existing roadways shall be buried at a minimum depth of 18 inches below finished grade. All new conduit placed in new roadways shall be installed prior to any paving operations and be buried at a minimum of 18 inches below finished subgrade with the

exception of conduit between detector handholes and the first pull box which shall be buried a minimum of 18 inches below finished grade. New conduit installed outside of the roadway and sidewalk shall be installed at a minimum depth of 36 inches below finished grade. All new and existing (empty) conduit that is 2" and larger to be cleaned and inspected via mandrel.

Unless otherwise specified, all signal interconnect (SIC) conduit shall be: 2 inch to 3 inch schedule 40 gray PVC conduit with 3 foot radius 90 degree sweeps into each number 6 pull box.

All traffic signal and SIC conduit shall have a DLC taped with a 5 inch green band labeled "LOCATE" in each pull box or approved equivalent pull tape installed along with the conductors/fibers.

End bells shall be installed on the pull box end of each 90 degree sweep conduit into all pull boxes prior to pulling the wire.

After conductors have been installed, the ends of conduits terminating in pull boxes and controller cabinets shall be sealed with a duct seal type of sealing compound.

If delay to motorists will not exceed 10 minutes, conduit may be installed as allowed by "Trenching In Pavement Method" as provided in Section 86-2.05C of the CalTrans Standard Specifications and these requirements:

1. The trench shall be maximum 6 inches wide and 2 inches wider than the outside diameter of the conduit to be installed. There shall be 1 inch minimum clearance between the conduit and the trench wall. The trench shall be crumbed clean prior to placement of conduit.

2. Aggregate material in concrete shall be pea gravel. Concrete shall be thoroughly consolidated around the conduit filling all voids.

3. Rock wheel trenching shall not be allowed in Portland cement concrete roadways. Rock wheel trenching per detail TS-13 and conduit installation in new and existing AC roadways shall be located along the centerline of the bike lane stripe or stop bar/crosswalk striping whenever possible. The trench cut will be hidden by the thermoplastic stripe where applicable. Pre-existing improvements requiring deviation from the centerline of the stripe shall be accomplished within 20 feet from the beginning to the end of deviation. Deviations along bike lane lines shall be to the curb side of the stripe unless directed otherwise by the City. Deviations greater than 20 feet shall require pavement repair per Item 4 below:

4. Rock wheel trenching parallel to the roadway centerline across acceleration, deceleration, or bus turn out openings that cannot be completed per TS-13 upon the same day shall be filled with concrete to the top of the trench and the Contractor shall return to complete per Detail TB-3.

5. Saw cutting in the street other than rock wheel trenching will require pavement repair per TB-1 or TB-3 and/or grinding between lane lines per City Standards (71-2,C).

6. Should the contractor fail to install the conduits in new asphalt concrete roadways prior to the

bottom lift of asphalt concrete, the City will require the installation of Tensar GlasGrid 8502 or equivalent matt prior to the final lift of pavement.

7. Should the contractor fail to install the conduits in new Portland cement concrete roadways prior to the placement of concrete, the City will require the conduits be installed by horizontal direction drilling or the contractor shall place the conduit per TB-1 or TB-3a.

The contractor is solely responsible to provide all labor and equipment necessary to locate existing underground facilities beyond the information provided by the U.S.A. markings including, but not limited to, metal detectors, wire locating equipment, and potholing.

86-2.06 PULL BOXES

Pull boxes shall not be placed within the area of an access ramp or driveway unless directed by the Engineer. Pull boxes should be installed a minimum offset of 1 foot from back of walk when within the sidewalk and from any score or deep tool joint. The bottoms of pull boxes shall be bedded in 6 inches of clean crushed rock. Grout in the bottom of pull boxes is not required. The pull box rim and lid shall be flush with surrounding surface. In planter areas, the pull box rim and lid shall be 1 inch above the finish grade. Pull boxes located outside of the sidewalk or planter area behind a sidewalk shall be of the Caltrans traffic rated pull box design.

Conduit termination in the pull box shall be a minimum of 2 inches from the sides of the pull box, 2 inches above the crushed rock, and at least 8 inches below the bottom of the pull box cover. Conduits shall enter and exit pull box quadrants relative to the direction of the run.

All pull boxes and lids shall be Fiberlyte FL36 with penta head bolts unless otherwise directed by the Engineer.

All pull boxes shall be No. 6 except as modified by the plans or the provisions below:

1. Advance loop pull boxes shall be No. 6 and shall have a minimum of 20 feet of detector lead-in cable (DLC) and 20 feet of extra loop cable spooled in the pull box.

2. The “Home Run” and “Communication Home Run” pull boxes (typically adjacent to the controller) shall be No 6, Fiberlyte FL36 24 inch deep vaults (02006110). Detector loop splicing is not allowed in the “Home Run” pull boxes.

3. Fiberlyte FL36 24 inch deep vaults shall be installed at the fiber hub locations as designated by the City and at every fiber optic cable splice point.

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.

86-2.06B COVER MARKING

Pull box covers shall read "TRAFFIC SIGNAL" (02006400), except covers for pull boxes used solely for traffic signal interconnect. Should the signal interconnect pull box or vault contain any communication cable, the cover shall read "TRAFFIC SIGNAL FIBER OPTICS" instead.

86-2.08 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 DLC taped with a 5 inch green band and labeled with "LOCATE" in each pull box or approved equivalent pull tape shall be installed in all conduits.

Equipment grounding conductors shall be #6 stranded copper with insulation.

At new and remodeled traffic signals, a 3 inch, two cell "MAX CELL" or equivalent product shall be provided in all street crossing traffic signal conduits and from #1 Home run box to controller cabinet and must be installed using swivels.
Three (3) shielded OSP category 6E cables (from the City approved equipment list), or City approved equivalent, and one (1) power cable (IMSA 14-3/20-1-STR 600V, Belden part number 601195) or City approved equivalent to top of designated pole with 10 feet of slack for each cable at the top of the pole and 40 feet of slack in the pull box adjacent to the pole and 60 feet of slack in the pull box adjacent to the pole.

In order to reduce strain on the shielded OSP CAT6E cabling, all cables shall be adequately supported by feeding them through a Kellems grip which is attached to and suspended from the pole cap. The hole drilled for the cabling shall be drilled on the back side of the pole 3 feet from the top in order to minimize the camera view obstructed by the cable and shall be threaded for a straight ¾ inch strain relief cord connector. At least 4 feet of cable shall be pulled through and secured by the strain relief cord connector. The cables shall be looped together, adequately secured to the pole to prevent movement, and sealed on the ends to prevent moisture exposure.

The contractor shall install new wire and/or cable in conformance with guidelines below. It is assumed that all existing conductors and cables are undamaged unless inspected, documented, and reported to the Construction Inspector prior to the contractor starting that section of the work. Otherwise, any damage to City facilities shall be repaired by the contractor at the contractor's cost in conformance with City standards.

New traffic signal and SIC conductors shall be installed per the following guidelines:

1. New wire may be pulled through existing conduits without removing conductors if based on common conditions:

   a. There are a maximum number of 4, 90 degree by 24 inch radius bends in 1 conduit run between pull boxes or termination points, and

b. Conductors, conduit, number of bends and length of the pull are within reasonable limits (under 175 feet for signal wiring and under 400 feet for signal interconnect wiring), and

c. Ratio of the conduit (inside diameter) to the combined diameter of both the new and existing conductors or cables (outside diameter), otherwise known as conduit fill, does not exceed 40 percent.

2. All existing conductors shall be removed from conduits, the conduit proven, existing wires inspected, and the new wires added and re-pulled along with the wires previously removed if:

a. Items 1a and 1b above are met but the ratio of the conduit (inside diameter) to the combined diameter of both the new and existing conductors or cables (outside diameter), otherwise known as conduit fill, is greater than 40 percent but less than or equal to 60 percent, or

b. Items 1a through 1c above are met but jamming occurs.

3. New conduit shall be installed per City of Roseville Construction Standards if more than 4, 90 degree radii exist, the length of the pull exceeds Item #1b above, or the ratio of the conduit (inside diameter) to the combined diameter of both the new and existing conductors or cables (outside diameter), otherwise known as conduit fill, exceeds 60 percent.

4. The new wire shall be pulled as follows:

a. Conductors shall be pulled into conduits by hand or by approved mechanical pulling methods such as a pulley with adjustable clutch.

b. Only Polymer Based pulling compounds such as Aqua-Gel by Ideal or equivalent shall be used.

c. Lubricants shall be forcefully injected into the conduit system.

d. Only fiberglass fish tape or polyester measure tape may be used.

e. All wiring shall be formed and bundled with tie-wraps and directed to the field wire termination area of the cabinet in the workman like manner. This work shall be approved by the Traffic Signal Technician before the field wiring termination work begins. All wire terminations shall be crimped and soldered.

86-2.08A CONDUCTOR IDENTIFICATION

Each multiple conductor cable shall have 2 distinct identification markings at the signal cabinet and at each pull box as follows:

1. A distinct colored tape marking.

2. An identification tag tie-wrap to identify which signal/pedestrian pole(s) the cable services within the intersection.

All individual conductors, including those within a multiple circuit conductor cable, shall be bundled together by vehicle and pedestrian phases and banded with plastic tie-wrap labels in the signal

cabinet, in every pull box (for individual conductors not within a cable), and at their field termination point(s).

Cat5 cables being installed shall be identified with electrical tape at both ends with orange for video and blue for the wireless access point.

86-2.08B MULTIPLE CIRCUIT CONDUCTORS

All new and replacement traffic signal phase wiring shall be compromised of multiple circuit conductors per Section 86.08D of the Caltrans Standard Specifications. A separate 3-conductor cable shall be provided for pedestrian pushbutton wiring. Multiple circuit conductor cable used for vehicle displays shall not be used for any part, hot or common, of the pedestrian pushbutton circuit. Unique color coding shall be provided for each wire within the cable. The number of wires per cable shall be the next common size up from that required to provide the necessary wires as specified on the plans. Phases shall be labeled as described in Section 86-2.08A.

The handling of multiple circuit conductors shall be to the best industry standard practice and as follows:

1. Razor blade knives shall not be used to strip back the outer jacket of insulation. A round cable stripper (example: Clifford #6-670-114-0 or equivalent) shall be the only means of stripping back the outer cable insulation.

2. The outer insulation jacket shall not protrude past the top of the signal cabinet entrance conduits.

86-2.08E SIGNAL INTERCONNECT CABLE

Traffic signal interconnect shall be provided for new signal installations, and for modification of existing signals which currently do not have interconnect. The interconnect cable shall have its own conduit and shall not share conduit with service conductors, signal conductors, or lead-in cables.

The interconnect shall connect the subject signal with at least 1 existing traffic signal. If the subject signal is between 2 existing signals, the interconnect shall connect all 3 signals.

If a City Parcel is adjacent to a new fiber run, a fiber stub shall be provided.

Signal interconnect cable (SIC) shall be a 9/125um wavelength, 72 to 216 strand, single mode, indoor/outdoor, loose tube, all-dielectric fiber optic cable as specified on the plans.

A Type 1 splice (refer to TS-26) shall be used at traffic signal locations where 2 point to point fiber cables will be spliced along with a tactical cable to service the local cabinet.

A Type 2 splice (refer to TS-27) shall be used at traffic signal locations where 2 point to point fiber cables will be spliced along with a tactical cable to service the local cabinet and a fiber cable from an outside facility (UE, IT, etc.) is also being spliced.

A Type 3 slice (refer to TS-28) shall be used at traffic signal locations where 2 point to point fiber cables forming a network ring path and 1 fiber cable from a non-ring path will be spliced along with 2 tactical cables to service the local cabinet.

A Type 4 splice (refer to TS-29) shall be used at traffic signal locations where 2 point to point fiber cables forming a network ring path will be spliced along with a tactical cable to service the local cabinet and 2 point to point fiber cables forming a second network ring path with be spliced along with a tactical cable to service the local cabinet.

SIC shall have footage markings every 4 feet. This marking may be on the outside of the cover or on the inside insulation jacket.

The signal interconnect cable shall not be placed in any conduit runs or pull boxes containing live conductors, unless otherwise directed by the Engineer.

Unless specified otherwise on the plans, 6 feet of copper and/or 15 feet of fiber optic cable slack shall be provided in each pull box. 50 feet of copper and/or 100 feet of fiber optic cable slack for each signal interconnect cable run shall be provided in the dedicated communications Home Run pull box in front of each signal controller or the last pull box before the controller if a dedicated communications Home Run pull box is not available.

An industry standard 4 inch orange or yellow label marked "CAUTION FIBER OPTIC CABLE" in black font shall be attached to each fiber optic cable in each pull box.

At the discretion of the City Engineer existing SIC may be disconnected by the City and moved out of the work area by the contractor during construction. However, the SIC must be reinstalled by the contractor within 7 days of its disconnection. Otherwise, all SIC must remain operational.

Existing copper SIC damaged during construction shall be replaced at the contractor's cost from controller cabinet to controller cabinet on either end of the damage. Splicing of copper SIC is not allowed. Damaged copper SIC shall be replaced with fiber optic SIC, conforming to current City standards including cable, conduit, splices, terminations, patch panels, and pull boxes. The contractor shall also be responsible, at the contractor's cost, to make any additional repairs needed to install the new cable from controller to controller.

Existing fiber optic SIC damaged during construction shall be repaired.

Damage

1. Fiber Optic Cable and related facilities damaged during construction shall be replaced/repaired to current City standards and as specified below at the contractor's cost. This work shall include fiber optic cable, conduit, pull boxes/vaults, trenches, concrete, asphalt, traffic control, pull tape, splices, splice enclosures, terminations, labor, etc., as required.

2. Damage is described as a breach in the fiber optic cable jacket, a kink, a break of the cable, or any other condition that causes a reduction in the capacity of the cable.

3. Should fiber optic cable facilities be damaged during construction without visible damage to the cable, the cable shall be tested by a certified fiber optic technician provided by the

contractor at the contractor's cost to ensure that there is no internal damage. Should the test show internal damage, the cable shall be replaced as specified below. Otherwise, the cable shall be protected and the facilities repaired to current City standards.

Repair

1. Fiber optic cable running between and terminating at adjacent traffic signals or devices shall be replaced from:

a. Termination to termination. All new cable and terminations shall be acceptance tested as required elsewhere in the City standards.

b. If the new cable must be pulled through conduits that contain traffic signal phase wiring, then a "MAX CELL" or equivalent sleeve, per City standards, shall be installed in the conduit prior to the installation of the new fiber optic cable.

i. Pull box adjacent to the damage to controller cabinet.

a) No more than 5 feet of slack may be used out of any one pull box.

b) Pull boxes where new splices shall occur will be replaced with Fiberlyte FL36 24 inch deep vaults as specified in these construction standards (86-2.06)(02006110).

c) At least 50 feet of slack must be provided in the new splice vault.

d) The slack shall be provided in even amounts on either side of the splice enclosure.

e) Only fusion splicing meeting City standards by a certified fiber optic technician will be allowed.

f) All new cable, splices, and terminations shall be acceptance tested as required elsewhere in the City standards.

g) The average optical loss of each splice shall not exceed 0.10 dB. The average is determined by measuring the splice loss in both directions with an OTDR, adding the 2 readings, and dividing by 2. Testing should be performed for both the 1310 and 1550 nm wavelengths.

h) Splicing will not be allowed in pull boxes or vaults shared with non-signal interconnect cables.

i) If the new cable must be pulled through conduits that contain traffic signal phase wiring, then a "MAX CELL" or equivalent sleeve, per City standards, shall be installed in the conduit prior to the installation of the new fiber optic cable.

2. Fiber optic cable running continuously past multiple traffic signal devices may be repaired by splicing at adjacent pull box locations.

a. A single splice location may be appropriate if the damage is close enough to the adjacent pull box that the repair may be accomplished by using some of the slack in the existing cable.

i. No more than 5 feet of slack may be used out of any 1 pull box.

ii. Pull boxes where new splices shall occur will be replaced with Fiberlyte FL36 24 inch deep vaults as specified in these construction standards (86-2.06)(02006110).

iii. At least 50 feet of slack must be provided in the new splice vault.

iv. The slack shall be provided in even amounts on either side of the splice enclosure.

v. Only fusion splicing meeting City standards by a certified fiber optic technician will be allowed.

vi. All new cable, splices, and terminations shall be acceptance tested as required elsewhere in the City standards.

vii. The average optical loss of each splice shall not exceed 0.10 dB. The average is determined by measuring the splice loss in both directions with an OTDR, adding the 2 readings, and dividing by 2. Testing should be performed for both the 1310 and 1550 nm wavelengths.

viii. Splicing will not be allowed in pull boxes or vaults shared with non-signal interconnect cables.

b. 2 splices may be necessary if the damage is not near an existing pull box. In this case, a splice shall be provided on either side of the damage and a new length of cable meeting City standards shall be installed between the splices.

i. Pull boxes where new splices shall occur will be replaced with Fiberlyte FL36 24 inch deep vaults as specified in these construction standards (86-2.06)(02006110).

ii. At least 100 feet of slack must be provided in each vault.

iii. The slack shall be provided in even amounts on either side of the splice enclosure.

iv. Only fusion splicing meeting City standards by a certified fiber optic technician will be allowed.

v. All new cable, splices, and terminations shall be acceptance tested as required elsewhere in the City standards.

vi. The average optical loss of each splice shall not exceed 0.10 dB. The average is determined by measuring the splice loss in both directions with an OTDR, adding the 2 readings, and dividing by 2. Testing should be performed for both the 1310 and 1550 nm wavelengths.

vii. Splicing will not be allowed in pull boxes or vaults shared with non-signal interconnect cables.

viii. If the new cable must be pulled through conduits that contain traffic signal phase wiring, then a "MAX CELL" or equivalent sleeve, per City standards, shall be installed in the conduit prior to the installation of the new fiber optic cable.

3. Repair work must **begin within 24 hours** and be **completed within 48 hours** of the damage occurring irrespective of weekends and holidays.

4. Should the contractor be unable to make the repairs within this time frame, the City will complete temporary repairs and bill the contractor for their time and materials at the City's billable rate. The temporary repair shall be treated with the same restrictions, requirements, and care as the original cable. The contractor will still be required to make the permanent repairs prior to completion of the project.

Temporary copper SIC repairs must be **made within 48 hours** of the damage and provide sufficient bandwidth and reliability for the intended purpose of the copper SIC. Permanent repairs shall be **completed within 30 days** of the damage. The City may make the repairs and bill the contractor for the work should the contractor be unwilling or unable to meet these requirements.

Should the copper SIC installation be required by the City, the contractor shall test all copper SIC prior to installation as follows:

1. For continuity of each wire pair. Resistance shall be consistent.

2. For high resistance (meggar) testing (250v setting):

a. Each wire pair to ground

b. Each wire pair to the cable shielding

c. Each wire pair to wire pair

3. The test may be in the field or shop

4. A city technician does not need to be present

5. The contractor shall be liable for all inspection costs related to the removal and re-installation of new cable should untested cable found to be faulty after installation

Fiber optic cable shall be acceptance tested, every strand, both before and after installation at both 1310 and 1550 nm wavelengths. All testing shall be documented on OTDR Acceptance Test and Splice Loss Record forms. Losses shall not exceed 1.85 dB per mile of cable including patch panels and splices.

86-2.09 WIRING

All wiring shall meet or exceed the current CalTrans Standards and National Electrical Code Standards.

86-2.09B WIRING INSTALLATION
Ends of spare conductors or conductors terminated in pull boxes shall be taped and water sealed with ScotchKote or approved equivalent.

86-2.09C CONNECTORS AND TERMINALS
Field conductor wiring shall not be doubled up on any single wire connector. For conductor sizes larger than number 10, connections shall be spliced by the use of "C" shaped compression connectors as shown in the CalTrans Standard Plans.
All field wiring connections shall be soldered after crimping the wire connector.

All crimp connectors shall be sized to accommodate the proper wire gauge.

86-2.09D SPLICING
Grounding conductor splicing shall be water sealed with Scotch Kote sealant or an approved equivalent. 2 applications are required.

86-2.09E SPLICE INSULATION
All splices shall be Method B. Heat-shrink tubing may be used with prior approval by the Engineer.

86-2.09F FUSED SPLICE CONNECTORS
Field fuses shall be installed in the hand hole of the standard.

All ungrounded conductors shall be fused.

86-2.10 BONDING AND GROUNDING
Grounding jumper shall be attached by 3/8 inch or larger galvanized bolt in the signal standard or controller pedestal and shall be run to the conduit, ground rod or bonding wire in adjacent pull box. Grounding jumper shall be visible after cap has been placed on foundation. All ground connections shall be water tight.

Grounding electrodes shall be of copper clad steel rod, not less than 5/8 of an inch in diameter x 10 feet in length.

A grounding electrode shall be installed in all electrical services and controller foundations. They shall be spaced a minimum of 20 feet apart. See NEC 2011 Part III 250.53(A)(3).

The grounding electrode rod in the pull box shall be greater than 20 feet from the service and shall be paralleled with the grounding electrode rod in the Service. This connection shall consist of a continuous stranded #6 green insulated copper conductor. The ground connection shall be on the line side of the electrical entrance terminal block.

A continuous stranded #6 green insulated copper conductor shall connect the ground bus in the electrical service, grounding electrode in service, grounding electrode in the pull box. See Detail TS-25.

The equipment-bonding conductor for all 1B standards shall be visible and accessible after completion of work.

In the event that ground resistance testing failed, the contractor shall install an additional 8 foot ground rod in the signal "Home Run" pull box. This additional ground rod shall be paralleled with the grounding electrode in the controller pad and service pad with a continuous stranded #6 green insulated copper conductor. The ground wire for this additional ground rod shall be permanently fused to the rod using a "CADWELD PLUS ONE SHOT" connection (See Detail TS-25).

86-2.11 SERVICE

The City shall supply an electrical service consisting of Type III AF, low body configuration, or Type 27-22 service with battery backup system.

The Contractor shall provide an address tag for the service as described in the Roseville Electric Department Specifications for Commercial Construction, Section 6, and "Panel Marking Policy".

The service pedestal shall be installed a minimum of 5 feet from the controller cabinet.

A City of Roseville Encroachment Permit is required for every traffic signal installation and/or modification. The project address for the permit shall be the service pedestal address. This address should be noted on the plans but is obtainable from the City in its absence. Minor modifications by City forces not involving the service pedestal are exempt from the encroachment permit requirement. Should a traffic signal be a part of a larger project, there may be an encroachment permit for the entire larger project and 1 or more permits for each and every signal installation/modification.

There shall be a 1 inch grouted section between the service and the foundation. A ¼ inch weep drain hole shall be installed in this grout section.

86-2.14 TESTING

The contractor shall contact the Construction Inspector at least 5 working days prior to installation of a tested controller assembly and/or electrical service.

86.2.14B (2) GROUND

Before electrical power can be connected, then grounding electrode shall be tested for earth ground resistance. The City Traffic Signal Technician shall perform this ground resistance testing and said test shall be performed after the service and controller pad foundation have cured. The earth ground resistance shall be a maximum of 5 ohms. If the ground resistance testing results are greater than 5 ohms maximum limit, refer to Section 86-2.10 and drawing TS-25 for corrective action requirements.

86-2.14C FUNCTIONAL TESTING

Functional testing shall be performed for 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 City Traffic Signal Technician, 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 Engineer at least 48 hour prior to interconnect cable installation.

86-2.15 SIGNAL ACTIVATION

On the day of signal activation, the contractor shall be required to have in his possession at the job site all tools, equipment and parts necessary to repair a signal malfunction. These items shall include, but not be limited to, a bucket truck, replacement LED's, wire, etc.

Immediately prior to the activation of a **NEW** traffic signal, the contractor shall install 2 orange flags on the "Signal Ahead" signs. Flags shall remain in place for 2 weeks.

Prior to activation of a **NEW** traffic signal, the contractor shall provide a minimum of 2 flaggers per intersection to control traffic. The number of flaggers may be increased at the request of the City's Construction Inspector for large intersections at no additional cost to the City. Each flagger shall wear appropriate safety gear and carry a stop paddle for controlling traffic. The flaggers shall completely stop traffic prior to the signal changing from red flash to full operation.

86-3.01 CONTROLLER CABINET ASSEMBLY

The City shall supply the controller cabinet assembly.

Wire connections and/or termination shall comply with section 86-2.08.

The traffic signal controller cabinet shall have a 1 inch bead of clear silicone sealant applied between the foundation and the controller cabinet bottom immediately before installation. The bead shall be centered 2 inches in from the outer edge of the controller cabinet around the entire perimeter. All excess silicone on the outer edges shall be cleaned off.

The sealant shall be 35 year rated 100% silicone. There shall be no substitution for the silicone sealant.

On 332 cabinets, the field wire entrance section of the controller shall face the intersection or as directed by the Engineer.

No access to the controller shall be permitted without supervision of a City of Roseville Traffic Signal Technician, unless otherwise directed by the Engineer.

86-3.08 EMERGENCY VEHICLE PREEMPTION EQUIPMENT

The City shall supply emergency vehicle preemption equipment, with the exception of the required cabling from the optical detector to the discriminator in the Controller Cabinet Assembly.

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.

Preemption cables shall be labeled in the following manner:

- Phase 2&5 single gray band
- Phase 4&7 double gray band
- Phase 1&6 triple gray band
- Phase 3&8 quadruple gray band

Labels shall consist of banded colored tape visible at the preemption detector, signal standard Handhole, adjacent pull box and the Controller Cabinet. Cables in the Controller Cabinet shall have tie wrap labels with appropriate phasing descriptions.

86-4.01 VEHICLE SIGNAL FACES

All signal faces shall be aluminum. All mountings for shall be bronze metal.

Signal faces shall have 12 inch LED displays, unless otherwise specified.

Vehicle signals and pedestrian signals shall be of the following types:

- MAT (3 section only)
- MAS
- MAS-4B
- SV-1-T
- SV-2-TB
- SV-3-TB
- TV-1-T
- TV-2-T
- TV-3-T
- SP-1-CS

The MAT mounting shall only be used for 3 section vehicle signals for protected left turn movements. All other mast arm mounted vehicle signals shall be MAS mounted. All MAT and MAS mounts shall use six (6) set screws.

All signal sections shall have full circle visors unless directed otherwise on the plans.

The following vehicle signal alignments are typical. Variations may be required on a case by case basis.

1. For single left turn lanes with protected left turn movement, the left turn signal shall line up with the center of the left turn lane as close as possible.

2. For dual left turn lanes (which shall have a protected movement), the left turn signal shall line up with the line between the 2 left turn lanes as close as possible.

3. Through movement signal indications shall align as follows:

- 1 travel lane – the center of the lane.
- 2 travel lanes – the lane line in-between the 2 lanes
- 3 or more travel lanes – 1 signal indication shall be provided on each lane line between through lanes.

4. For one through lane with permissive left turn, the MAS signal shall line up as close as possible with the center of the through lane. Far left permissive signal indications shall not be used.

5. When a 4 section MAS (MAS-4B) signal is used, it shall line up with:

- The lane line between the through and the left turn, or
- The lane line between dual left turn lanes at a "T" intersection, or
- The center of a single left turn lane at a "T" intersection, or
- The center of a split phase shared through/left turn lane at a "T" intersection.

Typical indications are as follows:

1. For protected left turn movements: one 3-section all arrow MAT and one 3-section all arrow far left side pole-mounted signal.

2. For through movements (with protected left turns): one 3-section MAS, one 3-section far right side pole-mounted signal, and one 3-section near right side or top pole-mounted signal.

3. For through movements (with permissive left turns): one 3-section MAS, one 3-section far right side pole-mounted signal, and one 3-section near right side pole-mounted signal. Far left permissive signal indications shall not be used.

4. For split phased situations: one 4-section MAS (MAS-4B w/GA), one 3-section far left side pole-mounted signal (all Arrow), one 3-section far right side pole-mounted signal, and one 3-section near right side pole-mounted signal.

5. For right turn arrow overlap situations: same as above except the far right side and near right side pole-mounted signals shall be 5-section with green and yellow arrows. Right turn arrow

overlaps shall not be provided without prior approval of the City Engineer. Where right turn arrow overlaps are provided, the conflicting U-turn shall be prohibited via signage.

86-4.01B SIGNAL SECTIONS

All signal sections shall be 12 inch mold-cast aluminum.

86-4.02 LIGHT EMITTING DIODE SIGNAL AND PEDESTRIAN MODULE

All vehicle and pedestrian displays shall be supplied with LED countdown signal lamps. Manufacture date of installed LED's must be newer than one (1) year old. Contact the City Traffic Section for an approved list of vendors and model numbers.

86-4.04 BACKPLATES

All vehicle signal sections shall include aluminum backplates with perforated louvers.

86-4.05 PROGRAMMED VISIBILITY VEHICLE SIGNAL FACES (PV DISPLAY)

All programming of the optic display shall be done in accordance with the manufacturer and the City Engineers' specifications. Programmed visibility heads shall not be used without prior approval from the Engineer and shall be LED type.

86-4.05B FRONT SCREEN

The front screen shall be plastic.

86-4.06 PEDESTRIAN SIGNAL FACES

Pedestrian signals shall be aluminum Type "A" with international symbols.

Pedestrian heads shall be mounted on the intersection side of the signal pole unless otherwise directed by the Engineer.

Pedestrian head indications shall be 9 inch LED countdown type. Contact the City for approved vendors and models.

86-4.08 SIGNAL MOUNTING ASSEMBLIES

Terminal compartments (TV & SV), mast arm slip fitters (MAS & MAT), and pedestrian clam shell mounts shall be bronze.

Signal mast arm mounted 4-section displays shall be type MAS-4B.

Extra support shall be incorporated whenever the following conditions arise:

1. The use of a SV-3-TA or SV-3-TB display.

2. If any display on a side mount is larger than a 3-section 12 inch display.

The extra support method shall consist of a 1 inch standoff w/ ¼ X 20 threaded hole. The stand-off shall be banded to the signal standard, 3 inch 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.

All signal display mounting assembly top members shall be watertight. The watertight sealing method shall be a ½ inch 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. Rubber washers used for water-sealing the top assembly shall not be permitted on any display framework or MAT mounting even if supplied by the manufacturer.

All MAT mounted signal displays shall have only 1 serrated washer Installed between the lock nut and the 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.

Where no vehicle or pedestrian displays are 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.

Pedestrian head mounts shall be clam shell type with bronze mounting hardware. Mounting shall include 1 Allen head screw for opening and all wiring shall be quick connect type (plug in).

86-5.01A(4) VEHICLE DETECTORS CONSTRUCTION MATERIALS

The first front call loops shall be Type D or a "Quadra Circle". All other vehicle loops shall be type A. Refer to detail's TS-9 and TS-10 for further information. The loops nearest the stop bar shall be placed 1 foot from the stop bar. Where a loop is designated to have counting ability as discussed above, the loop shall not share an input with any other loop. Loop wire shall terminate in the nearest pull box and not the handhole.

Vehicle loop wire shall be Caltrans Type 1 or Type 2.

All loops placed in concrete shall be City approved performed loops (See City approved equipment list).

Bicycle detection loops shall be Type D modified as follows:

- The loop size shall be decreased such that it is 1 foot narrower than the bike lane. A 6 foot bike lane shall have a 5 x 5 foot loop, a 5 foot bike lane shall have a 4 x 4 foot loop, etc.

- The loop shall be centered in the lane.
- The front of the loop shall be 6 inches back of the stop bar.
- Each bicycle loop shall have its own detector lead-in cable and shall be spliced in the pull box not the handhole.
- Each loop shall consist of 5 turns of 14 AWG with XLLP insulation.

Lead-in cable shall be Caltrans Type B. Lead-in cable shall not be spliced between the termination point (pull box adjacent to the detector loop) and the controller cabinet terminals. A spare DLC shall be pulled to each advance loop pull box with 20 feet of slack. For intersections that have a fourth crossing conduit, an additional spare DLC must be pulled through the long side and terminated in the advanced pull box. All spare DLC's must be un-spliced and marked in each pull box with a 5 inch green band labeled "LOCATE".

At grade detector hand holes shall be G5 w/ lockable lids (unless otherwise noted). Below grade detector hand holes shall use Type B (unless otherwise noted). Hand holes shall be placed so they line up with roadway stripes to minimize the frequency of vehicle tires driving over the handhole covers. A sufficient number of handholes shall be placed so that detector loop saw cuts shall not cross adjacent lanes of travel.

Traffic signal detectors must remain operational at all times unless approved by the City Engineer. Damaged detectors must be **replaced within 24 hours**. The contractor may use temporary detection including temporary loops, tape down loops, video detection, and microwave detection should the signal loop replacement need to be delayed more than 24 hours.

86-5.01A (5) VEHICLE DETECTORS INSTALLATION DETAILS

The Engineer, prior to saw cutting, shall verify all loop locations. The contractor shall give 48 hour notice prior to loop verification. Debris from saw-cutting operations shall be recovered immediately and disposed of properly. At no time can debris from saw-cutting operations enter the storm drain system.

Signal loops installed in new asphalt concrete (AC) shall be placed in the lift of AC immediately below the final lift. The new bottom lift of AC shall be a minimum of 3 inches thick (5 feet back of advance loop) where the traffic signal loops will be installed. New loops that will be buried under AC shall be installed with a saw cut depth as required to maintain a minimum of 1/2" coverage of loop sealant. Loops installed in the top lift will be saw cut to a depth required to maintain 1" of sealant coverage. Loops installed in existing pavement where existing loops are surface cut on that same approach may also be surface cut per the State of California Standard Plans unless otherwise directed by the Engineer. Vehicle loops shall have four (4) turns of wire in the slot. Bicycle loops shall have five (5) turns.

Signal loops installed in new concrete pavement shall be placed immediately below the concrete per Section 6-2 of the Design Standards.

Signal loops shall be protected from damage before and during pavement placement.

Existing buried loops damaged by construction shall be reinstalled as if in new pavement per the above paragraph. The contractor shall grind a minimum of 1 ½ inches of asphalt concrete from lane line to lane line and at least 1 foot outside the limits of work required to install the entire loop wire. The loops shall then be covered by an asphalt concrete overlay per City Standards. Should the AC thickness be insufficient to install the loops as specified above, the contractor shall complete any additional grinding, excavating, or paving necessary to install the loops. For concrete pavement, the entire panel, from joint line to joint line, shall be removed and replaced as specified elsewhere in the City Design Standards with the loops installed as described above.

New loops installed in existing pavement with a Pavement Quality Index (PQI) of 85 or greater shall be installed as if in new pavement per the above paragraphs unless the roadway was recently resurfaced.

New loops installed in existing pavement with a Pavement Quality Index of 85 or greater and resurfaced within the past three years, shall be surface cut per the State of California Standard Plans. In addition, the pavement shall be resurfaced with the resurfacing material used in the previous resurfacing project or as otherwise approved by the City Engineer.

Loop wires shall be labeled in the following manner:

- lane 1-black
- lane 2-red
- lane 3-blue
- lane 4-white
- lane 5 –yellow
- right turn lane – orange
- bike lane – brown

Labels shall consist of banded colored tape visible in the pull boxes, where the loop wire is spliced to the detector lead-in cable.

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. Refer to details TS-9 and TS-10 for further information.

The start and end leads of a loop detector shall be clearly marked by a means of plastic tie wrap labels.

Loop Home Run slots shall be double cut to accommodate the twisted pair (3-turns/foot), or as directed by the Engineer. Sealant for filling slots shall be Hot Melt Rubberized Asphaltic Sealant or equivalent as approved by the Engineer. All excess sealant shall be squeegeed off after application if under the top lift. If surface cut lift, must be neatly applied (not squeegeed).

During loop installation, the Contractor shall in the presence of Signal Technician, perform a high resistance test and an inductive reactance test. The Contractor shall notify the Engineer at least 48 hour prior to loop installation.

All wires for each detector loop shall terminate in the nearest pull box, not the hand hole.

Lead-in cables shall not be spliced between the termination point (the pull box adjacent to loop detectors) and the controller cabinet terminals.

Where the approved plans call for preformed detector loops, the following shall apply:

1. The conduit shall be sealed to prevent the entrance of water and the movement of wires within the conduit.

2. The loop wires from the preformed loop to the adjacent pull box or hand hole shall be twisted together into a pair (at least three (3) turns per foot) and encased in Schedule 40 or Schedule 80 PVC or polypropylene conduit (3/8 inches minimum diameter). The lead-in conduit shall be sealed to prevent the entrance of water at the pull box and handhole end.

3. The preformed loop and lead-in conduits shall be placed prior to placing final concrete. In new roadways, the top of the conduit shall be placed flush with the top of the base course. For other roadways, the top of the conduit shall be between 2 and 3 inches below top of finished surface. Where the concrete is steel reinforced, the preformed loops may rest on the steel.

4. All detector loop shields shall be left 6” inches in length and wrapped around the DLC and secured.

Typical vehicle detector layout and inputs shall be as follows (see details TS-9 and TS-10):

1. For permissive or protected left turn situations, the left turn lane shall have four loops with the first and second loops spaced 8 feet apart, the second and third loops spaced 9 feet apart, and the third and fourth loops spaced 10 feet apart. The fourth loop shall have counting ability. The other three loops can share one input.

2. Each through lane shall have two call loops spaced 8 feet apart with one count loop spaced 9 feet behind the second call loop and 1 advanced loop placed per the CAMUTCD.

3. Each right turn only lane shall have one loop placed 30 feet behind the stop bar in line with the through lane count loops. The loop shall be used for counting and may be used for detection following a 10 second minimum delay.

4. For the stem of a "tee" intersection, each left turn lane shall have four loops with the first and second loops spaced 8 feet apart, the second and third loops spaced 9 feet apart, and the third and fourth loops spaced 10 feet apart. The fourth loop shall have counting ability. The other three loops can share one input. No intermediate or advanced loops will be required on “tee” stems.

5. For split phase signals with a shared through/left turn lane, the shared lane shall have four loops with the first and second loops spaced 8 feet apart, the second and third loops spaced 9 feet apart, and the third and fourth loops spaced 10 feet apart. The fourth loop shall have counting ability. There shall also be one advanced loop placed per the CMUTCD.

6. All loops shall have 4 wraps.

86-5.01E DETECTOR LOOP CIRCUITRY

All loops shall be wound in a clockwise rotation. Adjacent loops on the same sensor unit channel shall be sliced to the DLC in an alternating pattern so that the electrical loops will alternate in a clockwise, counterclockwise pattern. The loop at the limit line, closest to the center median (lane 1), shall be spliced in a clockwise direction. The next loop back in the same lane shall be spliced in a counter-clockwise direction and so on. The loop detector in lane 2 closest to the limit line, shall be spliced in a counterclockwise direction.

86-5.02 PEDESTRIAN PUSH BUTTON ASSEMBLIES

Pedestrian push buttons shall be aluminum Type “B” with metal international symbol signs. Push buttons shall meet all Americans with Disabilities Act guidelines and be placed 36 inches above the grade of the closest edge of sidewalk and meet reach requirements per section 308.3 Side Reach of the 2010 ADA Standards for Accessible Design (https://www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards_prt.pdf). Buttons shall be solid state, 2 tone audible, momentary LED type. Contact the City for approved vendors and models. The Contractor shall provide a City approved wave file.

Pedestrian push buttons shall be within 5 feet from the edge of the access ramp pan (CAMUTCD Figure 4E-2).

86-6.01 HIGH PRESSURE SODIUM LUMINAIRES

All traffic signal luminaires shall be 400 watt equivalent LED unless directed otherwise by the City. See the City’s website for a list of approved equipment. 2 separate 120 volt circuits shall be provided to equally split the powerload.

86-6.065 INTERNALLY ILLUMINATED STREET NAME SIGNS

Internally illuminated street name signs shall be slim profile, LED with City logo. Contact the City for approved vendors and models. Sign proofs must be approved by the City prior to ordering equipment.

Internally Illuminated Street Name Signs (IISNS) shall require a City Traffic Engineering accepted stamp for all layout proof matching existing City LED IISNS’s prior to ordering. Only

products with prior approval from the City shall be allowed.

1. Refer to City of Roseville Construction Standards Section 56 "Signs".

2. Internally Illuminated Street Name Signs (IISNS)

a. All proof require a City approved layout matching existing City LED IISNS's prior to ordering.

b. IISNS name panels shall be manufactured as follows:

i. Sign panel material shall be clear (not opaque) poly. Thickness of the panel shall be 3.5 mm/6.0 mm maximum.

ii. Sign panels background sheeting shall be: 3M DG3 (Diamond Grade) series 4090. Color (White).

iii. Etched sheeting (Street name and City of Roseville logo) shall be 3M EC 1177c material. Color (Green).

iv. Manufacture shall warranty, no chemical reaction, shall be exhibited between the background sheeting and etched sheeting components.

v. The IISNS shall be double sided with street names on both sides.

86-6.07 PHOTOELECTRIC CONTROLS

Photoelectric controls shall be Type II and pole top mounted.

The Contractor shall supply all equipment, supplies, and material required for mounting the photoelectric cell.

86-6.07B (4) WIRING

Wiring from the photoelectric cell assembly to the electrical service shall be # 14. Wire color for the PEU shall be as follows: black for ungrounded conductor, red for ungrounded switch-leg conductor, and white for grounded conductor.

86-7.01 REMOVING 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 located at 2005 Hilltop Circle, Roseville, following at least 48 hours advance notice of delivery.

Damaged conduits deemed to not be reusable shall be removed from existing pull boxes and 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.

SECTION 91: SANITARY SEWER SYSTEM CONSTRUCTION

91-1 GENERAL

Sewer pipe and fittings shall be installed in accordance with the requirements of these Construction Standards and as recommended by the manufacturer. These Construction Standards and manufacturer's guidelines shall be present at the construction site at all times.

91-2 CONNECTION TO EXISTING FACILITIES

Connection to existing City sewer facilities may be made upon approval of the Environmental Utilities Department.

A. The Environmental Utilities Department has the option of making any system tap as required on the plans. Should the Environmental Utilities Department elect to perform the tap, the Contractor shall pay for such work on a time and materials reimbursement basis. The Contractor shall be responsible for the following task associated with the tap, and as determined by the Environmental Utilities Department:

1. Coordinating the work requested with the Sewer Division and the Development Services 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 Environmental Utilities Department.

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

5. Providing 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. **Existing Sewer Stubs**: The contractor shall excavate and connect to an existing sewer stub in the presence of the Development Services Inspector. Existing stubs shall be air tested by contractor and CCTV'd by Environmental Utilities before connecting. If an existing stub is found damaged or otherwise exceeding tolerances, the contractor shall remove and replace prior to connecting. Contractor shall incur all expenses. A note to this effect shall be placed on the improvement plans.

C. **Sewer System Outfalls**: Sewer system outfalls shall be mechanically plugged and grouted. The plug shall remain in place until final acceptance by the Environmental Utilities Department.

91-3 CONSTRUCTION STAKING

The sewer main 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 0.10 foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections and every 25 feet in curved sections, and every 10 feet in approved vertical curve sections.

91-4 EARTHWORK

Earthwork required to construct sewer facilities and appurtenances shall be performed to the lines and grades shown on the approved project plans and as specified in the following:

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 Construction Standard Detail SS-1. Excavations shall conform to all applicable Federal and State safety requirements. The contractor shall appoint a designated "competent person" to be present during construction.

B. Trench Width: The trench bottom width to 6 inches above top of pipe shall comply with Construction Standard Detail SS-1 or as approved by the Environmental Utilities Department.

C. Compaction: Compaction of the trench shall conform to Construction Standard Detail SS-1. Compaction test results shall be supplied to the Development Services Inspector/ Environmental Utilities Department upon request. Jetting of trenches is not allowed.

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

E. Existing Roadways: Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated or backfilled as approved by the Development Services Inspector/Development Services Department.

F. Excess Material: Excess material and materials determined unsuitable for backfill by the Development Services Inspector shall be removed from the project site.

91-5 DEWATERING

Dewatering for the installation of structure 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 measures, shall be used to eliminate sediment-laden discharges in accordance with the approved SWPP.

91-6 PIPE BEDDING

Conform to Construction Standard Detail SS-1 and the following:

A. 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.

B. Loose material shall be removed from the trench bottom and replaced with imported material.

C. Where rocky, unyielding or unsuitable foundation material is encountered, the subgrade shall be over-excavated a minimum of 4 inches and replaced with imported bedding material.

D. Where the trench bottom is soft, yielding or unstable, the trench bottom shall be over-excavated and ¾-inch crushed rock shall be placed in the trench to provide a stable foundation, to the satisfaction of the Development Services Inspector. The rock is in addition to the required pipe bedding used in the pipe zone.

E. Where a saturated trench condition is encountered, the trench wall and pipe shall be lined with a geotextile fabric as shown on Construction Standard Detail SS-1, and to the satisfaction of the Development Services Inspector.

F. 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.

91-7 CONCRETE CRADLES, ARCHES & ENCASEMENTS AND TRENCH DAMS

Concrete cradles, arches and encasements and trench dams shall conform to the Construction Standard Details W-23, W-24, and the following:

A. Concrete shall conform to the requirements of the construction standards.

B. 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.

C. 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 1/3 and ½ 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.

D. Restrained pipe within casings, bridges, shall be fully extended or "stretched out" to remove the slack between the joints the entire length of the structure.

E. Water shall not be permitted to enter, seep, or run onto the concrete while curing.

F. Trench dams shall be constructed of controlled density fill or clay as shown on the drawings or as directed by the Development Services Inspector. Trench dam excavations shall be made into native earthen materials to the dimensions shown on the drawings or as directed by the Development Services Inspector. Clay materials shall be moisture conditioned to near-optimum moisture content prior to placement in the excavation and compacted to the required relative compaction.

91-8 PIPE ZONE BACKFILL

Pipe zone backfill shall conform to Construction Standard Detail SS-1 and the following:

A. Extreme care shall be taken when consolidating the backfill around the pipe zone. For pipe 12 inches in diameter and smaller, no more than ½ of the pipe shall be covered prior to shovel slicing the haunches of the pipe. For pipe greater than 12 inches in diameter, no more than 6 inches shall be covered prior to shovel slicing. Shovel slicing shall be witnessed by the Development Services Inspector prior to shading the pipe.

B. Compaction equipment shall not make direct contact with the pipe.

C. Where the pipe is to be installed below historic groundwater levels or where the trench is subject to inundation, crushed rock material shall be placed to the crown of the pipe. Additionally, woven geotextile fabric Mirafi® 600x or approved equal shall be installed per Construction Standard Detail SS-1.

91-9 PIPE INSTALLATION

The sewer system outfall(s) shall be mechanically plugged and grouted, and shall remain plugged until final acceptance. Sewer pipe (gravity and pressure) shall be installed in accordance with the following provisions:

A. 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 break times as well as overnight.

B. Trenches shall be in a reasonably dry condition when pipe is laid.

C. 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.

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

E. Improvements installed without proper inspection shall be exposed and inspected as required by the Development Services Inspector.

F. 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.

G. A 12 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 or finish grade (outside of aggregate base).

H. Mains in unpaved areas shall be marked every 125 lineal feet with a green composite utility marker having 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.

I. Vitrified Clay Pipe (VCP) Installation: Pipe-laying shall proceed upgrade with the bell end of the pipe placed upstream, and shall follow manufacturer's guidelines for installation.

J. Gravity Ductile Iron Pipe (DIP) Installation: DIP for gravity sewer applications shall have an interior coating with "Permashield 431" (or approved equal) unless otherwise specified on the approved plans. The pipe bedding and shading shall be ½ inch or ¾ inch crushed rock. DIP sewer systems shall be constructed per the manufacture's recommendations and the following:

1. **Gravity Installations**: Transitions from DIP to VCP pipes shall be in accordance with Section 91-9.K of these specifications.

2. **Force Main Installations**: The force main shall be constructed and tested in accordance with the water pressure pipe standards established in Section 81, Domestic Water Supply System Construction, of these Construction Standards, with the following deviations:

   a) The force main will not require disinfecting or water quality testing. The main shall be pre-flushed again with a properly sized "pig" after the pressure test. Flushing shall occur in the presence of a Development Services Inspector.

   b) Backfill tape shall be 12 inch wide green plastic stating "BURIED FORCE SEWER MAIN".

   c) 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 Section 81, Domestic Water Supply System Construction, of these Construction Standards.

d) When it is necessary to cut a "Permashield 431" treated pipe, the City's Wastewater Division shall make all repairs prior to installation. Coordinate through the Development Services Inspector.

e) All DIP fittings for wastewater use shall have an interior coating with "Permashield-431" Or approved equal.

f) Tracing wire shall be installed per Section 81, Domestic Water Supply System Construction, of these 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 2 feet minimum from back of walk and marked per standards.

K. Transitions between VCP and DIP: When specified on the approved Improvements Plans, transitions between VCP and DIP shall be made using one of the following two methods:

1. Manufactured "speed-seal" gasketed DIP spigot. The transition fitting shall be manufactured by Gladding McBean. The Contractor shall incur all expenses.

2. At a manhole, if a pre-cast manhole is to be used, a manufactured transition shall be used. If a cast-in-place manhole is used, a flex joint is not required.

L. Boring: Borings for installation of sewer lines shall be made per Detail W-22 and as follows:

1. The equipment, method and sequence of operation and casing pipe grades shall be approved by the Environmental Utilities Department. A minimum of 48 hours notice shall be given prior to the start of work. 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. Casing: Welded steel casing pipe shall have a minimum wall thickness of a ¼ inch for pipe 24 inches in diameter and smaller and 5/16 inch for pipe 27 inches through 36 inches in diameter. Casing material larger than 36 inches shall be engineered on a case by case basis.

3. Installation of Casing: The casing shall closely follow the boring operation. The bored hole shall not be more than 0.10 of a foot 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 casing within allowable limits. The casing 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 casing shall be a minimum of 10 inches larger than the outside diameter of the conducted pipe bell or joint, as approved by the Environmental Utilities Department. A minimum of 4 inches clearance shall be required between the conducted pipe and the casing, taking the skids into consideration.

4. **Placing Pipe in Casing**: Conducted pipe shall be fully restrained ductile iron with Permashield 431 interior coating, supported by a minimum of 3 sets of Calpico or equal synthetic skids per stick of pipe, or as required by the Environmental Utilities Department. Pipe sections shall be joined outside of the casing. 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.

   The space between the conducted pipe and casing shall be completely filled with clean, dry silica sand, blown into place. Both ends of the casing shall be plugged with non-shrink grout a minimum of 12 inches into the casing. Both ends shall have a pipe of sufficient diameter placed through the mortar plug and parallel with the conducted pipe. 1 pipe shall be used for blowing the sand into the annular space. The other pipe shall remain open for venting. Prior to starting, the method of placing sand in the void shall be approved by the Environmental Utilities Department.

5. **Backfill of Voids**: When, in the opinion of the Developer's design engineer or geotechnical engineer, the nature of the soil indicated the likelihood of ground loss which would result in a greater space between the outer surface of the casing 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 casing.

   The jacking head shall cover the upper 2/3 of the casing and project not more than ½ inch beyond the casing 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 Environmental Utilities Department. Where voids are suspected, the Developer's design or geotechnical engineer may direct the Contractor to drill the casing, to pressure inject grout to refusal and repair the drilled hole. Grouting pressure shall not exceed 50 pounds per square inch at the nozzle.

6. Utilizing the City's drainage system for residual discharge from boring operations without the required measures 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 discharges at an appropriate location, or if the situation allows, fluid may be discarded into an open area with the pre-written approval of the property owner and approval from the Regional Water Quality Control Board (RWQCB) provided it meets RWQCB requirements and 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. The

City stormwater or Development Services Inspector shall inspect and monitor the discharge recovery, containment, and restoration process.

91-10 MANHOLE INSTALLATION

Manholes shall be installed in accordance with the Construction Standard Details and as specified herein:

A. Manholes shall be set flush with finish grade, unless otherwise noted on the approved plans.

B. Manholes placed in off-site, unimproved areas shall be constructed with the top of the casting cover a minimum of 1 foot above the final surrounding grade. A minimum 12 inch wide concrete collar with a #4 rebar ring shall be constructed around the casting and centered in collar.

C. 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.

D. VCP pipe entering a sewer manhole shall have a flex joint at the manhole base. A flex joint consists of a bell and spigot joint at the manhole with only bell ends cast into the manhole base, and a second bell and spigot joint located 12 to 24 inches outside of the manhole. Service "Y's" shall not be installed directly onto a manhole.

E. Manhole lids and castings for 48 inch diameter barrels shall be 24 inch diameter. Manhole lids and castings for 60 inch barrels shall be 36 inch diameter. Lid shall be bolt-down type with 2 cast-in-place bars and a gas detector probe hole, and 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 Development Services Inspector. Manholes constructed outside of paved area shall use a GMI or EJCO COM3800 Durostreet composite lid and frame. All manhole openings 36 inches or larger shall use a GMI or EJCO COM3800 Durostreet composite lid and frame.

F. 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.

G. Any work on an existing sewer manhole shall require the manhole to pass a vacuum test as described in section 91-13 of these Construction Standards. The work completed shall remain exposed until the vacuum test has been accepted by the Development Services Inspector.

H. Concrete manhole bases may be either pre-cast or cast-in-place. Pre-cast bases shall conform to section 91-16 of these Construction Standards.

This section covers all the work necessary to complete the installation of a cast in place manhole base, comprising cast-in-place concrete manhole base slab and wall.

1. Concrete
   Cement shall be ASTM C-150, Type V Portland cement with proportioning and mix design as follows:

   1. Specified 28-day Compressive Strength: 4000 psi minimum.
   2. Air content: 2% ± 1%.
   3. Slump, after addition of superplasticizer: 8" maximum

Coarse Aggregate Size	Cementitious Content-Pounds Per Cubic Yard	Water-Cement Ratio by Weight
¾"	625 min, 800 max	0.375
1"	600 min, 800 max	0.385
1 ½"	590 min, 800 max	0.400

2. Reinforcing

   a. Bars shall be ASTM A615, Grade 40 for all non-welded bars.
   b. Position, support, and secure reinforcement against displacement during formwork construction or concrete placement. Locate and support reinforcing by chairs, spacers and hangers, as required. Arrange, space, and securely tie bars with16-gage wire to hold reinforcement accurately in position during concrete placement operations.
   c. Place reinforcement to obtain the minimum concrete cover as shown in detail SS-2A.
   d. Reinforcement with bends, kinks or reduced cross section due to excessive rusting or other causes will not be permitted.
   e. Reinforcement around pipe openings shall be in accordance with detail SS-2A.
   f. Provide reinforcement lap splices as noted in detail SS-2A, by placing bars in contact and tying tightly with wire.
   g. Do not place concrete until the reinforcing steel is inspected and permission for placing concrete is granted by ENGINEER. All concrete placed in violation of this provision will be rejected.

3. Concrete Placement

   I. General
      a. Place concrete continuously so that no concrete will be placed on concrete, which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Deposit concrete as nearly as practical in its final location to avoid segregation due to rehandling or flowing.
      b. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the job site and dispose of it in an acceptable location.

c. Do not place concrete until all forms, bracing, reinforcement, and embedded items are in final and secure position.
d. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
e. Force concrete under pipes, sleeves, openings and inserts from one side until visible from the other side to prevent voids.
f. The forms shall be limited in height to allow visual observation of the concrete and the vibrator operators shall be required to see the concrete being consolidated to ensure good quality workmanship.
g. Unless otherwise approved, place concrete only when ENGINEER is present.

II. Cold Weather Placing:
a. Do not place base slab on frozen soil.
b. Protect all concrete from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
c. When the air temperature has fallen to or may be expected to fall below 40°F, provide adequate means to maintain the temperature, in the area where concrete is being placed, at between 50°F and 70°F for at least seven days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.
d. When air temperature has fallen to or is expected to fall below 40°F, uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 55°F and not more than 85°F at point of placement.
e. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost and ice before placing concrete.
f. When temperatures are expected to be below 32°F the night before the concrete is placed, then all reinforcing steel, forms and the ground shall be preheated, for a minimum of 12 hours, under a minimum temperature of 50°F.
g. Do not use salt and other materials containing antifreeze agents or chemical accelerators, or set-control admixtures, unless approved by ENGINEER, in mix designs.

III. Hot Weather Placing:
h. Cool ingredients before mixing to maintain concrete temperature at time of placement below 85°F. No concrete shall be placed if its temperature exceeds 90°F. Mixing water may be chilled or chopped ice may be used. The addition of ice shall not increase the specified water to cement ratio.
i. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

j. Thoroughly wet forms before placing concrete. Forms shall be free of standing water when concrete is placed.
k. Do not use set-control admixtures, unless approved by ENGINEER in mix designs.
l. Fog spray shall be used during finishing operations whenever necessary to avoid surface plastic shrinkage cracking. Fog spray shall also be used after finishing and before the specified curing is commenced to avoid surface plastic shrinkage cracking.
m. Obtain ENGINEER'S approval of other methods and materials proposed for use.

4. Execution

a. Construct manhole base slab and stem per dimensions shown in detail SS-2A. Concrete may be poured monolithically or in 2 separate pours with slab and wall with prior approval from City Engineer.
b. The poured manhole base must not be moved until adequate hydration has occurred. The concrete on cast-in-place bases shall cure a minimum of 24 hours before stacking the barrel sections.
c. Excavation at manhole location shall be wide enough to provide working room around manhole. Concrete in the cast-in-place portion shall be placed against a stable subgrade. All loose material shall be removed from the excavation prior to installation. The bedding shall consist of a minimum of 4 inches of compacted ½ inch or ¾ inch crushed rock, compacted to 95% relative density.
d. Belled pipes set in the manhole base wall shall be set flush with the exterior of the wall. The “speed-seal” on the spigot end shall be cut off prior to setting.
e. Unless specified on the approved plans, there shall be a 0.10-foot drop constructed across the manhole base. U channel can pour monolithically with the base or hand placed per City's approval. Install PVC or hydrophilic water stop as shown in detail around the base, if slab and stem for base is constructed in separate pours.
f. The top of the base shall be formed to accept the first barrel section. Wet setting is not permitted. Ram neck shall be installed on this first joint after the Environmental Utilities Department inspector has approved the manhole base for stacking.
g. Flow through manholes shall have the pipe laid continuously as a whole pipe with flex joints and a minimum 0.10-foot drop, or as approved. After the initial 24-hour curing period, the top half of the pipe shall be carefully cut off without cracking the bottom. The sides shall be mortared smooth.
h. Backfill shall be placed in layers of not more than 12 loose measure inches and mechanically tamped. Flooding will not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the manhole structure.

5. Final Testing and Approval
   a. Acceptance: Manholes will be accepted with relation to the vacuum test requirements in section 91-12 E of this document.

b. No repairs shall be allowed for manhole base with cracks, holes or other defective concrete in areas of potential leakage. Any manhole base which fails the initial test will be rejected and must be replaced prior to backfilling.

I. Adjusting Manholes: The manhole neck and frame shall be adjusted to grade. Use of metal grade rings is not permitted. The finished manhole shall conform to Construction Standard Detail SS-2, or as approved by the Environmental Utilities Department.

J. Frame and Lid: The manhole frame and lid shall be sealed with an approved rubber gasket. Manholes constructed in streets shall have the lid bolt holes filled with silicone (91-16,F.10). Manholes constructed outside of the street or paved area shall be bolted down or closed by other locking mechanism.

K. Manholes Coatings: Approved materials include epoxy or calcium aluminate.

Epoxy Coating: Sewer manholes requiring an epoxy coating shall first pass a vacuum test, per Section 91-12,E.4 of these Construction Standards, 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 (81-16,G.26) prior to backfilling. Use to 10 mil vinyl tape (81-16,G.25) to secure and seal the polyethylene per Section 81 of these standards.

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 and 50 percent sand. The mortar mixture shall be manually worked into the dampened surface with sufficient pressure to completely fill voids and imperfections. The surface shall then be finished smooth.

a. This process shall be continued until the entire manhole surface (base, barrel, cone, neck and joints) is smooth and free of imperfections. Note that it is not required to cover the entire interior surface area of the manhole, only where voids or imperfections exist.

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

3. The epoxy coating and applicator's certification must be submitted to the Environmental Utilities 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 approved by Development Services Inspector and allow curing per the manufacturer's recommendations. Application may be withheld if, in the opinion of the Development Services Inspector, the walls of the manhole exceed the recommended moisture content. A visqueen test may be performed to determine the absence of moisture.

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

e. Verify the thickness and adherence of the coating by coring samples, to the satisfaction of the Development Services Inspector.

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 Development Services Inspector, remove the masking from the metal frame and use "Sikaflex" (or approved equal) sealant to caulk to transition joint between the epoxy coating and the metal frame.

i. Use "Sikaflex" (or approved equal) sealant at the concrete VCP interface and for all epoxy transitions.

j. Remove the plugs.

Calcium aluminate: Calcium aluminate may be used in lieu of epoxy coating. The manhole shall pass a vacuum test, per section 91-12,E.4 of these Construction Standards. Calcium aluminate shall be SewperCoat by Kerneos Aluminate Technologies or approved equal and shall be installed per manufacture specifications. Whenever Calcium Aluminate is used, the contractor shall immediately TV the sewer line to ensure no grout entered the line during application. Use "Sikaflex" (or approved equal) sealant at the concrete VCP interface and for all epoxy transitions.

91-11 SERVICE INSTALLATION

Sewer services shall be installed in accordance with Construction Standard Details SS-4 and SS-5.

A. Sewer services originating from sewer mains 14 feet in depth or greater shall have the crotch on the VCP "Y" fitting filled with concrete.

91-12 TESTING OF INSTALLED IMPROVEMENTS

Sewer mains, services, manholes and appurtenances shall be tested by the following procedures:

A. Sewer Mains and Services: Public and private sewer mains and services shall be air-tested per ASTM C828 by the Contractor and the Environmental Utilities Department shall provide closed circuit TV inspection, after installation of the joint trench utility crossings and subgrade elevations have been met. For private laterals on HDR parcels, maintenance of the wye fitting at the main, and any portion of the private lateral upstream of it, is the responsibility of the private owner. Any work the City performs on private laterals, including the wye fitting that connects the private lateral to the main, shall be billed to the private owner on a time and materials basis. Additionally, pipeline segments beneath road bases to be lime-treated shall be tested before and after the lime treatment process.

B. Air Pressure Test: Sewer mains and laterals shall be pressure tested in accordance with the National Clay Pipe Institute recommended guidelines with the following amendment:

1. Minimum test time shall be 60 seconds.

2. 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.

3. The test gauge shall be liquid-filled, capable of testing up to 15 PSI, and graduated to 1/10 PSI.

C. TV Inspection: TV inspection of sewer mains and services shall be performed by the Environmental Utilities Department, Wastewater Division. 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 Environmental Utilities Department as an official record.

1. 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:

a. For main lines 12 inches and smaller - standing water or sags greater than ½ inch in depth at acceptance or greater than 1 inch at warranty.

b. For main lines exceeding 12 inches - standing water or sags greater than ¾ of an inch in depth at acceptance and greater than 1 ½ inches at warranty.

c. Standing water in services.

d. Offset joints.

e. Joint separations greater than ½ inch wide.

f. Damaged pipe.

D. Inspection Criteria for Coated Ductile Iron Pipe: All ductile iron sewer will have the following additional inspection requirements:

1. The condition of the barrel section of pipe as well as 360◦ at each joint shall be recorded to a DVD or portable drive. Once completed, and the inspection demonstrates the pipe meets the City's construction standards, the contractor may proceed with the backfill of the trench. The Contractor shall provide the DVD and a map of the section inspected, to the Wastewater Collection Division for review prior to the City's acceptance inspection.

2. Upon finding any deficiency in the pipe which does not meet the design and construction standards of the City of Roseville, it is strongly encouraged that the contractor make the necessary corrections at that time. If deficiencies aren't corrected City forces at time of acceptance CCTV will identify these deficiencies and require the contractor to dig and replace the pipe sections; there will be no exceptions.

3. The observation data on the DVD provided to the City shall include the following:

a. City wide job number.

b. Encroachment permit number.

c. Project name.

d. Location (street name).

e. Manhole numbers (based on approved plan set or city asset numbers if applicable).

f. Direction of inspection (upstream or downstream).

g. Date of inspection.

4. The speed of travel shall be slow enough to inspect each pipe joint, wye connection, coating integrity, and potential sags. Camera speed should travel at a rate of no more than 30 feet per minute. The camera speed shall be steady and slow enough to record features and defects.

E. Manholes: Sewer manholes shall pass a vacuum test consisting of the following criteria and procedures:

1. The test shall be performed after assembly of the manhole and installation of the pipe entering or exiting the manhole, but prior to backfilling. The Contractor shall perform the test and supply all test equipment. The Development Services Inspector shall witness the test results.

2. Lift holes shall be filled with non-shrink grout prior to testing.

3. Pipe entering and exiting the manhole shall be plugged. The plug shall be places on the flex joint outside of the manhole base. Securely brace the plugs to prevent them from being drawn into the manhole. Unused channels shall be permanently plugged with a plastic or clay stopper.

4. A vacuum of 10 inches of mercury shall be drawn to start the test. The amount of time required for the vacuum to drop to 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 inch manhole, 75 seconds for a 60 inch manhole, 90 seconds for a 72 inch manhole and 120 seconds for an 84 inch manhole. A liquid-filled vacuum gauge shall be used for testing. All detectable leaks shall be repaired with non-shrink grout while the vacuum is drawn. No mortar shall be applied to the inside of the manhole until the vacuum test has passed.

5. 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 elapsed times are satisfactory.

6. After passing the vacuum test, all joints shall then be mortared, inside and out. Outside mortared joints shall be allowed to dry 24 hours or as approved by the Development Services Inspector before backfilling.

7. If damage to the manhole is evident any time during the construction, the Development Services Inspector may require repairs to be made on the manhole which will require a new vacuum test prior to acceptance.

F. Topside Improvements: When all water, recycled water and sewer infrastructures have passed air, vacuum, pressure and continuity test as well as CCTV inspection the Development Services Inspector will email a notification to internal departments indicating that the project is ready for road bases and top side improvements only. This does not constitute approval for use of the infrastructure.

G. Tying Into the City System: A tie-in procedure shall be submitted and approved by the Environmental Utilities Department prior to the proposed work. The contractor shall allow for up to 7 days for review of the procedures by the Environmental Utilities Department. The sewer system shall be tied into the City system within 10 working days upon completing and passing all the testing procedures. Tie-ins shall be conducted as specified in Section 91-2 of these Construction Standards.

91-13 PUNCHLIST PROCESS

After the sewer manholes have been raised and finished to grade, the sewer system shall have a final ball and flushed in the presence of the Development Services Inspector. The system shall then have a final TV inspection to ensure the entire sewer system is intact for warranty. Final ball and flush can be done by city forces on a time and material basis at the request of the contractor.

When all improvements are complete, the contractor shall provide a written request for a punch list inspection of the improvements. With the assistance and presence of the Contractor, the wastewater facilities punch list shall be generated by the Development Services Inspector and Wastewater Collection Division.

91-14 REPAIRING INSTALLED IMPROVEMENTS

Sewer mains, services, manholes and appurtenances shall be repaired per these Construction Standards and by the following procedures:

A. Repairing Vitrified Clay Pipe

1. Damaged pipe shall be exposed and replaced in-kind by "bridging" the new pipe into place. Coupling devices shall not be used.

2. Sagging or misaligned pipe shall be exposed and corrected in place if possible. If the pipe is defective, then a new pipe shall be bridged in place.

3. After the correction has been completed, the excavation shall be backfilled and compacted to grade as specified. The repairs shall then be retested per section 91-12 of these Construction Standards.

91-15 ABANDONING SEWER STUBS AND SERVICES

In new construction, 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 Environmental Utilities Director.

91-16 MATERIALS

A. Approved Equal: The words "approved equal" shall mean any material deemed by the Environmental Utilities Department to be acceptable for use within the City's sewer system as compared to products of specified manufacturers. Contractors proposing to use materials which are not specifically named shall submit all necessary documentation to allow review of said material for use as an approved equal.

The submittal shall include a letter with:

1. **Product**: A description of the product and the appropriate materials specification section number. A sample of the product may be required for review and testing.

2. **Contact**: The name and telephone number of the contact person for the proposed product.

3. **Reference**: A list of a minimum of 3 agencies using the proposed product (include names and telephone numbers).

4. **Performance**: Information and reference for 3 locations with a performance record of 3 years in operation of the installation.

5. Address the letter to the Environmental Utilities Department Engineering Division, 2005 Hilltop Circle, Roseville, CA 95747, ATTN: EUD, Chairman of METAC. City staff may request a sample of the product for review.

6. The Contractor shall submit all material for review 35 days prior to contract award. All submittals shall include documentation verifying contract award date. Contractors shall allow 2 to 4 weeks review time by the Environmental Utilities Department.

B. Conditionally Approved Material: Materials or products that have met the reference and performance requirements shall be conditionally approved for a minimum trial period of 2 years. Upon completion of the 2 year period, the product may be approved, the evaluation period may be extended, or the product may be denied approval as determined by the Environmental Utilities Director. A list of conditionally approved products may be obtained from the Environmental Utilities Department.

C. Unapproved Materials: Materials not approved for use on the project shall be removed from the site within 24 hours if requested by the Development Services Inspector.

D. Sewer Main and Services: Unless noted on the approved plans, all gravity pipe shall be Vitrified Clay Pipe Bell and Spigot (VCP), conforming to ASTM C700-C301, C828 Standards manufactured by Gladding McBean or approved equal. The VCP shall be Extra Strength.

All commercial sewer services shall be VCP up to 5' outside the building footprint.

All force main pressure pipe will be Ductile Iron Pipe (DIP) manufactured by Pacific States Company, US Pipe, Griffin, Electrosteel USA or approved equal. The interior of the DIP shall be coated with Permashield 431, or approved equal, from bell gasket seat to 8 inches of spigot end exterior. The coated DIP shall be manufactured with an exothermic weld (cadweld) plate installed on the spigot end.

E. Manholes: Manholes, frames and covers are to be in accordance with details SS-2 and SS-3. All materials used in cast-in-place concrete or precast concrete shall conform to ASTM C-150 Specifications with Type V cement for sulfate protection.

1. Barrels, Cones, and Lids

- Jensen, Oldcastle Precast, Armorock (polymer concrete) or approved equal.

2. Grade Rings

3. Jensen, Oldcastle Precast, Armorock or approved equal.

3. Manhole Frame and Cover

a. For 24 inch Openings: South Bay Foundry, #SBF 1920 RV-S, GMI Composite frame and cover 2600 Series, Saint-Gobian PAM, Rexus – CDRU60EHSEW, D&L Supply -

#A-1021 with "sniffer plug" and "O" ring gasket, National Casting Corporation - NC 1021 or approved equal

b. For 36 inch Openings: GMI or EJCO COM3800 Durostreet Composite frame and cover 3800 Series or approved equal due to safety reasons.

4. Precast Bottom

- Jensen, Oldcastle Precast, Armorock or approved equal.

5. Precast Flat Lid

-
- Jensen, Oldcastle Precast, Armorock or approved equal.
-

F. Appurtenances

1. Air Release Valve: Stainless steel or composite models of Crispin, Val-Matic, or equivalent. Iron/Steel valve bodies are not allowed.

2. Clay to Concrete Sealant: SikaFlex or approved equal.

3. Trench Dam: Clay or Controlled Density Fill.

4. Cleanout Caps: ABS.

5. Couplings: For 4 inch lines, use Flex Seal Repair Coupling for ABS cap only, or approved equal. For 4 to 12 inch lines, use a rubber coupling with stainless steel band typical of Mission Rubber Repair Coupling, Fernco or approved equal. Couplings may not be used in new construction.

6. Flange Gaskets: All flange gaskets to be neoprene rubber or red rubber, USSO Standard B.16.21 insulation flange kits—Calpico Type E full-faced gasket and two-side insulation.

7. Joint Sealing Compound: Ram-Nek, Con Seal Compound or approved equal.

8. Location Stakes: Carsonite 4 inch x 5 feet CUM 375 with anchor barb kit or approved equal.

a. Caution stickers attached, #CW-112 and organization identification decal #P101, stating: "CITY OF ROSEVILLE - CALL BEFORE DIGGING (916) 774-5750".

b. For pressurized sewer mains, use decal #CPS-1977. For gravity sewer mains, use decal # CS-225.

9. **Mortar**: Non-shrink grout during manhole vacuum testing and as specified. Standard mortar mix for all other applications.

10. **Silicone**: 100 percent clear silicone with a 25-year life, or approved equal.

11. **MH Coatings**

    - Hydro Pox 204 or approved equal.
    - Calcium aluminate (SewperCoat by Kerneos Aluminate Technologies or approved equal)

12. **Wastewater Marking Tape**: Terra Tape Extra Stretch 450 Material, detectable, 12 inch wide or approved equal. Non-Detectable for sewer force mains.

13. **Grease Interceptor**: Jensen Precast, Oldcastle Precast or approved equal. . 1000 gallon and greater grease interceptors to have three 24" access points per detail SS-6

14. **Hydro-mechanical Grease trap:** HGI, Trapzilla, Schier or approved equal.

15. **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.

16. **Eccentric Non-Lubricated AWWA Plug Valves**: Crispin Series 800 or approved equal.

91-17 ILLEGAL USE OF SEWER SYSTEM

If Stormwater enters the sewer system, the Contractor and/or Owner/Developer shall be charged according to Title 14.16.220 of the City of Roseville Municipal Code. Stormwater run-off shall be classified as "low-strength metered commercial users." The sewer unit shall be 1 sewer unit per 1,000 cubic feet discharge. The Environmental Utilities Department shall determine the volume of discharge.

91-18 CONDITIONALLY APPROVED

The following products are conditionally approved in the City for a period of 2 years conditional acceptance period, the product may be granted approved equal status and be added to the list of approved products in the City of Roseville Standards.

A. ARV
   a. A.R.I. D-025L
   b. Apco/DeZurik

B. Sherman Williams DuraPlate 6100 MH coating

C. Rinker MH

D. Mission Clay VCP sewer pipe

SECTION 101: DRAINAGE

101-1 GENERAL

Drainage improvements are to include: culverts, drop inlets, lined channels, turf reinforcement matting, manholes, Stormwater quality control measures, outlet and inlet structures and storm drain pipe. These improvements shall be installed in accordance with the approved improvement plans, these Construction Standards, the West Placer Storm Water Quality Design Manual, the City of Roseville Stormwater Quality BMP Guidance Manual for Construction and the latest edition of the State of California Department of Transportation Standard Specifications hereinafter referred to as the Caltrans Standard Specifications. These Standards shall apply to the public right of way and easements and private on-site drainage improvements. Several items within this section shall apply to on-site improvements and in conformance to stormwater quality requirements.

The City of Roseville has adopted Stormwater quality design standards to reduce water pollution generated by urban runoff. These design standards are detailed in the West Placer Storm Water Quality Design Manual. This manual is available on the City of Roseville's webpage: https://p1cdn4static.civiclive.com/UserFiles/Servers/Server_7964838/File/Government/Departments/Development%20Services/Engineering/Stormwater%20Design%20Inspection/Post%20Development%20Run-off%20Control/W%20Placer%20SWMP%20Manual%20FINAL%202016-04-01.pdf

Storm Water Pollution Prevention Plans (SWPPP's), as defined by the State, shall not be required for projects smaller than 1 acre in size, provided the project is not part of a larger project. An erosion and sediment plan shall be required as part of the project improvement plan submittal that identifies temporary and permanent Best Management Practices (BMP's).

The Owner of the property or their permit applicant representative may be responsible for Storm Water Inspection services, as required through such time the project is deemed complete.

101-2 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 foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections and every 25 feet in curved sections. Cut sheets shall be on-site and shall be furnished to the City's Construction Inspector upon request.

101-3 DROP INLET INSTALLATION

Drop inlet installations shall conform to Construction Standard Details DR-1, DR-2 and DR-3 and to provisions in Sections 51 and 52 of the Caltrans Standard Specifications. The interior of the drop 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 fish stamp conforming to Construction Standard Detail DR-20 shall be placed adjacent to all drop 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. Drop Inlets shall conform to ASTM C913. Otherwise, unused knockouts shall be grouted to wall thickness dimension.

101-4 MANHOLE INSTALLATION

A. Bases

1. **Precast**: Precast concrete structures shall be of approved design and sufficient strength to withstand the loads to be imposed upon them. Precast concrete walls for catch basins shall be 6 inch thickness except at knockouts where the minimum thickness shall be 2 inches. Precast bases shall be placed on a foundation of 3/4 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 City's Construction Inspector. Precast bases shall be furnished with cutouts or knockouts. Unused knockouts need to be grouted solid to wall thickness dimension if wall is left intact should ASTM C913 certification not be submitted to City Engineer prior to construction. Pipes shall be installed only in factory knockouts unless otherwise approved by the City Engineer. Maximum Knockout or cutout hole-size shall not be greater than the sum of the outer pipe diameter plus the catch basin wall thickness.

2. **Cast-in-Place Base**: The cast-in-place base portion shall not be placed higher than 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 1 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 water tight.

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 inside and a 12 inch by 12 inch minor concrete collar outside. 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 3 inches in height. The total height of the grade rings, frame, and cover casting shall not exceed 18 inches.

F. Frames and Covers: The tops of frames and covers shall be set no more than 1/8th inch below finish grade pavement in the street and 6 inches above finish grade in landscape areas and 12 inches in unimproved, isolated areas unless otherwise shown on the approved plans. Per the Construction Standard Details, a 12 inch deep by 12 inch wide concrete collar shall be

placed around the casting, either covered by 3 inches of asphalt concrete paving in a street area, per Detail DR-4, or be placed flush with the finished surface using minor concrete with a medium broom finish with pattern perpendicular to travel direction. The concrete collar shall be in conformance to Section 90-2, "minor concrete". 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, or by suspending with timber and wires. 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. Compaction: Compaction around storm drain manholes shall conform to Construction Standard Details TB-1 and TB-3.

101-5 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. A registered civil engineer shall design vaults. Shops drawings shall be submitted and approved by the City Engineer.

101-6 PIPE INSTALLATION

All drainage improvements shall conform the following requirements:

A. Excavation: Pipeline excavation shall be open-cut trenches, unless otherwise specified on the approved improvement plans. All excavations shall adhere 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.

Wherever the trench bottom is unstable, the area shall be excavated and an adequate amount of ½ or ¾ inch crushed rock shall be compacted in place to provide a stable base for the pipe. Pipe bedding material, per approved plans, will be placed on top of stabilized trench bottom.

B. Trench Width: A minimum clearance of 6 inches shall be maintained between the pipe and the trench wall for reinforced concrete pipe and ductile iron pipe. See Detail TB-2 for trench widths for non-rigid pipe.

C. Pipe Bedding: Pipes shall be placed on a firm bed of imported granular material conforming to Details TB-1, TB-2 and TB-3. Unless unstable pipe bedding subgrade needs to be removed, pipe bedding shall only be placed on native, undisturbed soil. Prior to placing pipe bedding, the trench bottom shall be free of any loose material.

D. Laying Pipe: The pipe shall be laid up-stream with the bell end of the pipe placed up-stream. 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. **Handling, Laying and Backfill of Polyvinyl Chloride (PVC), High Density Polyethylene Pipe (HDPE), Steel Reinforced High Density Polyethylene Pipe (SRHDPE), and Polypropylene Pipe**: The pipe shall be handled in accordance with the manufacturer's published recommendations. Laying and backfill shall conform to Caltrans Standard Specifications, the manufacturer's recommendations, ASTM D-2321 and Construction Standard Detail TB-2, 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 1 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 City's Construction Inspector may require dewatering 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. The pipe run between the last structure and the discharge/inlet opening shall be reinforced concrete. Pipe stub runs from storm drain mains into commercial sites shall also be reinforced concrete.

   e. No pipe, conduit or any other appurtenance shall be located within any existing or newly constructed storm drainpipe or culvert. Each run of storm drainpipe and culvert shall also be 100% clear and unobstructed the total length.

E. Non Rigid (PVC/HDPE/SRHDPE/Polypropylene) Pipe Testing: A mandrel test shall be conducted following completion of subgrade processing and compaction for curb gutter and sidewalk and pavement. Placement of curb, gutter and sidewalk and pavement (and related aggregate base) shall not occur until the City's Construction Inspector has confirmed the passing of the mandrel test. The City's Construction 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 improperly 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 section. 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.

F. Pipe Laying Tolerances: The pipes shall be laid true to line and grade with allowed tolerances of 0.03 foot above or below the design grade and 0.10 foot left or right of the design alignment.

G. Trench Backfill: Initial backfill material shall be place immediately after pipe joints have been completed inspected and passed by the City's Construction Inspector.

The material shall be carefully placed so as not to disturb or damage the pipe, and shall be brought up evenly on both sides. Trench backfill shall be placed in accordance with Section 111 of these Construction Standards.

H. Cast-in-Place Concrete Pipe: Cast-in-place concrete pipe shall conform to provisions in Section 63 of the May, 2006 Edition of the Caltrans Standard Specifications. Where excavations for other utilities undermine installed cast-in-place pipe, that excavation shall be backfilled to the spring line of the cast-in-place pipe with 2 sack slurry per these Standards.

I. 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.

The proper tools and equipment shall be used in marking and removal of the pavement such that it is cut accurately to a neat and parallel line on either side of the trench width required, in conformance with the Trench Cut Ordinance. All cuts in Portland cement concrete pavements shall be sawcut with equipment approved by the City's Construction Inspector. See Section 31, Trench Backfill, of these Standards.

J. Cleaning of Storm Drain System: The storm drain system shall be cleaned to the satisfaction of the City's Construction 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 City's Construction Inspector. Flushing shall comply with requirements of Section 21-2 U of these Standards

101-7 CHANNEL LINING INSTALLATIONS

Channel lining installations shall conform to Construction Standards DR-16 and DR-17 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 1 inch clear from either face of the concrete, unless otherwise noted.

C. Joints:

1. **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.

2. **Deep Tool Joints**: Transverse deep tool joints shall be constructed at 10 foot intervals. The aggregate shall be separated with the joint tool a minimum of 2 inches deep. Immediately following application of the deep tool joint, a ¼ 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 10 feet, midway between contraction joints on each side of the channel. The weep hole elevation shall be 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 6 inches thick and 18 inches in depth, as measured from the surface of the lining. The welded wire fabric shall be bent down into the cutoff walls.

F. Geotextile Linings: Geotextile linings shall follow the manufacture's recommendations for preparation of soil, seed bedding, blanket orientation, anchoring details, and appropriate seed blend and application rates.

101-8 MATERIAL

A. Backfill Material: All Drainpipe backfill material shall conform to Construction Standard Details TB-1, TB-2, TB-3, TB-4 and TB-5.

B. Drop Inlets: All drop inlets shall conform to Construction Standard Details DR-1, DR-2 and DR-3. Concrete shall conform to these standards.

C. Manholes: All precast manhole barrels, risers, cones, flat tops and grade rings shall conform to ASTM Designation C478 and shall conform to dimensions shown on Construction Standard Details DR-4 through DR-8 inclusive.

1. **Bases -** Bases shall be either precast or cast-in-place. Precast bases shall conform to ASTM Designation. Cast-in-place bases shall be of minor concrete with cementitious content of not less than 505 pounds per cubic yard, with a maximum size aggregate not greater than 1 inch or smaller than 3/8 inch, per Section 90 of the Caltrans Standard. Slump shall not exceed 4 inches as determined by the slump cone method of ASTM Designation C143 or an equivalent slump as determined by CTM533.

2. **Barrels**: Manhole barrels shall conform to dimensions of Jensen Precast Products or approved equal, and shall conform to ASTM Designation C478.

3. **Cones**: All cones shall be concentric (unless otherwise shown on the approved improvement plans), Jensen Precast Products and conform to ASTM Designation C478.

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 1 cubic foot of Portland cement to 2 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: 24 inch frame and slotted cover: D&L Supply #A-1021 (standard 6 5/8 inch high) or South Bay Foundry #D1920; "D" shall be embossed in center.

   a. 36 inch frame and cover: D&L Supply #A-1462 or South Bay Foundry #D1907; "D" shall be embossed in center.

   b. 24 inch frame and slotted cover: D&L Supply #C-2660 (#A-1021 with slotted cover), or South Bay Foundry #1920 (specify slotted cover).

c. Short 24 inch frames and covers: D&L Supply #A-1022 (5 inch) and #A1023 (3 inch); South bay Foundry #1922 (5 inch) and #1923 (3 inch).

d. 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 drainpipe; shall conform to the following:

1. **Cast-in-Place Concrete Pipe**: Concrete shall be Type II Modified Portland Cement content of the minor concrete shall not be less than 550 pounds per cubic yard with a maximum size aggregate not greater than 1 inch or smaller than 3/8 inch and shall conform to the requirements of Sections 63 (2006 Edition) and 90 of the Caltrans State Specifications.

2. **High Density Polyethylene Pipe (HDPE)**: HDPE shall be type "S", conforming to Section 64 of the Caltrans Standard Specifications. Joint connections shall be water tight, rubber ring gasketed. HDPE shall be Hancor (Sure-Lok F477), ADS, Inc. (N-12 Pro Link Ultra) or approved equal.

3. **Polyvinyl Chloride Pipe (PVC)**: PVC shall conform to the following standards based on pipe diameter:

Pipe Diameter	ASTM Designation
12" through 15"	D3034, SDR 35
18" through 27"	F794, F2241, SDR 51
30" through 48"	F794

All PVC pipe joints shall be integral wall bell and spigot configuration, factory formed. All rubber rings shall conform to ASTM Designation F477.

4. **Precast 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 Caltrans Standard Specifications.

5. **Steel Reinforced High Density Polyethylene Pipe (SRHDPE)**: SRHDPE shall be manufactured in accordance with ASTM F2562 "Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage". SRHDPE shall be manufactured from high density polyethylene stress rated resins conforming to the minimum requirements of cell classification 345464 C per ASTM D3350 "Standard Specification for Polyethylene Plastic Pipes and Fittings Material".

Joints shall be watertight to an internal water pressure of 15 psi when tested in accordance with ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals". SRHDPE shall be CONTECH (DuroMaxx) or approved equal.

6. **Polypropylene Pipe**: Pipe 12 inch – 60 inch Diameter shall conform to ASTM F2736 (12-30 inch diameters) and ASTM F2881 (36-60 inch diameters). Joints must be watertight in accordance to ASTM D3212 with gaskets meeting the requirements ASTM F477. Minimum cover shall be 36 inches cover from top of pipe bell to bottom of roadway structural section. Maximum cover exceeding 20 feet and unpaved surfaces will be approved on a case-by-case basis at the discretion of the City Engineer. Polypropylene Pipe shall be ADS N-12 HP Pipe, or Prinsco GOLDPRO Storm Dual Wall HP Pipe, or approved equal.

E. Stormwater Treatment Devices: The use of on-site storm water treatment devices are strictly limited to smaller development projects with limited space where bio-retention facilities are not functional, at the discretion of the City Engineer.

F. Inlet and Outlet Structures: All inlet and outlet structures shall conform to Construction Standard Details DR-1 through DR-14 inclusively.

G. Slurry Cement Backfill: Slurry cement backfill shall conform to the requirements of Section 19 of the Caltrans Standard Specifications containing 188 pounds of cement.

H. Lined Channels: All lined channels shall conform to Construction Standard Details DR-16 and DR-17 and the following materials:

1. **Air Blown Mortar**: Air blown mortar shall conform to provisions in Section 53 "Shotcrete" of the Caltrans Standard Specifications.

2. **Concrete**: Concrete shall be either "Minor Concrete" with Type II cement, sacked concrete, or doweled and sacked concrete. The minimum weight of sacked concrete shall be 94 pounds per sack.

3. **Curing Compound**: Curing Compound shall conform to provisions in Section 90-1.03B(3) of the CalTrans Standard Specifications and Section 71-5,I of these Design and Construction Standards.

4. **Grouted Cobbles**: Ground cobbles shall be set in 6 inches of "Minor Concrete" with pea gravel concrete. The top surface of the concrete shall be flush with adjacent finish grade. Cobbles shall be 4 to 10 inches in size, with 1/3 exposed above the concrete surface, per Caltrans 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 2 inches in diameter and made of: galvanized steel pipe, schedule 40 or greater; PVC pipe, schedule 40 or greater; or ABS pipe, schedule 40 or greater.

6. **Welded Wire Reinforcement**: Welded wire reinforcement to conform to ASTM Designation A185.

I. Metal Storm Drain Marker: "No Dumping" public notices are required at all storm drain inlets within the City limits, public and private storm drain improvements. Where conditions do not warrant as defined in Detail DR-20 "Detail A" of these Design and Construction Standards, metal storm drain markers as shown on Detail DR-20 "Detail B" may be substituted as approved by the City's Construction Inspector. "Detail B" shall be Almetek Industries Marker, stainless steel storm drain marker model SDM-SS, "No Dumping Drains to Creek" with "fish" symbol and blue background. Installation methods shall be installed per manufactures' recommendations and approved by the City's Construction Inspector.

101-8A ABANDONING STORM DRAINS

In newer construction, storm drain stubs and services to be abandoned shall be either removed to the main or manhole of origin or filled solid with concrete slurry, at the discretion of the City Engineer. Abandonment of existing storm drain stubs shall be removed or left in place as directed by the Director and/or as shown on the approved plans.

Temporary storm drain plugs may be used when short term blockage is necessary at either the stub or lateral run to prevent storm water from entering/exiting the stub or lateral run. Material for plugs may be a combination of 6 mil plastic and rigid plywood. For longer term plugs, and at the discretion of the City's Construction Inspector, 6 mil plastic and 1 foot thick of 2 sack concrete is required. In both cases, the plug shall be marked with a 4x4 temporary post.

SECTION 111: GRADING

111-1 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), the City of Roseville Grading Ordinance, the SWRCB Construction General Permit No.CAS000002, (WQ ORDER No. 99-08-DWQ), The City of Roseville Stormwater Ordinance, and the latest edition of The State of California Department of Transportation Standard Specifications hereinafter referred to as the Caltrans Standard Specifications.

The City of Roseville has adopted Stormwater Quality Design Standards to reduce water pollution generated by urban runoff. These design standards are detailed in the Stormwater Quality Design Manual for the Sacramento and South Placer Regions. This Manual is available on-line at the Sacramento Stormwater Management Partnership website, https://www.cityofsacramento.org/-/media/Corporate/Files/DOU/Specs-Drawings/SWQ_Design_Manual_FINAL2018.pdf?la=en. The manual can also be purchased at the City's Permit Center located on the first floor of the Civic Center Building at 311 Vernon Street downtown Roseville.

111-2 CONSTRUCTION STAKING

Construction staking shall be provided by the Developer for all grading improvements as indicated below including adjacent to wetlands per 111-3.G: Cut sheets shall be on-site and shall be furnished to the City's Construction Inspector upon request.

A. Channels: Channel staking shall provide the station and offset, as well as the cut to the nearest 0.1 foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections and every 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 1 acre of disturbed surface area are subject to the Storm Water Pollution Prevention Plan (SWPPP) requirements. Owner's SWPPP must be approved 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 0.1 foot. Stakes shall be provided at each property corner, front and rear.

D. Retaining Walls: All retaining wall shall be staked for line and grade to the nearest 0.1 foot.

E. Roadways: Roadway excavation staking shall provided the station and offset, as well as the cut to the nearest 0.1 foot. Minimum staking intervals shall be 50 feet in tangent sections

and 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.

111-3 INSTALLATION

All grading improvements shall be installed in accordance with provisions in Chapter 33 of the UBC, recommendations of site specific geotechnical reports and geotechnical engineer, provision in Sections 16 through 19 of 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 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. Erosion Control Measures: Construction sites shall have required erosion and sediment control measures in place between October 1 and April 30. 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. If construction is in progress, the Contractor shall ensure that the construction site is prepared prior to the onset of any storm. For Stormwater quality compliance information, refer to the City's Storm Water Quality Best Management Practices (BMP) Guidance Manual for Construction Activities, latest edition. Waterways under the jurisdiction of governmental agencies other than the City of Roseville may be subject additional erosion control measures or criteria and is the responsibility of the Developer/Owner. City of Roseville 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 Wildlife.

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 elimination soil migration. A City Stormwater Inspector may require additional control measures be installed if deemed necessary.

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 1 and April 30 unless approved by the Engineering Division, 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, a construction access conforming the City's Stormwater Quality Best Management Practices Guidance Manual. Alternative tracking control measure will be considered provided they are equally or more effective than specified. Construction access locations shall be maintained during the course 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 Development Services Construction Inspector.

c. Construction Vehicles: The Contractor is responsible for cleaning construction vehicles leaving the site on a daily basis to prevent dust, silt, mud and dirt from being released or tracked offsite. See the City of Roseville Stormwater Quality BMP Guidance 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 suitable to prevent the generation of airborne dust. Trucks transporting dry soil shall be covered with tarpaulins. Stockpiling of spoils during the wet season, (October 1 to April 30), should be avoided. If avoidable, spoil stockpiles shall be covered with plastic, or adequately stabilized by other BMP's, with a perimeter sediment barrier installed at all times. The City Stormwater Inspector may require additional control measure 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 hydrant permit from the Environmental Utilities Department 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 City's Development Services Construction Inspector. In addition, Placer County Air Pollution Control 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 filter, or other devices that have been approved of the Stormwater Inspector shall be used.

5. **Perimeter Protection**: Silt fences, and straw wattles are commonly used as perimeter sediment control BMP's. Proper installation of these is critical for their effectiveness. Refer to the City's Stormwater Quality Best Management Practices Manual, for proper installation procedure for these BMP's and for information on additional BMP's that may be available.

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, soil stabilizers, and linear sediment controls along the toe, face, and grade breaks of exposed slopes shall be employed to minimize or eliminate erosion. Refer to the City's Stormwater Quality Best Management Practices Manual, Temporary Soil Stabilization, for proper installation procedures.

7. **Straw Bales**: Straw bales should strategically stockpiled on site during the "Wet Season" for the purpose if immediate broadcasting prior to storm events. Measures shall be provided to keep straw dry. Refer to the projects' SWPPP or erosion control plan for proper stockpiling of BMP's.

8. **Alternative Control Devices**: Use of alternative sediment control devices will be approved of at the discretion of the City's Stormwater Inspector.

9. **Wildlife Friendly / Non-entrapment Materials**: Areas where permanent erosion and sediment control materials are placed, or locations adjacent to open space or other sensitive areas shall employ wildlife friendly, or non-entrapment products. (Non-entrapment products are those that use specially designed netting, biodegradable netting, or no netting at all for their blanket and waddle products, which are designed to minimize or eliminate animal entrapment). Materials shall be approved prior to placement by Development Services staff.

C. 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). Recertification of lot pad compaction/elevation certificates may be necessary due to stockpiling, rutting, sales trailers, temporary parking lots, erosion, and time lapse at the discretion of the City Construction Inspector, refer to section 21-5 E.

D. Retaining Walls:

1. **Concrete/Masonry/Rock Walls**: All concrete, masonry, or rock walls shall be installed per the manufacturer's instructions or design engineer's recommendations.

2. **Wood Retaining Walls**: All wood retaining walls shall be installed in accordance with Construction Standard Detail GR-3.

E. 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 shoulder, 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.

2. **Grade Control**: When the next layer to be placed on the subgrade is a portland cement concrete pavement, 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 City's Development Services Construction Inspector shall approve the equipment used for proof rolling.

4. **Unsuitable Materials**: Any unsuitable material encountered within 2 feet below subgrade or 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 on-site geotechnical engineer. Other methods for subgrade stability may be used upon review and approval of the Developer's geotechnical engineer.

10. **Tree Grading**: Grading activities within the protected zone of a Native Oak Tree or Landmark Tree shall be conducted under the conditions set forth under the Grading Permit and Tree Permit Conditions. These conditions shall also include:

1. **Fencing**: A minimum 5-foot high chain link fence, or approved equal by the Planning Department, shall be installed at the outermost edge of the protected zone of each protected tree or group of trees. The fence shall not be removed until written authorization is received from the Planning Department.

   Fences must be installed in accordance with the approved fencing plan prior to the start of any grading operations. The Contractor shall call the Planning Department for an inspection of the fencing prior to grading operations.

   Signs must be installed on the fence in four locations, equidistant around the tree. On fencing around a grove of trees, the signs shall be placed at approximately 50-foot intervals. Sign verbiage is indicated in Section 111-4.B.

2. **Grade Changes**: No grade changes are permitted which cause water to drain to within twice the longest radius of the protected zone of any protected tree.

3. **Native Ground Surface Fabric**: Removal of any native ground surface fabric from the protected zone of the tree shall require protection of the tree within 48 hours of removal.

4. **Preservation Devices**: Preservation devices (such as aeration systems, oak trees wells, drains, special paving and cabling systems) shall be installed per approved plans and certified by the Developers arborist.

5. **Retaining Walls**: The Contractor shall provide immediate protection against moisture lost to exposed roots due to construction of a retaining wall within the protected zone of the tree. The retaining wall shall be constructed within 72 hours after completion of grading in the protected zone.

6. **Roots**:

   a. **Minor roots**: Minor roots (less than 1 inch in diameter) may be cut. Damaged roots shall be traced back and cleanly cut behind any split, cracked or damaged area.

   b. **Major roots**: Major roots (over 1 inch in diameter) may not be cut without approval and supervision of the Developer's arborist.

7. **Trenching**: Trenching within the protected zone of a tree, when permitted, may only be conducted with hand tools, in order to avoid root damage. The Contractor shall follow provisions approved in the Utility Trenching Pathway Plan, submitted by the Developer to the Planning Department.

11. **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 Preserve 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 Preserve. Post and cable fencing or other improvements shall be utilized to meet this requirement.

3. Landscaping adjacent to the Preserve shall be California native, drought-tolerant groundcover, shrubs, plants and trees.

4. The Pre-Construction meeting shall address the presence of the Preserve, the sensitive habitats present and minimization of disturbance to the Preserve. During grading and construction the preserve area shall be avoided and shall not be used for parking, storage, or project staging. The contractor shall remove all trash blown into the preserve from adjacent construction on a daily basis. After construction is complete, the temporary fencing shall be removed from the preserve, along with all temporary erosion control measures.

111-4 MATERIALS

A. Retaining Walls:

1. **Concrete/Masonry/Rock Walls**: All concrete, masonry, or rock walls shall conform to materials and specifications provided by the wall manufacturer or designing engineer.

2. **Wood Retaining Walls**: All wood retaining wall materials are to be in accordance with Construction Standard Detail GR-3.

B. Tree Fencing:

1. **Signs**: The size of each sign shall be a minimum of 2 feet by 2 feet and shall contain the following language.

WARNING
THIS FENCE SHALL NOT BE REMOVED
OR RELOCATED WITHOUT WRITTEN
AUTHORIZATION FROM THE
PLANNING DEPARTMENT

C. Wetland Preserve Fencing:

1. **Signs**: The size of each sign shall be a minimum of 2 feet by 2 feet and shall contain the following language:

WARNING
THIS FENCE SHALL NOT BE REMOVED
OR RELOCATED WITHOUT WRITTEN
AUTHORIZATION FROM THE
COMMUNITY DEVELOPMENT DEPARTMENT

111-5 SOIL TESTING PROCEDURES AND FREQUENCIES

A. Field Testing:

1. **Field Density Testing**: Field density test for earthwork and backfill will be performed by either the owner's Independent Testing Laboratory (ITL), or the City's Geotechnical Engineering Consultant, at the discretion of the City Engineer as follows:

   a. Private property building areas including 10 feet outside the exterior building lines shall be tested by the property owner's Geotechnical Engineer with proper written pad certifications submitted to City Building Official prior to foundation placement.

   b. Public Right-of-Way - 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. Test Method-In-place nuclear density, ASTM D2922 (Method B-Direct Transmission) to check conformance to requirements of Geotechnical Report, project plans, specifications, and Section 71 of these 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 the Daily Field Reports (DFR's). 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 City's field representative.

   d. The City expects testing at a higher frequency at the discretion of the field technician or City's Development Services Construction 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 (DRF)**: All testing and observations shall be recorded in a DFR. The DFR 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's along with the observation of corrective operations and retest results. DFR's shall also indicate where observation and soil probing was performed in between nuclear gauge testing.

C. Mass Grading Testing Frequencies:

1. Large Area Density Testing: One test per 1,000 to 2,000 cubic yards. A separate compaction certification report is required for City right-of-way limits.

2. Small Area Density Testing: One test per 500 cubic yards or each 10,000 square feet of fill.

D. 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 noncompliant items.

2. Compaction Testing - By Nuclear Gauge Method: Tests shall be taken at a minimum frequency of 1 test per lift per 200 lineal feet of backfill, testing pattern should be staggered such that the location of test varies with each lift of backfill. The maximum loose lift thickness shall conform to the requirements outlined in Section 31-2E, Typical Compaction Equipment and Maximum Lift Depths Achieved by Proper Compaction, of these Standards, or as approved by the City Engineer. The ITL shall submit copies of the field technician's DFR's and testing logs on a weekly basis to the City City's Construction 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 will 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 conditions, 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 City's Development Services Construction 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 is required. Adequate compaction of material containing more than 30 percent rock larger than ¾ inch shall

be verified via performance specifications. The ITL shall develop the performance specification and, if none exists, perform full-time observation of the operations to verify compliance. Field observations shall be recorded in the field technician's DFR's as described above. The DFR shall clearly reference approximate stations and elevations over which the observation of performance specification was performed.

4. Dry Utility Trenches: Installation of Electric Department facilities shall be according to Electric Department designed job print and City of Roseville Electric Department Specifications, Details: Residential 1.2, 1.2.1; Commercial 3.1, 3.2. Frequencies of testing to coincide with these Standards.

5. Manholes: Areas around manholes shall be tested every vertical foot. Testing methods and recordings shall be as described above.

6. Utility Services to Residences: Test at least every other lift on a minimum of 50 percent of the services.

7. Retrofit Utilities: See Section 31 of these Construction Standards.

SECTION 141: RECYCLED WATER SYSTEM CONSTRUCTION

141-1 GENERAL

On-site and public recycled water pipe, fittings, gate valves, fire hydrants, blow-offs and other appurtenances shall concur with the current Environmental Utilities Department list of approved materials, provided herein, and shall be installed in accordance with the requirements of the American Water Works Association (AWWA) Standards, these Construction Standards, and as recommended by the manufacturer. These Construction Standards and manufacturer's guidelines shall be present at the construction site at all times.

141-2 CONNECTION TO EXISTING FACILITIES

Connection to existing recycled water facilities may be made upon approval of the Environmental Utilities Department.

A. The Environmental Utilities Department has the option of making a system tap as required on the approved plans. Should the Environmental Utilities Department elect to perform the tap, 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, or as determined by the Environmental Utilities Department:

1. Coordinating the work requested with the Environmental Utilities Department and the Development Services Construction 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 Development Services Construction Inspector.

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

5. Providing 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. The Contractor shall tie-in the new system to an existing stub under the following conditions:

1. With specific approval of the Development Services Construction Inspector.

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

3. Dewatering of both the new and existing recycled 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.

5. All tie-ins shall take place in the presence of the Development Services Construction Inspector.

6. Tie-ins may take place after the newly constructed recycled water system has successfully passed all required testing procedures as established in Section 141-13 of these Construction Standards and as determined by the Development Services Construction Inspector.

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

141-3 CONSTRUCTION STAKING

The recycled water shall be staked prior to excavation. Staking shall provide the station and offset to the recycled water main, as well as a cut to the nearest 0.1 foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections and every 25 feet in curved sections and every 10 feet in approved vertical curve sections.

141-4 EARTHWORK

Earthwork required to construct recycled water facilities and appurtenances shall be performed to the lines and grades shown on the approved project plans and as specified below:

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 Construction Standard Detail W-1. Excavations shall conform to all applicable Federal and State safety requirements. The contractor shall appoint a designated "competent person" who will be present during construction.

B. Trench Width: The trench bottom width to 6 inches above top of the pipe shall comply with Construction Standard Detail W-1 or as approved by the Environmental Utilities Department.

C. Compaction: Compaction of the trench shall conform to Construction Standard Detail W-1 and Section 31. Compaction test results shall be supplied to the Environmental Utilities Department upon request.

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

E. Existing Roadways: Trenching in existing roadways shall be limited to the length of pipe that can be laid that day. No open trenches shall be left overnight. Exposed trenches shall be plated or backfilled as required by the Development Services Construction Inspector and/or the Development Services Department.

F. Excess Material: Excess material and materials determined unsuitable for backfill by the Development Services Construction Inspector shall be removed from the project site.

141-5 DEWATERING

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 measures shall be used to eliminate sediment-laden discharges in accordance with the approved SWPPP.

141-6 PIPE BEDDING

The gradation of allowable backfill material is as shown on the Construction Standard Detail W-1 and Section 31. Pipe bedding shall be installed as follows:

A. 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.

B. Loose material shall be removed from the trench bottom and replaced with imported material.

C. Where rocky unyielding, or unsuitable foundation material is encountered, the subgrade shall be excavated a minimum of 12 inches below the pipe and the trench width shall be increased a minimum of 12 inches. The over-excavation shall be replaced with imported material. DIP may be used as an alternative to the over-excavation requirements.

D. Where the trench bottom is soft, yielding or unstable, the trench bottom shall be over-excavated. 3/4 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.

E. 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 that the bell hole is no larger than necessary to accomplish proper joint assembly.

141-7 CONCRETE CRADLES, ARCHES & ENCASEMENTS AND TRENCH DAMS

Concrete cradles, arches and encasements shall conform to Construction Standard Details W-23 and 24 and the following:

A. 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. 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 1/3 and ½ 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.

C. Restrained pipe within casings, bridges, shall be fully extended or "stretched out" to remove the slack between the joints the entire length of the structure.

D. Water shall not be permitted to enter, seep or run onto the concrete while curing.

E. Trench dams shall be constructed of controlled density fill or clay as shown on the drawings or as directed by the Development Services Construction inspector. Trench dam excavations shall be made into native earthen materials to the dimensions shown on the drawings or as directed by the Development Services Construction inspector. Clay materials shall be moisture conditioned to near-optimum moisture content prior to placement in the excavation and compacted to the required relative compaction.

141-8 PIPE ZONE BACKFILL

Pipe zone backfill shall conform to Construction Standard Detail W-1 and the following:

A. Extreme care shall be taken when consolidating the backfill around the pipe zone. For pipe 12 inches in diameter and smaller, no more than ½ of the pipe shall be covered prior to shovel slicing the haunches of the pipe. For pipe greater than 12 inches in diameter, no more than the lesser of 6 inches or 1/3 of the pipe diameter shall be covered prior to shovel slicing. Sufficient care shall be taken to prevent movement of the pipe and damage to the polyethylene encasement during shovel slicing. Shovel slicing shall be witnessed by the Development Services Construction Inspector prior to shading the pipe.

B. Compaction equipment shall not make direct contact with the pipe.

C. Where the pipe is to be installed below historic groundwater levels or where the trench is subject to inundation, crushed rock material shall be placed to the crown of the pipe.

141-9 PIPE INSTALLATION

Recycled water pipe shall be installed in accordance with Section 81-9 of these Construction Standards and the following provisions:

A. 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 break time as well as overnight.

B. Trenches shall be in a reasonably dry condition when pipe is laid.

C. 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.

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

E. No facility is to be backfilled without inspection by the Development Services Construction Inspector. Improvements installed without proper inspection shall be exposed and inspected as required by the Development Services Construction Inspector.

F. 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.

G. Pipes shall be mechanically restrained to the length specified in the approved plans, using materials specified herein. Thrust blocks shall only be used where specifically shown on the plan/profile sheets and/or the standard detail sheets. All fittings and appurtenances shall maintain a minimum of 18 feet of restrained pipe into the fitting from all directions.

H. A continuous number 12 blue insulated tracing wire (81-16,G.36) shall be attached to mains, service lines and appurtenances per the Construction Standard Details and as follows:

1. Tracing wire shall also be continuous between main line 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 1 foot of the rim.

4. Wire splices shall be located above ground and inside of valve boxes and conform to Details W-16, W-17, and as follows:

a. Install a copper split bolt connector on the splice

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

c. Solder all Connections with electrical solder.

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

I. A 12 inch wide plastic backfill tape with black printing on a purple field having the words "RECYCLED WATER PIPELINE BELOW" shall be installed above all mains. Tape is to be buried 12 to 24 inches below finished grade.

J. Pipe Identification: All buried recycled water piping shall be purple-colored (Pantone 522) PVC with stenciling identifying it as recycled water in accordance with the AWWA manual, Guidelines for the Distribution of Non-Potable Water. The pipe shall be installed with the manufacturing label on top. Markings shall be as specified in Section 141-16 of these Construction Standards, and as modified herein:

1. Alternate pipe with warning tape, as specified below, will be accepted as an alternative to stenciled purple-colored PVC pipe only on a project-by-project basis, with prior written approval from the Environmental Utilities Department.

2. The plastic warning tape shall be prepared with black printing on a purple field, having the words "CAUTION: RECYCLED WATER PIPELINE." The overall width of the tape shall be 3 inches.

The warning tape shall be installed directly on top to the pipe, longitudinally and centered. The warning tape shall be installed continuous for the entire length of the pipe and shall be fastened to each pipe length by plastic tape banded around the pipe with fasteners no more than 5 feet apart. Taping attached to the section of the pipe before laying in the trench shall have flaps sufficient for continuous coverage. All risers between the main line and control valves shall be installed with warning tape.

K. Mains in unpaved areas shall be marked every 150 lineal feet with a purple composite utility marker, 5 feet 6 inches tall, having a decal stating: "CAUTION: RECYCLED WATER PIPELINE." Appurtenances (valves, ARVs, 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 4 inches above finish grade. The brass marker shall state "City of Roseville Recycled Water Main."

L. All underground metal (ductile iron, valves, fittings, copper, brass, etc.) shall be wrapped in 8 mil minimum thickness polyethylene encasement.

M. 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 immediately removed from the job site.

4. The pipe shall be installed with the manufacturing label on 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 in a mechanical joint.

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

N. Concrete Cylinder Pipe: Concrete cylinder pipe shall be installed in accordance with the manufacturer's recommendations, and in accordance with the following provisions:

1. A 3 inch wide plastic warning tape with black printing on a purple field with the words: "CAUTION: RECYCLED WATER PIPELINE" shall be installed longitudinally, and centered directly on top of the pipe. The warning tape shall be installed continuous for the entire length of the pipe and shall be fastened to each pipe length by plastic tape banded around the pipe with fasteners no more than 5 feet apart. Taping attached to the sections of pipe before laying in the trench shall have flaps sufficient for continuous coverage.

O. Ductile Iron Pipe (DIP): DIP shall be installed in accordance with Section 81-9.M of these Construction Standards. Warning tape shall be applied as specified in Section 141-9.N.1 above.

P. Borings: Borings for installation of recycled water lines shall be in accordance with Section 81-9.P of these Construction Standards. Utilizing the City's drainage system for residual discharge from boring operations without the required measures 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 discarded 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 (RWQCB) provided it meets RWQCB requirements and 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. The City stormwater or Development Services Construction Inspector shall inspect and monitor the discharge recovery, containment, and restoration process.

141-10 SERVICE INSTALLATION

Recycled water services shall be installed in accordance with manufacturer's recommendations, per Section 81-10 of these Construction Standards, per the Construction Standard Details and with the following provisions:

A. Services shall be continuous from the main line to the service box. Bends in copper tubing shall be made in a manner that does not crimp or flatten the tubing.

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

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

D. Service lines shall be encased in 8 mil minimum thickness poly tubing and backfilled with sand. Use pipe tape to secure and seal the polyethylene wrap.

E. Recycled water identification shall be installed on service lines as provided for in these Construction Standards.

F. 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 Construction Standard Detail W-14. The new service line and manifold shall be tested in accordance with Section 81-13 of 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 Development Services Construction Inspector. The new service line and manifold shall be pressure tested in accordance with Section 81-13.A of 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.

Meter Installation and Address: When location of meter is absolutely certain, developer/contractor shall verify address with Development Services Inspector. This shall be prior to payment of recycled water meter by developer/contractor.

G. Concrete mow strip shall be used to separate potable and non-potable landscaping unless otherwise approved by the Environmental Utilities Department.

141-11 APPURTENANCES INSTALLATION

Appurtenances, including blow-offs, sample stations, air release valves, booster pump stations and meters shall be installed in accordance with manufacturer's recommendations, Construction Standard Details and with the following provisions:

A. All valves, fittings, DIP, copper and underground brass shall be wrapped and sealed in 8 mil minimum thickness polyethylene encasement. Use vinyl pipe wrap tape to secure and seal the polyethylene. 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 Development Services Construction Inspector prior to wrapping. Otherwise, the damaged valve shall be replaced with a new valve.

B. Gate valves shall be centered in a one piece riser stock. Operator nuts deeper than 40 inches from finished grade shall require a continuous valve nut extension to within 24 inches of finished grade. Extension shall conform to section 81-16.G.41.

C. Buried nuts and bolts shall be coated with a bituminous coating. This includes exposed bolts found on a manufactured appurtenance (i.e., valve bonnets, etc.). "T" bolt heads do not require coating.

D. Dead end lines, permanent and temporary, shall have a blow-off constructed per these Construction Standards.

E. All appurtenances shall be marked with warning tags, signs and/or purple paint as indicated on the approved plans.

F. Insulating kits shall be installed at any transition between dissimilar metal pipes per the Construction Details and as required by the Environmental Utilities Department.

141-12 ON-SITE RECYCLED WATER FACILITIES

Private, on-site recycled water systems shall conform to additional specifications as described herein:

A. Inspections: If the on-site system is installed prior to plan approval and/or inspection, any and all portions of the systems shall be exposed, inspected and corrected as directed by the Development Services Construction Inspector. Failure to comply will result in termination of service. Plan changes or field modifications shall be reviewed and approved by the Environmental Utilities Department prior to installation.

B. Coverage Test for On-site Irrigation Systems: The Owner/Developer shall be responsible for controlling overspray and run-off on new systems or systems requesting conversion. To ensure that overspray or run-off is in accordance with the Department of Health Services regulations, inspection by the Environmental Utilities Department is required. The Environmental Utilities Department is to be contacted at (916) 774-5750 for a coverage inspection test upon completion of the landscaping improvements involving use of recycled water.

The Owner/Developer or representative shall attend the coverage test and shall have someone attend capable of making minor adjustments to the sprinkling system. All modifications and costs are the responsibility of the Owner/Developer.

The Owner/Developer will be notified in writing of modifications to the system which could not be made during the coverage test. Such modifications shall be made in a timely manner. Failure to make timely modifications will result in termination of service.

C. Controller Charts: Controller charts shall be prepared by the Owner/Developer, approved by the Environmental Utilities Department, and then placed in the controllers prior to start of service. Failure to provide controller charts, or removal of charts from the controller will result in termination of service. Controller charts shall be prepared as set forth herein:

1. Provide 1 controller chart for each automatic controller, showing the area covered by the controller. The chart shall be the maximum size the controller door will physically allow.

2. The chart shall be a reduced size drawing of the actual as-built system. The line weights and lettering on the original controller chart drawing shall be drawn so that the reduced chart is clearly legible.

3. The chart shall be a black line print, with a different color used to show the area of coverage provided by the controller.

4. When completed and approved, the charts shall be hermetically sealed between 2 pieces of plastic, each plastic piece being a minimum of 10 mils thick.

D. Conversion From a Potable System to Recycled Water Supply: The facilities to be converted shall be investigated in detail, including review of any record drawings, preparation of required reports, findings and determinations by the Environmental Utilities Department of measures necessary to bring the system into full compliance with these Construction Standards. The Owner/Developer shall pay all costs associated with converting the system.

E. Conversion From a Recycled Water System to Potable Water Supply: If it becomes necessary to convert from a recycled water system to a potable water system, it shall be the responsibility of the Owner/Developer to pay all costs associated with the conversion, including, but not limited to, the following items:

1. Isolation of the Recycled Water Supply: Service shall be removed and plugged at the main, or abandoned in a manner approved by the Environmental Utilities Department.

2. Installation of approved backflow devices on all meter connections.

3. Removal of recycled water quick couplers and replacement with approved potable water quick couplers.

4. Notification to all personnel involved.

5. Removal of all above ground warning labels.

6. Installation of potable water lines, as necessary. Potable water connection fees shall be paid prior to installation.

7. Any previously paid recycled water connection fees will not be credited toward potable water connection fees.

8. Water quality testing as specified in these standards.

9. Any other provisions necessary to meet City Water System Design and Construction Standards, as deemed necessary by the Environmental Utilities Department Director.

10. Preparation of required reports.

F. On-site Pipe Identification: All buried on-site recycled water piping shall be purple-colored (Pantone 522) PVC with stenciling identifying it as recycled water in accordance with the AWWA manual, Guidelines for the Distribution of Non-Potable Water. The pipe shall be installed with the manufacturing label on top. Markings shall be as specified in Section 141-9 of these Construction Standards, and as modified herein:

1. Alternate pipe with warning tape, as specified below, will be accepted as an alternative to stenciled purple-colored PVC pipe only on a project-by-project basis, with prior written approval from the Environmental Utilities Department.

2. The plastic warning tape shall be prepared with black printing on a purple field, having the words "CAUTION: RECYCLED WATER PIPELINE." The overall width of the tape shall be 3 inches.

The warning tape shall be installed directly on top of the pipe, longitudinally and centered. The warning tape shall be installed continuous for the entire length of the pipe and shall be fastened to each pipe length by plastic tape banded around the pipe with fasteners no more than 5 feet apart. Taping attached to the sections of the pipe before laying in the trench shall have flaps sufficient for continuous coverage. All risers between the main line and control valves shall be installed with warning tape.

G. Quick Coupling Valves: Quick coupling valves shall conform to the following:

1. Recycled Water: Quick coupling valves used for recycled water systems shall be constructed of brass with a purple rubber or vinyl cover and shall have a ¾ inch or 1 inch inlet.

a. The cover shall be of a locking type and shall have a warning label, permanently stamped or molded into the cover, stating:

"RECYCLED WATER"
"DO NOT DRINK" in English and "NO BEBER" in Spanish

2. **Potable Water**: Quick coupling valves used in potable water systems shall have a cover made of brass, metal or yellow rubber or vinyl. Quick coupling valves intended for recycled water use shall not be used on potable water systems.

H. Sprinklers: All sprinklers used for on-site recycled water systems shall have an exposed surface colored purple. The exposed surface shall be colored purple through the use of dyed plastic. The exposed surface shall also display either a molded or hot stamped warning, stating "DO NOT DRINK" in English and Spanish along with an international warning symbol cautioning against drinking the water emitted through the sprinkler or an identification tag conforming to these Construction Standards.

Sprinkler risers and swing joints shall be identified with purple adhesive 3 inch x 3 inch labels. Each label shall state "Recycled Water – Do Not Drink" in English and "NO BEBER" in Spanish.

I. Warning Labels: Controller panels, wash down or blow-off fire hydrants on water trucks and temporary construction services may require installation of warning labels, as directed by the Environmental Utilities Department Director. The labels shall state "Recycled Water – Do Not Drink" in English and Spanish.

J. Valve Boxes and Tags:

1. **Valve Boxes**: Valve boxes shall meet the following requirement:

   a. All gate valves, manual control valves, electrical control valves, and pressures relief valves for on-site recycled water systems shall be installed below grade in a purple valve box with a lid identifying use of recycled water.

   b. Electrical and manual control valve boxes shall have a warning label permanently molded into or affixed onto the lid with stainless steel rivets or bolts. Warning labels shall be constructed of a purple weatherproof material with the warning permanently stamped or molded into the label. The warning shall contain the following information:

"RECYCLED WATER"
"DO NOT DRINK" in English and "NO BEBER" in Spanish

2. **Valve Tags**: All recycled water sprinkler control valves shall be tagged with identification tags conforming to the following:

   a. Tags shall be ~~weatherproof plastic~~ engraved stainless steel, 3 inch x 4 inch, ~~purple background with permanent black lettering~~, stating "RECYCLED WATER – DO NOT

DRINK" imprinted on one side and "AGUA RECICLADA – NO BEBER" on the other side.

b. One tag shall be attached to each valve as follows:

- Attach to valve stem directly or with plastic tie wrap, or;
- Attach to solenoid wire directly or with plastic tie wrap, or;
- Attach to valve cover with existing valve cover bolt.

K. Strainers: Strainers shall be installed as follows:

1. Sprinkler irrigation systems shall have a "Y" or basket strainer located upstream of the meter. The strainer shall have a 30 mesh or finer screen. Strainers that have automatic backwash features will not be normally allowed unless it can be demonstrated to the Environmental Utilities Department that the backwash water will not cause run-off and is disposed of in a manner approved by the Environmental Utilities Department. The strainer drain valve shall operate with a recessed key slot.

2. All strainers shall be installed below grade in a rectangular box of sufficient size to easily allow repair or replacement of the unit(s). Box shall be permanently marked "RECYCLED WATER – DO NOT DRINK/NO BEBER".

L. On-site Recycled Water Piping: All on-site recycled water piping shall be installed in accordance with the Uniform Plumbing Code and all other local governing codes, rules and regulations. Recycled water piping under paved or concreted areas shall be installed within a marked C900 sleeve as approved by the Environmental Utilities Director. All piping shall be continuously and permanently marked with the manufacturer's name or trademark, nominal size and schedule or class indicating the pressure rating.

1. Minimum Requirements of Piping and Fittings: The minimum class or schedule of piping and fittings shall be as follows:

a. Cast-iron fittings for A.C. P.: ANSI 21.10 and AWWA C110.

b. Galvanized steel: Schedule 40, mild steel screwed pipe.

c. Galvanized malleable iron fittings: ANSI B-16.3.1

d. Hard drawn copper Type K: ANSI H-26.1 and ASTM B 88.

e. Wrought copper or bronze solder fittings: ANSI B.16.22

f. All PVC constant pressure pipe shall be as follows:

- Schedule 40 for lines 2½ inches in diameter and smaller.
- Class 160 rubber-gasketed pipe for lines 3 inches and larger.
- C905 Class 165 for 16 inch pipe.
- DIP or CCP for pipe larger than 16 inches.

g. PVC intermittent pressure lateral line piping: Schedule 40 or Class 200.

h. PVC fittings: PVC Schedule 40 solvent weld and factory manufactured, or Schedule 40 with rubber-ring joint. PVC schedule 80 solvent weld and factory manufactured, or schedule 80 with rubber-ring joint.

i. Tubing for drip irrigation systems: Manufactured from virgin polyethylene conforming to ASTM D 1248, Type II, Class C.

j. Ductile-iron mortar lined fittings: Class 250 AWWA C110.

2. PVC Piping: PVC pipe fittings shall conform to the following:

a. PVC plastic pipe and fittings shall be installed below grade.

b. All PVC pipe shall be made from NSF-approved Type I, Grade I compound conforming to ASTM D 1784.

c. All PVC Schedule 40 and Schedule 80 pipe shall be manufactured conforming to ASTM D 1785 and D 2466 and shall meet requirements set forth in Federal Specifications PS-21.

d. All PVC Class 200 solvent weld and Ring-Tite pipe shall be manufactured conforming to ASTM D 2241 and meet requirements set forth in Federal Specification PS-22 with Standard Dimension Ration (S.D.R.) for pressure rated pipe. Pipe shall be extruded from approved Class 12454-PVC with resin specifications conforming to ASTM D 1784 and rubber rings conforming to ASTM D 169.

e. All PVC C900 and C905 shall be manufactured conforming to ASTM D 2241. Pipe shall be extruded from approved Class 12454 PVC with resin specifications conforming to ASTM 1784 and rubber rings manufactured conforming to ASTM F477.

f. All pipe shall be homogeneous throughout, free from visible cracks, holes or foreign materials.

The pipe shall be free from blisters, dents, wrinkles, ripples, die and heat marks. All piping shall be manufactured per NSF specifications.

g. All PVC plastic pipefittings shall be rigid PVC virgin Type I, minimum Schedule 40, with working pressure no lower than that of the pipe. Sockets shall be tapered to conform to the outside diameter of the pipe, as recommended by the pipe manufacturer. All Schedule 40 fittings shall conform to ASTM D 2466. Schedule 80 fittings shall conform to ASTM D 2464 and D 2467.

h. All fittings shall be injection-molded of an improved PVC fitting compound featuring high tensile strength, high chemical resistance and high strength. The compound must meet the requirements described in ASTM D 1784 and D 2466, cell classification 13454B. Where threads are required for plastic fittings, they shall also be injection molded. All tees and ells shall be side gated.

i. PVC solvent cement shall conform to ASTM D 2564.

j. Class 160 pipe and gasket shall conform to ASTM D 1784, D2241, and D1869

M. On-site Potable Water Piping: All potable water piping installed within the same project limits as the on-site recycled water piping shall be installed in accordance with the Uniform Plumbing Code and all other local governing codes, rules and regulations, and shall also conform to the following provisions:

1. The pipe shall be continuously and permanently marked with the manufacturer's name or trademark, nominal size and schedule or class indicating the pressure rating.

2. All potable water piping shall have a blue plastic tape identifying it as a potable water line. Potable water warning tape shall be a minimum of 3 inches wide and shall run continuously for the entire length of each line. The tape shall be attached to the top of the pipe with nylon tie-wrap banded around the warning tape and the pipe every 5 feet on center. Warning tape for the potable water piping shall be blue in color with the words "CAUTION: POTABLE WATER LINE" imprinted in minimum 1 inch high, black letters. Imprinting shall be continuous and permanent.

141-13 TESTING PROCEDURES

Recycled water facilities testing shall be performed once joint utility crossings, sewer pressure test and TV inspection and subgrade is made and in accordance with Section 81-13 of these Construction Standards, and as provided herein:

A. Public System (Offsite): Tests and procedures for recycled water systems to be accepted and maintained by the City shall consist of the following:

1. **Pressure Test**: Shall conform to Section 81-13.A of these Construction Standards.

2. **Topside Improvements:** Shall conform to Section 81-13B of these Construction Standards.

3. **Chlorine Disinfection**: Shall conform to Section 81-13.C of these Construction Standards.

4. **Water Quality Testing**: Shall conform to Section 81-13.D of these Construction Standards.

5. **Cross-Connection Control Survey (Hazard Assessment)**: Testing for cross-connection shall be in accordance with the California Plumbing Code, Chapter 16 part II, and the following requirements prior to acceptance and use.

    a. A Cross Connection Control Survey (CCCS) shall be performed on the system by City forces including a certified cross connection control specialist with the assistance of the Contractor. Depending on the complexity of the site, a preliminary field meeting may also be required. The Contractor shall coordinate the test through the Environmental Utilities and/or Parks Department inspector. A minimum of two (2) business days of advance notice is required for the survey.
    b. At the time of the CCCS, construction on both the recycle water system and/or the potable water system being tested must be complete and both systems fully operational and functioning as designed.
    c. During the Cross Connection Control Survey, only potable water through a permitted city hydrant meter/backflow assembly may be used to pressurize the recycled water system.
    d. No connection shall be made to the City's existing recycled water system until the new facilities have been successfully pressure tested and a CCCS has been performed by the City. Taps to the existing recycled system will be made by City forces only.
    e. Once the CCCS passes, the recycle water meter can be installed.

6. **Continuity**: Shall be in conformance with Section 81-13.F of these Construction Standards.

7. **Corrosion Protection System Testing**: Shall conform to Section 81-13G of these Construction Standards.

B. Private System (On-site): Tests and procedures for recycled water systems for private use and maintenance shall conform to the following:

1. **Pressure Test**: The constant pressure recycled water system including appurtenances shall be tested at 125 PSI for 1 hour with non-detectable leakage.

2. **Cross-Connection Testing**: Testing for cross-connections shall be in accordance with the California Plumbing Code, Chapter 16 part II prior to use.

141-14 REPAIRING INSTALLED IMPROVEMENTS

All PVC and concrete cylinder pipe recycled water mains shall be repaired by the following procedure:

A. PVC: PVC repairs shall consist of the following:

1. Damaged or failed pipe sections shall be removed and replaced with new pipe in the presence of the Development Services Construction Inspector. Replacement can be accomplished by the use of City-approved ductile iron mechanical joint repair sleeves. Pipe restraints may be required, depending on repair locations.

2. After the repair has been completed, the excavation shall be backfilled and compacted to grade as specified. The repairs shall then be re-tested per these Construction Standards.

3. 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.

B. Concrete Cylinder Pipe Repairs: Concrete cylinder pipe repairs shall be coordinated with the Environmental Utilities Department on a case-by-case basis.

141-15 PUNCHLIST PROCESS

When the Contractor feels 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 Development Services Construction Inspector. The cost in generating the punchlist shall be borne by the Contractor/Developer.

141-16 MATERIALS

A. Approved Equal: The words “approved equal” shall mean any material deemed by the Environmental Utilities Department to be acceptable for use within the City’s recycled water system as compared to products of specified manufacturers. Contractors proposing to use materials which are not specifically named shall submit all necessary documentation to allow review of said material for use as an approved equal.

The submittal shall include a letter with:

1. **Product**: A description of the product and the appropriate materials specification section number. A sample of the product may be required for review and testing.

2. **Contact**: The name and telephone number of the contact person for the proposed product.

3. **Reference**: A list of a minimum of 3 agencies that are using the proposed product (include names and telephone numbers).

4. **Performance**: Information and reference for 3 locations with a performance record of 3 years in operation of the installation.

5. Address the letter to the Environmental Utilities Department Engineering Division, 2005 Hilltop Circle, Roseville CA 95747, ATTN: EUD, Chairman of METAC. City staff may request a sample of the product for review.

6. The contractor shall submit all material for review 35 day prior to contract award. All submittals shall include documentation verifying the contract award date. Contractors shall allow 2 to 4 weeks review time by the Environmental Utilities Department.

B. Conditionally Approved Material: Materials or products that have met the reference and performance requirements shall be conditionally approved for a minimum trial period of 2 years. Upon completion of the 2 year period. The product may be approved or the evaluation period may be extended as required by the Environmental Utilities Director. A list of conditionally approved products may be obtained from the Environmental Utilities Department.

C. Unapproved Materials: Materials not approved for use on the project shall be removed from the site within 24 hours if requested by the Development Services Construction Inspector.

D. Recycled Water Main: Unless noted on the approved plans, all recycled water mains shall be either Polyvinyl Chloride Pressure Pipe (PVC), Concrete Cylinder Pipe, or DIP.

1. **PVC Pressure Pipe**: PVC Pressure Pipe shall be manufactured in accordance with Section 81-16 of these Construction Standards, except as modified herein:

   a. All PVC transmission mains up to 12 inches in diameter shall be purple colored (Pantone 522) PVC. Mains 12 inches in diameter and smaller shall be AWWA C-900 class 150. pipe manufacturers include: Westlake-Aquaspring C900 Certa-Lok, Diamond Plastics Corporation, J-M Manufacturing, Pacific Western Pipe, Vinyl Tech-White Knight, PW-Eagle, North American Pipe Corporation or approved equal.

b. PVC pipe shall be manufactured within the 18 month period prior to installation. All PVC pipe shall be purple in color with stenciling identifying it as recycled water, in accordance with the AWWA manual "Guidelines for the Distribution of Non-Potable Water". Markings on the PVC pipe shall be placed continuous on two sides of the pipe and shall include:

- "RECYCLED WATER – DO NOT DRINK"
- The pressure rating of the pipe, in pounds per square inch (PSI).
- The ASTM designation.

2. Concrete Cylinder Pipe (CCP) – The use of CCP is one option for recycled water transmission mains larger than 16 inches in diameter, CCP shall be in accordance with AWWA designations.

Approved concrete cylinder pipe manufacturers include: Ameron, Pacific-States, or approved equal.

3. Ductile Iron Pipe (DIP) – Mains 16" in diameter or larger shall be DIP. DIP shall conform to Section 81-16 of these Construction Standards.

E. Services

1. Brass Material: Shall conform to Section 81-16.F of these Construction Standards.

2. Copper Tubing: Shall conform to Section 81-16.F,c.2 of these Construction Standards.

3. Corporation Stops: Shall conform to Section 81-16.F,3 of these Construction Standards.

4. Curb Stops: Shall conform to Section 81-16.F,4 of these Construction Standards.

5. Service Saddles: PVC Pressure Pipe Saddles shall conform to Section 81-16.F,6 of these Construction Standards.

F. Appurtenances

1. Air Release Valves: Shall conform to Section 91-16.F,1 of these Construction Standards.

2. Blocking for Boxes: Shall conform to Section 81-16.G,6 of these Construction Standards.

3. **Boxes**: All box lids are to permanently be marked with the appropriate label (i.e., Recycled Water, ARV, Blow-Off, CPT, etc.). Boxes and manufacturers shall conform to Section 81-16.G,33 of these Construction Standards.

4. **Cadwelds**: Shall conform to Section 81-16.G,8 of these Construction Standards.

5. **Fittings**: PVC fittings shall conform to Section 81-16.G,9 of these Construction Standards.

6. **Gaskets**: Shall conform to Section 81-16.G,11 of these Construction Standards.

7. **Location Stakes**: Shall conform to Section 81-16.G,15 of these Construction Standards.

8. **Mainline Valve Lockout**: Shall conform to Section 81-16.G,16 of these Construction Standards.

9. **Manhole Frame and Cover**: Shall conform to Section 81-16.G,17 of these Construction Standards.

10. **Meters:** All meters are to be purchased through the Environmental Utilities Department Water Division at (916) 774-5750.

11. **Meter Idlers**: Shall conform to Section 81-16.G,19 of these Construction Standards.

12. **Meter Setters**: Shall conform to Section 81-16.G,20 of these Construction Standards.

13. **Meter Spud Couplers**: Shall conform to Section 81-16.G,21 of these Construction Standards.

14. **Nuts and Bolts**: Shall conform to Section 81-16.G,22 of these Construction Standards.

15. **Nylon Bushing**: Shall conform to Section 81-16.G,23 of these Construction Standards.

16. **Patching Material**: Shall conform to Section 81-16.G,24 of these Construction Standards.

17. **Polyethylene Encasement**: Shall conform to Section 81-16.G,26 of these Construction Standards.

18. **Pressure Regulators**: Shall conform to Section 81-16.G,27 of these Construction Standards.

19. **Restraints**

a. 12 Inches and Smaller Diameter c-900 PVC – Approved restraint systems for PVC Pressure Pipe include: Aquaspring C900 Certa-Lok (for straight runs only), Romac Grip Rings, Romac Model 611 Bell restraint, or approved equal.

b. Roman 470 or approved equal for mechanical joint restraint or bell and spigot restraint**.**

c. Restraint systems for pipe diameters 24 inches and larger shall conform to Section 81-16.G,28 of these Construction Standards.

20. Riser Aligners: Shall conform to Section 81-16.G,29 of these Construction Standards.

21. Riser Stock: Shall conform to Section 81-16.G,30 of these Construction Standards. Purple pipe shall be used.

22. Sampling Station: Sampling stations shall be purchased from the Environmental Utilities Department Water Division at (916) 774-5750.

23. Tracing Wire: Shall conform to Section 81-16.G,36 of these Construction Standards.

24. Tracing Wire Connectors: Shall conform to Section 81-16.G,37 of these Construction Standards.

25. Traffic Boxes: Shall conform to Section 81-16.G,35 of these Construction Standards.

26. Valves: Shall conform to Section 81-16.G,39 of these Construction Standards.

27. Valve Boxes: Shall conform to Section 81-16.G,40 of these Construction Standards.

28. Valve Nut Extensions: Shall conform to Section 81-16.G,41 of these Construction Standards.

29. Zinc Caps: Shall conform to Section 81-16.G,43 of these Construction Standards.

SECTION 151

SOLID WASTE CONSTRUCTION

151-1 GENERAL - Solid Waste enclosures shall be constructed in accordance with the requirements of these Construction Standards and as recommended by the manufacturer. These Construction Standards and manufacturer's guidelines shall be present at the construction site at all times.

151-2 APPROVED PLANS - Planning Department and Building Division approvals of the solid waste enclosure shall be obtained prior to beginning construction.

151-3 INSPECTION - Enclosures shall be inspected per the following procedure:

1. Contractor shall meet with the designated Development Services Construction Inspector prior to beginning work.

2. A City approved detailed structural design for the enclosure shall be provided to the inspector.

3. Footings, enclosure floor reinforcements, approach floor reinforcement, vertical wall reinforcement, and bollards shall be inspected prior to pouring concrete.

4. Gates shall be inspected prior to and after installation.

5. Signage and striping shall be inspected prior to and after installation.

151-4 PUNCHLIST PROCESS - When all improvements are substantially complete, the contractor shall provide a written request for a punchlist inspection of the improvements.

151-5 MATERIALS - Materials shall be as specified on these Construction Standards and as approved by the architect and the City for the specific project.

CITY OF ROSEVILLE
DESIGN AND CONSTRUCTION DETAILS
January 2025

Trench Backfill

Utility Trench Paving Backfill and Embedment	TB 1
HDPE, SRHDPE & PVC Storm Drain Pipe Only (Nonrigid) Bedding and Backfill	TB 2
Deep Cut "T" Patch Reconstruction Asphalt Streets	TB 3
Deep Cut "T" Patch Reconstruction Concrete Streets	TB 3A
Rock Wheel Trench (In Existing Street)	TB 4
Pothole Reconstruction	TB 5

Streets

Alley Detail	ST 1a
Modified Alley Residential	ST 1b
Minor Residential Streets – Attached Sidewalk	ST 2
Minor Residential Streets – Detached Sidewalk	ST 3
Primary Residential Streets – Attached Sidewalk	ST 4
Primary Residential Streets – Detached Sidewalk	ST 5
Collector/Industrial Streets – Attached Sidewalk	ST 6
Collector/Industrial Streets – Detached Sidewalk	ST 7
Minor Arterial Streets	ST 8
Major Arterial Streets	ST 9
Four-lane Arterial Single Left Turns	ST 10
Four-lane Arterial Dual Left Turns	ST 11
Six-lane Arterial Single Left Turns	ST 12
Six-lane Arterial Dual Left Turns	ST 13
Cul-De-Sac Street	ST 14
Offset Cul-De-Sac Street	ST 15
Standard Elbow	ST 16
Type 1 and 2 Curb and Gutter with Sidewalk	ST 17
Barrier Curbs and Valley Gutters	ST 18
Acceleration Lane for Free Rights	ST 19
"Type S" Driveway Apron	ST 20
"Type D" Driveway Apron	ST 21
"Type A-7" Driveway	ST 22
Right Turn Curb Flare	ST 23
Right Turn Curb Flare (With "Type A-7" Driveway)	ST 24
Private Gated Entrance	ST 25
Case "C" Pedestrian Curb Ramp – Attached Sidewalk	ST 26
Case "C" Pedestrian Curb Ramp at Curb Return – Detached Sidewalk	ST 27
Bus Stop Shelter Pad	ST 28
Bus Turnout Concrete Slab	ST 29
Gull Wing Design	ST 30

Temporary Sidewalk Barricade	ST 31
Pedestrian Barricade	ST 32
Stub Street Barricade	ST 33
End of Street Timber Barricade	ST 34
Detectable Warning (Truncated Dome Panel) Retrofit or Replacement	ST 35
Boxed Survey Monument	ST 36
Stamped Concrete	ST 37
Bollard	ST 38
Fixed Bollard	ST 38A
Emergency Access Gate Through Landscape Median	ST 39
Typical Traffic Control Lane Closure/Transition	ST 40
Green Belt Access	ST 41
Under Walk Drain	ST 42
Under Walk Drain (Flows from Street)	ST 42A
Encasement for All Roseville Electric Junction Boxes in City Sidewalks	ST 43
Landscape Sight Distance	ST 44
Residential Bulbed Intersection	ST 45
Permitted Driveways Streets or Minor Arterials	ST 46
Minimum Driveway or Street Offset On Minor Arterial	ST 47
Bus Shelter/Driveway Locations	ST 48
Bus Shelter/Driveway Location - Acceleration Lane	ST 49
Roadway Structural Section Conform	ST 50
Portland Cement Concrete Roadway Structural Section Conform	ST 50a
6’ High Tubular Steel View Fence	ST 51
Single Lane Roundabout Standard Construction	ST 52
Single Lane Roundabout Standard Striping and Signage	ST 53

Domestic Water

Water Main Trench and Backfill	W 1
Fire Protection Assembly	W 2
Onsite Fire Protection	W 3
Dead-End Hydrant Assembly	W 4
Residential 1” Service Line	W 5
Commercial 1” Service Line	W 6
Commercial/Irrigation 1 ½” & 2” Service Line	W 7
Commercial 3” & Larger Service	W 8
Residential Water Service	W 9
Residential Water Service For Separated Sidewalks	W 10
Sampling Station	W 11
1” and 2” Air Release Valve Assembly	W 12
Fire Hydrant Assembly	W 13
Construction Water Detail	W 14
Backflow Manifold Schematic	W 15
Gate Valve & Box	W 16
Tracing Wire Splice	W 17

Trench and Backfill for All Water Line 2" and smaller W 18
Insulating Flange Test Station W 19
Exothermic Weld W 20
Insulated Flange W 21
Casing & Test Station W 22
Shallow Water Mains W 23
Siphon S Concrete Encasement W 24
36" Manhole Ring and Cover W 25
Saddle Detail W 26
Combination Pressure Reducing and Pressure Sustaining Valve W 28
3", 4", 6", 8" Compound & Turbo Meter With Bypass W 29
Flow thru Detail W 30
Transmission Main Hydrant Blow Off W 32
3" Through 6" ARV W 33
16" Mainline Valve Enclosure W 34
24" larger Mainline Valve W 35
Inspection Manhole for Transmission Mains W 36
Inspection Port for Transmission Mains W 37
Concrete Cap on Shallow CCP Transmission Main W 38
Water Main and Sewer Main Crossing W 39
Test Station W 40
Galvanic Anode Installation W 41
Chlorine Flushing / Monitoring Station W 42

TRAFFIC SIGNALS – CITY APPROVED EQUIPMENT LIST

TRAFFIC SIGNALS

Typical Service and Wiring Schedule TS 1
Typical Pole and Equipment Schedule TS 2
Typical Conductor Schedule TS 3
332 Controller/Service Cabinet Pad Detail TS 4
Nema 2070 Controller/Service Cabinet Pad Detail TS 5
332 to Type "P" Cabinet/Service Pad Conversion Detail TS 6
Existing 332 to Type "P" Cabinet Pad Conversion Detail TS 7
Existing Type III-AF to 27-22 Combo Pad Conversion Detail TS 8
332 Typical Loop Detector Layout TS 9
Type "P" Cabinet Loop Detector Layout TS 10
IISNS Support Arm Mounting Detail TS 11
IISNS Support Arm Typical Clamp Detail TS 12
Traffic Signal Rock Wheel Trench (In Existing Streets) TS 13
Encasement for PL 48 Boxes in City Sidewalks TS 14
U-Turns TS 15
Advanced Sign Spacing Requirements TS 16
Roadway Signs TS 17A
Mid Block Roadway Signs TS 17B
Bike Lane Striping A TS 18
Bike Lane Striping B TS 19

Triple Left Striping TS 20
Intersection Red Flash Approval TS 21
Traffic Signal Inspection Check List TS 22
Holiday Traffic Control Restrictions TS 23
CCTV Mounting Assembly TS 24
Controller Service/Grounding Diagram TS 25
Type 1 Fiber Splice TS 26
Type 2 Fiber Splice TS 27
Type 3 Fiber Splice TS 28
Type 4 Fiber Splice TS 29
Standard Installation of Flashing Yellow Arrow Protected/Permissive Traffic Signal TS 30
Loop detail: Connections and Saw Cut TS 31

Sanitary Sewer

Sewer main Trench and Backfill SS 1
Sewer Manhole Standard 48 inch SS 2
Sewer Manhole Cast-In-Place Base SS 2a
Standard Sewer manhole Frame and Cover SS 3
Sewer Service SS 4
Sewer Service Cleanout SS 5
Grease Interceptor (TYP) SS 6
Sand/Oil Interceptor SS 7
Trench Dam SS 8
Creek Crossing Support SS 9
60” + and Sewer Trunk Main Manhole SS 10
Camera Channel Manhole SS 11
Inside Drop Connection SS 12
Downstream Sampling Manhole for Interceptors SS 13
PVC Liner Penetration Sealing Detail SS 14

Drainage

Drop Inlet Type “C” DR 1
Flow Capacity Type “C” Grate DR 2
Drop Inlet Type “F” DR 3
Standard Precast manhole (Drainage) DR 4
Type A & B Saddle Manhole DR 5
Standard Drainage Manhole Frame and Cover DR 6
Standard 36” Manhole Frame and Cover DR 7
Grate Type Manhole Cover DR 8
Drop Inlet Frame & Grate For Type “C” Inlets DR 9
Water Quality Outfall Swale Within Open Space DR 10
Water Quality Outfall Swale DR 11
Headwall DR 12
Pipe Inlet Structure DR 13
Velocity Check Dam DR 14
Inlet Trash Rack 33” Pipe or Larger DR 15

Trash Rack DR 16
Lined Channel Section DR 17
Typical Ramp & Transition DR 18
Trench Depth & Minimum Cover Requirements DR 19
"NO DUMPING" Public Notice DR 20
Stream Gauging Station DR 21
Street-Side Storm Water Bioretention Planter DR 23

Grading

Class 1 Lot Grading GR 1
Lot Grading Class II and III GR 2
Wood Retaining Wall GR 3
Exterior Perimeter Property Line Grading GR 4
Interior Property Line Grading GR 5

Bikeways

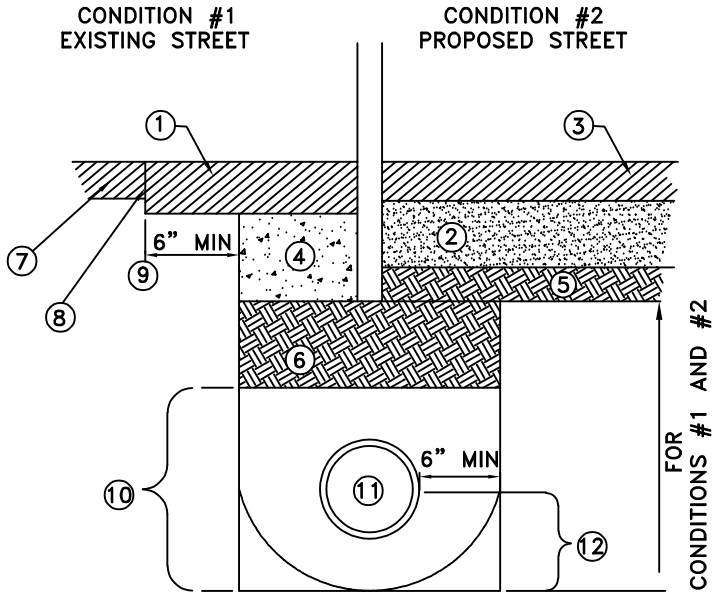
Class I Bikeway Grading BK 1
Class I Bikeway Striping Details BK 2
Bench Installation Detail Adjacent to Bike Trail BK 3
Interpretive Sign Installation Adjacent to Bike Trail BK 4
Bike Trail Stencil BK 5

Recycled Water

Recycled Water 2" Blowoff Assembly (All Brass) RW 1
Recycled Water inline 2" Blowoff Assembly (All Brass) RW 2
Recycled Water Construction Water RW 3
Recycled Water 3" & Larger Service RW 4
1" and 2" Air Release Valve Assembly RW 5
¾" and 1" Service Line RW 6
Recycled Water #88-V Eclipse Sampling Station for Warm Climates RW 7
1 ½" and 2" Recycled Water Service RW 8
Recycled Water Use Signage RW 9

Solid Waste

Standard Trash Enclosure SW 1
Front Loading Compactor Enclosure SW 2
Commercial Compactor Enclosure SW 3
Residential/Commercial Compactor Enclosure SW 4



NOTES:

1. PAVEMENT PATCH, 6 INCHES THICK OR THAT OF EXISTING, WHICHEVER IS MORE.
2. AGGREGATE BASE OR AGGREGATE BASE AND SUBBASE SECTION PER APPROVED PLAN. 95% RELATIVE COMPACTION.
3. PAVEMENT SECTION PER APPROVED PLANS.
4. 24 INCHES OF TWO SACK CONCRETE SLURRY PER CALTRANS STANDARD SPEC 16-302E
5. SIX INCHES OF SUBGRADE, PROCESSED TO 95% RELATIVE COMPACTION.
6. NATIVE BACKFILL MATERIAL, 90% RELATIVE COMPACTION.
7. EXISTING STREET PAVEMENT.
8. TACK COAT ON ALL VERTICAL PAVEMENT SAWCUTS, OR SAWCUT CONCRETE PER STREETS DETAIL ST-54.
9. TYPICAL EACH SIDE OF TRENCH IN EXISTING STREET.
10. FOR PIPE EMBEDMENT SEE TB-2 FOR PLASTIC STORM DRAIN, W-1 FOR WATER PIPE, SS-1 FOR SANITARY SEWER PIPE, OF THESE CONSTRUCTION STANDARDS.
11. PIPE
12. FOR REINFORCED CONCRETE PIPE EMBEDMENT: PLACE 1/2 OR 3/4 INCH CRUSHED ROCK UP TO SPRING LINE WITH MINIMUM OF FOUR (4) INCHES OF 1/2 OR 3/4 INCH CRUSHED ROCK BEDDING. MAINTAIN MINIMUM OF SIX (6) INCHES OF CLEARANCE BETWEEN THE PIPE AND THE TRENCH WALL.
13. ALTERNATE TRENCH BOTTOM. THE DIAMETER OF THE ALTERNATE ROUNDED TRENCH BOTTOM SHALL EQUAL THE WIDTH OF THE TRENCH.

NOTE: IN CONDITION #1, TRENCH CUT FEE MAY APPLY PER CITY ORDINANCE.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

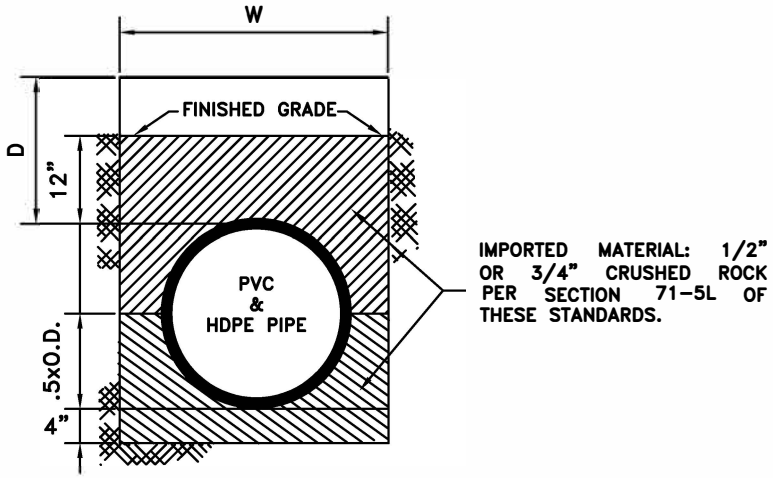
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

UTILITY TRENCH PAVING BACKFILL AND EMBEDMENT

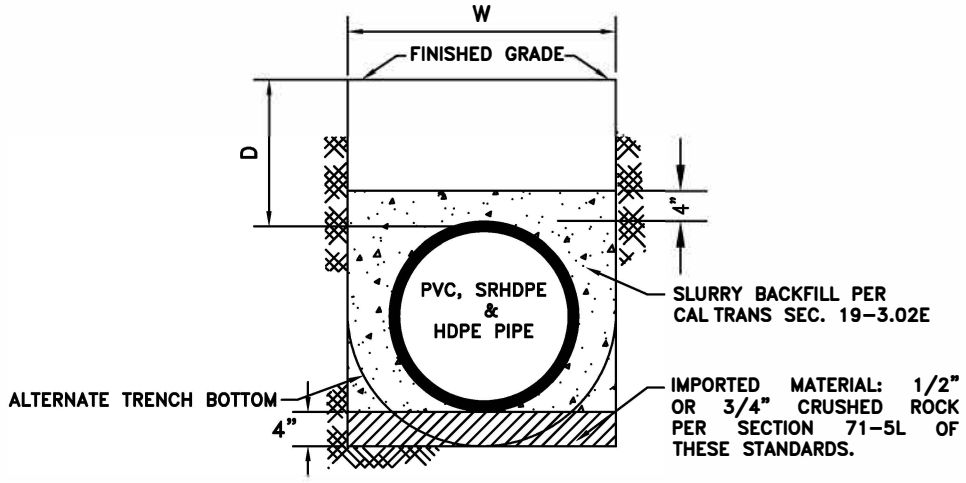
SCALE: NONE
REVISED: DECEMBER 2024
DRAWN BY: R MEDINA
APPROVED BY: JASON SHYKOWSKI

TB-1



DETAIL A

SRHDPE, PVC & HDPE PIPE ONLY (NONRIGID)



DETAIL B

SRHDPE, PVC & HDPE PIPE ONLY (NONRIGID)

NOTES:

1. TRENCH WIDTH:

PIPE SIZE	TRENCH WIDTH = W
30" AND UNDER	O.D. + 16"
OVER 30"	O.D. x 1.25 + 12"

2. HIGH DENSITY POLYETHYLENE (HDPE) AND POLYPROPYLENE N-12HP, 12"-60" STORM DRAIN PIPE SHALL BE TYPE "S" AS DESCRIBED IN SECTION 64 OF THE CALTRANS STANDARD SPECIFICATIONS. PIPE INSTALLATION AND PIPE CONFIGURATION SHALL BE AS SHOWN ON THIS DRAWING AND AS DESCRIBED IN THESE GENERAL NOTES. JOINTS SHALL BE SEALED WITH A RUBBER GASKET. GASKETS SHALL MEET THE REQUIREMENT OF ASTM F-477. "
3. FILL HEIGHTS "D" FOR NONRIGID (PVS & HDPE) DRAIN PIPE SHALL BE A MINIMUM OF 36 INCH AND A MAXIMUM OF 15 FEET, AND (SRHDPE) SHALL HAVE A MINIMUM OF ONE FOOT (IN ADDITION TO THE ROADWAY STRUCTURAL SECTION) AND A MAXIMUM OF 30 FEET FROM THE TOP OF PIPE FINISH GRADE. (SEE DETAILS A & B FOR TRENCH BACKFILL REQUIREMENTS. CONTRACTOR MAY USE EITHER DETAIL A OR B.)
4. PIPE MATERIAL CHANGES BETWEEN STRUCTURES ARE PROHIBITED. OUTFALL/INLET RUNS AND STUBS INTO FUTURE SITES SHALL BE RCP. (SEE SECTION 101-6 D.1.C. AND 101-8 D.4. FOR CONCRETE PIPE APPLICATION.)
5. REFER TO TB-1 FOR TREATMENT OF THE TOP PORTION OF THE TRENCH WITHIN THE CITY STREET.
6. THE DIAMETER OF THE ALTERNATE, ROUNDED TRENCH BOTTOM SHALL BE EQUAL TO THE WIDTH OF THE TRENCH.

MARC STOUT
CITY ENGINEER

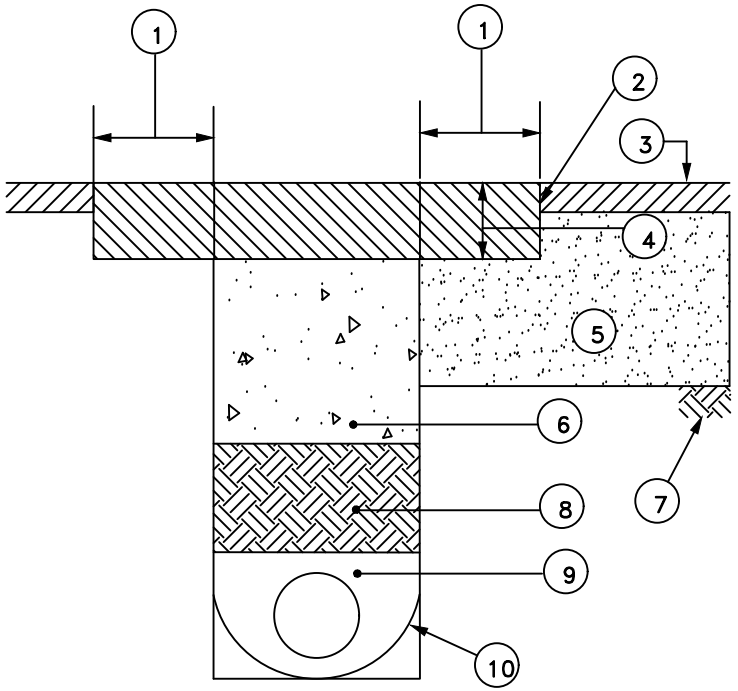
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

HDPE, SRHDPE PVC STORM DRAIN PIPE ONLY (NONRIGID) BEDDING AND BACKFILL

SCALE: NONE
REVISED: JANUARY 1, 2019
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

TB-2



NOTES:

1. 18 INCH KEY OUTSIDE TRENCH LINE
2. COAT ALL EXISTING VERTICAL FACES WITH ASPHALTIC EMULSION (TACK) PRIOR TO PAVING
3. EXISTING PAVING
4. PATCH SHALL BE THICKNESS OF EXISTING SECTION PLUS 2 1/2 INCHES. PER CITY TRENCH CUT ORDINANCE (6 INCH MINIMUM THICKNESS).
5. AGGREGATE BASE/SUBBASE: RECOMPACT DISTURBED SURFACE AREAS TO 95%.
6. TWO FEET OF TWO SACK CONCRETE SLURRY PER CALTRANS STANDARD SPECIFICATION 19-3.062
7. NATIVE SOIL
8. NATIVE SOIL TO BE PROCESSED TO 90% RELATIVE COMPACTION.
9. FOR PIPE EMBEDMENT, SEE THE FOLLOWING CONDITIONS:
   a. TB-2 FOR PLASTIC STORM DRAIN PIPE
   b. W-1 FOR WATER PIPE
   c. SS-1 FOR WASTE WATER PIPE
   d. FOR REINFORCED CONCRETE PIPE, PLACE 1/2 OR 3/4 INCH CRUSHED ROCK UP TO SPRING LINE WITH A MINIMUM OF FOUR INCHES OF BEDDING BELOW PIPE. MAINTAIN A MINIMUM OF SIX INCHES OF CLEARANCE BETWEEN THE PIPE AND THE TRENCH WALL.
10. ALTERNATE TRENCH BOTTOM. THE DIAMETER OF THE ALTERNATE, ROUNDED TRENCH BOTTOM SHALL EQUAL THE WIDTH OF THE TRENCH.

NOTE: THIS DETAIL APPLIES TO UTILITY TRENCHES IN WHICH TRENCH CUT FEES WERE NOT PAID BY THE APPLICANT, OR AS SPECIFIED BY THE ENGINEER.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

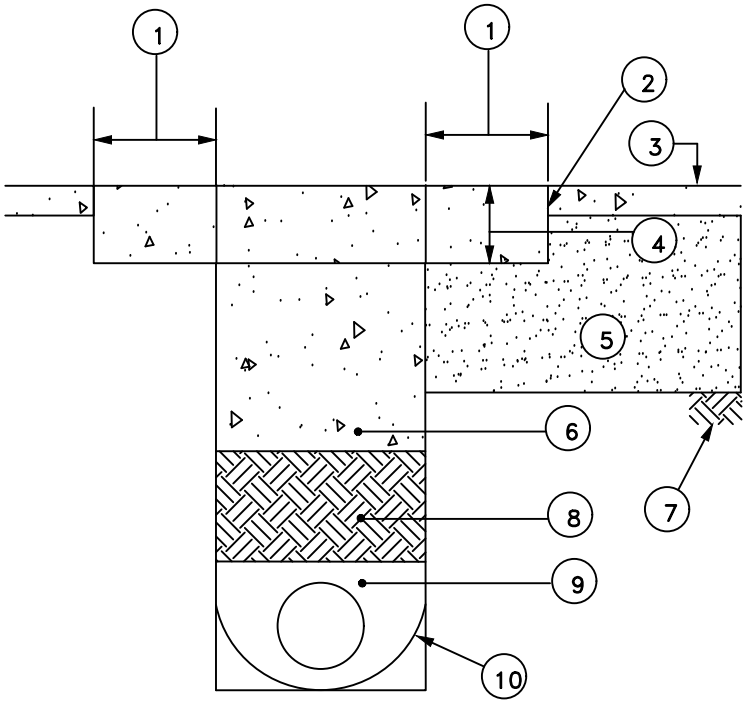
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

DEEP CUT "T" PATCH RECONSTRUCTION ASPHALT STREETS

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: R MEDINA
APPROVED BY: JASON SHYKOWSKI

TB-3



NOTES:

1. SAWCUT EXISTING CONCRETE PAVEMENT PER ST-54 AT LEAST 18" FROM TRENCH LINE AND:
   a. AT AN EXISTING JOINT
   b. IN THE MIDDLE OF A TRAVELED LANE OR MID-PANEL PERPENDICULAR TO PATH OF TRAVEL
2. COAT ALL EXISTING VERTICAL FACES WITH TWO-PART EPOXY PRIOR TO PLACING CONCRETE.
3. EXISTING PAVING
4. PATCH SHALL BE THICKNESS OF EXISTING SECTION. PER CITY TRENCH CUT ORDINANCE (6 INCH MINIMUM THICKNESS).
5. AGGREGATE BASE/SUBBASE: RECOMPACT DISTURBED SURFACE AREAS TO 95%.
6. TWO FEET OF TWO SACK CONCRETE SLURRY PER CALTRANS STANDARD SPECIFICATION 19-3.062
7. NATIVE SOIL
8. NATIVE SOIL TO BE PROCESSED TO 90% RELATIVE COMPACTION.
9. FOR PIPE EMBEDMENT, SEE THE FOLLOWING CONDITIONS:
   a. TB-2 FOR PLASTIC STORM DRAIN PIPE
   b. W-1 FOR WATER PIPE
   c. SS-1 FOR WASTE WATER PIPE
   d. FOR REINFORCED CONCRETE PIPE, PLACE 1/2 OR 3/4 INCH CRUSHED ROCK UP TO SPRING LINE WITH A MINIMUM OF FOUR INCHES OF BEDDING BELOW PIPE. MAINTAIN A MINIMUM OF SIX INCHES OF CLEARANCE BETWEEN THE PIPE AND THE TRENCH WALL.
10. ALTERNATE TRENCH BOTTOM. THE DIAMETER OF THE ALTERNATE, ROUNDED TRENCH BOTTOM SHALL EQUAL THE WIDTH OF THE TRENCH.

NOTE: THIS DETAIL APPLIES TO UTILITY TRENCHES IN WHICH TRENCH CUT FEES WERE NOT PAID BY THE APPLICANT, OR AS SPECIFIED BY THE ENGINEER.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

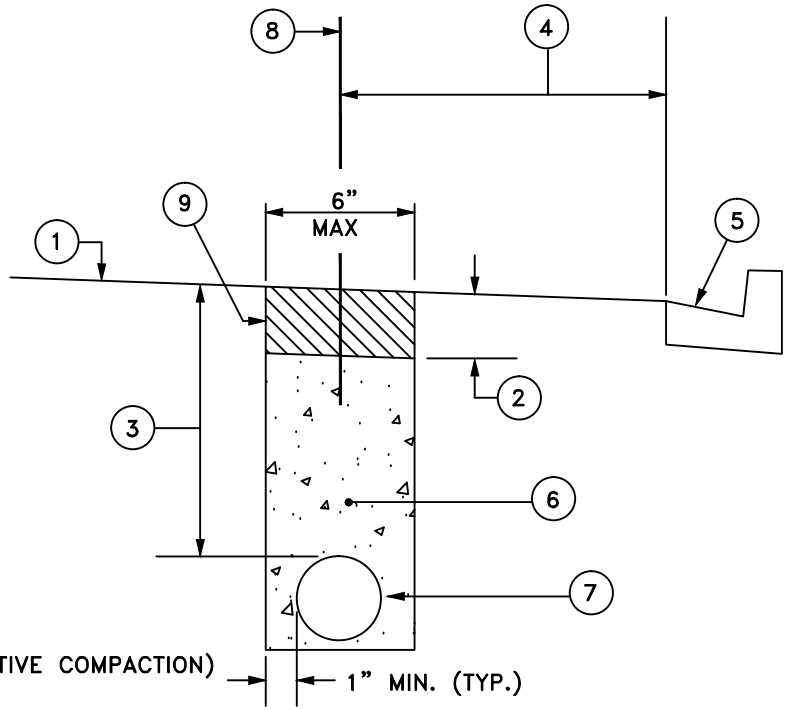
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

DEEP CUT "T" PATCH RECONSTRUCTION CONCRETE STREETS

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENGINEERING
APPROVED BY: JASON SHYKOWSKI

TB-3a



LEGEND:

1. SURFACE OF EXISTING STREET SECTION
2. .25' THICK ASPHALT CONCRETE PER SECTION 71-4.D. (93% RELATIVE COMPACTION)
3. PIPE COVER PER UTILITY CO. (18" MIN TO 30" MAX)
4. DISTANCE VARIES. IF LESS THAN 3 FEET, THEN CONTRACTOR IS REQUIRED TO EDGE GRIND FROM LIP OF GUTTER (.15' DEEP) TO INSIDE LIMIT LINE OF TRENCH
5. EXISTING CURB AND GUTTER
6. "MINOR CONCRETE" CONFORMING TO THE PROVISIONS IN SECTION 71-5B, "CONCRETE", WITH FINE AGGREGATE (PEA GRAVEL MIX). CONCRETE SHALL BE FLOW-ABLE AT DISCRETION OF CITY INSPECTOR
7. CONDUIT AS SPECIFIED
8. CENTER LINE OF BIKE LANE STRIPE
9. PLACE BINDER (TACK COAT) ON ALL SURFACES PRIOR TO PAVING PER SECTION 39 OF STATE STANDARD SPECIFICATIONS

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT OF BIKE LANE STRIPE AND LEGENDS (AFFECTED BY TRENCHING) WITH THERMOPLASTIC MATERIAL.
2. ALL EXCAVATED AREAS IN THE PAVEMENT SHALL BE BACKFILLED, EXCEPT FOR THE TOP 0.25' BY THE END OF EACH WORK DAY. THE TOP .25' SHALL BE PLACED WITHIN 3 WORKING DAYS AFTER TRENCHING. DELINEATORS SHALL BE PLACED ON TEN FOOT CENTERS, AND WITHIN 1' OF EACH SIDE OF DRIVEWAYS IN THE INTERIM. REFER TO SECTION 6.2W.5 FOR TRANSITION LOCATIONS.
3. TRENCH CUT FEE SHALL APPLY PER CITY ORDINANCE. NO ALTERNATE TRENCH CONFIGURATION IS ALLOWED.
4. SEE DETAIL TS-13 FOR MULTIPLE CONDUIT PROVISIONS.

MARC STOUT
CITY ENGINEER

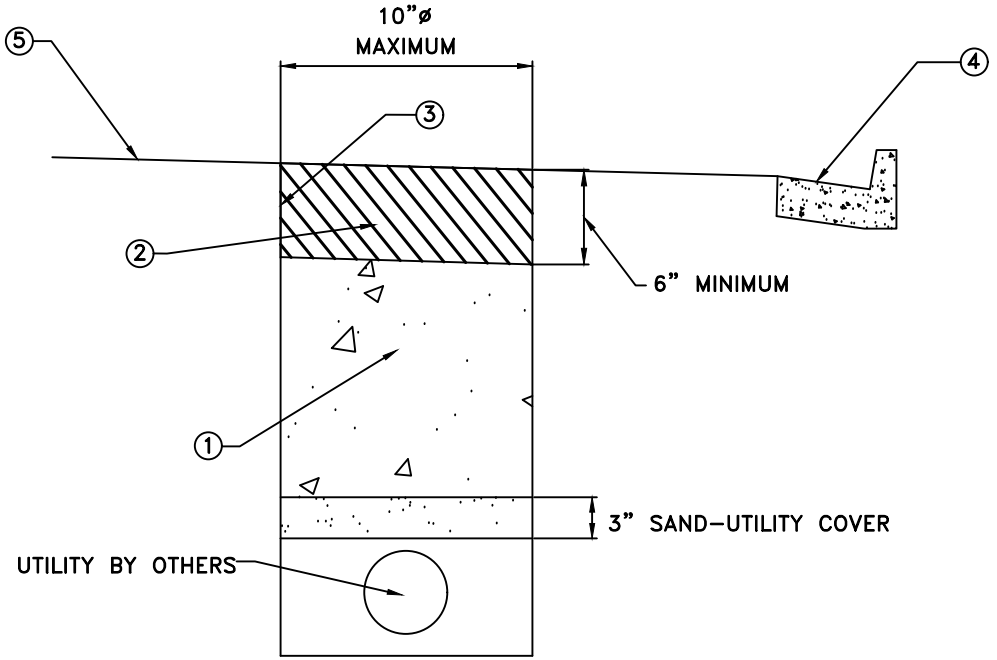
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

ROCK WHEEL TRENCH (IN EXISTING STREET)

SCALE: NONE
REVISED: JANUARY 1, 2016
DRAWN BY: J MCKINNEY
APPROVED BY: MARC STOUT

TB-4



LEGEND:

1. "MINOR CONCRETE" CONFORMING TO THE PROVISIONS IN SECTION 71–5B, "CONCRETE", WITH FINE AGGREGATE (PEA GRAVEL MIX).
2. A) FOR ASPHALT CONCRETE, 1/2" ASPHALT PER CONSTRUCTION STANDARDS SECTION 71–4.D. (93% RELATIVE COMPACTION).
   B) FOR PORTLAND CEMENT CONCRETE, SEE CONSTRUCTION STANDARDS SECTION 71–4.
3. A) FOR ASPHALT CONCRETE, PLACE BINDER (TACK COAT) ON ALL SURFACES PRIOR TO PAVING PER SECTION 39 OF STATE STANDARD SPECIFICATIONS.
   B) FOR PORTLAND CEMENT CONCRETE, SAWCUT PER DETAIL ST–54 AND COAT ALL SURFACES WITH TWO–PART EPOXY PRIOR TO PLACING CONCRETE PAVEMENT.
4. EXISTING CURB AND GUTTER
5. SURFACE EXISTING STREET SECTION (PAVEMENT)

NOTES

1. ASPHALT CONCRETE ROADWAY SURFACE POTHOLE SHALL BE SAW CUT OR JACKHAMMERED IN A UNIFORM FASHION. FOR PORTLAND CEMENT CONCRETE ROADWAYS, BRING CONCRETE BACKFILL TO SURFACE, AND FINISH WITH MEDIUM BROOM FINISH PARALLEL TO PATH OF TRAVEL.
2. MAXIMUM POTHOLE SIZE SHALL BE 10" DIAMETER. SHOULD POTHOLE SIDEWALL CAVE–IN OCCUR DURING JET–VAC EXCAVATION ADDITIONAL EXCAVATION MAY BE REQUIRED (AT THE DISCRETION OF THE DEVELOPMENT SERVICES INSPECTOR).
3. REPLACE ALL PAVEMENT MARKINGS AND THERMOPLASTIC LEGENDS THAT WERE DAMAGED.
4. POTHOLE EXCAVATION MUST BE TEMPORARILY BACKFILLED SAME DAY AS EXCAVATION AND PERMANENTLY WITHIN SEVEN CALENDAR DAYS.
5. TEMPORARY STEEL COVERS ARE REQUIRED WHEN POTHOLING IS LOCATED WITHIN THE TRAVEL LANES, WHEN OPEN TO TRAFFIC.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

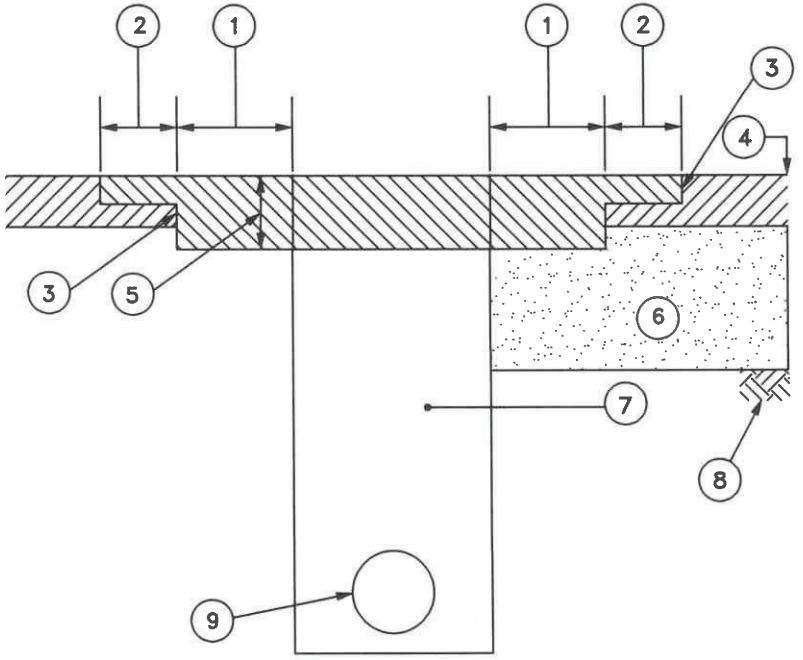
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

POTHOLE RECONSTRUCTION

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: N. SIVIGLIA
APPROVED BY: JASON SHYKOWSKI

TB–5



NOTES:

1. 18 INCH KEY OUTSIDE TRENCH LINE
2. FINAL LIFT, MINIMUM 2" THICK, SHALL EXTEND 12" BEYOND KEY LOCATION IDENTIFIED IN NOTE 1 OR ADJACENT LANE LINE AS DETERMINED BY THE STREETS DEPARTMENT.
3. COAT ALL EXISTING VERTICAL FACES WITH ASPHALTIC EMULSION (TACK) PRIOR TO PAVING
4. EXISTING PAVING
5. PATCH SHALL BE THICKNESS OF EXISTING SECTION PLUS 2 1/2 INCHES. PER CITY TRENCH CUT ORDINANCE (6 INCH MINIMUM THICKNESS).
6. AGGREGATE BASE/SUBBASE: RECOMPACT DISTURBED SURFACE AREAS TO 95%.
7. UTILITY TRENCH, CONSTRUCTED AS REQUIRED BY CITY STANDARDS
8. NATIVE SOIL
9. UTILITY

AS PART OF THE TRENCH BACKFILL, THE CONTRACTOR SHALL COORDINATE WITH DEVELOPMENT SERVICES–ENGINEERING PRIOR TO START OF PAVEMENT REHABILATATION WORK TO DETERMINE EXACT LIMITS OF THE PAVEMENT RESTORATION. DEVELOPMENT SERVICES – ENGINEERING RETAINS ALL RIGHTS TO INCREASE THE EXTENTS OF THE REPAIRS ABOVE, DUE TO FIELD CONDITIONS.

WHERE THE ADJACENT SURFACE IS MICROSURFACED, CONTRACTOR SHALL MICROSURFACE AREA IDENTIFIED BY DEVELOPMENT SERVICES – ENGINEERING AND REPAIR STRIPING AS NECESSARY.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

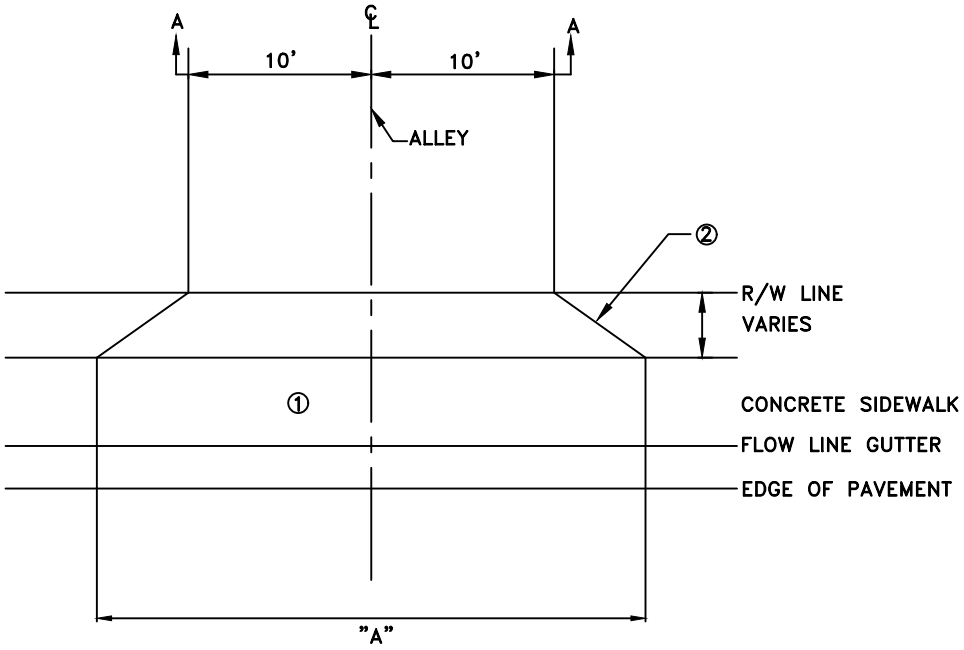
CITY OF ROSEVILLE CALIFORNIA

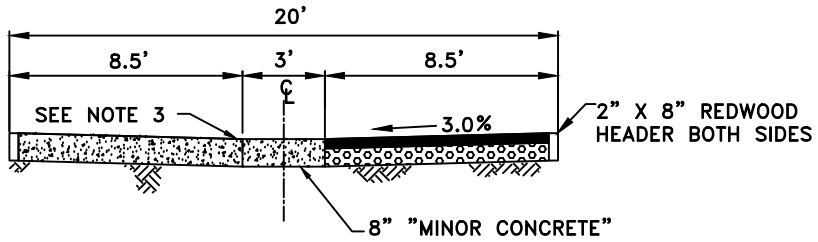
DEPARTMENT OF PUBLIC WORKS

MORATORIUM STREET DEEP CUT "T" PATCH RECONSTRUCTION ASPHALT STREETS

SCALE: NONE
REVISED: DECEMBER 2023
DRAWN BY: J. KHATKAR
APPROVED BY: JASON SHYKOWSKI

TB–6





SECTION A–A

NOTES

1. ALLEY ENTRANCE SHALL CONFORM TO DESIGN STANDARD DRAWING ST–20 OR ST–21 WITH "A" EQUAL TO 25 FEET.
2. TRANSITION FROM DRIVEWAY TO ALLEY SHALL BE MADE BETWEEN BACK OF WALK AND RIGHT OF WAY. VARIATION FROM THIS MAY REQUIRE DEDICATION OF ADDITIONAL RIGHT OF WAY FOR TRANSITION.
3. SEE SECTION 7–4 OF THESE STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
4. ALL CONCRETE TO BE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

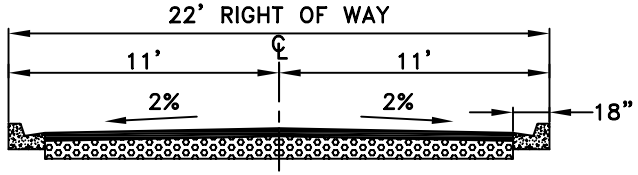
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

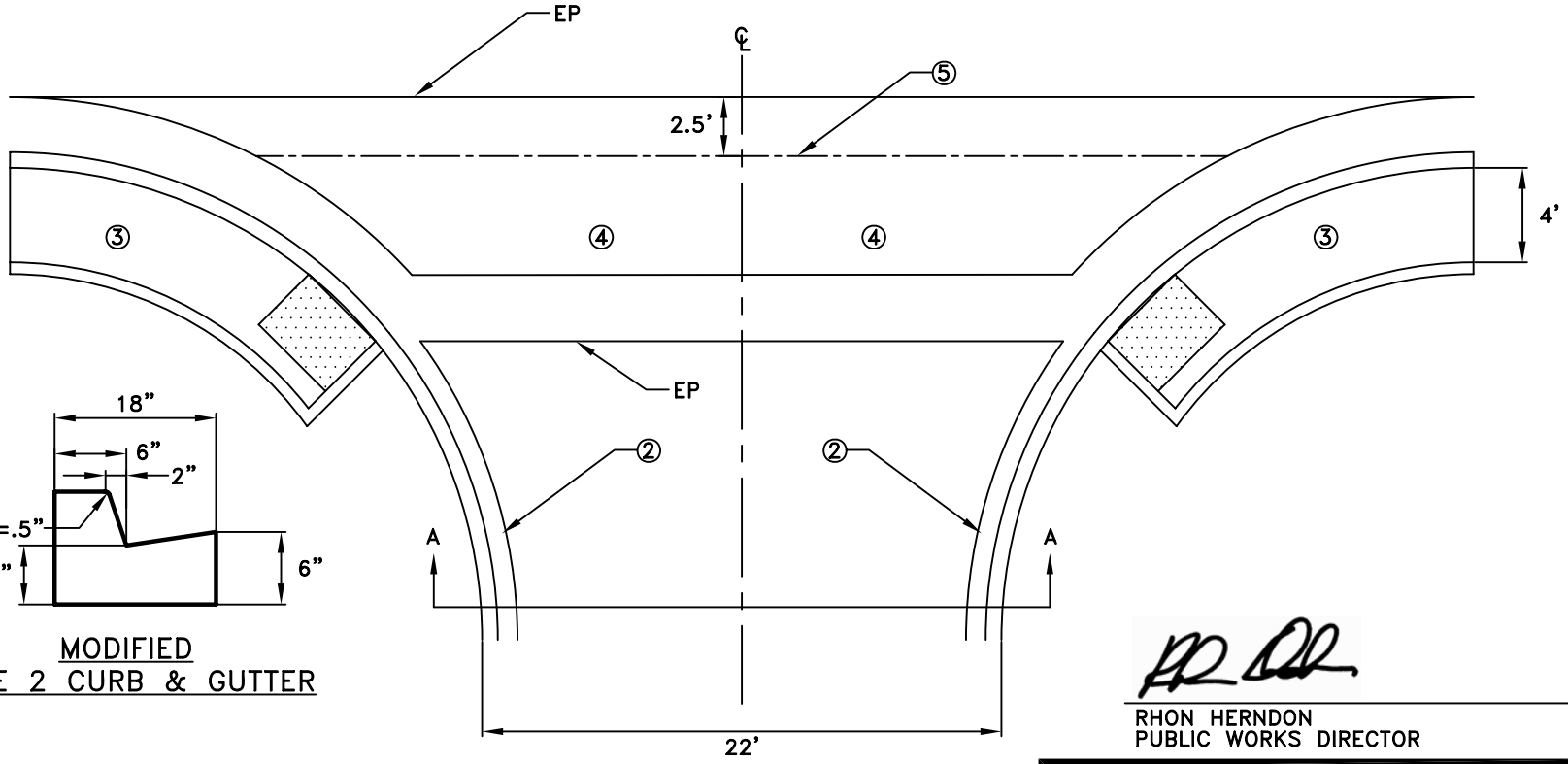
ALLEY DETAIL

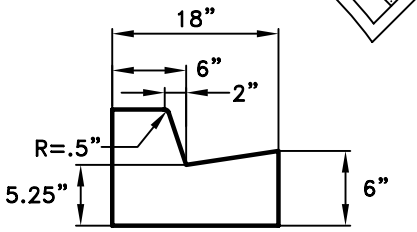
SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: N. SIVIGLIA
APPROVED BY: JASON SHYKOWSKI

ST–1a



SECTION A–A





MODIFIED
TYPE 2 CURB & GUTTER

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

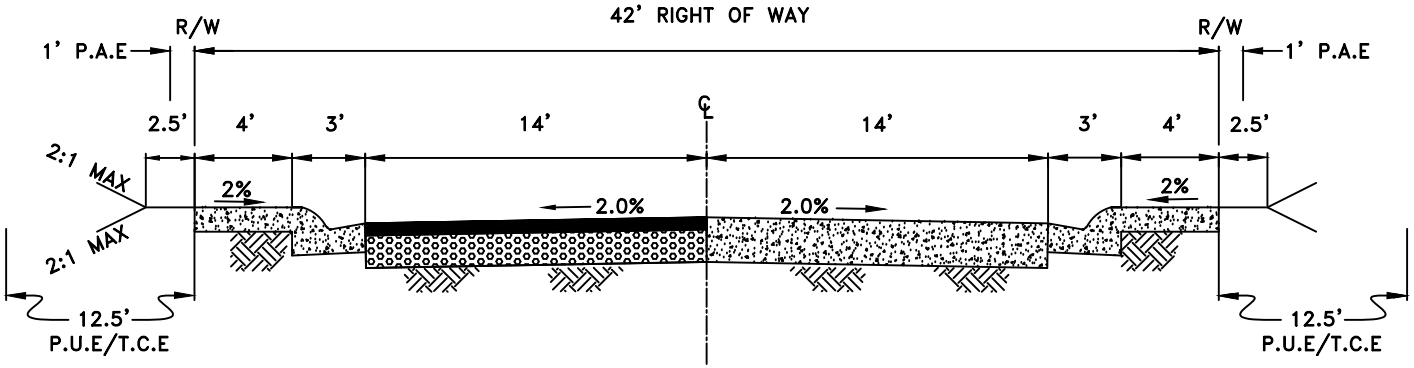
MODIFIED ALLEY RESIDENTIAL

NOTES

1. PAVEMENT SECTION TO BE DESIGNED BASED ON A TRAFFIC INDEX (TI) OF 7. SEE SECTION 7–4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
2. CURB AND GUTTER TO BE "MODIFIED TYPE 2" PER THIS DETAIL.
3. "CURB RAMP" PER DETAIL ST–22 WITH A 4' SIDEWALK.
4. ALL CONCRETE TO BE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS, AND SHALL BE 10" THICK.
5. "V–GUTTER" PER DETAIL ST–22.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST–1b



MINOR RESIDENTIAL STREETS
ATTACHED SIDEWALK

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

NOTES:

1. SEE SECTION 7-4 OF THESE STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
2. CURB AND GUTTER TO BE "TYPE 1" (ST-17) ADJACENT TO SINGLE FAMILY RESIDENTIAL LOTS. "TYPE 2" (ST-17) AT ALL OTHER LOCATIONS.
3. SIDEWALK TO HAVE EITHER THICKNESS OF 6" ON COMPACTED NATIVE SOIL OR 4" THICKNESS WITH 4" COMPACTED AGGREGATE BASE.
4. PRIVATE STREET SECTION'S WIDTH CAN BE REDUCED BY 4-FEET BY ELIMINATING SIDEWALK FROM ONE SIDE OF THE STREET WITH THE APPROVAL OF CITY ENGINEER.
5. P.U.E/T.C.E - PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT
6. P.A.E - PEDESTRIAN ACCESS EASEMENT

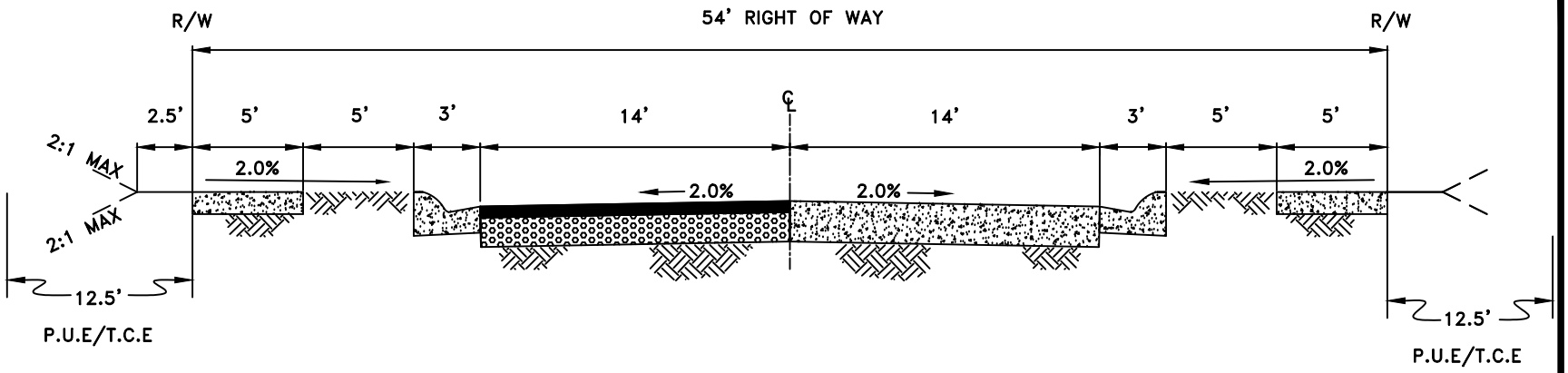
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

MINOR RESIDENTIAL STREETS
ATTACHED SIDEWALK

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-2



MINOR RESIDENTIAL STREETS
DETACHED SIDEWALK

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

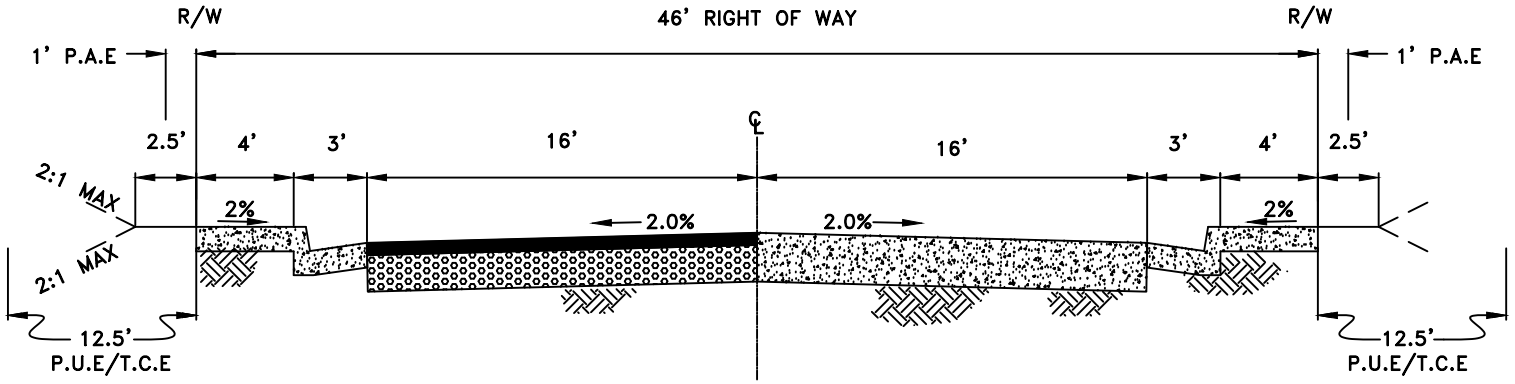
MINOR RESIDENTIAL STREETS
DETACHED SIDEWALK

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-3

NOTES:

1. SEE SECTION 7-4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
2. CURB AND GUTTER TO BE "TYPE 1"(ST-17) ADJACENT TO SINGLE FAMILY RESIDENTIAL LOTS. "TYPE 2"(ST-17) AT ALL OTHER LOCATIONS
3. SIDEWALK TO HAVE EITHER THICKNESS OF 6" ON COMPACTED NATIVE SOIL OR 4" THICKNESS WITH 4" COMPACTED AGGREGATE BASE.
4. P.U.E/T.C.E – PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT



PRIMARY RESIDENTIAL STREETS
ATTACHED SIDEWALK

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

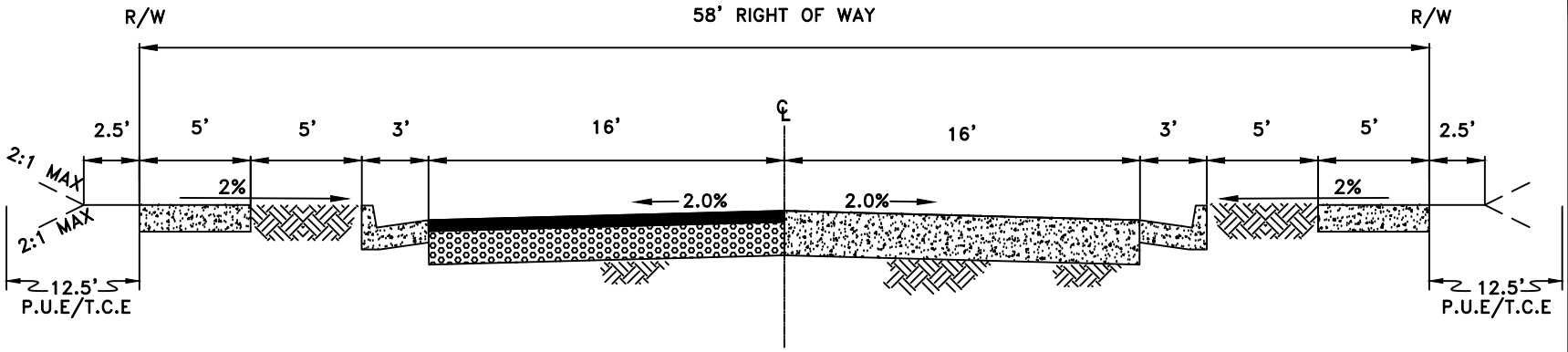
PRIMARY RESIDENTIAL STREETS
ATTACHED SIDEWALK

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: J MCKINNEY
APPROVED BY: JASON SHYKOWSKI

ST-4

NOTES:

1. SEE SECTION 7-4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
2. CURB AND GUTTER TO BE "TYPE 1"(ST-17) ADJACENT TO SINGLE FAMILY RESIDENTIAL LOTS. "TYPE 2"(ST-17) AT ALL OTHER LOCATIONS
3. SIDEWALK TO HAVE EITHER THICKNESS OF 6" ON COMPACTED NATIVE SOIL OR 4" THICKNESS WITH 4" COMPACTED AGGREGATE BASE.
4. P.U.E/T.C.E – PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT
5. P.A.E – PEDESTRIAN ACCESS EASEMENT



PRIMARY RESIDENTIAL STREETS
DETACHED SIDEWALK

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

PRIMARY RESIDENTIAL STREETS
DETACHED SIDEWALK

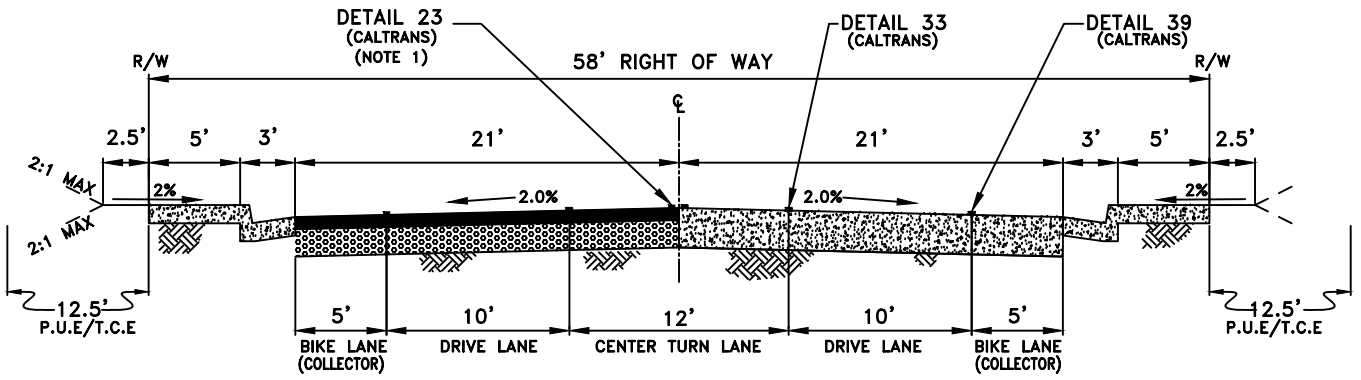
SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-5

NOTES:

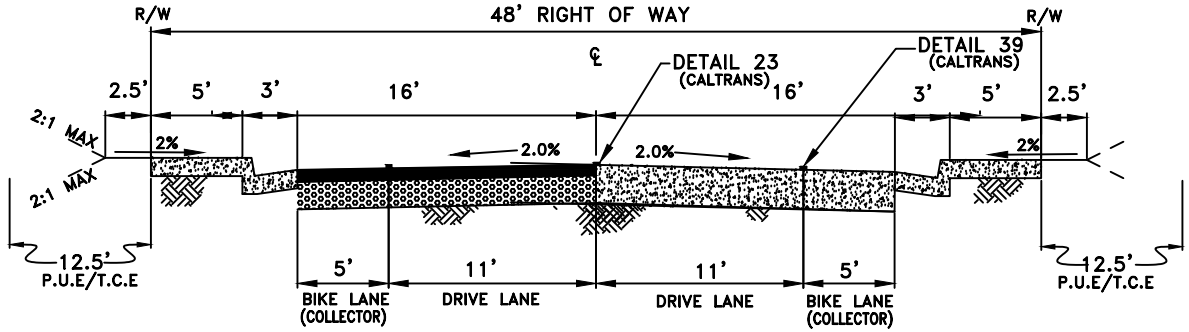
1. SEE SECTION 7-4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
2. CURB AND GUTTER TO BE "TYPE 1"(ST-17) ADJACENT TO SINGLE FAMILY RESIDENTIAL LOTS. "TYPE 2"(ST-17) AT ALL OTHER LOCATIONS
3. SIDEWALK TO HAVE EITHER THICKNESS OF 6" ON COMPACTED NATIVE SOIL OR 4" THICKNESS WITH 4" COMPACTED AGGREGATE BASE.
4. P.U.E/T.C.E - PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT

OPTION A



OPTION B

(SEE NOTE #8)



NOTES:

1. ON INDUSTRIAL STREETS THE CENTER TWO WAY LEFT TURN (DETAIL 33) SHALL BE REPLACED BY A DETAIL "23"(CALTRANS) CENTERLINE STRIPING AND TURN LANES AS MAY BE REQUIRED. NO BIKE LANES ARE REQUIRED.
2. SEE SECTION 7-4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
3. CURB AND GUTTER SHALL BE "TYPE 2"(ST-17) AND SIDEWALK TO HAVE EITHER THICKNESS OF 6" ON COMPACTED NATIVE SOIL OR 4" THICKNESS WITH 4" COMPACTED AGGREGATE BASE.
4. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
5. P.U.E/T.C.E – PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT
6. "NO PARKING"(R-26) SIGNS SHALL BE PLACED ON STREET LIGHT POLES WHERE BIKE LANE EXIST OR AS DIRECTED BY CITY ENGINEER.
7. SIGN DETAIL NUMBERS REFERENCE 2012 CALIFORNIA MUTCD.
8. IN CERTAIN INSTANCES, WITH THE RECOMMENDATION OF THE PUBLIC WORKS DIRECTOR, AND APPROVAL OF THE CITY COUNCIL, THIS ROADWAY STANDARD MAY BE MODIFIED WITH THE DEMONSTRATION THAT "BLUEPRINT" GOALS AND OBJECTIVES OF A WALKABLE COMMUNITY ARE BEING ACHIEVED WITHIN A COMMUNITY PLAN.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

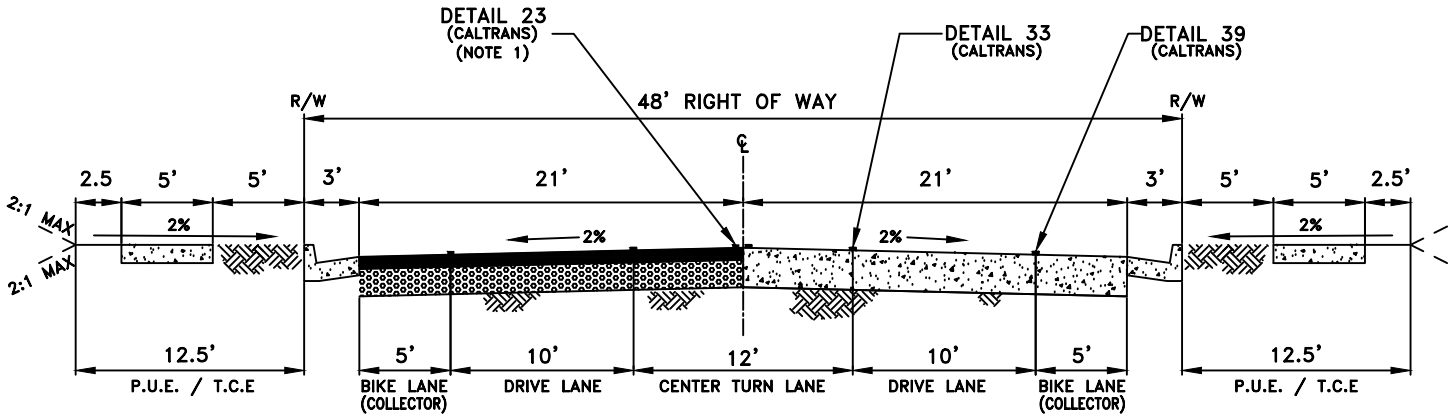
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

COLLECTOR/INDUSTRIAL STREETS ATTACHED SIDEWALK

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-6



COLLECTOR/INDUSTRIAL STREETS
DETACHED SIDEWALK

NOTES:

1. ON INDUSTRIAL STREETS THE CENTER TWO WAY LEFT TURN (DETAIL 33) SHALL BE REPLACED BY A DETAIL "23"(CALTRANS) CENTERLINE STRIPPING AND TURN LANES AS MAY BE REQUIRED. NO BIKE LANES ARE REQUIRED.
2. SEE SECTION 7-4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
3. CURB AND GUTTER SHALL BE "TYPE 2"(ST-17) AND SIDEWALK TO HAVE EITHER THICKNESS OF 6" ON COMPACTED SOIL OR 4" THICKNESS ON 4" COMPACTED AGGREGATE BASE. BIKE LANE MAY BE DISCONTINUED ALONG PARK OR SCHOOL FRONTAGE AS DEEMED APPROPRIATE BY THE CITY ENGINEER.
4. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
5. P.U.E/T.C.E – PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT
6. "NO PARKING"(R-26) SIGNS SHALL BE PLACED ON STREET LIGHT POLES WHERE BIKE LANE EXIST OR AS DIRECTED BY CITY ENGINEER.
7. SIGN DETAIL NUMBERS REFERENCE 2012 CALIFORNIA MUTCD

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

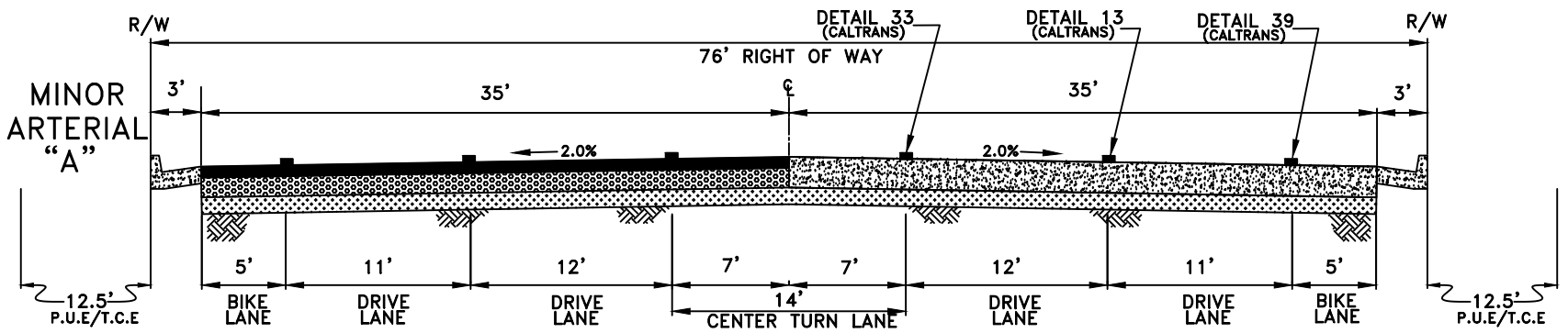
CITY OF ROSEVILLE CALIFORNIA

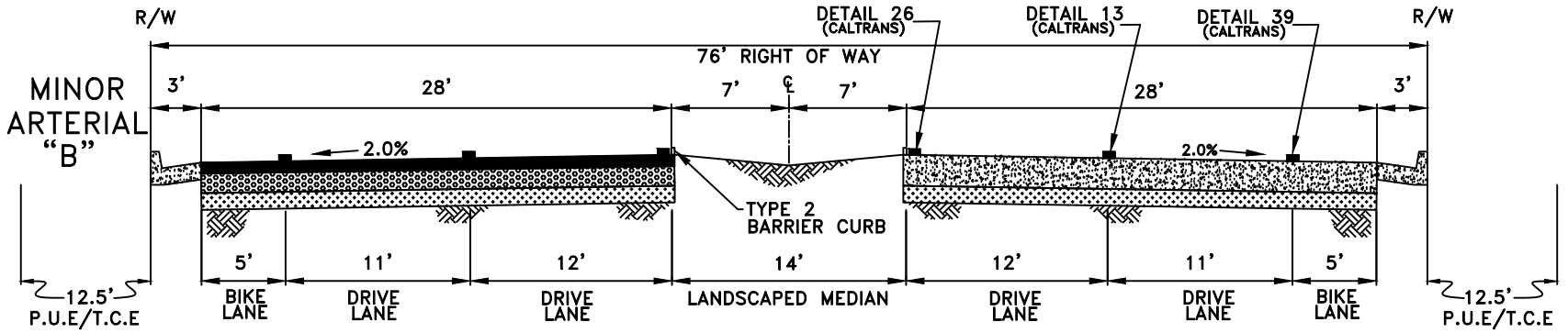
DEPARTMENT OF
PUBLIC WORKS

COLLECTOR/INDUSTRIAL STREETS
DETACHED SIDEWALK

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-7





JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

NOTES:

1. MINOR ARTERIAL "A" SHALL BE USED WHEN CENTER TURN LANES ARE TO BE INSTALLED.
2. MINOR ARTERIAL "B" SHALL BE USED WHEN LANDSCAPED MEDIAN ARE TO BE INSTALLED.
3. SEE SECTION 7-4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
4. CURB AND GUTTER SHALL BE "TYPE 2"(ST-17). MEDIAN CURBS SHALL BE "TYPE 1"(ST-18) BARRIER CURB WHEN SOLID MEDIANS ARE INSTALLED AND "TYPE 2"(ST-18) BARRIER CURB WHEN LANDSCAPED MEDIANS ARE INSTALLED.
5. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
6. P.U.E/T.C.E - PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT.

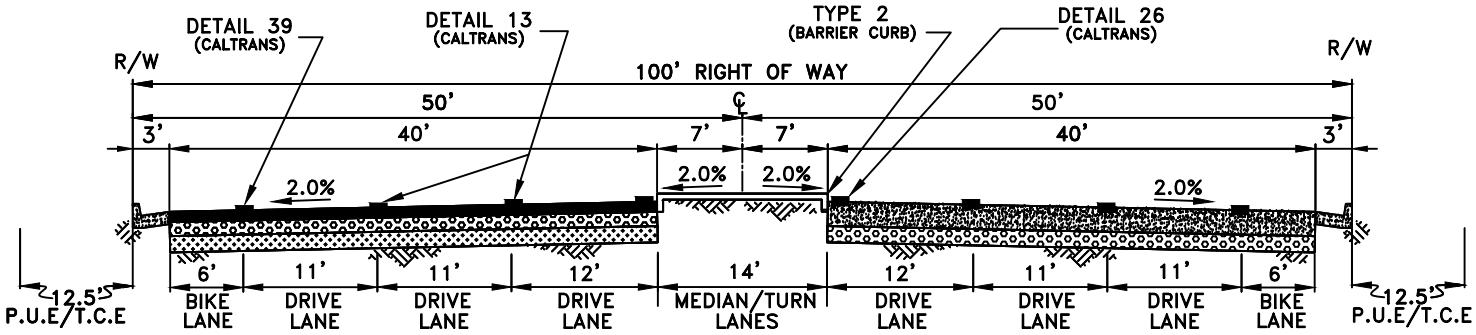
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

MINOR ARTERIAL STREETS

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-8



MAJOR ARTERIAL STREETS

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

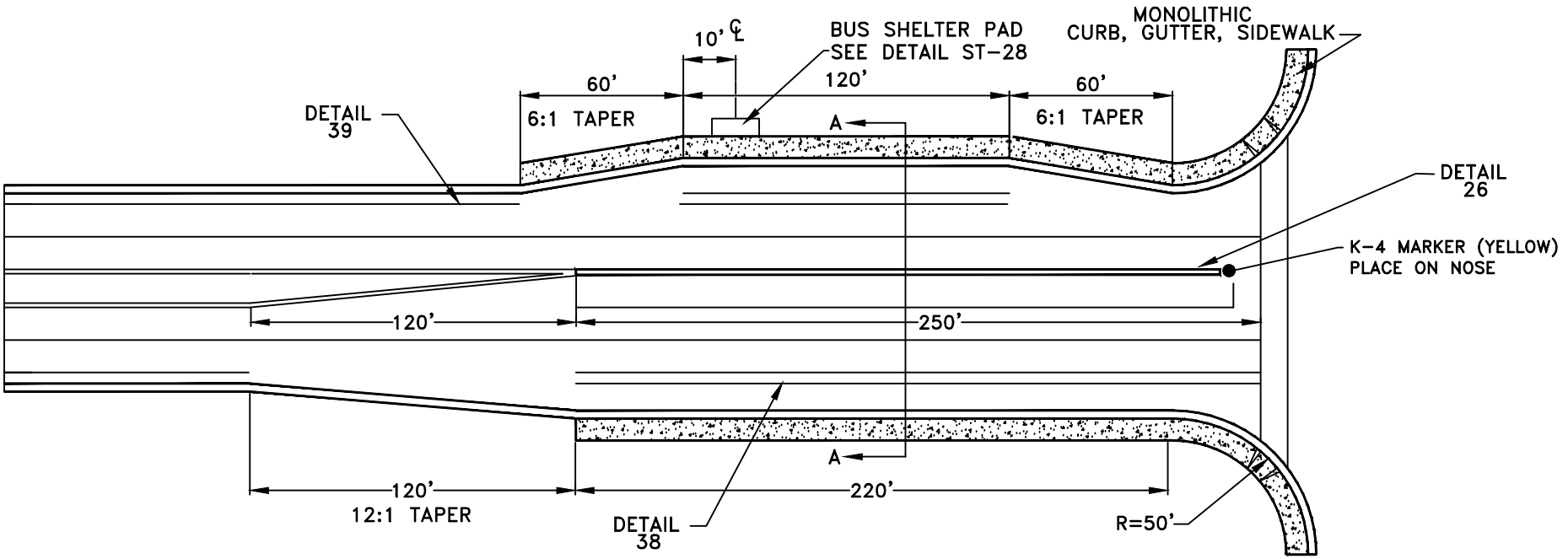
MAJOR ARTERIAL STREETS

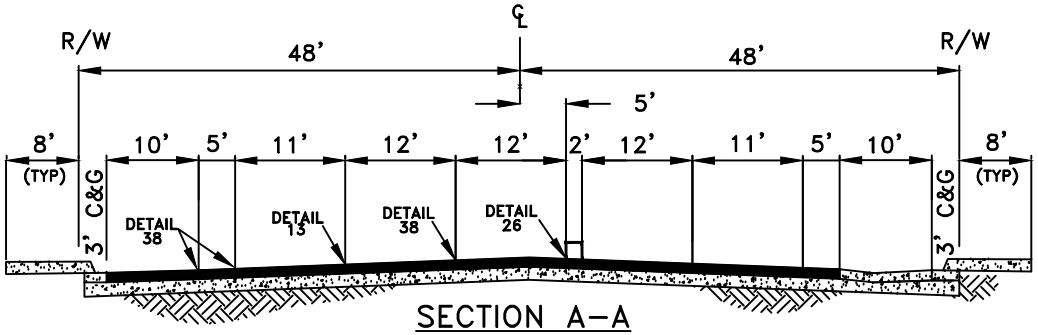
SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-9

NOTES:

1. CURB AND GUTTER SHALL BE "TYPE 2"(ST-17) AND THE MEDIAN CURB SHALL BE "TYPE 2"(ST-18) BARRIER CURB.
2. SEE SECTION 7-4 OF THE DESIGN STANDARDS FOR STREET PAVEMENT REQUIREMENTS.
3. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
4. P.U.E/T.C.E - PUBLIC UTILITY EASEMENT / TRAFFIC CONTROL EASEMENT.





SECTION A-A

MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES
DEPARTMENT

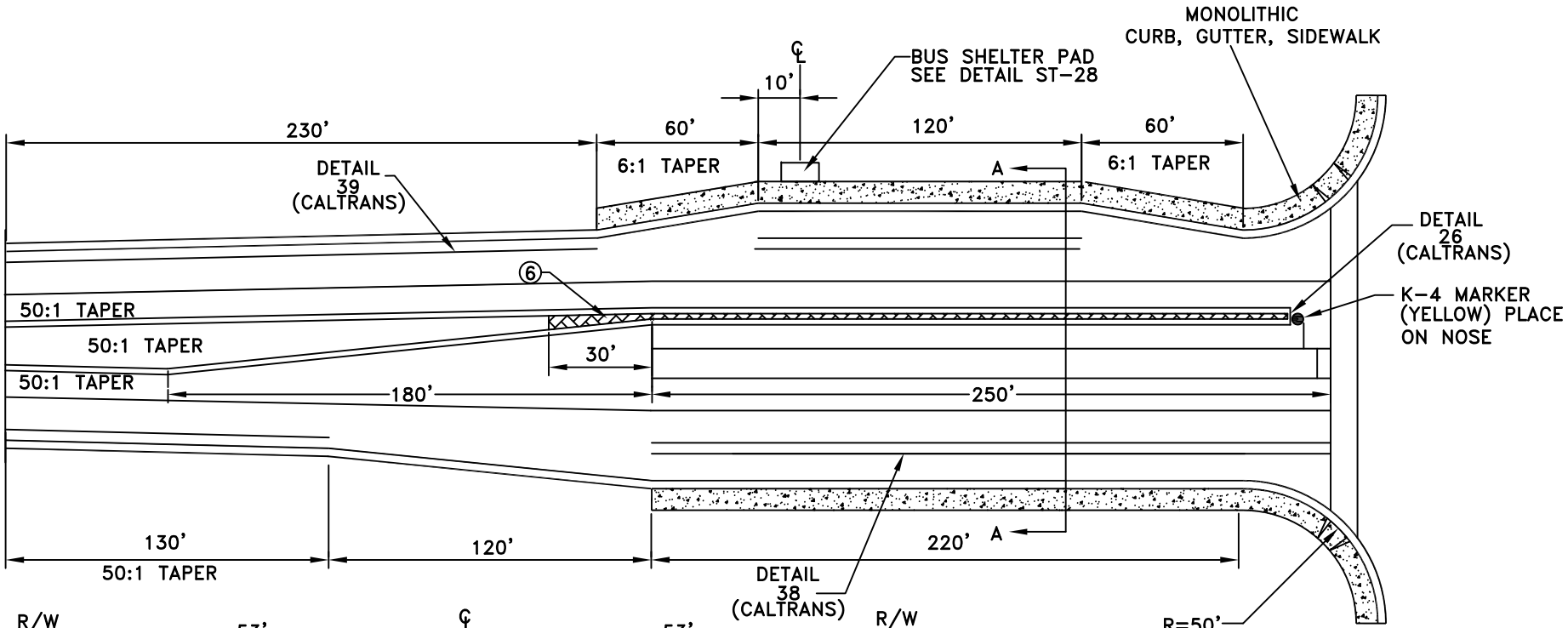
FOUR-LANE ARTERIAL
SINGLE LEFT TURNS

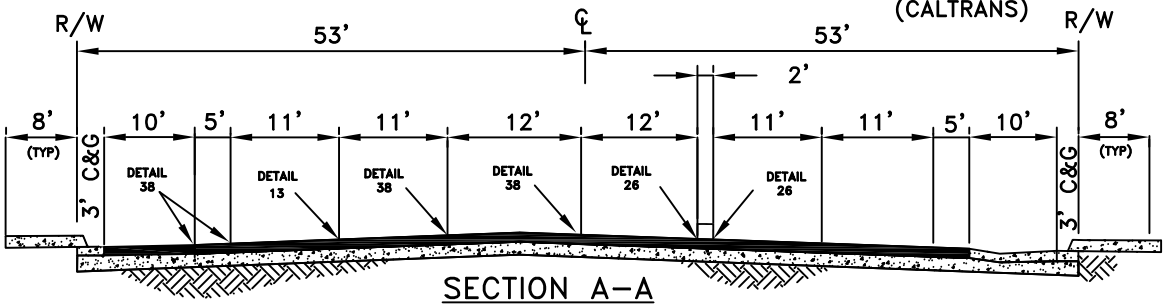
SCALE: NONE
REVISED: JANUARY 1, 2023
DRAWN BY: J THOMPSON
APPROVED BY: MARC STOUT

ST-10

NOTES:

1. RIGHT OF WAY SHALL BE DEDICATED TO ACCOMMODATE DUAL LEFT TURNS AS SPECIFIED IN DESIGN STANDARD DRAWING ST-11.
2. STOP BAR FOR LEFT TURN LANE SHALL BE TEN FEET BACK OF NEAR CROSSWALK STRIPE.
3. NOSE OF MEDIAN SHALL BE 15 FEET BACK OF NEAR CROSSWALK STRIPE.
4. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
5. SIGN DETAIL NUMBERS REFERENCE 2012 CALIFORNIA MUTCD.





SECTION A–A

MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

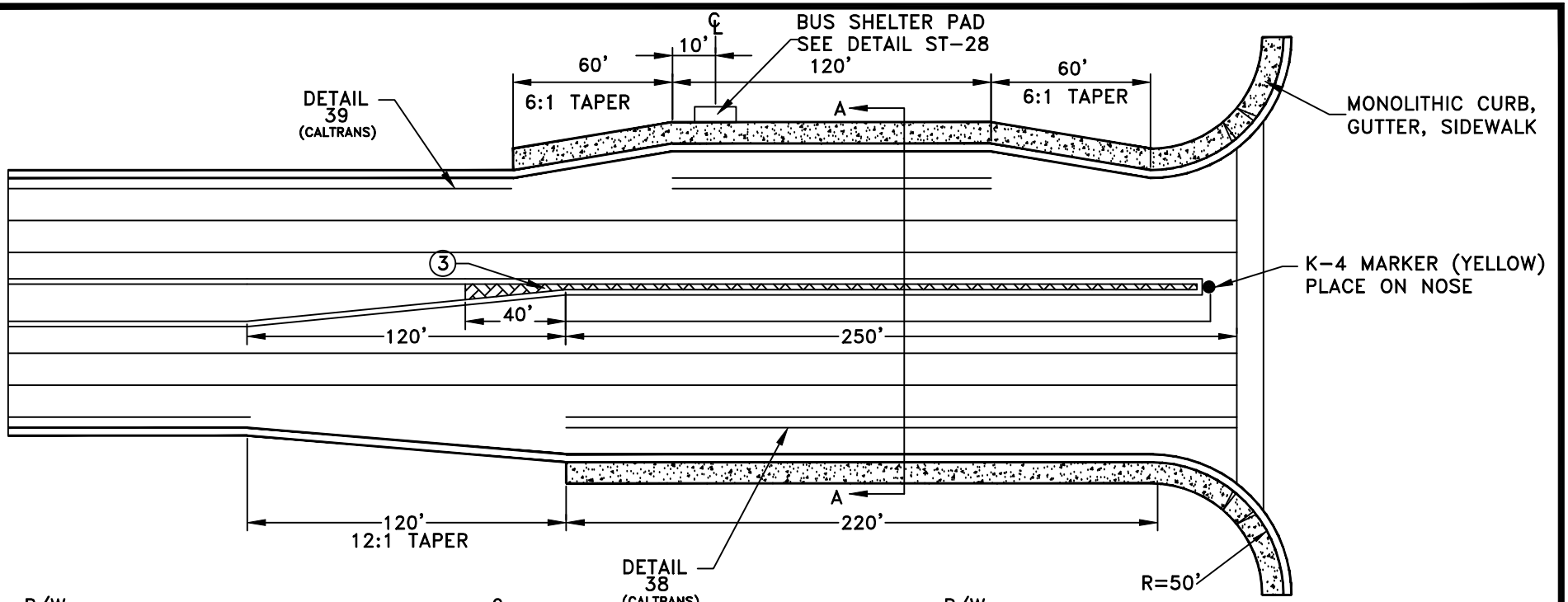
FOUR–LANE ARTERIAL DUAL LEFT TURNS

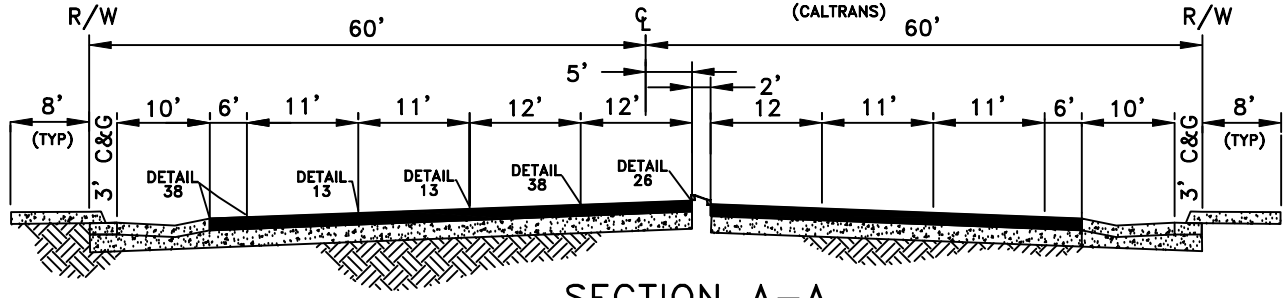
SCALE: NONE
REVISED: JANUARY 1, 2023
DRAWN BY: J THOMPSON
APPROVED BY: MARC STOUT

ST–11

NOTES:

1. STOP BAR FOR INSIDE DUAL LEFT TURN LANE SHALL BE TEN FEET BACK OF NEAR CROSSWALK STRIPE.
2. STOP BAR FOR OUTSIDE DUAL LEFT TURN LANE SHALL BE FIVE FEET BACK OF NEAR CROSSWALK STRIPE.
3. NOSE OF MEDIAN SHALL BE 15 FEET BACK OF NEAR CROSSWALK STRIPE.
4. STRIPING DETAIL REFERENCE CALTRANS STANDARDS.
5. SIGN DETAIL REFERENCE 2012 CALIFORNIA MUTCD.
6. "STAMPED CONCRETE" SEE DETAIL ST–37.





SECTION A-A

MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES
DEPARTMENT

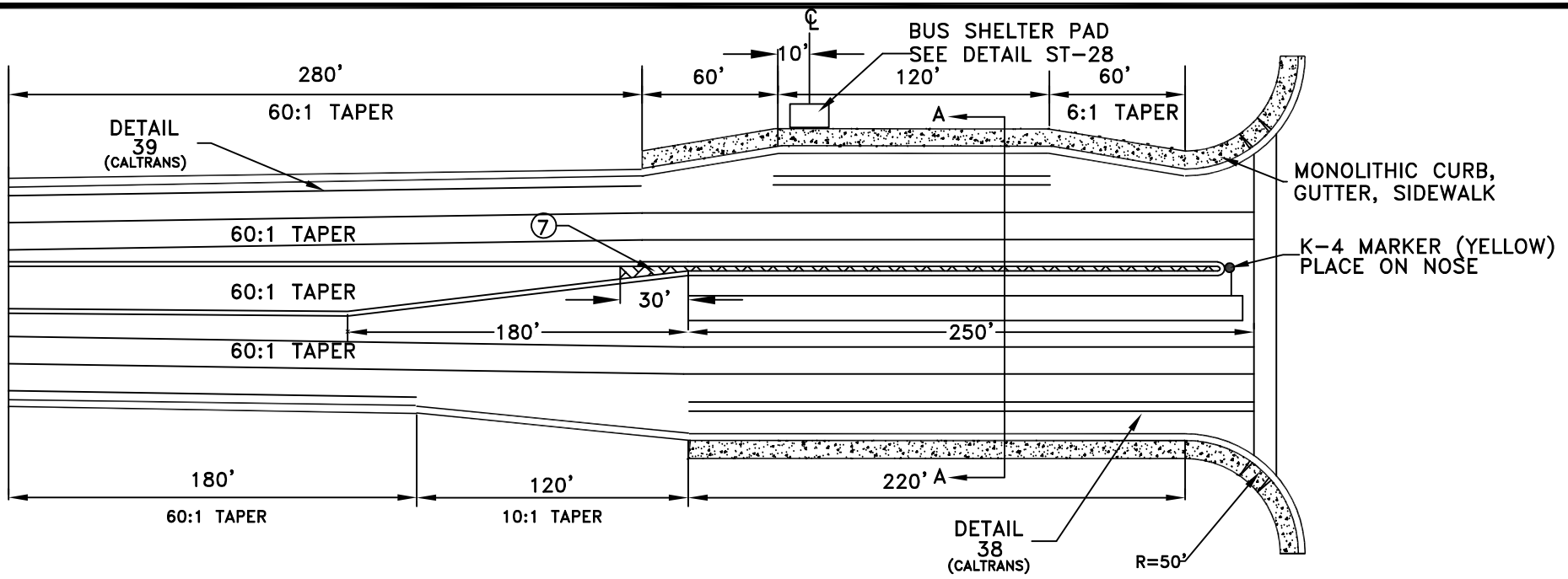
SIX-LANE ARTERIAL
SINGLE LEFT TURNS

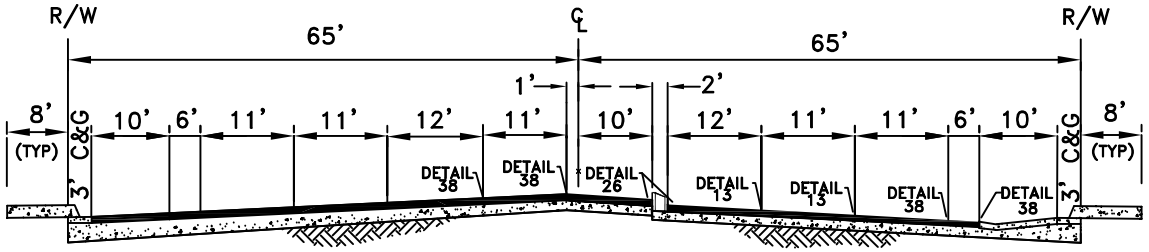
SCALE: NONE
REVISED: JANUARY 1, 2016
DRAWN BY: J MCKINNEY
APPROVED BY: MARC STOUT

ST-12

NOTES:

1. STOP BAR FOR LEFT TURN LANE SHALL BE TEN FEET BACK OF NEAR CROSSWALK STRIPE.
2. NOSE OF MEDIAN SHALL BE 15 FEET BACK OF NEAR CROSSWALK.
3. "STAMPED CONCRETE" SEE DETAIL ST-37.
4. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
5. SIGN DETAIL NUMBERS REFERENCE 2012 CALIFORNIA MUTCD.





SECTION A-A

MARC STOUT
CITY ENGINEER

NOTES:

1. ONE FOOT WIDE BREAKS AT 50 FOOT CENTERS TO BE PROVIDED IN MEDIAN TO ALLOW DRAINAGE THROUGH MEDIAN FOR DUAL LEFT LANE.
2. NOSE OF MEDIAN SHALL BE 15 FEET BACK OF NEAR CROSSWALK STRIPE.
3. STOP BAR FOR INSIDE LEFT TURN LANE SHALL BE 10 FEET BACK OF NEAR CROSSWALK STRIPE.
4. STOP BAR FOR OUTSIDE DUAL LEFT TURN LANE SHALL BE 5 FEET BACK OF NEAR CROSSWALK STRIPE.
5. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
6. SIGN DETAIL NUMBERS REFERENCE 2012 CALIFORNIA MUTCD.
7. "STAMPED CONCRETE" SEE ST-37.

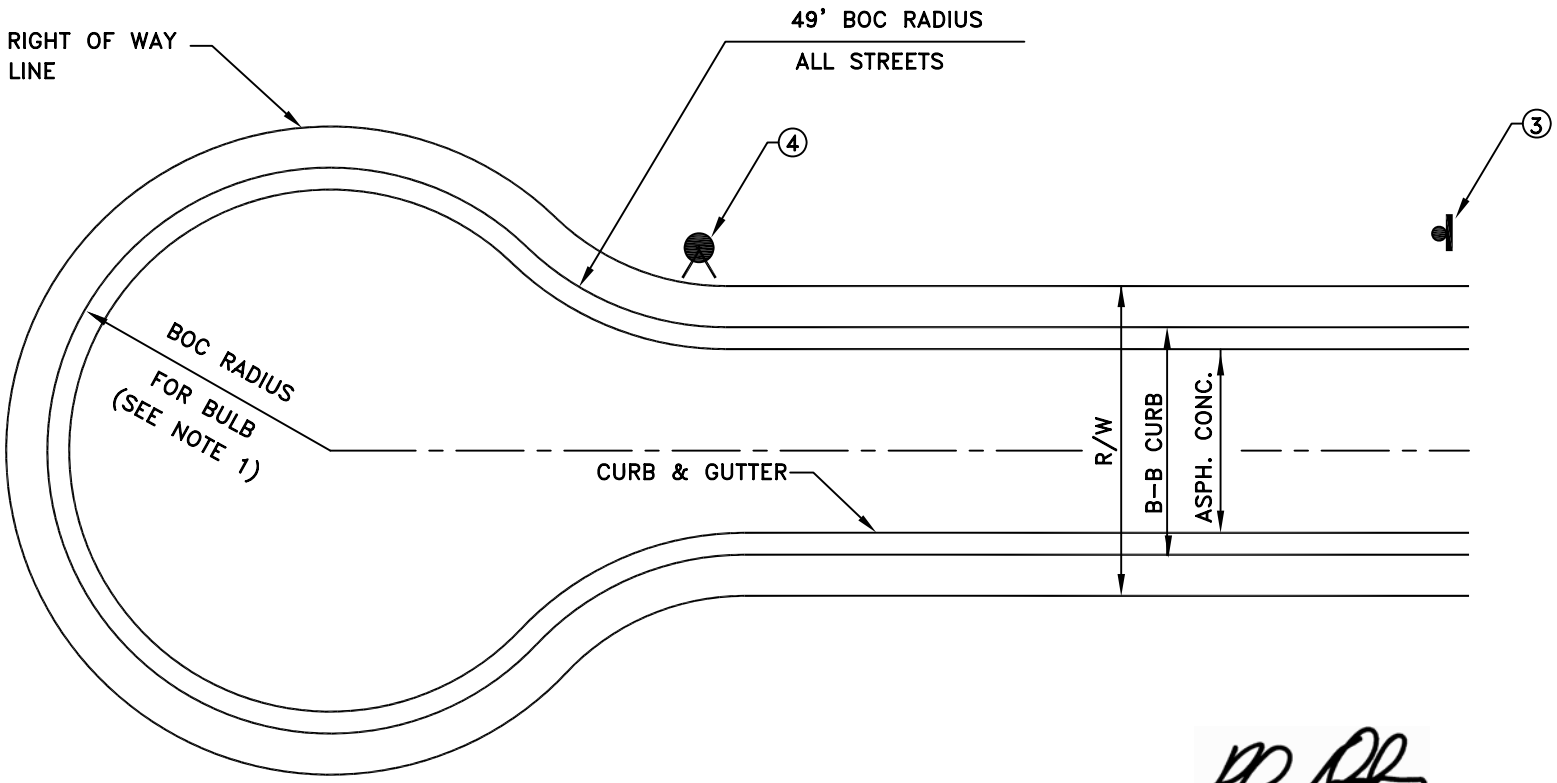
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

SIX-LANE ARTERIAL DUAL LEFT TURNS

SCALE: NONE
REVISED: April 1, 2022
DRAWN BY: J MCKINNEY
APPROVED BY: MARC STOUT

ST-13



RHON HERNDON
PUBLIC WORKS DIRECTOR

NOTES:

1. BACK OF CURB RADIUS FOR BULB SHALL BE AS FOLLOWS:
   INDUSTRIAL STREET / RESIDENTIAL STREET – 39 FEET
2. LENGTH OF CUL-DE-SAC STREETS SHALL BE MEASURED FROM CENTER OF BULB TO CENTER LINE OF INTERSECTING STREET. CUL-DE-SAC LENGTH SHALL NOT EXCEED 500 FEET WITHOUT THE APPROVAL OF THE CITY ENGINEER.
3. 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.
4. ALL CUL-DE-SACS IN EXCESS OF 200' SHALL HAVE A FIRE HYDRANT INSTALLED AT THE BULB. SUBJECT TO THE APPROVAL OF THE FIRE DEPARTMENT.

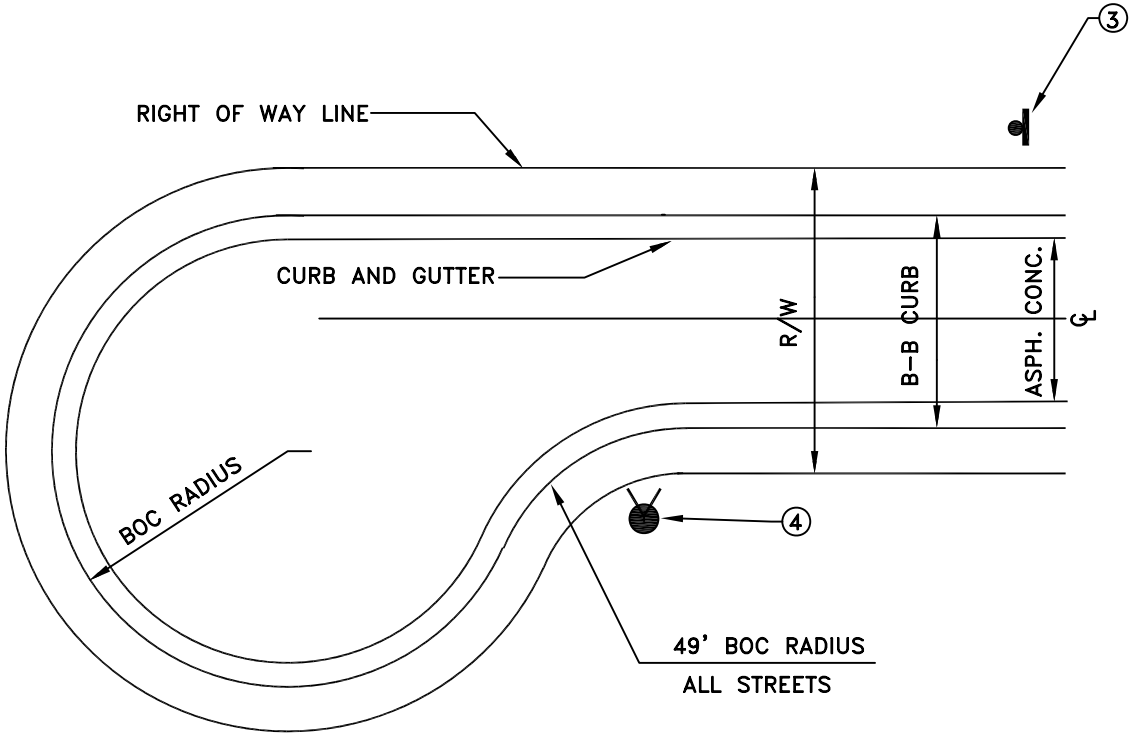
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

CUL-DE-SAC STREET

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-14



RHON HERNDON
PUBLIC WORKS DIRECTOR

NOTES:

1. BACK OF CURB RADIUS FOR BULB SHALL BE AS FOLLOWS:
   INDUSTRIAL STREET / RESIDENTIAL STREET – 39 FEET
2. LENGTH OF CUL-DE-SAC STREETS SHALL BE MEASURED FROM CENTER OF BULB TO CENTER LINE OF INTERSECTING STREET. CUL-DE-SAC LENGTH SHALL NOT EXCEED 500 FEET WITHOUT THE APPROVAL OF THE CITY ENGINEER.
3. 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.
4. ALL CUL-DE-SACS IN EXCESS OF 200' SHALL HAVE A FIRE HYDRANT INSTALLED AT THE BULB.

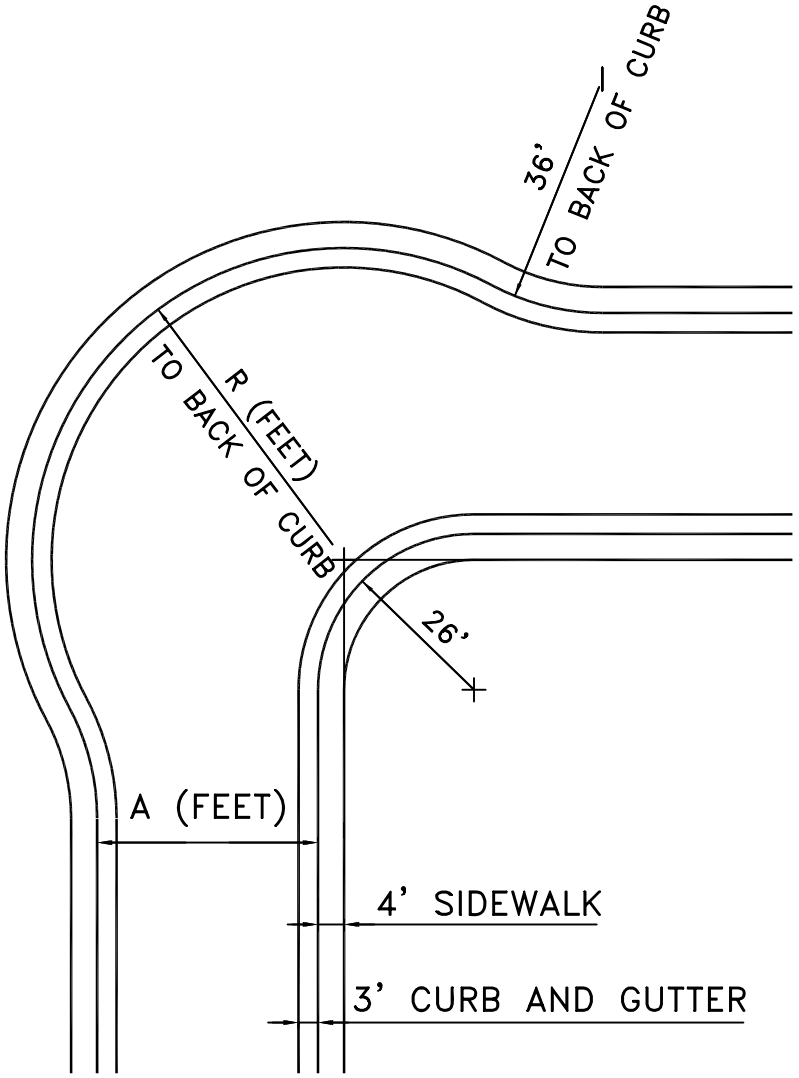
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

OFFSET CUL-DE-SAC STREET

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-15



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

RHON HERNDON
PUBLIC WORKS DIRECTOR

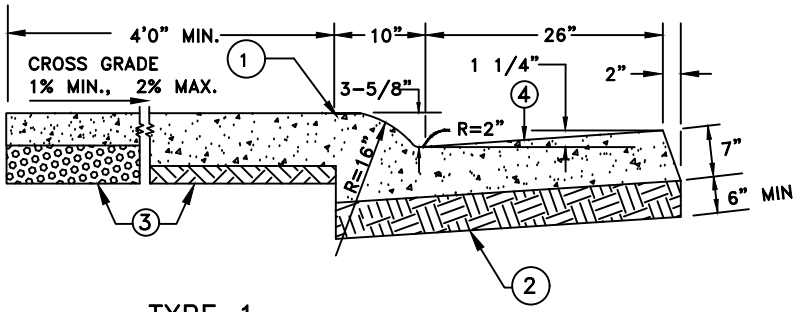
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

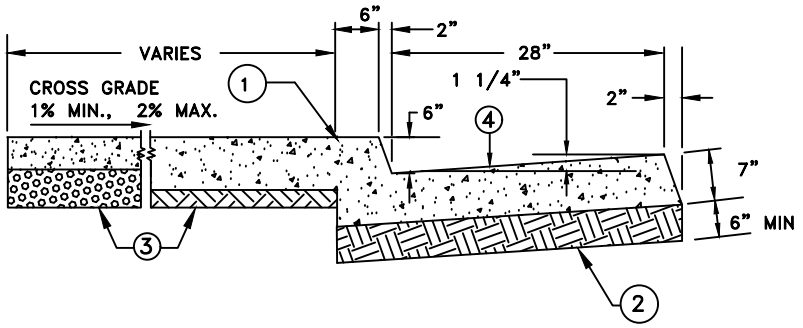
STANDARD ELBOW

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

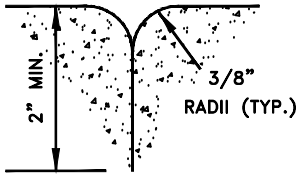
ST-16



TYPE 1
ROLLED CURB & GUTTER



TYPE 2
VERTICAL CURB & GUTTER
(OPTION 1)



TOOL JOINT
(TYP.)
SEE SECTION 71-4.C.3.
(CONSTRUCTION STANDARDS)

LEGEND:

1. SCORE MARK, 1/8" DEEP
2. NATIVE OR MINIMUM 4" AGGREGATE BASE UNDERNEATH CURB AND GUTTER.
3. ALL SIDEWALK HAS OPTION OF 4" CONCRETE ON 4" AGGREGATE BASE, IN LIEU OF 6" CONCRETE ON NATIVE.
4. GUTTER PAN CROSS SLOPE NOT TO EXCEED 5% MAX, OR BE LESS THAN 4%.

NOTES:

A. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.
B. SEE SECTION 71-4 C OF THE CITY CONSTRUCTION STANDARDS FOR FINISH AND JOINTS.
C. ALL ADJOINING SIDEWALK, CURB AND GUTTER SHALL BE POURED MONOLITHIC.
D. SUBGRADE AND/OR AGGREGATE BASE PROCESSED TO 95% RELATIVE COMPACTION.

MARC STOUT
CITY ENGINEER

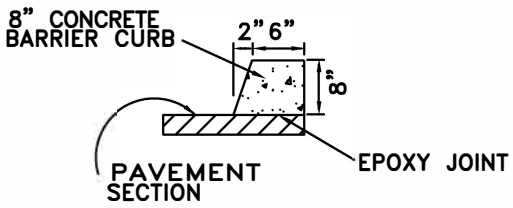
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

TYPE 1 AND 2 CURB AND GUTTER WITH SIDEWALK

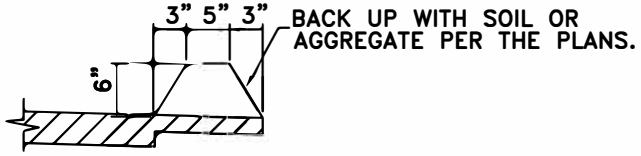
SCALE: NONE
REVISED: FEBRUARY 1, 2020
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

ST-17



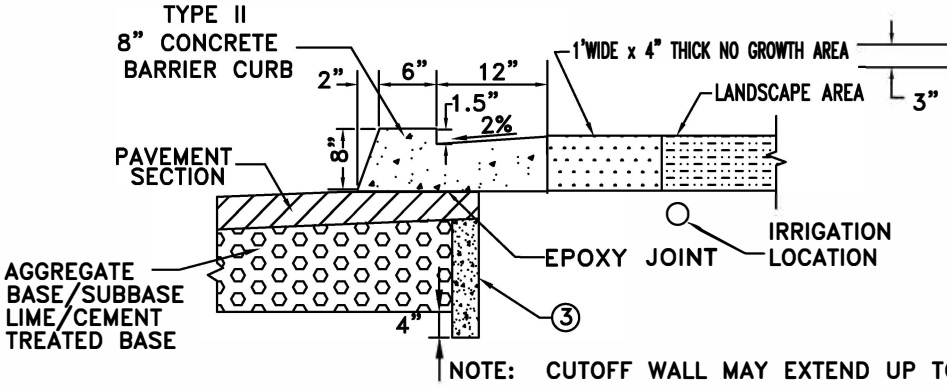
TYPE 1 BARRIER CURB

(ADJACENT TO UNIRRIGATED AREAS)



STATE "TYPE A" HIGH DIKE

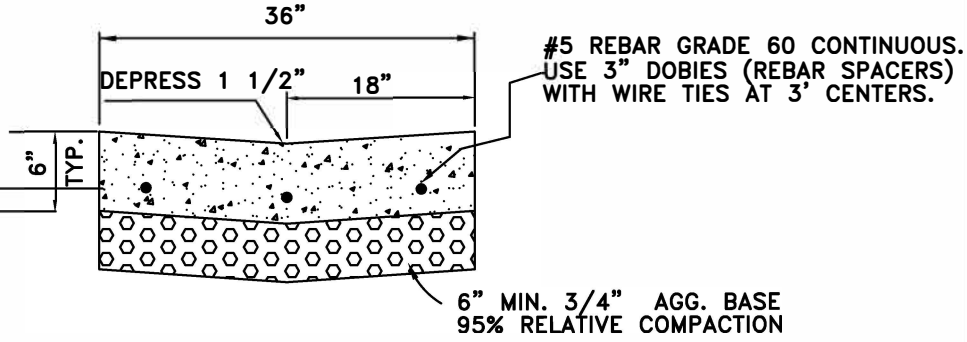
(ASPHALT CONCRETE DIKE)



NOTE: CUTOFF WALL MAY EXTEND UP TO PAVEMENT SURFACE OR AS SHOWN ABOVE.

TYPE 2 BARRIER CURB

(ADJACENT TO IRRIGATED AREAS)



36 INCH VALLEY GUTTER

(ALLEYS ONLY)

MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

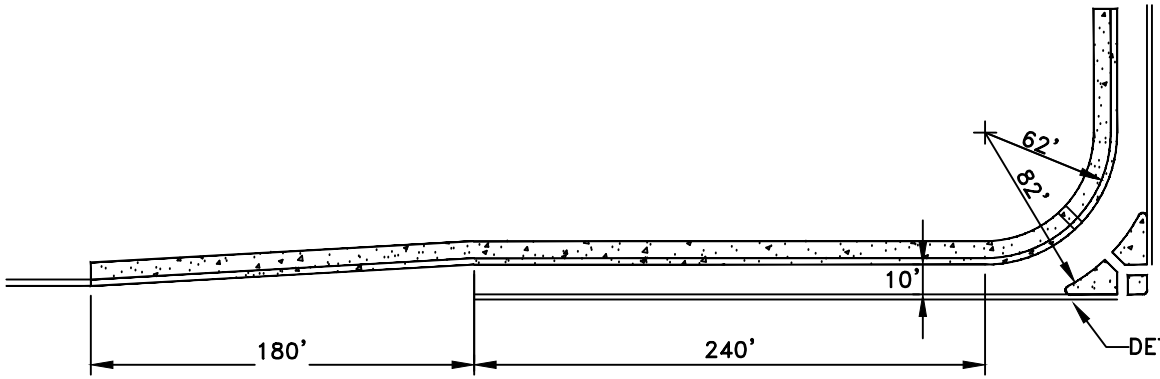
BARRIER CURBS AND VALLEY GUTTERS

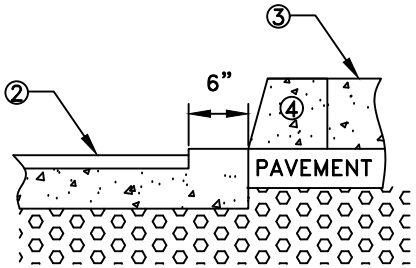
SCALE: NONE
REVISED: JANUARY 1, 2020
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

ST-18

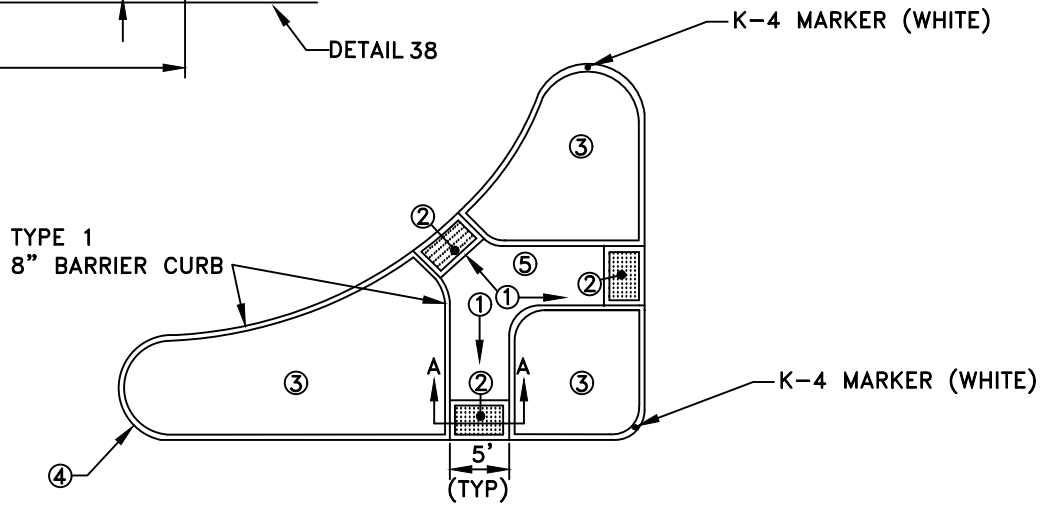
NOTES:

1. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS UNLESS OTHERWISE NOTED.
2. TOOL JOINTS" SEE DETAIL ST-17.
3. 4" THICK CONCRETE SLURRY CUTOFF WALL REQUIRED ADJACENT TO IRRIGATED AREAS, AS ALLOWED PER THE CITY'S WATER EFFICIENT LANDSCAPE ORDINANCE.





SECTION A–A



JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

NOTES:

1. 1% TO 2% SLOPE SHALL BE MAINTAINED.
2. 3' X 4' DETECTABLE WARNING PANEL PER SECTION 71–5.E. OF THE CITY OF ROSEVILLE CONSTRUCTION STANDARDS. FLAT SURFACES SHALL BE FLUSH WITH CONCRETE AND ADJACENT PAVEMENT BORDER AROUND PANEL SHALL BE 6" ADJACENT PAVEMENT (TYP)
3. "STAMPED CONCRETE" SEE DETAIL ST–37
4. FACE OF "TYPE 1"(ST–18) EIGHT INCH BARRIER CURB, PAVEMENT EDGE. (TYPICAL)
5. PLACE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS.
6. STRIPING DETAILS REFERENCE CALTRANS STANDRDS.

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

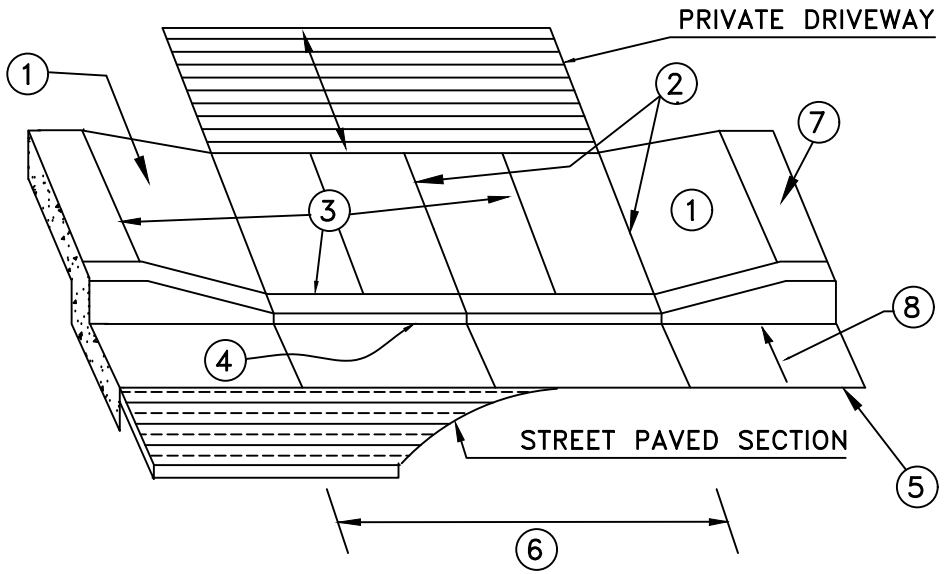
ACCELERATION LANE FOR FREE RIGHTS

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: N. SIVIGLIA
APPROVED BY: JASON SHYKOWSKI

ST–19

LEGEND:

1. THE MAX. GRADE IS 5% IF LONGITUDINAL STREET GRADE ALLOWS. THE MAX. TRANSITION TO OBTAIN 5% IS 15 FEET. OTHERWISE, A MAX. GRADE OF 8.33% SHALL BE OBTAINED BETWEEN 15 AND 25 FEET. 25 FEET IS THE MAX. TRANSITION REQUIRED/ALLOWED, REGARDLESS OF LONGITUDINAL STREET GRADE.
2. "TOOL JOINT" SEE DETAIL ST-17.
3. SCORE MARKS EVERY 4 FEET FOR 4 FOOT SIDEWALK AND 5 FEET FOR 5 FOOT SIDEWALK ETC.
4. 1 INCH HIGH LIP AT 45 DEGREE BATTER.
5. "TYPE 2"(ST-17) CURB AND GUTTER.
6. DRIVEWAY WIDTH PER THE APPROVED PLAN. (MIN. 25',MAX 40' FOR COMMERCIAL 32' FOR RESIDENTIAL)
7. ADJACENT SIDEWALK.
8. GUTTER PAN CROSS SLOPE NOT TO EXCEED 5% MAX.



NOTES:

A. SIDEWALK CROSS GRADE THROUGH THE ENTIRE DRIVEWAY SHALL BE 1% MINIMUM, 2% MAXIMUM.
B. FOR COMMERCIAL DRIVEWAY: SIDEWALK, APRON AND GUTTER PAN SHALL BE 8" THICK WITH NO. 4, GRADE 60 REBAR ON 18" CENTERS EACH WAY. USE 3" DOBIES (REBAR SPACERS) AT 3' INTERVALS. FOR RESIDENTIAL: WALK, APRON, AND GUTTER PAN SHALL BE 7" THICK NONRIENFORCED. FOR COMMERCIAL AND RESIDENTIAL, SIDEWALK, APRON AND GUTTER PAN SHALL BE PLACED MONOLITHICALLY. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.
C. BASE FOR CONCRETE SHALL BE NATIVE SOIL OR CLASS 2, 3/4 INCH AGGREGATE BASE, EITHER PROCESSED 6 INCHES THICK TO 95% RELATIVE COMPACTION.
D. SEE SECTION 71-4 C.6. OF THE CONSTRUCTION STANDARDS FOR PAVEMENT PATCH ADJACENT TO GUTTER LIP.
E. FROM 8 TO 20 FEET BACK OF SIDEWALK, RAISE PRIVATE PAVING/LANDSCAPING TO A MINIMUM HEIGHT OF THE HIGHEST TOP OF CURB ELEVATION AT THE DRIVEWAY.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

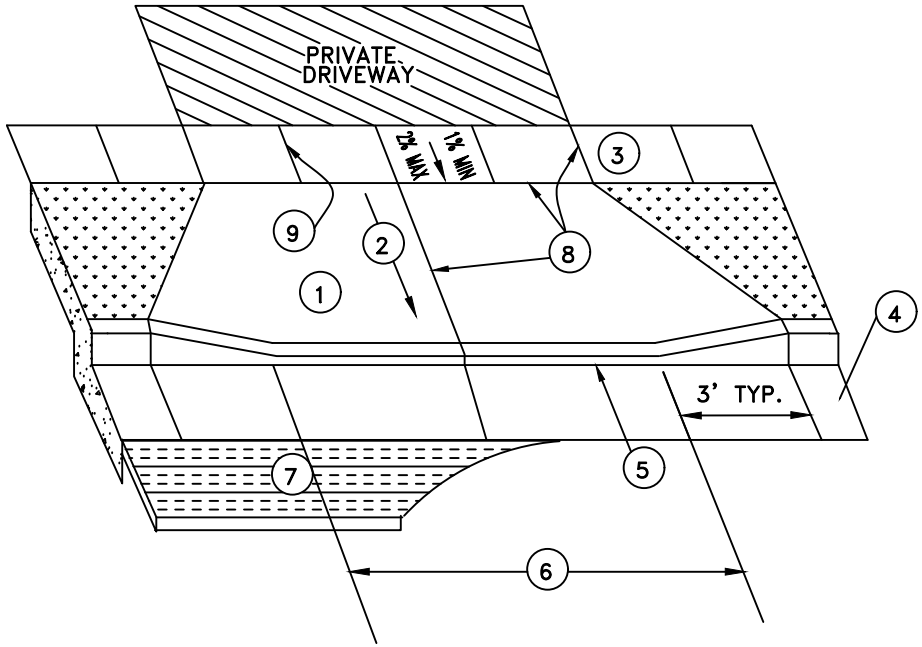
CITY OF ROSEVILLE CALIFORNIA

PUBLIC WORKS DEPARTMENT

"TYPE S" DRIVEWAY APRON

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: N. SIVIGLIA
APPROVED BY: JASON SHYKOWSKI

ST-20



NOTES:

1. FOR COMMERCIAL DRIVEWAY: SIDEWALK, APRON AND GUTTER PAN SHALL BE 8 INCHES THICK WITH NO. 4, GRADE 60 REBAR ON 18 INCH CENTERS EACH WAY. USE 3 INCH DOBIES (REBAR SPACERS) AT 3 FOOT INTERVALS. FOR RESIDENTIAL: WALK, APRON AND GUTTER PAN SHALL BE 7 INCHES THICK, NONREINFORCED. FOR COMMERCIAL AND RESIDENTIAL, SIDEWALK, APRON AND GUTTER PAN SHALL BE PLACED MONOLITHICALLY. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.
2. STRAIGHT GRADE FROM SIDEWALK TO LIP AT FLOWLINE.
3. ADJACENT SIDEWALK: IF EXISTING SIDEWALK EXCEEDS 2% CROSS GRADE, REPLACE 5 FEET ADDITIONAL EXISTING AND TRANSITION TO ACCOMMODATE 2% MAXIMUM CROSS GRADE IN SIDEWALK WITHIN DRIVEWAY.
4. "TYPE 2"(ST-17) CURB AND GUTTER: IF EXISTING IS NOT "TYPE 2" SECTION, MATCH THE EXISTING GUTTER PAN UNLESS OTHERWISE REQUIRED PER THE APPROVED PLAN.
5. 1 INCH HIGH LIP AT 45 DEGREE BATTER.
6. DRIVEWAY WIDTH PER THE APPROVED PLAN. MINIMUM 25' MAXIMUM OF 40' FOR COMMERCIAL, 32' FOR RESIDENTIAL.
7. SEE SECTION 71-4 C.6. OF THE CONSTRUCTION STANDARDS FOR PAVEMENT PATCH ADJACENT TO GUTTER LIP.
8. "TOOL JOINT" SEE DETAIL ST-17.
9. SCORE MARKS EVERY FOUR FEET FOR FOUR FOOT SIDEWALK AND FIVE FEET FOR FIVE FOOT SIDEWALK, ETC.
10. SUBGRADE BASE FOR CONCRETE WITHIN CITY RIGHT-OF-WAY SHALL BE 6 INCHES OF NATIVE SOIL, OR CLASS II, 3/4 INCH AGGREGATE BASE, BOTH AT 95% RELATIVE COMPACTION.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

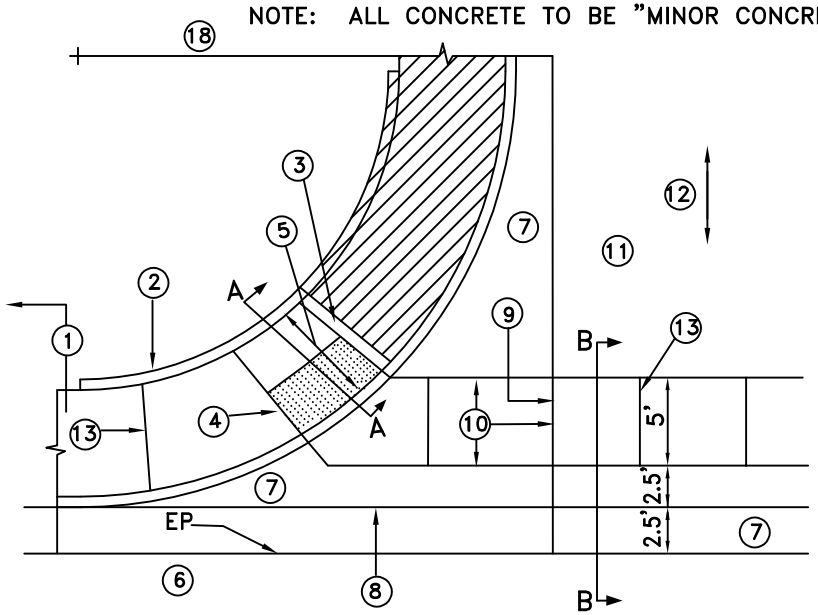
DEPARTMENT OF PUBLIC WORKS

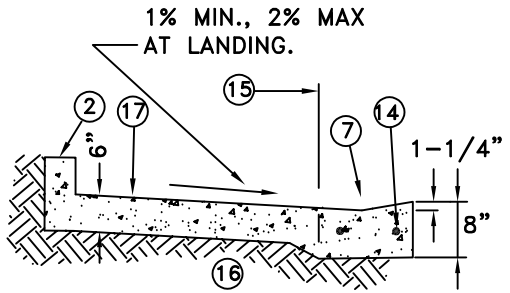
"TYPE D" DRIVEWAY APRON

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: N. SIVIGLIA
APPROVED BY: JASON SHYKOWSKI

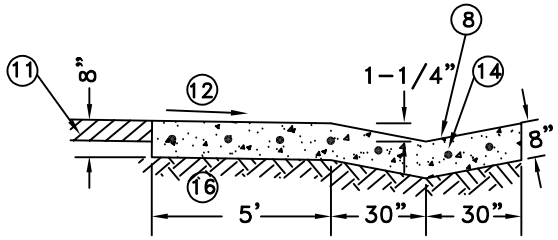
ST-21

NOTE: ALL CONCRETE TO BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS





SECTION A-A



SECTION B-B

LEGEND

1. "TYPE 2"(ST-17) CURB AND GUTTER WITH SIDEWALK OUTSIDE DRIVEWAY AREA
2. RETAINING CURB AT BACK OF WALK, HEIGHT VARIES.
3. PLACE RAMP IF SIDEWALK EXTENDS ON SITE (CROSSHATCHED AREA); EXTEND RETAINING CURB IF NO ON-SITE SIDEWALK. (AT #3 ARROW)
4. CASE C RAMP WITH TRUNCATED DOME PANEL; NUMBER 4 LINE COINCIDES WITH BACK OF V GUTTER (TYP). SLOPE TOP OF CURB 1/2 INCH AT OPENING. NO LIP. SEE SECTION 71-4 C.4. (CONSTRUCTION STANDARDS).
5. LANDING DEPTH IS 6 FEET DEEP. TRANSITION TO ADJACENT WALK WIDTH FROM LANDING TO CURB RETURN.
6. STREET PAVING.
7. DRIVEWAY 8 INCHES THICK PER SECTION B-B, SIDEWALK 6 INCHES PER SECTION A-A.
8. GUTTER FLOW LINE.
9. PLACE GUTTER, WALKS AND CURBS MONOLITHICALLY. POUR MAY BE SEPARATED WITH COLD JOINT AT NUMBER 9 LINE.
10. "TOOL JOINT" SEE DETAIL ST-17.
11. PRIVATE PAVING PER APPROVED PLANS.
12. MAXIMUM GRADE OF 2%, MINIMUM GRADE OF 1%. THESE GRADE REQUIREMENTS SHALL EXTEND A MINIMUM DISTANCE OF 15 FEET BACK OF V-GUTTER.
13. SCORE MARK.
14. NO. 4 REBAR, 18 INCHES O.C. EACH WAY, 3 INCH DOBIES WITH WIRE TIES AT 3 FOOT INTERVALS, EACH WAY.
15. EXTENDED CURB FACE.
16. IN DRIVEWAY, CLASS B, 3/4 INCH AGGREGATE BASE OR NATIVE SUBGRADE; EITHER PROCESSED TO 95% RELATIVE COMPACTION. UNDER SIDEWALK, NATIVE SOIL, MINIMUM 6 INCH, PROCESSED TO 95% RELATIVE COMPACTION AGGREGATE BASE THICKNESS SHALL BE AT THE CONTRACTOR'S DISCRETION.
17. ALL SIDEWALK 1% MINIMUM, 2% MAXIMUM CROSS GRADE TOWARD STREET.
18. STANDARD RADIUS IS 20-FEET. WHERE DELIVERY TRUCKS WILL ACCESS DRIVEWAYS RADIUS WILL BE INCREASED TO 30-FEET.

MARC STOUT
CITY ENGINEER

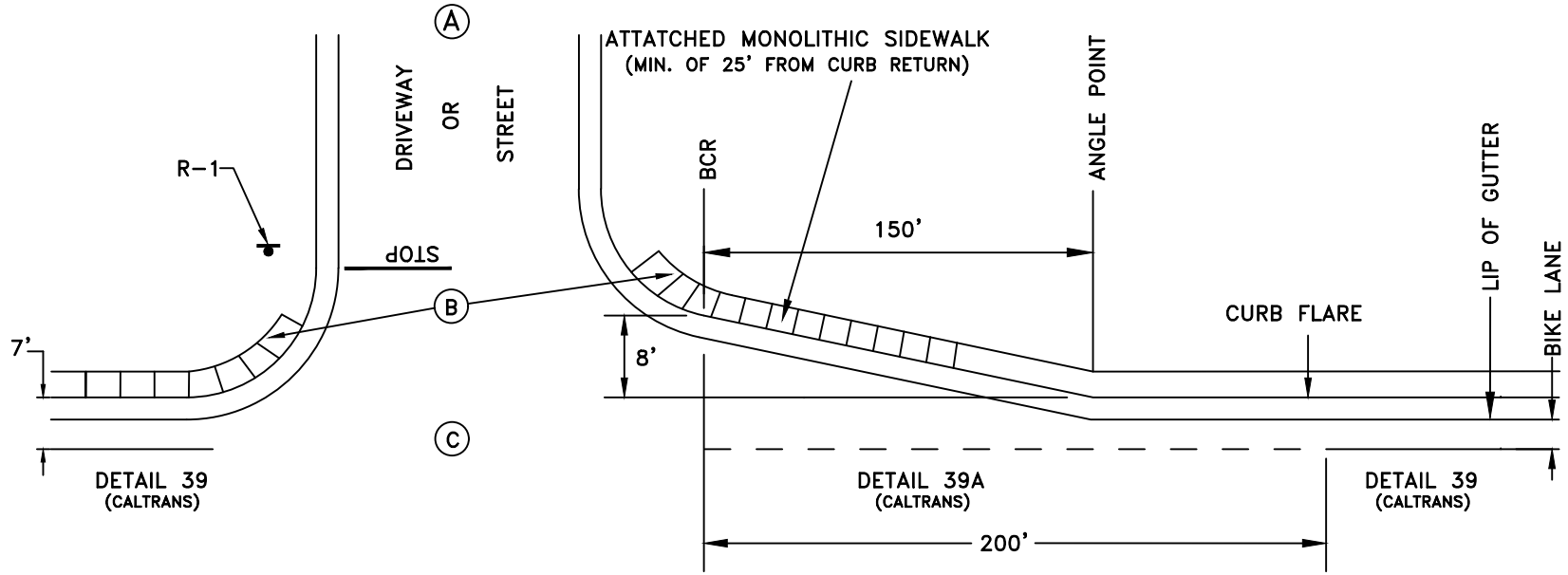
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

"TYPE A-7" DRIVEWAY

SCALE: NONE
REVISED: JANUARY 1, 2025
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

ST-22



LEGEND

A. ON-SITE PAVEMENT
B. CURB RAMPS AND SIDEWALK
C. PAVEMENT PER DESIGN STANDARDS
D. BCR – BEGINNING OF CURB RETURN

NOTES:

1. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS
2. DRIVEWAYS WHERE THE MEDIAN IS NOT BROKEN SHALL HAVE THE DETAIL 39 CONTINUE THROUGH THE CURB FLARE AND DRIVEWAY.
3. SIGN DETAIL NUMBERS REFERENCE 2012 CALIFORNIA MUTCD.
4. STOP BAR TO BE PLACED AT BEGINNING OF CURB RETURN.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

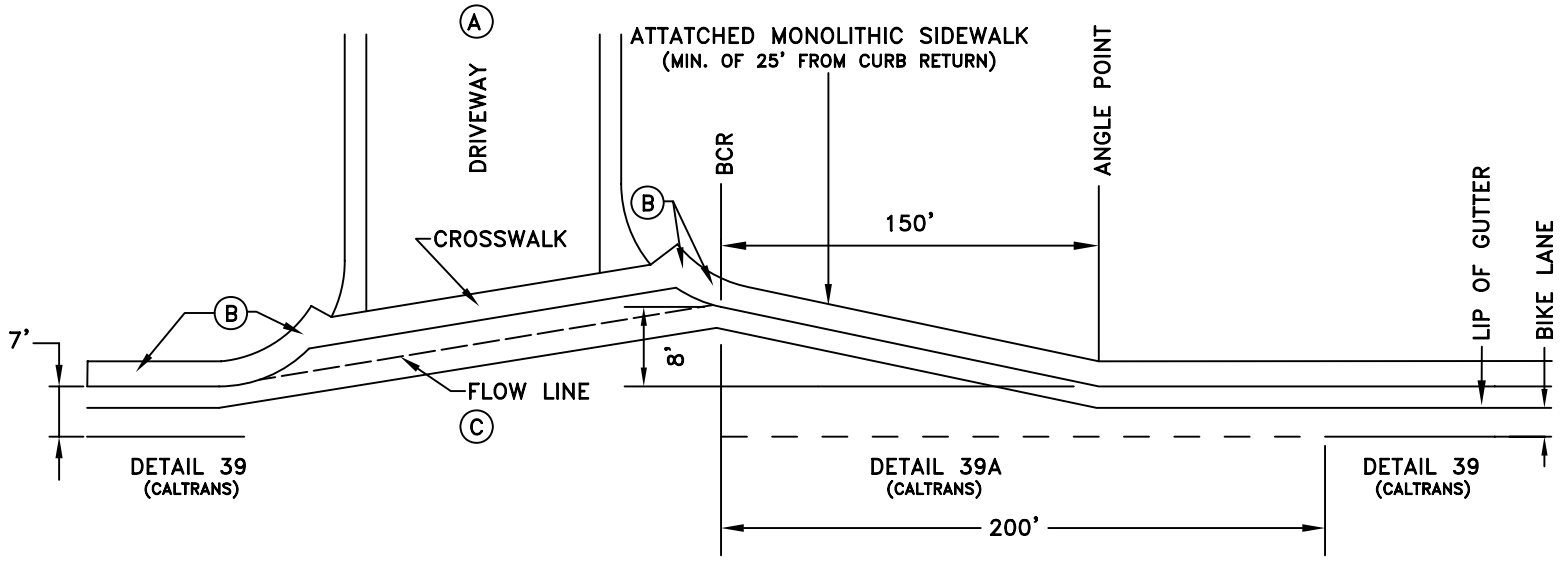
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

RIGHT TURN
CURB FLARE

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: N. SIVIGLIA
APPROVED BY: JASON SHYKOWSKI

ST-23



LEGEND

A. ON-SITE PAVEMENT
B. CURB RAMPS AND SIDEWALK
C. ASPHALT CONCRETE PAVEMENT PER DESIGN STANDARDS
D. BCR – BEGINNING OF CURB RETURN

NOTES:

1. WHEN A CURB FLARE IS PROVIDED AT AN A-7 DRIVEWAY, THE FLOWLINE SHALL BE CONSTRUCTED WITH A CONCRETE VALLEY GUTTER EXTENDING FROM THE OUTSIDE END OF EACH CURB RETURN. DRAIN INLETS MAY BE REQUIRED ON DRIVEWAY LEG TO INTERCEPT WATER LEAVING THE SITE.
2. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS.
3. FOR "A-7 DRIVEWAY" SEE DETAIL ST-23.
4. DRIVEWAYS WHERE THE MEDIAN IS NOT BROKEN SHALL HAVE THE DETAIL 39 CONTINUE THROUGH THE CURB FLARE AND DRIVEWAY.

RHON HERNDON
PUBLIC WORKS DIRECTOR

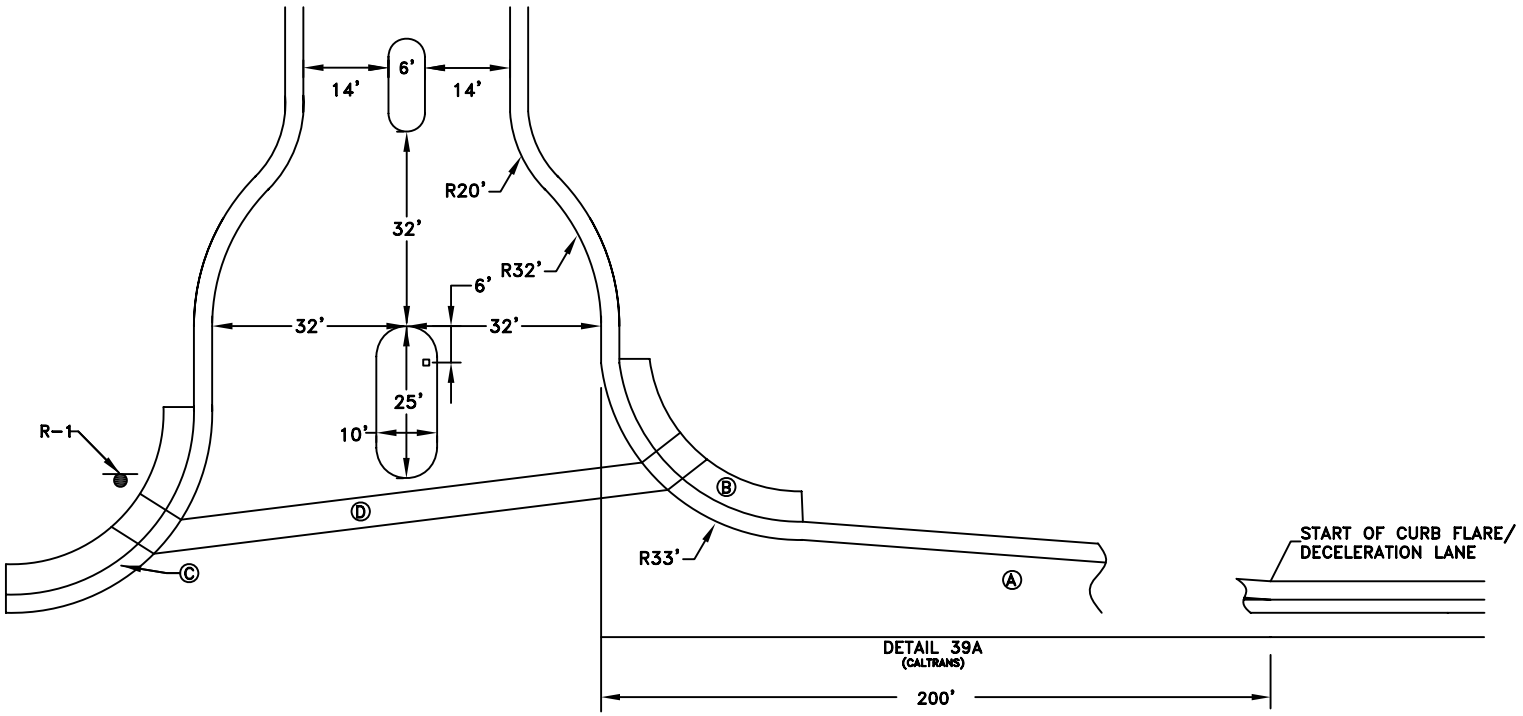
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

RIGHT TURN CURB FLARE (WITH "TYPE A-7" DRIVEWAY)

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-24



RHON HERNDON
PUBLIC WORKS DIRECTOR

LEGEND

A. STANDARD CURB FLARE OR DECELERATION LANE SEE DETAIL ST-23
B. SIDEWALK WIDTH PER PLANS, 5 FOOT MINIMUM
C. CURB AND GUTTER TO BE "TYPE 1" ST-17.
D. PLACE CROSS WALK

NOTES

1. STRIPING DETAIL NUMBERS REFERENCE CALTRANS STANDARDS
2. SIGN DETAIL NUMBERS REFERENCE 2006 CALIFORNIA MUTCD
3. DRIVEWAYS WHERE THE MEDIAN IS NOT BROKEN SHALL HAVE THE DETAIL 39 CONTINUE THROUGH THE CURB FLARE AND DRIVEWAY.

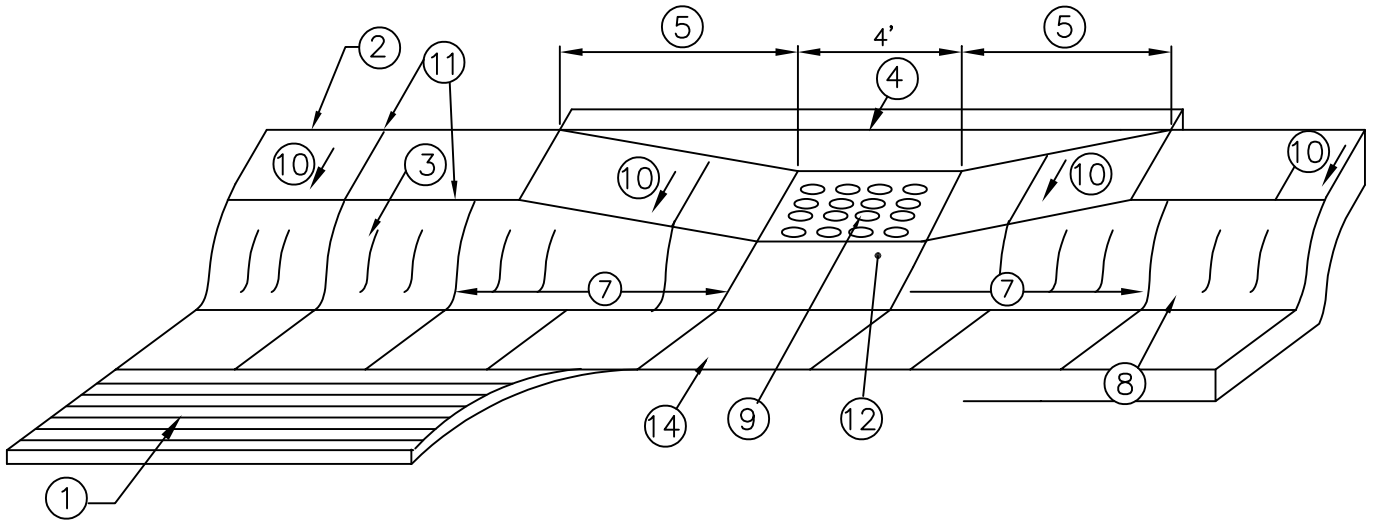
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

PRIVATE GATED ENTRANCE

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-25



NOTES:

1. STREET PAVEMENT.
2. STANDARD SIDEWALK WIDTH IS 5 FEET FOR COMMERCIAL AND 4 FEET FOR RESIDENTIAL (BACK OF WALK TO BACK OF CURB FOR BOTH UNLESS SHOWN OTHERWISE ON PLANS).
3. TOP FACE OF CURB, STANDARD 6 INCH HIGH FOR COMMERCIAL, 3-5/8 INCH FOR RESIDENTIAL.
4. 6 INCH WIDE RETAINING CURB, HEIGHT TO BE DETERMINED BY PROJECTED BACK OF WALK GRADE. POUR MONOLITHIC WITH SIDEWALK; MINIMUM DEPTH SECTION FLUSH WITH BOTTOM OF SIDEWALK.
5. THE MAXIMUM 8.33%. FOR CASE C RAMPS, ON STEEPER GRADES WHERE 8.33% CANNOT BE ACHIEVED, 25 FEET IS THE MAXIMUM LENGTH TRANSITION REQUIRED.
6. N/A
7. "TOOL JOINT" SEE DETAIL ST-13.
8. GUTTER PAN, FLOW LINE.
9. TRUNCATED DOMES: SEE SECTION 71-4 C.2. AND 71-5 OF THE CONSTRUCTION STANDARDS FOR REQUIRED PRODUCT OR APPROVED EQUAL INFORMATION. 1% TO 2% GRADE TO STREET.
10. CROSS-GRADE SHALL BE 1% MIN, 2% MAX. (LANDING 1% MIN. TO STREET). PLEASE REFER TO SECTION 71-4.C.4.
11. SCORE MARK TYPICAL.
12. ACROSS THE 4 FOOT WIDTH OF THE CURB RAMP OPENING, THE TOP OF CURB SHALL BE SLOPED UP FROM THE FLOWLINE TO THE BACK OF RAMP LANDING 1% TO 2% SLOPE.
13. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.
14. GUTTER PAN CROSS SLOPE NOT TO EXCEED 5% MAX.

MARC STOUT
CITY ENGINEER

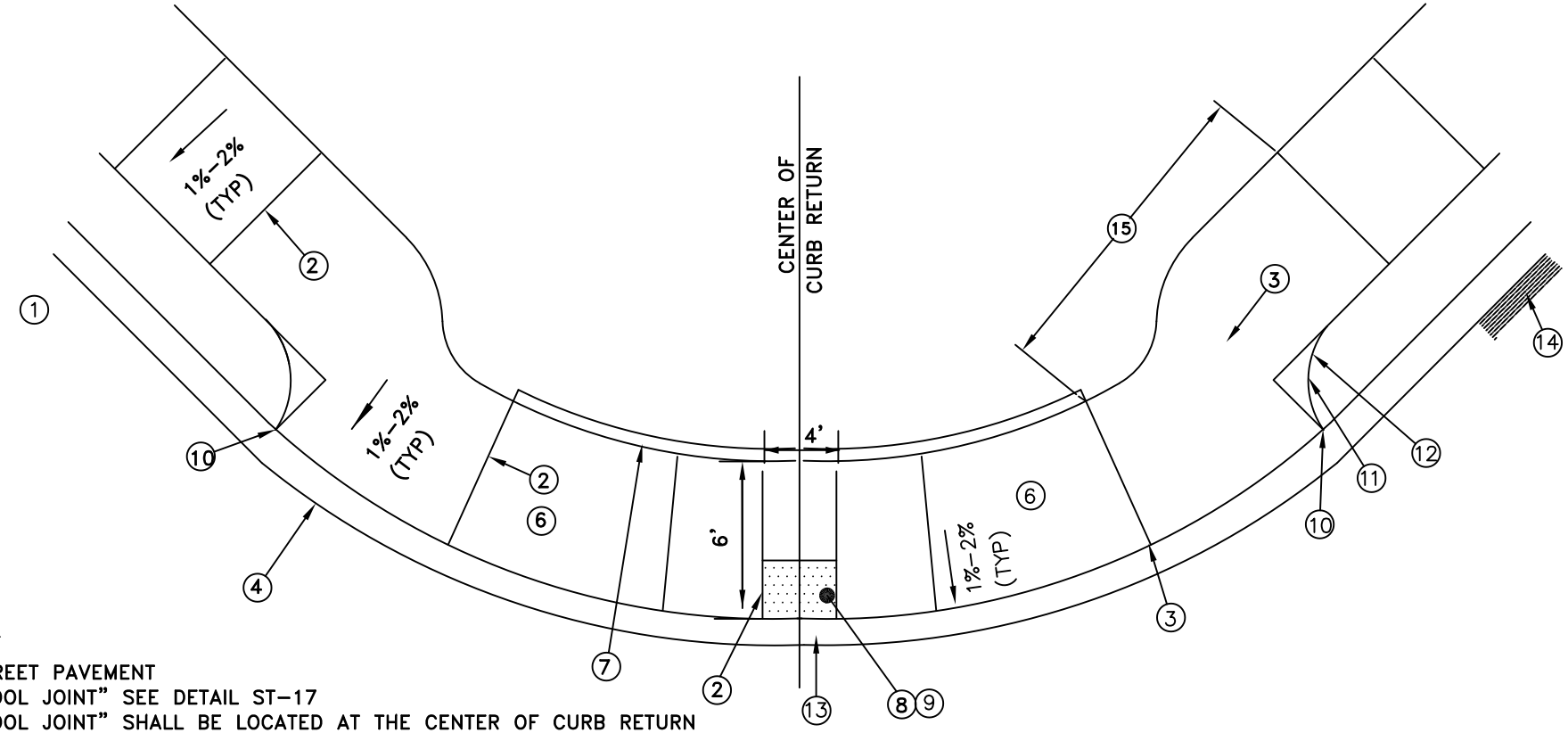
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

CASE "C" PEDESTRIAN CURB RAMP ATTACHED SIDEWALK

SCALE: NONE
REVISED: JANUARY, 2025
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

ST-26



NOTES:

1. STREET PAVEMENT
2. "TOOL JOINT" SEE DETAIL ST–17
3. "TOOL JOINT" SHALL BE LOCATED AT THE CENTER OF CURB RETURN
4. "TYPE 2"(ST–17) CURB AND GUTTER
5. N/A
6. THE MAXIMUM IS 8.33%. FOR "CASE C" RAMPS, ON STEEPER GRADES WHERE 8.33% CANNOT BE ACHIEVED, 25 FEET IS THE MAXIMUM LENGTH TRANSITION REQUIRED.
7. 6 INCH WIDE RETAINING CURB, HEIGHT TO BE DETERMINED BY PROJECTED BACK OF WALK GRADE. POUR MONOLITHIC WITH SIDEWALK; MINIMUM DEPTH SECTION FLUSH WITH BOTTOM OF SIDEWALK.
8. DETECTABLE WARNING PANEL, TRUNCATED DOMES"(ST–35) SEE SECTIONS 71–4, C.2, AND 71–5 OF THE CONSTRUCTION STANDARDS. 1% TO 2% GRADE TO FLOW LINE.
9. SLOPE TOP OF CURB DOWN TO FLOWLINE 1% TO 2% FOR TYPE 2"(ST–17) CURB AND GUTTER AT RAMP OPENING; NO LIP. SEE SECTION 71–4 C.40 F THE CONSTRUCTION STANDARDS.
10. TERMINATE PLANTER RADIUS AT CURB RETURN. RADIUS SHALL MATCH PLANTER WIDTH.
11. RADIUS OR SQUARE AS SHOWN ON PLANS. PLANTER WIDTH VARIES.
12. SIDEWALK TO HAVE EITHER THICKNESS OF 6" ON COMPACTED NATIVE SOIL OR 4" THICKNESS WITH 4" COMPACTED AGGREGATE BASE.
13. GUTTER PAN CROSS SLOPE NOT TO EXCEED 5% MAX. IN PATH OF TRAVEL.
14. SEE SECTION 71–4 C.6. OF CONSTRUCTION STANDARDS FOR AC PATCH ADJACENT TO GUTTER LIP.
15. REVERSE CURVE TRANSITION FROM TOP OF RAMP TO BACK OF MEANDERING SIDEWALK.

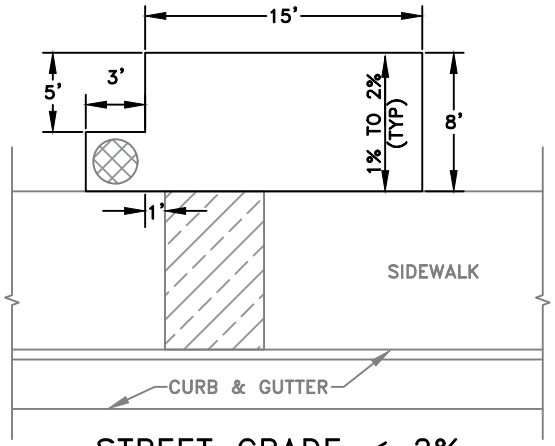
MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT

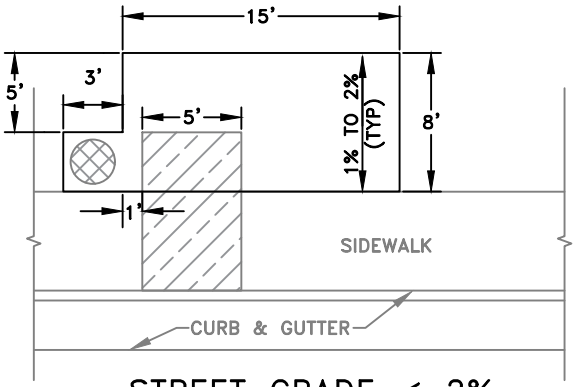
CASE "C" PEDESTRIAN CURB RAMP AT CURB RETURN DETACHED SIDEWALK

SCALE: NONE
REVISED: JANUARY 1, 2025
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

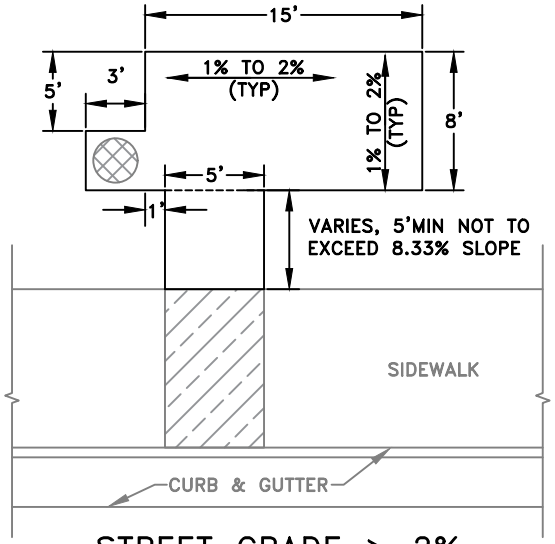
ST–27



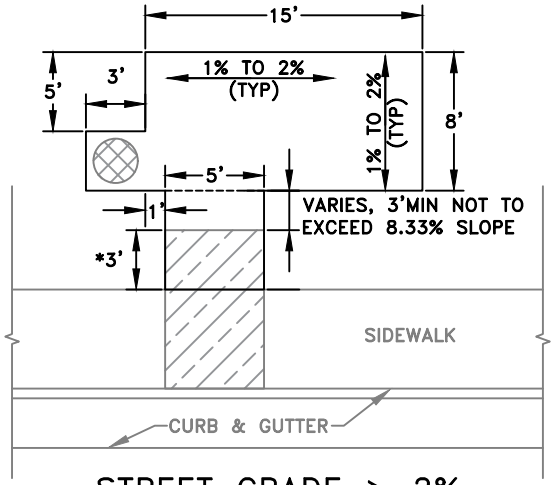
STREET GRADE ≤ 2%
8' SIDEWALK



STREET GRADE ≤ 2%
5' SIDEWALK



STREET GRADE > 2%
8' SIDEWALK



STREET GRADE > 2%
5' SIDEWALK

NOTES:

1. ALL CONCRETE SLABS SHALL BE 6 INCHES THICK, "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS. 6 INCHES OF SUBGRADE SHALL BE PROCESSED TO 95% RELATIVE COMPACTION.
2. FOR BUS SHELTER REQUIREMENTS, CONTACT ALTERNATIVE TRANSPORTATION DEPARTMENT AT 916-774-5293.
3. WHEN CONCRETE SLAB IS POURED SEPARATELY TO EXISTING SIDEWALK SLAB SHALL BE DOWELED PER CITY STANDARDS.
4. PROVIDE A 3 FOOT CLEAR WORKING SPACE AROUND THE SHELTER PAD. NO SLOPES GREATER THAN 2% WILL BE ALLOWED WITHIN THE 3 FOOT CLEAR AREA. A RETAINING WALL MAY BE REQUIRED TO MAINTAIN THE 2% MAXIMUM GRADE. ONLY TURF OR LOW GROWTH GROUND COVER LESS THAN 4 INCHES IN HEIGHT AND SUITABLE FOR WALKING ON ARE PERMITTED WITH THE CLEAR AREA.
5. REFERENCE ST-48 AND ST-49 FOR LOCATION OF BUS SHELTER PAD.

LEGEND:

* FROM BACK OF SIDEWALK, FIRST 3 FEET SLAB OFFSET TO MATCH SIDEWALK SLOPE, REMAINING OFFSET SLAB TO WARP TO CONFORM TO BUS SHELTER PAD.

AREA FOR TRASH RECEPTACLE

8'x5' MINIMUM ADA LANDING PAD PER CITY ADA TRANSITION PLAN. MUST BE IN PLANE WITH EXISTING SIDEWALK. NO GRADE BREAKS IN THIS AREA.

MARC STOUT
CITY ENGINEER

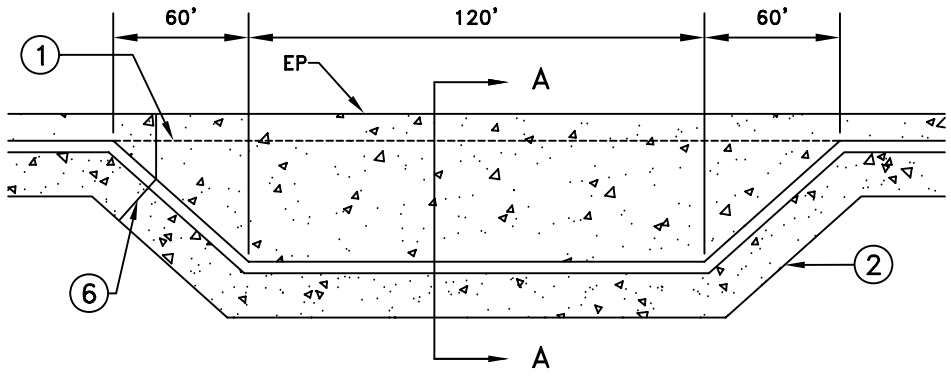
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

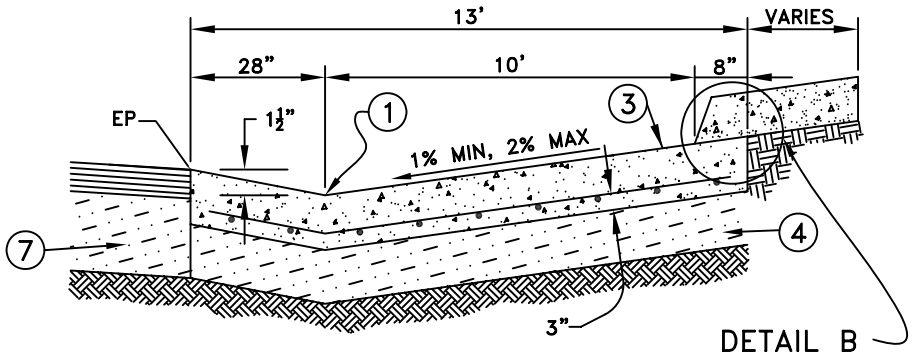
BUS STOP SHELTER PAD

SCALE: NONE
REVISED: JANUARY 1, 2020
DRAWN BY: J MCKINNEY
APPROVED BY: MARC STOUT

ST-28

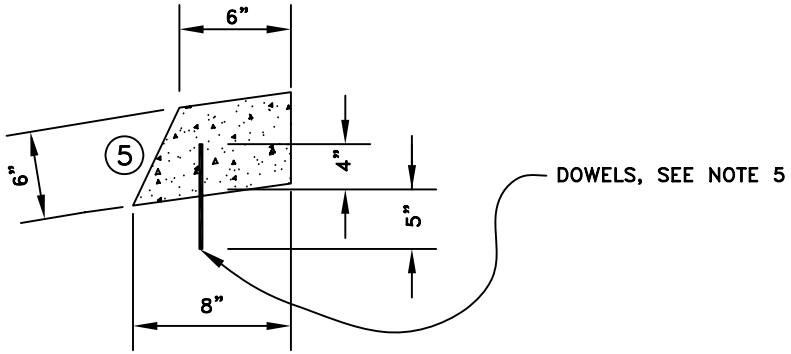


PLAN VIEW



SECTION A–A

DETAIL B



DETAIL B

NOTES:

1. GUTTER FLOWLINE.
2. SIDEWALK AND CURB.
3. CONCRETE SHALL BE EIGHT INCHES THICK WITH #4, GRADE 60 REBAR AT 18 INCH CENTERS EACH WAY. USE THREE INCH DOBIES (REBAR SPACERS WITH WIRE TIES). CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS, ALL FINISH SHALL BE MEDIUM BROOM
4. PLACE SIX INCHES OF 3/4 INCH AGGREGATE BASE AT 95% RELATIVE COMPACTION. THE TOP SIX INCHES OF SUBGRADE SHALL BE PROCESSED TO 95% RELATIVE COMPACTION. THE TOP SIX INCHES OF SIDEWALK SUBGRADE SHALL BE PROCESSED TO 95% RELATIVE COMPACTION PER THESE CONSTRUCTION STANDARDS.
5. 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 (WET SET) TO THE SLAB WITH #4, GRADE 60 REBAR AT FOUR FOOT CENTERS. CURB SHALL ALSO BE EPOXYED TO THE SLAB. SIDEWALK SHALL CONFORM TO SECTION 71 OF THE CONSTRUCTION STANDARDS.
6. PLACE 2 INCH DEEP TOOL JOINTS AT 12 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 DETAIL ST–17.
7. EXISTING STRUCTURAL SECTION OR PER PLANS.

RHON HERNDON
PUBLIC WORKS DIRECTOR

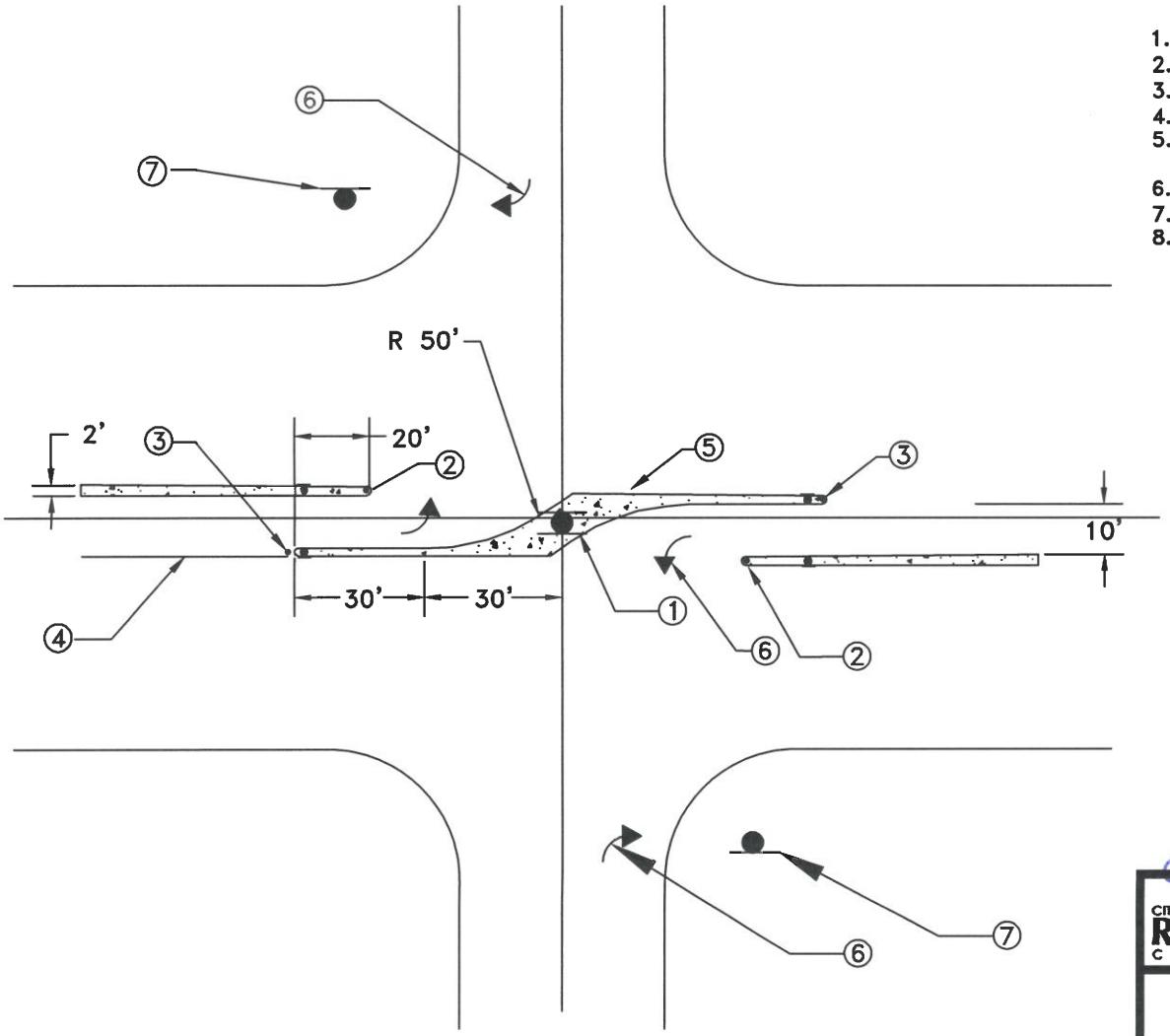
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

BUS TURNOUT CONCRETE SLAB

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST–29



NOTES:

1. PLACE TWO (2) R6-1(R) ON ONE POLE
2. PLACE YELLOW SUPERDUCK (TYP)
3. PLACE WHITE SUPERDUCK (TYP)
4. CALTRANS DETAIL 38 (TYP)
5. INSTALL DETAIL 26 MARKINGS ALONG RAISED MEDIAN 4 INCH OFF EDGE OF CURB.
6. TYPE III PAVEMENT ARROW (TYP)
7. PLACE ONE(1) R3-5(R) ON POLE
8. SIGN DETAIL NUMBERS REFERENCE 2014 REV 5 CALIFORNIA MUTCD.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

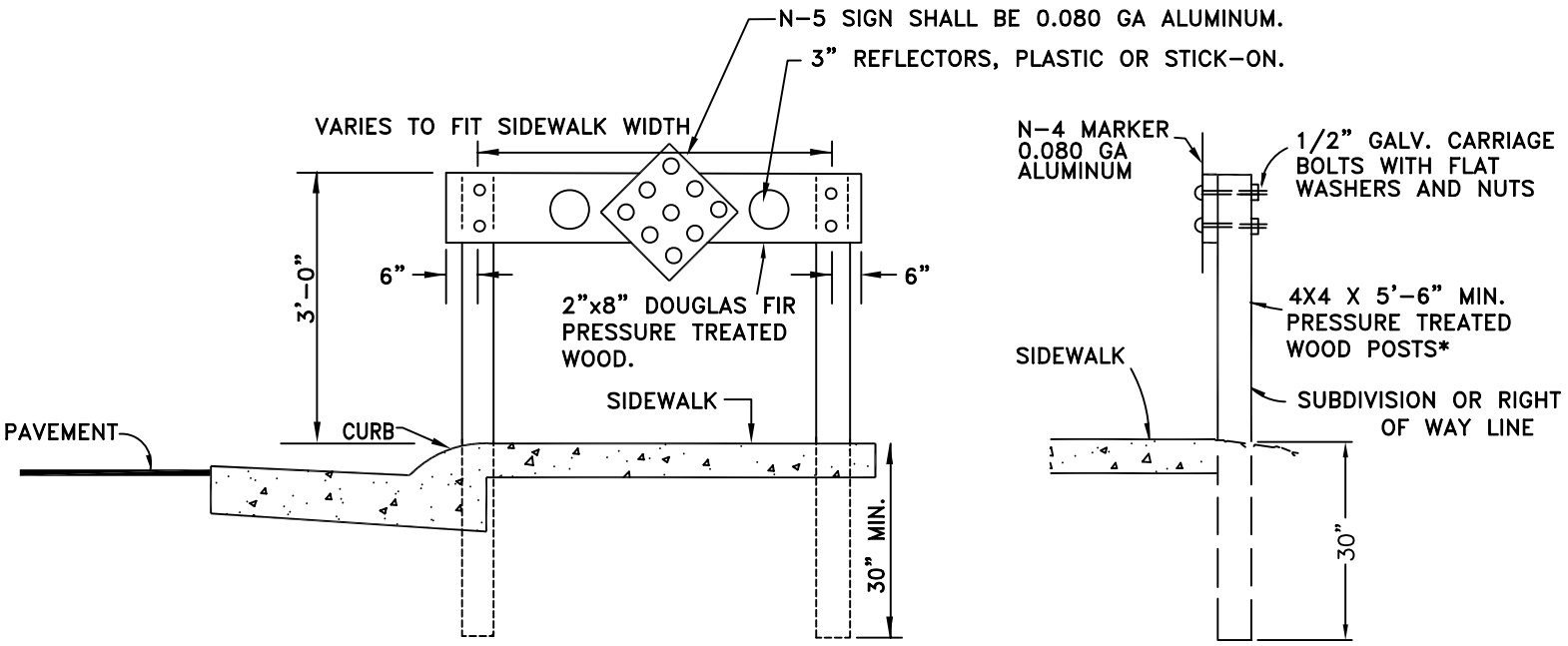
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

GULL WING DESIGN

SCALE: NONE
REVISED: MARCH 2023
DRAWN BY: J MCKINNEY (REVISED RY)
APPROVED BY: JANA CERVANTES

ST-30



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

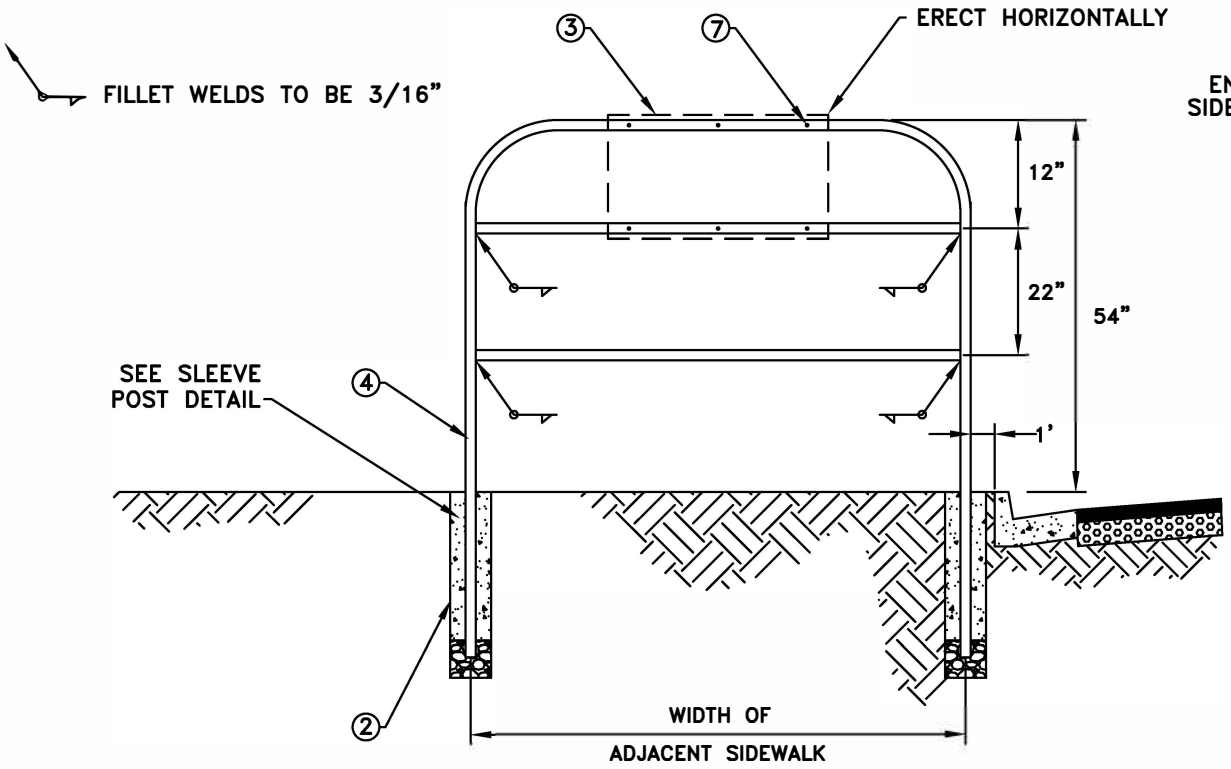
TEMPORARY SIDEWALK BARRICADE

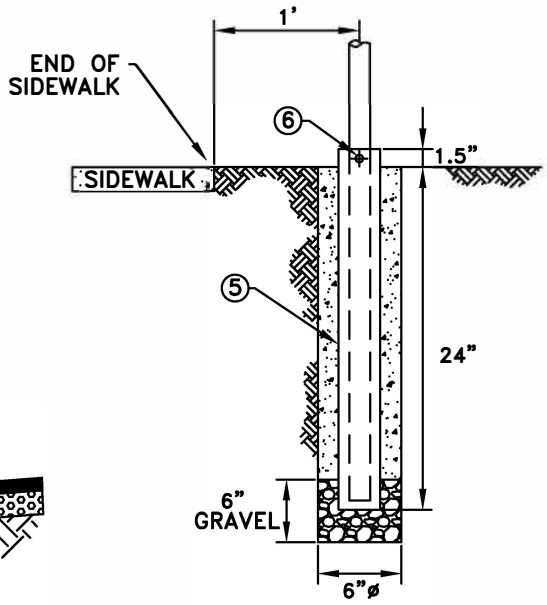
SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-31

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





SLEEVE POST DETAIL

NOTES:

1. SIDEWALK BARRICADES SHALL BE PLACED ADJACENT TO BACK OF CURB. SIDEWALK SHALL BE PLACED ADJACENT TO CURB, AND CENTERED ON SIDEWALK WHEN SIDEWALK IS DETACHED FROM CURBS.
2. CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.
3. PLACE A R5-10c SIGN (SIGN DETAILS REFERENCE 2012 CALIFORNIA MUTCD).
4. USE 1.5" DIAMETER NPS, GALVANIZED STANDARD PIPE
5. STEEL SLEEVE TO BE CONSTRUCTED WITH A 1/10" LARGER DIAMETER THEN POST. WALL THICKNESS OF SLEEVE TO BE SAME AS POST OR LARGER.
6. 3/8" DIAMETER GALVANIZED BOLT, WITH NUT AND WASHER. DEFORM THREADS (TYP)
7. DRILL 1/2" DIAMETERS HOLES. TOTAL OF 6
8. ALL SURFACES SHALL BE PAINTED WITH TWO COATS OF WHITE PAINT CONFORMING TO SECTION 91-3.02 OF THE STATE SPECIFICATIONS.

MARC STOUT
CITY ENGINEER

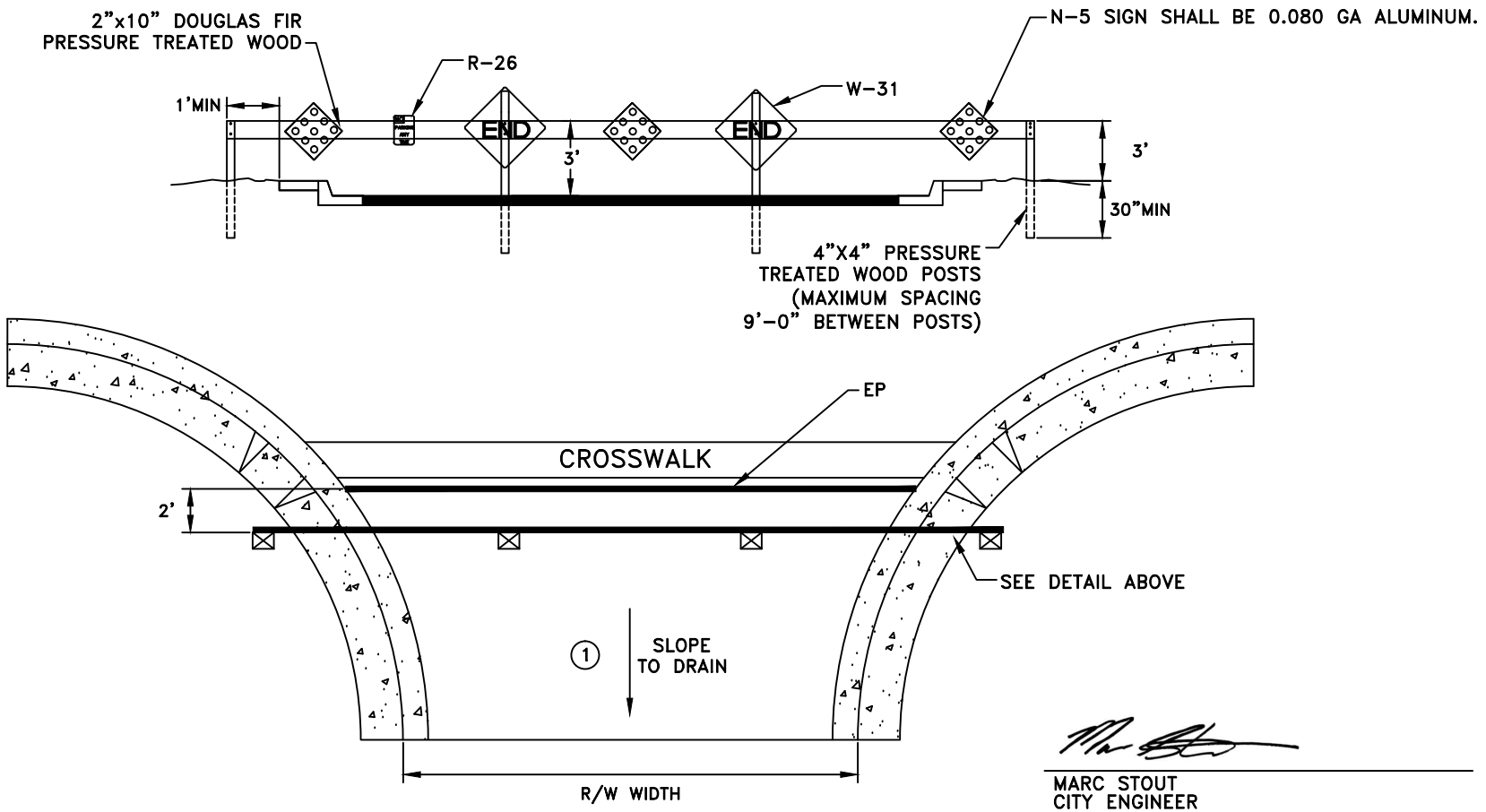
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

PEDESTRIAN BARRICADE

SCALE: NONE
REVISED: JANUARY 1, 2019
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

ST-32



MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

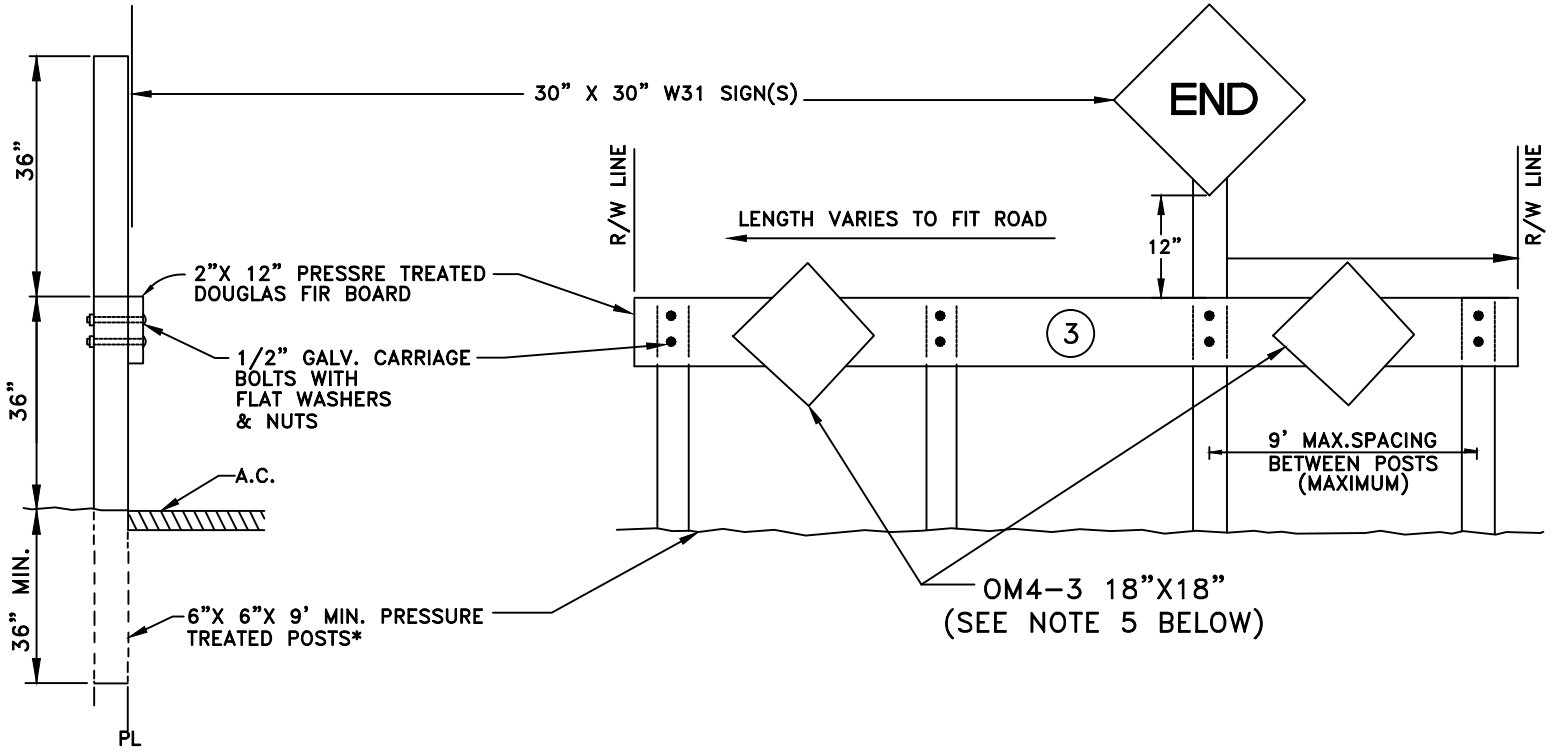
STUB STREET BARRICADE

NOTES:

1. ASPHALT BASE MATERIAL BACKFILLED TO 90% RELATIVE COMPACTION.
2. SIGN DETAIL NUMBERS REFERENCE 2012 CALIFORNIA MUTCD.
3. ALL EXPOSED SURFACES SHALL BE PAINTED WITH TWO COATS OF WHITE PAINT CONFORMING TO SECTION 91-3.02 OF THE STATE SPECIFICATIONS.
4. ALL FASTENED POINTS SHALL USE 1/2" DIAMETER GALVANIZED CARRIAGE BOLTS WITH FLAT WASHERS AND NUTS. (DEFORM THREADS TYP.)

SCALE: NONE
REVISED: JANUARY 1, 2016
DRAWN BY: J MCKINNEY
APPROVED BY: MARC STOUT

ST-33



MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

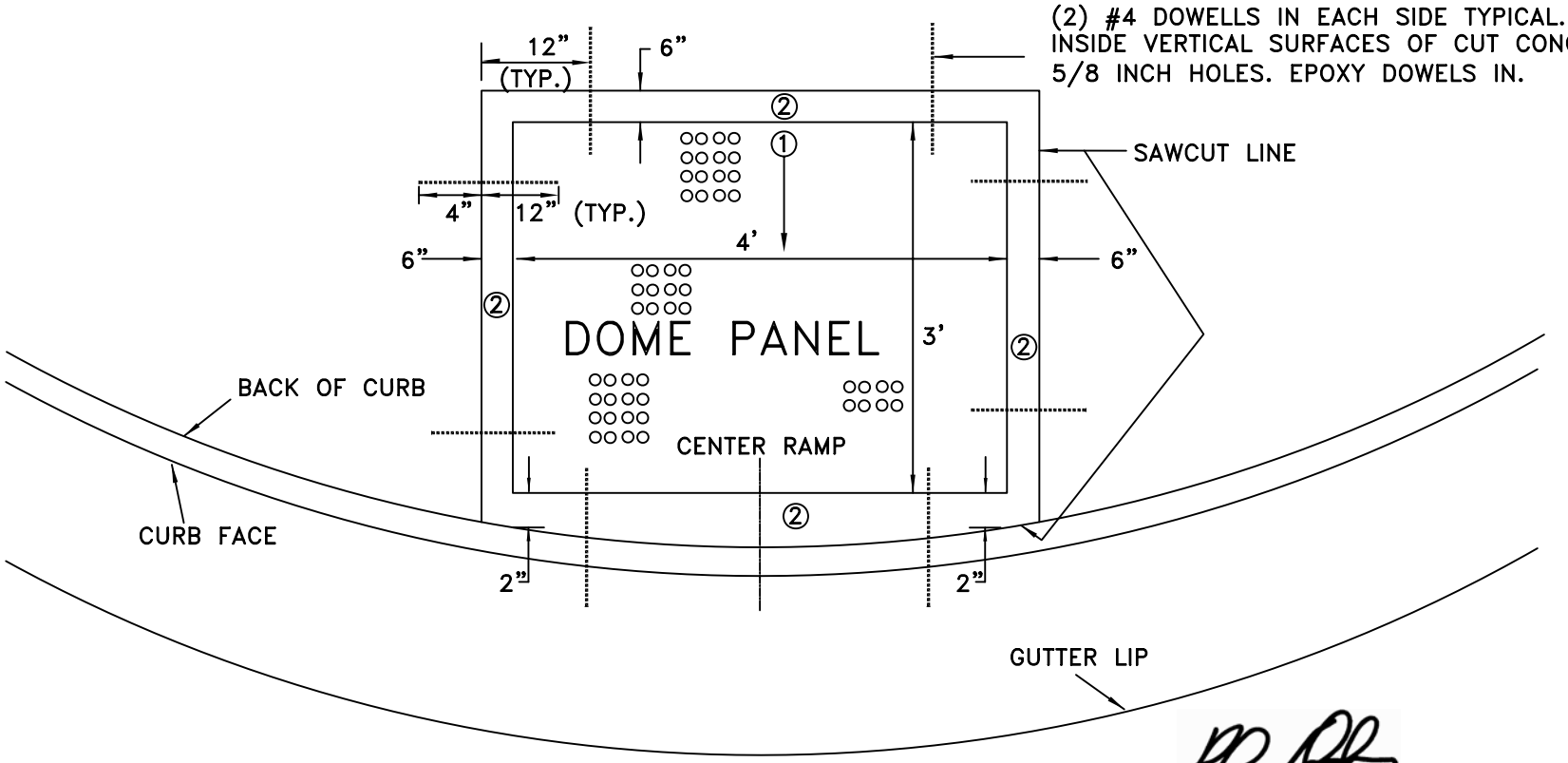
END OF STREET TIMBER BARRICADE

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. SIGN DETAIL NUMBERS REFERENCE THE 2012 CALIFORNIA MUTCD.
4. SIGN POST SHALL BE 9-FEET MINIMUM.
5. OM4-3 SIGN SHEETING MATERIAL TO BE RETROREFLECTIVE.

SCALE: NONE
REVISED: JANUARY 1, 2016
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

ST-34



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

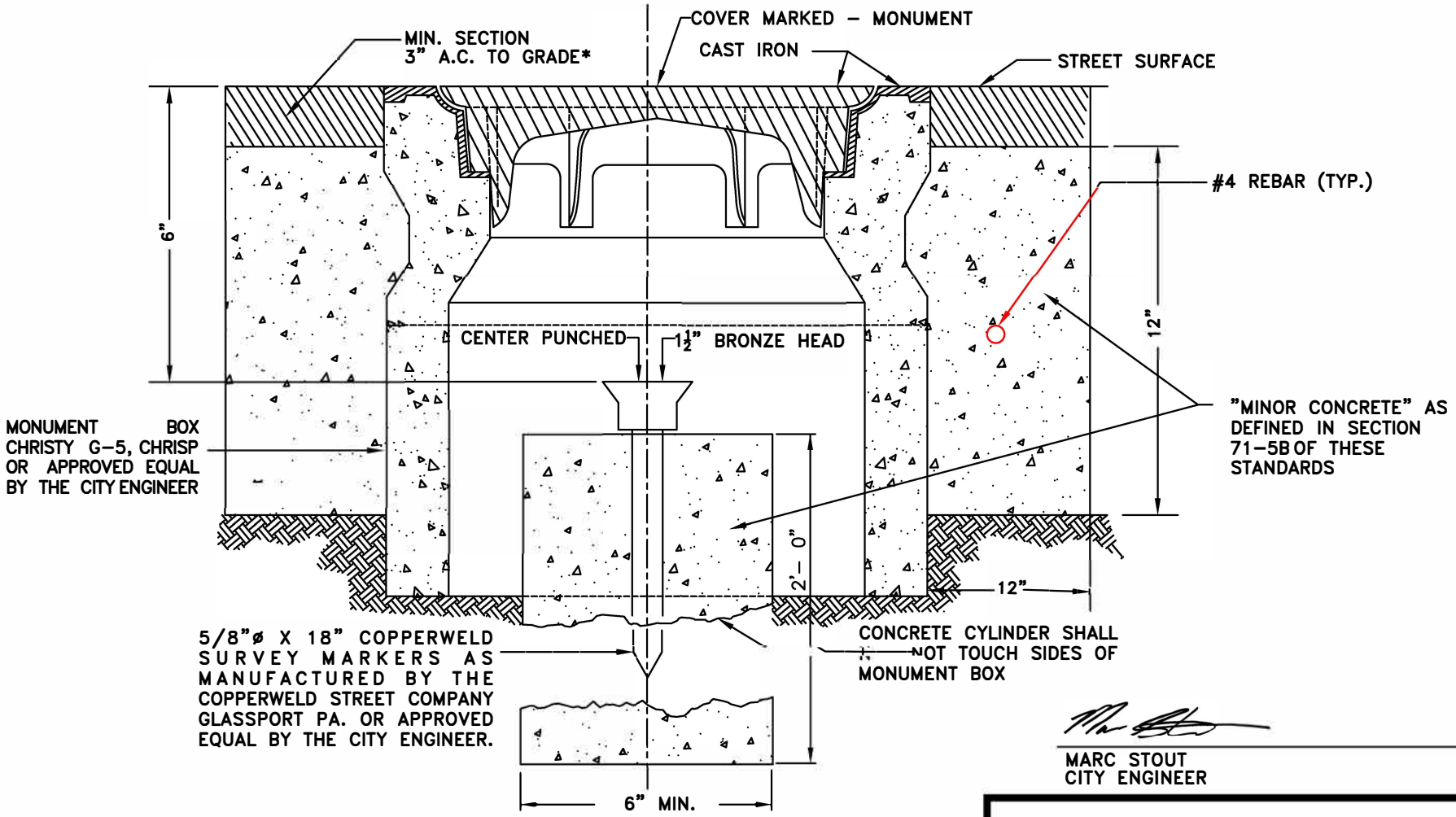
DETECTABLE WARNING (TRUNCATED DOME PANEL) RETROFIT OR REPLACEMENT

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST–35

NOTES:

1. PRIOR TO RETROFITTING TRUNCATED DOME PANEL, ASSURE GRADES CONFORM TO CITY REQUIREMENTS.
2. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS.



MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

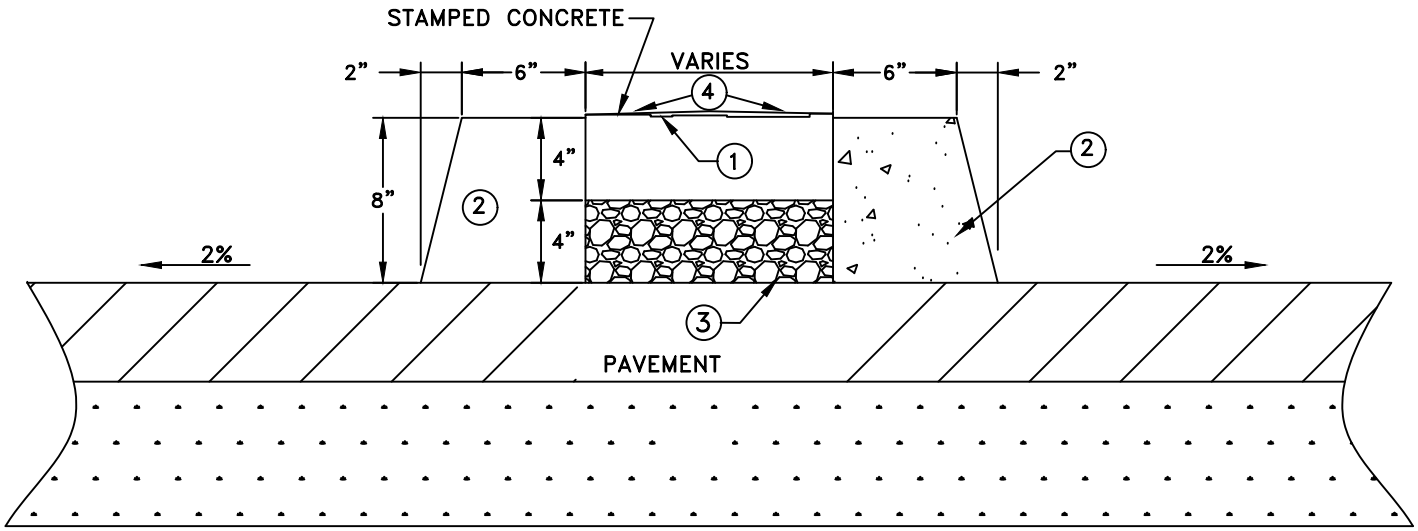
DEVELOPMENT SERVICES DEPARTMENT

BOXED SURVEY MONUMENT

SCALE: NONE
REVISED: JANUARY 1, 2019
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

ST-36

*OPTION: CONCRETE COLLAR MAY BE PLACED FLUSH TO FINISHED SURFACE WITH MEDIUM BROOM FINISH PATTERN PERPENDICULAR TO VEHICLE TRAVEL DIRECTION.



NOTES:

1. THE STANDARD PATTERN SHALL BE "BASKETWEAVE USED BRICK" AND THE STANDARD COLOR SHALL BE DAVIS STYLE TILE RED #1117, OR SCOFIELD SYSTEMS CHROMIX QUARRY RED, OR AS APPROVED EQUAL. APPLY 60 POUNDS PER 80 SQUARE FEET IN TWO HAND BROADCAST APPLICATIONS. CONTRACTOR MAY ELECT TO INCORPORATE APPROVED COLOR INTO CONCRETE MIX AT 30 POUNDS OF COLOR, INTEGRALLY MIXED, PER CUBIC YARD.
2. "TYPE 1" BARRIER CURB SEE DETAIL ST-18.
3. NATIVE MATERIAL OR BASE ROCK COMPACTED AT 90% RELATIVE COMPACTION OR FILL WITH CONCRETE.
4. SLOPE TO DRAIN, (1-2%)
5. WHERE RAISED CENTER MEDIANS ARE LESS THAN 4' WIDE FROM THE INSIDE FACE OF CURB, (NARROW MEDIANS AND NOSES), STAMPED CONCRETE (PER NOTE 1) SHALL APPLY. 4' TO 6' WIDE RAISED LANDSCAPED MEDIANS WILL BE RESTRICTED TO BARK ONLY, NO PLANTING OR IRRIGATION PERMITTED.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

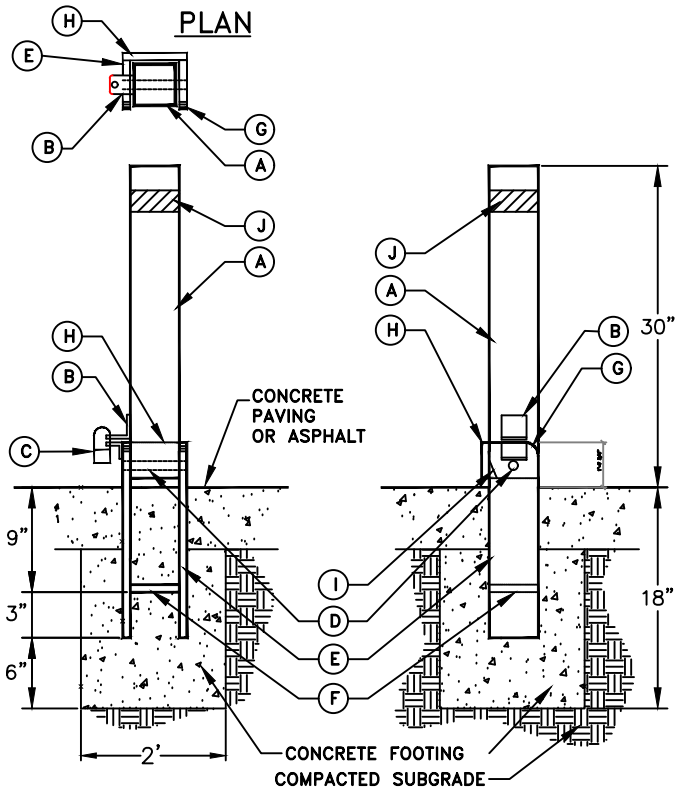
CITY OF ROSEVILLE CALIFORNIA

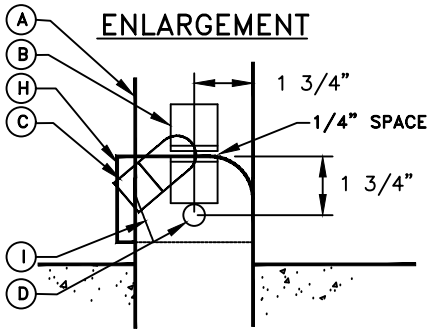
DEVELOPMENT SERVICES DEPARTMENT

STAMPED CONCRETE

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: R MEDINA
APPROVED BY: JASON SHYKOWSKI

ST-37





LEGEND

A. 3 1/2" O.D. 1/4" WALL STEEL TUBE WITH CAP WELDED ON TOP, 3/4" HOLES FOR SWIVEL ROD. EASE ALL EDGES OF STEEL TUBE.
B. 1 1/2" X 1 1/2" X 1/4" ANGLE IRON (2) WELDED TO TUBE AND BASE WITH 1 1/2" RADIUS CORNERS. PLACE 1/2" HOLE DRILLED 1/4" FROM END OF ANGLE IRON. ANGLE IRON ON BASE SIZE AS NECESSARY TO EQUAL LENGTH OF ANGLE IRON ON TUBE.
C. PADLOCK, TO BE PROVIDED BY CITY.
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 1/2" RADIUS CORNERS. EASE ALL EDGES.
F. 3/8" STEEL BRACE. FILET WELD BOTH SIDES TO BASE PLATES.
G. 1 1/2" 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 TUBE.
J. PLACE 2" WHITE REFLECTIVE TAPE.

NOTES

1. ALL TUBING 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 ZINC CHROMATE PRIMER AND TWO COATS EXTERIOR ENAMEL. COLOR: SAFETY YELLOW GLOSS.
4. BOLLARD SHALL BE INSTALLED SUCH THAT IT LAYS FLAT WHEN FOLDED.
5. CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.

MARC STOUT
CITY ENGINEER

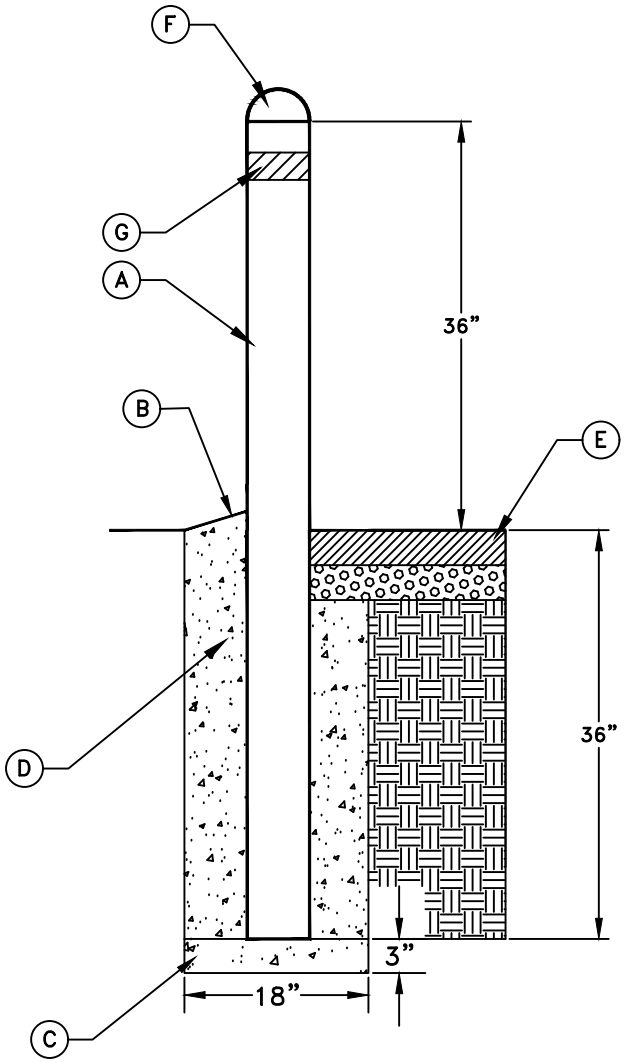
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

BOLLARD

SCALE: NONE
REVISED: JANUARY 1, 2020
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

ST-38



LEGEND

A. 6" O.D. 1/4" WALL STEEL TUBE WITH CONCRETE CAP.
B. SLOPE CONCRETE BASE IN LANDSCAPE AREAS.
C. REST ON 3" DOBIES.
D. CONCRETE FOOTING.
E. AC PAVING OR CONCRETE PER PAVING PLAN.
F. CONCRETE CAP.
G. PLACE 2" WHITE REFLECTIVE TAPE.

NOTES

1. ALL TUBING SHALL BE BLACK STEEL PIPE.
2. ALL PARTS SHALL BE PAINTED WITH TWO COATS ZINC CHROMATE PRIMER AND TWO COATS EXTERIOR ENAMEL. COLOR: SAFETY YELLOW GLOSS.
3. CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.

MARC STOUT
CITY ENGINEER

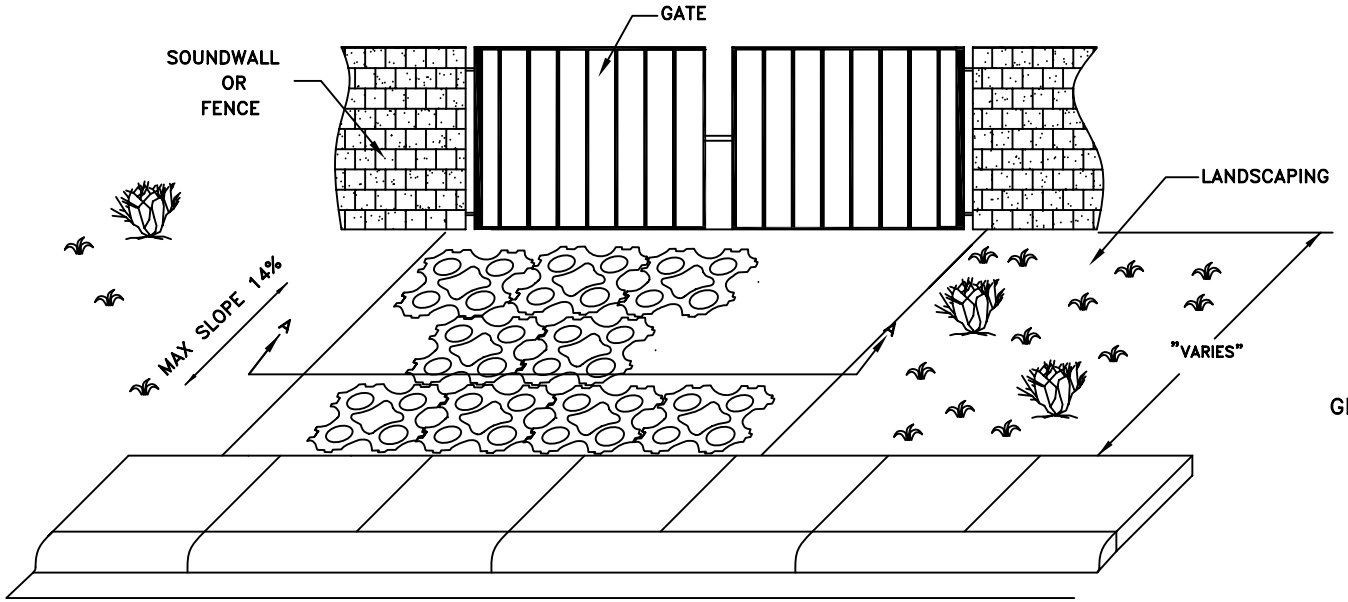
CITY OF ROSEVILLE CALIFORNIA

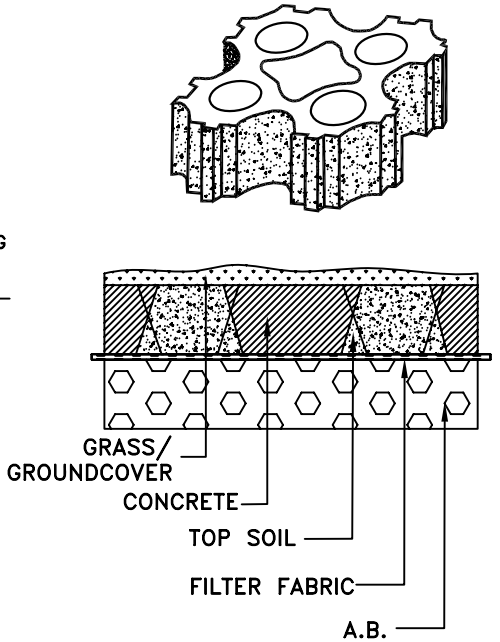
DEVELOPMENT SERVICES DEPARTMENT

FIXED BOLLARD

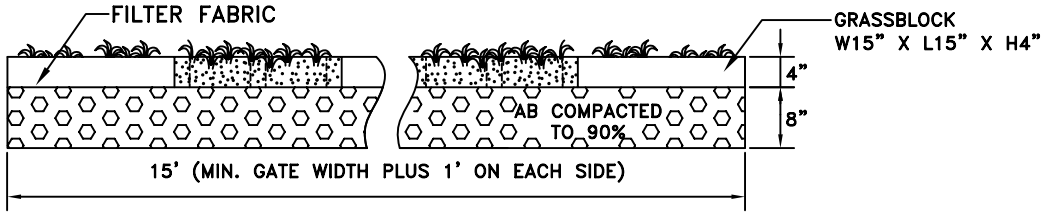
SCALE: NONE
REVISED: JANUARY 1, 2020
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

ST-38A





SECTION



SECTION A–A

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

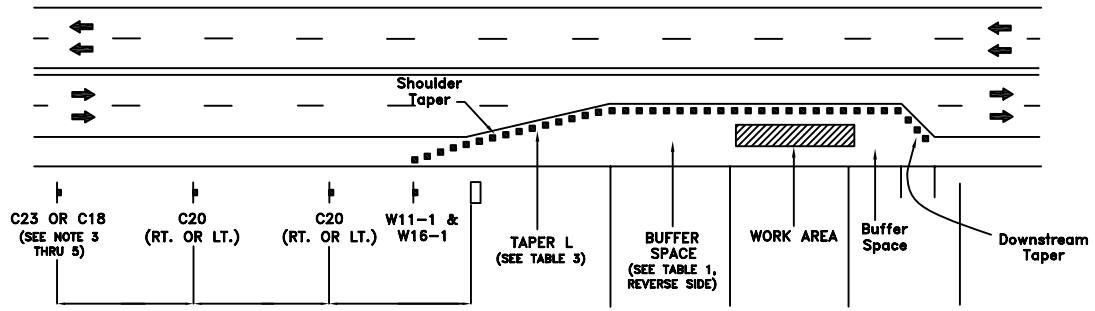
EMERGENCY ACCESS GATE THROUGH LANDSCAPE MEDIAN

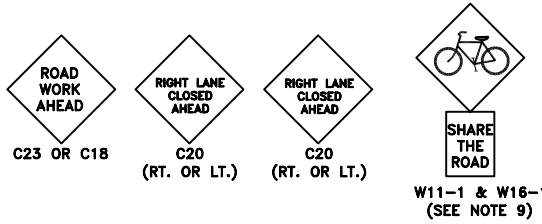
NOTES:

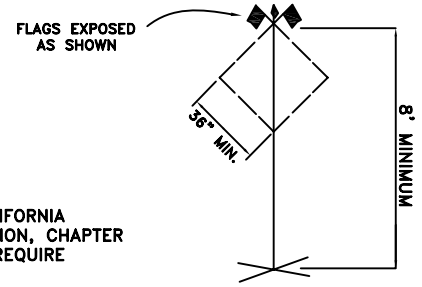
1. STANDARD GRASSBLOCK OR TURFSTONE
2. PLACE FILTER FABRIC UNDER GRASSBLOCK.
3. PLACE TOP SOIL ON GRASS BLOCK AND COMPACT TO 90%.
4. ACCESS DRIVEWAY TO CONTINUE THROUGH GATE TO BACK OF ADJOINING CURB OR SIDEWALK.
5. IRRIGATION LINES SHALL BE SLEAVED IN AREAS UNDER STRUCTURAL SECTION AND VEHICULAR WHEEL LOADS. AREA SHALL BE IRRIGATED WITH PERIMETER HEADS.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST–39







ADVANCE WARNING SIGN
(2 FLAGS AND MINIMUM DIMENSIONS MANDATORY)

SPECIAL NOTES:

THIS DETAIL IS REPRODUCED FROM FIGURE 6C-1 OF THE CALIFORNIA MANUAL ON UNIFORMED TRAFFIC CONTROL DEVICES 2012 EDITION, CHAPTER 6-TEMPORARY TRAFFIC CONTROL. FIELD CONDITIONS COULD REQUIRE DEVIATIONS FROM THESE PLANS AND ACCOMPANYING NOTES.
SEE SECTION 21-2 OF THE CITY OF ROSEVILLE DESIGN/CONSTRUCTION STANDARDS FOR CONES AND DELINEATORS.

LEGEND:

- SIGN
- CONE OR PORTABLE DELINEATOR
- DIRECTION OF TRAFFIC
- FLASHING ARROW SIGN

NOTES:

TAPER FORMULA:

L = $WS^2/60$ FOR SPEEDS OF 40 MPH OR LESS

L = S x W FOR SPEEDS OF 45 MPH OR MORE

WHERE:

L = MINIMUM LENGTH OF TAPER

S = NUMERICAL VALUE OF POSTED SPEED LIMIT PRIOR TO WORK OR 85th PERCENTILE SPEED

W = WIDTH OF OFFSET

TABLE 3

Length of Taper in Feet		
Speed in Miles per Hour	Width of Lane	
	11 Feet	12 Feet
25	115	125
30	165	180
35	225	245
40	293	320
45	495	540
50	550	600
55	605	660
60	660	720
65	715	780
70+	770	1000

TABLE 2

Advance Warning Sign Spacing	
Speed Limits	Distance Between Signs in Feet
25 mph or less	100
30 or more	350
Rural	500
Expressway	1000

NOTES:

1. THIS PLAN DOES NOT APPLY WHERE THERE ARE EMERGENCY CONDITIONS. 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.
2. ALL ADVANCE WARNING SIGNS SHALL BE 36" X 36" MINIMUM. (SEE NOTE 5)
3. ALL WARNING SIGNS FOR NIGHT CLOSURES SHALL BE EITHER ILLUMINATED OR RETROREFLECTORIZED.
4. A "C18 ROAD CONSTRUCTION AHEAD" SIGN MAY BE USED IN LIEU OF THE C23. (SEE NOTE 3)
5. WARNING (W) SERIES SIGNS USED IN WORK ZONES SHALL BE BLACK ON ORANGE. EXISTING YELLOW WARNING SIGNS ALREADY IN PLACE WITHIN THESE AREAS MAY REMAIN IN USE.
6. PAVEMENT MARKINGS FOR CLOSURES SHALL CONFORM TO SECTION 6 OF THE CALIFORNIA MUTCD 2006 EDITION AND CALTRANS STANDARD PLANS.
7. ALL CONES SHALL BE INTERNALLY ILLUMINATED OR FITTED WITH RETROREFLECTIVE WHITE SLEEVES FOR NIGHT CLOSURES. (SEE SECTION 6-6F.59 OF THE CALIFORNIA MUTCD MANUAL)
8. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD BE APPROXIMATELY EQUAL TO THE SPEED LIMIT.
9. W11-1 AND W16-1 REQUIRED ONLY WHEN TAPER CROSSES A MARKED BICYCLE LANE.

RHON HERNDON
PUBLIC WORKS DIRECTOR

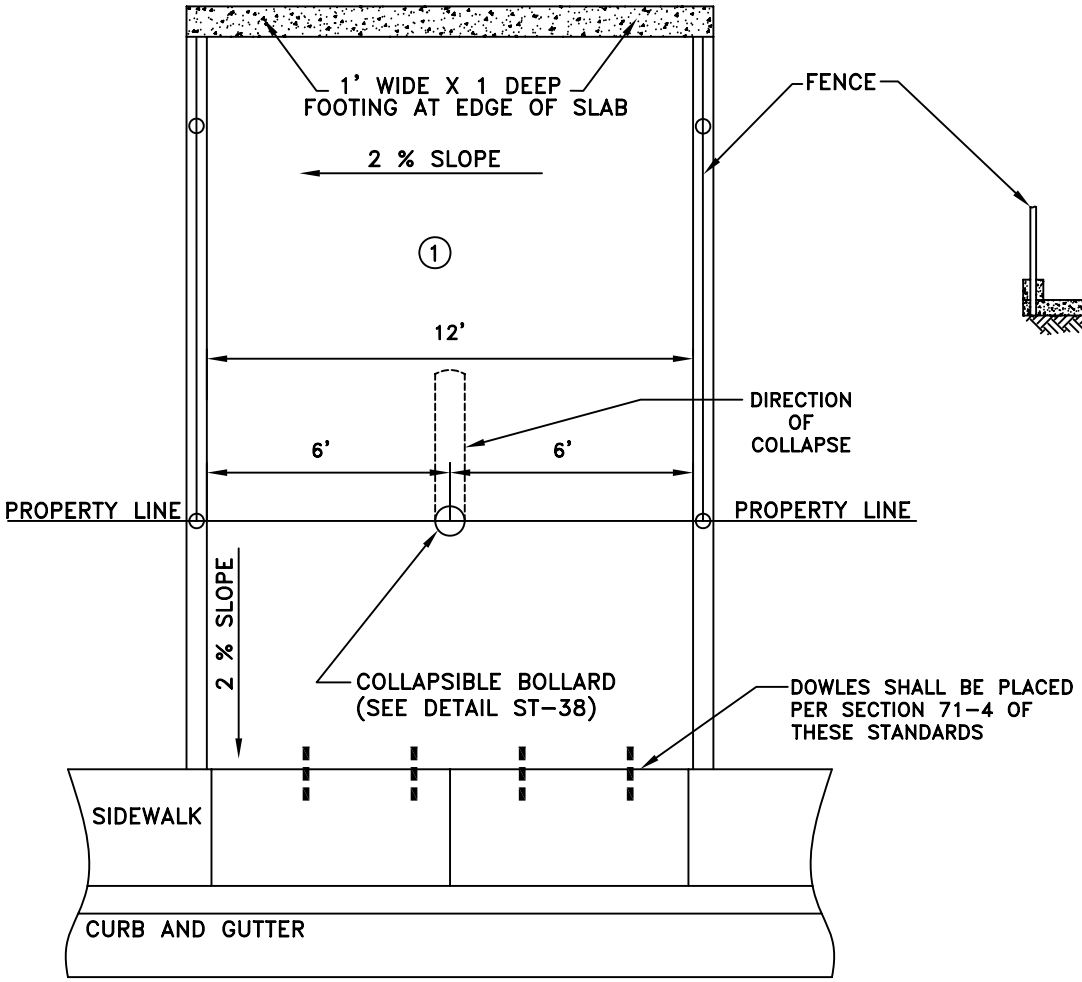
CITY OF ROSEVILLE CALIFORNIA

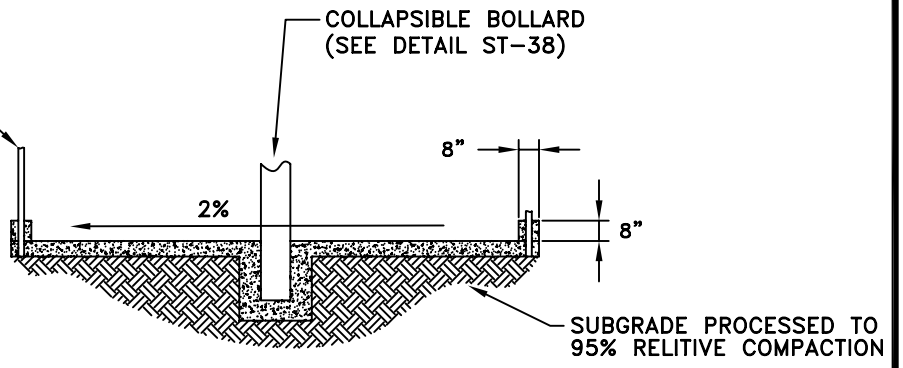
DEPARTMENT OF PUBLIC WORKS

TYPICAL TRAFFIC CONTROL LANE CLOSURE/TRANSITION

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-40





SECTION

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

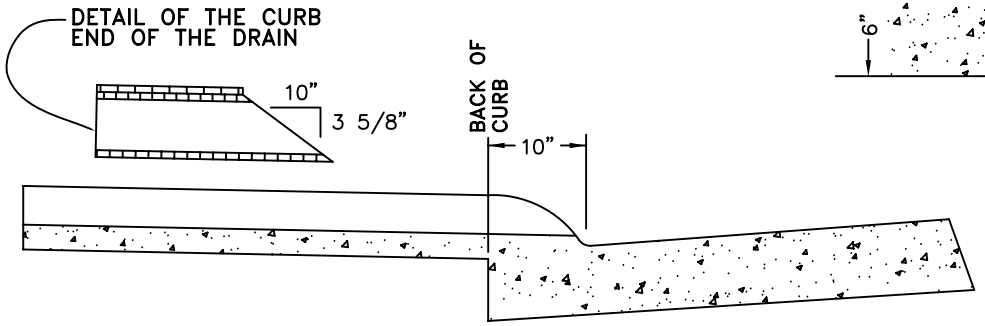
GREEN BELT ACCESS

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-41

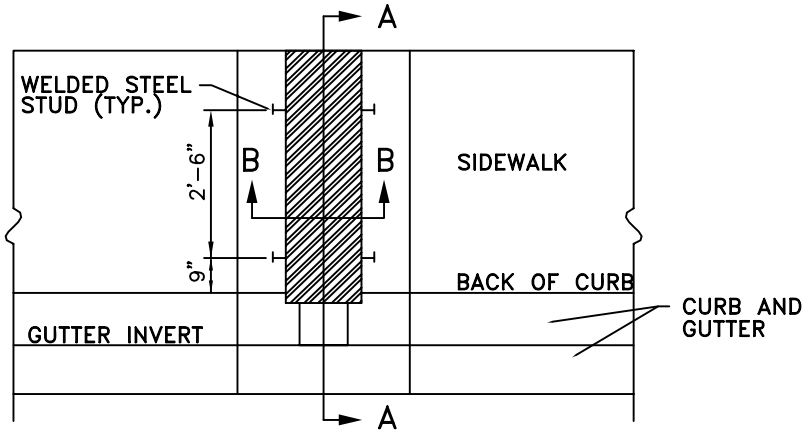
NOTES:

1. 6" CONCRETE SLAB SECTION TO BE 6" A.B. COMPACTED SUBGRADE, 95% COMPACTION.
2. CHAIN LINK OR ROD IRON FENCE MAY NOT EXCEED 3' IN HEIGHT WITHIN BUILDING SET BACK, 6' IN HEIGHT THEREAFTER.
3. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.

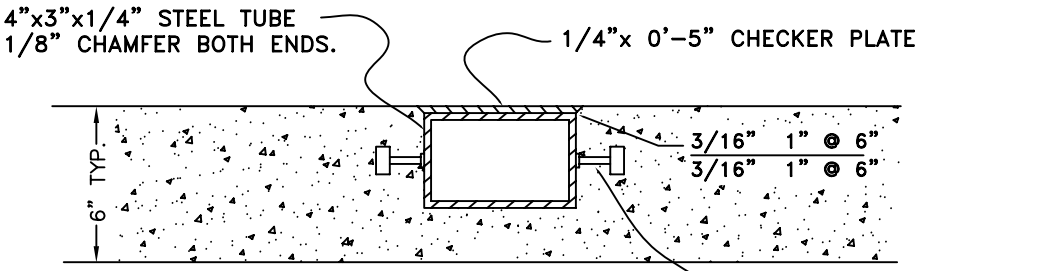


SECTION A–A
FOR TYPE 1 CURB

(FOR TYPE II CURB & GUTTER, ASSEMBLY SHALL MATCH CURB BATTER)



PLAN VIEW OF CURB, GUTTER & SIDEWALK



SECTION B–B

WHEN PLACING IN EXISTING SIDEWALK, SAWCUT AND REPLACE A LENGTH OF CURB, GUTTER AND SIDEWALK EQUAL TO THE SIDEWALK WIDTH. IF THE ASPHALT CONCRETE EDGE IS DAMAGED, SAWCUT THE PAVEMENT AND PAVE A TWO FOOT WIDE BY SIX INCH DEEP PATCH AT THE GUTTER LIP.

ALL HARDWARE SHALL BE GALVANIZED PER CALTRANS SPECIFICATIONS.

RHON HERNDON
PUBLIC WORKS DIRECTOR

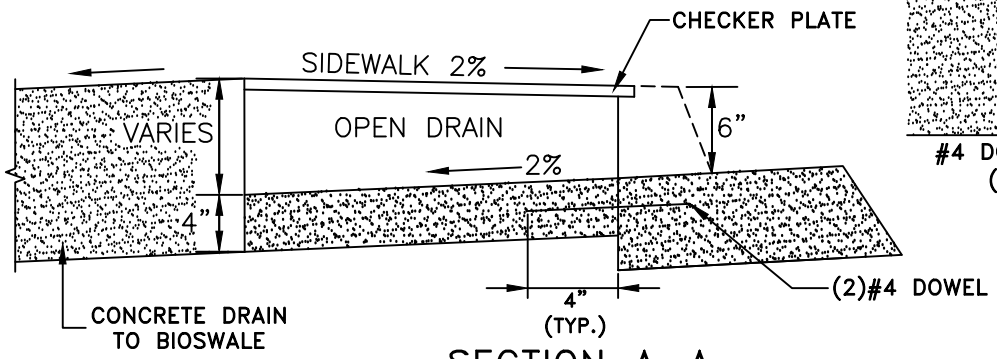
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

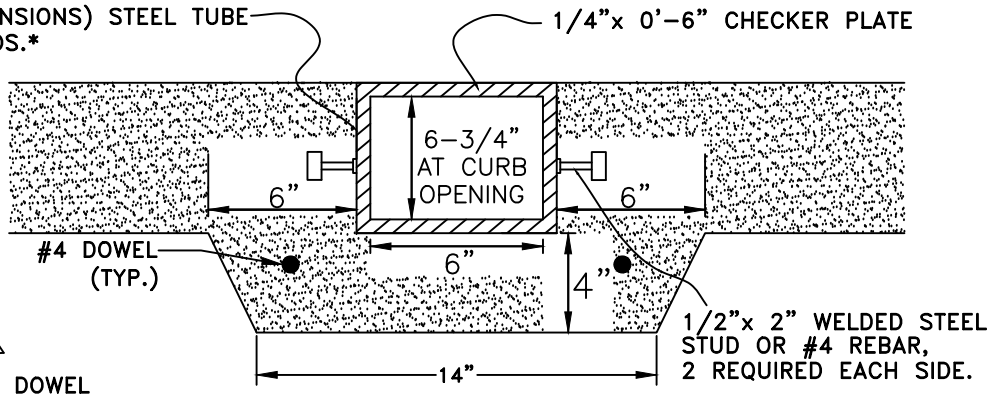
UNDER WALK DRAIN

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

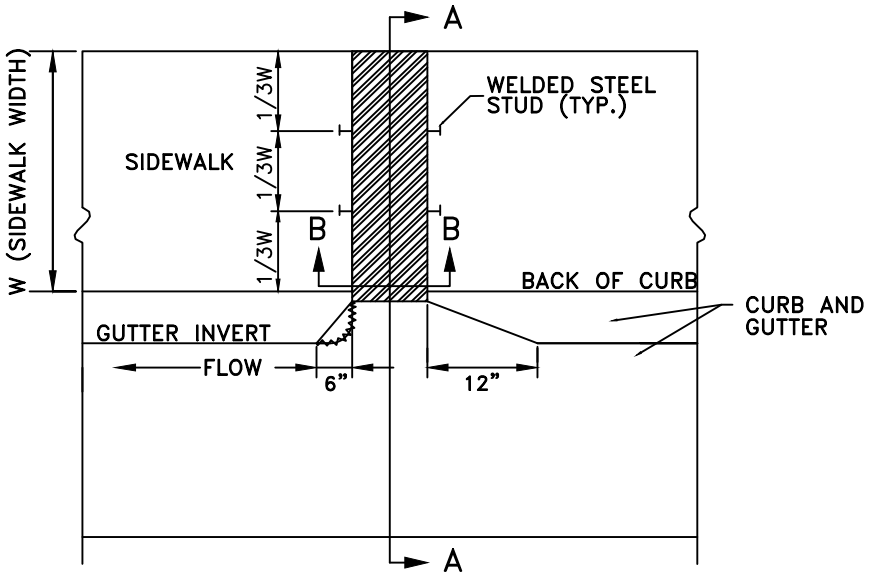
ST–42



SECTION A–A



SECTION B–B



PLAN VIEW OF CURB, GUTTER & SIDEWALK

WHEN PLACING IN EXISTING SIDEWALK, SAWCUT AND REPLACE A LENGTH OF CURB, GUTTER AND SIDEWALK EQUAL TO THE SIDEWALK WIDTH. IF ADJACENT ASPHALT PAVEMENT EDGE IS DAMAGED, SAWCUT THE PAVEMENT AND PAVE A TWO FOOT WIDE BY SIX INCH DEEP PATCH AT THE GUTTER LIP, PER CITY STANDARD. IF ADJACENT CONCRETE PAVEMENT EDGE IS DAMAGED, SAWCUT THE PAVEMENT AT THE NEAREST JOINT AND PAVE PER CITY STANDARD. IF APPROVED BY CITY, CONCRETE PAVEMENT MAY BE REPAIRED WITH CALTRANS SPALL REPAIR METHOD.

*ALL HARDWARE SHALL BE GALVANIZED PER CALTRANS SPECIFICATIONS.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

NOTES:

1. VERTICAL CURB (TYPE 2)
2. MAINTAIN POSITIVE FLOW

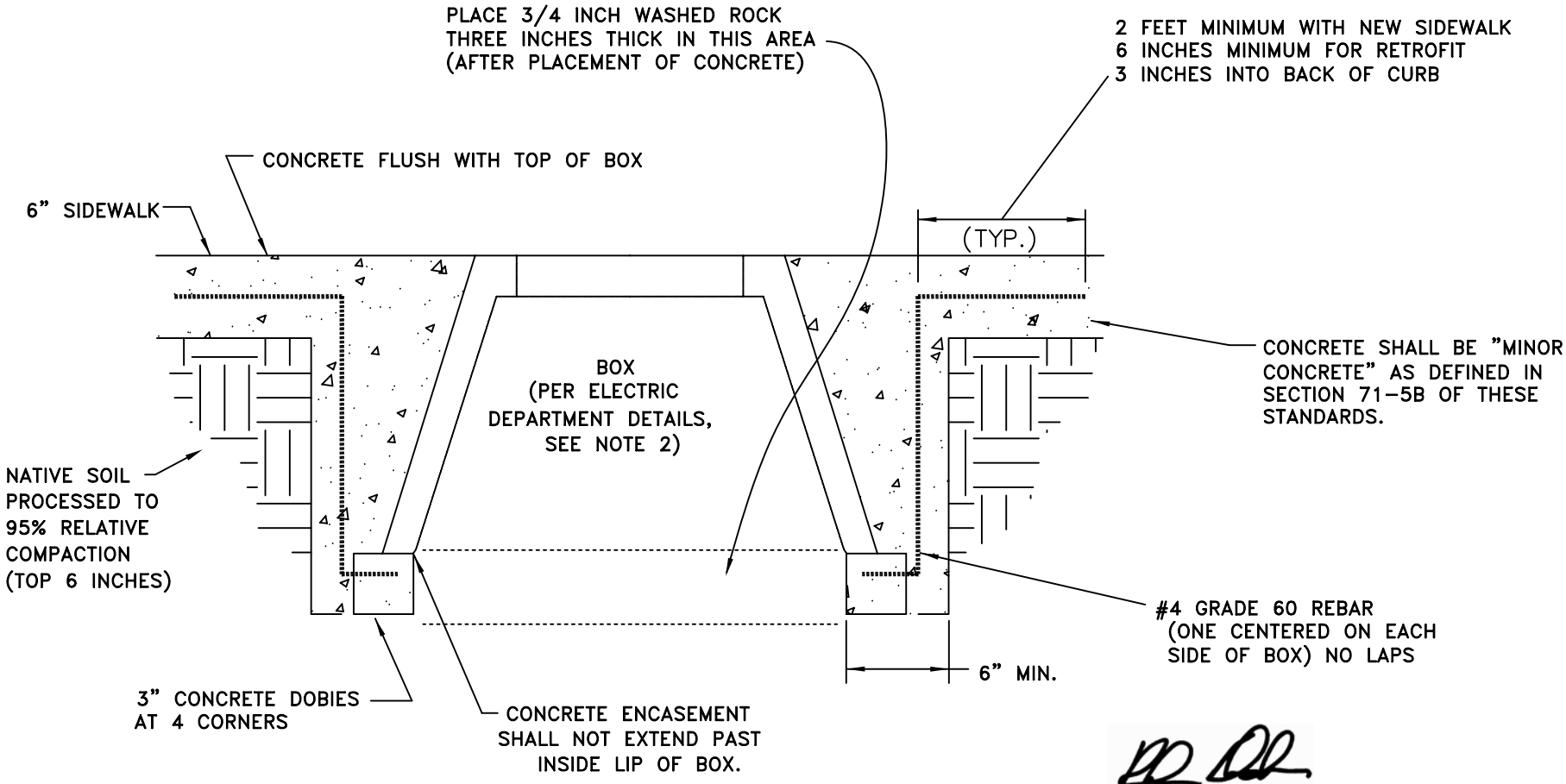
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

UNDER WALK DRAIN (FLOWS FROM STREET)

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: R. MEDINA
APPROVED BY: JASON SHYKOWSKI

ST–42A



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

ENCASEMENT FOR ALL ROSEVILLE ELECTRIC JUNCTION BOXES IN CITY SIDEWALKS

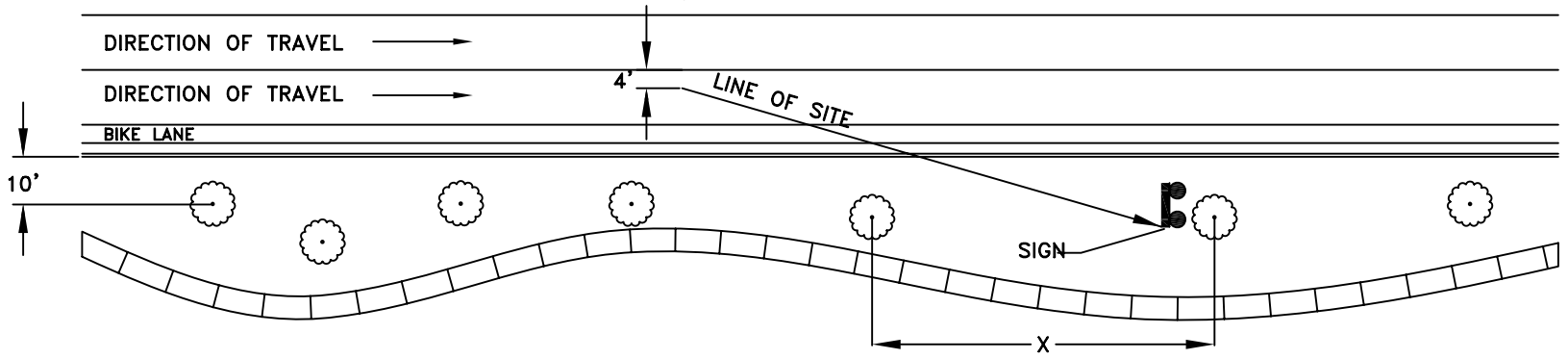
SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-43

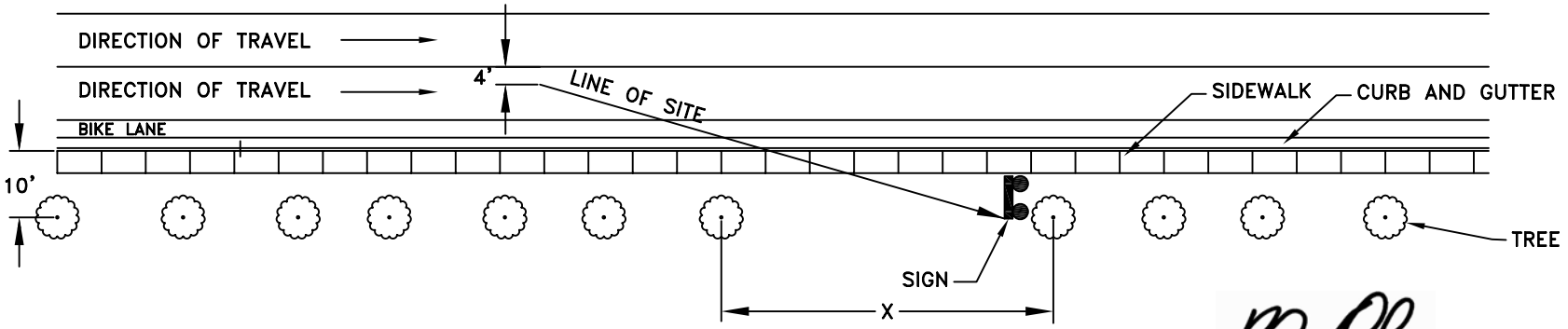
NOTES:

1. IF A BOX EXTENDS OUTSIDE BACK OF SIDEWALK, PROVIDE ONE FOOT WIDE BY SIX INCH THICK CONCRETE COLLAR AROUND FULL PERIMETER. (EXTEND REBAR 10 INCHES INTO COLLAR.)
2. SEE ELECTRIC DEPARTMENT DETAIL PAGES 6.1 AND 6.2 (RESIDENTIAL) AND PAGES 8.1 AND 8.2 (COMMERCIAL).

DETACHED SIDEWALK



ATTACHED SIDEWALK



RHON HERNDON
PUBLIC WORKS DIRECTOR

SPEED MPH	MINIUM CLEARNCE FOR LINE OF SITE "X"
25	75–ft
30	90–ft
40	120–ft
50	150–ft
60	180–ft

NOTES:

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

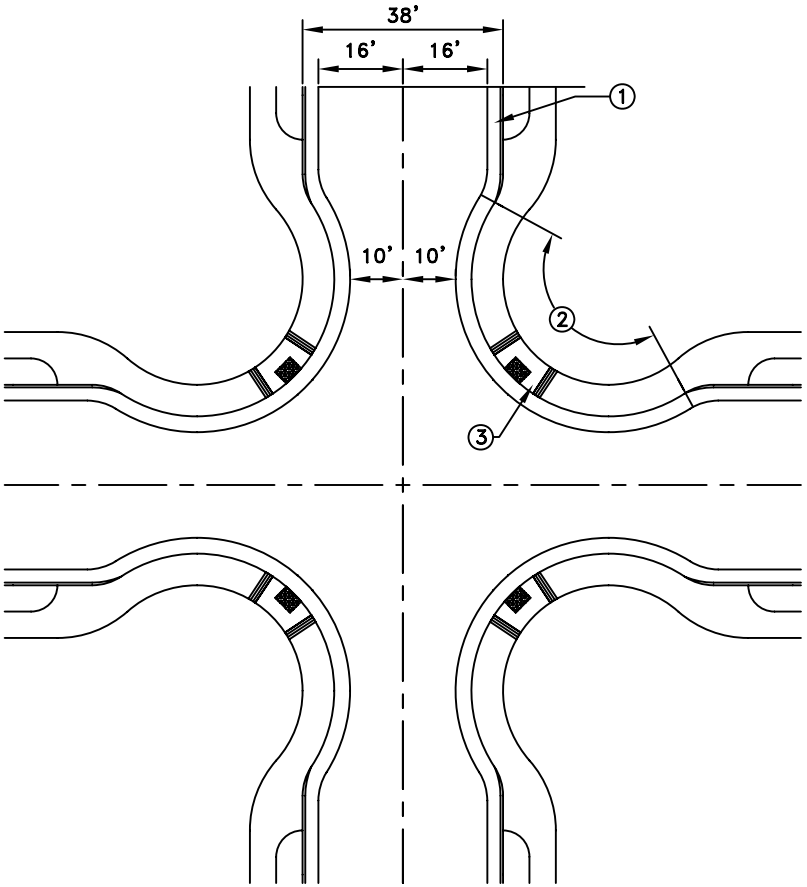
CITY OF ROSEVILLE CALIFORNIA

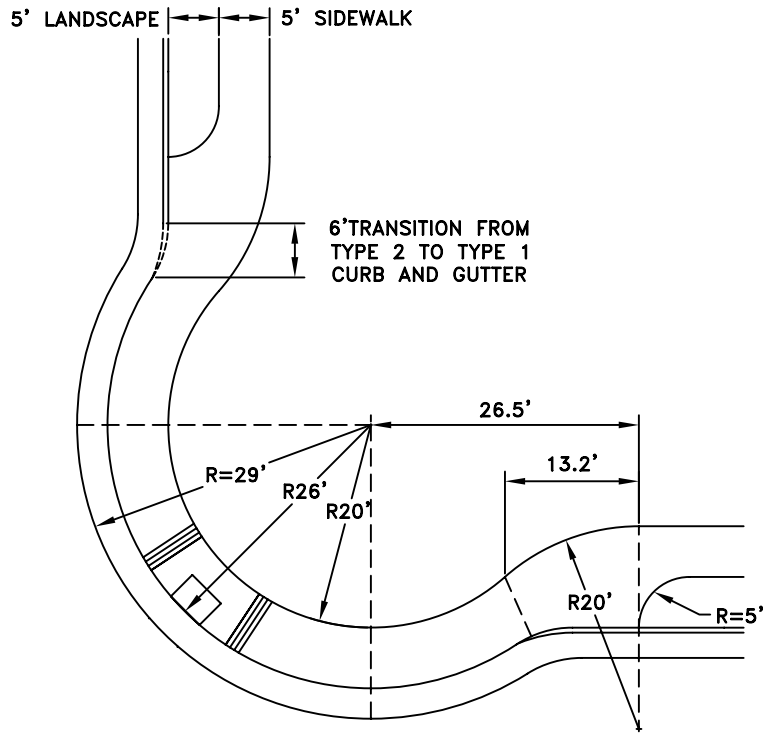
DEPARTMENT OF PUBLIC WORKS

LANDSCAPE SIGHT DISTANCE

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST–44





RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

RESIDENTIAL BULBED INTERSECTION

LEGEND

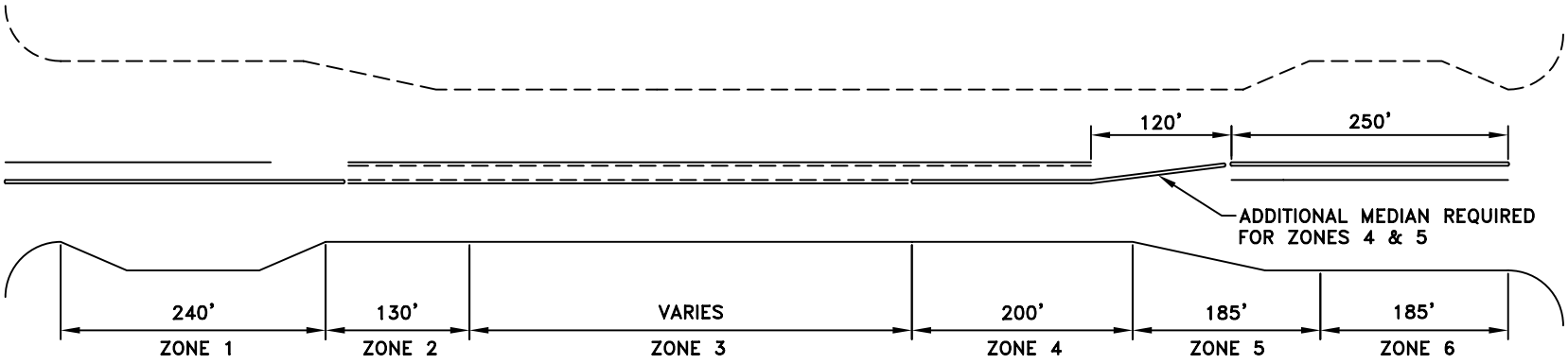
1. TYPE 2 CURB AND GUTTER
2. TYPE 1 CURB AND GUTTER AND SIDEWALK TO BE 10" THICK "MINOR CONCRETE"
3. PLACE CASE "C" PEDESTRIAN RAMP, SEE DETAIL "ST-27".

NOTES:

1. ALL CONCRETE TO "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THE STANDARDS.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

ST-45



ZONE 1 NO DRIVEWAYS OR STREETS ALLOWED.
ZONE 2 DRIVEWAYS AND STREETS ALLOWED. LEFT TURN OUT PROHIBITED. WHERE THE ADJACENT STREET WILL HAVE DUAL LEFT TURN LANES, ZONE 2 SHALL BE INCREASED TO 190 FEET.
ZONE 3 DRIVEWAYS AND STREETS ALLOWED. ALL TURNING MOVEMENTS PERMITTED.
ZONE 4 DRIVEWAYS AND STREETS ALLOWED. LEFT TURNS IN AND OUT PROHIBITED.ADDITIONAL MEDIAN REQUIRED.
ZONE 5 DRIVEWAYS ARE ALLOWED. STREETS ARE PROHIBITED. LEFT TURNS IN AND OUT ARE PROHIBITED. ADDITIONAL MEDIAN REQUIRED.
ZONE 6 NO DRIVEWAYS OR STREETS ALLOWED.

NOTES:

1. OPPOSING DRIVEWAYS SHOULD ALIGN WITH EACH OTHER, IF NOT SEE DETAIL "ST-47" FOR MINIMUM OFFSETS.
2. SEE DETAIL "ST-48" OR "ST-49" FOR DRIVEWAYS NEAR BUS TURNOUTS.

RHON HERNDON
PUBLIC WORKS DIRECTOR

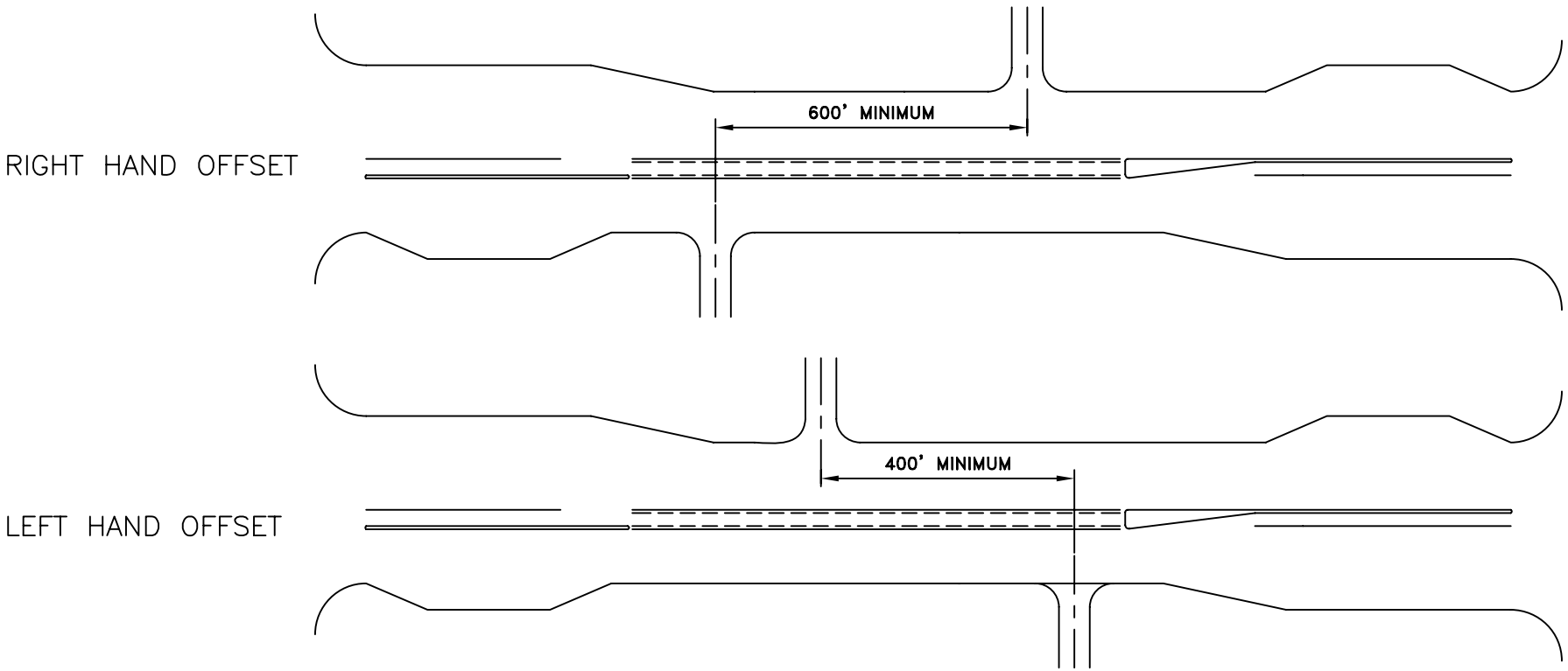
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

PERMITTED DRIVEWAYS STREETS OR MINOR ARTERIALS

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: R HERNDON

ST-46



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

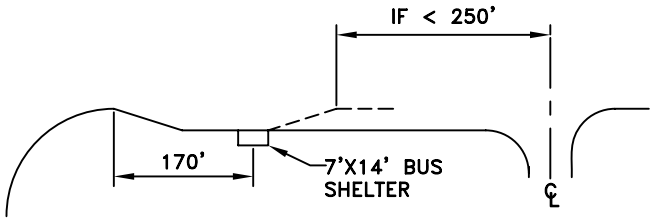
MINIMUM DRIVEWAY OR STREET OFFSET ON MINOR ARTERIAL

NOTES:

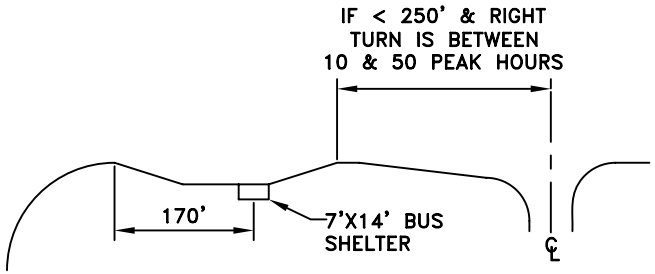
1. SEE DETAIL "ST-46" FOR PERMITTED LOCATIONS AND TURNING MOVEMENTS.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: R HERNDON

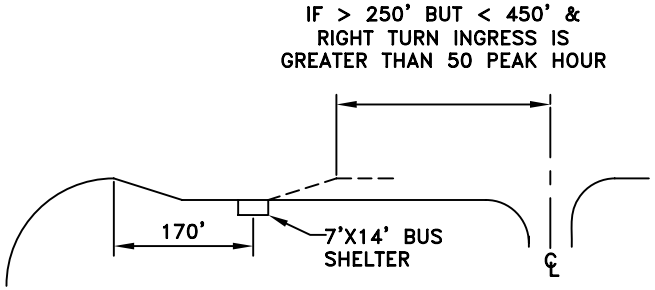
ST-47



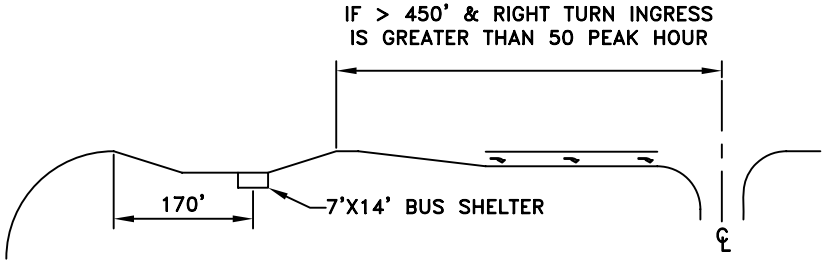
CASE 1



CASE 2



CASE 3



CASE 4

RHON HERNDON
PUBLIC WORKS DIRECTOR

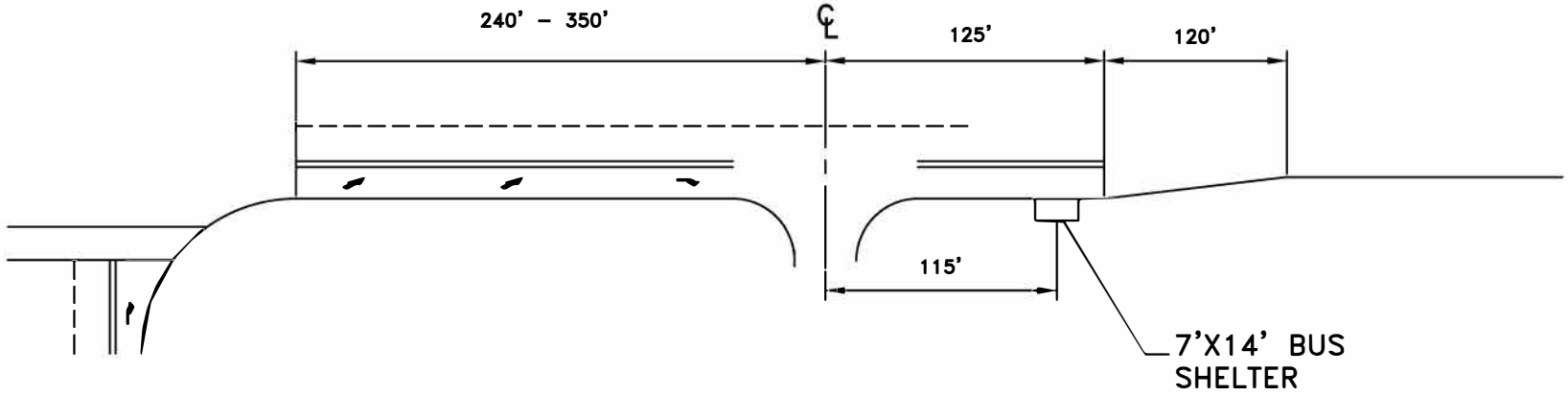
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

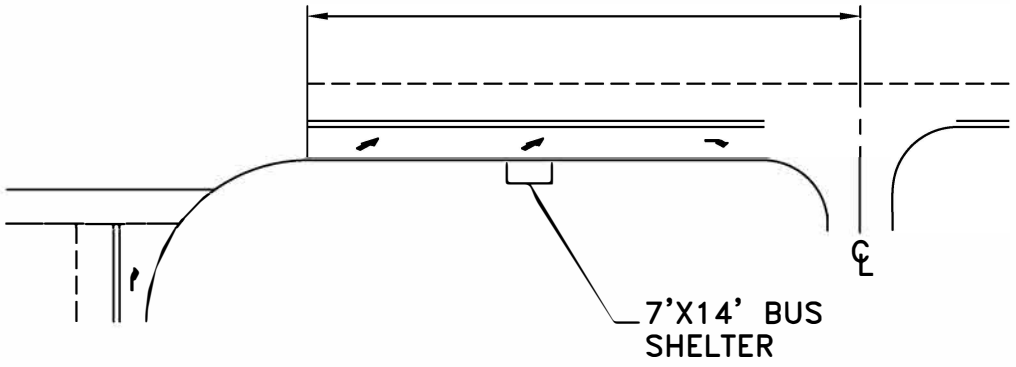
BUS SHELTER/DRIVEWAY LOCATIONS

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: R HERNDON

ST-48



IF < 250' BUT < 440'



RHON HERNDON
PUBLIC WORKS DIRECTOR

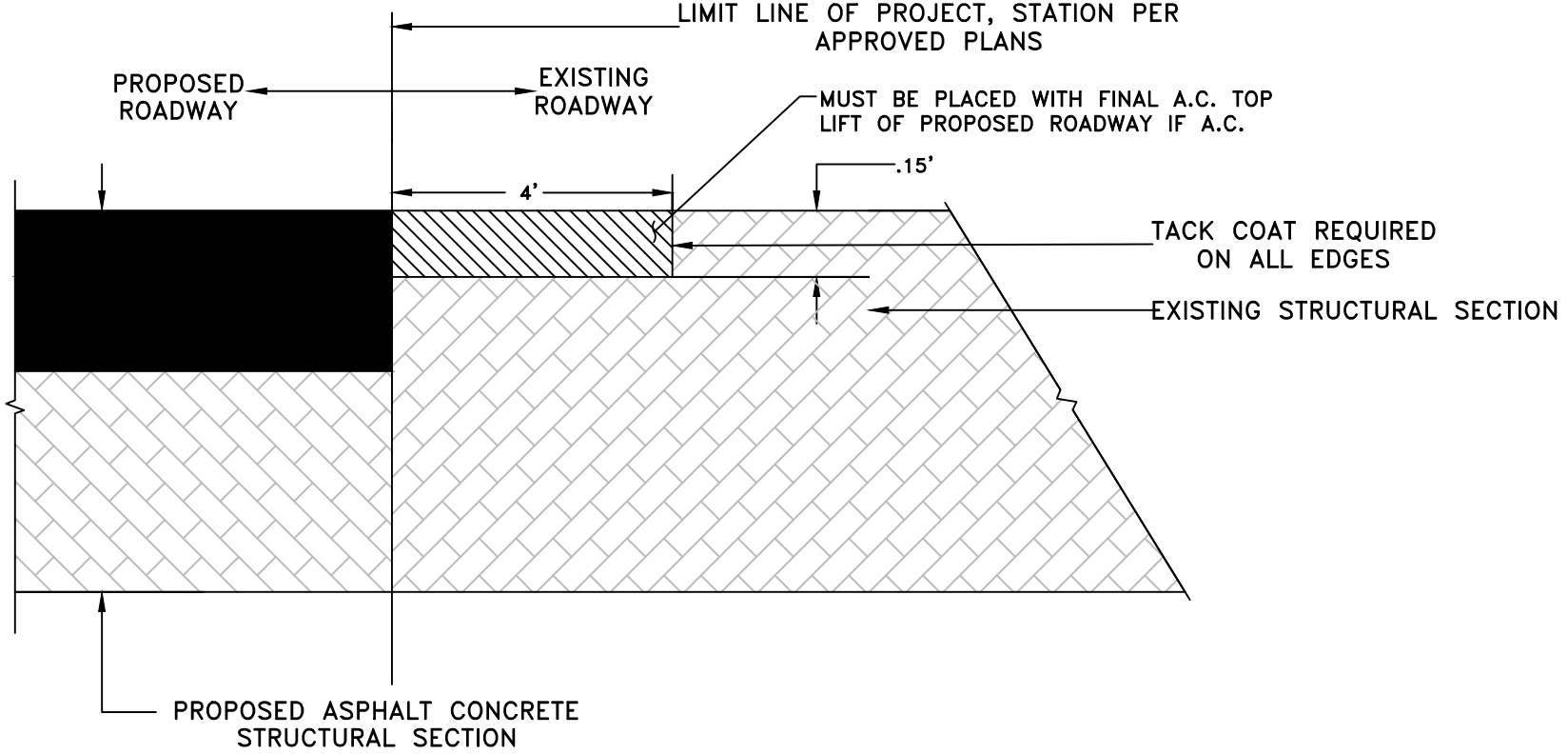
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

BUS SHELTER/DRIVEWAY LOCATIONS – ACCELERATION LANE

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: R HERNDON

ST–49



SECTION DETAIL

LEGEND:

- PROPOSED ASPHALT CONCRETE
- MILLED ASPHALT

NOTES:

1. ALL MATERIAL AND COMPACTION REQUIREMENTS SHALL CONFORM TO CITY CONSTRUCTION STANDARDS.
2. ROADWAY CONFORMS INTENDED FOR ALL ARTERIAL & COLLECTOR ROADWAYS WHERE PHASED CONSTRUCTION EXISTS.
3. LIMITS OF RESIDENTIAL ROADWAY CONFORMS, INCLUDING STUB STREETS, SHALL BE AT THE CITY INSPECTORS DISCRETION.
4. ROADWAY STRUCTURAL COMPONENTS MAY VARY IN THICKNESS BETWEEN NEW AND EXISTING ROADWAYS. WHERE THIS OCCURS, EXISTING COMPONENTS SHALL BE TIED-IN AT CITY INSPECTORS DISCRETION.
5. FIRST 4 FEET OF MILLED ASPHALT FROM LIMIT LINE SHALL BE MILLED .15'.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

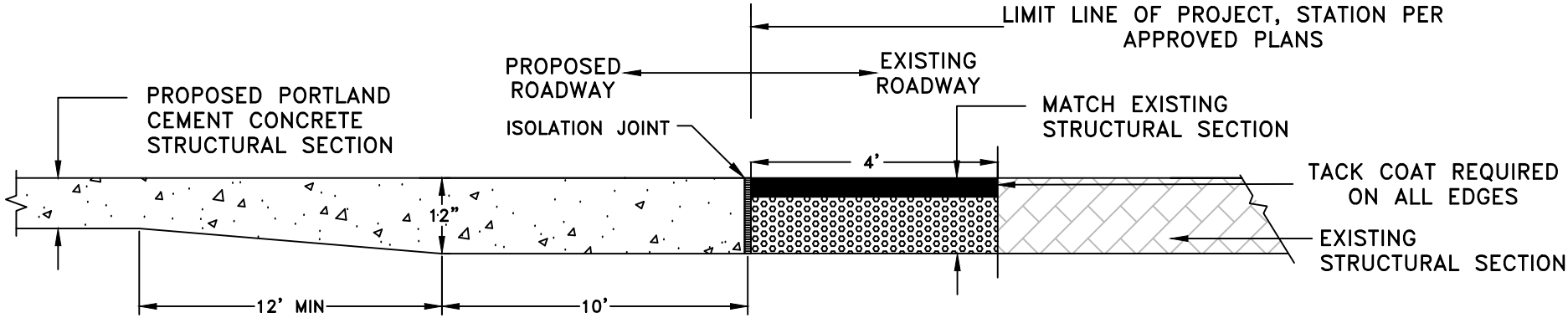
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

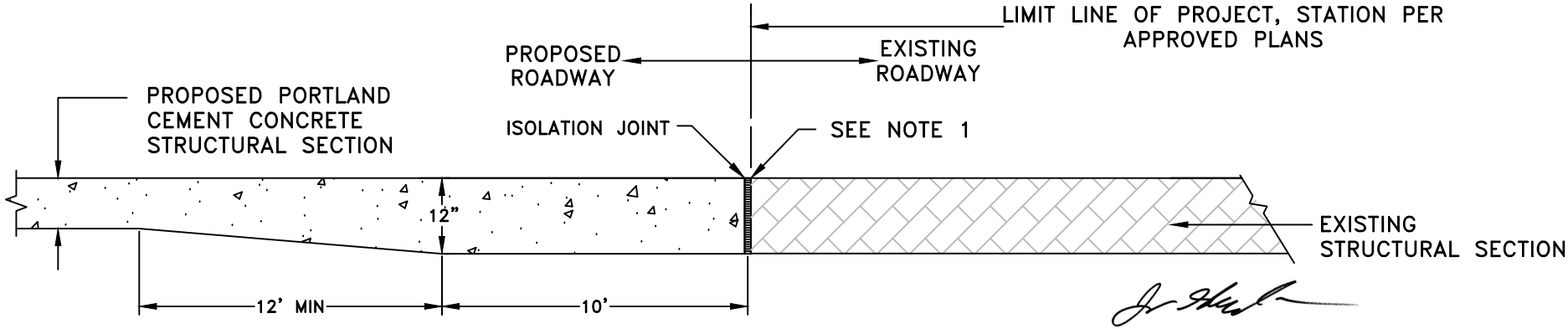
ASPHALT CONCRETE ROADWAY STRUCTURAL SECTION CONFORM

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: J HENDRIX
APPROVED BY: JASON SHYKOWSKI

ST-50



SECTION DETAIL ADJACENT TO EXISTING ASPHALT CONCRETE PAVEMENT



SECTION DETAIL ADJACENT TO EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

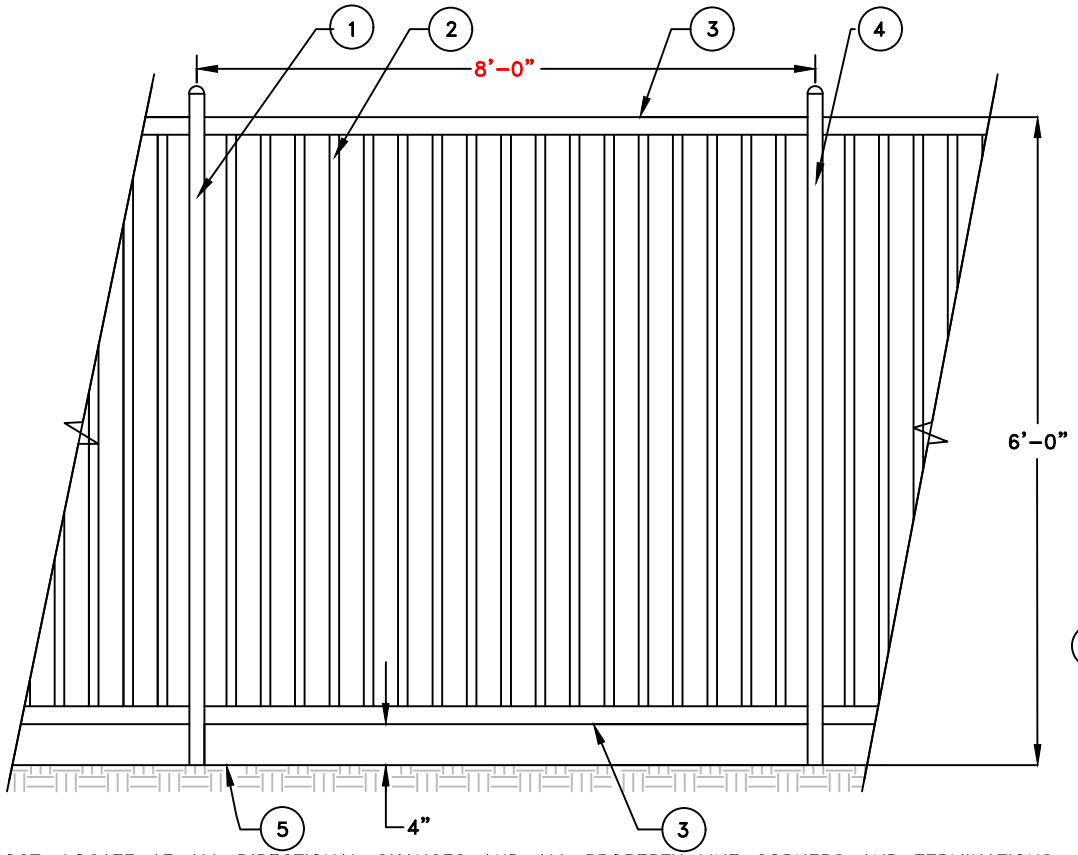
PORTLAND CEMENT CONCRETE ROADWAY STRUCTURAL SECTION CONFORM

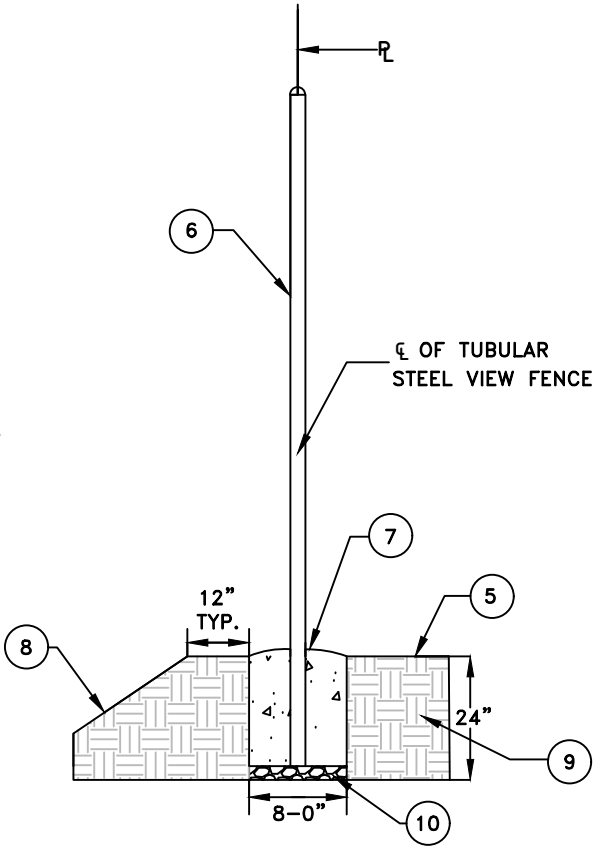
SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST–50a

NOTES:

1. SEE SECTION 71–4 OF THESE STANDARDS FOR TREATMENT OF ADJACENT PORTLAND CEMENT CONCRETE PAVEMENT.





LEGEND:

1. TERMINAL POST, LOCATE AT ALL DIRECTIONAL CHANGES AND ALL PROPERTY LINE CORNERS AND TERMINATIONS, TYP.
2. 3/4"☐ X14 GA. PICKET
3. 1-1/2"X14 GA. RAIL (TOP & BOTTOM)
4. 2" X 12 GA. POST W/ CAP, TYP.
5. FINISH GRADE AT RESIDENTIAL LOT PAD
6. CONSTRUCT ON PROPERTY LINE UNLESS OTHERWISE NOTED ON APPROVED PLAN
7. TOP OF CONCRETE FOOTING EXPOSED MIN. 1" ABOVE EXISTING GRADE SLOPE TO DRAIN, TYP. MINOR CONCRETE AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.
8. FINISH GRADE BEHIND REAR PROPERTY LINE (SLOPE VARIES)
9. COMPACTED SUBGRADE TO 90% RELATIVE DENSITY, TYP.
10. 2" INCH THICK 3/4" CRUSHED ROCK.

NOTES:

1. ALL FENCE PARTS TO BE PREFINISHED BLACK POWDER COATED TUBULAR STEEL, ALL FULLY WELDED CONSTRUCTION AND INSTALLATION. GRIND SMOOTH ALL WELDS.
2. ALL PAINT AND PRIMER SHALL BE APPLIED TO CLEAN SURFACES IN 5 MIL. COATS. FINISH COLOR SHALL MATCH POWDER COAT SHEEN, AND BE RUSTOLEUM TYPE PAINT OR APPROVED EQUAL.
3. FIELD VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.
4. DESIGN ENGINEER TO SUBMIT MODIFIED FOOTING DESIGN DETAIL TO CITY FOR APPROVAL PRIOR TO CONSTRUCTION WHEN VIEW FENCE TERMINAL POST CANNOT BE CONSTRUCTED PER THIS DETAIL AS IN THE CASE OF A KEYSTONE BLOCK CONFIGURATION.

MARC STOUT
CITY ENGINEER

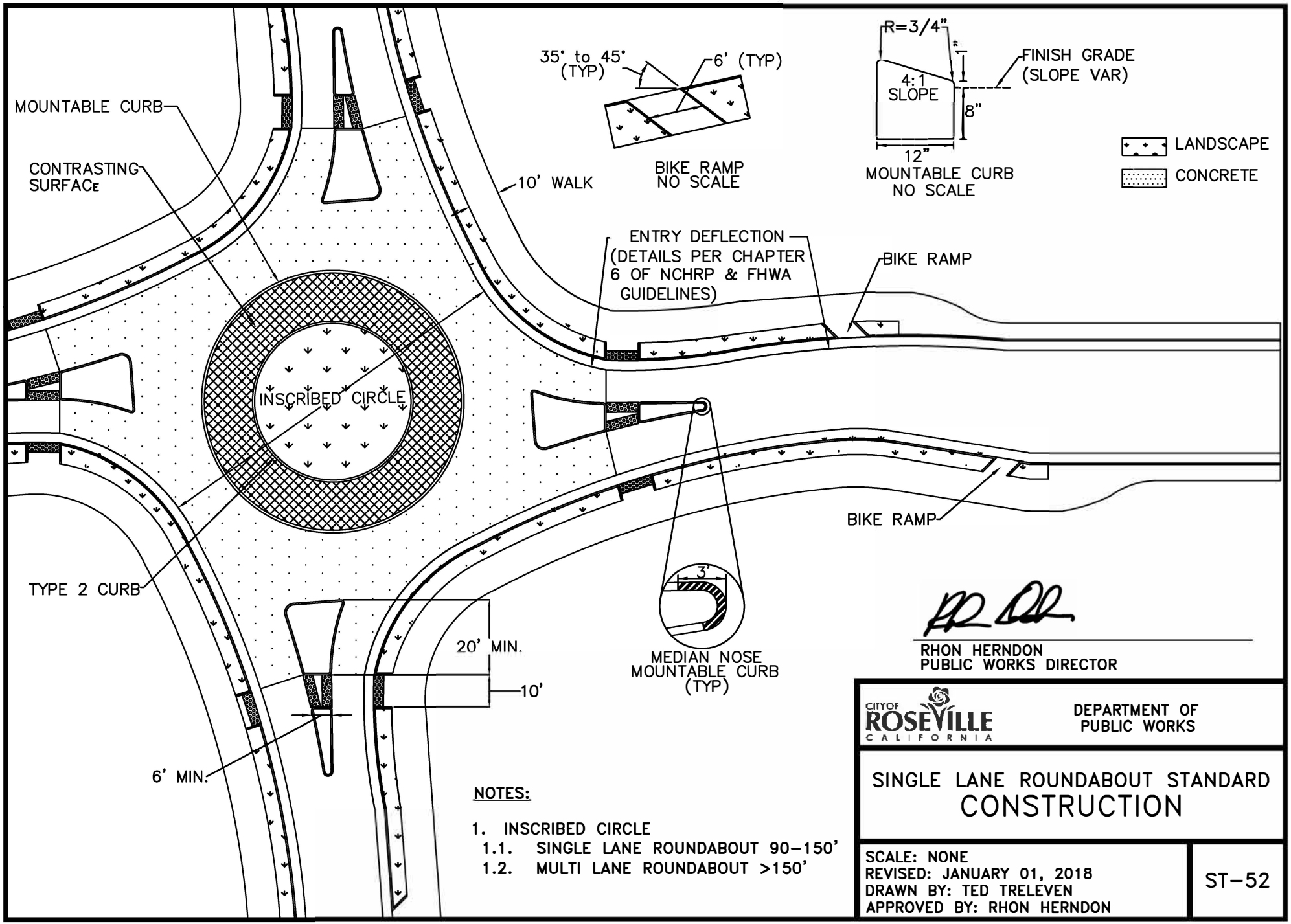
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

6' HIGH TUBULAR STEEL VIEW FENCE

SCALE: NONE
REVISED: JANUARY 1, 2021
DRAWN BY: R MEDINA
APPROVED BY: G. HOWES

ST-51



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

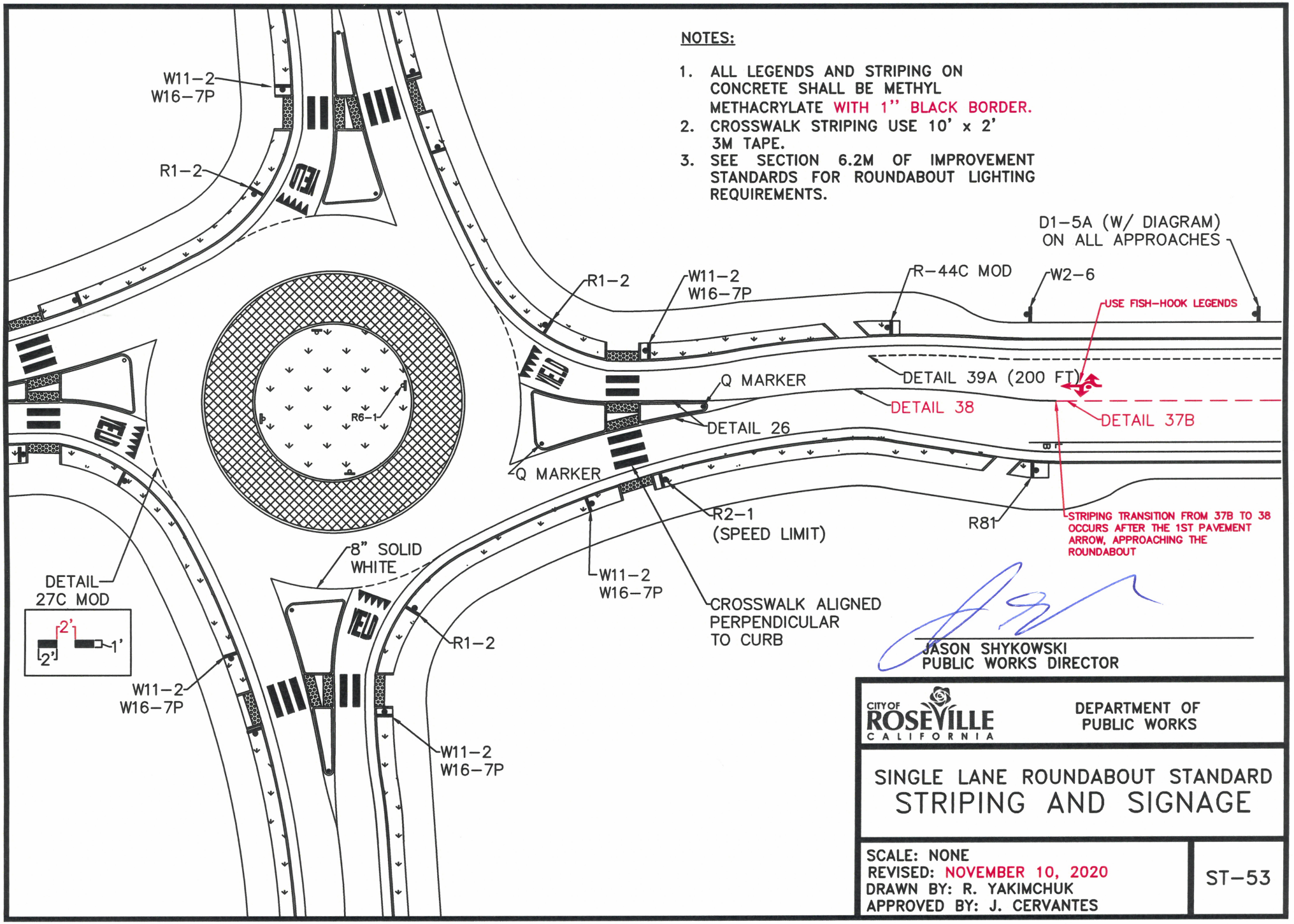
SINGLE LANE ROUNDABOUT STANDARD CONSTRUCTION

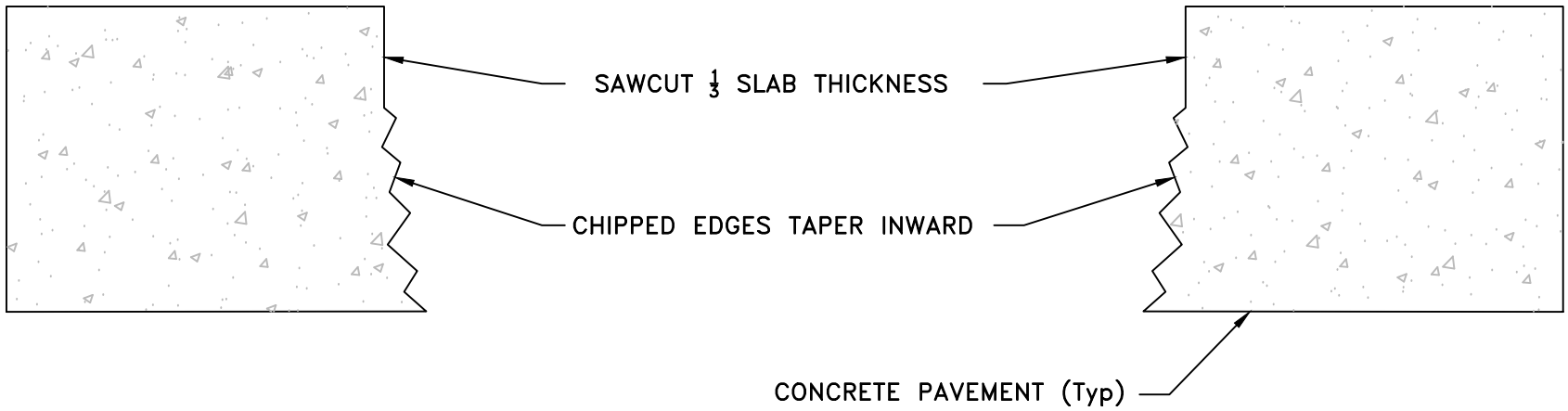
NOTES:

1. INSCRIBED CIRCLE
   1.1. SINGLE LANE ROUNDABOUT 90–150'
   1.2. MULTI LANE ROUNDABOUT >150'

SCALE: NONE
REVISED: JANUARY 01, 2018
DRAWN BY: TED TRELEVEN
APPROVED BY: RHON HERNDON

ST–52


NOTES:
1. ALL LEGENDS AND STRIPING ON CONCRETE SHALL BE METHYL METHACRYLATE WITH 1'' BLACK BORDER.
2. CROSSWALK STRIPING USE 10' x 2' 3M TAPE.
3. SEE SECTION 6.2M OF IMPROVEMENT STANDARDS FOR ROUNDABOUT LIGHTING REQUIREMENTS.
W11-2
W16-7P
R1-2
R6-1
D1-5A (W/ DIAGRAM) ON ALL APPROACHES
R-44C MOD
W2-6
USE FISH-HOOK LEGENDS
Q MARKER
DETAIL 39A (200 FT)
DETAIL 38
DETAIL 37B
DETAIL 26
R2-1 (SPEED LIMIT)
R81
STRIPING TRANSITION FROM 37B TO 38 OCCURS AFTER THE 1ST PAVEMENT ARROW, APPROACHING THE ROUNDABOUT
8" SOLID WHITE
DETAIL 27C MOD
2'
1'
CROSSWALK ALIGNED PERPENDICULAR TO CURB
JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR
CITY OF ROSEVILLE CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
SINGLE LANE ROUNDABOUT STANDARD
STRIPING AND SIGNAGE
SCALE: NONE
REVISED: NOVEMBER 10, 2020
DRAWN BY: R. YAKIMCHUK
APPROVED BY: J. CERVANTES
ST-53



SECTION DETAIL

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

NOTES:

1. CUT BOUNDARIES SHALL BE CUT TO DEPTH OF ⅓ THE SLAB THICKNESS AND THE REMAINDER OF THE DEPTH SHALL BE REMOVED WITH A JACKHAMMER.
2. THE CHIPPED EDGES REMOVED WITH A JACKHAMMER SHALL TAPER INWARD.

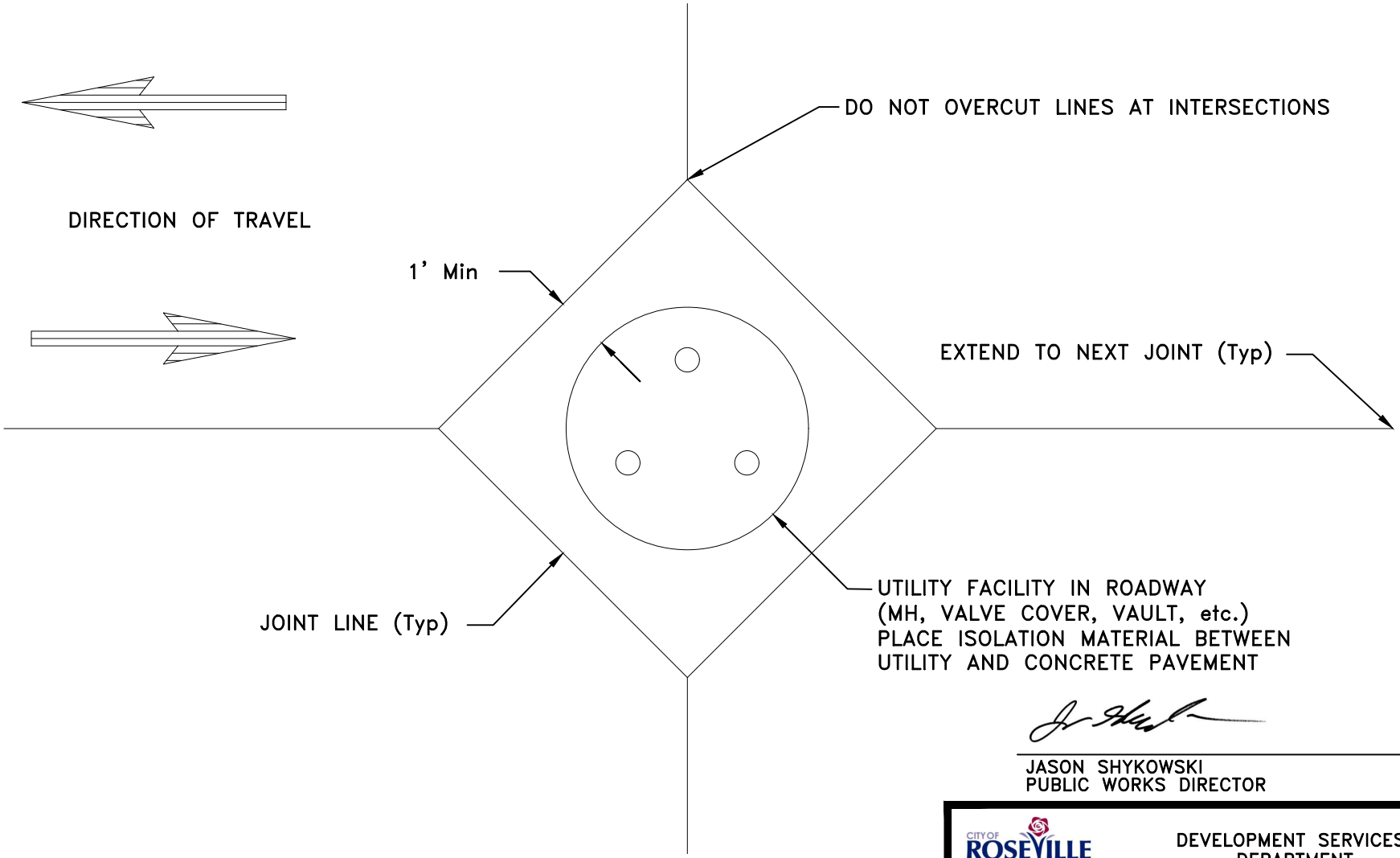
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

CUTTING CONCRETE FOR REMOVAL

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENGINEERING
APPROVED BY: JASON SHYKOWSKI

ST-54



PLAN

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

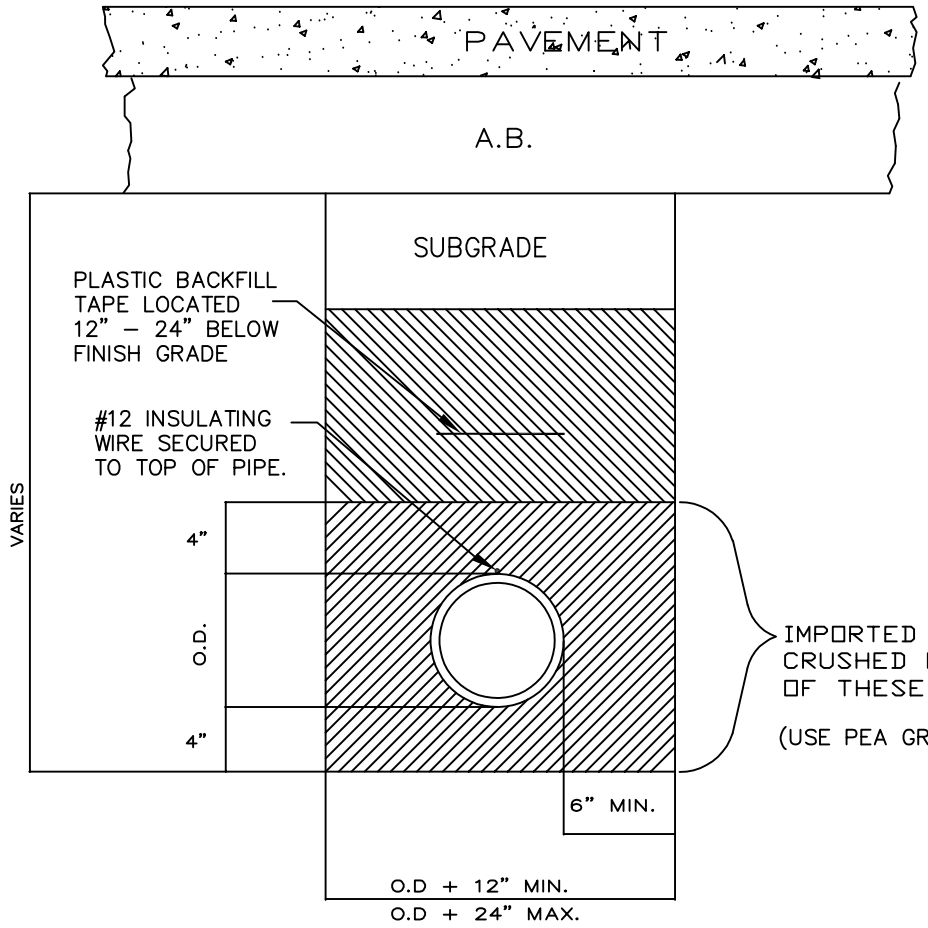
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

UTILITY FACILITY JOINTING

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: BENNETT ENG
APPROVED BY: JASON SHYKOWSKI

ST-55



TRENCH BACKFILL REQUIREMENTS:

1. PROPOSED STREETS – REFER TO DETAIL TB–1 OF SECTION 31 FOR BACKFILL REQUIREMENTS ABOVE THE PIPE ZONE.

2. EXISTING STREETS – REFER TO DETAILS TB–1 AND TB–3, TB–3a OF SECTION 31 FOR BACKFILL REQUIREMENTS ABOVE THE PIPE ZONE.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

BACKFILL SHALL BE MECHANICALLY CONSOLIDATED OR SHOVEL SLICED UNDER THE HAUNCHES OF THE PIPE.

IN ROCKY OR UNYIELDING SOIL, THE TRENCH SHALL BE EXCAVATED A MINIMUM OF 12" BELOW THE PIPE AND THE TRENCH WIDTH SHALL BE INCREASED BY 12".

ONE 12" WIDE STRIP OF BACKFILL TAPE SHALL BE USED FOR EVERY 12" PIPE DIAMETER OR FRACTION THERE OF.

CITY OF ROSEVILLE CALIFORNIA | ENVIRONMENTAL UTILITIES DEPARTMENT

WATER MAIN TRENCH AND BACKFILL

SCALE: NONE
REVISED: OCTOBER 2020
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–1

NOTES:

NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY THE THE ENVIRONMENTAL UTILITIES DEPT.

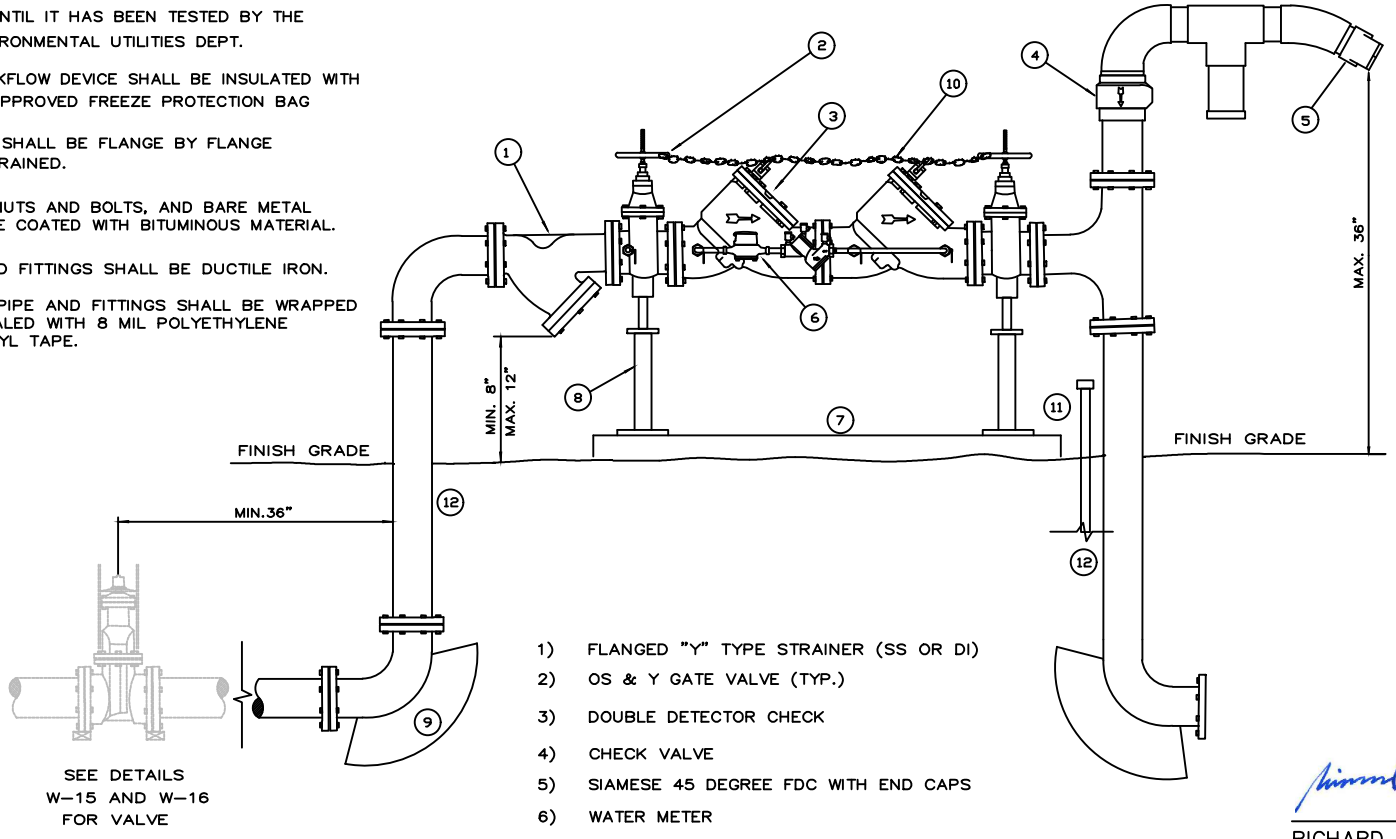
THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG

FITTINGS SHALL BE FLANGE BY FLANGE OR RESTRAINED.

BURIED NUTS AND BOLTS, AND BARE METAL SHALL BE COATED WITH BITUMINOUS MATERIAL.

PIPE AND FITTINGS SHALL BE DUCTILE IRON.

BURIED PIPE AND FITTINGS SHALL BE WRAPPED AND SEALED WITH 8 MIL POLYETHYLENE AND VINYL TAPE.



SEE DETAILS W–15 AND W–16 FOR VALVE

1) FLANGED "Y" TYPE STRAINER (SS OR DI)
2) OS & Y GATE VALVE (TYP.)
3) DOUBLE DETECTOR CHECK
4) CHECK VALVE
5) SIAMESE 45 DEGREE FDC WITH END CAPS
6) WATER METER
7) 3 1/2" THICK REINFORCED CONCRETE SLAB. WITH #4 REBAR 12" ON CENTER
8) SUPPORTS 2–TYP. SHALL BE BOLTED DOWN WITH A MINIMUM OF TWO BOLTS EACH
9) THRUST BLOCK (TYP.)
10) 1/4" NON CASE HARDENED CHAIN WITH BREAKAWAY LOCK BETWEEN VALVES.
11) VALVE TAMPER SWITCH CONDUIT TO BUILDING FIRE CONTROL ROOM
12) ONE CONTINUOUS PIECE

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

FIRE PROTECTION ASSEMBLY

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–2

NOTES:

NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY THE THE ENVIRONMENTAL UTILITIES DEPT.

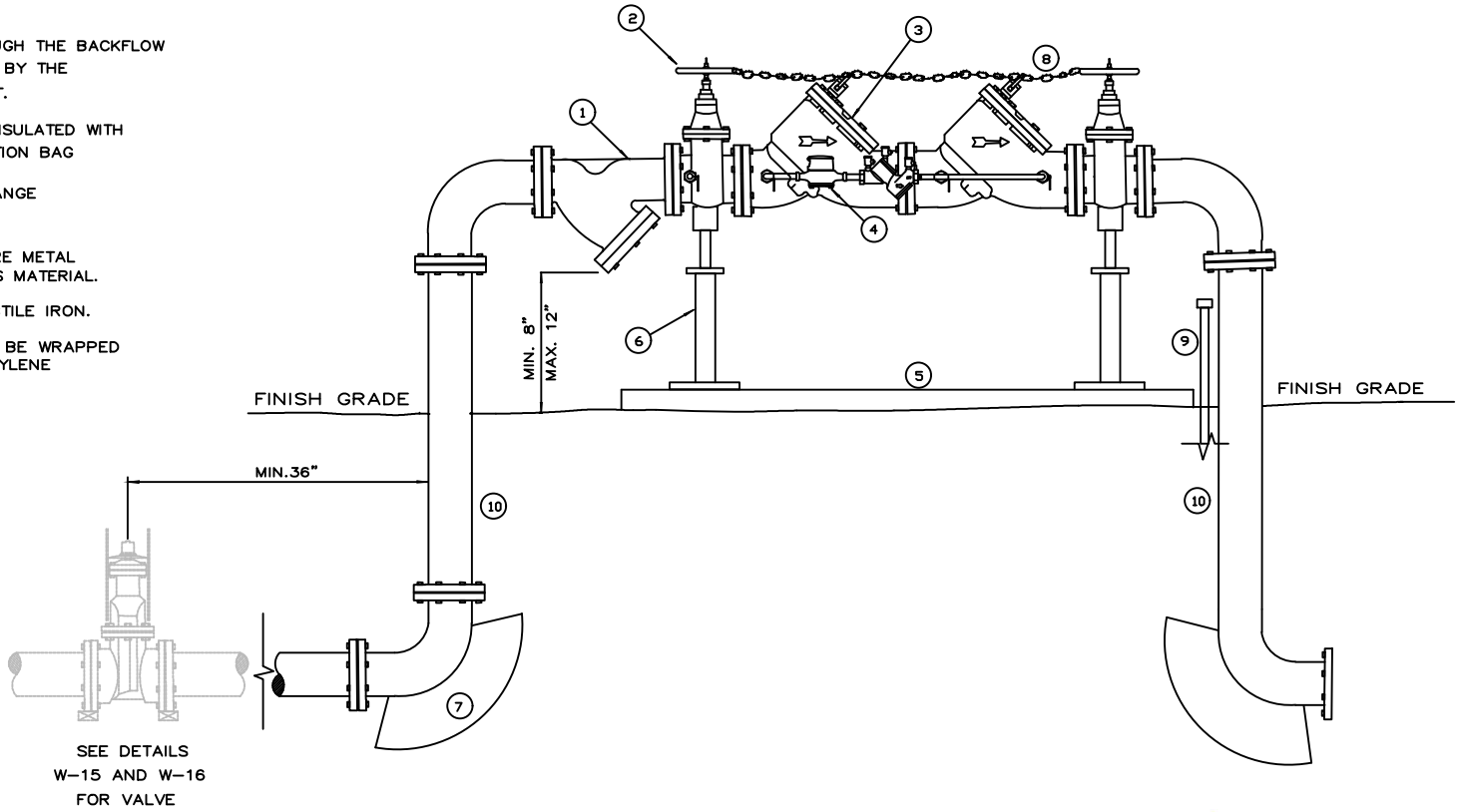
THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG

FITTINGS SHALL BE FLANGE BY FLANGE OR RESTRAINED.

BURIED NUTS AND BOLTS, AND BARE METAL SHALL BE COATED WITH BITUMINOUS MATERIAL.

PIPE AND FITTINGS SHALL BE DUCTILE IRON.

BURIED PIPE AND FITTINGS SHALL BE WRAPPED AND SEALED WITH 8 MIL POLYETHYLENE AND VINYL TAPE.



1) FLANGED "Y" TYPE STRAINER (SS OR DI)
2) OS & Y GATE VALVE (TYP.)
3) DOUBLE DETECTOR CHECK
4) WATER METER
5) 3 1/2" THICK REINFORCED CONCRETE SLAB W/#4 REBAR 12" ON CENTER.
6) SUPPORTS 2-TYP. SHALL BE BOLTED DOWN WITH A MINIMUM OF TWO BOLTS EACH
7) THRUST BLOCK (TYP.)
8) 1/4" NON CASE HARDENED CHAIN WITH BREAKAWAY LOCK BETWEEN VALVES.
9) VALVE TAMPER SWITCH CONDUIT TO BUILDING FIRE CONTROL ROOM.
10) ONE CONTINUOUS PIECE

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

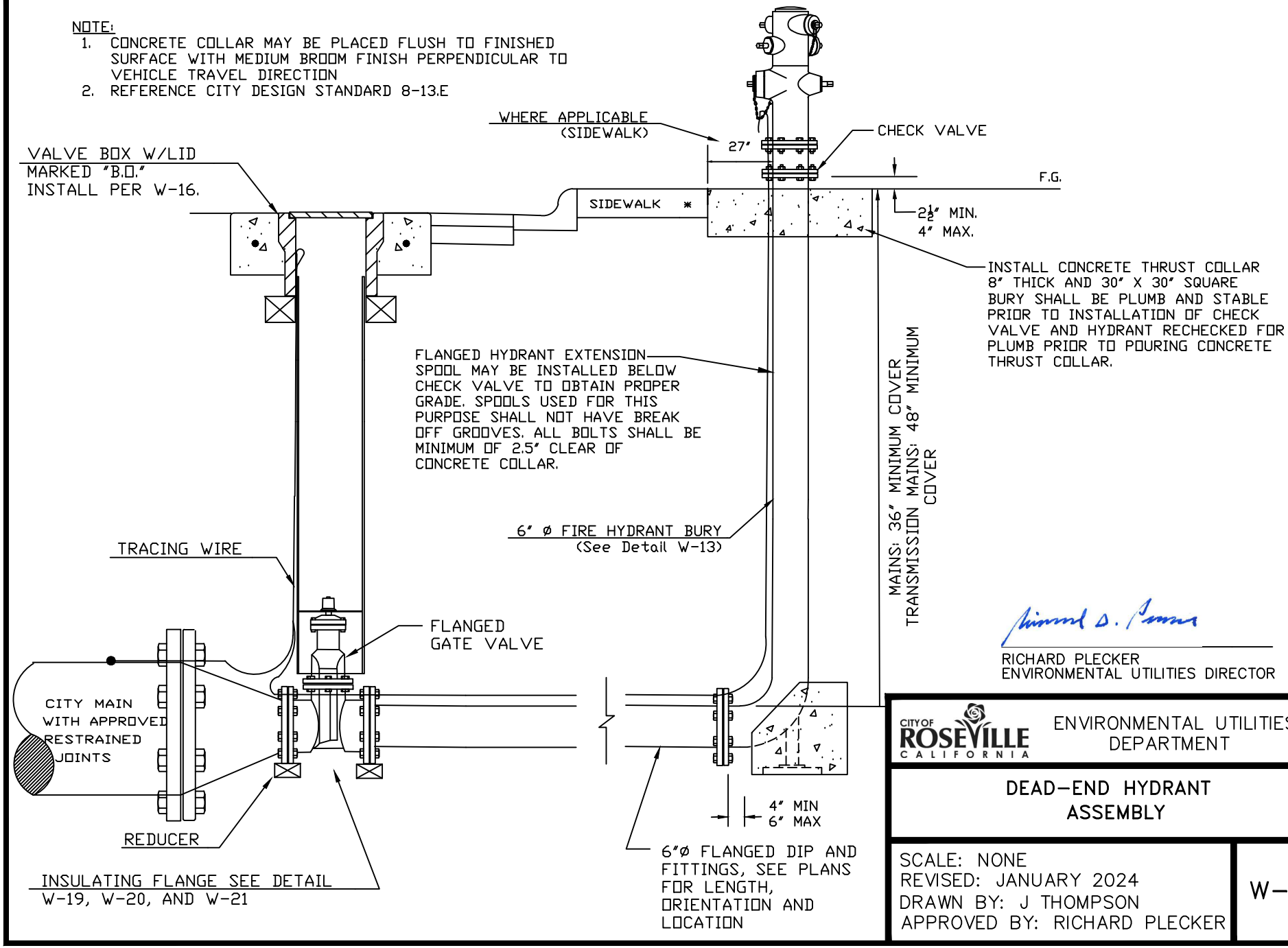
ENVIRONMENTAL UTILITIES DEPARTMENT

ONSITE FIRE PROTECTION

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-3

NOTE:
1. CONCRETE COLLAR MAY BE PLACED FLUSH TO FINISHED SURFACE WITH MEDIUM BROOM FINISH PERPENDICULAR TO VEHICLE TRAVEL DIRECTION
2. REFERENCE CITY DESIGN STANDARD 8-13.E



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

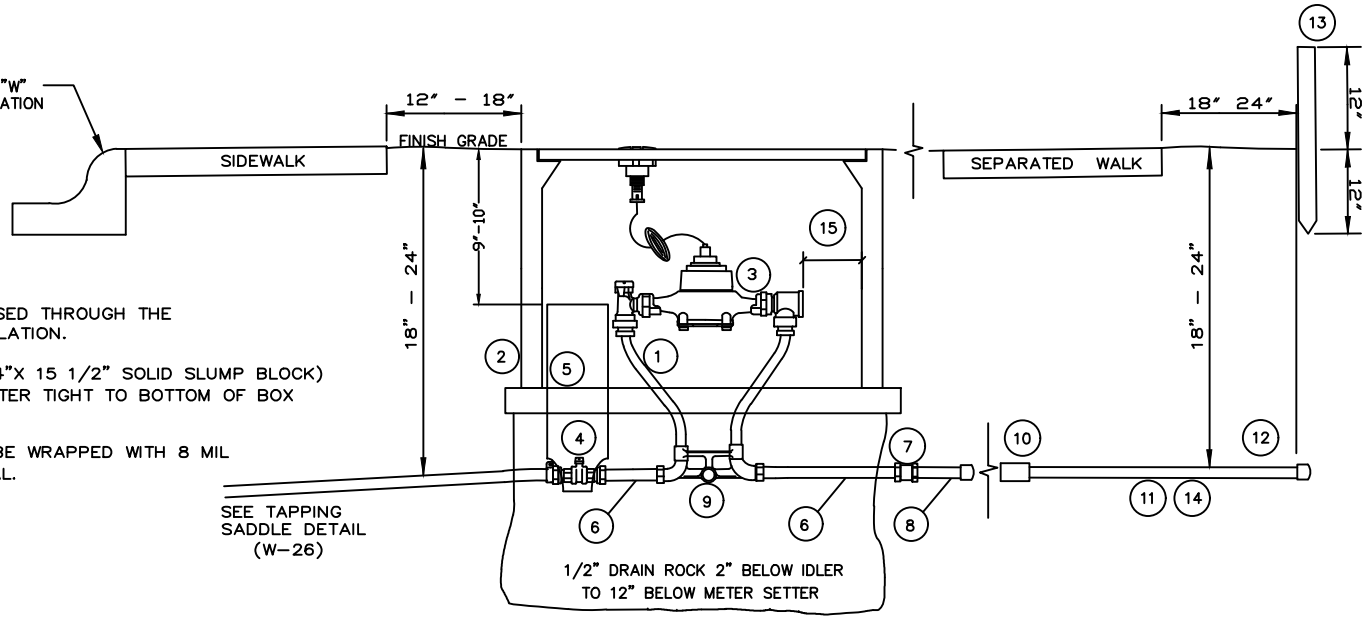
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

DEAD-END HYDRANT ASSEMBLY

SCALE: NONE
REVISED: JANUARY 2024
DRAWN BY: J THOMPSON
APPROVED BY: RICHARD PLECKER

W-4



NOTES:

WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.

INSTALL CONCRETE BLOCKING (4"X4"X 15 1/2" SOLID SLUMP BLOCK) UNDER ENTIRE UTILITY BOX PERIMETER TIGHT TO BOTTOM OF BOX NO GAPS ALLOWED

BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.

1) METER SETTER WITH IDLER
2)* N-30 UTILITY BOX WITH FL 30 METER LID FOR 1" SERVICE
3) WATER METER (PURCHASED THROUGH CITY)
4) CURB STOP (COMPRESSION X FIPT)
5) 4" DIA. BLUE SCHEDULE 40 RISER (NOTCHED OVER PIPE AT BASE)
6) 4" METER SPUD
7) BRASS COUPLING (FIPT X FIPT)
8) 18" BRASS NIPPLE WITH END CAP (FOR ATTACHED SIDEWALK)
9) SCH. 40 PVC THROUGH PIPE EYE
10) BRASS-PVC ADAPTER
11) 1 1/2" PVC
12) PVC END CAP
13) 2"X2" RDWD. STAKE PAINTED BLUE
14) AS AN OPTION, CONTRACTOR MAY INSTALL A 3" SCH 40 SLEEVE PRIOR TO INSTALLATION OF 1-1/2" PVC.
15) SETTERS W/VERTICAL CHECK, PROVIDE 1" GAP MIN. THE SETTERS W/HORIZONTAL CHECK, PROVIDE 2" GAP MIN.(NOTCH THE TOP OF THE 4"SCHEDULE 40 RISER TO ACHIEVE 2"GAP).

* IF LOCATED IN THE DRIVEWAY USE A B1324 BOX W/STEEL CHECKER COVER #B1324-51JH OR APPROVED EQUAL.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

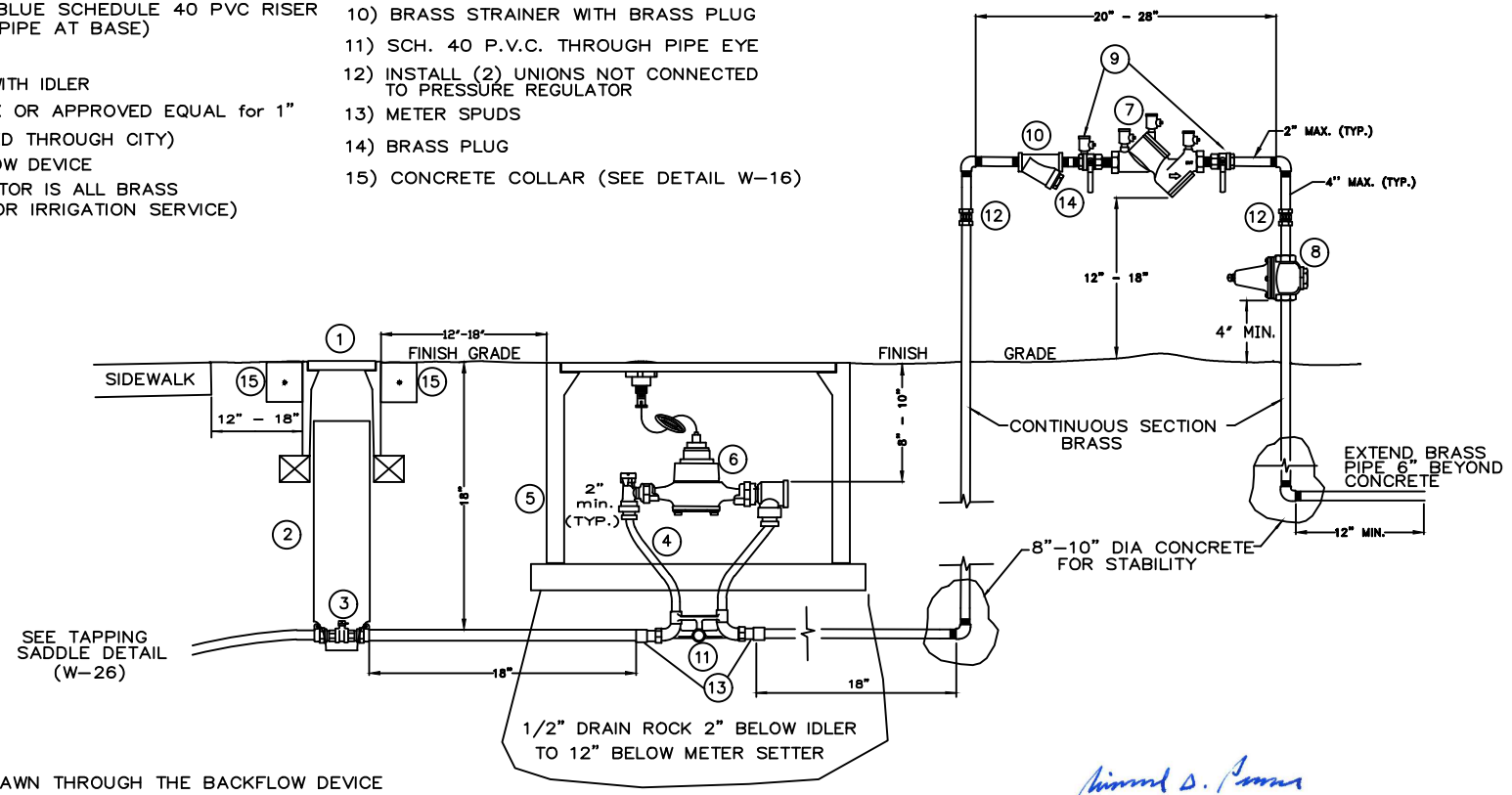
ENVIRONMENTAL UTILITIES DEPARTMENT

RESIDENTIAL 1" SERVICE LINE

SCALE: NONE
REVISED: JANUARY 2022
DRAWN BY: J. VAROZZA
APPROVED BY: RICHARD PLECKER

W-5

1) CONCRETE VALVE BOX (G–5 PER DETAIL W–16)
2) 6" CONTINUOUS BLUE SCHEDULE 40 PVC RISER (NOTCHED OVER PIPE AT BASE)
3) CURB STOP
4) METER RESETTER WITH IDLER
5) N–30 UTILITY BOX OR APPROVED EQUAL for 1"
6) METER (PURCHASED THROUGH CITY)
7) R.P TYPE BACKFLOW DEVICE
8) PRESSURE REGULATOR IS ALL BRASS (NOT REQUIRED FOR IRRIGATION SERVICE)
9) BALL VALVES
10) BRASS STRAINER WITH BRASS PLUG
11) SCH. 40 P.V.C. THROUGH PIPE EYE
12) INSTALL (2) UNIONS NOT CONNECTED TO PRESSURE REGULATOR
13) METER SPUDS
14) BRASS PLUG
15) CONCRETE COLLAR (SEE DETAIL W–16)



NOTES:

NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY THE ENVIRONMENTAL UTILITIES DEPT.

ALL FITTINGS AND PIPING SHALL BE BRASS BEGINNING AT CURB STOP

IF USED FOR IRRIGATION DO NOT INCLUDE PRESSURE REGULATOR.

INSTALL (3" X 5") CONCRETE BRICK UNDER PERIMETER OF UTILITY BOXES.

WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.

THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG.

BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

COMMERCIAL 1" SERVICE LINE

SCALE: NONE
REVISED: JANUARY 2024
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–6

NOTES:

NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY THE ENVIRONMENTAL UTILITIES DEPT.

WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.

THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG.

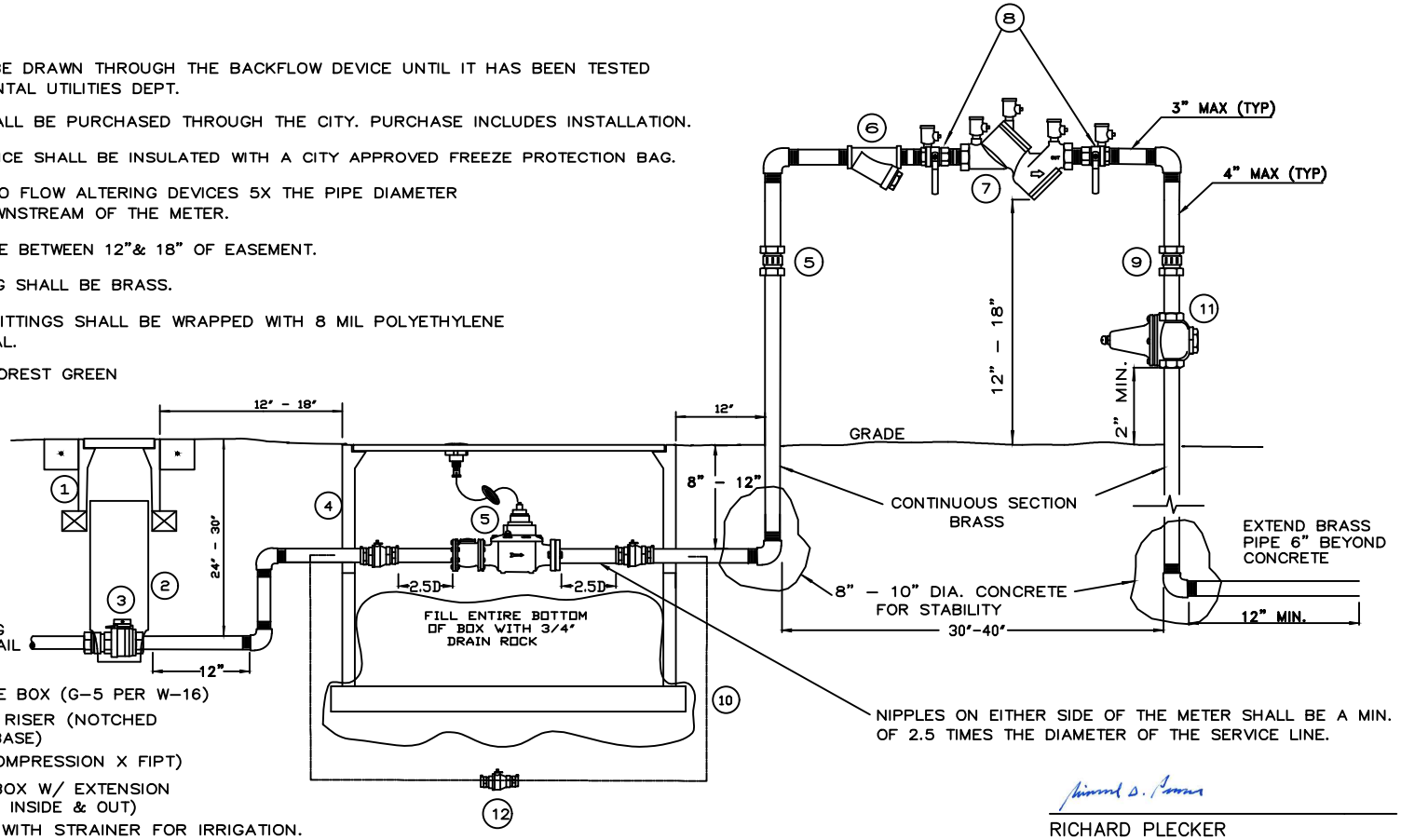
THERE SHALL BE NO FLOW ALTERING DEVICES 5X THE PIPE DIAMETER UPSTREAM AND DOWNSTREAM OF THE METER.

CURBSTOP SHALL BE BETWEEN 12"& 18" OF EASEMENT.

FITTINGS AND PIPING SHALL BE BRASS.

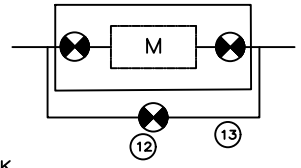
BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.

PAINT BACKFLOW FOREST GREEN
RAL 6004

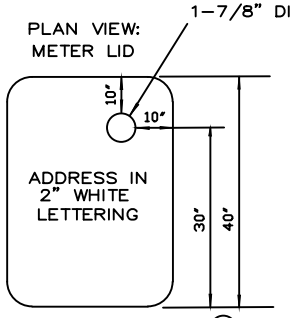


1) CONCRETE VALVE BOX (G-5 PER W-16)
2) 6"CONTINUOUS RISER (NOTCHED OVER PIPE AT BASE)
3) CURB STOP (COMPRESSION X FIPT)
4) B-40 UTILITY BOX W/ EXTENSION (MORTAR JOINTS INSIDE & OUT)
5) TURBO METER WITH STRAINER FOR IRRIGATION. COMPOUND METER FOR COMMERCIAL (PURCHASED THROUGH CITY). INSTALL IDLER SPOOL DURING INSTALLATION OF METER BOX.
6) "Y" STRAINER WITH BRASS PLUG
7) R.P. TYPE BACKFLOW DEVICE
8) BALL VALVES
9) INSTALL (2) UNIONS
10) CONCRETE BRICK (4"X4"X15 1/2") UNDER ENTIRE PERIMETER OF UTILITY BOX
11) BRASS PRESSURE REGULATOR NOT REQUIRED FOR IRRIGATION SERVICE
12) 3/4" LOCKING CURB STOP IN G-5 BOX NOT REQUIRED FOR IRRIGATION SERVICE
13) 3/4" BY PASS MATERIAL TO BE SOFT COPPER TYPE K AND FITTINGS TO BE BRASS COMPRESSION TYPE. NOT REQUIRED FOR IRRIGATION SERVICE
14) OR, FOR APPLICABLE LID TYPE, REFER TO METER APPLICATION TABLE AT THE END OF MATERIALS SECTION.

PLAN VIEW:
METER BYPASS



PLAN VIEW:
METER LID



CHECKER PLATE LID (14)

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA
ENVIRONMENTAL UTILITIES DEPARTMENT

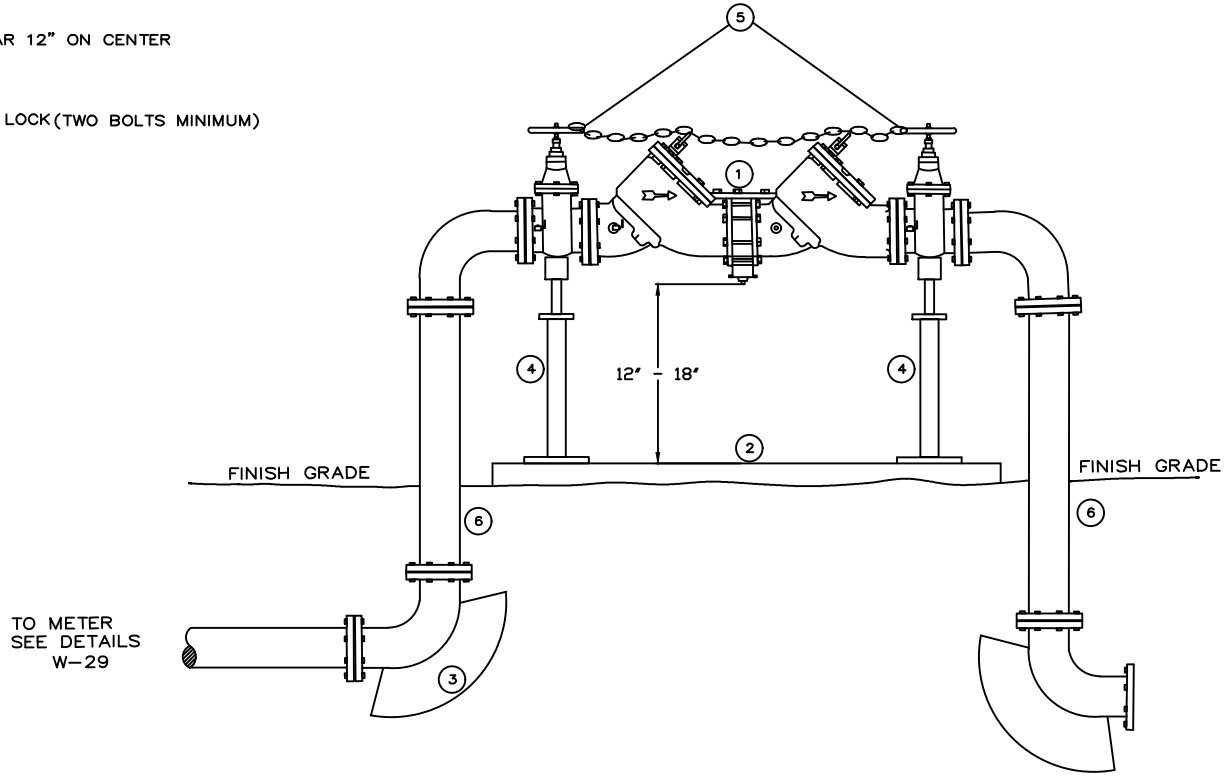
COMMERCIAL/IRRIGATION 1 1/2" & 2" SERVICE LINE

SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: D.SAMUELSON
APPROVED BY: RICHARD PLECKER

W-7

MATERIALS:

1) R.P. TYPE BACKFLOW DEVICE (CITY APPROVED)
2) 4" THICK REINFORCED CONCRETE SLAB WITH #4 REBAR 12" ON CENTER
3) THRUST BLOCKS (TYP.)
4) SUPPORT STANDS BOLTED INTO CONCRETE
5) 1/4" NON-CASE HARDENED CHAIN WITH BREAKAWAY LOCK (TWO BOLTS MINIMUM)
6) ONE CONTINUOUS PIECE



NOTES:

NO WATER IS TO BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY THE ENVIRONMENTAL UTILITIES DEPT.

PIPE SHALL BE DUCTILE IRON.

PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL. POLYETHYLENE

USE CITY APPROVED RESTRAINED JOINTS OR FLANGED SPOOLS

THE BACKFLOW DEVICE SHALL BE INSULATED WITH A CITY APPROVED FREEZE PROTECTION BAG.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

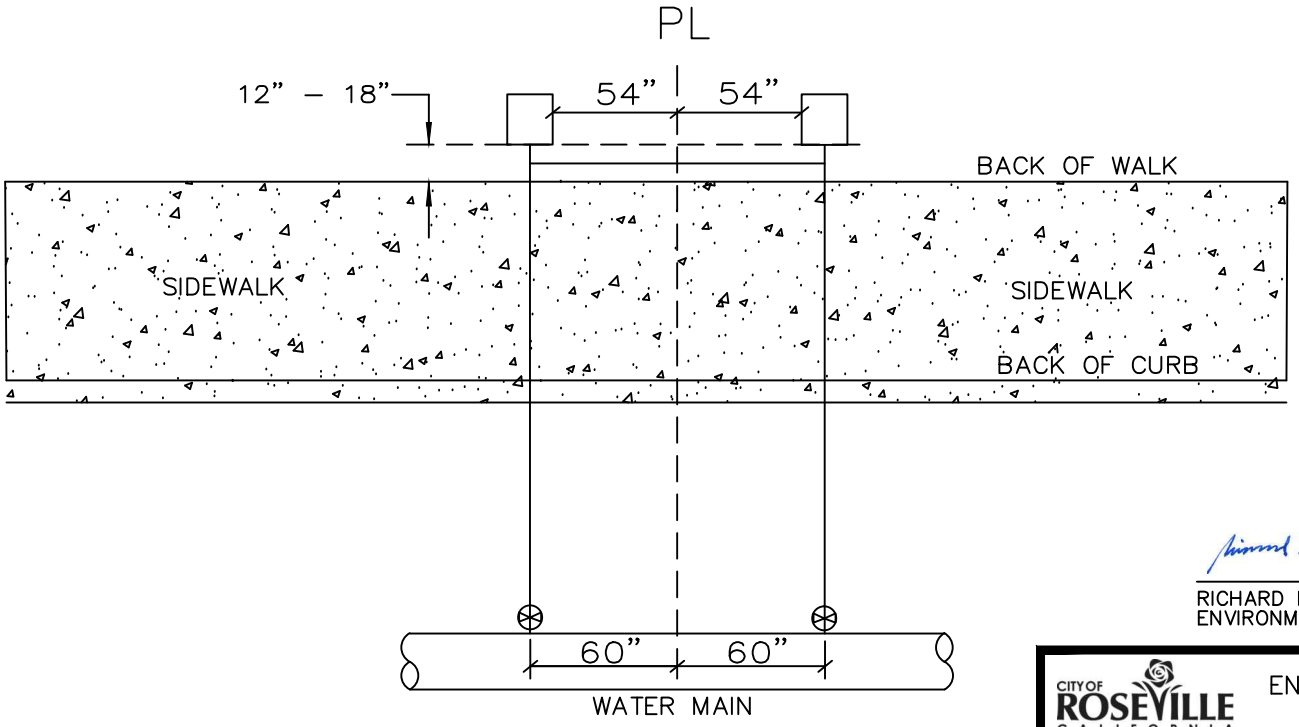
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

COMMERCIAL 3" & LARGER SERVICE

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J THOMPSON
APPROVED BY: RICHARD PLECKER

W-8



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

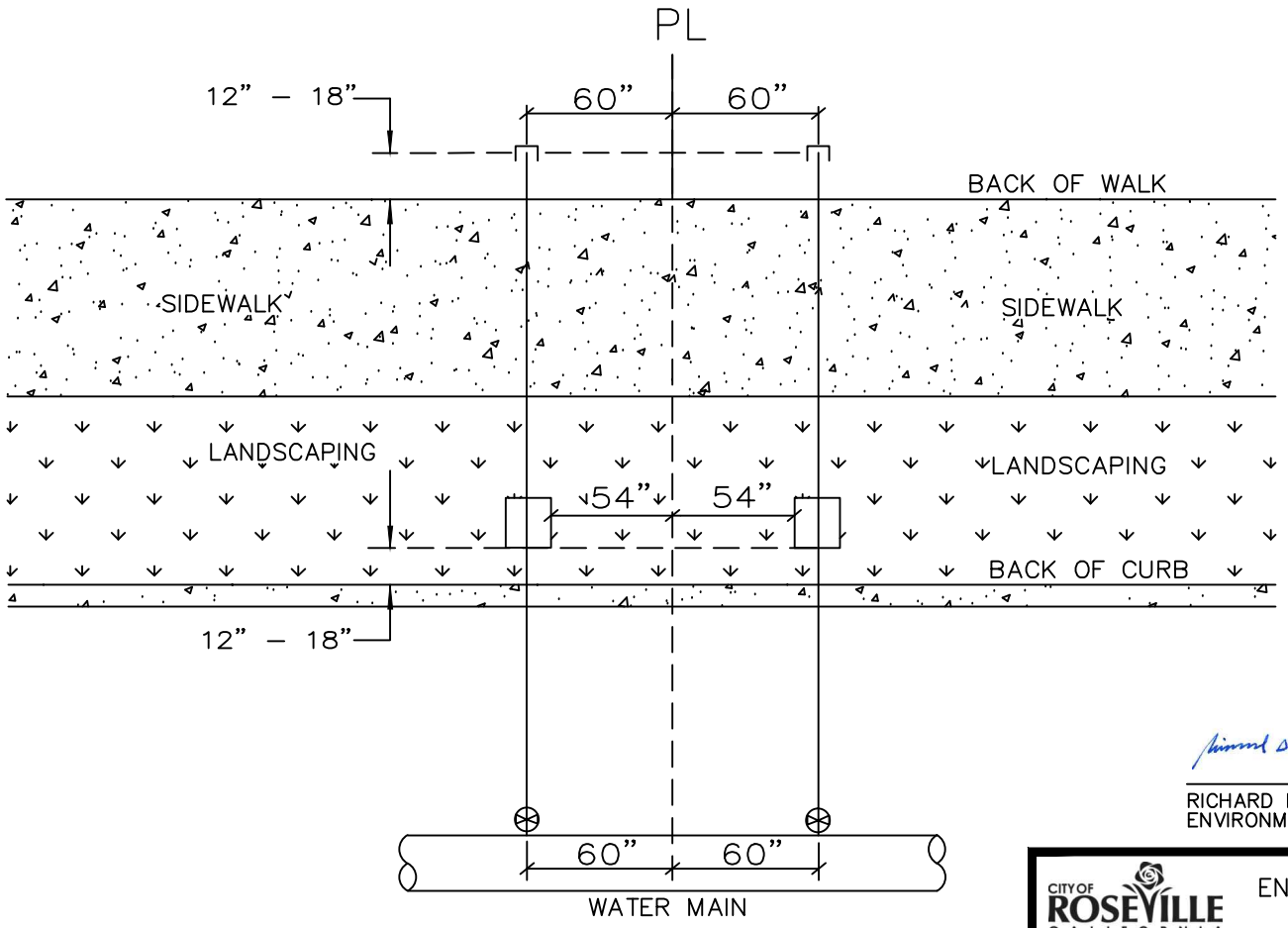
ENVIRONMENTAL UTILITIES DEPARTMENT

RESIDENTIAL WATER SERVICE

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–9

NOTE: REFER TO DETAIL W–18 FOR "WATER SERVICE TRENCH AND BACKFILL"



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

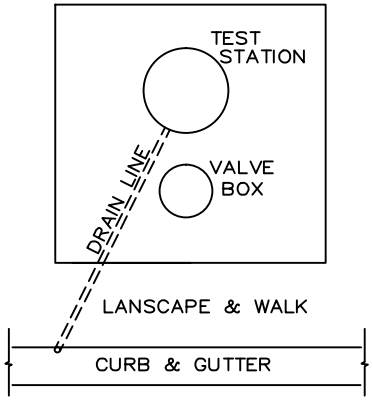
RESIDENTIAL WATER SERVICE FOR SEPARATED SIDEWALKS

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–10

NOTE: REFER TO DETAIL W–18 FOR "WATER SERVICE TRENCH AND BACKFILL"

DRAIN LINE DETAIL



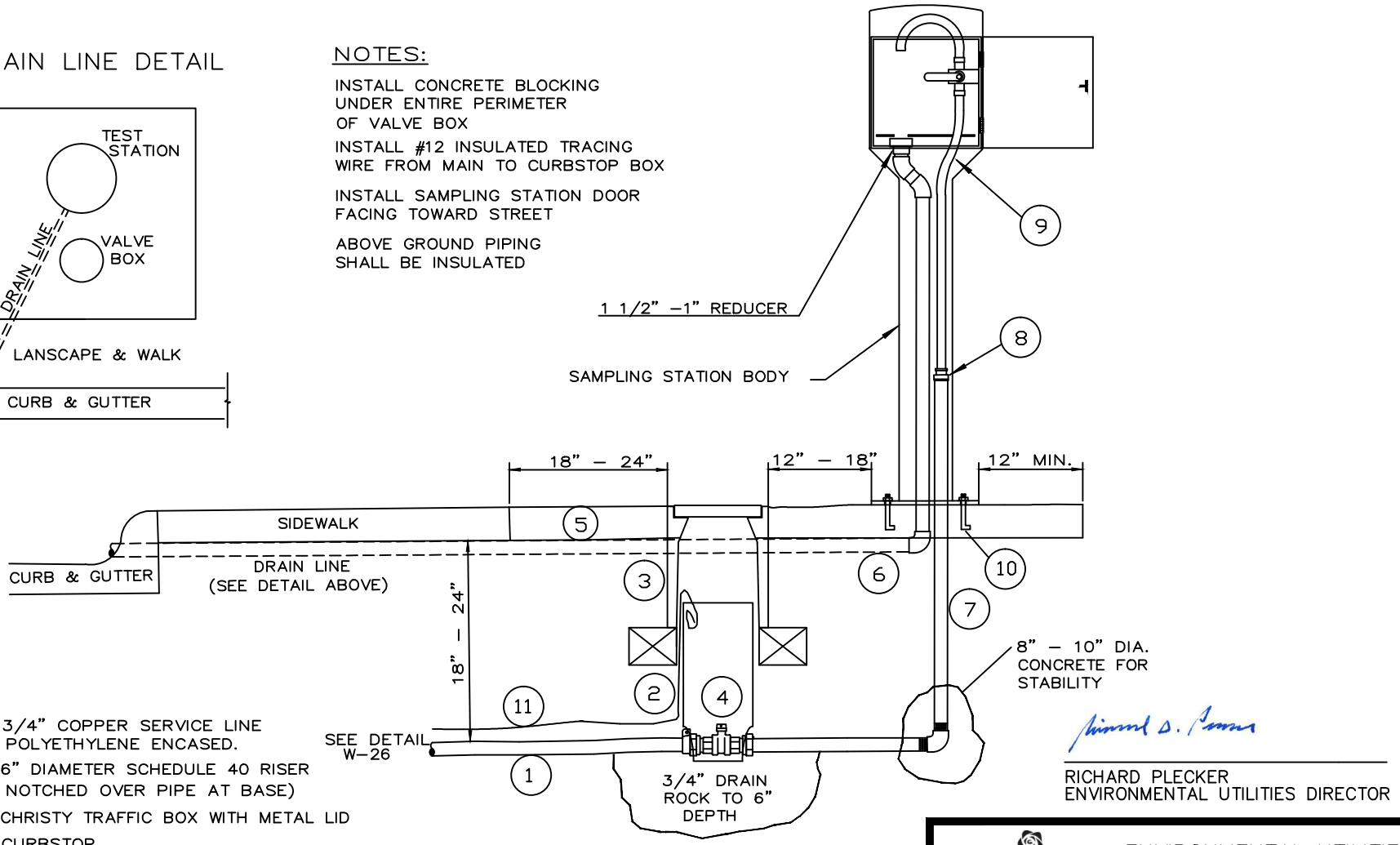
NOTES:

INSTALL CONCRETE BLOCKING UNDER ENTIRE PERIMETER OF VALVE BOX

INSTALL #12 INSULATED TRACING WIRE FROM MAIN TO CURBSTOP BOX

INSTALL SAMPLING STATION DOOR FACING TOWARD STREET

ABOVE GROUND PIPING SHALL BE INSULATED



1) 3/4" COPPER SERVICE LINE POLYETHYLENE ENCASED.
2) 6" DIAMETER SCHEDULE 40 RISER NOTCHED OVER PIPE AT BASE)
3) CHRISTY TRAFFIC BOX WITH METAL LID
4) CURBSTOP
5) 3 1/2" THICK REINFORCED CONCRETE SLAB
6) 1" SCH. 40 PVC DRAIN TO GUTTER
7) 3/4" BRASS PIPE
8) 3/4" TO 1/2" REDUCER (BRASS)
9) 1/2" COPPER TUBING
10) (4) ANCHOR BOLTS WITH WASHERS & NUTS
11) INSTALL TRACING WIRE FROM MAIN TO CURB STOP. PLACE WIRE OUTSIDE THE RISER, BUT INSIDE THE BOX.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

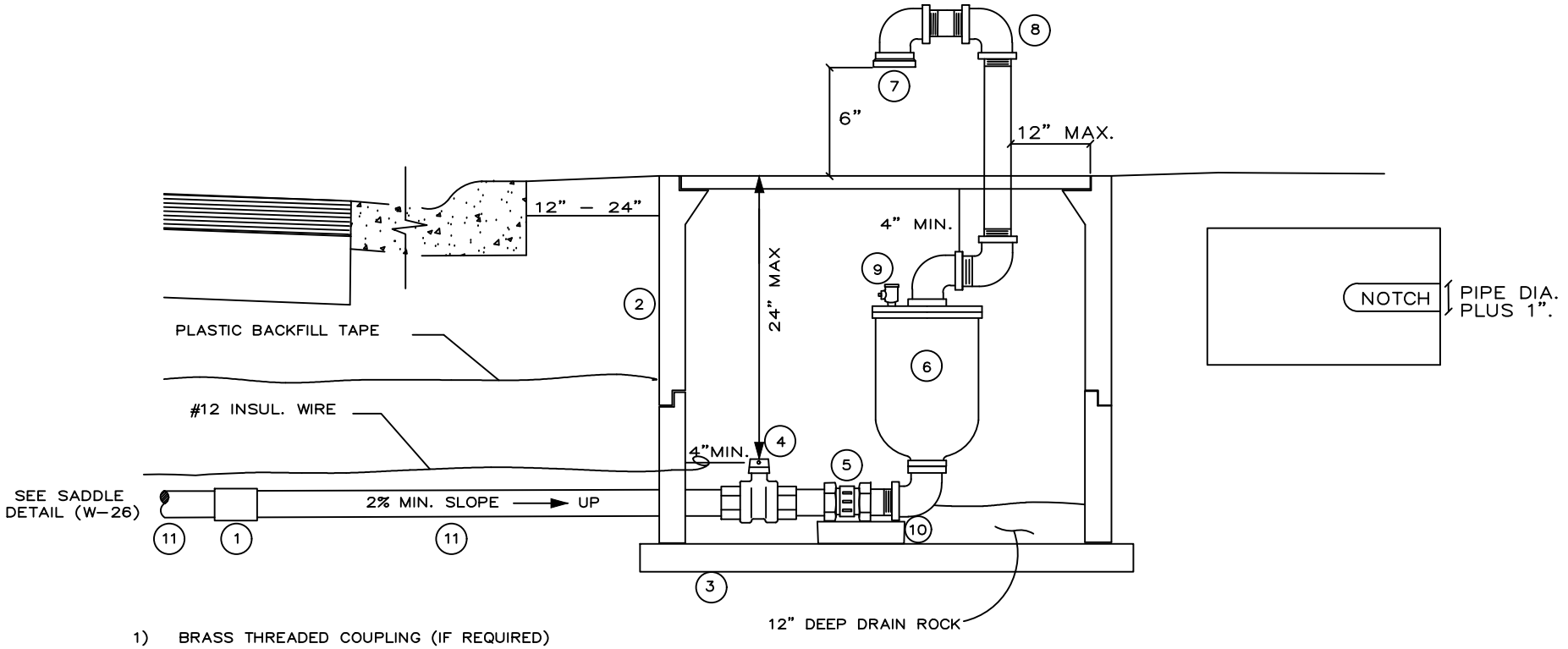
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

SAMPLING STATION

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–11



1) BRASS THREADED COUPLING (IF REQUIRED)

2) B–40 UTILITY BOX W/TRAFFIC COVER MARKED, "RSVL ARV"
IF EXTENSION IS REQ. MOTAR EXTENSION JOINT INSIDE & OUT.

3) 3" x 5" CONCRETE BRICK UNDER
ENTIRE PERIMETER OF UTILITY BOX.

4) CURB STOP

5) BRASS UNION

6) COMBINATION AIR / VACUUM VALVE

7) PVC TERMINATION WITH INSECT/RODENT SCREEN.

8) USE SCH 80 PIPE AND FITTINGS ABOVE GROUND. EXPOSED PIPE AND FITTINGS SHALL BE PAINTED SAFETY BLUE TO MATCH CARBOLINE S150.

9) 1/4" TEST COCK

10) CONCRETE BLOCK FOR SUPPORT

11) THREADED BRASS PIPE

NOTE:

BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

1" AND 2" AIR RELEASE VALVE ASSEMBLY

SCALE: NONE
REVISED: JANUARY 2024
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–12

NOTES:

FITTINGS SHALL BE DUCTILE IRON

VALVES AND FITTINGS SHALL BE WRAPPED IN 8 MIL. OR THICKER POLYETHYLENE.

BURIED NUTS AND BOLTS SHALL BE COATED WITH A BITUMINOUS MATERIAL. "T" BOLT HEADS DO NOT REQUIRE COATING.

VALVE SHALL BE A MINIMUM OF 15' FROM HYDRANT.

USE APPROVED RESTRAINING JOINTS FROM VALVE TO HYDRANT BURY.

MARK THE LOCATION OF THE HYDRANT WITH A BLUE REFLECTOR PLACED 1' OFF STREET CENTERLINE. HYDRANTS LOCATED AT INTERSECTIONS SHALL BE MARKED ON BOTH STREETS, PER PROVISIONS IN SECTION 84 OF THE CALTRANS SPECIFICATIONS.

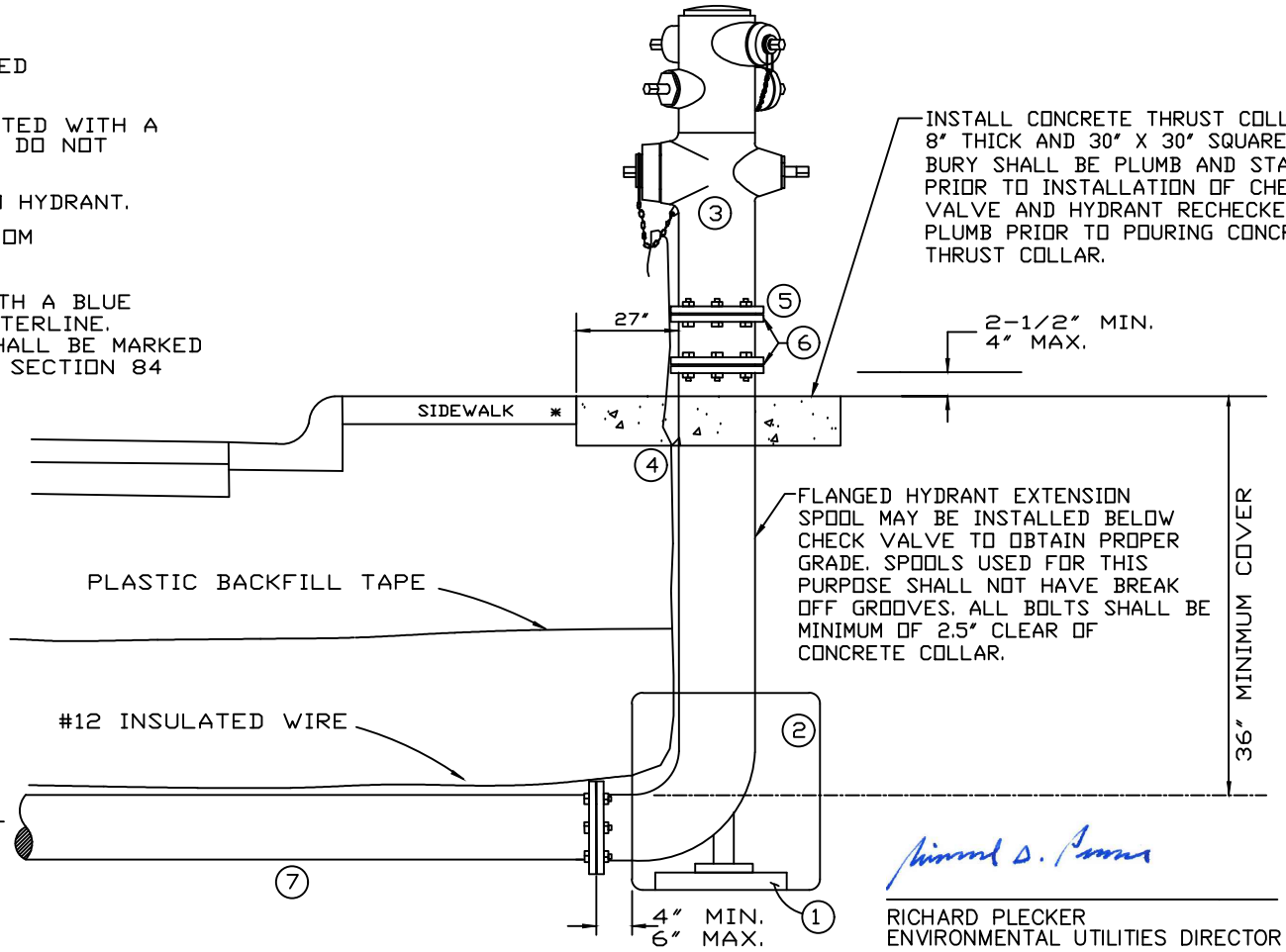
HYDRANTS USED AS BLOW-OFFS SHALL HAVE THE TOP 2" PAINTED WHITE AND BE MARKED WITH AN "X".

A MINIMUM 3 FOOT CLEAR AREA SHALL BE MAINTAINED AROUND THE FIRE HYDRANT.

CITY MAINTAINED HYDRANTS SHALL BE PAINTED WITH TWO COATS SAFTEY-YELLOW.

PRIVATELY OWNED HYDRANTS SHALL BE PAINTED WHITE.

* - HYDRANTS SHALL BE 27" BEHIND CURB WHEN THE SIDEWALK IS DETACHED.



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

MATERIALS:

1) CONCRETE BLOCKING
2) CONCRETE SUPPORT AGAINST UNDISTURBED SOIL
3) FIRE HYDRANT 6"x 2-1/2"x 2-1/2x 4-1/2 (LEAD FREE)
4) INSTALL CONCRETE THRUST COLLAR 8" THICK AND 30" X 30" SQUARE
5) CLOW LP619 BREAK OFF CHECK VALVE OR APPROVED EQUAL
6) NON-BREAKAWAY BOLTS
7) FULLY RESTRAINED DUCTILE IRON PIPE ENTIRE LENGTH

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

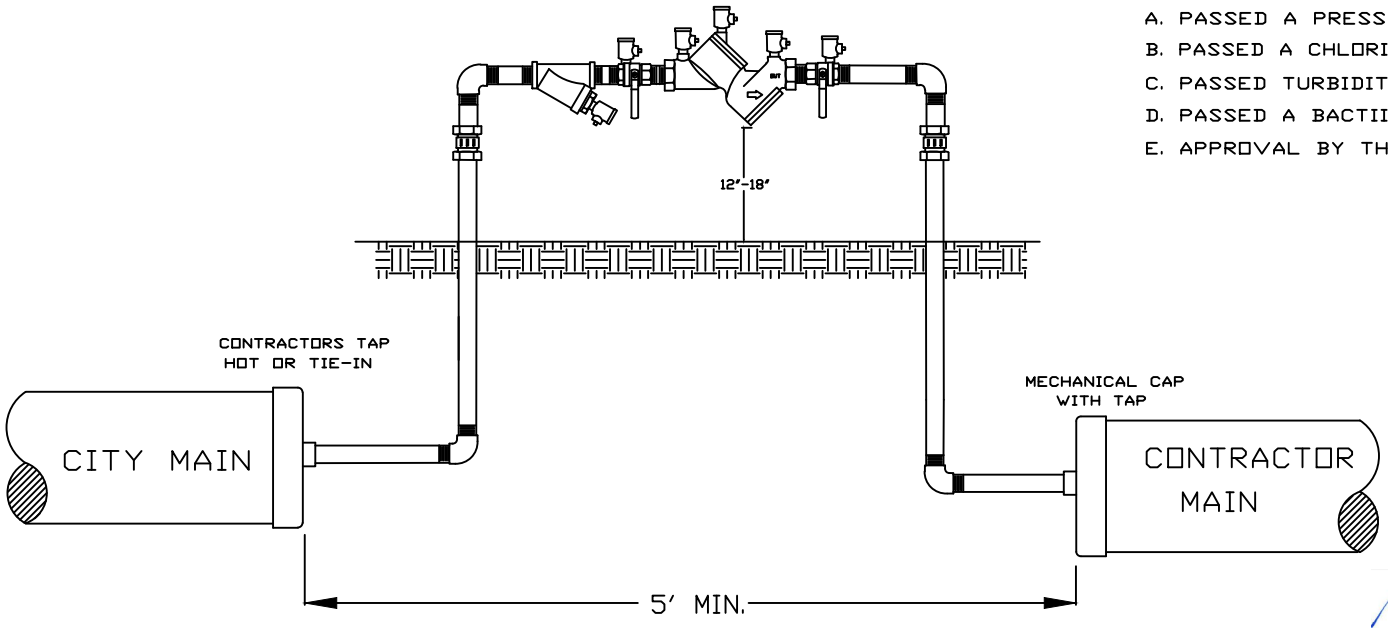
FIRE HYDRANT ASSEMBLY

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J. THOMPSON
APPROVED BY: RICHARD PLECKER

W-13

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

A. PASSED A PRESSURE TEST
B. PASSED A CHLORINE TEST
C. PASSED TURBIDITY TEST
D. PASSED A BACTII TEST
E. APPROVAL BY THE EUD INSPECTOR



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

WATER SHALL ONLY BE DRAWN INTO THE CONTRACTORS MAIN THROUGH A CITY APPROVED RP TYPE BACKFLOW DEVICE WHICH HAS BEEN TESTED AND TAGGED BY THE ENVIRONMENTAL UTILITIES DEPARTMENT.

FINAL SYSTEM COMPONENTS NECESSARY FOR TIE-IN SHALL BE PRE-CHLORINATED AND PRE-FLUSHED IN THE PRESENCE OF AN ENVIRONMENTAL UTILITIES DEPARTMENT INSPECTOR.

UPON COMPLETION OF THE CONDITIONS NOTED ABOVE AND WITH THE APPROVAL OF THE EUD INSPECTOR, CONNECTION TO THE CITY SYSTEM MAY BE MADE. THE EUD INSPECTOR SHALL BE NOTIFIED 48 HOURS PRIOR TO THE START OF WORK.

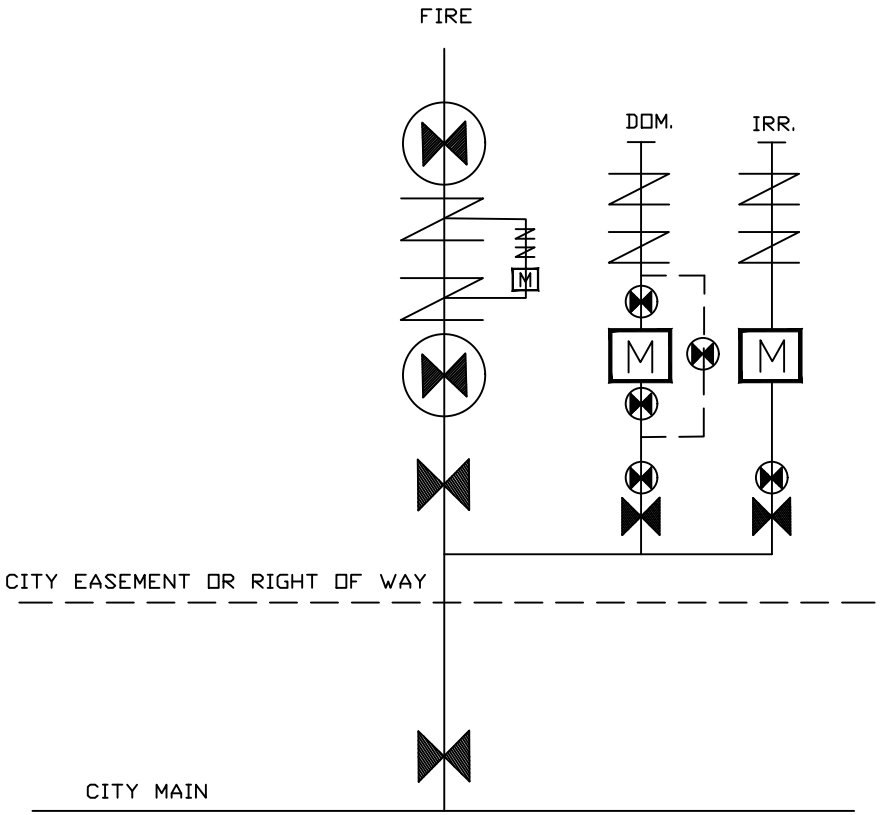
CONTRACTOR IS TO SIZE JUMPER ADEQUATELY FOR FLUSHING PURPOSES.

CITY OF ROSEVILLE CALIFORNIA
CITY OF ROSEVILLE
ENVIRONMENTAL UTILITIES DEPT.

CONSTRUCTION WATER DETAIL

SCALE: NONE
REVISED: JANUARY 2017
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-14



NOTES:

1) RESTRAINT ENTIRE MANIFOLD WITH APPROVED RESTRAINT SYSTEMS.

2) TAPS SHALL BE MADE SUCH THAT NO DEAD END LINES RESULT.

3) ALL LINES 3" AND LARGER SHALL BE DIP.

4) AFTER THE MANIFOLD, UNDERGROUND AND ABOVE, HAS BEEN ACCEPTED, METERS SHALL BE PURCHASED THROUGH THE CITY AND INSTALLED BY CITY CREWS. WATER MAY NOT DRAWN PRIOR TO TESTING AND TAGGING THE BACKFLOW DEVICE BY THE EUD

5) PROVIDE A PAD WITHIN THE LIMITS OF THE BACKFLOW MANIFOLD WITH POSITIVE DRAINAGE AND A 2% MAX. SLOPE.

6) IN A BACKFLOW MANIFOLD CONFIGURATION THAT INCLUDES DOMESTIC AND IRRIGATION SERVICES, THE IRRIGATION SERVICE TAP SHALL BE DOWNSTREAM OF THE DOMESTIC SERVICE TAP.

7) PROVIDE A MINIMUM 3 FOOT SEPARATION BETWEEN BACKFLOWS IN PARALLEL.

8) PROVIDE A 3' MINIMUM CLEARANCE FROM TOE OR TOP OF ANY SLOPE. NO SLOPES GREATER THAN 2:1 ADJACENT TO BACKFLOW MANIFOLD. IF THE ABOVE CRITERIA IS NOT MET, A RETAINING WALL IS REQUIRED. THE RETAINING WALL SHALL BE CONSTRUCTED OF CONCRETE OR MASONRY ONLY.

9) PROVIDE CURB STOPS AS REQUIRED PER THESE STANDARDS.

10) METER LID SHALL BE STENCILLED WITH THE NUMBER ADDRESS IT SERVES. USE WHITE ENAMEL PAINT AND 2" TALL STENCILING.

11) A METER BYPASS WITH A LOCKING CURB STOP OR LOCKING VALUE SHALL BE REQUIRED FOR ALL DOMESTIC SERVICES 3" AND LARGER OR WHERE REQUIRED.

12) MANIFOLD PIPING SHALL BE A MAXIMUM DEPTH OF 6 FEET.

13) MANIFOLD PIPING CONNECTING THE DOMESTIC AND IRRIGATION SERVICES SHALL BE 4" MINIMUM DIP BEYOND THE TEE CONNECTION WITH THE FIRE SERVICE.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

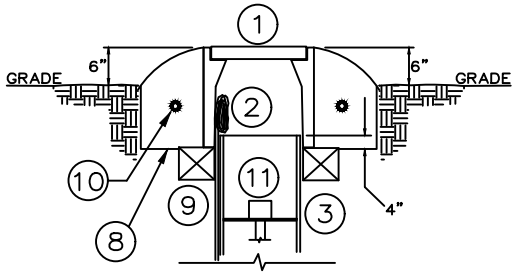
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

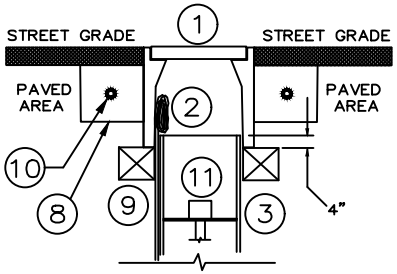
BACKFLOW MANIFOLD SCHEMATIC

SCALE: NONE
REVISED: JANUARY 2022
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

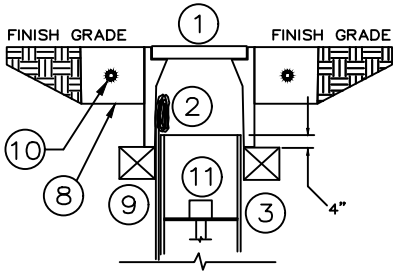
W-15



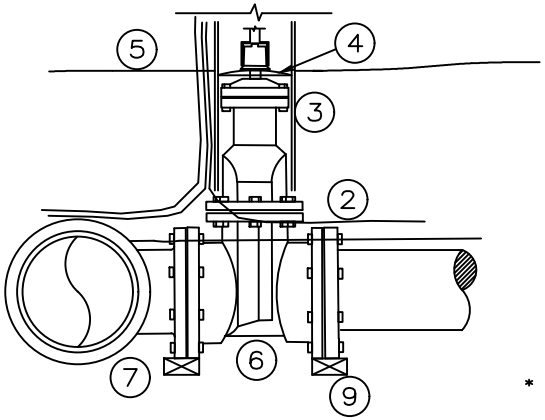
UNDEVELOPED AREA



PAVED AREA



LANDSCAPED AREA



GATE VALVE

MATERIALS

1) CONCRETE VALVE BOX
2) #12 INSULATED TRACING WIRE OUTSIDE RISER
3) 8" RISER STOCK
4) RISER ALIGNER
5) PLASTIC BACKFILL TAPE
6) GATE VALVE
7) DUCTILE IRON TEE
8) CONCRETE COLLAR (SEE NOTES) *
9) CONCRETE BRICK (SEE NOTES)
10) #4 REBAR AROUND CIRCUM. (TYP.)
11) VALVE EXTENSION PER SECTION 81-12.B

* CONCRETE COLLAR SHALL BE PLACED FLUSH TO FINISH GRADE IN ALL COLLECTORS AND ARTERIALS, OPTIONAL IN ALL OTHER ROADWAYS. FINISH SURFACE SHALL BE MEDIUM BROOM FINISH WITH PATTERN PERPENDICULAR TO VEHICLE TRAVEL DIRECTION. SET COLLAR 1/8" BELOW ADJACENT FINISHED PAVEMENTS.

NOTES:

TRACING WIRE THROUGH VALVE BOXES SHALL BE PLACED OUTSIDE OF RISER BUT INSIDE OF BOX.

TRACING WIRE SHALL BE SPLICED INSIDE THE VALVE BOX PER (W-17) AND SHALL LOOP WITHIN THE VALVE BOX WITH 18" OF SLACK WIRE

ALL GATE VALVES SHALL BE CENTERED IN A ONE PIECE RISER STOCK WITH THE USE OF A RISER ALIGNER

OPERATOR NUTS DEEPER THAN 40 INCHES FROM FINISH GRADE SHALL REQUIRE A VALVE NUT EXTENSION 2 FEET MINIMUM IN LENGTH.

VALVE BOXES LOCATED IN A PAVED AREA SHALL BE PLACED IN A 6" X 6" CONCRETE COLLAR A MINIMUM OF 3" BELOW PAVEMENT

VALVE BOXES LOCATED IN A LANDSCAPED AREA SHALL BE PLACED IN A 6" X 6" CONCRETE COLLAR AT FINISHED GRADE.

VALVE BOXES LOCATED IN AN UNDEVELOPED AREA SHALL BE PLACED IN A 12" DEEP BY 6" WIDE CONCRETE COLLAR 6 INCHES ABOVE GRADE.

INSTALL (3" X 5" CONCRETE BRICK) UNDER ENTIRE PERIMETER OF BOX.

VALVES AND FITTINGS SHALL BE WRAPPED AND SEALED IN 8 MIL POLYETHYLEN.E

VALVE RISOR STOCK SHALL BE A MINIMUM OF 4" INSIDE VALVE BOX AND MINIMUM 2" BELOW METAL RING.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

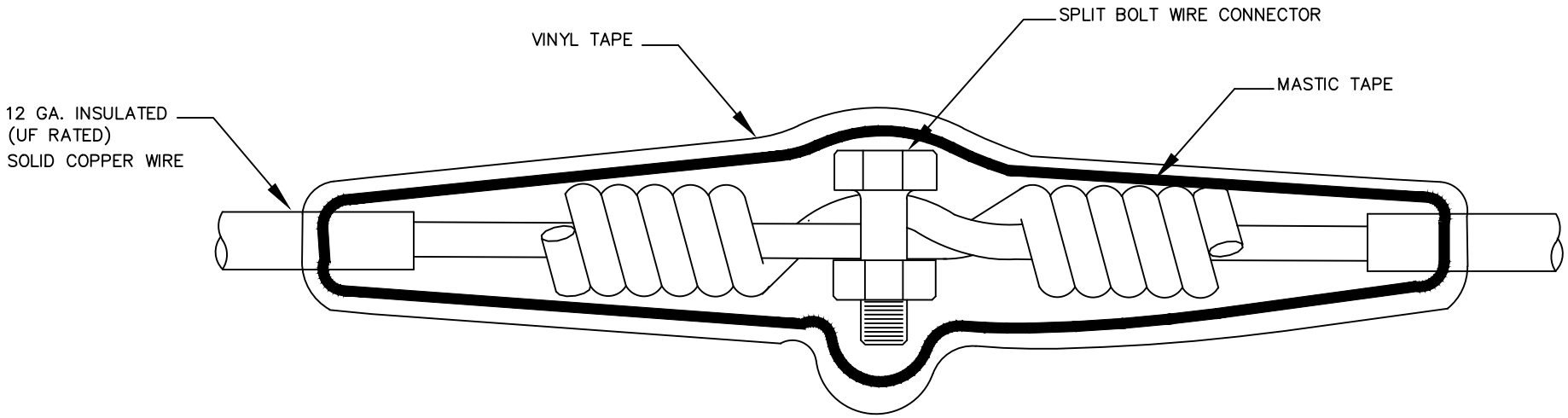
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

GATE VALVE & BOX

SCALE: NONE
REVISED: JANUARY 2020
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-16



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 DETAIL W–16.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

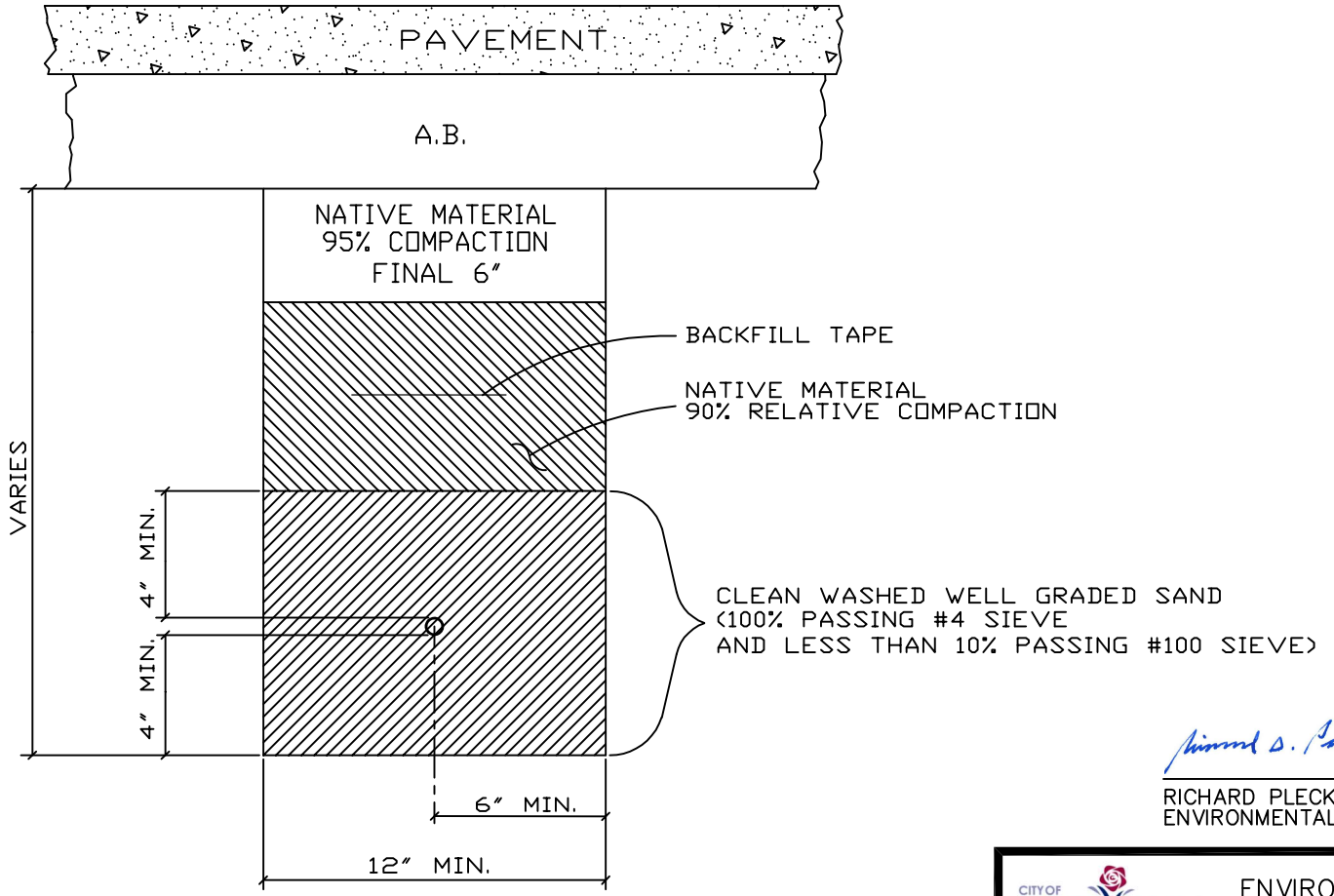
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

TRACING WIRE SPLICE

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–17



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

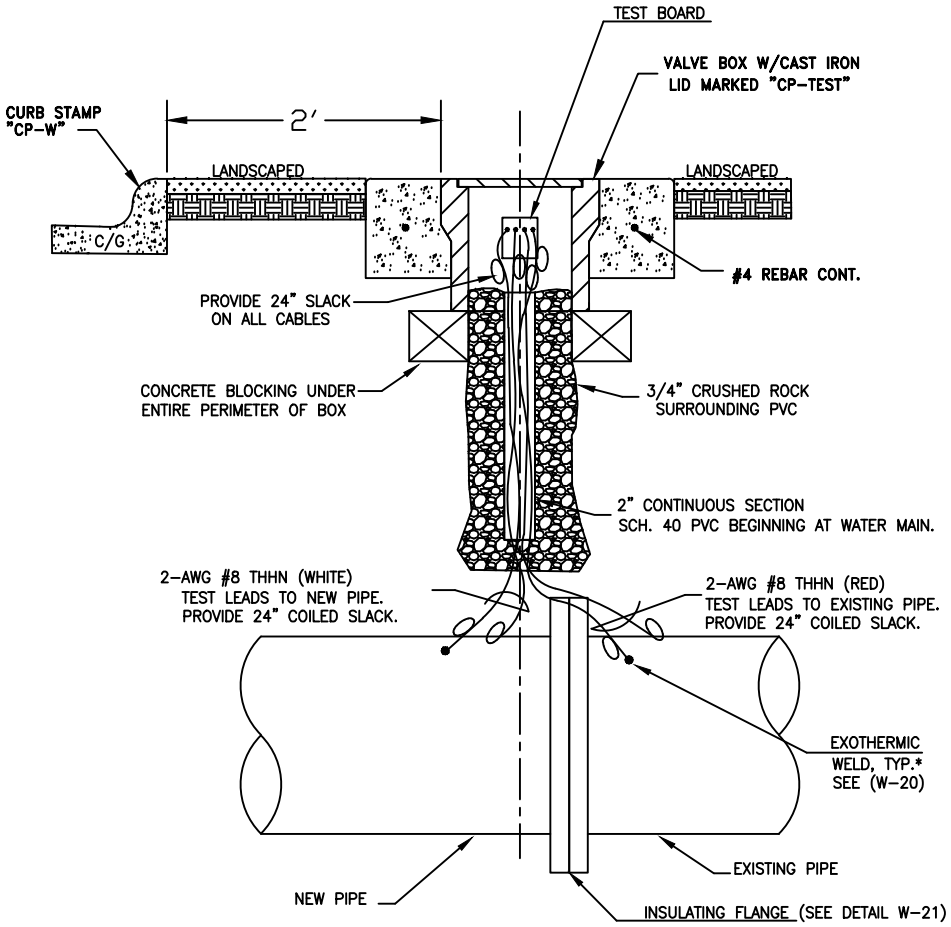
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

TRENCH AND BACKFILL FOR ALL WATER LINES 2" AND SMALLER

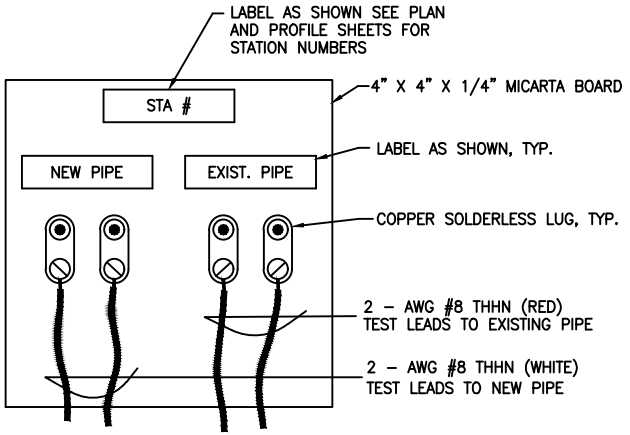
SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-18



TEST STATION (TYPICAL)

*FOR VALVES WELD ON FLANGE



TEST STATION BOARD (TYPICAL)

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

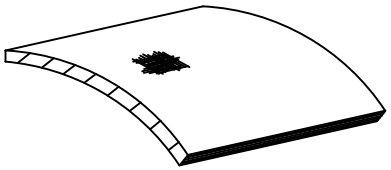
ENVIRONMENTAL UTILITIES DEPARTMENT

INSULATING FLANGE TEST STATION

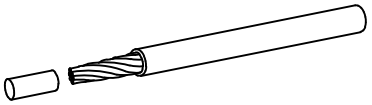
SCALE: NONE
REVISED: JANUARY 2017
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

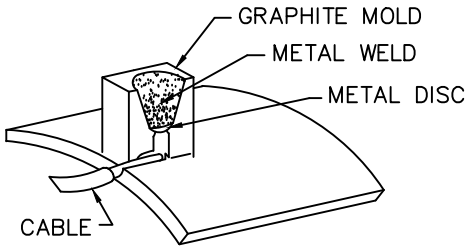
W-19

1) FILE TO BARE METAL & CLEAN OVER SURFACE

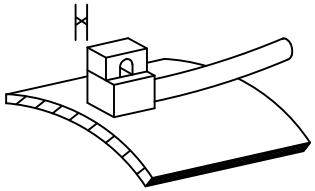


2) STRIP INSULATION FROM WIRE AND ATTACH SLEEVE



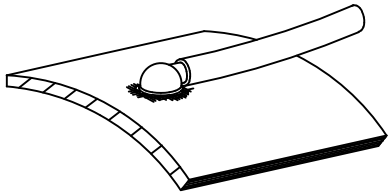


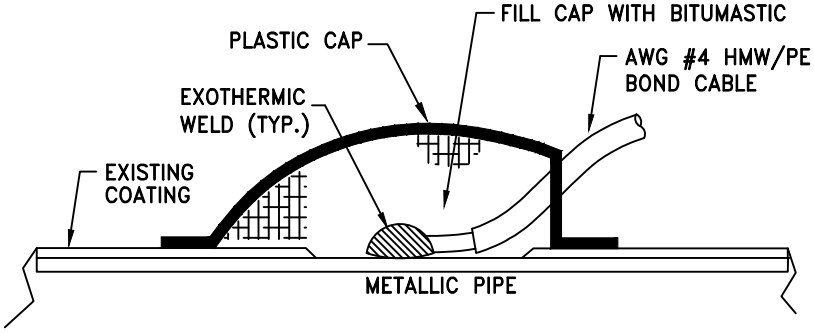
3) HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR, IGNITE WITH FLINT GUN



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





RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

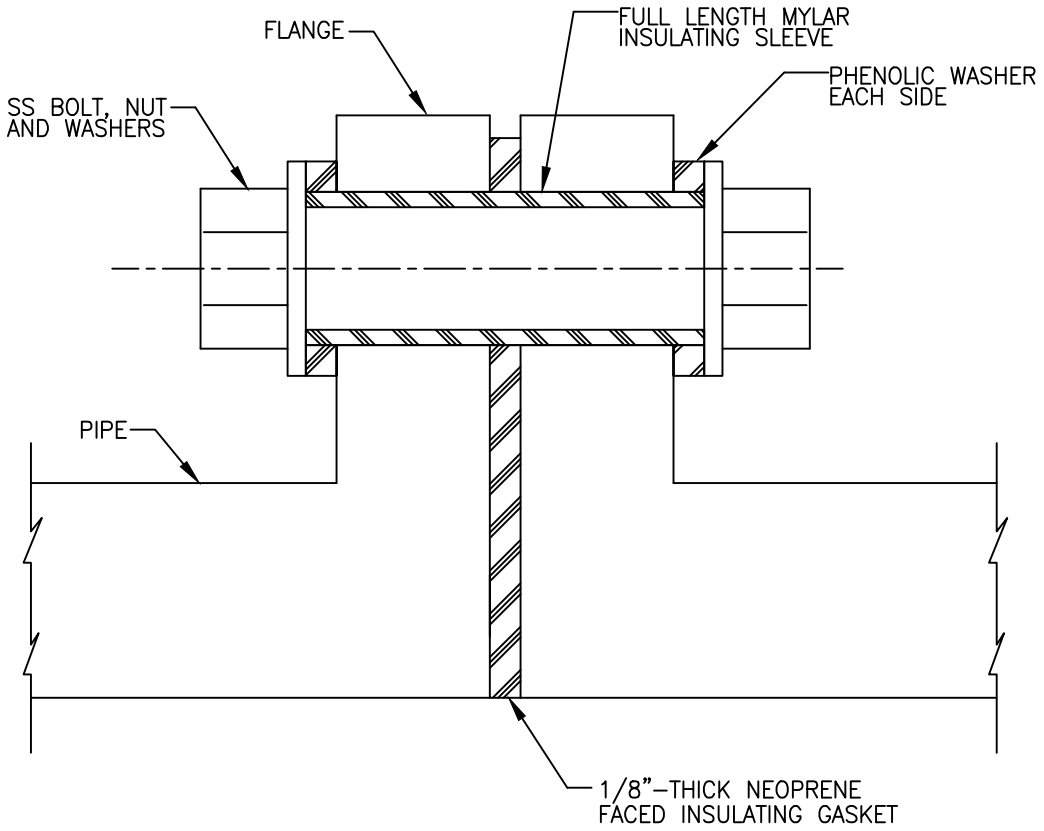
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

EXOTHERMIC WELD

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-20



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

1. DIELECTRIC FLANGE KITS SHALL BE MANUFACTURED BY F.H. MALONEY CP., CALPICO OR APPROVED EQUAL

2. PROVIDE AN INSULATING FLANGE TEST STATION FOR THE INSULATED FLANGE.

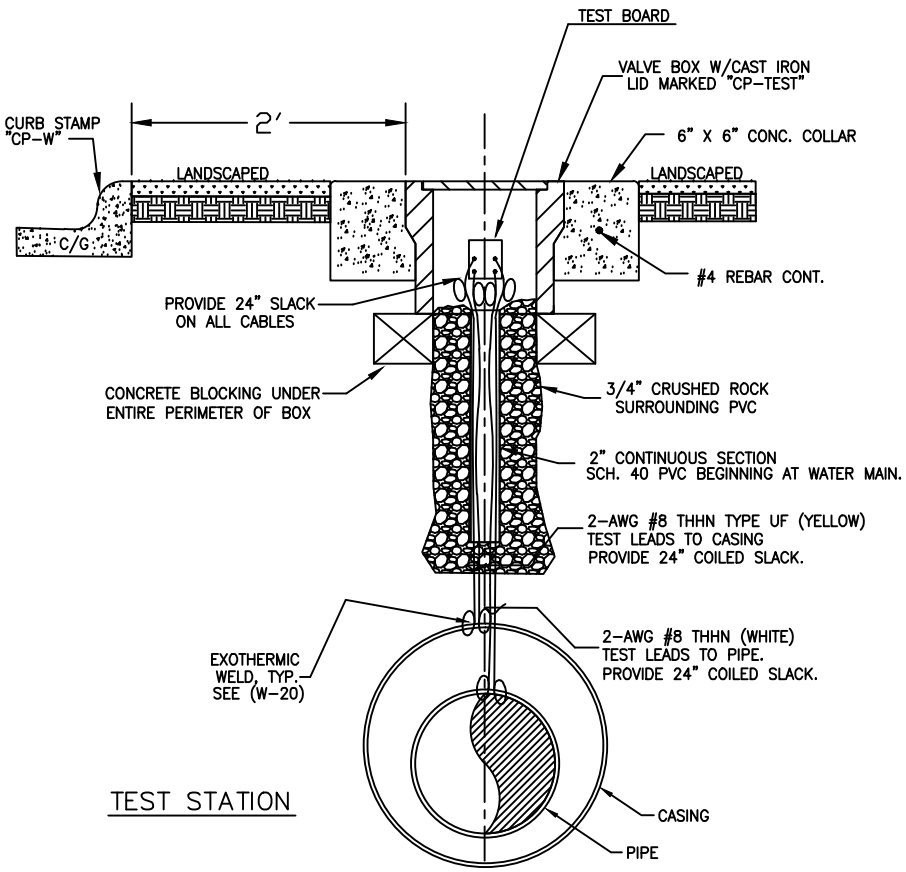
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

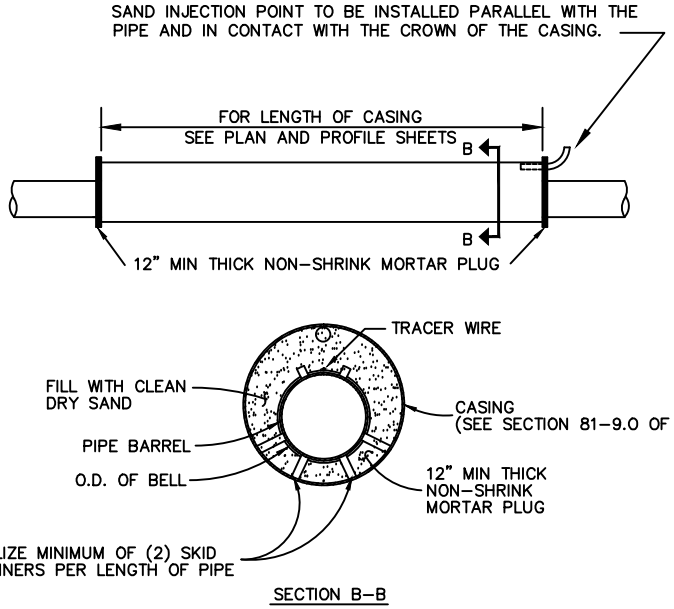
INSULATED FLANGE

SCALE: NONE
REVISED: JANUARY 2015
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W–21



TEST STATION

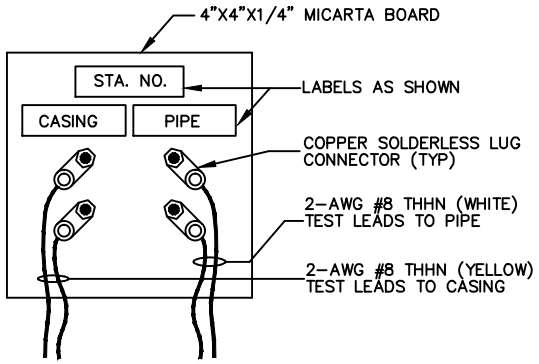


SECTION B-B

NOTES:

1. THE MINIMUM STRENGTH FOR STEEL CASING SHALL BE 35,000 PSI
2. 18 MIL COAL TAR EPOXY SHALL BE APPLIED ON THE INSIDE & OUTSIDE OF THE STEEL CASING.
3. RESTRAINED PIPE WITHIN CASINGS OR BRIDGES SHALL BE FULLY EXTENDED OR "STRETCHED OUT" TO REMOVE THE SLACK BETWEEN THE JOINTS THE ENTIRE LENGTH OF THE STRUCTURE.

CASING DETAIL



TEST BOARD

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

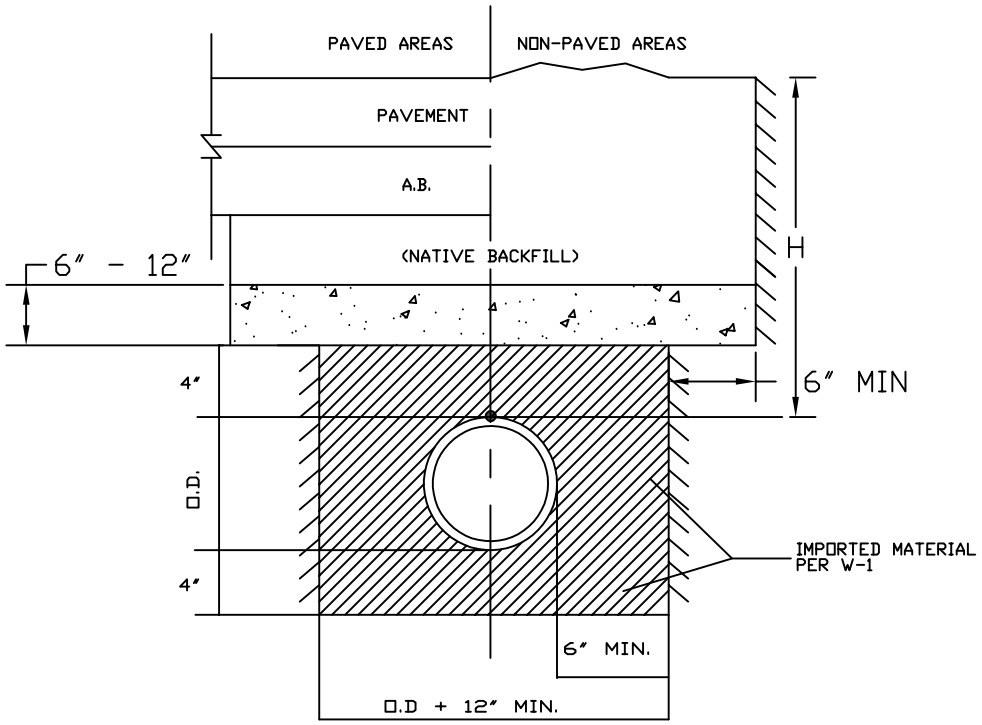
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

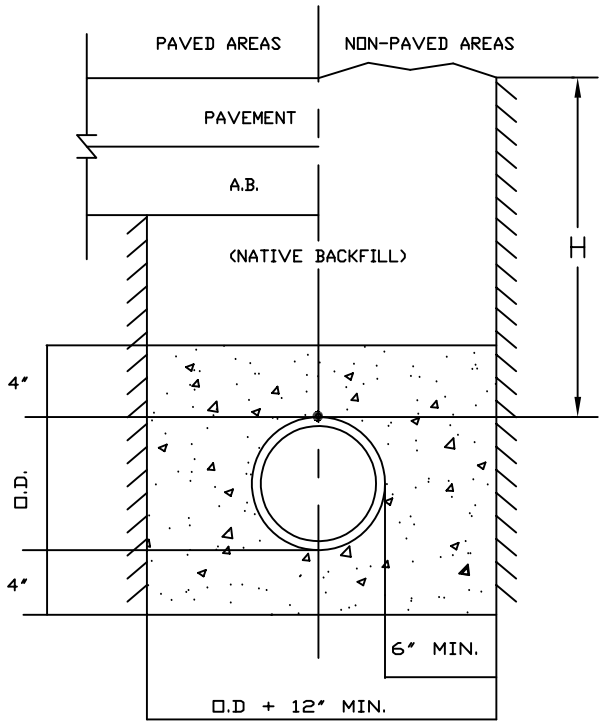
CASING & TEST STATION

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-22



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 1/2" CLOSED CELL 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 EUD DIRECTOR. IN MOST CASES, THE 36" MINIMUM COVER SHALL PREVAIL.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

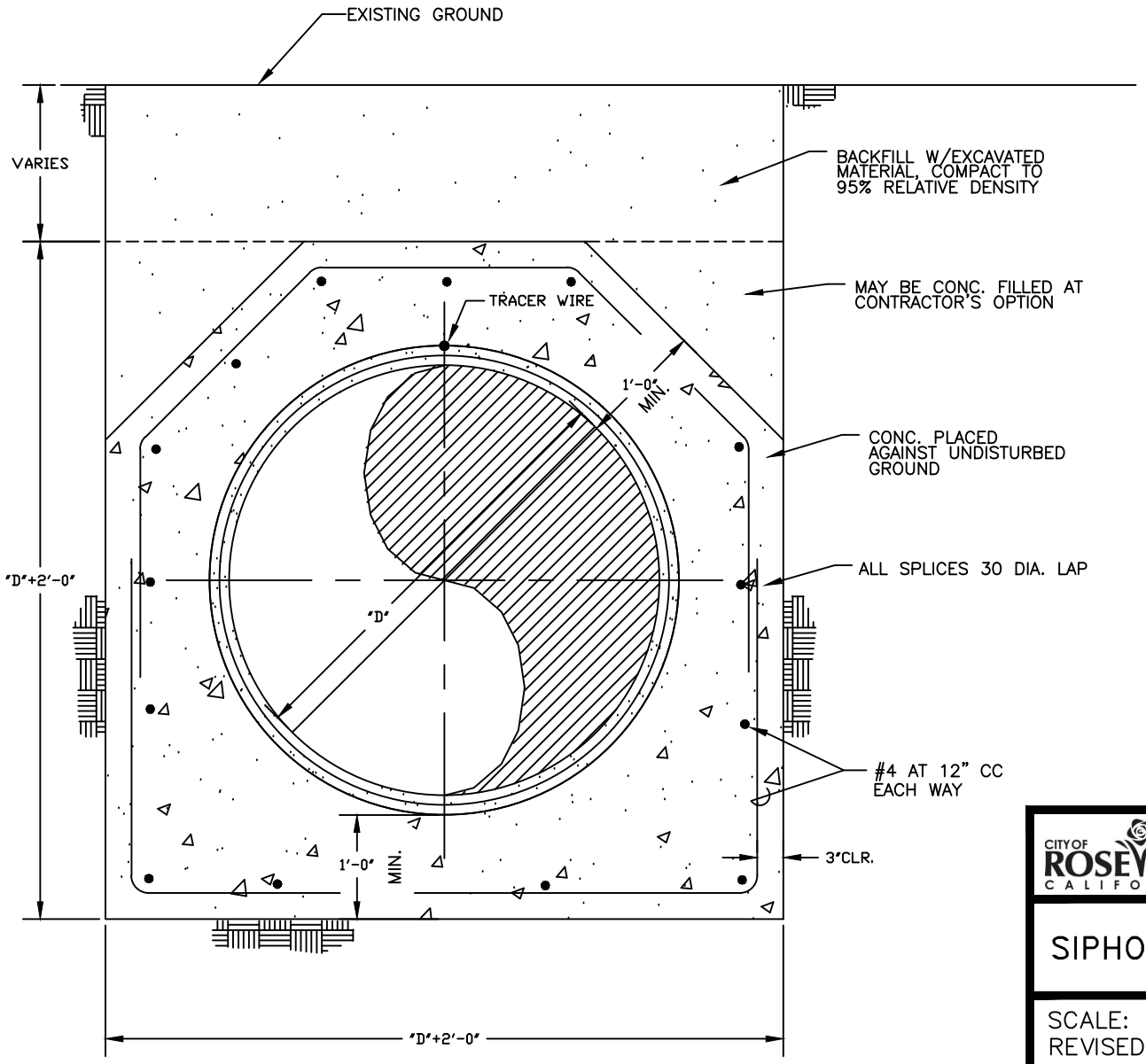
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

SHALLOW WATER MAINS

SCALE: NONE
REVISED: JANUARY 2017
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-23



NOTES:

1. RESTRAINED PIPE WITHIN CASINGS OR BRIDGES SHALL BE FULLY EXTENDED OR "STRETCHED OUT" TO REMOVE THE SLACK BETWEEN THE JOINTS THE ENTIRE LENGTH OF THE STRUCTURE.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

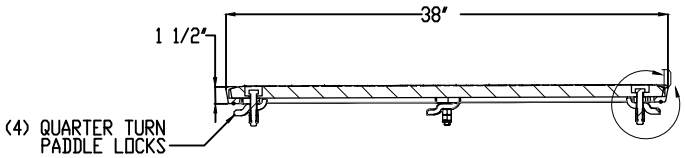
ENVIRONMENTAL UTILITIES DEPARTMENT

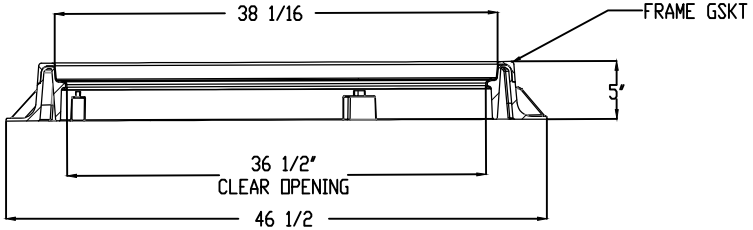
SIPHON CONCRETE ENCASEMENT

SCALE: NONE
REVISED: JANUARY 2020
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

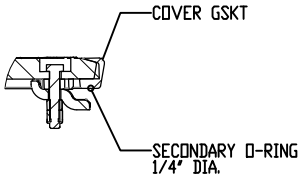
W-24

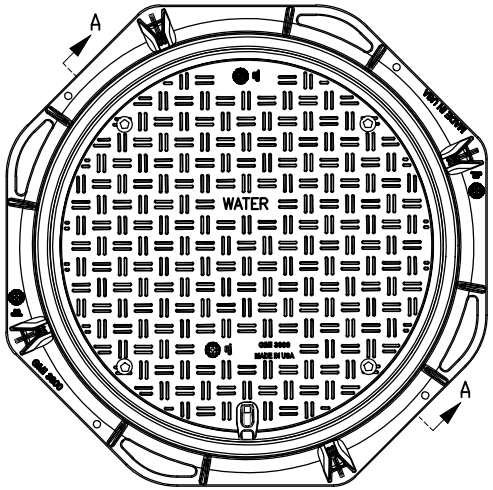
GMI Cover and Frame Assembly





SECTION A-A





RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA
ENVIRONMENTAL UTILITIES DEPARTMENT

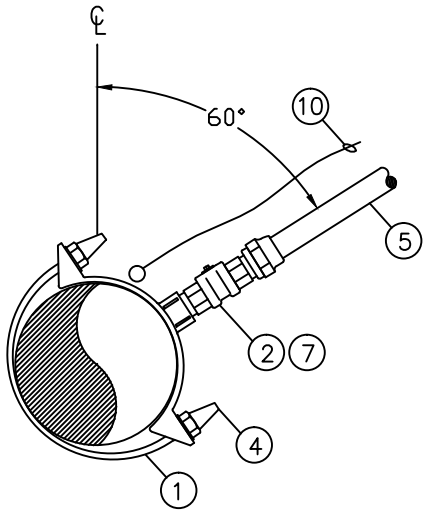
36" MANHOLE RING AND COVER

SCALE: NONE
REVISED: JANUARY 2017
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

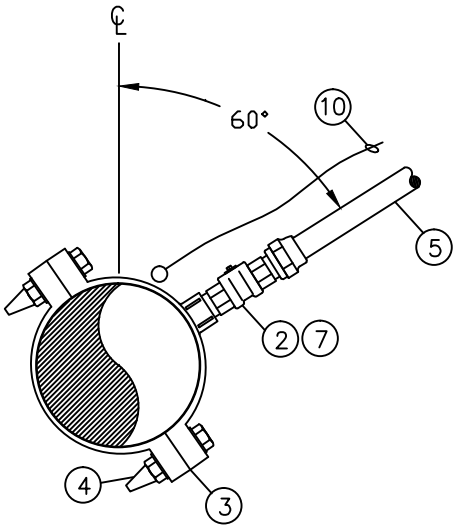
W-25

NOTES:

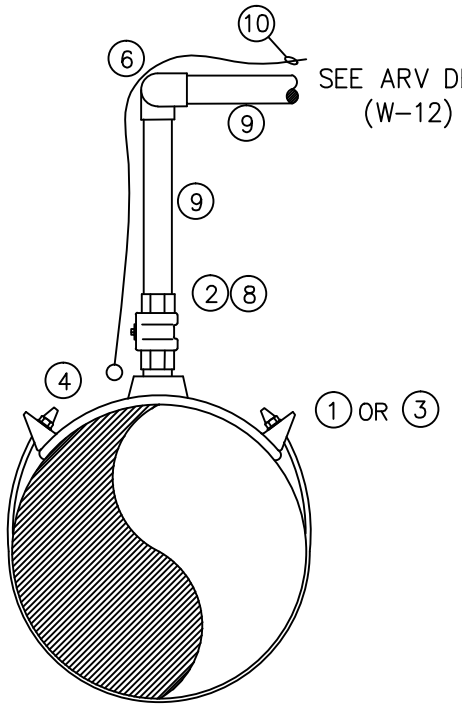
TO CONFORM TO AASHTO M306-05, H-20 AND H-25 EN/24 D4000.



DOUBLE STRAP
DUCTILE IRON PIPE SADDLE



PVC PIPE SADDLE



ARV SADDLE

MATERIALS:

1.) DOUBLE STRAP BRASS SADDLE FOR DUCTILE IRON MAIN
2.) INSULATING CORPORATION STOP OR NON INSULATED CORPORATION STOP WITH NYLON BUSHING
3.) BRASS SADDLE FOR PVC MAIN
4.) ZINC CAPS ON ALL BOLTS (ONLY WITH NON-INSULATED CORPORATION STOP)
5.) COPPER SERVICE
6.) SWING JOINT (2 – 90° BRASS FITTINGS)
7.) CORP STOP W/COMPRESSION COUPLING
8.) CORP STOP W/THREADED COUPLING
9.) THREADED BRASS PIPE
10.) TRACING WIRE (FOR COMMERCIAL SERVICES ONLY)

NOTES:

WRAP CORPORATION STOP AND COPPER SERVICE A MINIMUM OF 3' WITH AN APPROVED DIELECTRIC TAPE AND POLYKEN PRIMER PER MANUFACTURER'S RECOMENDATIONS.

SADDLES SHALL BE WRAPPED IN 8 MIL POLYETHYLENE AND BACKFILLED WITH SAND.

TRACING WIRE SHALL BE REQUIRED ON ARV, HYDRANT RUNS, BLOW OFFS, SERVICES WITHOUT CONTINUOUS COPPER PIPE, AND OTHER MAJOR APPURTENANCES.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

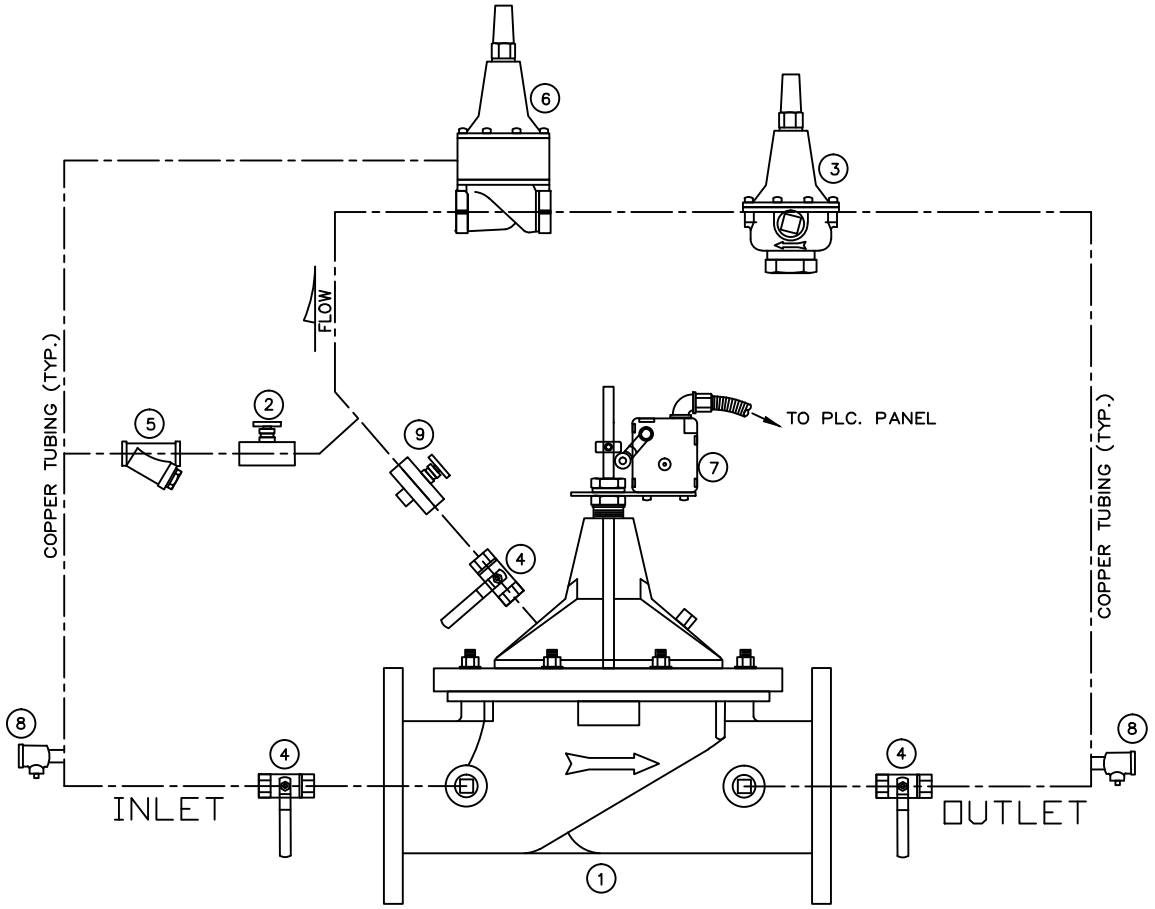
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

SADDLE DETAIL

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-26



1) MAIN VALVE, STAINLESS STEEL BODY, AMES, CLA VAL
2) NEEDLE VALVE, DELTRO
3) PRESSURE REDUCING CONTROL, AMES CP-15,
4) BALL VALVES, APOLLO OR HOKE
5) "Y" STRAINER WITH BRASS PLUG 1/4"NPT
6) PRESSURE SUSTAINING VALVE, AMES CP-16,
7) OPEN LIMIT SWITCH, MICROSWITCH
8) TEST COCK, MIPT 1/4" BRASS
9) OPENING SPEED CONTROL, DELTRO

RICHARD PLECKERD
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

CITY APPROVED GATE VALVES SHALL BE PLACED UP AND DOWN STREAM OF MAIN VALVE.

FITTINGS SHALL BE BRASS COMPRESSION TYPE

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

COMBINATION PRESSURE REDUCING AND PRESSURE SUSTAINING VALVE

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-28

NOTES:

PIPE SHALL BE DUCTILE IRON FOR 3" AND LARGER.

INSTALL (3" X 5") CONCRETE BRICK UNDER ENTIRE PERIMETER OF THE UTILITY BOX.

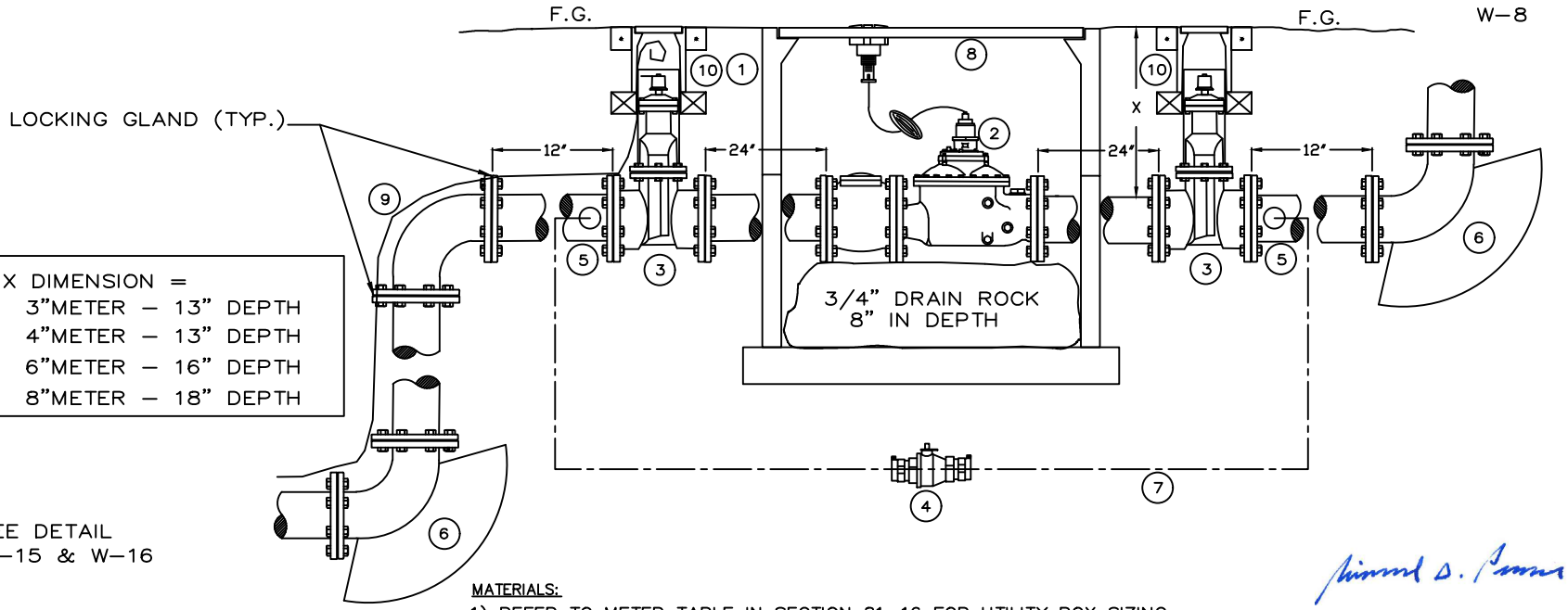
PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL. POLYETHYLENE

USE CITY APPROVED RESTRAINED JOINTS OR FLANGED SPOOLS

WATER METER SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.

USE TURBO METER FOR IRIGATION & COMPOUND METER FOR COMMERCIAL SERVICE.

TO BACKFLOW
SEE DETAIL
W–8



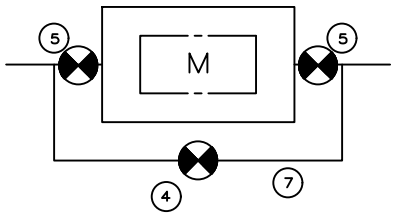
X DIMENSION =
3"METER – 13" DEPTH
4"METER – 13" DEPTH
6"METER – 16" DEPTH
8"METER – 18" DEPTH

SEE DETAIL
W–15 & W–16

MATERIALS:

1) REFER TO METER TABLE IN SECTION 81–16 FOR UTILITY BOX SIZING. WITH EXTENSION. MORTAR EXTENSION JOINT INSIDE AND OUT.
2) METER WITH STRAINER (PURCHASED THROUGH CITY) INSTALL IDLER SPOOL DURING INSTALLATION OF METER BOX.
3) RESILENT SEAT GATE VALVE (3"–6")
4) 2" LOCKING CURB STOP IN G–5 BOX
5) 2" DOUBLE STRAP BRASS SADDLE FOR DUCTILE IRON MAIN WITH 2" MIPT BY COMPRESSION ADAPTER
6) THRUST BLOCKS (TYP.)
7) 2" BYPASS PIPE MATERIAL TO BE SOFT COPPER TYPE K (STICK NOT ROLLED COPPER) AND FITTINGS TO BE BRASS COMPRESSION TYPE.
8) METAL TRAFFIC LID WELD MARKED "RSVL WATER"
9) TRACING WIRE
10) SEE W–16 FOR VALVE BOX AND RISER DETAIL
11) TOP OF GATE VALVE MUST BE A MIN. 18" FROM FINISH GRADE

PLAN VIEW:
METER BYPASS



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

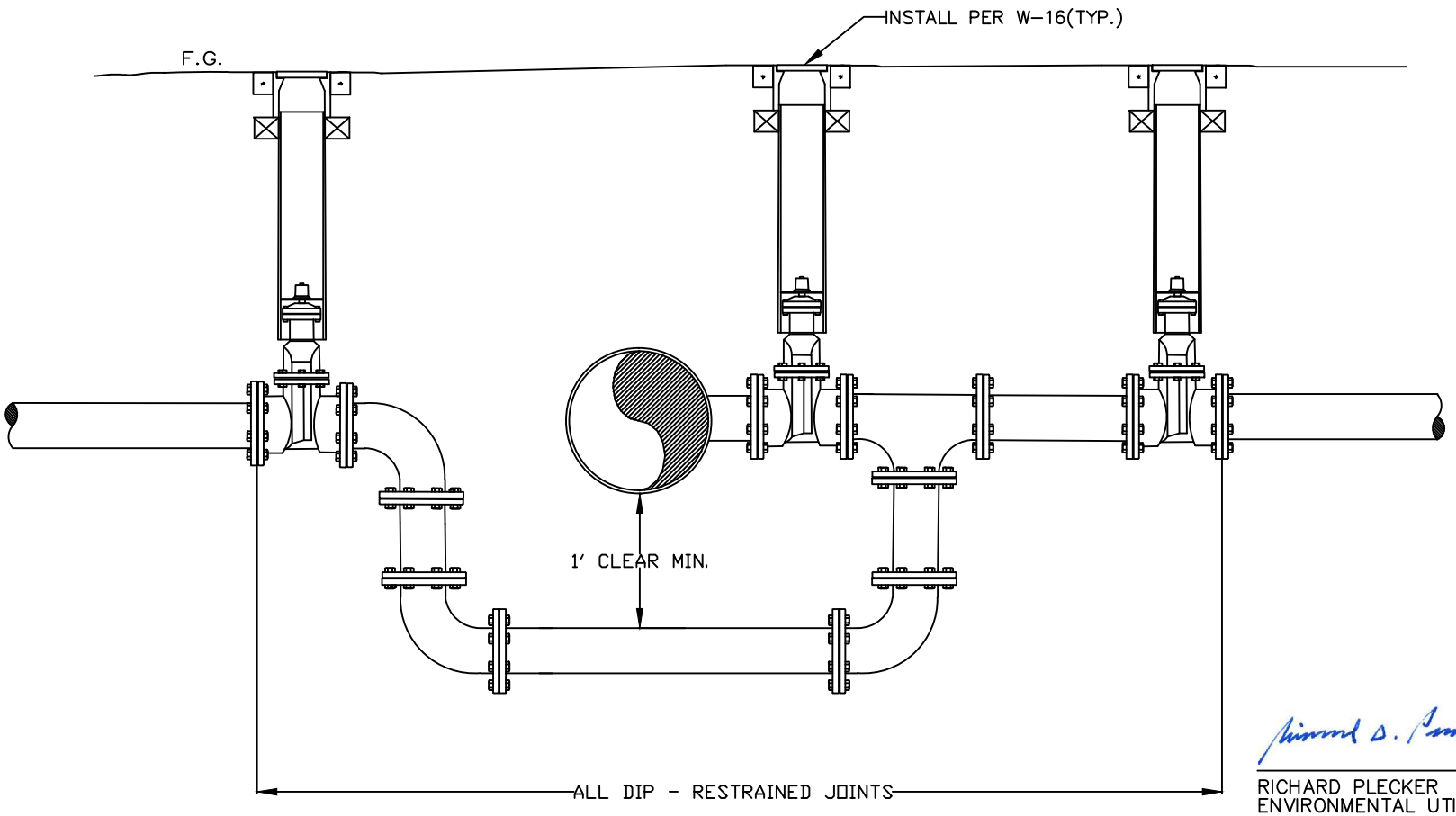
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

3", 4", 6", 8" COMPOUND & TURBO METER WITH BYPASS

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J. THOMPSON
APPROVED BY: RICHARD PLECKER

W–29



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

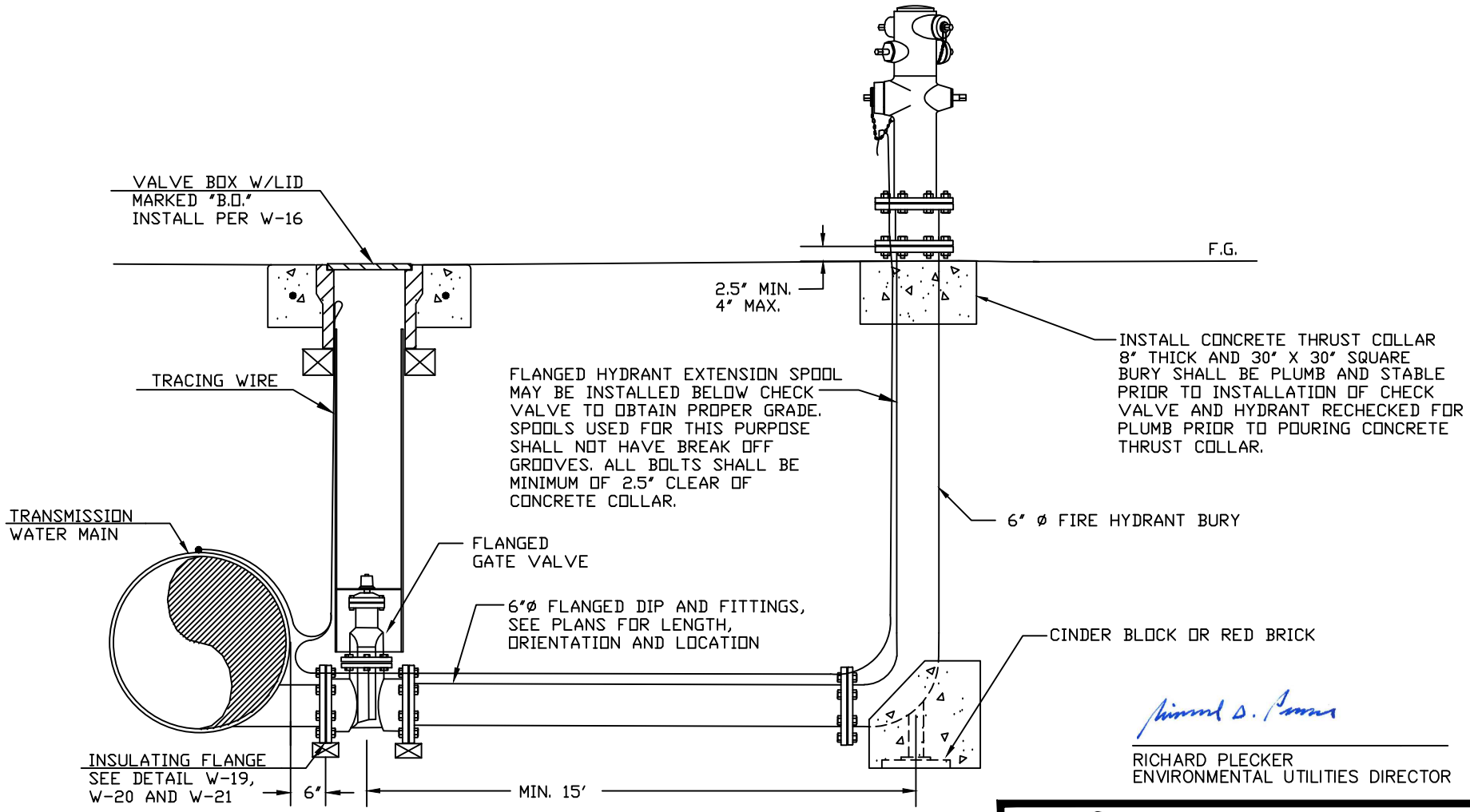
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

FLOW THRU DETAIL

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-30



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

1. STATION LOCATIONS SHOWN ON PLANS ARE APPROXIMATE. PLACE BLOW-OFFS ADJACENT TO LOW POINT IN MAIN LINE.
2. ALL FITTINGS SHALL BE DIP.
3. HYDRANT BOLTS SHALL BE BREAK AWAY. INSTALLED NUT SIDE UP AND FILLED WITH 25 YEAR (MIN) SILICONE CAULK.
4. ENTIRE LENGTH TO BE RESTRAINED.
5. CONTRACTOR HAS THE OPTION OF USING MECHANICAL JOINT (MJ) FITTING. IF MJ FITTINGS ARE USED, MEGALUGS SHALL BE INSTALLED.
6. CONCRETE INSTALLED FOR STABILITY.

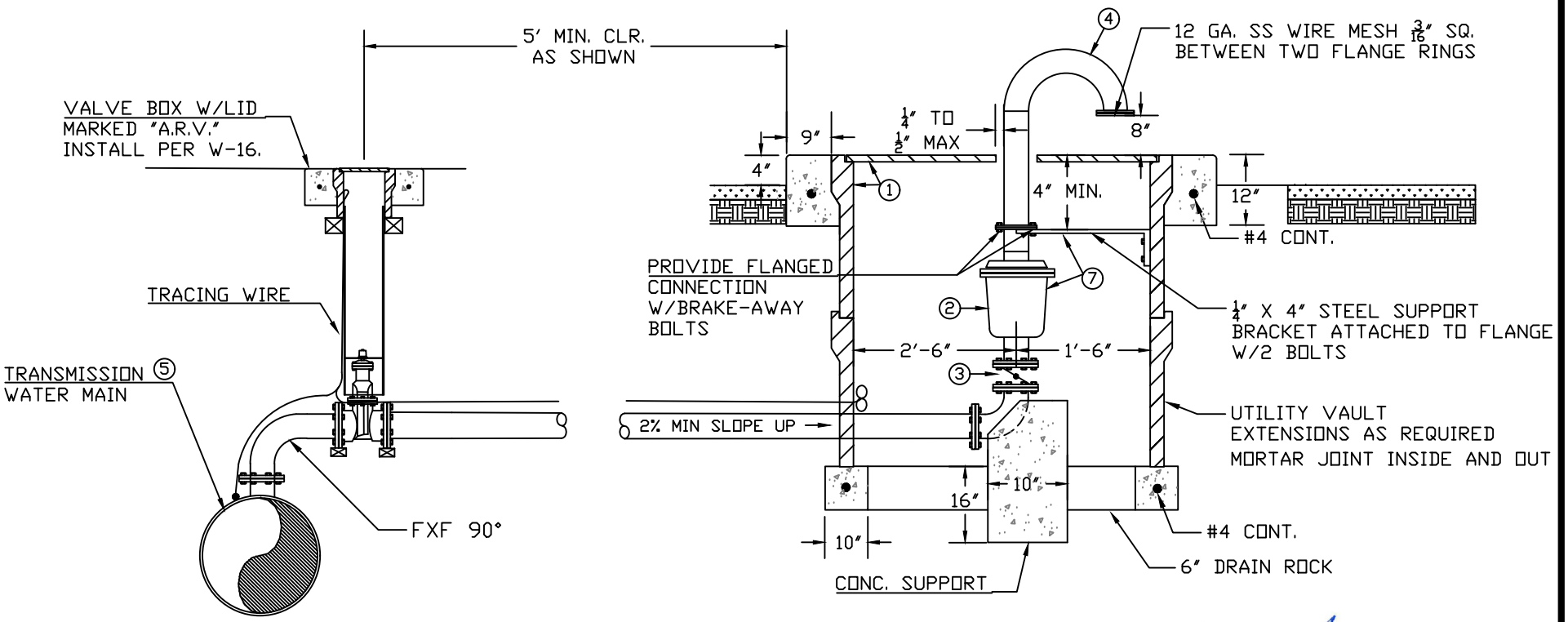
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

TRANSMISSION MAIN HYDRANT BLOW OFF

SCALE: NONE
REVISED: JANUARY 2024
DRAWN BY: JACK VAROZZA
APPROVED BY: RICHARD PLECKER

W-32



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

1. PRECAST CONC. UTILITY BOX (48"X48" I.D.) WITH GALV. STEEL LID CHECKERED PLATE COVER (2 PIECE SPLIT LID, DESIGNED FOR H20 LOADING) MARKED "RSVL A.R.V." (USE SS HOLD DOWN SCREWS).
2. COMBINATION AIR/VACUUM RELEASE VALVE, PIPING, AND FITTINGS SIZED AS SHOWN ON PLAN & PROFILE SHEETS. (VALVE SHALL BE FLANGED)
3. FLANGED BUTTERFLY VALVE WITH HAND WHEEL OPERATOR.
4. WSP VENT, SCH 40, GALV. AFTER FABRICATION.
5. ARV TO BE PLACED AT HIGH POINT OF PIPE AT SIDE OUTLET FLANGE.
6. RESTRAIN ALL JOINTS BETWEEN C.C.P. AND ARV. RESTRAINED MJ WITH MEGALUG GLANDS MAY BE USED IN LUE OF FLANGED FITTINGS BEYOND G.V.
7. EXPOSED NON-GALVANIZED PIPING, VALVES, AND APPUR. SHALL BE PAINTED WITH TWO PRIMER AND TWO FINISH COATS OF MACHINERY ENAMEL (COLOR TO BE SELECTED BY EUD)
8. ALL BURIED PIPE, FITTINGS, VALVES AND APPUR. SHALL BE DUCTILE IRON AND ENCASED WITH 8 MIL. POLYETHYLENE.
9. CONCRETE INSTALLED FOR STABILITY.

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

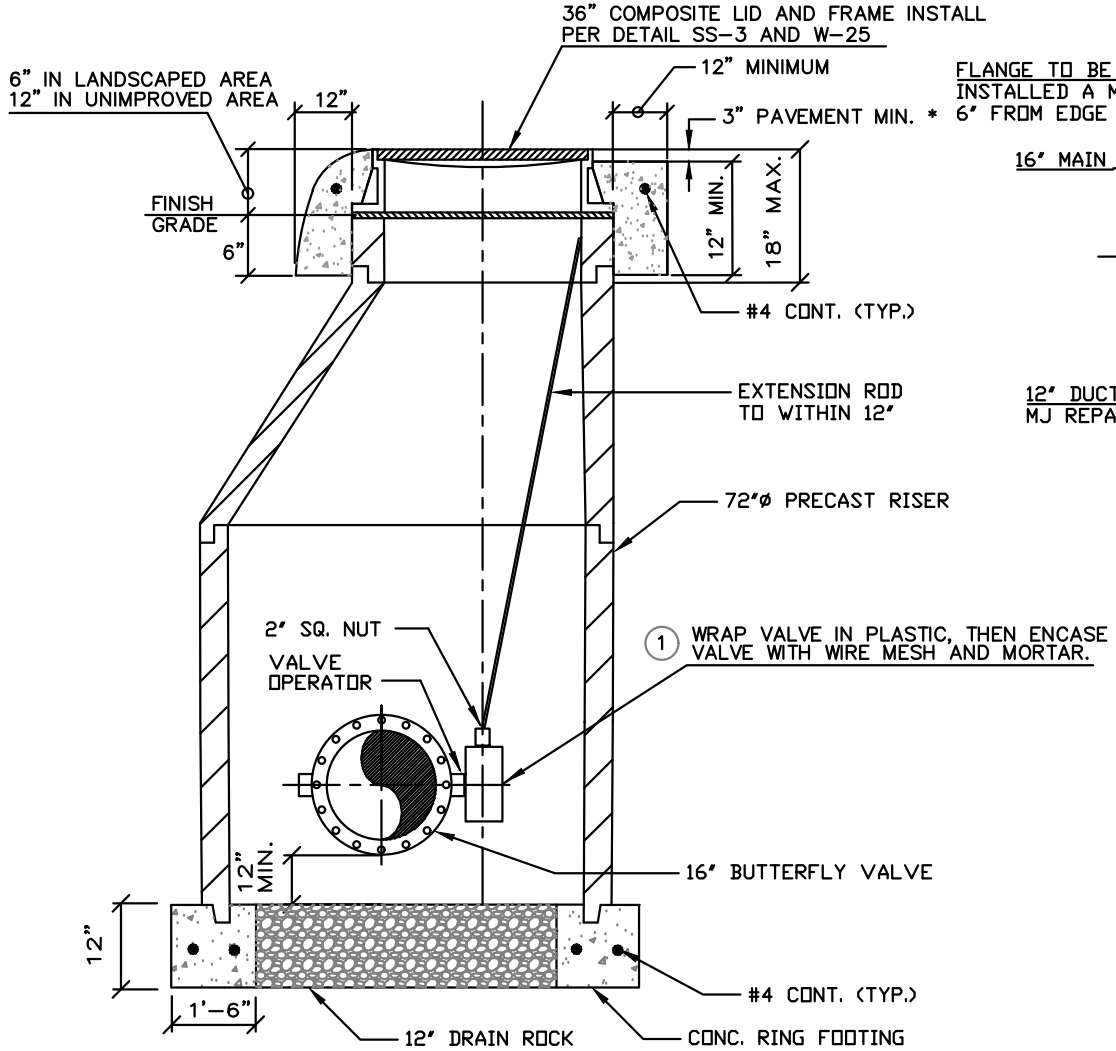
3" THROUGH 6" ARV

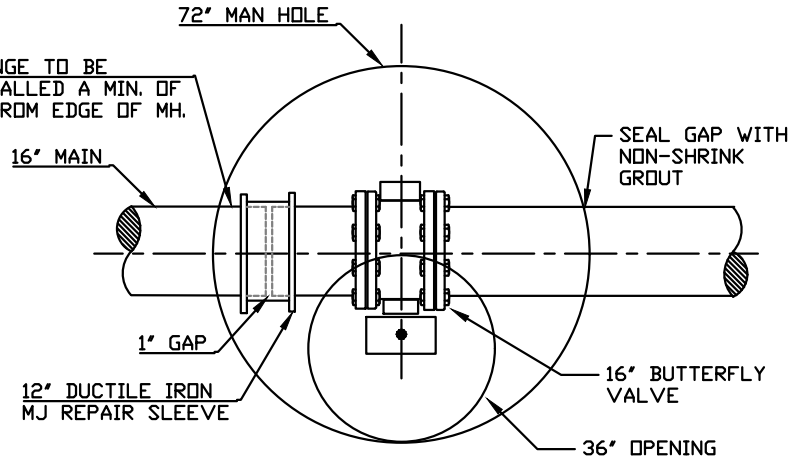
SCALE: NONE
REVISED: JANUARY 2020
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-33

NOTES

1. SEE VALVE BONDING DETAIL FOR ADDITIONAL REQUIREMENTS.





* NOTE: CONCRETE AROUND RIM SHALL BE BROUGHT TO FINISH GRADE FOR ALL COLLECTORS AND ARTERIALS, OPTIONAL IN ALL OTHER ROADWAYS. FINISH SURFACE SHALL BE MEDIUM FINISH WITH PATTERN PERPENDICULAR TO TRAVEL DIRECTION.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

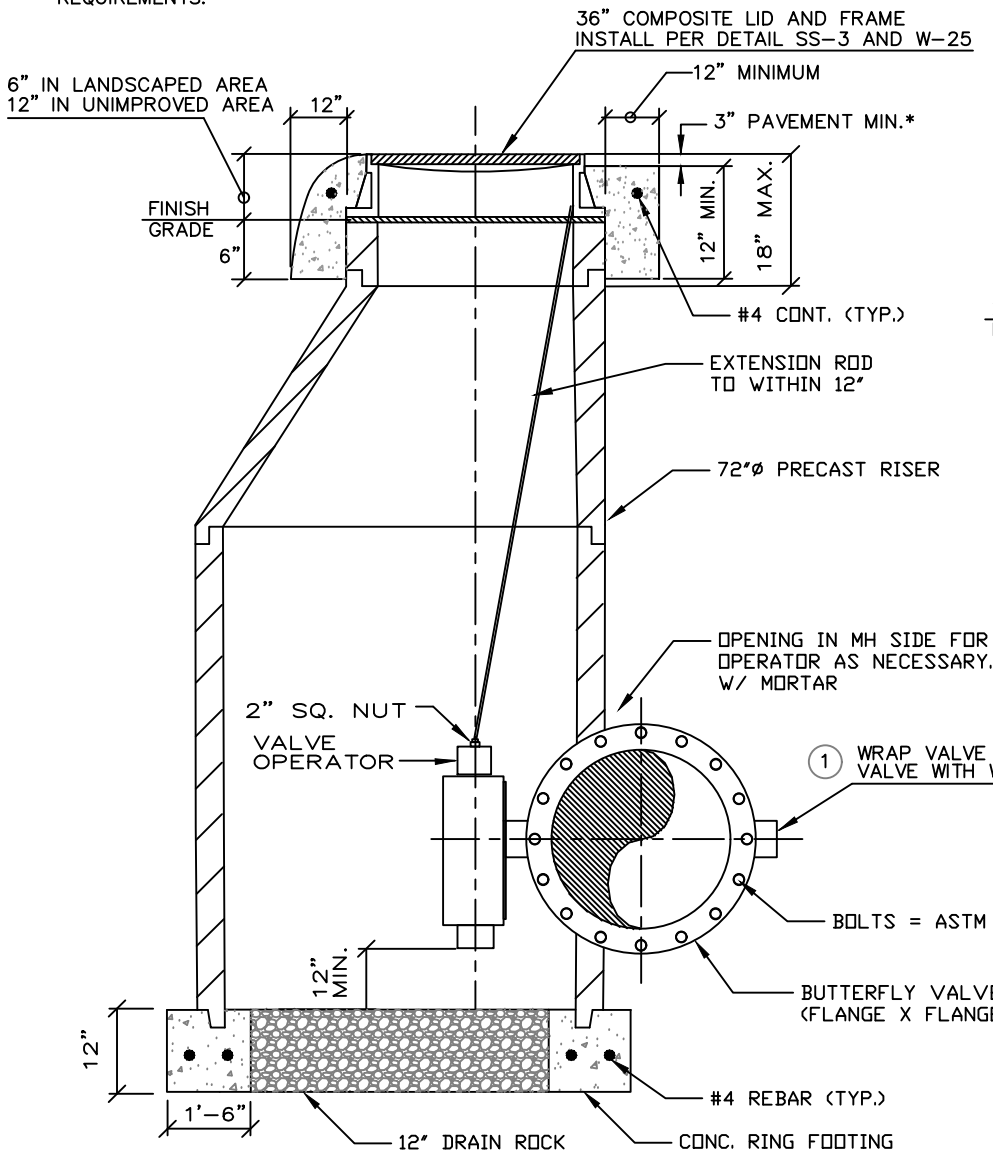
16" MAINLINE VALVE ENCLOSURE

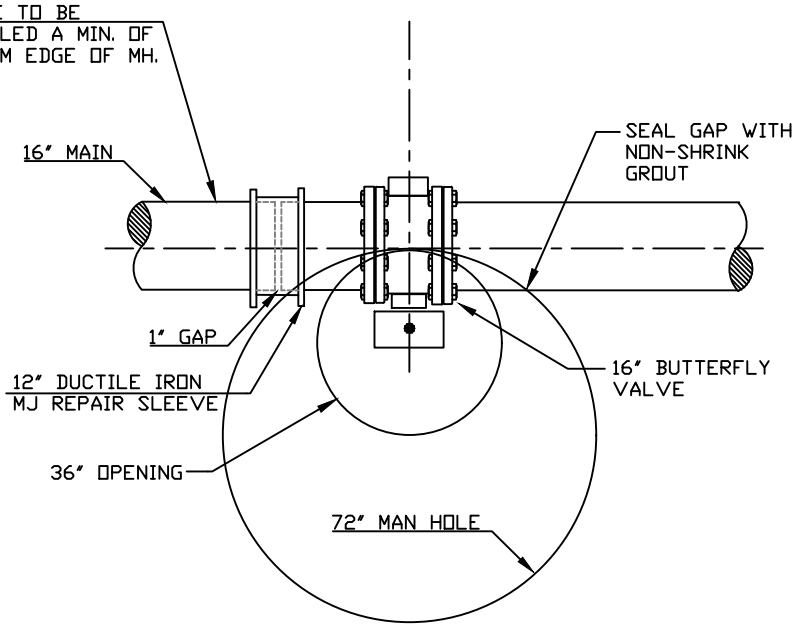
SCALE: NONE
REVISED: JANUARY 2023
DRAWN BY: J. THOMPSON
APPROVED BY: RICHARD PLECKER

W-34

NOTES

1. SEE VALVE BONDING DETAIL FOR ADDITIONAL REQUIREMENTS.





* NOTE: CONCRETE COLLAR SHALL BE PLACED FLUSH (WITHIN 1/8") OF FINISH GRADE IN ALL COLLECTORS & ARTERIALS, OPTIONSL FOR ALL OTHER ROADWAYS. FINISH SURFACE SHALL BE MEDIUM BROOM FINISH WITH PATTERN PERPENDICULAR TO VEHICLE TRAVEL DIRECTION.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

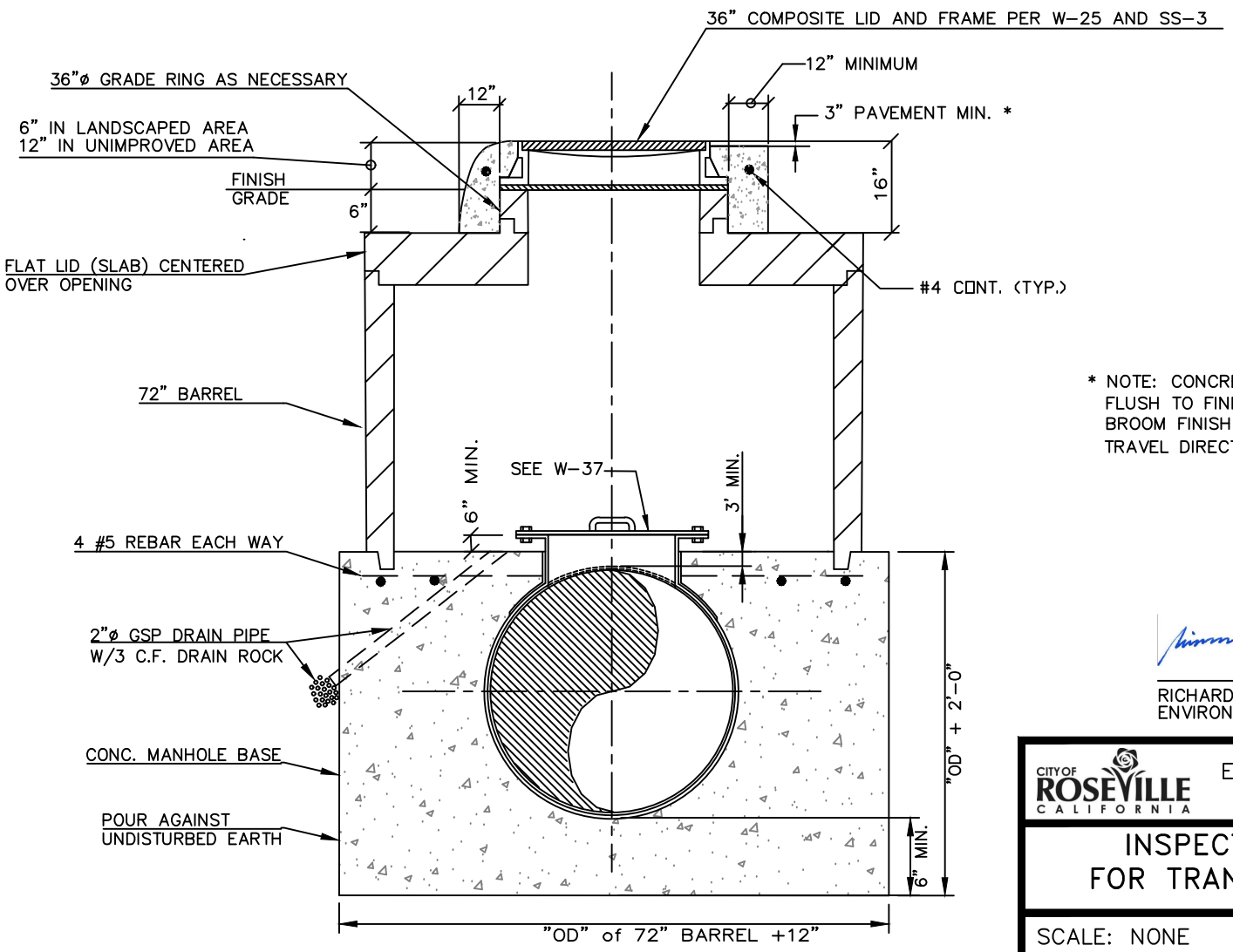
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

24" & LARGER MAINLINE VALVE

SCALE: NONE
REVISED: JANUARY 2024
DRAWN BY: J. THOMPSON
APPROVED BY: RICHARD PLECKER

W-35



* NOTE: CONCRETE COLLAR MAY BE PLACED FLUSH TO FINISHED SURFACE WITH MEDIUM BROOM FINISH PERPENDICULAR TO VEHICLE TRAVEL DIRECTION.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

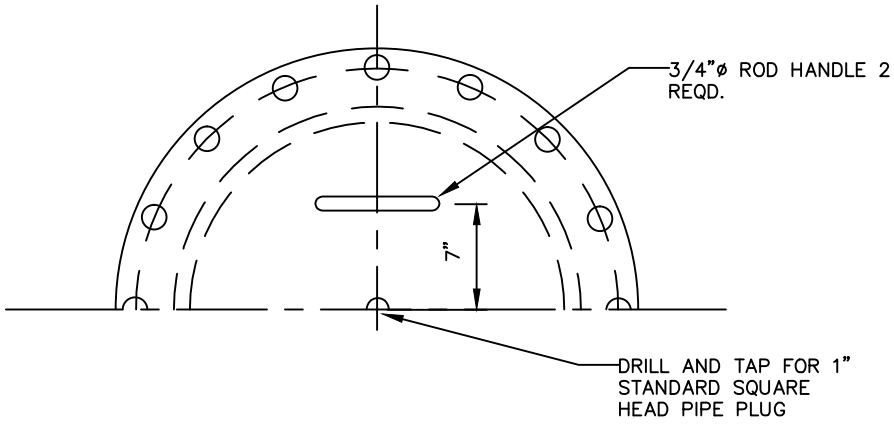
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

INSPECTION MANHOLE FOR TRANSMISSION MAINS

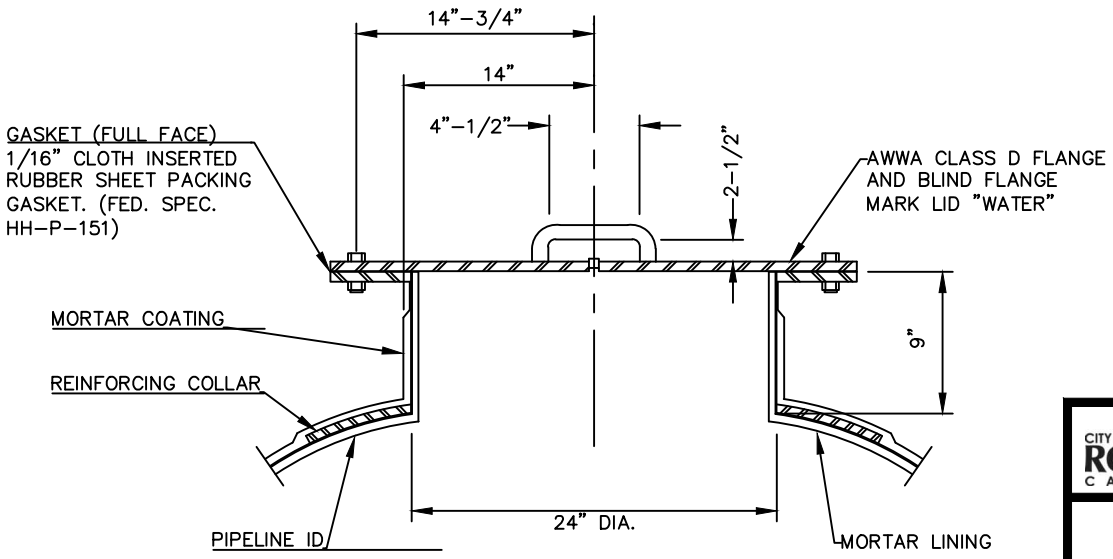
SCALE: NONE
REVISED: JANUARY 2018
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-36



NOTES

CONSTRUCT MANHOLE PER AWWA C208 AND C303. DESIGN PRESSURE SHALL MEET OR EXCEED PIPELINE DESIGN PRESSURE.



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

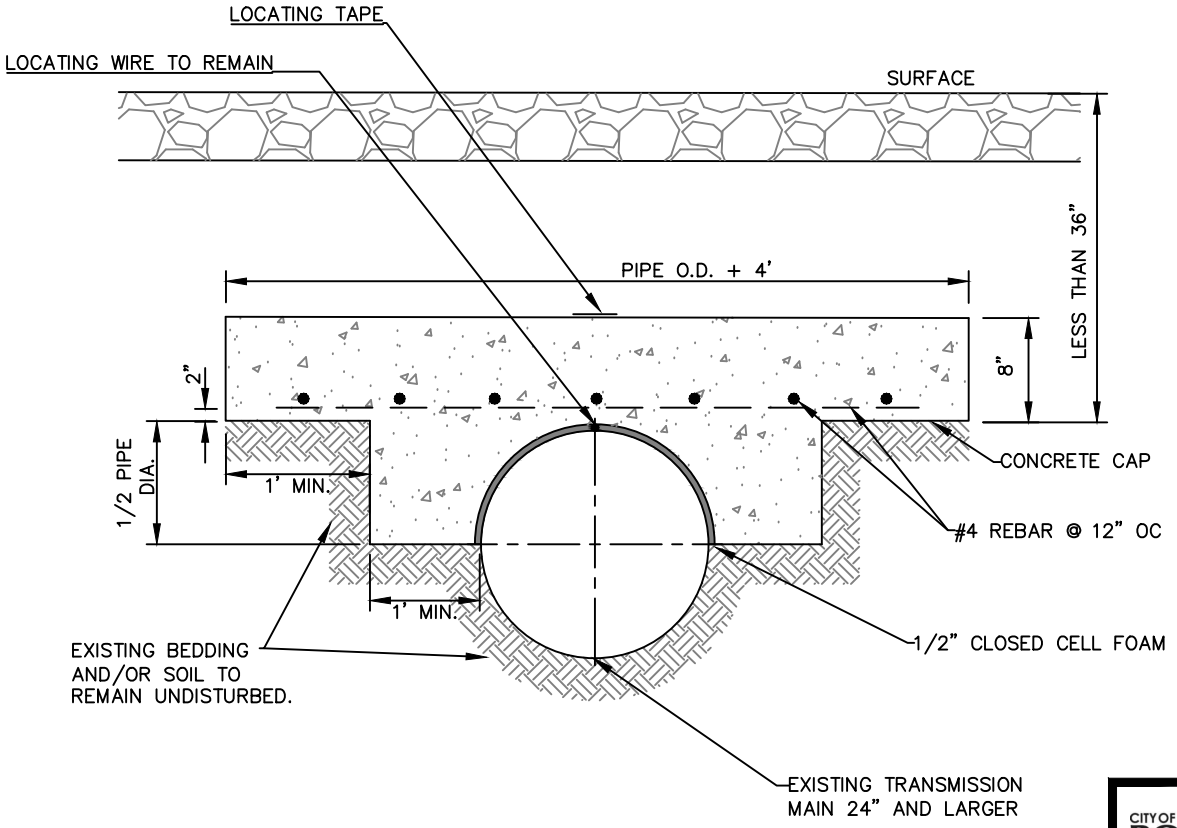
INSPECTION PORT FOR TRANSMISSION MAINS

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-37

NOTES

1. CONCRETE CAP REQUIRED FOR ALL AREAS WITH LESS THAN 36" COVER
2. CONCRETE SHALL BE 5 SACK MIX MECHANICALLY TAMPED TO ELIMINATE VOIDS.



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

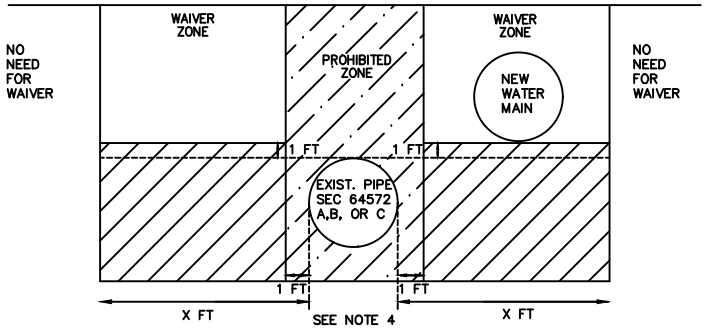
ENVIRONMENTAL UTILITIES DEPARTMENT

CONCRETE CAP ON SHALLOW C.C.P. TRANSMISSION MAIN

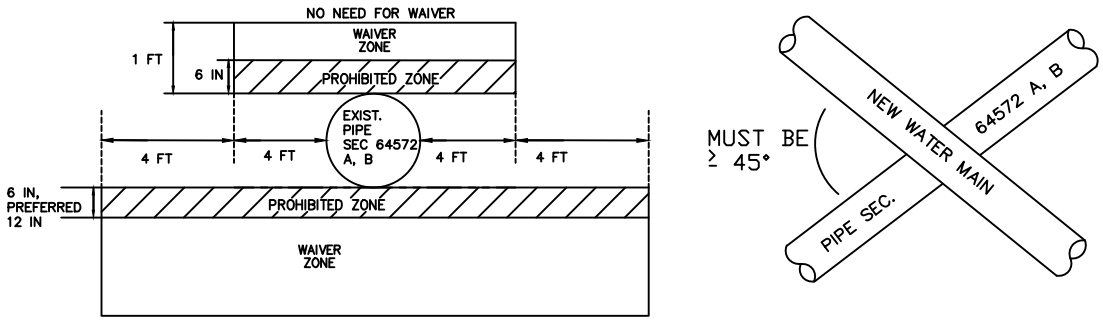
SCALE: NONE
REVISED: JANUARY 2019
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

W-38

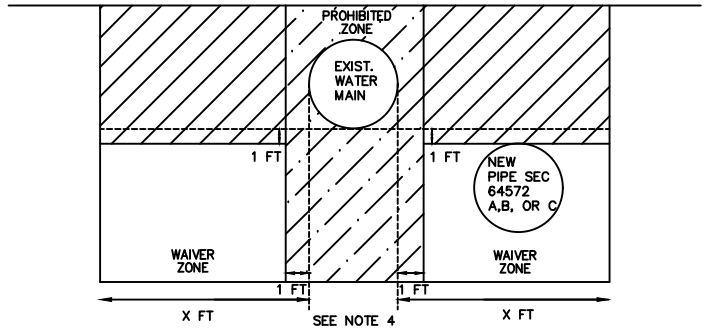
NEW WATER MAIN PARALLEL CONSTRUCTION



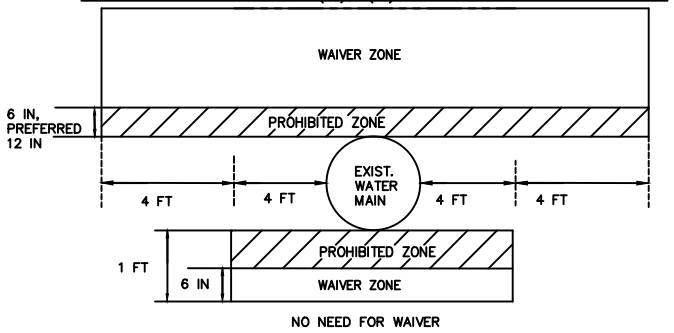
NEW WATER MAIN CROSSING CONSTRUCTION



NEW PIPE SEC. 64572 (A), (B), (C) PARALLEL CONSTRUCTION



NEW PIPE SEC. 64572 (A), (B) CROSSING CONSTRUCTION



NOTES:

1. THE CONTRACTOR SHALL FOLLOW THE CITY OF ROSEVILLE STANDARDS AND THE CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 22 SECTION 64572 WATER MAIN SEPARATION REQUIREMENTS. SEE CITY DESIGN STANDARDS SECTION 8-13.C FOR DDW WAIVER PROCESS.

2. PARALLEL PIPE INSTALLATION: NO WATER MAINS PARALLEL TO PIPELINES CONVEYING A FLUID LISTED IN CCR TITLE 22 SECTION 64572 SUBSECTIONS (A), (B), OR (C) SHALL BE INSTALLED WITHIN THE WAIVER ZONES WITHOUT SPECIAL APPROVAL FROM THE DDW.

3. DISTANCE X FT EQUALS 10 FT WHEN NON-WATER MAIN PIPELINE CONVEYS A FLUID LISTED IN CCR TITLE 22 SECTION 64572 SUBSECTION (A).

4. DISTANCE OF X FT EQUALS 5 FT (CITY OF ROSEVILLE DESIGN STANDARD SECTION 8-13.A) WHEN NON-WATER MAIN PIPELINE CONVEYS A FLUID LISTED IN CCR TITLE 22 SECTION 64572 SUBSECTION (B) OR (C).
   a. SEPARATION DISTANCES BETWEEN 4 FT AND 5 FT REQUIRE CITY OF ROSEVILLE ENVIRONMENTAL UTILITIES DIRECTOR APPROVAL. SEPARATION DISTANCES LESS THAN 4 FT ALSO REQUIRE A DDW WAIVER.

5. PIPE CROSSING INSTALLATION: WHEN LOCATED IN THE WAIVER ZONE, THE WATER MAIN SHALL HAVE NO JOINTS WITHIN 8 HORIZONTAL FEET OF THE PIPE CROSSING CONVEYING FLUIDS CLASSIFIED IN CCR TITLE 22 SECTION 64572 SUBSECTIONS (A) AND (B). THE CONTRACTOR MUST WORK WITH THE CITY TO OBTAIN A WAIVER FROM THE DDW TO INSTALL WITHIN THE WAIVER ZONE.

6. NEW WATER MAINS AND NEW PIPELINES CONVEYING A FLUID LISTED IN CCR TITLE 22 SECTION 64572 SUBSECTION (A) SHALL NOT BE INSTALLED IN THE SAME TRENCH.

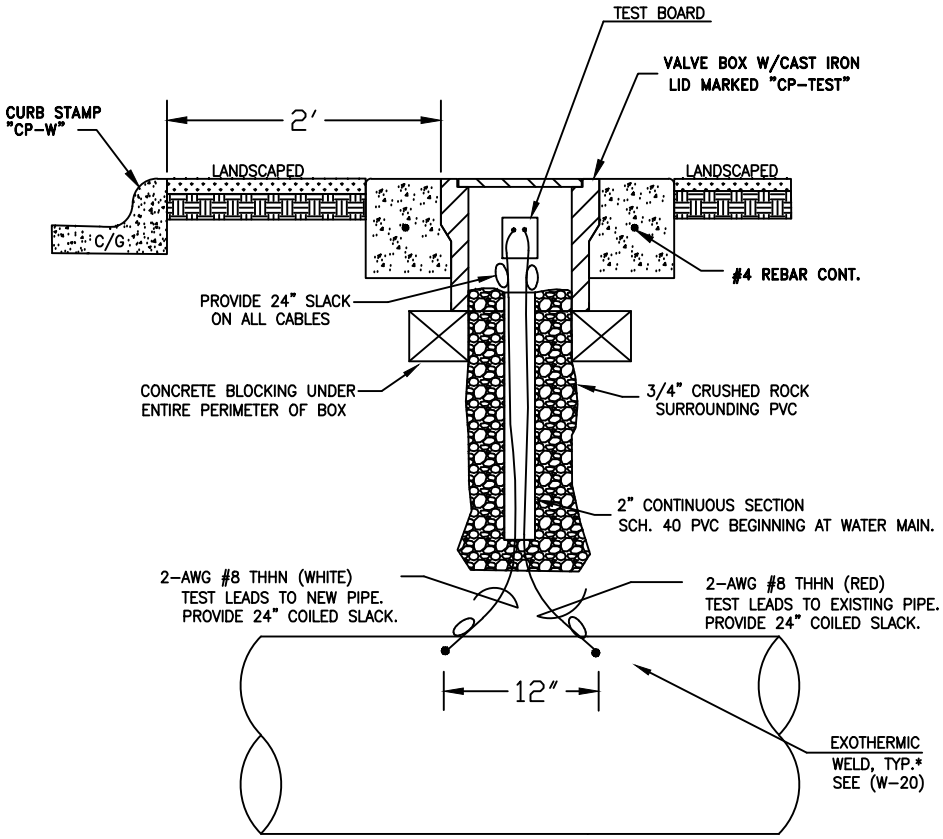
RICH PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA
ENVIRONMENTAL UTILITIES DEPARTMENT

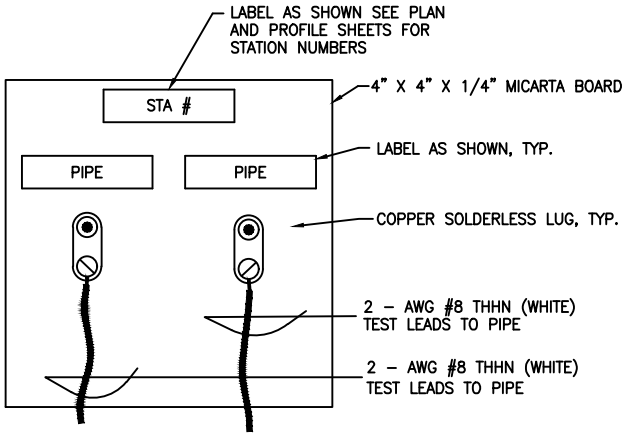
WATER MAIN AND SEWER MAIN CROSSING

SCALE: NONE
REVISED: JANUARY 2023
DRAWN BY: J. THOMPSON
APPROVED BY: R. PLECKER

W-39



TEST STATION (TYPICAL)



TEST STATION BOARD (TYPICAL)

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

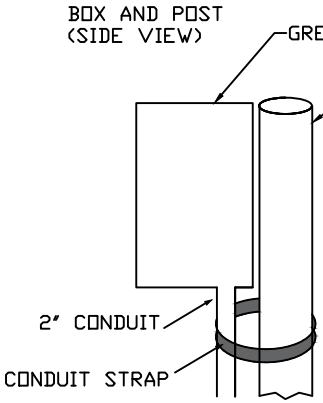
CITY OF ROSEVILLE CALIFORNIA

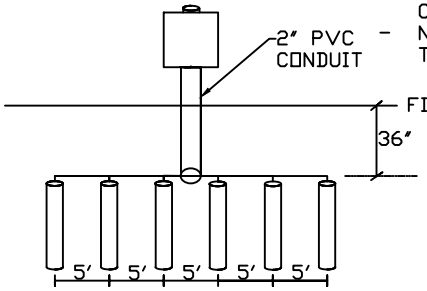
ENVIRONMENTAL UTILITIES DEPARTMENT

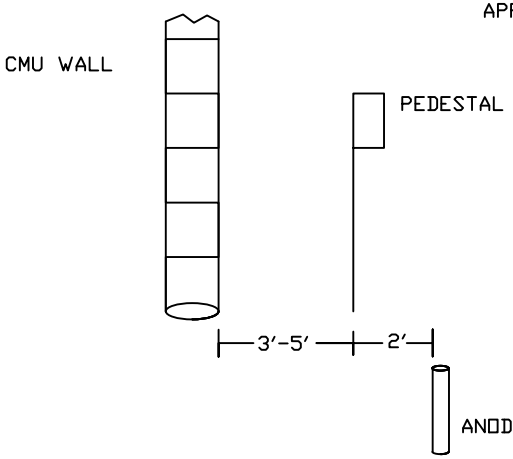
TEST STATION

SCALE: NONE
REVISED: JANUARY 2019
DRAWN BY: D. SAMUELSON
APPROVED BY: RICHARD PLECKER

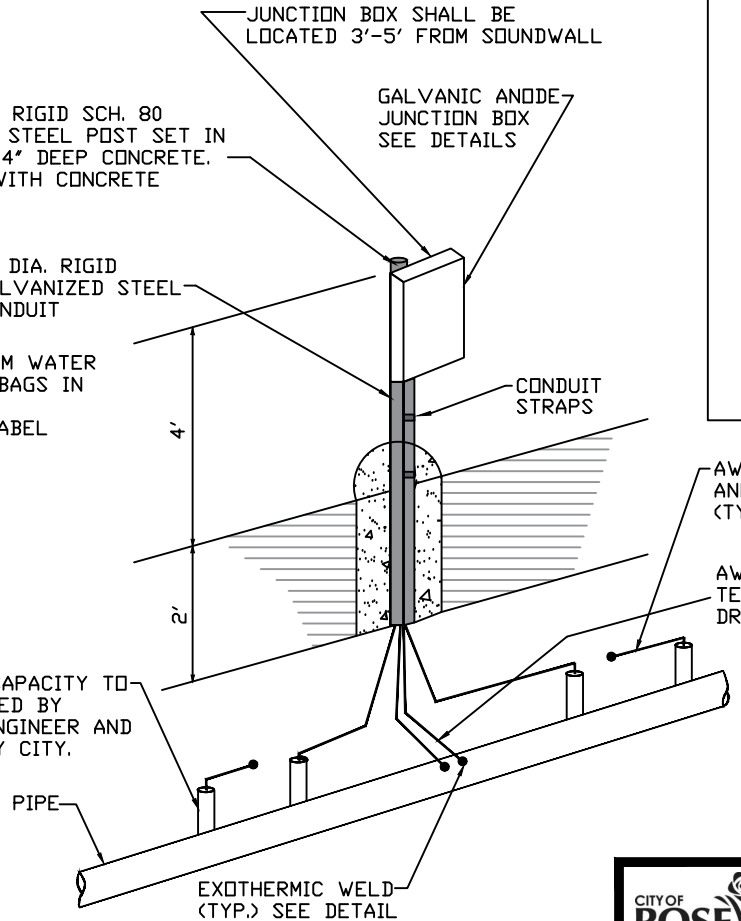
W-40

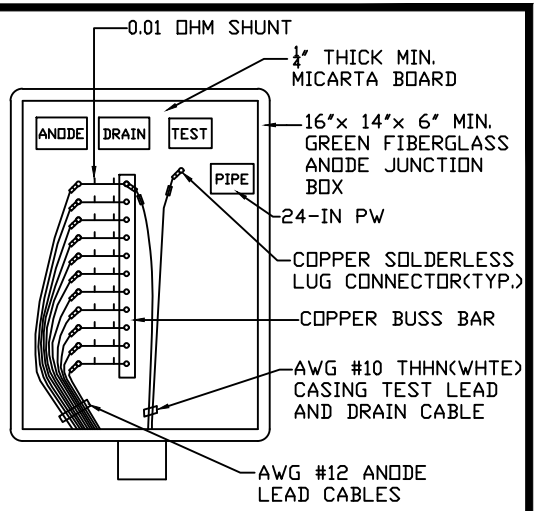






- PLACE WIRES FROM WATER MAIN AND ANODE BAGS IN CONDUIT
- NUMBER WIRES (LABEL THEM)





ANODE JUNCTION BOX DETAIL

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

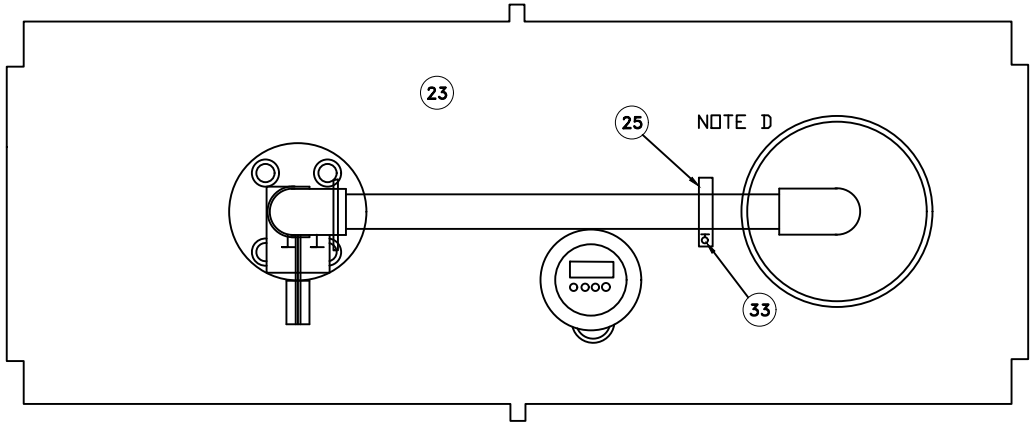
CITY OF ROSEVILLE CALIFORNIA

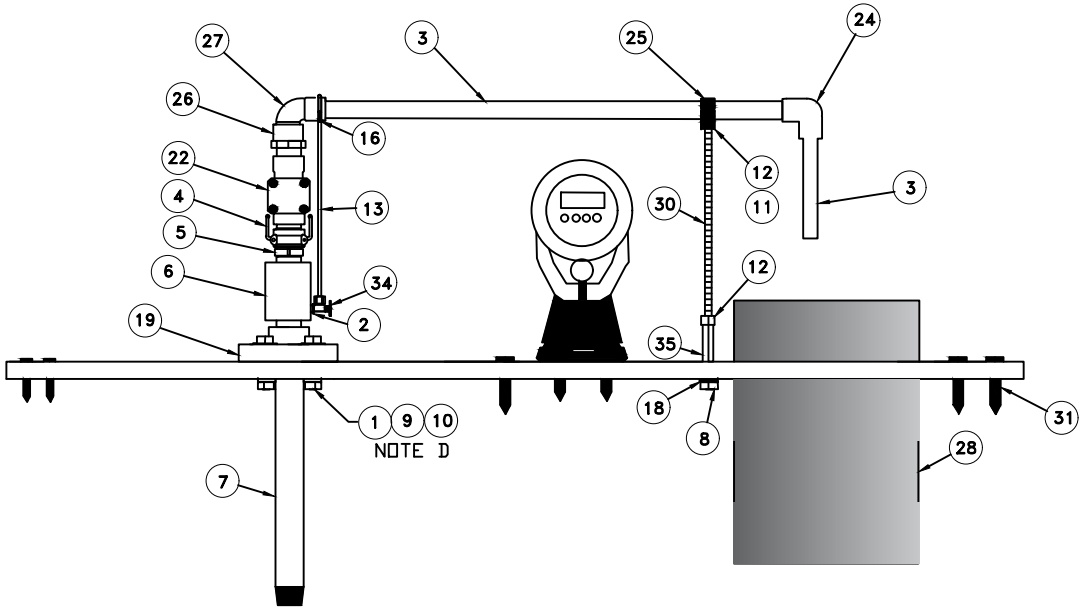
ENVIRONMENTAL UTILITIES DEPARTMENT

GALVANIC ANODE INSTALLATION

SCALE: NONE
REVISED: FEBRUARY 2022
DRAWN BY: J. THOMPSON
APPROVED BY:

W-41





ITEM	DESCRIPTION	NOTES
1	S.S. WASHER FOR THREADED FLANGE	
2	1/4" X 1/8" S.S. HEX BUSHING	
3	1" SCH. 80 PVC PIPE	
4	1" S.S. "B" QUICK DISCONNECT	
5	1" S.S. "F" QUICK DISCONNECT	C
6	1" S.S. COUPLING	
7	1" S.S. PIPE	
8	COUPLING NUT BOLT	
9	S.S. BOLT FOR THREADED FLANGE	
10	S.S. NUT FOR THREADED FLANGE	
11	S.S. LOCK WASHER FOR THREADED FLANGE	
12	3/8"-16 S.S. HEX NUT	
13	1/4" COPPER TUBING	
14	SOLENOID COVER	A,C
15	CONTROLLER COVER	A,C
16	SAMPLING POINT COVER	
18	3/8" S.S. LOCK WASHER	
19	1" SCH. 80 PVC THREADED FLANGE	
20	VALVE CONTROLLER	A
21	9 VOLT BATTERY	A
22	1" PGV VALVE	C
23	9800 WCA FLOOR	
24	1" SCH. 80 PVC ELBOW (GLUE x GLUE)	
25	1" PIPE CLAMP	C
26	1" SCH. 80 PVC ADAPTER (MIP x GLUE)	
27	1" SCH. 80 STREET ELBOW (GLUE x GLUE)	
28	4" SCH. 40 PVC COUPLING	
29	4" SCH. 35 PVC SEWER PIPE	A
30	S.S. THREADED ROD	
31	FLOOR SCREW	
34	90° BRASS NEEDLE VALVE	
35	S.S. COUPLING NUT	

NOTE	DESCRIPTION
A	NOT SHOWN
C	SOLD AS REPLACEMENT PART
D	BOLT ASSEMBLY USED ON ALL SIMILAR HOLES/BRACKETS.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

CHLORINE FLUSHING/ MONITORING STATION

SCALE: NONE
REVISED: JANUARY 2022
DRAWN BY: J. THOMPSON
APPROVED BY:

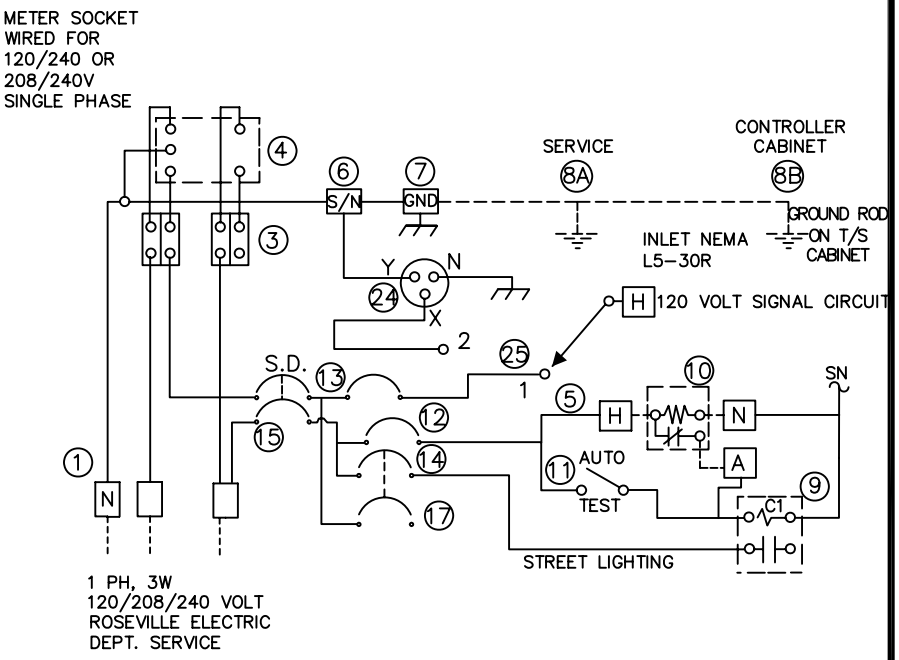
W-42

TYPE III–AF SERVICE EQUIPMENT SCHEDULE

	COMPONENT	NAME PLATE DESCRIPTION
①	NEUTRAL LUG	
②	LANDING LUG	
③	TEST BYPASS FACILITIES	
④	METER SOCKET AND SUPPORT	
⑤	TERMINAL BLOCKS	
⑥	SOLID NEUTRAL BUS	
⑦	GROUND BUS	
⑧	GROUND ROD	
⑨	35A MERCURY CONTACTOR	
⑩	PHOTO ELECTRIC UNIT	
⑪	15 AMP SWITCH SPST	LIGHTING TEST SWITCH
⑫	15A,120V,1P,CKT.BKR.	LIGHTING CONTROL
⑬	50A,120V,1P.CKT.BKR.	SIGNALS
⑭	20A,240V,1P,CKT.BKR.	STREET LIGHTS (TRAF.SIG.)
⑮	100A,240V,2P,CKT.BKR.	SERVICE DISCONNECT
⑰	20A,120V,1P,CKT.BKR.	SPARE
㉔	50A,120V,FLANGED RECEPTACLE	
㉕	55A,120V,1P	TRANSFER SWITCH

SERVICE ENCLOSURE WIRING DIAGRAM

METERED PER UTILITY REQUIREMENTS



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

TYPICAL SERVICE AND WIRING SCHEDULE

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS–1

EQUIPMENT SCHEDULE

STANDARD				VEHICLE SIGNAL MOUNTING		PEDESTRIAN SIGNAL MOUNTING			HPS LUMINAIRE WATTAGE	REMARKS
LOC	TYPE	SIG. MA (FEET)	LUM. MA (FEET)	MAST ARM	POLE		PPB ø	ARROW		
(A)	61-5-129 *	65'	15'	MAT MAS MAS	SV-1-T	SP-1-CS	–	–	400W	INSTALL EVD AND R73-5 ON SMA. INSTALL IISNS MAST ARM AND CITY SUPPLIED IISNS (Fiddyment Rd) ON POLE AT 25'.
(B)	PPB POST	–	–	–	–	–	ø6 ø8	LEFT RIGHT	–	
(C)	1-B	–	–	–	TV-2-T	SP-1-CS	–	–	–	
(D)	61-5-129 *	65'	15'	MAT MAS	SV-1-T	SP-1-CS	–	–	400W	INSTALL EVA AND R73-5 ON SMA. INSTALL IISNS MAST ARM AND CITY SUPPLIED IISNS (Blue Oaks Blvd) ON POLE AT 25'.
(E)	PPB POST	–	–	–	–	–	ø2 ø8	RIGHT LEFT	–	
(F)	1-B	–	–	–	TV-2-T	SP-1-CS	–	–	–	
(G)	61-5-129 *	65'	15'	MAT MAS MAS	SV-1-T	SP-1-CS	–	–	400W	INSTALL EVB AND R73-5 ON SMA. INSTALL IISNS MAST ARM AND CITY SUPPLIED IISNS (Fiddyment Rd) ON POLE AT 25' MIN. INSTALL WIFI CABLE AND PAN, TILT, ZOOM (PTZ) CAMERA CABLES TO TOP OF POLE WITH 10' SLACK. CITY WILL INSTALL PTZ CAMERA. PEU ATOP THIS POLE.
(H)	PPB POST	–	–	–	–	–	ø2 ø4	LEFT RIGHT	–	
(I)	1-B	–	–	–	TV-2-T	SP-1-CS	–	–	–	
(J)	61-5-129 *	65'	15'	MAT MAS	SV-1-T	SP-1-CS	–	–	400W	INSTALL EVC AND R73-5 ON SMA. INSTALL IISNS MAST ARM AND CITY SUPPLIED IISNS (Blue Oaks Blvd) ON POLE AT 25'.
(K)	PPB POST	–	–	–	–	–	ø4 ø6	LEFT RIGHT	–	
(L)	1-B	–	–	–	TV-2-T	SP-1-CS	–	–	–	

* CONTRACTOR SHALL PROVIDE TO THE CITY, ENGINEERING CALCULATIONS FROM THE POLE MANUFACTURER FOR LOADING CONDITIONS IF NOT ALREADY ON FILE WITH THE CITY.

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TYPICAL POLE AND EQUITMENT SCHEDULE

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS-2

ALL TRAFFIC SIGNAL AND SIC CONDUIT SHALL HAVE A DLC TAPED WITH A 5" GREEN BAND AND LABELED WITH "LOCATE".

CONDUCTOR SCHEDULE

CONDUCTOR DESIGNATION				NUMBER OF CONDUCTORS RUN NUMBER										
CABLE TYPE	STD	PHASE		1	2	3	4	5	6	7	8	9	10	11
VEH-PED / 12CSC	Ⓐ	1,6,4,4P,6P	4P,6P					2 / 2						2 / 2
	Ⓑ	5,4,OLA,4P,6P	4P,6P			2 / 2	2 / 2	2 / 2			2 / 2			
	Ⓒ	1,4,2P,4P	2P		2 / 1				2 / 1			2 / 1	2 / 1	
	Ⓓ		4P	1				1	1	1				
	Ⓔ	2,5,2P		2									2	2
	Ⓕ		2P,4P			2		2			2			2
PPB / 3CSC	Ⓖ	4,OLA,4P			2		2			2	2			
	Ⓗ	2,5,2P	2P		2 / 1			2 / 1				2 / 1		2 / 1
TOTAL CABLES 12/3 CONDUCTORS				2 / 1	6 / 2	2 / 4	2 / 2	6 / 8	2 / 2	2 / 1	4 / 4	4 / 2	4 / 1	6 / 5
#14	PEU							3	3	3	3			
#12	IISNS			2	2	2	2	2	2	2	2		2	
#8	LUMINAIRES			2	2	2	2	2	4	4	4		2	
	GROUND +			1	1	1	1	1	1	1	1	1	1	1
	TRACER TAPE ++			1	1	1	1	1	1	1	1	1	1	1
DLC	ø1				4	4	4	4	4	4	4	4		
	ø2										4	5		
	ø3						4	4	4	4	4	4		
	ø4								7	7	7	7	7	7
	ø5									4	4	4		
	ø6				5	5	5	5	5	5	5	5		
	ø7								4	4	4	4	4	4
	ø8						7	7	7	7	7	7		
	TOTAL			–	9	9	20	20	31	35	39	40	11	11
EVP				1	1	2	2	3	4	4	4	4	1	
PTZ CCTV CAT6 ⊙								2	2	2	2	2		
PTZ CCTV POWER CABLE *								1	1	1	1	1		
RSU CAT6 ⊙								1	1	1	1	1		
	CONDUIT SIZE			2"	3"	2-3"	2-3"	2-3"	3-3"	3-3"	3-3"	3-3"	3"	3"
	PERCENT FILL			25	22	15	21	26	25	27	28	26	24	15

\+ = PROVIDE 1 #8 AWG STRANDED COPPER WIRE WITH GREEN THW INSULATION IN EACH CONDUIT.

++ = PROVIDE A DLC TAPED WITH A 5" GREEN BAND AND LABELED WITH "LOCATE" IN EACH CONDUIT.

⊙ = FURNISH AND INSTALL SHIELDED OSP CAT6 CABLES OR PER CITY APPROVED EQUIVLAENT LIST. COIL 10 FEET OF SLACK AT TOP OF POLE.

* = FURNISH AND INSTALL IMSA 14-3/20-1-STR 600V POWER CABLE, COLOR CODE 3/C (BELDEN PART NUMBER 601195 OR CITY APPROVED EQUIVALENT). COIL 10 FEET OF SLACK AT TOP OF POLE.

ALL FIELD WIRING SHALL BE COMPRISED OF MULTIPLE CIRCUIT CONDUCTORS PER THE "CONDUCTOR SIGNAL CABLE REQUIREMENTS" TABLE IN SECTION 86-2.08D OF THE CALTRANS STANDARD SPECIFICATIONS. THERE SHALL BE 3 SPARE CONDUCTORS AT EACH POLE.

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

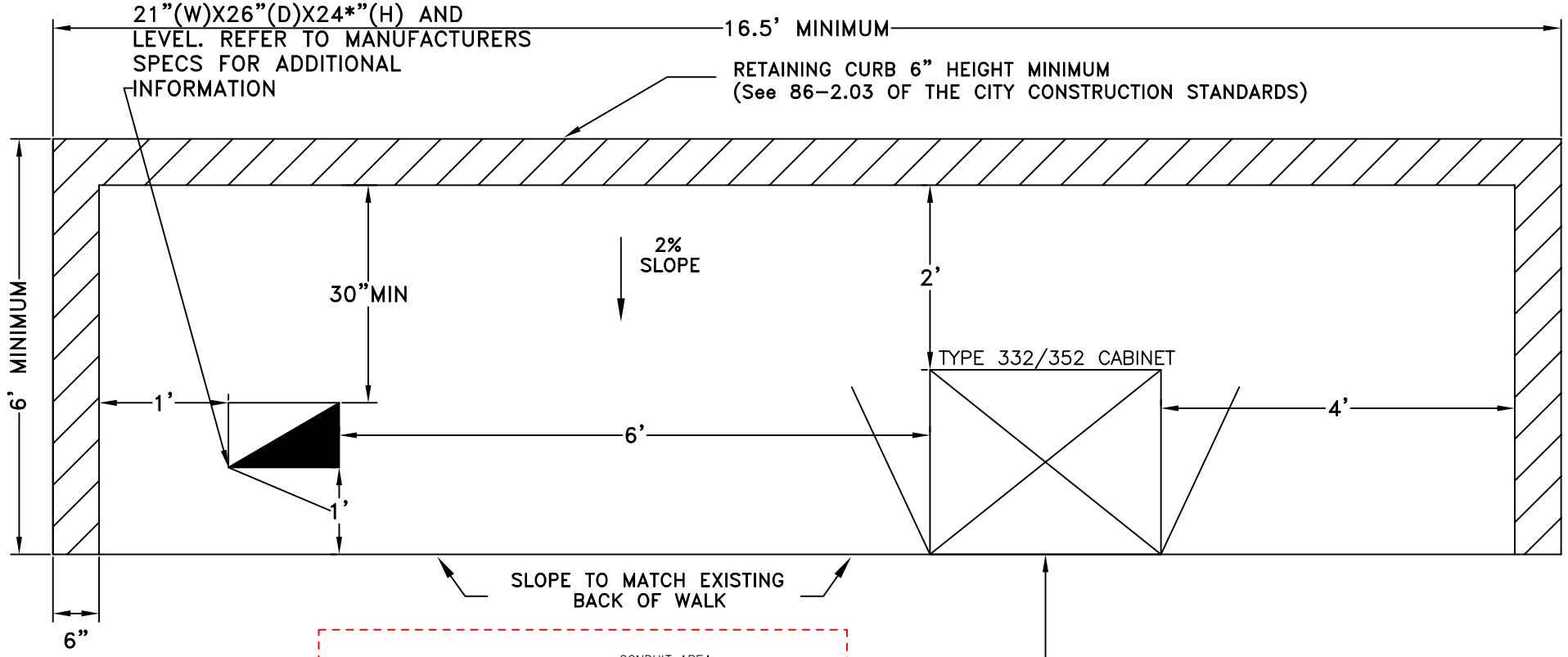
TYPICAL CONDUCTOR SCHEDULE

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J PASTOR
APPROVED BY: RHON HERNDON

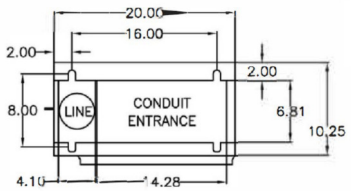
TS-3

TESCO TYPE 27–22 SERVICE WITH BATTERY BACK–UP SYSTEM EQUIVALENT) (OR APPROVED SERVICE FOUNDATION SHALL BE 21”(W)X26”(D)X24*”(H) AND LEVEL. REFER TO MANUFACTURERS SPECS FOR ADDITIONAL INFORMATION

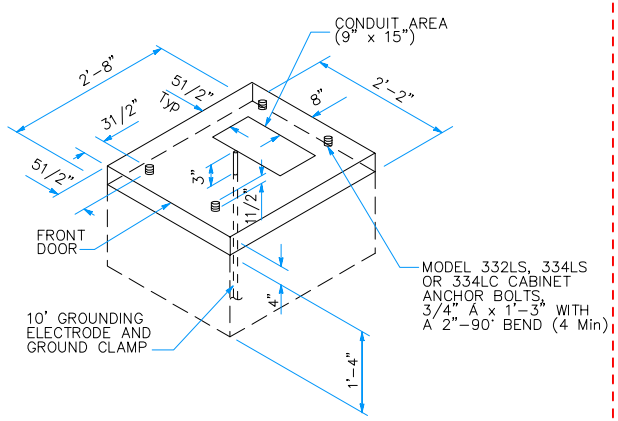
*THE TOP OF FOUNDATION SHALL BE A MINIMUM OF 4” ABOVE THE CONTROLLER/SERVICE PAD



CONTROLLER FOUNDATION SHALL BE PER CALTRANS 2018 STANDARD PLANS ES–3C



BASE PLATE LAYOUT FOR COMBO SERVICE



FOUNDATION DETAIL
Model 332LS, 334LS, and 334LC

JASON SHYKOWSKI
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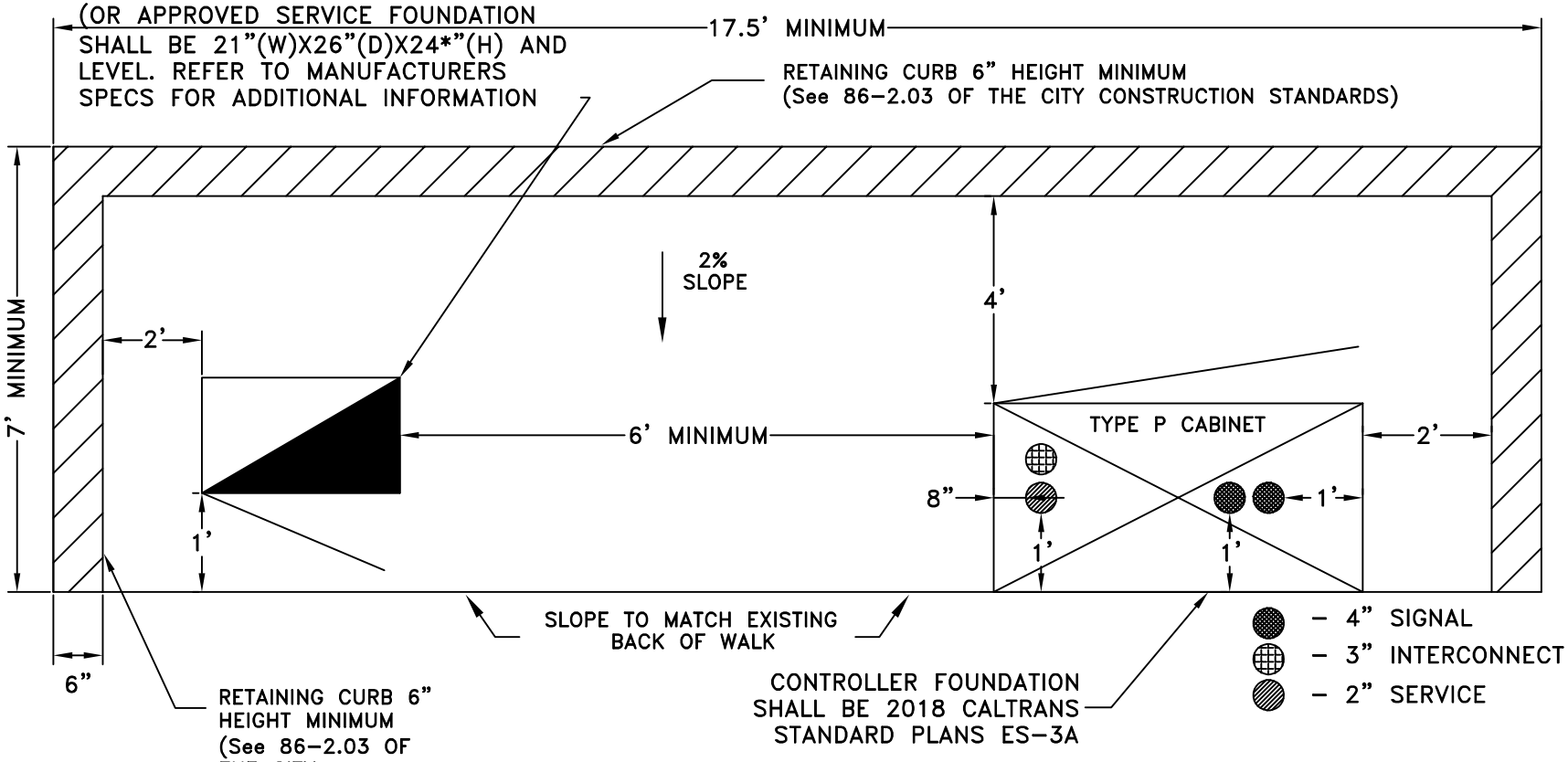
DEPARTMENT OF PUBLIC WORKS

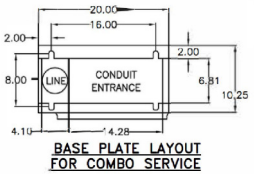
332/352 CONTROLLER/SERVICE CABINET PAD DETAIL

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R YAKIMCHUK
APPROVED BY: J CERVANTES

TS–4

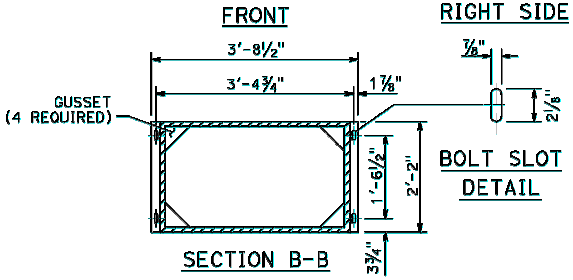
TESCO TYPE 27–22 SERVICE WITH
BATTERY BACK–UP SYSTEM EQUIVALENT)
(OR APPROVED SERVICE FOUNDATION
SHALL BE 21"(W)X26"(D)X24*"(H) AND
LEVEL. REFER TO MANUFACTURERS
SPECS FOR ADDITIONAL INFORMATION





BASE PLATE LAYOUT
FOR COMBO SERVICE

BASE PLATE LAYOUT
FOR COMBO SERVICE



TYPE P CABINET

* TOP OF FOUNDATION SHALL BE A MINIMUM OF 4" ABOVE THE CONTROLLER/SERVICE PAD

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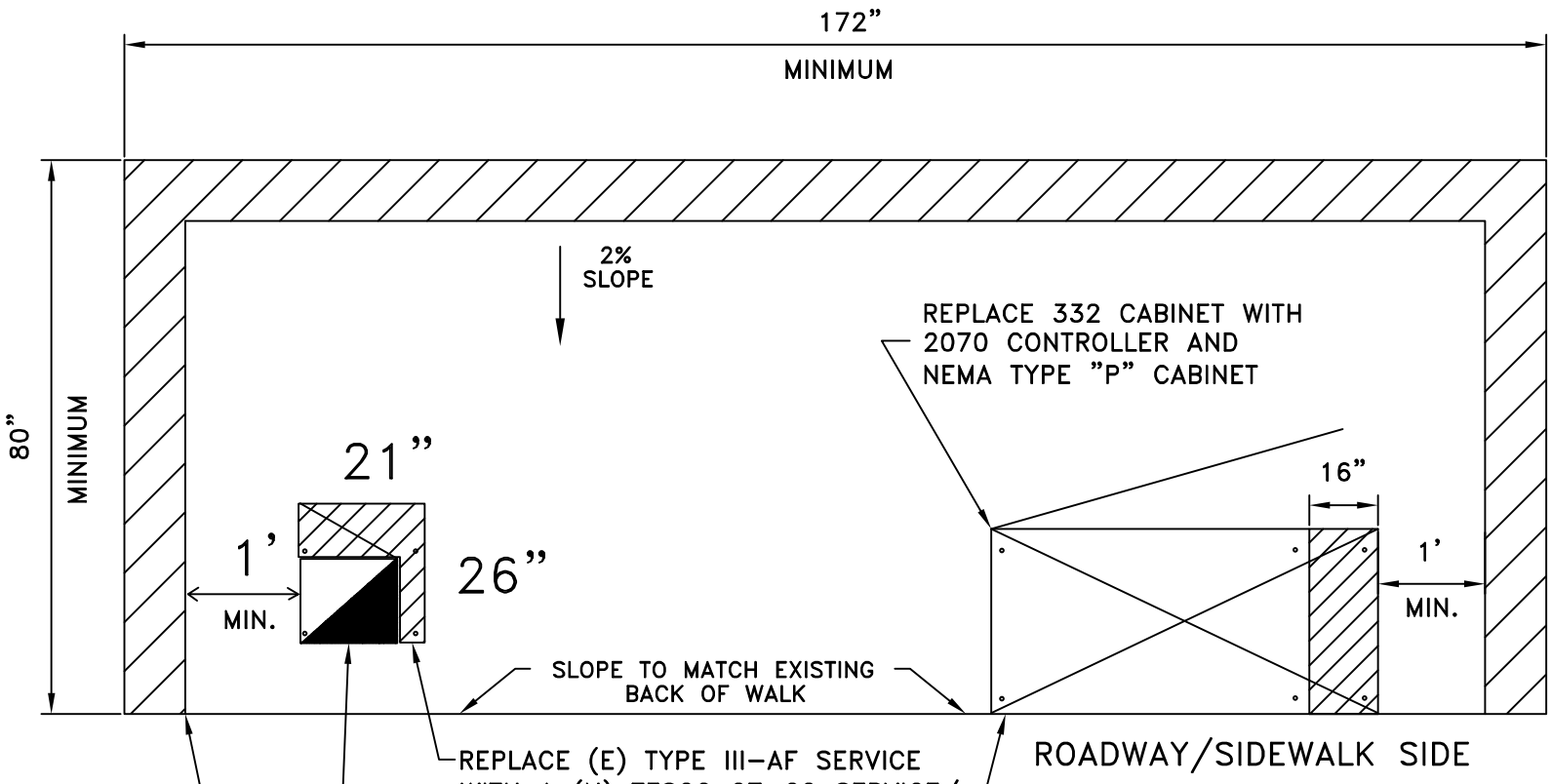
CITY OF ROSEVILLE CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

NEMA 2070 CONTROLLER/SERVICE CABINET PAD DETAIL

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R YAKIMCHUK
APPROVED BY: J CERVANTES

TS–5



RETAINING CURB 6" HEIGHT MINIMUM (SEE 86-2.03 OF THE CITY CONSTRUCTION STANDARDS)

REPLACE (E) TYPE III-AF SERVICE WITH A (N) TESCO 27-22 SERVICE/ BATTERY BACK-UP SYSTEM OR APPROVED EQUIVALENT WITH PEU (OR APPROVED EQUIVALNT). SERVICE FOUNDATION SHALL BE LEVEL.

CABINET FOUNDATION SHALL BE MODIFIED PER CONSTRUCTION STANDARD DETAIL TS-7. REFER TO CALTRANS STANDARD PLANS ES-3A FOR MORE CABINET INFORMATION. CABINET FOUNDATION SHALL BE LEVEL.

SERVICE FOUNDATION SHALL BE MODIFIED PER CONSTRUCTION STANDARD DETAIL TS-8. IF (E) ABOVE GROUND FOUNDATION IS GROUTE MATERIAL, REPOUR ENTIRE FOUNDATION PER TS-5.

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PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

332 TO TYPE "P" CABINET/SERVICE PAD CONVERSION DETAIL

SCALE: NONE
REVISED: JANUARY 1, 2025
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS-6

A= EXISTING 332 CABINET FOUNDATION PER STANDARD PLANS DRAWING ES-3B.

B= EXISTING PAD AROUND THE 332 CABINET IS TO BE REMOVED AND REPLACED PER CONSTRUCTION STD. DRAWING TS-6 WHEN POSSIBLE.

C= EXISTING 332 CABINET MOUNTING BOLTS TO BE CUT OFF FLUSH WITH PAD.

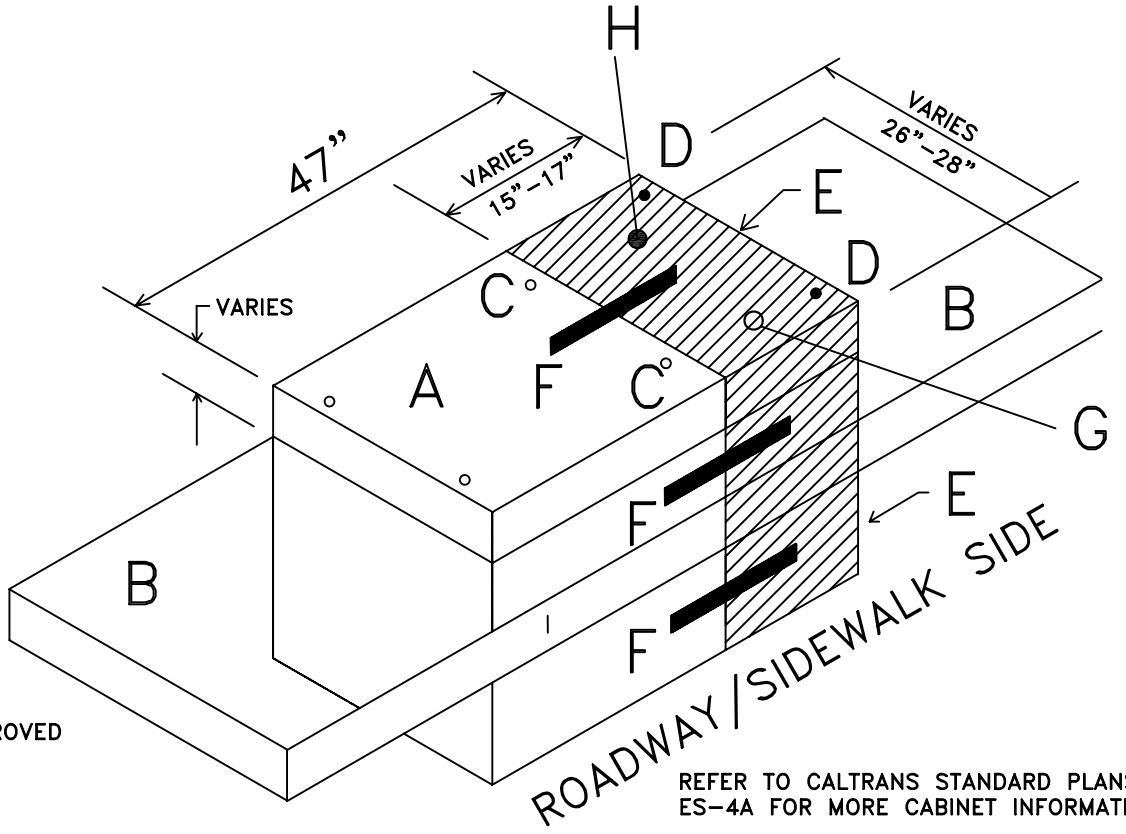
D= INSTALL TWO NEW CABINET BOLTS PER STD. PLANS ES-4A SPACING.

E= INSTALL NEW FOUNDATION EXTENSION TO ACCOMMODATE TYPE "P" CABINET.

F= INSTALL A MINIMUM OF (3) 5/8" X 17" METAL DOWELS & TWO PART EPOXY PER SECTION 71, PARAGRAPH 11 OF THE CITY CONSTRUCTION STANDARDS.

G= SHOULD THE (E) 332 CABINET NOT HAVE A CONDUIT INTO THE SERVICE FOUNDATION, INSTALL ONE 2" C FROM THE NEW 'P' CABINET FOUNDATION TO THE NEW COMBO/SERVICE FOUNDATION.

H= SHOULD THE (E) 332 CABINET NOT HAVE AN APPROVED GROUND ROD, INSTALL GROUND ROD IN NEW FOUNDATION AREA.



REFER TO CALTRANS STANDARD PLANS ES-4A FOR MORE CABINET INFORMATION

CAUTION: LOCATE (E) CONDUITS IN (E) FOUNDATION PRIOR TO DRILLING FOR DOWELS TO AVOID ELECTRICAL SHOCK HAZARD.

NOTE: 1) (E) 332 CABINET & 170 CONTROLLERARE TO REMAIN IN OPERATION WHILE NEW FOUNDATION & PAD ARE POURED. CONVERSION TO THE NEW TYPE "P" CABINET & 2070 CONTROLLER ARE TO OCCUR ONLY AFTER COMPLETION OF ALL CONCRETE WORK, WITH MINIMAL TRAFFIC SIGNAL DOWN TIME.

2) THE TYPE "P" CABINET MOUNTING HOLES WILL HAVE TO BE RE-DRILLED ON ONE SIDE TO MATCH (E) BOLT PATTERN ON (E) FOUNDATION SIDE.

3) NEW GROUND ROD AND/OR CONDUITS INSTALLED IN NEW FOUNDATION AREA SHALL BE LOCATED AT LEAST 3" INSIDE THE NEW CABINET BOLTS TO AVOID HITTING THE NEW 'P' CABINET WHEN INSTALLED.

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

EXISTING 332 TO TYPE "P" CABINET PAD CONVERSION DETAIL

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS-7

A= EXISTING TYPE III–AF CABINET FOUNDATION PER STANDARD PLANS DRAWING ES–2D.

B= EXISTING PAD AROUND THE TYPE III–AF SERVICE TO BE REMOVED AND REPLACED PER CONSTRUCTION STANDARD TS–6.

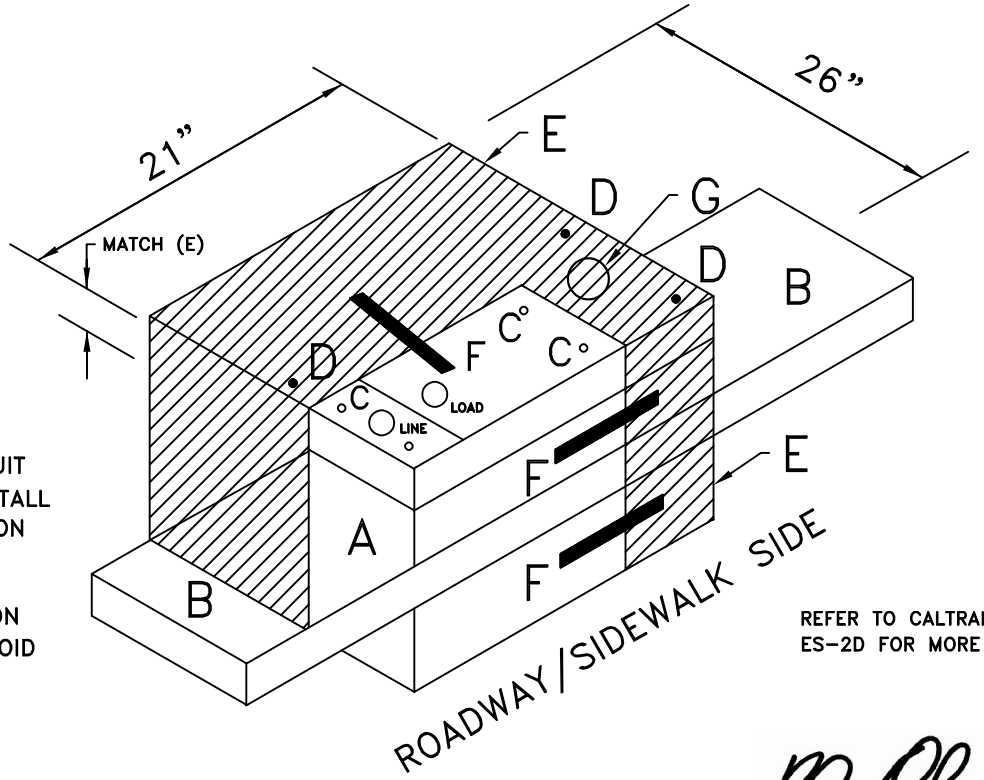
C= EXISTING TYPE III–AF CABINET MOUNTING BOLTS TO BE CUT OFF FLUSH WITH PAD.

D= INSTALL THREE (3) NEW CABINET BOLTS PER TESCO 27/22 PLAN SPACING.

E= INSTALL NEW FOUNDATION EXTENSION TO ACCOMMODATE TESCO 27–22 OR APPROVED EQUIVALENT CABINET.

F= INSTALL A MINIMUM OF (4) 5/8" X 12" METAL DOWELS & TWO PART EPOXY PER SECTION 71, PARAGRAPH 11 OF THE CITY CONSTRUCTION STANDARDS.

G= SHOULD THE (E) SERVICE NOT HAVE A CONDUIT DIRECTLY INTO THE CONTROLLER CABINET, INSTALL ONE 2" C FROM THE NEW SERVICE FOUNDATION TO THE NEW 'P' CABINET FOUNDATION.



CAUTION: LOCATE (E) CONDUITS IN (E) FOUNDATION PRIOR TO DRILLING FOR DOWELS TO AVOID ELECTRICAL SHOCK HAZARD.

NOTE: 1) (E) TYPE III–AF CABINET & SERVICE ARE TO REMAIN IN OPERATION WHILE NEW FOUNDATION & PAD ARE POURED. CONVERSION TO THE NEW COMBO SERVICE/ BATTERY BACK–UP ARE TO OCCUR ONLY AFTER COMPLETION OF ALL CONCRETE WORK, WITH MINIMAL TRAFFIC SIGNAL DOWN TIME.

2) THE COMBO 22–27 CABINET MOUNTING HOLES MAY HAVE TO BE RE–DRILLED ON ONE SIDE OF CABINET TO MATCH (E) BOLT PATTERN ON (E) FOUNDATION SIDE.

3) IF (E) ABOVE GROUND FOUNDATION IS GROUTE MATERIAL, REMOVE GROUT AND REPOUR AREA WITH THE NEW FOUNDATION EXTENSION.

4) ANY CONDUITS INSTALLED IN NEW PAD DETAIL SHALL BE LOCATED AT LEAST 3" INSIDE THE NEW COMBO/SERVICE BOLTS TO AVOID HITTING THE NEW COMBO/SERVICE CABINET WHEN INSTALLED.

REFER TO CALTRANS STANDARD PLANS ES–2D FOR MORE CABINET INFORMATION

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PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

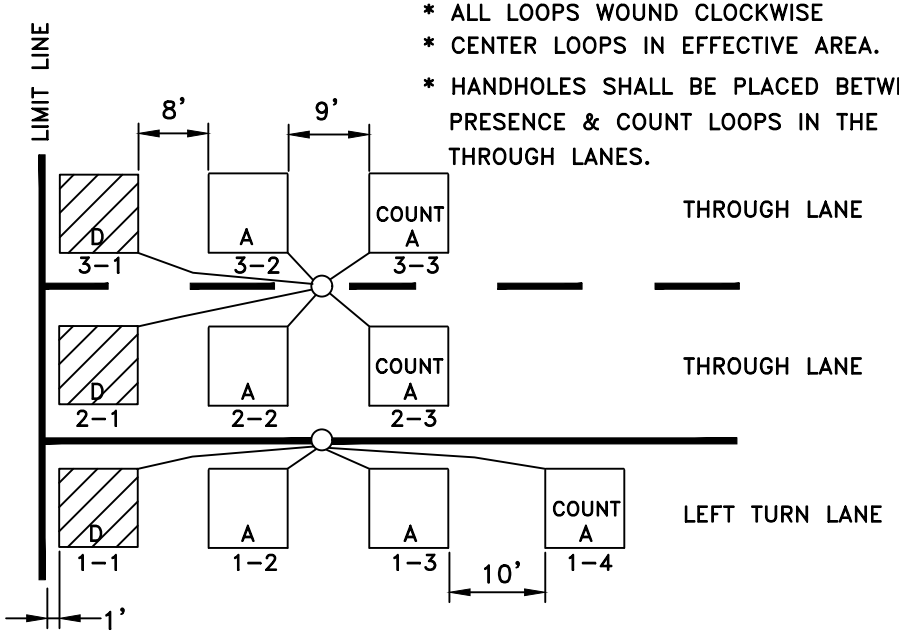
EXISTING TYPE III–AF 27–22 COMBO PAD CONVERSION DETAIL

SCALE: NONE
REVISED: JANUARY 1, 2025
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS–8

LEGEND

A= TYPE "A" OR "E" LOOP
D= TYPE "D" LOOP OR QUADRACIRCLE
1-1= LANE # , LOOP#
COUNT= COUNT LOOP



* ALL LOOPS WOUND CLOCKWISE
* CENTER LOOPS IN EFFECTIVE AREA.
* HANDHOLES SHALL BE PLACED BETWEEN PRESENCE & COUNT LOOPS IN THE THROUGH LANES.

332 LOOP DETECTOR ASSIGNMENTS

	LT (1)		LT (2)		(1) THRU		(2) THRU		(3) THRU	
	170	2070	170	2070	170	2070	170	2070	170	2070
CALL TYPE 3/QUEUE ◎	1I1U	1	1I1L	1		2I4U	6		2I4L	6
	3I5U	7	3I5L	7		4I8U	12		4I8L	12
	5J1U	15	5J1L	15		6J4U	20		6J4L	20
	7J5U	21	7J5L	21		8J8U	26		8J8L	26
COUNT/VOLUME TYPE 3/QUEUE #			1I9U	13	2I3U	4	2I2U	2	2I2L	3
			3I9L	14	4I7U	10	4I6U	8	4I6L	9
			5J9U	27	6J3U	18	6J2U	16	6J2L	17
			7J9L	28	8J7U	24	8J6U	22	8J6L	23
EXTENSION							2I3L	5		
							4I7L	11		
							6J3L	19		
							8J7L	25		

◎ = L/T's are Call/Extension Detectors
= L/T's are Count-Volume/Extension Detectors

* Separate DLC's shall be provided for each loop detector and a permanent label shall be provided to designate their location.

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PUBLIC WORKS DIRECTOR

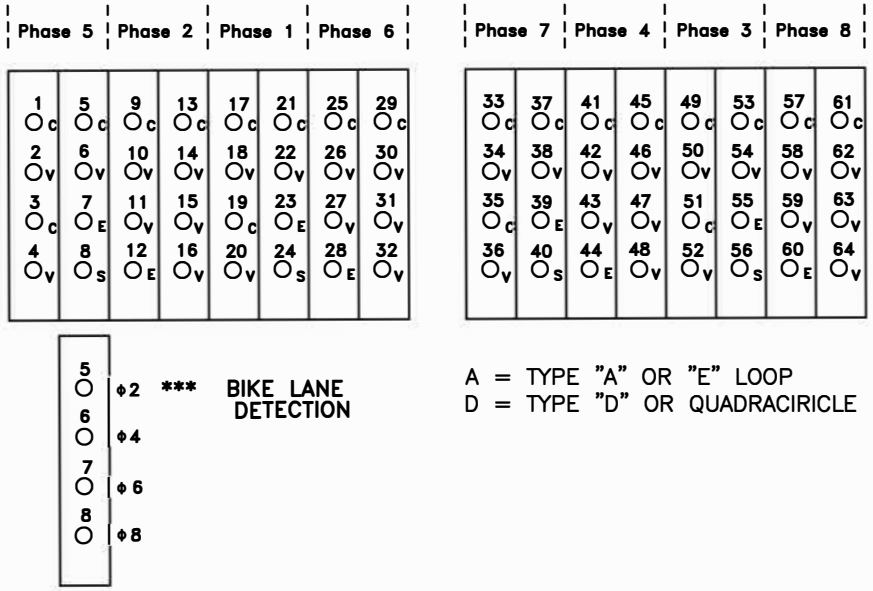
CITY OF ROSEVILLE CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

332 TYPICAL LOOP DETECTOR LAYOUT

SCALE: NONE
REVISED: JANUARY 01, 2018
DRAWN BY: J PASTOR
APPROVED BY: RHON HERNDON

TS-9

TYPE "P" CABINET DETECTOR LAYOUT

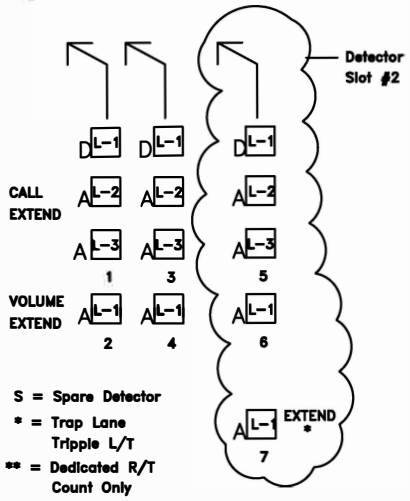


2070 LOOP DETECTOR ASSIGNMENTS

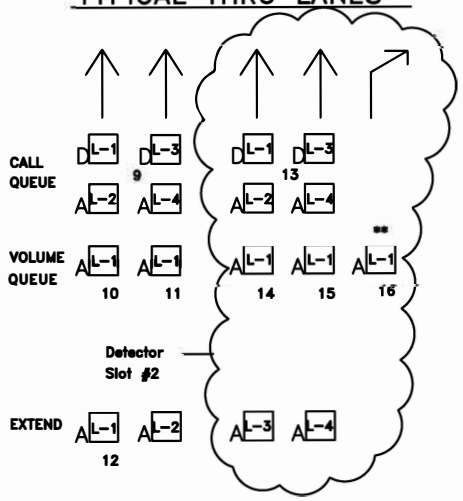
	LT (1)	LT (2)	LT (3)	(1) THRU	(2) THRU	(3) THRU	(4) THRU	(5) R/T
CALL QUEUE C ◎	1/17 3/49 5/1 7/33	1/19 3/51 5/3 7/35	1/21 3/53 5/5 7/37	2/9 4/41 6/25 8/57		2/13 4/45 6/29 8/61		
VOLUME QUEUE V #	1/18 3/50 5/2 7/34	1/20 3/52 5/4 7/36	1/22 3/54 5/6 7/38	2/10 4/42 6/26 8/58	2/11 4/43 6/27 8/59	2/14 4/46 6/30 8/62	2/15 4/47 6/31 8/63	2/16 4/48 6/32 8/64
EXTENSION E *	1/23 3/55 5/7 7/39			2/12 4/44 6/28 8/60				

◎ = L/T's are Call/Extension Detectors
= L/T's are Volume/Extension Detectors
*** = If Phase 5 is a Tripple L/T use the Phase 1 Second Slot for Bike Lane Detection

TYPICAL LEFT TURNS



TYPICAL THRU LANES



NOTE: – Separate DLC's shall be provided for each loop detector and a nent label shall be provided to designate their location.
perma – All loops shall be wound clockwise

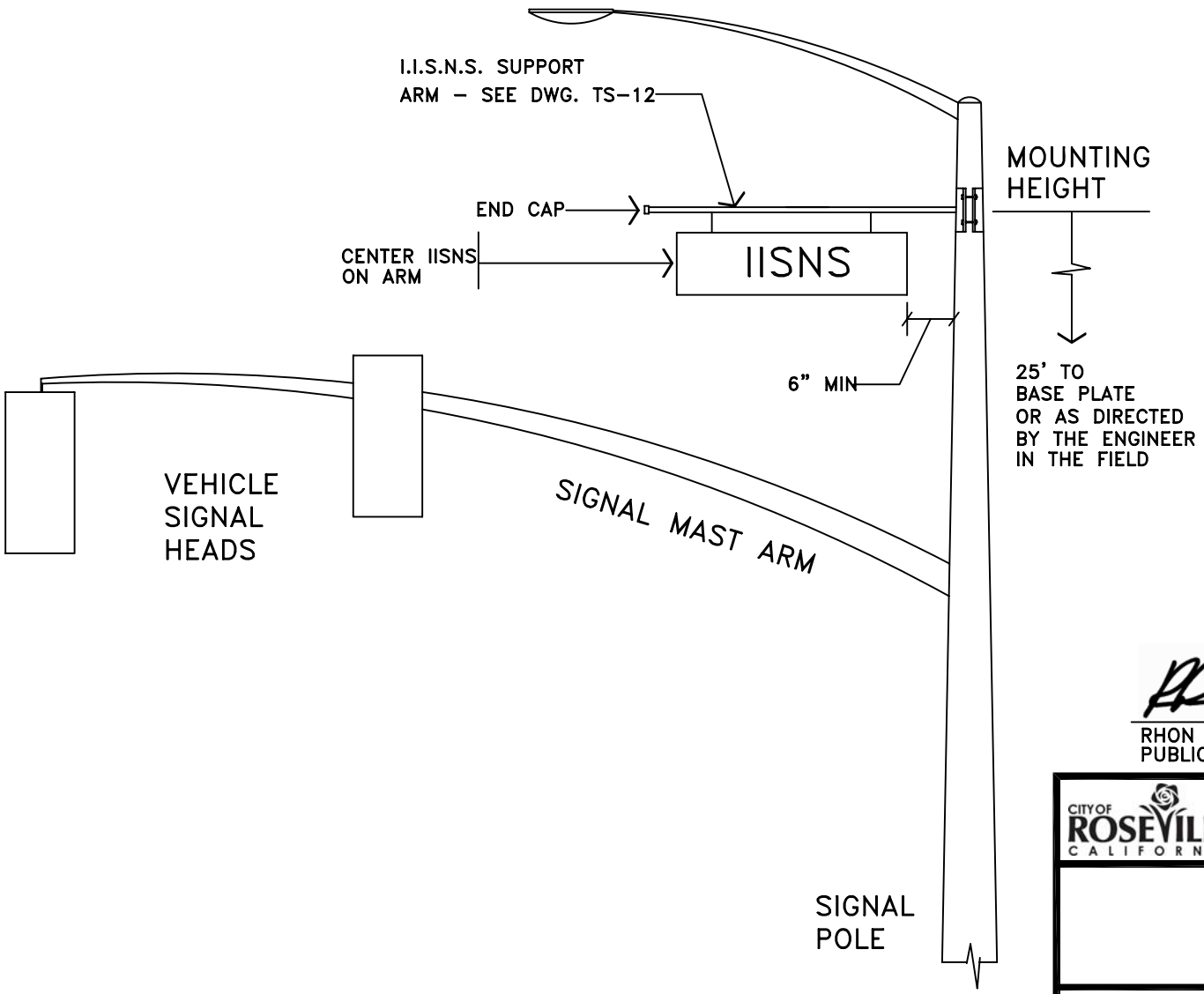
RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

TYPE P CABINET LOOP DETECTOR LAYOUT

SCALE: NONE
REVISED: OCTOBER 26, 2017
DRAWN BY: J PASTOR
APPROVED BY: RHON HERNDON

TS–10



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PUBLIC WORKS DIRECTOR

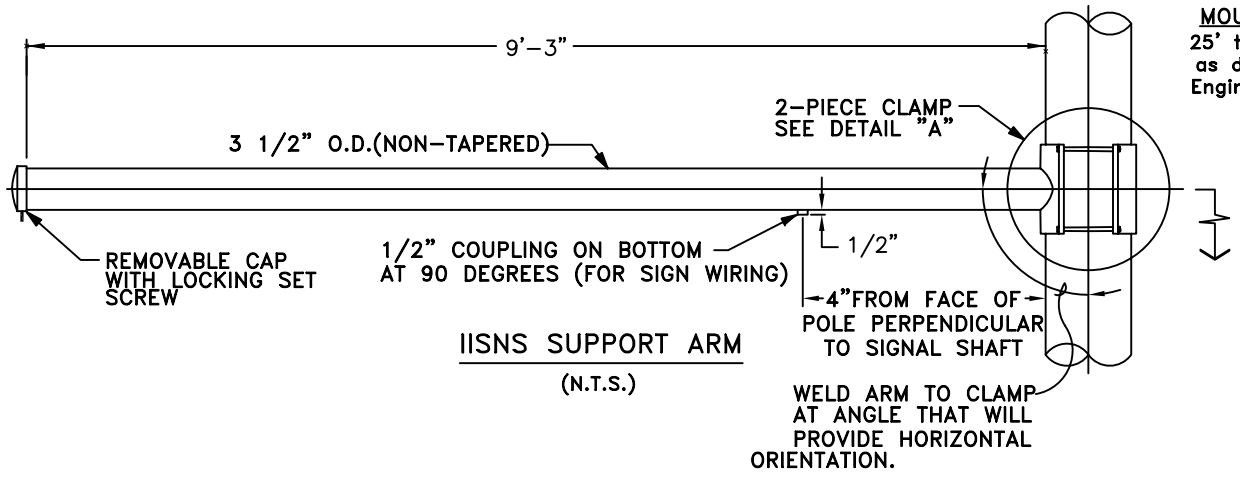
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

IISNS SUPPORT ARM MOUNTING DETAIL

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS–11



IISNS SUPPORT ARM

(N.T.S.)

MOUNTING HEIGHT

25' to base plate or as directed by the Engineer in the field

GENERAL NOTES

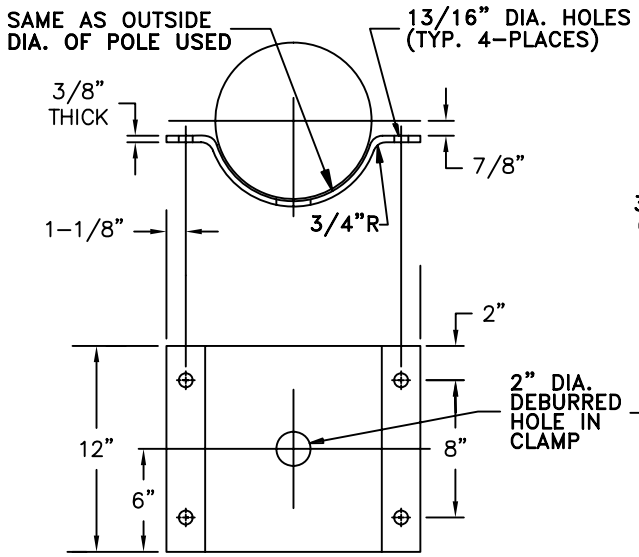
MATERIAL SPECIFICATIONS	
SHAFT	STEEL OF 48,000 PSI MINIMUM YIELD AFTER FABRICATION
CLAMP PLATE	ASTM A-572 GR. 50 STEEL

MANUFACTURING PROCESSES	
LONGITUDINAL WELDS	ALL WELDS SHALL CONFORM TO AWS D1.1 WELD SPECIFICATION

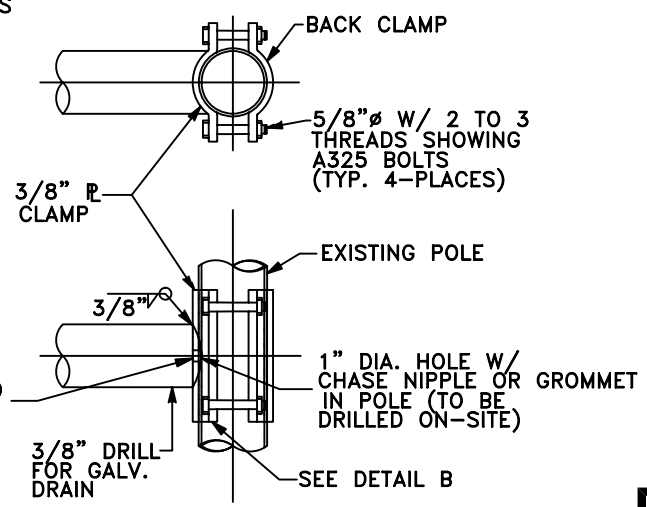
FINISH COATING	
STRUCTURE	HOT DIP GALVANIZED PER ASTM A-123
HARDWARE	HOT DIP GALVANIZED PER ASTM A-153

DESIGN CRITERIA	
STRUCTURE, HARDWARE, AND WELDING	IN ACCORDANCE WITH THE "SPECIFICATIONS FOR STRUCTURAL SUPPORTS OF HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", AASHTO 1994

A SEPARATE LIGHTING CIRCUIT SHALL BE INSTALLED TO POWER THE SIGNS. (120 V./TWO #12 AWG CONDUCTORS). A 3/4" LB CONDOLET SHALL BE INSTALLED AS A DISCONNECTING POINT BETWEEN THE SIGN AND THE SYSTEM POWER SOURCE.



DETAIL B



DETAIL A

CLAMP DETAILS

(N.T.S.)

NOTE: FURNISH SEPARATE CIRCUIT FOR IISNS TO BE CONNECTED TO THE BATTERY BACKUP

INCLUDE ENGINEERED SUPPORT ARM AND SIGNAL POLE LOAD CALCULATIONS IF NOT ALREADY ON FILE WITH THE CITY.

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CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

IISNS SUPPORT ARM TYPICAL CLAMP DETAIL

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

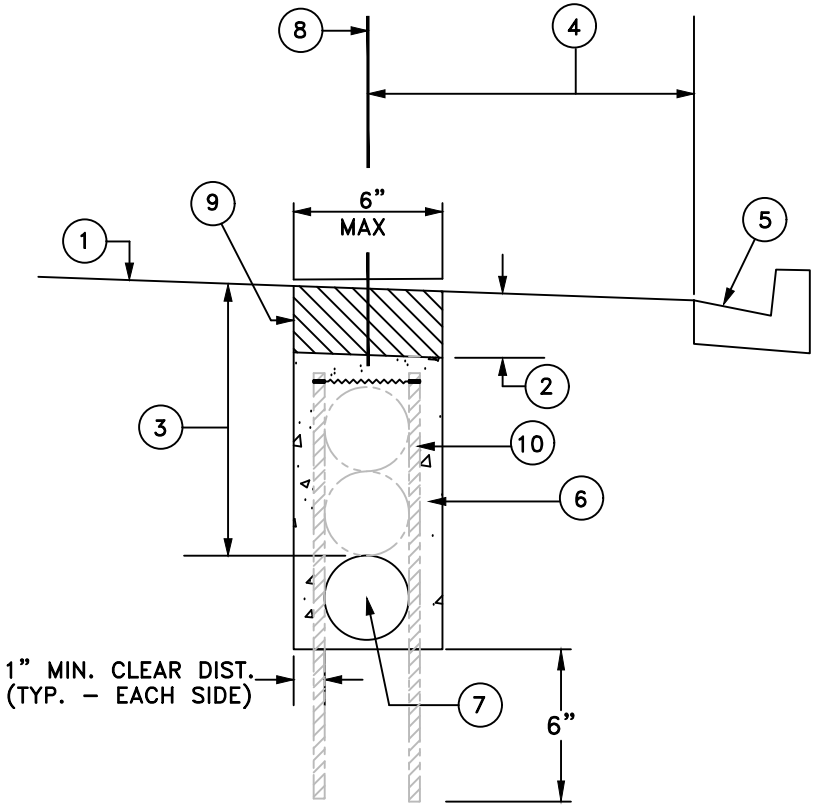
TS-12

LEGEND:

1. SURFACE OF EXISTING STREET SECTION.
2. .25' THICK PAVEMENT PER SECTION 71-4.D. (93% RELATIVE COMPACTION).
3. PIPE COVER TO BE A MINIMUM 18" (18" MIN TO 30" MAX).
4. DISTANCE VARIES. IF LESS THAN 3 FEET, THEN CONTRACTOR IS REQUIRED TO EDGE GRIND FROM LIP OF GUTTER (.15' DEEP) TO INSIDE LIMIT LINE OF TRENCH.
5. EXISTING CURB AND GUTTER.
6. "MINOR CONCRETE" CONFORMING TO THE PROVISIONS IN SECTION 71-5B, "CONCRETE", WITH FINE AGGREGATE (PEA GRAVEL MIX). CONCRETE SHALL BE FLOW-ABLE AT DISCRETION OF CITY INSPECTOR.
7. CONDUIT(S) AS SPECIFIED.
8. CENTER LINE OF BIKE LANE STRIPE.
9. PLACE BINDER (TACK COAT) ON ALL SURFACES PRIOR TO PAVING PER SECTION 39 OF STATE STANDARD SPECIFICATIONS, OR SAWCUT CONCRETE PER STREETS DETAIL ST-54
10. REINFORCING BARS 2 - #3 TO SUPPORT MULTIPLE CONDUITS, VERTICAL ALIGNMENT ONLY. REINFORCING BARS SHALL BE DRIVEN 6" INTO BOTTOM OF TRENCH AND WIRED TOGETHER AT THE TOP. REINFORCING BAR SUPPORTS SHALL BE 8'-0" ON CENTER. MAXIMUM 3 - 3" CONDUITS PER ROCKWHEEL TRENCH.

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT OF BIKE LANE STRIPE AND LEGENDS (AFFECTED BY TRENCHING) WITH THERMOPLASTIC MATERIAL.
2. ALL EXCAVATED AREAS IN THE PAVEMENT SHALL BE BACKFILLED, EXCEPT FOR THE TOP 0.25' BY THE END OF EACH WORK DAY. THE TOP .25' SHALL BE PLACED WITHIN 3 WORKING DAYS AFTER TRENCHING. DELINEATORS SHALL BE PLACED ON TEN FOOT CENTERS, AND WITHIN 1' OF EACH SIDE OF DRIVEWAYS IN THE INTERIM. REFER TO SECTION 6.2.W.5. FOR TRANSITION LOCATIONS.
3. TRENCH CUT FEE SHALL APPLY PER CITY ORDINANCE. NO ALTERNATE TRENCH CONFIGURATION IS ALLOWED.
4. DETECTOR HANDHOLES (DH's) CONDUIT SHALL BE INSTALLED IN A SEPARATE TRENCH.



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PUBLIC WORKS DIRECTOR

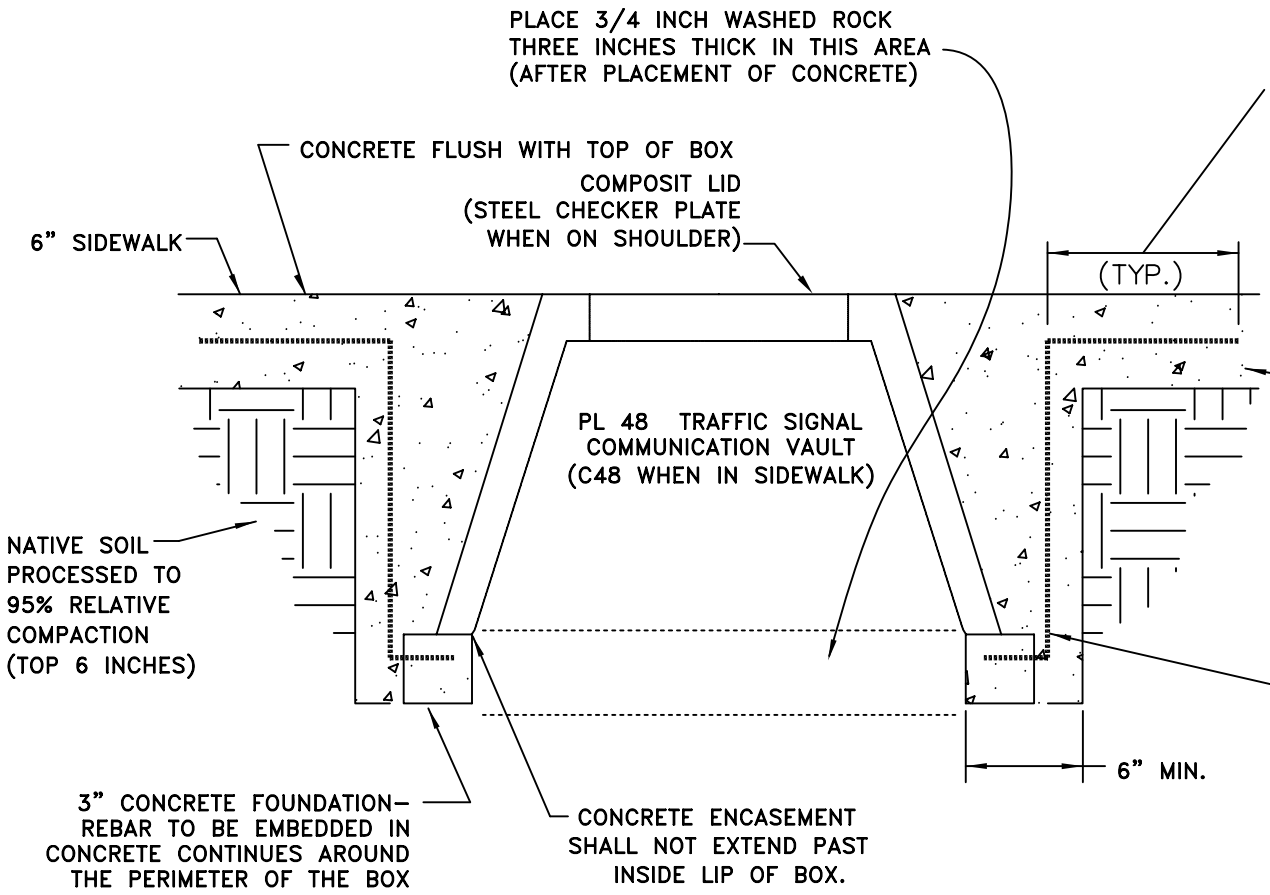
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TRAFFIC SIGNAL ROCK WHEEL TRENCH (IN EXISTING A.C. STREETS)

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: J PASTOR
APPROVED BY: JASON SHYKOWSKI

TS-13



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

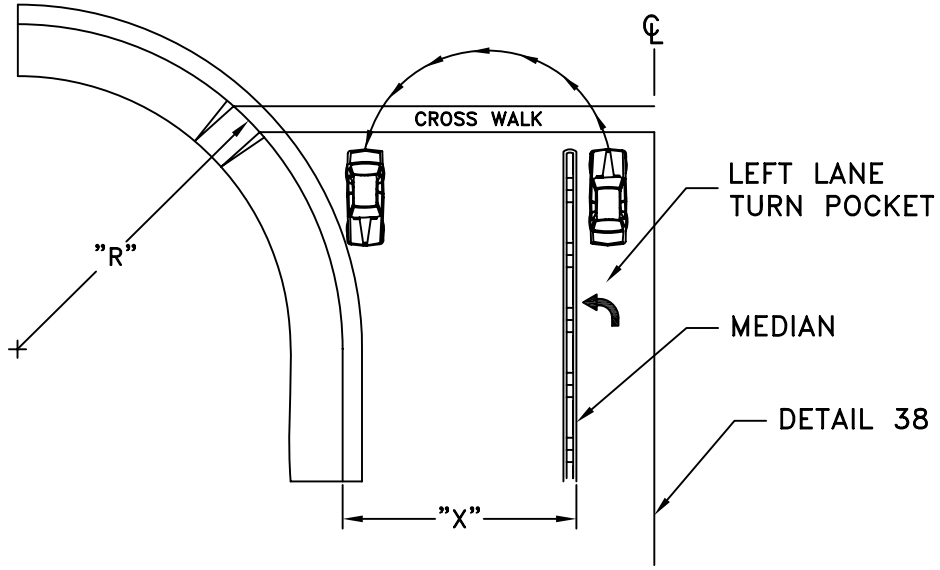
ENCASEMENT FOR PL 48 BOXES IN CITY SIDEALK

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS-14

NOTES:

1. IF A BOX EXTENDS OUTSIDE BACK OF SIDEWALK, PROVIDE ONE FOOT WIDE BY SIX INCH THICK CONCRETE COLLAR AROUND FULL PERIMETER. (EXTEND REBAR 10 INCHES INTO COLLAR.)
2. BOX TO BE INSTALLED IN LANDSCAPING OR CONTROLLER PAD AREA WHEN POSSIBLE.



RHON HERNDON
PUBLIC WORKS DIRECTOR

NOTES:

1. U–TURNS ARE PERMISSIBLE UNDER THE FOLLOWING CONDITIONS:
   IF "R"<50', THEN "X"≥35'
   IF "R"≥50', THEN "X"≥30'
2. U–TURNS MAY BE RESTRICTED DUE TO RIGHT TURN OVERLAPS OR OTHER CONDITIONS DETERMINED BY THE CITY ENGINEER.
3. SIGN DETAILS NUMBERS REFERENCE THE 2006 CALIFORNIA MUTCD.
4. INSTALL TYPE R73–5 SIGN WHERE DUAL LEFT TURNS AND U–TURNS ARE PERMITTED.
5. WHERE U–TURNS ARE PERMITTED FOR A SINGLE LEFT TURN, NO SIGNS ARE NECESSARY.

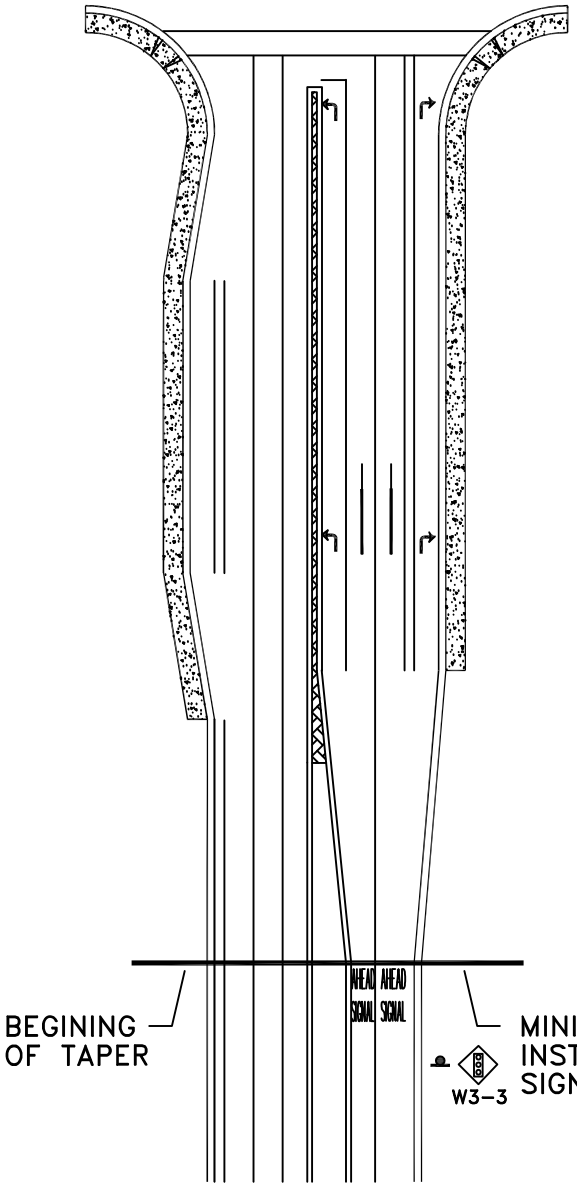
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

U–TURNS

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS–15



BEGINING OF TAPER

MINIMUM DISTANCE TO INSTALL "SIGNAL AHEAD" SIGN AND LEGENDS WHEN REQUIRED

POSTED OR 85TH PERCENTILE SPEED	ADVANCED STREET G7 SIGNS	ADVANCED W3-1, W3-3, SIGNS	NO PARKING SIGNS
20MPH	175FT	N/A	300FT
25MPH	250FT	N/A	300FT
30MPH	325FT	100FT	300FT
35MPH	400FT	150FT	300FT
40MPH	475FT	225FT	300FT
45MPH	550FT	300FT	300FT
50MPH	625FT	375FT	300FT
55MPH	700FT	450FT	300FT
60MPH	775FT	550FT	300FT
65MPH	850FT	650FT	300FT

* USE EXISTING STREET LIGHT POLES WHERE POSSIBLE

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

ADVANCED SIGN SPACING REQUIREMENTS

SCALE: NONE
REVISED: NOVEMBER 22, 2019
DRAWN BY: J PASTOR
APPROVED BY: J CERVANTES

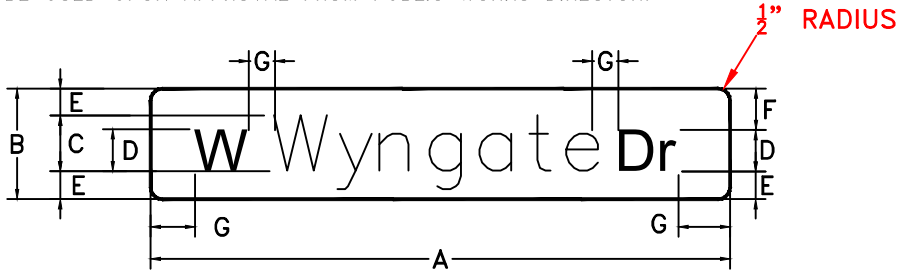
TS-16

LEGEND:

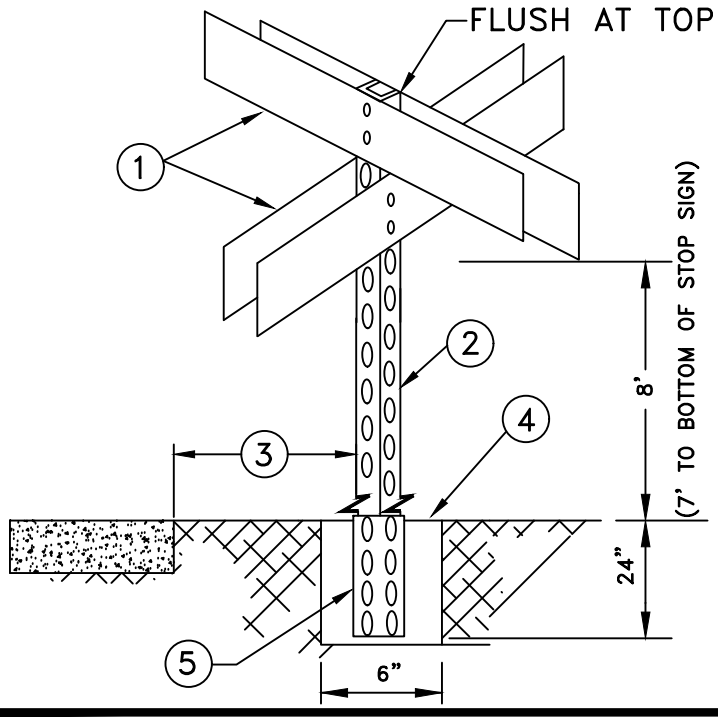
1. STREET NAME SIGNS.
2. SIGN POST SHALL BE SQUARE METAL WHITE POWDER COATED 12 GAUGE POSTS. REFER TO SECTION 56.02A.
3. EDGE OF STREET NAME SIGN SHALL BE A MINIMUM OF 2' FROM FACE OF CURB OR AT BACK OF SIDEWALK.
4. POST HOLE FOOTING SHALL BE 24" DEEP AND ø6" IN DIAMETER AND BACKFILLED WITH MINOR CONCRETE.
5. 24" GALVANIZED ANCHOR SLEEVE SHALL BE INSTALLED IN POST FOOTING. TOP TWO HOLES OF ANCHOR SLEEVE SHALL REMAIN ABOVE FINISH GRADE OF CONCRETE, HOLES BELOW FISH GRADE SHALL BE TAPED CLOSED. NO MATERIAL OTHER THAN SQUARE POST SHALL INTRUDE INTO SLEEVE. THE SQUARE POST SHALL MOVE FREELY IN THE SLEEVE IN A VERTICAL DIRECTION UPON INSTALLATION.
6. SIGN PLATE ATTACHMENT SHALL USE $\frac{5}{16}$"X2$\frac{1}{2}$" ZINC PLATED HEX HEAD BOLTS AND NUTS. $\frac{5}{16}$" ZINC PLATED WASHERS SHALL BE USED INSIDE OF BOLT AND NUT PER TOP VIEW DETAIL BELOW.

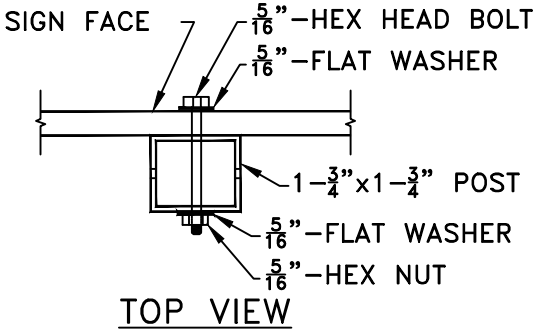
SIGN PLATE SPECIFICATIONS:

A. SIGN PLATES SHALL BE 8" OR 12" TALL AND 24" TO 48" LONG IN 6" INCREMENTS.
B. SIGN PLATES SHALL BE 0.080 GAUGE ALUMINUM.
C. SIGN PLATE FINISH SHALL BE 3M HIGH INTENSITY PRISMATIC GRADE RETRO REFLECTIVE BACKGROUND WITH 3M ELECTRONIC CUTTABLE GREEN FILM SHEETING OR APPROVED EQUIVALENT.
D. FONT FOR STREET NAME SIGNS SHALL BE FHWA SERIES "D" 2000~~EX~~. IF STREET NAME TEXT IS TOO LONG FOR 48" SIGN PLATE, SERIES "C" FHWY FONT MAY BE USED UPON APPROVAL FROM PUBLIC WORKS DIRECTOR.



SIGN DIMENSIONS							
MPH	A	B	C	D	E	F	G
25	VARIABLE	8"	4"	3"	2"	3"	3"
≥30	VARIABLE	12"	6"	4"	3"	5"	4.5"





TOP VIEW

MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

ROADWAY SIGNS

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J PASTOR
APPROVED BY: J CERVANTES

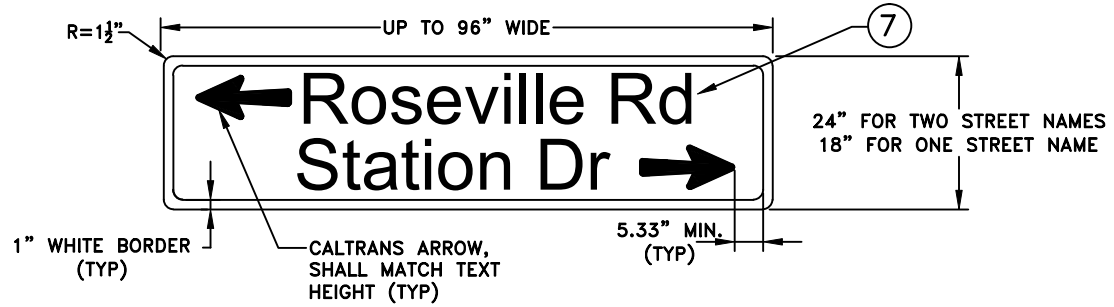
TS–17A

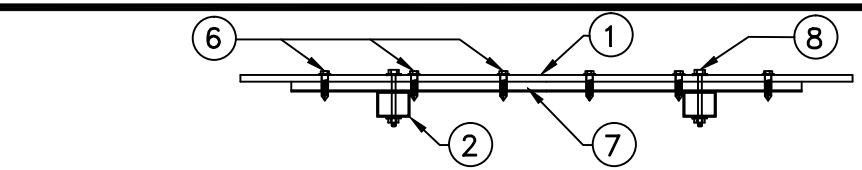
LEGEND:

1. STREET NAME SIGNS, D3 OR G8 GUIDE SIGN.
2. SIGN POST SHALL BE SQUARE METAL WHITE POWDER COATED 12 GAUGE POSTS. REFER TO SECTION 56.02A.
3. EDGE OF STREET NAME SIGN SHALL BE A MINIMUM OF 2' FROM FACE OF CURB OR AT BACK OF SIDEWALK.
4. POST HOLE FOOTING SHALL BE 24" DEEP AND ø6" IN DIAMETER AND BACKFILLED WITH MINOR CONCRETE.
5. 24" GALVANIZED ANCHOR SLEEVE SHALL BE INSTALLED IN POST FOOTING. TOP TWO HOLES OF ANCHOR SLEEVE SHALL REMAIN ABOVE FINISH GRADE OF CONCRETE, HOLES BELOW FISH GRADE SHALL BE TAPED CLOSED. NO MATERIAL OTHER THAN SQUARE POST SHALL INTRUDE INTO SLEEVE. THE SQUARE POST SHALL MOVE FREELY IN THE SLEEVE IN A VERTICAL DIRECTION UPON INSTALLATION.
6. THE SIGN MUST BE FASTENED TO THE BACK BRACING USING NO.14 x $\frac{3}{4}$" LONG SELF TAPPING SCREWS, RIVETS OR APPROVED EQUAL AND SPACED 10" OFF CENTER.
7. BACK BRACING FOR SIGNS OVER FIVE SQUARE FEET SHALL BE CONNECTED TO THE POST. THE BACK BRACING SHALL BE MINIMUM OF 1-$\frac{5}{8}$"x $\frac{13}{16}$" x L(LENGTH VARIES), 14 GAUGE MINIMUM. A USTRUT, U-CHANNEL, SQUARE TUBBING, C-CHANNEL OR APPROVED EQUAL CAN BE USED.
8. SIGN PLATE AND BACK BRACING ATTACHMENT SHALL USE $\frac{5}{16}$"-18 x 3-$\frac{1}{2}$" ZINC PLATED HEX HEAD BOLTS WITH $\frac{5}{16}$" ZINC PLATED HEX NUTS USING $\frac{5}{16}$" WASHER BETWEEN BOLT/HEAD AND SIGN PLATE. THREADS SHALL NOT PROTRUDE FARTHER THEN $\frac{1}{4}$" PAST THE HEX NUT.

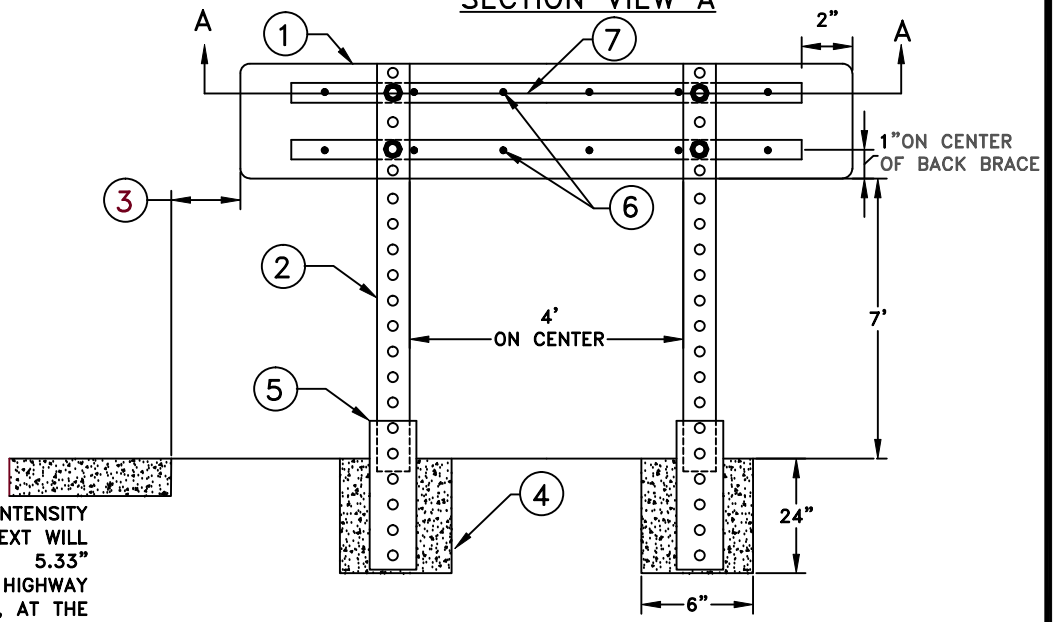
SIGN PLATE SPECIFICATIONS:

A. TEXT SIZE SHALL BE 8" UPPER AND LOWER CASE WHITE HIGH INTENSITY PRISMATIC (HIP) OR APPROVED EQUAL. SERIES C HIGHWAY FONT TEXT WILL BE CENTERED TOP AND BOTTOM AND SIDES HAVE A MINIMUM 5.33" CLEAR SPACE FROM EDGE OF SIGN PLATE. IN THE EVENT A 8" HIGHWAY FONT EXCEEDS 96", 7" SERIES "C" HIGHWAY FONT MAY BE USED, AT THE DISCRETION OF THE PUBLIC WORKS DIRECTOR
B. SIGN PLATES SHALL BE 0.080 GAUGE ALUMINUM.
C. SIGN PLATE FINISH SHALL BE 3M HIGH INTENSITY PRISMATIC GRADE RETRO REFLECTIVE BACKGROUND WITH 3M ELECTRONIC CUTTABLE GREEN FILM SHEETING OR APPROVED EQUIVALENT. LETTER OF AUTHENTICITY IS REQUIRED. SEE CONSTRUCTION STANDARDS SEC 56 – SIGNS, 56 – 1.01.
D. SIGNS SHALL BE D3 OR G8 GUIDE SIGNS.





SECTION VIEW A



MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

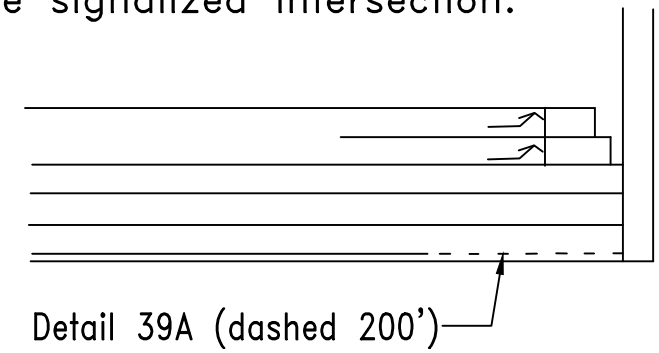
MID BLOCK ROADWAY SIGNS

SCALE: NONE
REVISED: JANUARY 1, 2016
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

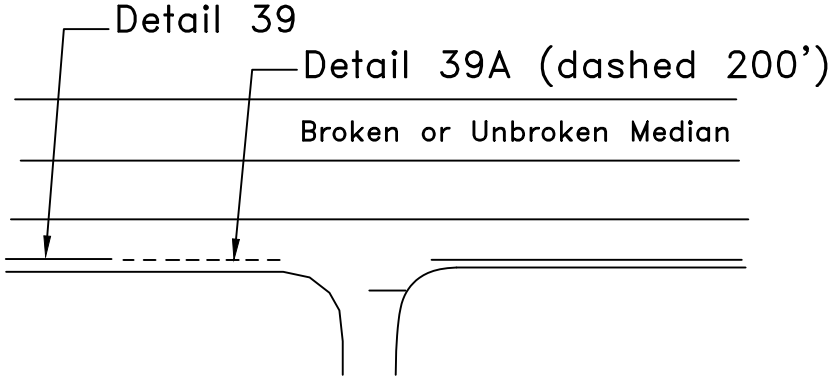
TS-17B

SIGNALIZED INTERSECTIONS

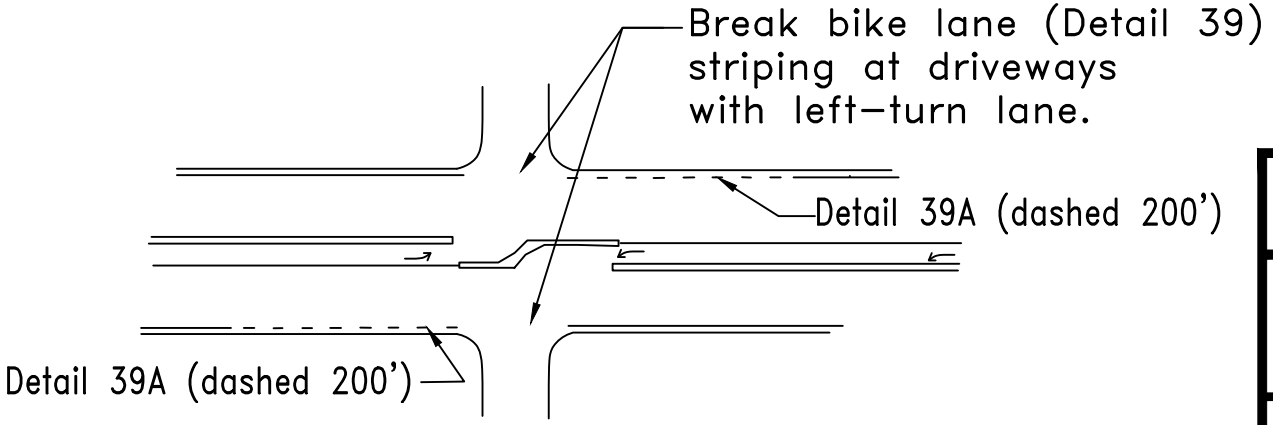
Extend bike lane (Detail 39) to the signalized intersection.



PUBLIC ROADWAYS



PRIVATE DRIVEWAYS WITH A LEFT-TURN LANE



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

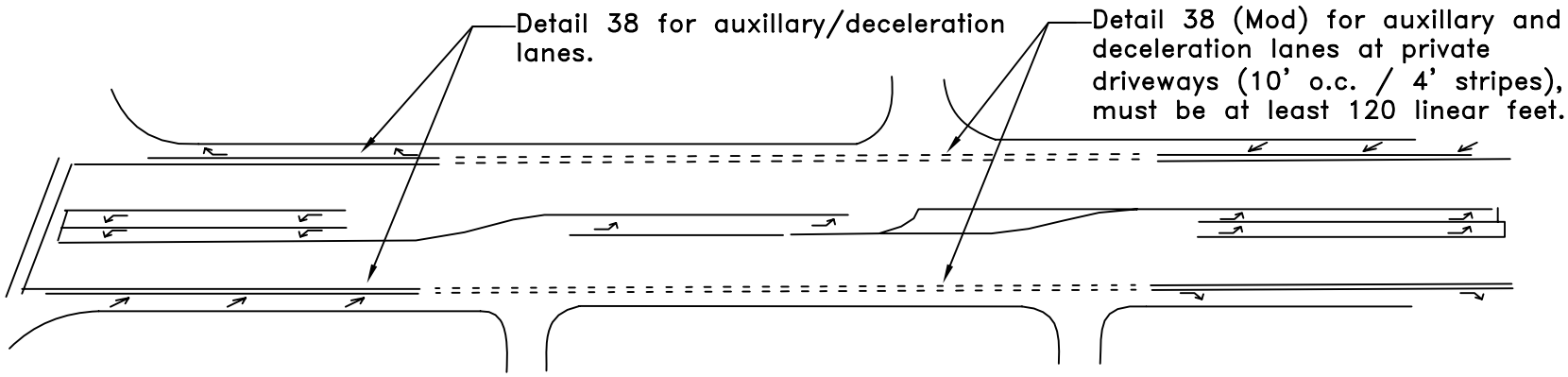
DEPARTMENT OF PUBLIC WORKS

BIKE LANE STRIPING A

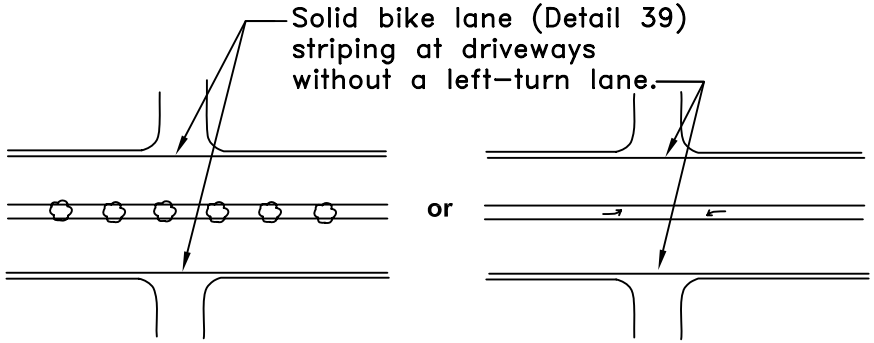
SCALE: NONE
REVISED: JANUARY 01, 2018
DRAWN BY: J PASTOR
APPROVED BY: J CERVANTES

TS-18

AUXILLARY LANES



PRIVATE DRIVEWAYS WITHOUT A LEFT–TURN LANE



RHON HERNDON
PUBLIC WORKS DIRECTOR

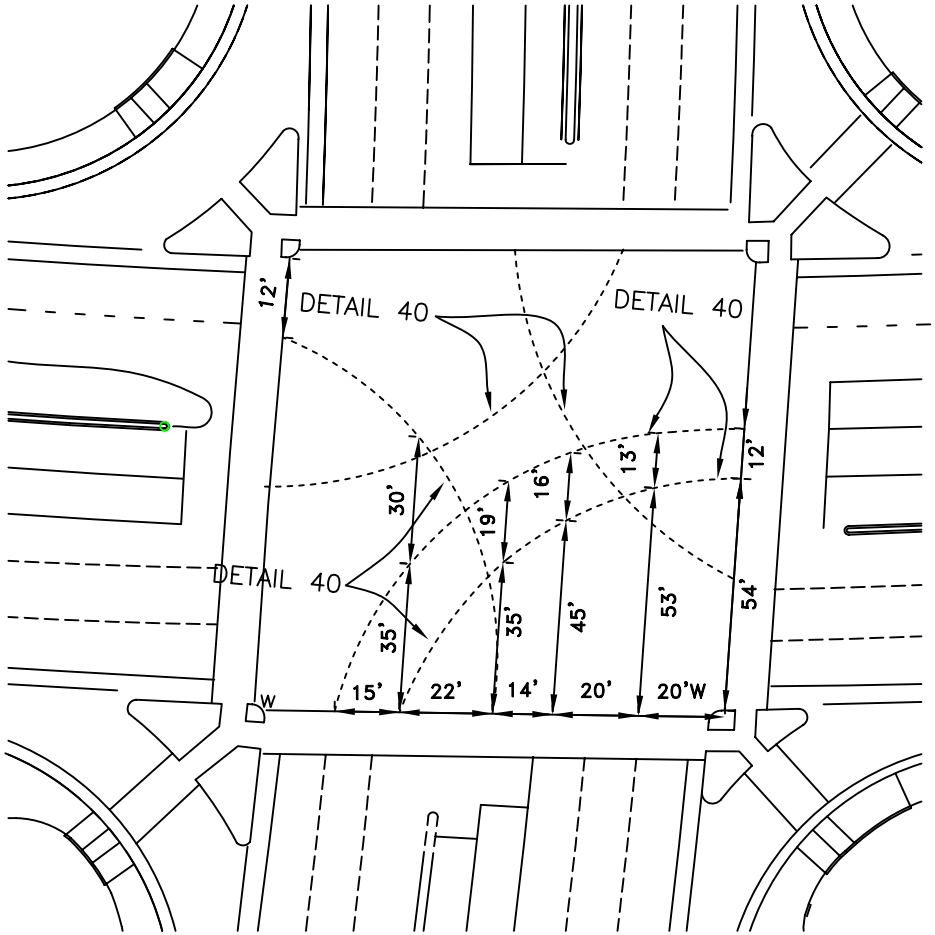
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

BIKE LANE STRIPING

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS–19



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TRIPLE LEFT STRIPING

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS-20

Public Works
Engineering
311 Vernon Street
Roseville, California 95678-2649

INTERSECTION RED FLASH APPROVAL

With stamped approval of this letter by the Traffic Section, Red Flash/Dark Signal is approved for the following intersection as specified below:

LOCATION: _____

PROJECT ACCOUNT NUMBER: _____

DATE: _____

TIME/DURATION: _____

☐ RED FLASH APPROVED:

1. Contractor shall submit the completed Intersection Red Flash Approval Form to the City Inspector and to TRedFlashRequests@roseville.ca.us 72 hours prior to needing the intersection in red flash. Signal shutdown shall be performed only by City personnel, unless otherwise directed by the Engineer.
2. During normal working hours (M-F, 7am-5pm) the contractor shall contact the Traffic Signal Technician either by telephone at **(916) 746-1760** or by email or text message at pagesignaltechnicians@roseville.ca.us one hour prior to needing the traffic signal placed into or removed from red flash. Outside of normal working hours - no phone call required.
3. The traffic signal will not be permitted to be placed in red flash during rain, lightning, or inclement weather conditions (including wet pavement conditions).
4. The Contractor shall reimburse the City for the actual cost of all inspection, including City Traffic Signal Technician time as required.
5. "Road Work Ahead" Signs required at all approaches to intersection when in red flash.
6. The Contractor shall furnish and place 36" "Stop" signs on arterial roadway approaches. Signs shall be mounted at a height of 84".

☐ DARK SIGNAL APPROVED – ADDITIONAL REQUIREMENTS

1. The Contractor shall place "Stop Ahead" C-W17 and "Stop" R-1 signs to direct vehicle and pedestrian traffic through the intersection during traffic signal system shutdown. Temporary "Stop Ahead" and "Stop" signs shall be removed when the system is turned on.
2. "Stop Ahead" and "Stop" signs shall be furnished by the Contractor. Minimum size of "Stop" signs shall be 36" for single sign placements and 24" for dual sign placements. Signs shall be mounted at a **height of 84"**.
3. One "Stop Ahead" sign and one "Stop" sign shall be placed for each direction of traffic. For approaches with two or more through or left turn lanes, two "Stop" signs shall be placed. Typical sign placement should be between the left turn and through lanes. Additional "Stop" signs should be placed on the shoulder. No "Stop" signs shall be placed in a manner that blocks bike lanes.
4. "Stop Ahead" and "Stop" signs shall be in place in each direction immediately prior to the intersection going dark and removed immediately after the intersection is placed back into red flash.
5. **Red flashing beacons or flares shall** be placed and maintained at each "Stop" sign during nighttime (dark) hours.
6. Traffic control must be verified by the Public Works Construction Inspector prior to the signal being deactivated.

☐ **I have read the above Intersection Red Flash Approval requirements.**

REQUESTOR INFO: _____
Name of Company

_____ ( ) _____
Print Name of Requestor Contact Phone Number

SIGNATURE: **X**_____ / / _____
Date

INSPECTOR NAME: _____ Inspector. Phone #: _____

Copy To: Contractor, Public Works Inspector, Signal Technicians, NOTE: Contractor is required to follow all requirements of this letter and keep a signed and stamped copy at job site.

Traffic Signal Inspection Check List

DSI – Development Services Inspector **TECH** – Signal Technician **ENG** – City Traffic Engineer
ATMS – Advanced Traffic Management System

PRIOR TO BEGINNING WORK

- ☐ **Pre-Job – DSI -** DSI to e-mail the Signal Technicians a minimum of 24 hours prior to the scheduled project pre-job meeting. The TECH assigned to the project will respond to the DSI's e-mail confirming attendance.
- ☐ **Communications** – **DSI -** At the pre-job meeting, the chain of communication shall be clearly defined. Requests for inspection, City supplied equipment, beginning of functional testing, and the scheduling of signal turn-on must be through the DSI. All other communication should either go through or be relayed to the DSI.

DURING CONSTRUCTION

- ☐ **Approve Pole Locations – DSI**, **TECH**, **ENG** – Pole locations, face of curb, utilities, limit lines, and lane lines shall be clearly marked and checked by the DSI prior to requesting inspection by the TECH and ENG.
- ☐ **Approve Controller and Service Cabinet Locations – DSI**, **TECH**, **ENG** – Face of curb, back of walk, and signal poles shall be clearly marked and verified by the DSI prior to requesting inspection by the TECH and ENG
- ☐ **Approve PTZ Camera Location – DSI**, **TECH**, **ENG**
- ☐ **Approve Loop/Handhole Layout – DSI**, **TECH**, **ENG** – Lane lines, limit lines, and medians shall be clearly marked and verified by the DSI prior to inspection by TECH and ENG.
- ☐ **Inspect Signal Pole Foundation – DSI**, **TECH**, **ENG -** including size, reinforcement cage, foundation conduit, bolt pattern, bolt orientation, and foundation height
- ☐ **Inspect Conduit Trenches** – **DSI -** including depth, width, and location
- ☐ **Inspect Controller and Service Cabinet Foundations** – **DSI**, **TECH** – Require approval prior to concrete and grounding
- ☐ **Inspect Conduit, Pull Box, and Handhole Installations** – **DSI**, **TECH** – Handholes must be located on the lane lines. Check conduit/Pull Box sizes.
- ☐ **Inspect Loop Installation** – **TECH**
- ☐ **Inspect Trench Backfill** – **DSI -** including AC/PCC repair
- ☐ **Inspect DLC Installation** – **TECH**
- ☐ **Inspect Signal Pole Installation** – **DSI**, **TECH**
- ☐ **Inspect Phase and Service Wire Installation** – **TECH**
- ☐ **Inspect Signal Head Installation and Alignment** – **TECH**
- ☐ **Request City Supplied Equipment –TECH**, **ENG** – requires 10 day notice and prepayment for equipment prior to contractor pick-up unless exempt (contact Engineering for invoice)
- ☐ **Inspect Controller and Service Cabinet Installations** – **TECH** – DSI to notify the TECH 48 hours prior to the contractor's scheduled equipment pickup date.
- ☐ **Inspect Pedestrian Push Button, Opticom, and Luminaire Installation** – **TECH**
- ☐ **Inspect SIC Installation - TECH**

PRIOR TO SIGNAL ACTIVATION

- ☐ **Install/Verify Approved Signal Timing - TECH**
- ☐ **5 Day Functional Test** – **TECH**
- ☐ **Flash Out Signal** – **TECH**
- ☐ **Initiate QuicNet Communication** – **TECH**, **ATMS**
- ☐ **Verify Final Striping** – **DSI**, **TECH**, **ENG**
- ☐ **Signal Turn-On** – **DSI**, **TECH**, **ENG**

POST SIGNAL ACTIVATION

- ☐ **Verify all Signal Indications and Pedestrian Phases Operational** – **TECH, ENG**
- ☐ **Monitor Signal Timing** – **TECH**, **ENG**
- ☐ **Generate Signal Punch List** – **TECH, ENG**
- ☐ **1-Year Warranty Inspection** – **DSI, TECH**

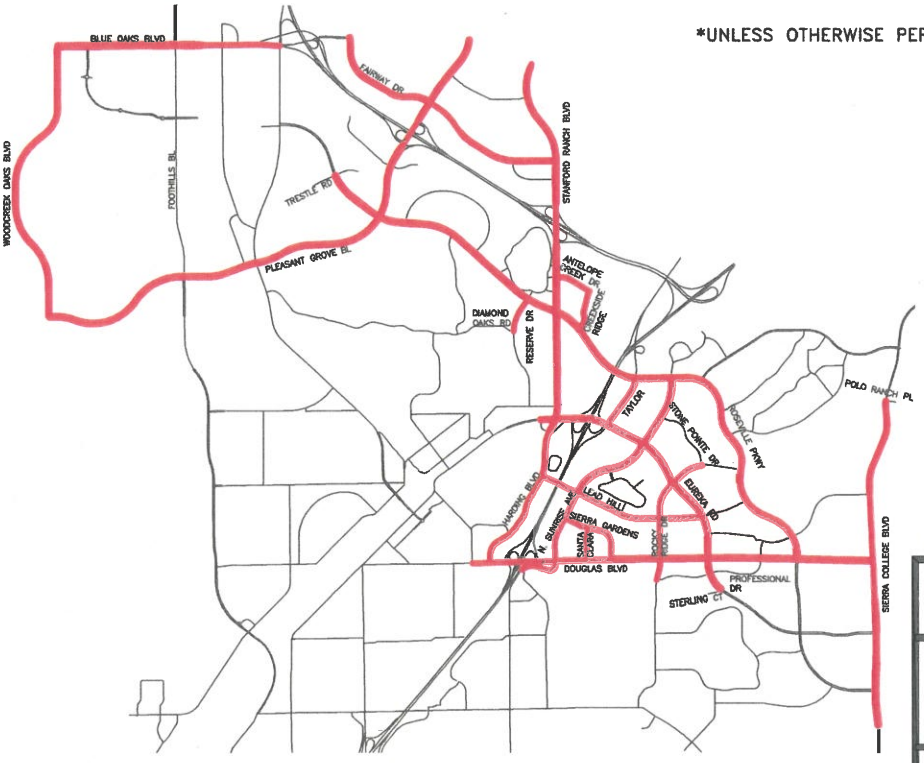
48 hour notice required for inspections, Functional testing, and Signal Turn-On without prior approval.

RESTRICTIONS 10 DAYS PRIOR TO THANKSGIVING THROUGH JANUARY 3RD

WORK MAY BE ALLOWED: WEEKDAYS 9PM TO 11AM

NO WORK ALLOWED: WEEKDAYS 11AM TO 9PM
WEEKENDS/HOLIDAYS

*UNLESS OTHERWISE PERMITTED BY AN APPROVED TRAFFIC CONTROL PLAN



LEGEND

RESTRICTED ROADWAYS

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

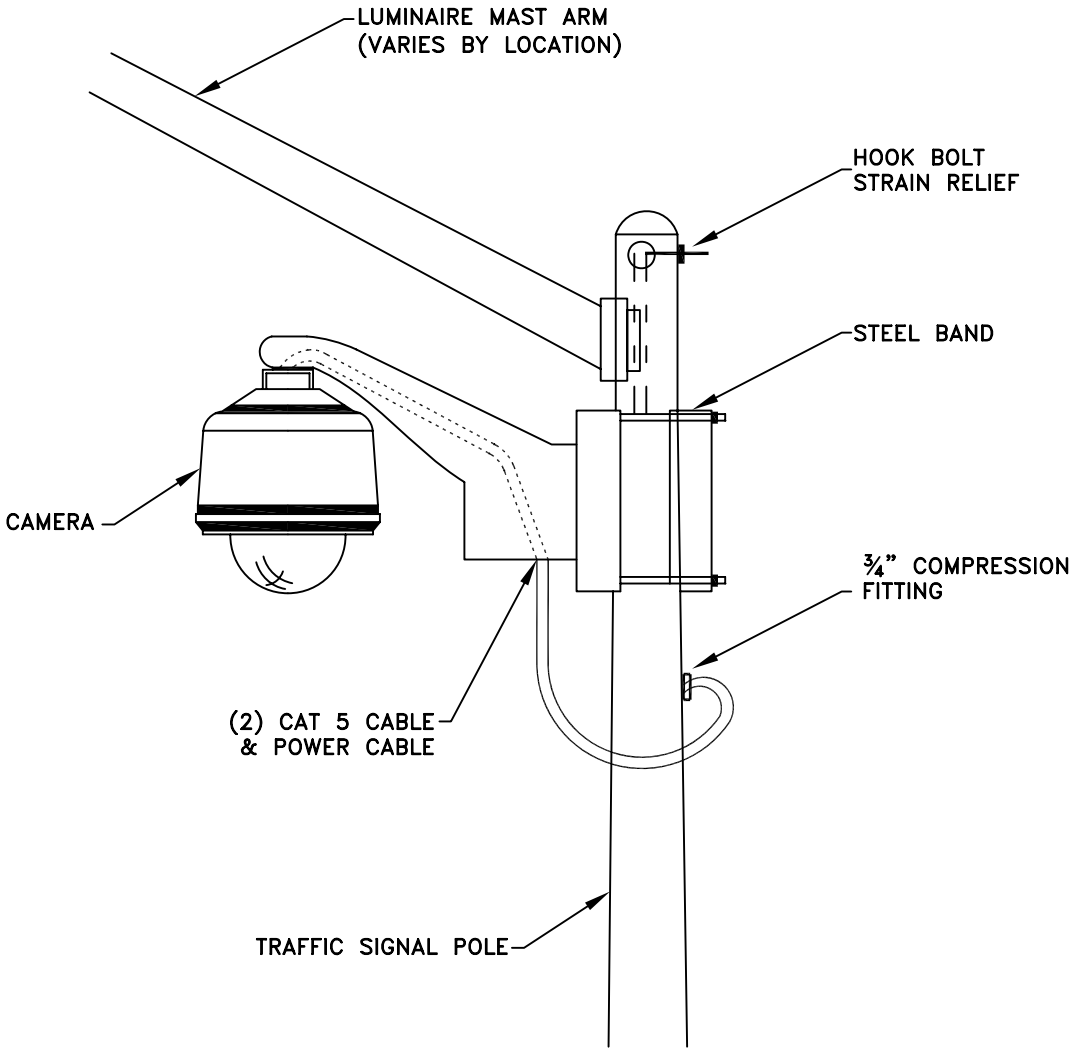
DEPARTMENT OF PUBLIC WORKS

HOLIDAY TRAFFIC CONTROL RESTRICTIONS

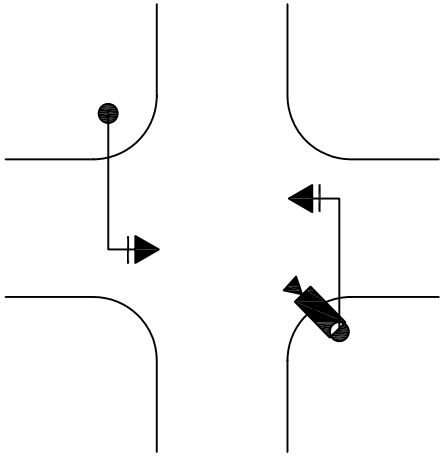
(IN ADDITIONS TO CITY STANDARDS WORKING HOUR RESTRICTIONS)

SCALE: NONE
REVISED: DEC 20, 2022
DRAWN BY: J PASTOR
APPROVED BY: J CERVANTES

TS-23



CCTV MOUNTING ASSEMBLYORIENTATION



THE ROTATION OF THE CCTV MOUNT SHALL BE ALIGNED TO A POINT AT THE TRAFFIC SIGNAL POLE ON THE DIAGONALLY OPPOSITE CORNER.

RHON HERNDON
PUBLIC WORKS DIRECTOR

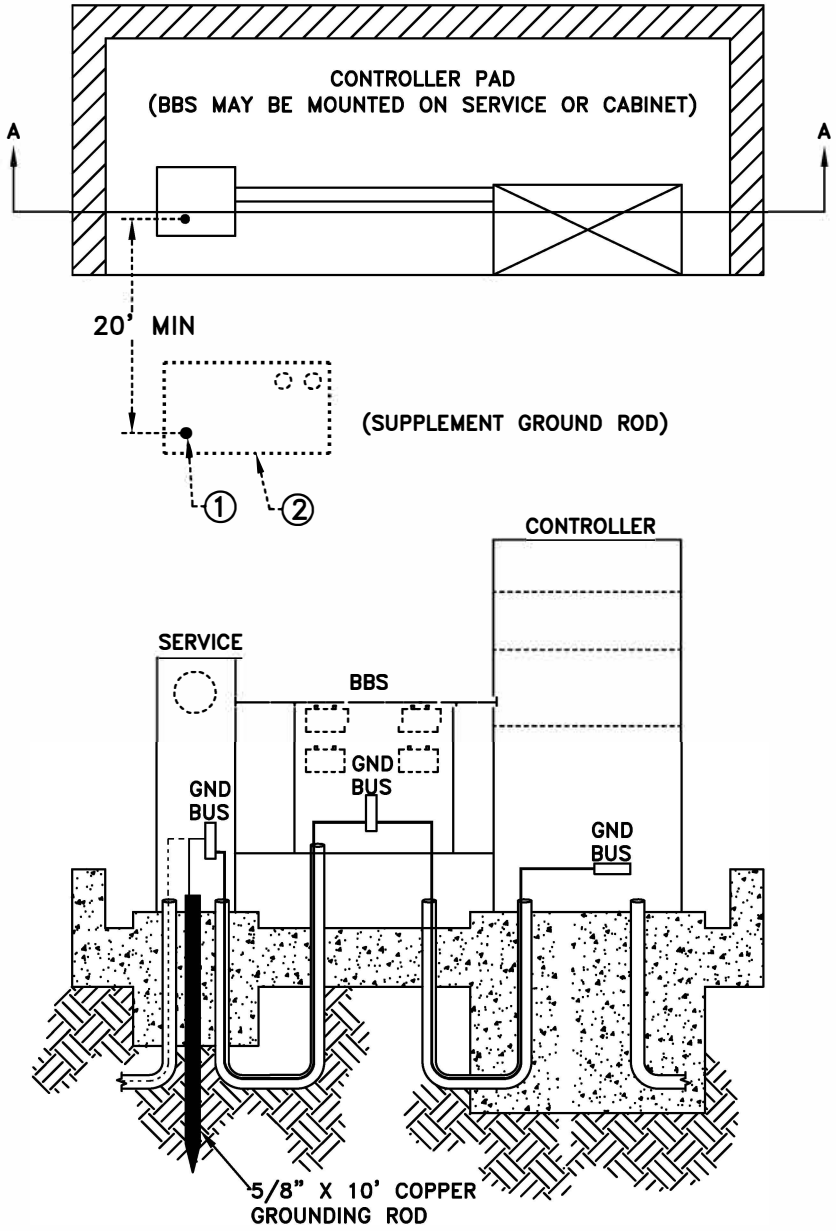
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

CCTV MOUNTING ASSEMBLY

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

TS–24



SECTION A

LEGEND

- ø5/8" x 10' GROUNDING ROD
- CONDUIT
- GROUNDING ELECTRODE CONDUCTOR #6 STRANDED WITH THW INSULATION (COLOR GREEN)
- EQUIPMENT GROUNDING CONDUCTOR – #8 STRANDED WITH THW INSULATION (COLOR GREEN)

NOTE (SUPPLEMENTAL GROUND ROD):

THE COMBINED GROUND ROD RESISTANCE BETWEEN THE SERVICE AND N–36 PULLBOX WITH EXTENSION SHOULD BE LESS THAN 5Ω, IF RESISTANCE IS GREATER THAN 5Ω, A THIRD GROUND ROD MAY BE NECESSARY (SEE CITY STAFF FOR FURTHER DIRECTION).

LEGEND (SUPPLEMENTAL GROUND ROD)

1. 5/8"X10'(L) GROUND ROD SHALL BE INSTALLED A MINIMUM OF 20' FROM SERVICE GROUND ROD. GROUND ROD TO BE PLACED ON STREET SIDE CORNER OF PULL BOX. GROUNDING ELECTRODE CONDUCTOR SHALL BE CONTINUOUS TO THE SERVICE GROUND ROD AND CONTINUE TO THE SERVICE GROUND BUS.
2. THE SUPPLEMENTAL GROUND ROD SHALL BE LOCATED IN A N–36 PULLBOX WITH EXTENSION THAT HAS A HORIZONTAL SEPARATION OF 20' OR GREATER FROM THE SERVICE GROUND ROD.

RHON HERNDON
PUBLIC WORKS DIRECTOR

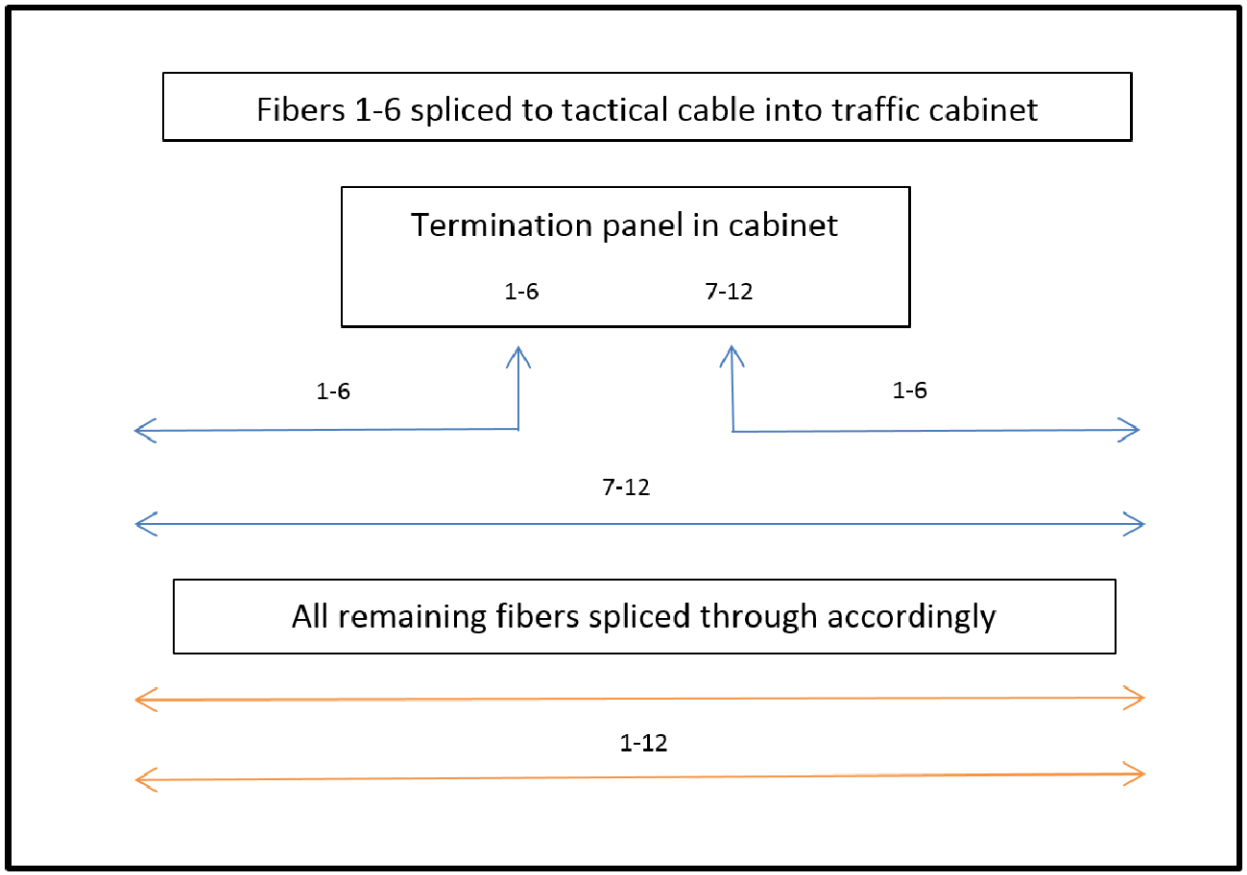
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

CONTROLLER/SERVICE GROUNDING DIAGRAM

SCALE: NONE
REVISED: JANUARY 01, 2018
DRAWN BY: J PASTOR
APPROVED BY: J CERVANTES

TS–25



Materials required for Type 1 splice:

Coyote LCC splice enclosure and splice trays (P.N. COYFCC–F006) or Coyote Runt splice enclosure and splice trays (P.N. 8006671). (City to determine which enclosure to use.)

Minimum pull box size for splice location is N–36.
Corning tactical fiber optic cable for local cabinet – see City approved equipment list.
Cabinet termination panel Corning SPH–01P housing with CCH–CP12–A9 panel.

RHON HERNDON
PUBLIC WORKS DIRECTOR

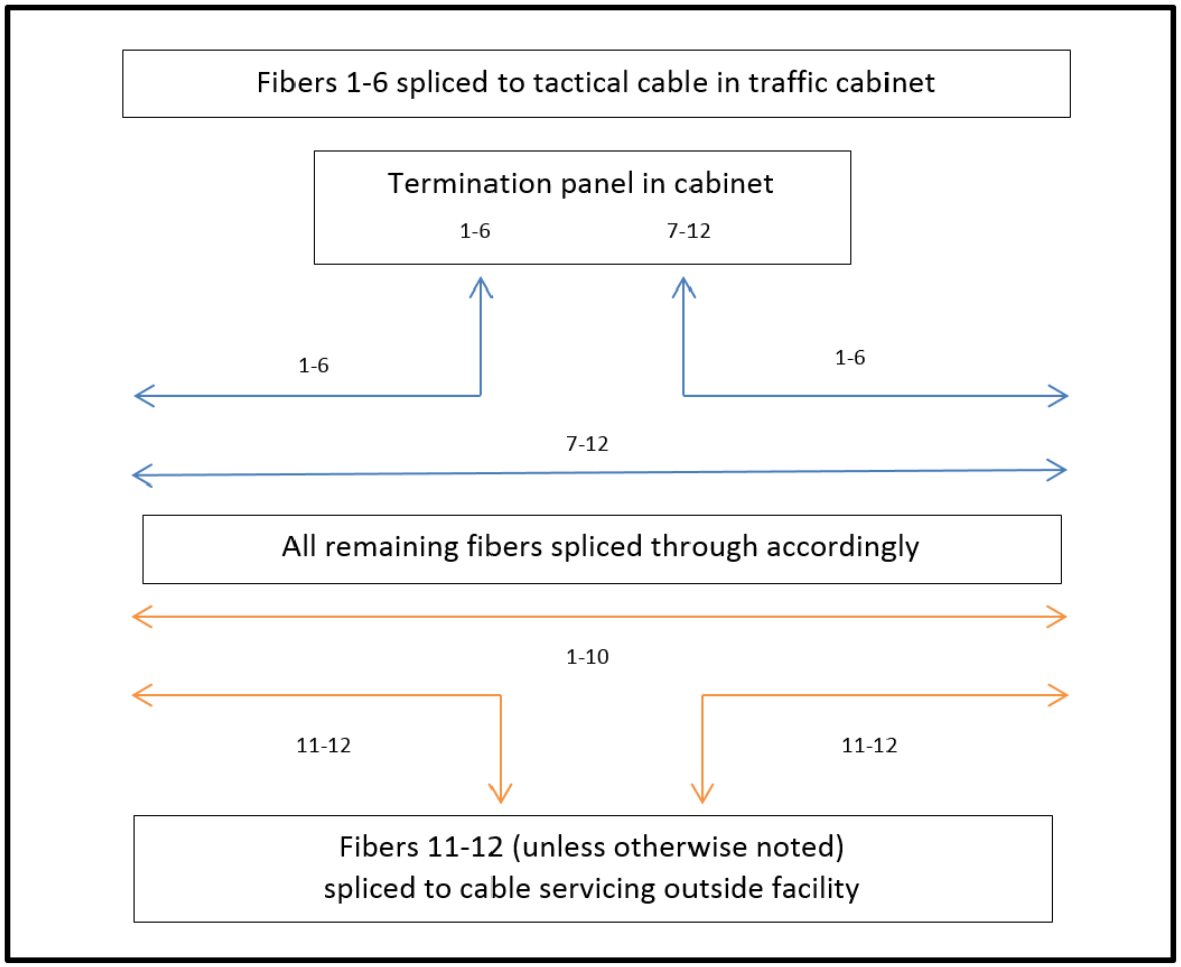
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TYPE 1 FIBER SPLICE

SCALE: NONE
REVISED: MAR. 24, 2015
DRAWN BY: T. ZAMORA
APPROVED BY: RHON HERNDON

TS–26



Materials required for Type 2 splice:

Coyote LCC splice enclosure and splice trays (P.N. COYFCC–F006) or Coyote Runt splice enclosure and splice trays (P.N. 8006671). (City to determine which enclosure to use.)

Minimum pull box size for splice location is N–36.
Corning tactical fiber optic cable for local cabinet – see City approved equipment list.
Cabinet termination panel Corning SPH–01P housing with CCH–CP12–A9 panel.

RHON HERNDON
PUBLIC WORKS DIRECTOR

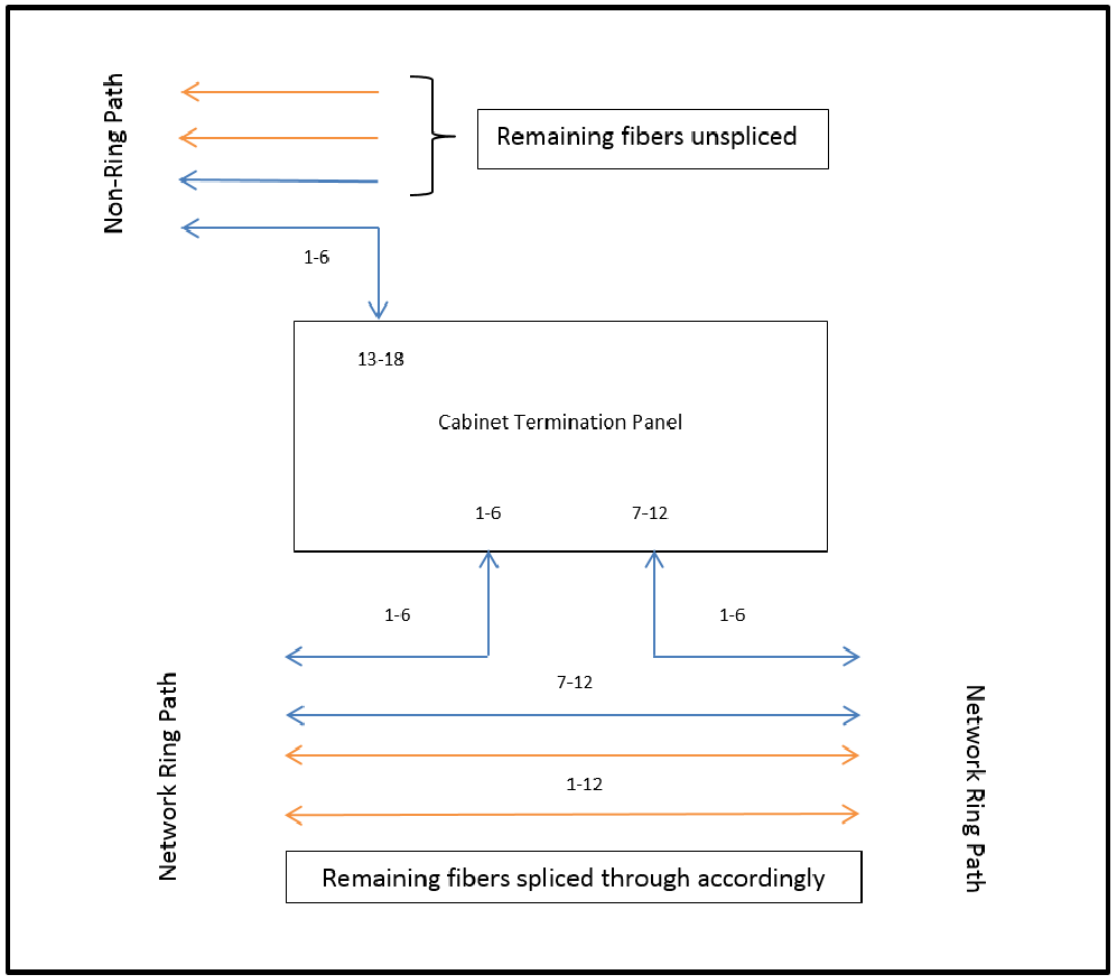
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TYPE 2 FIBER SPLICE

SCALE: NONE
REVISED: MAR. 24, 2015
DRAWN BY: T. ZAMORA
APPROVED BY: RHON HERNDON

TS–27



Materials required for Type 3 splice:

Coyote Runt splice enclosure and splice trays (P.N. 8006671).
Minimum pull box size for splice location is N–36.
Corning tactical fiber optic cable for local cabinet – see City approved equipment list.
Cabinet termination panel(s):
Corning SPH–01P housing (2 ea.) with CCH–CP12–A9 panels or
Corning SPH–01P housing with CCH–CP24–A9 panel.
(City to determine which panel(s) to use.)

RHON HERNDON
PUBLIC WORKS DIRECTOR

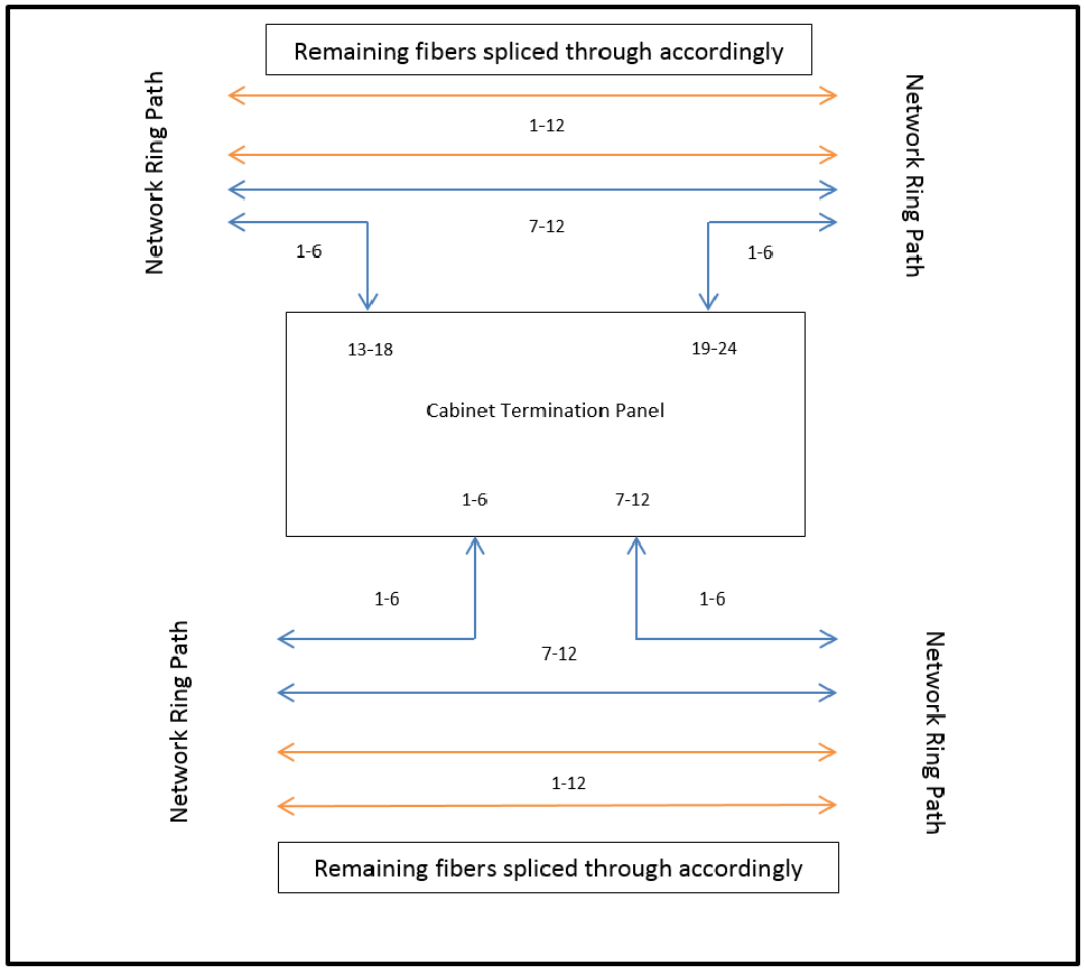
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TYPE 3 FIBER SPLICE

SCALE: NONE
REVISED: MAR. 24, 2015
DRAWN BY: T. ZAMORA
APPROVED BY: RHON HERNDON

TS–28



Materials required for Type 4 splice:

Coyote Runt splice enclosure and splice trays (P.N. 8006671) or
Coyote Dome splice enclosure (9.5" x 19") and splice trays (P.N. COYD-919B-000).
(City to determine enclosure to use.)

Minimum pull box size for splice location is N-48 with extension.
Corning tactical fiber optic cable for local cabinet - see City approved equipment list.
Cabinet termination panel(s):
Corning SPH-01P housing (2 ea.) with CCH-CP12-A9 panels or
Corning SPH-01P housing with CCH-CP24-A9 panel.
(City to determine which panel(s) to use.)

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

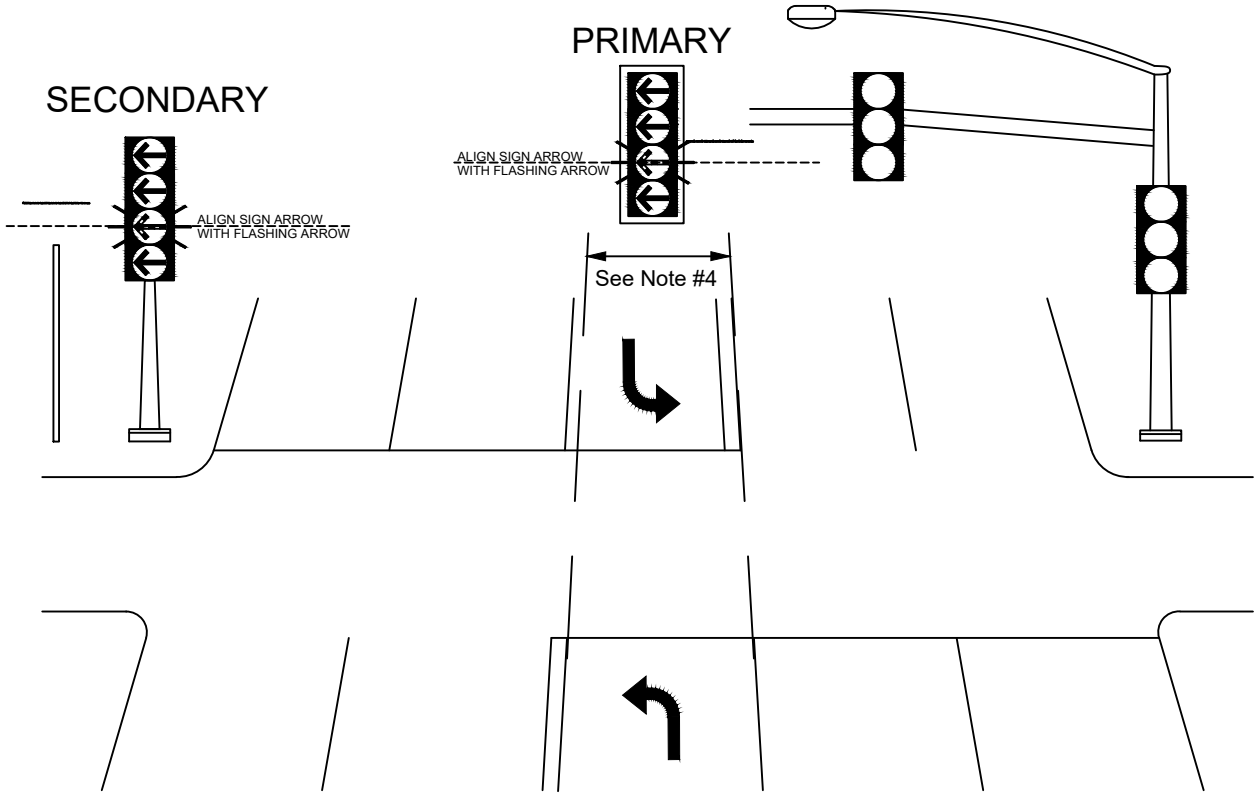
DEPARTMENT OF PUBLIC WORKS

TYPE 4 FIBER SPLICE

SCALE: NONE
REVISED: MAR. 24, 2015
DRAWN BY: T. ZAMORA
APPROVED BY: RHON HERNDON

TS-29

Steady Red Arrow - Drivers turning left must stop and wait
Steady Yellow Arrow - Stop, if you can do so safely
Flashing Yellow Arrow - Proceed with left turn after yielding to oncoming traffic
Steady Green Arrow - Proceed with left turn



DETAIL A

NOTES:

1. Shall conform to current CA MUTCD guidelines.
2. Sight distance (SD) should meet AASHTO/FHWA recommended intersection SD for permissive left turns.
3. Number of opposing thru lanes ≤3.
4. Implemented at Single Left turn lanes only.
5. Cannot be implemented if traffic signal has split phased operation.
6. Sign - "Left Turn Yield on Flashing" - Yellow Arrow Symbol, minimum size ~~24"x30"~~ 36"x48", white - background, black-letters, yellow - arrow symbol.
7. MAS-4B mounting type shall be used for the signal mast arm 4-section head.
8. TV mounting type shall be used for the 1-b pole 4-section head.
9. Optional 2nd sign for "far-side" 1B. Sign to be angled towards corresponding left-turn lane. Sign location TBD in field.
10. Yellow reflective tape shall be installed on overhead signal head (outlined)
11. Tee-intersections: Sign placard (18"x36" with 4" letter height) as shown on Detail A shall be installed underneath a Signal Ahead (W3-3) sign on the approach of the major roadway that does not have a left-turn/flashing yellow arrow.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

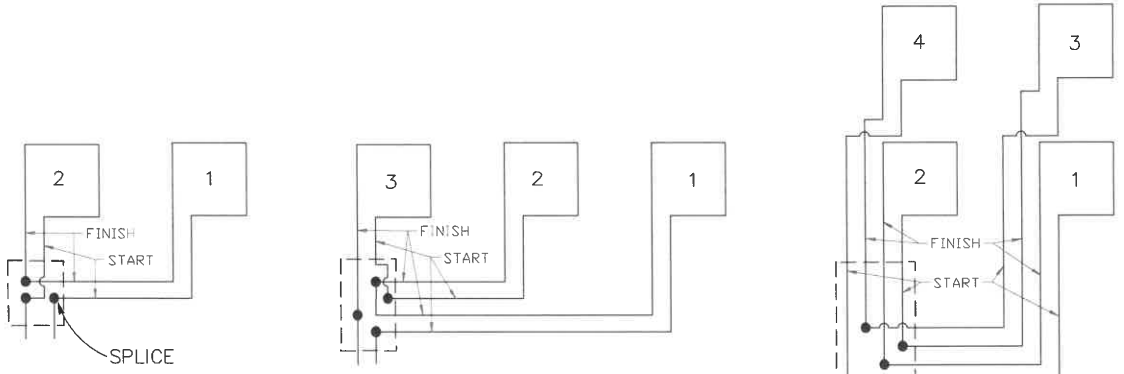
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

STANDARD INSTALLATION OF FLASHING YELLOW ARROW PROTECTED/PERMISSIVE TRAFFIC SIGNAL

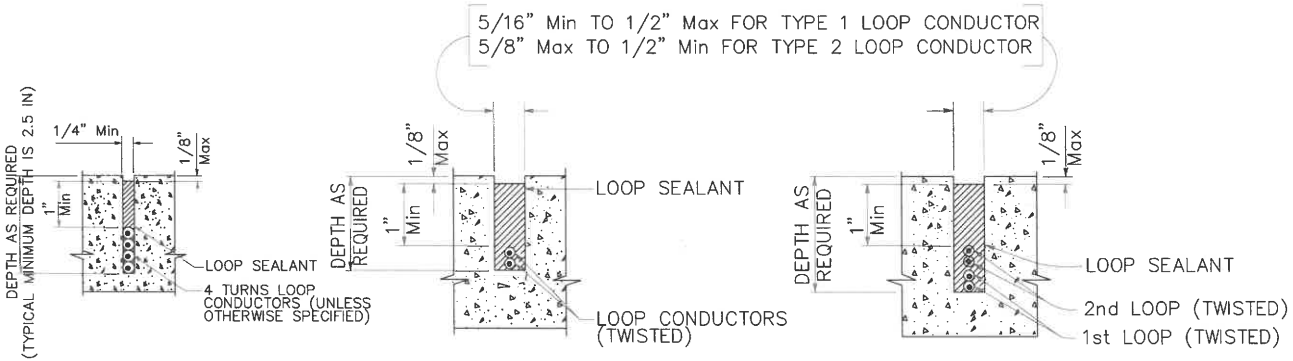
SCALE: NONE
REVISED: APRIL 01, 2024
DRAWN BY: J PASTOR
APPROVED BY: J CERVANTES

TS-30



TYPICAL LOOP CONNECTIONS

Dashed lines represent the pull box



TYPICAL SAW CUT DETAILS

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

LOOP DETAIL: CONNECTIONS AND SAW CUT

ALL LOOPS WOUND CLOCKWISE.
ALL LOOPS SPLICED IN SERIES.

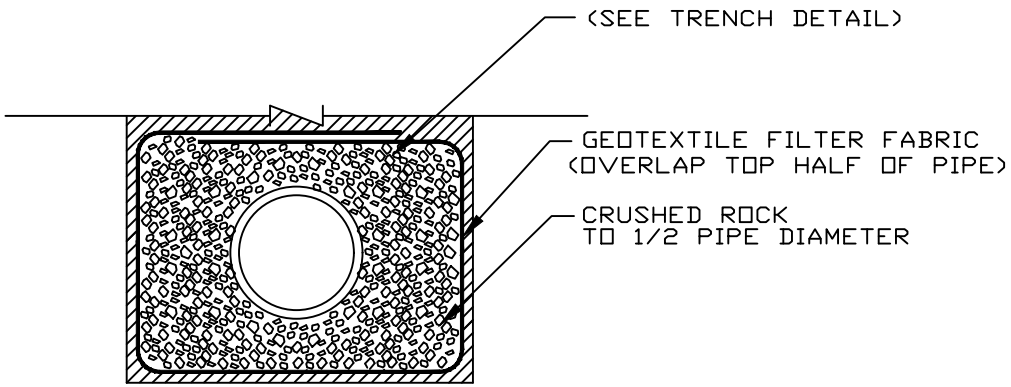
SCALE: NONE
REVISED: NOVEMBER 2023
DRAWN BY: R. YAKIMCHUK
APPROVED BY: J CERVANTES

TS-31

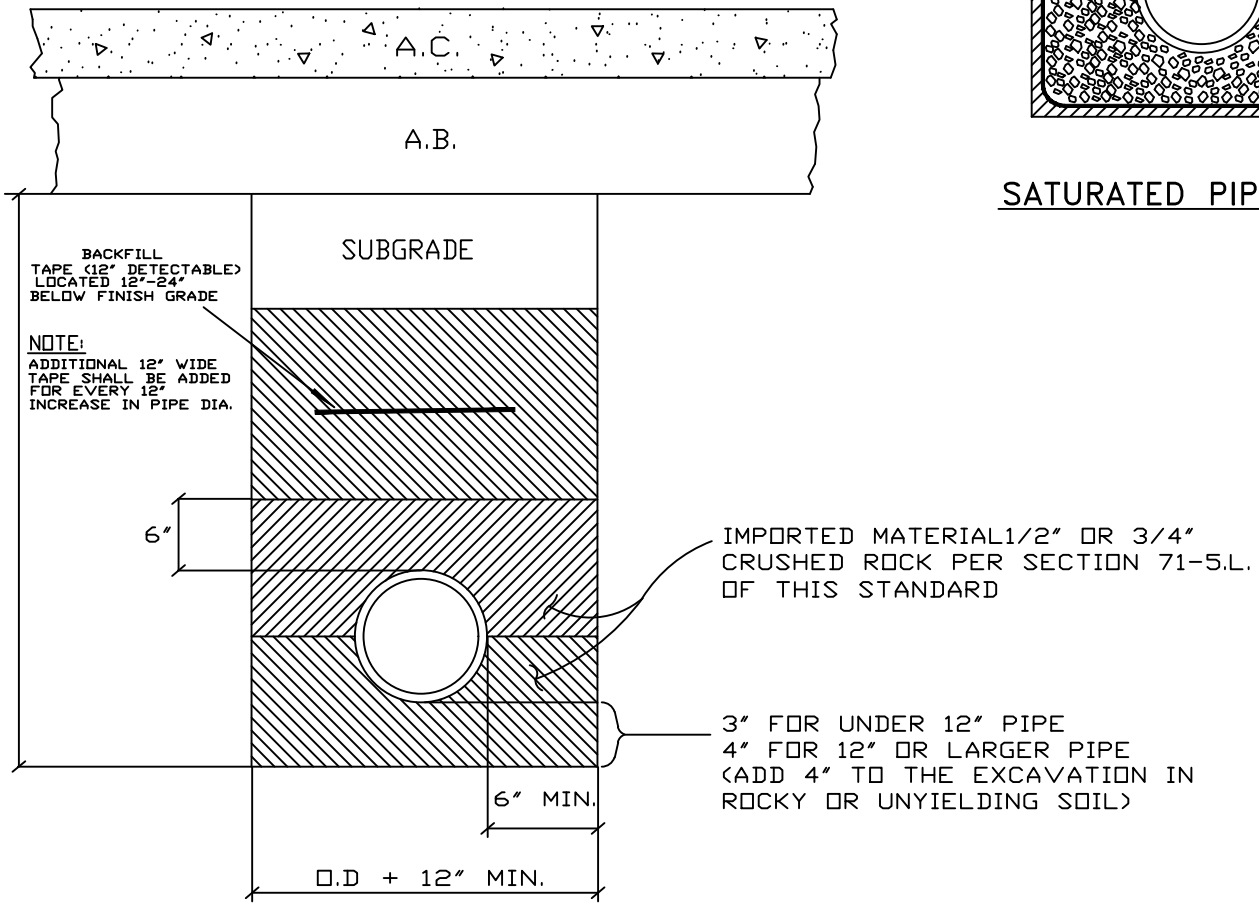
TRENCH BACKFILL REQUIREMENTS:

1. PROPOSED STREETS- REFER TO DETAIL TB-1 OF SECTION 31 FOR BACKFILL REQUIREMENTS ABOVE THE PIPE ZONE.

2. EXISTING STREETS- REFER TO DETAIL TB-1 AND TB-3 OF SECTION 31 FOR BACKFILL REQUIREMENTS ABOVE THE PIPE ZONE.



SATURATED PIPE TRENCH



NOTE: BACKFILL SHALL BE MECHANICALLY CONSOLIDATED OR SHOVEL SLICED UNDER THE HAUNCHES OF THE PIPE

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

SEWER MAIN TRENCH AND BACKFILL

SCALE: NONE
REVISED: JANUARY 2019
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-1

NOTES

MANHOLE LIDS SHALL BE SEALED WITH AN APPROVED RUBBER GASKET.

JOINTS SHALL BE MORTARED INSIDE AND OUT.

UNUSED CHANNELS SHALL BE COMPLETELY FILLED WITH GROUT.

STUBS SHALL BE PLUGGED AND END MARKED ABOVE FINISHED GRADE WITH A REDWOOD 4 BY 4 POST PAINTED GREEN

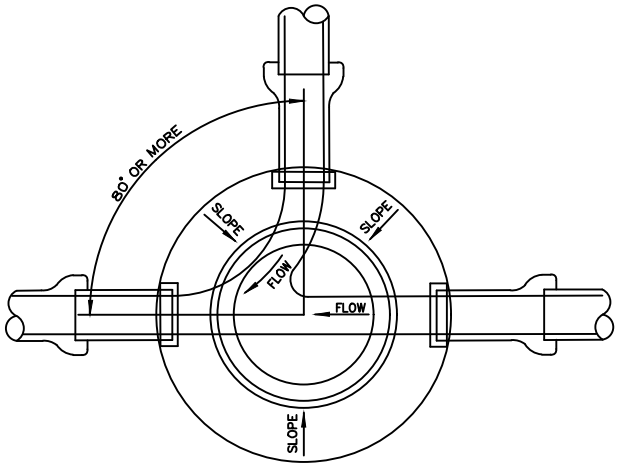
IF AN ECCENTRIC CONE IS USED, PLACE SUCH THAT THE OPENING IS OVER THE UPSTREAM INVERT.

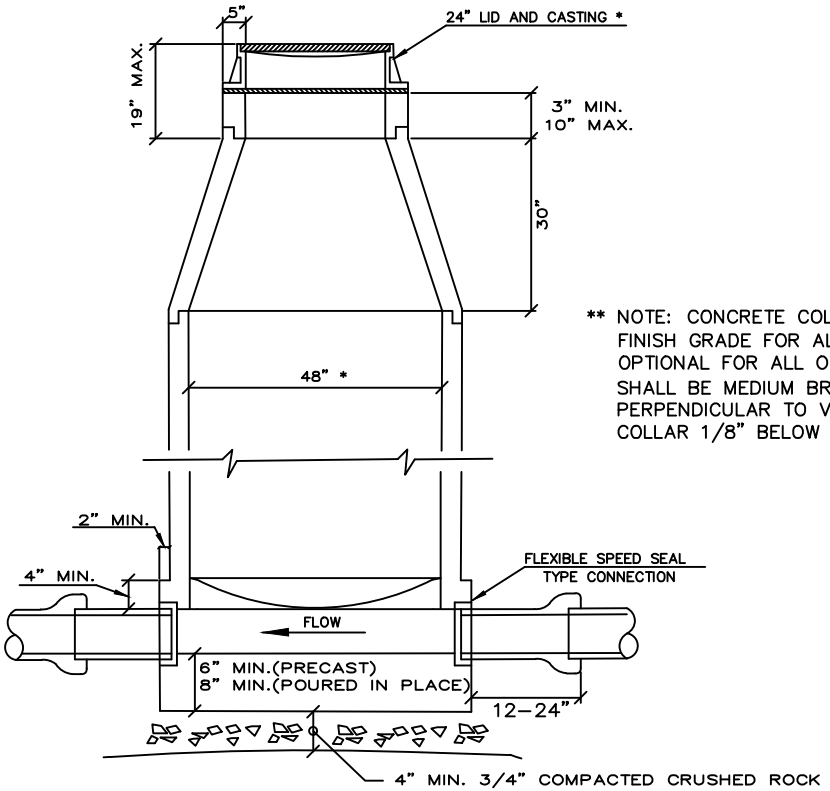
NO CAULDER OR REPAIR COUPLINGS SHALL BE USED ON NEW CONSTRUCTION

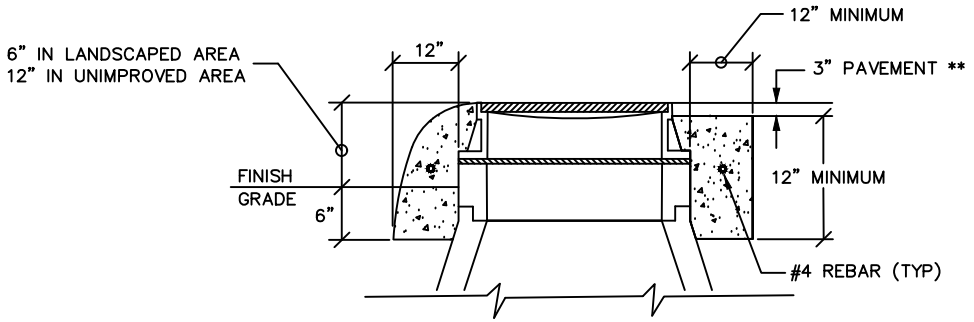
FLOW LINES SHALL HAVE A 1/10 DROP OR AS INDICATED ON PLANS

MANHOLES WITH DROPS SHALL BE EPOXY COATED. THE COATING SHALL BE APPLIED PER SEC. 91-10K OF THESE STANDARDS.

* 60" & 72" MANHOLES SHALL USE A 36" COMPOSITE LID AND FRAME,







CONCRETE COLLAR DETAIL

** NOTE: CONCRETE COLLAR SHALL BE PLACED FLUSH TO FINISH GRADE FOR ALL COLLECTORS AND ARTERIALS, OPTIONAL FOR ALL OTHER ROADWAYS. FINISH SURFACE SHALL BE MEDIUM BROOM FINISH WITH PATTERN PERPENDICULAR TO VEHICLE TRAVEL DIRECTION. SET COLLAR 1/8" BELOW ADJACENT FINISHED PAVEMENT.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

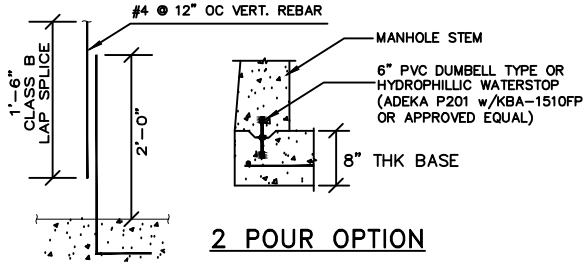
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

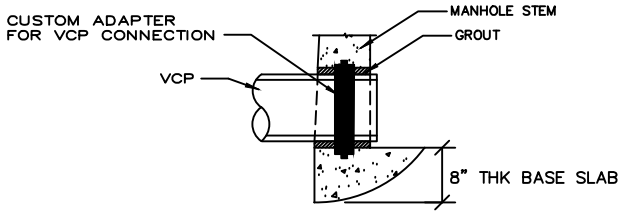
SEWER MANHOLE STANDARD 48 INCH

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-2



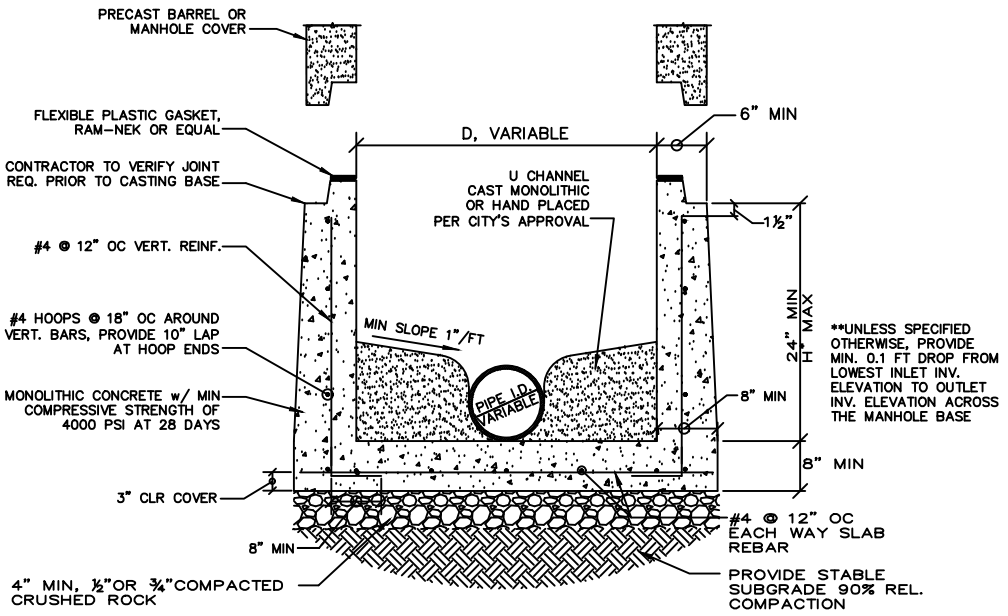
2 POUR OPTION



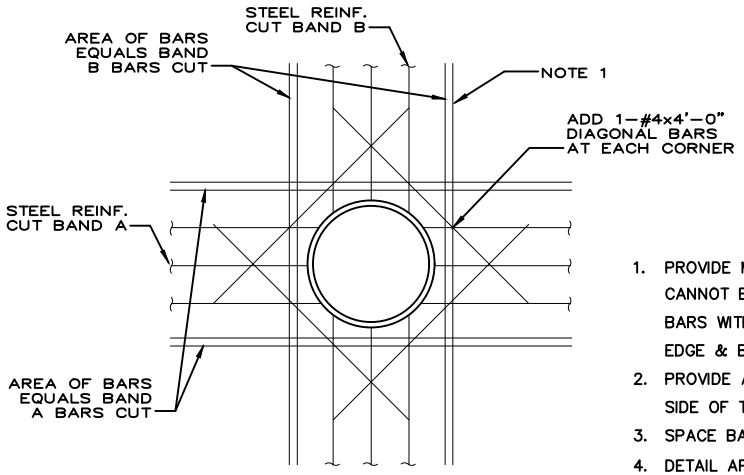
MANHOLE ADAPTER

PIPE DIA	MANHOLE DIA, D*
6" THRU 12"	4'-0"
24" THRU 36"	5'-0"

* MANHOLE BASE DIMENSIONS FOR PIPE DIA. LARGER THAN 36" TO BE DESIGN BUILT. CONTRACTOR TO MODIFY THE DESIGN FOR BUOUYANCY AS NEEDED FOR HIGH GROUND WATER, DEEP MANHOLE BASE APPLICATION.



CAST-IN-PLACE MANHOLE BASE



REINF. AROUND OPENING

1. PROVIDE MINIMUM LAP LENGTH, WHERE FULL LAP LENGTH CANNOT BE ACHIEVED DUE TO THE SLAB, TERMINATE BARS WITH A STANDARD 90° BEND, 2" CLEAR OF SLAB EDGE & BOTTOM.
2. PROVIDE A MIN OF 2"A" BARS AND 2"B" BARS EACH SIDE OF THE OPENING.
3. SPACE BARS AT 3*DIAMETER OR 3" MIN. ON CENTER
4. DETAIL APPLIES TO PIPE OPENINGS > 9" DIAMETER
5. ALL REBAR TO BE GRADE 40 KSI REINFORCING STEEL

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

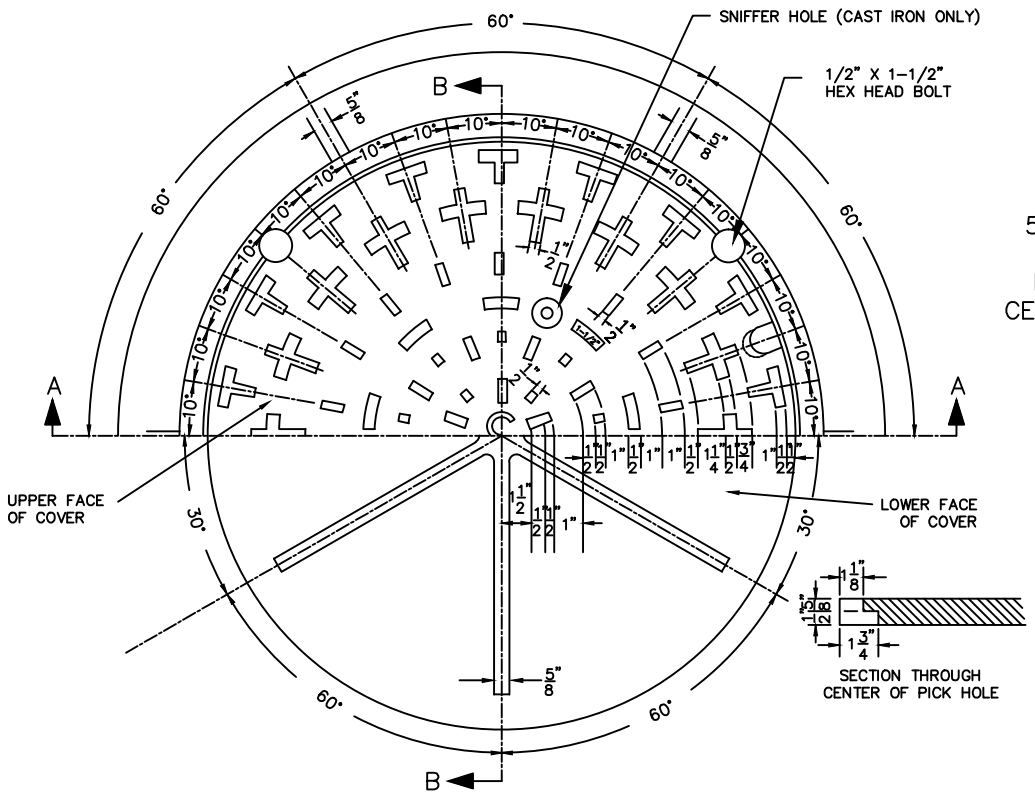
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

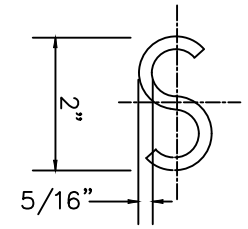
SEWER MANHOLE CAST-IN-PLACE BASE

SCALE: NONE
REVISED: SEPTEMBER 2022
DRAWN BY: J. THOMPSON
APPROVED BY: RICHARD PLECKER

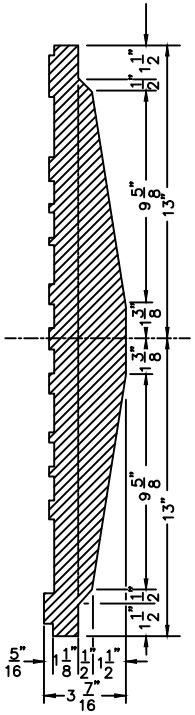
SS-2A



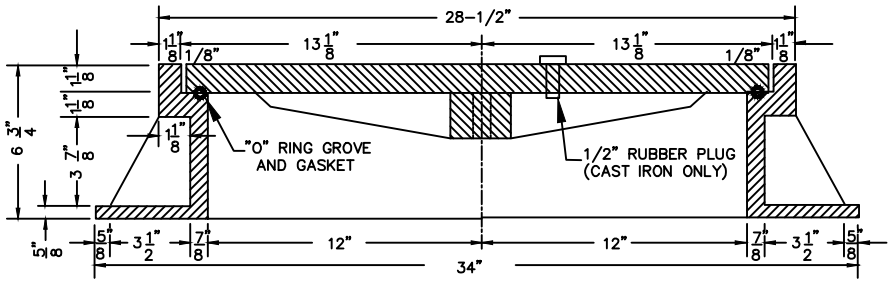
HALF PLAN OF HEAD AND COVER



LETTER 'S' AT CENTER OF COVER



SECTION B–B



SECTION A–A

NOTES: SEE SECTION 91-16.E.3 FOR APPROVED LIST OF SEWER MANHOLE FRAME AND COVER

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

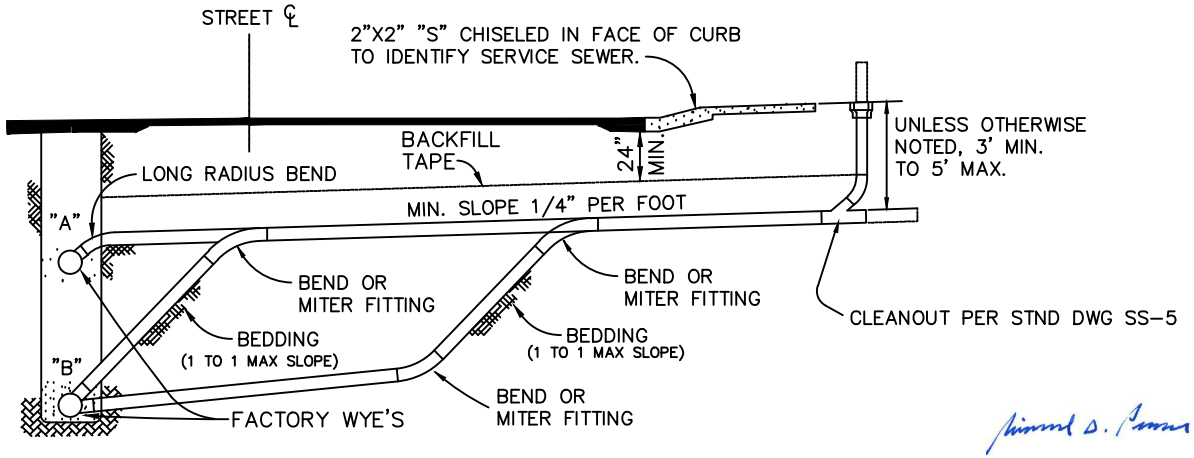
STANDARD SEWER MANHOLE FRAME AND COVER

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-3

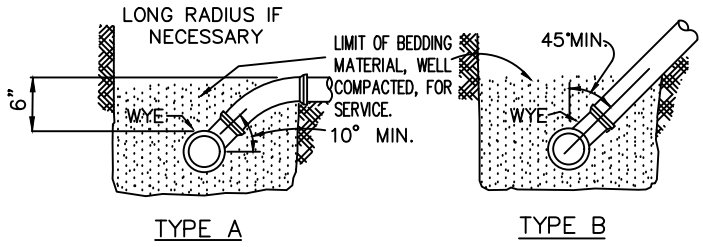
GENERAL NOTES:

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 OR B) FOR THE PARTICULAR SITUATION ENCOUNTERED.
4. SERVICE SEWER SHALL HAVE MINIMUM 3'–0" COVER AT PROPERTY LINE WHENEVER LATERAL DEPTH AND SERVICE SEWER SLOPE OF 1/4" PER FOOT (MINIMUM) PERMIT. SEE NOTE 10.
5. WHEN THE LATERAL SEWER DEPTH IS SUCH THAT MINIMUM COVER AT PROPERTY LINE CANNOT BE MET, THE MINIMUM SLOPE OF 1/4" PER FOOT SHALL GOVERN THE COVER.
6. MIN. SPECIFIED COVER AT THE PROPERTY LINE SHALL BE MEASURED FROM EXISTING GROUND SURFACE OR EDGE OF ADJACENT ROADWAY, WHICHEVER IS LOWER.
7. A SPECIFIC ELEVATION AT THE PROPERTY LINE, WHEN SHOWN ON THE PLANS OR DESIGNATED BY THE ENGINEER, SHALL GOVERN.
8. MITER FITTING SHALL BE MAX. 45°.
9. 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.
10. SEWER SERVICES ORIGINATING FROM SEWER MAINS 14 FT AND GREATER IN DEPTH SHALL HAVE THE CROTCH OF THE VCP "WYE" FITTING FILLED WITH CONCRETE.
11. UNDERGROUND CONTRACTOR SHALL END SEWER SERVICE 2–3' UPSTREAM OF SEWER CLEANOUT. SEE STANDARD DETAIL SS–5.



ELEVATION

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR



TYPE A TYPE B

CONNECTION DETAILS

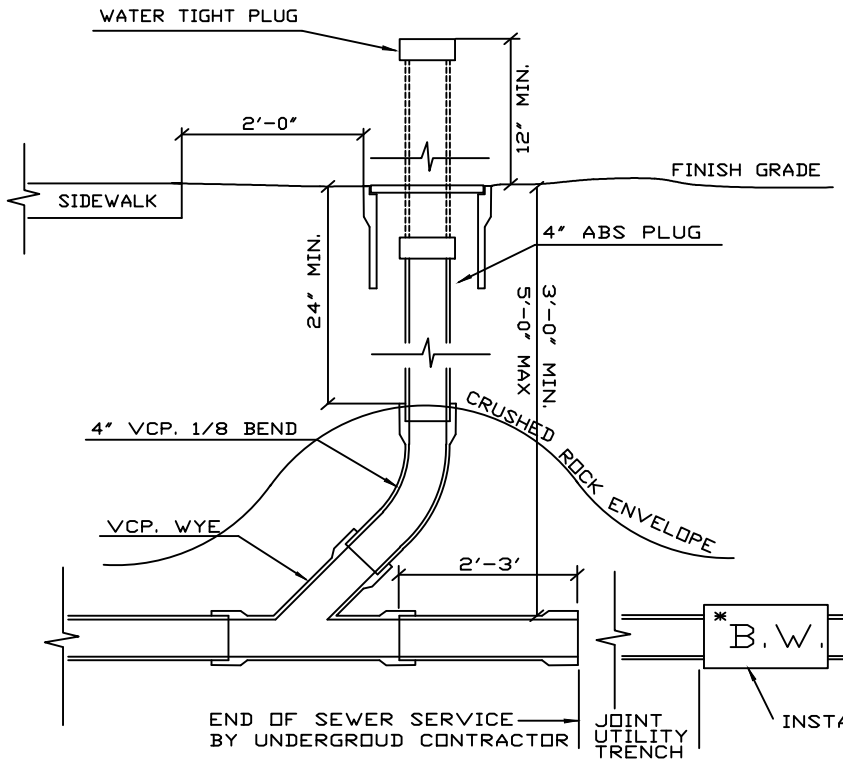
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

SEWER SERVICE

SCALE: NONE
REVISED: JANUARY 2017
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS–4



NOTES:

1) INSTALL ROUND NON-TRAFFIC TYPE CONCRETE VALVE BOX & COVER MARKED "SEWER" IN A NON - TRAFFIC AREA . INSTALL METAL LID MARKED "SEWER" IN AREAS WITH POTENTIAL TRAFFIC. A G5 BOX SHALL BE INSTALLED IN TRAFFIC AREAS.

2) 3' VCP STUB SHALL BE INSTALLED UPSTREAM OF CLEANOUT. 2' VCP SHALL BE INSTALLED WHERE SEWER SERVICE ENTERS OVER JOINT UTILITY TRENCH

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 A G-5 BOX FOR 4" - 6" RISERS AND A G-12 BOX FOR 8" RISERS. CONSTRUCT PER W-16.

5) CONNECTION TO MAIN SHALL BE WITH A FACTORY WYE OR AT A MANHOLE.

6) THE CLEANOUT RISER SHALL BE INSTALLED 12" ABOVE GRADE PRIOR TO BUILDING CONSTRUCTION.

7) BUILDING CONTRACTOR SHALL SET BOX TO FINISH GRADE AND INSTALL AN ABS PLUG SET 6" BELOW THE SURFACE PRIOR TO BUILDING PRE-FINAL.

* 8) BACKWATER VALVE IF REQUIRED SHALL BE INSTALLED BY THE BUILDING CONTRACTOR

9) TREES ARE TO BE PLACED 7 1/2' FROM CLEAN OUT.

10) INSTALL A CITY CLEANOUT AT A MINIMUM 5' FROM COMMERCIAL BUILDINGS.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

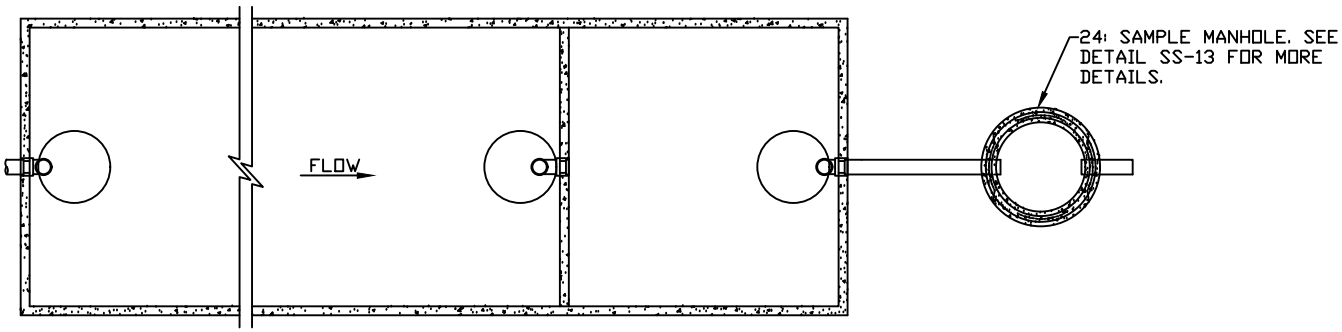
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

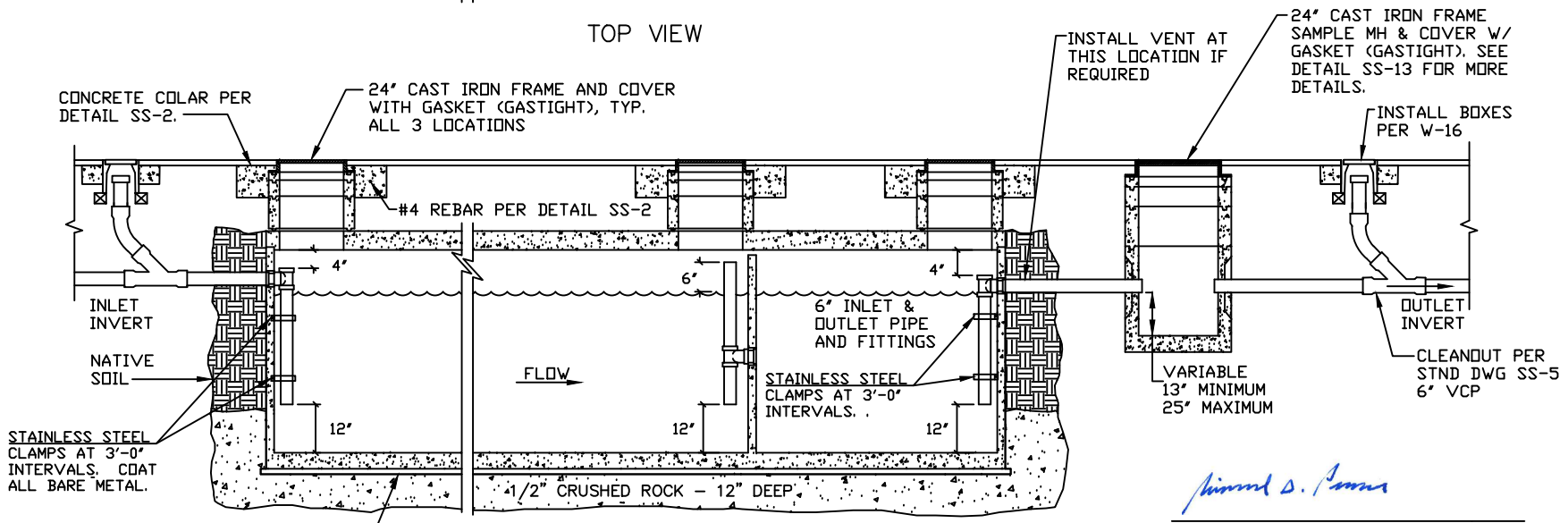
SEWER SERVICE CLEANOUT

SCALE: NONE
REVISED: JANUARY 2020
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-5



TOP VIEW



SIDE VIEW (CUT AWAY)

MIN. BOX DESIGN LOAD: H-20 TRAFFIC

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

*NOTE: THE PRECAST CONCRETE UNITS SHALL BE PLACED ON LEVEL UNDISTURBED SOIL, W/1/2" CRUSHED ROCK 12" DEEP. TWO 2x6 REDWOOD GRADE BOARDS SHALL BE PLACED BELOW THE TANK SIDE WALLS ALONG THE LONG DIMENSION PER THE MANUFACTURERS GUIDELINES.

SIZING SHALL BE BASED ON THE CALIFORNIA PLUMBING CODE

*NOTE: PRIOR TO BACKFILL, INTERCEPTOR SHALL BE FILLED WITH WATER AND HELD FOR 24HRS WITH NO VISIBLE LEAKAGE.

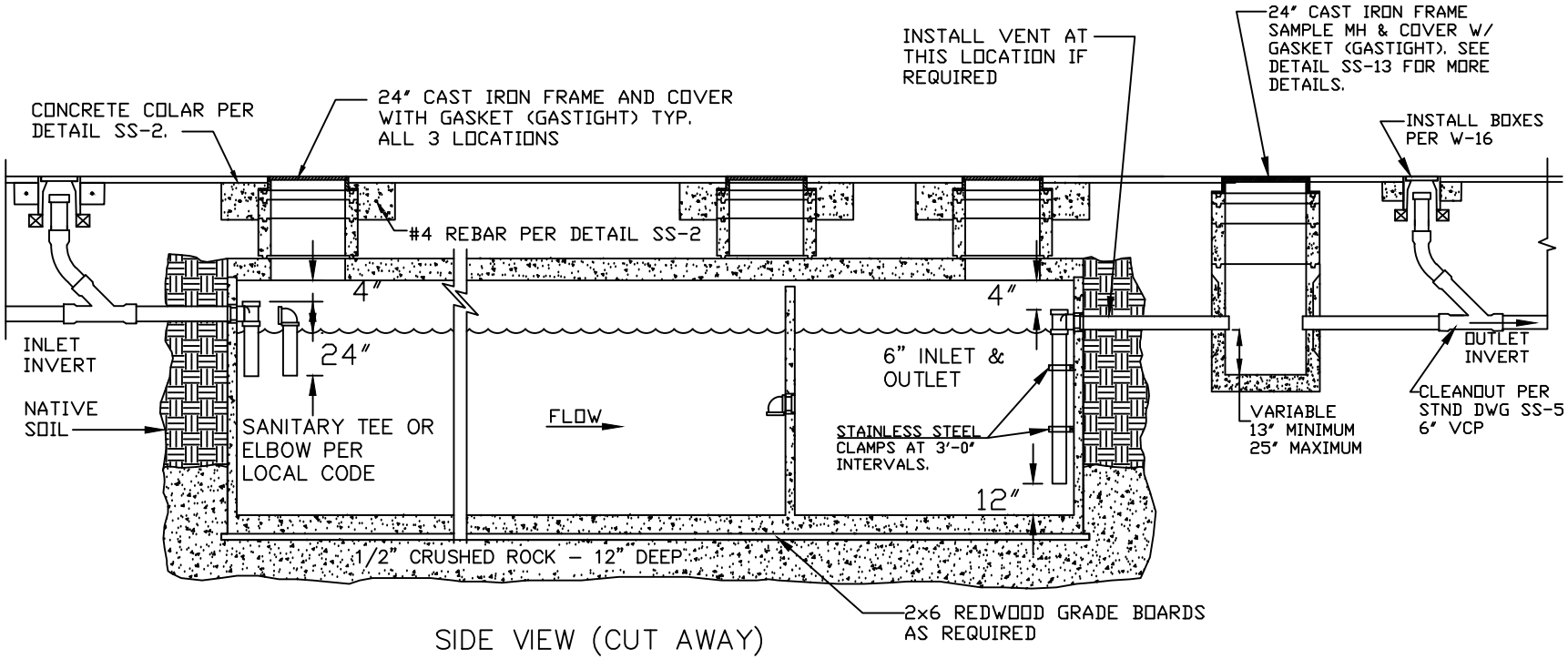
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

GREASE INTERECEPTOR (TYP.)

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-6



SIDE VIEW (CUT AWAY)

MIN. BOX DESIGN LOAD: H-20 TRAFFIC

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

*NOTE: THE PRECAST CONCRETE UNITS SHALL BE PLACED ON LEVEL UNDISTURBED SOIL, W/1/2" CRUSHED ROCK 12" DEEP. TWO 2x6 REDWOOD GRADE BOARDS SHALL BE PLACED BELOW THE TANK SIDE WALLS ALONG THE LONG DIMENSION PER THR MANUFACTURERS GUIDELINES.

SIZING SHALL BE BASED ON CALIFORNIA PLUMBING CODE

*NOTE: PRIOR TO BACKFILL, INTERCEPTOR SHALL BE FILLED WITH WATER AND HELD FOR 24HRS WITH NO VISIBLE LEAKAGE.

*NOTE: IF SIZE IS <1000 GAL, INTERCEPTOR DOES NOT HAVE MIDDLE MANHOLE

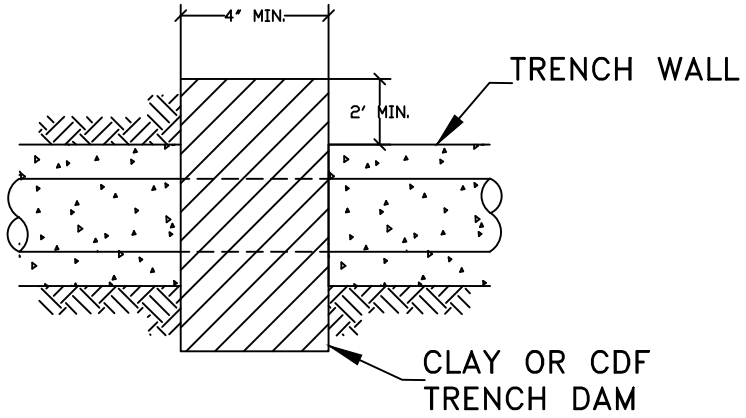
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

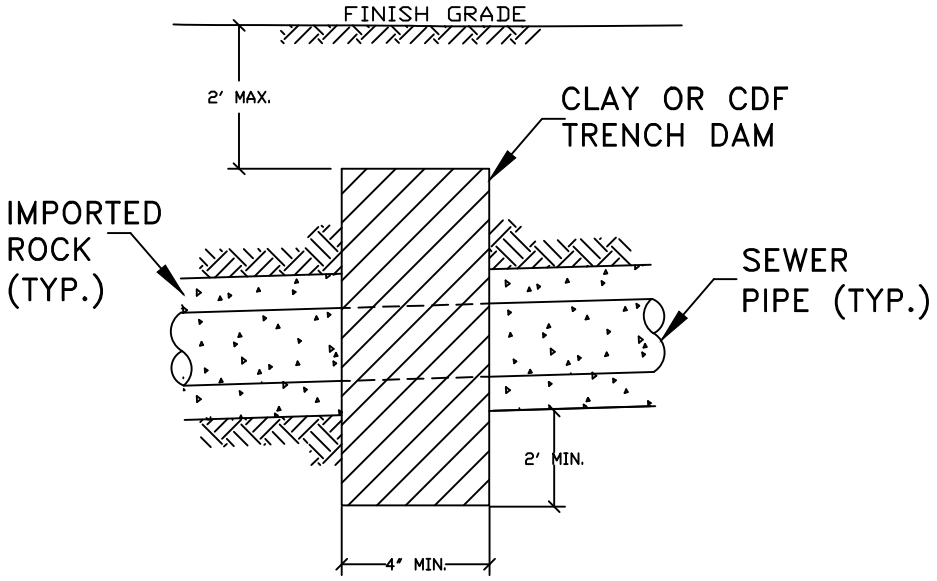
SAND/OIL INTERECEPTOR

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-7



PLAN VIEW



PROFILE VIEW

NOTE:

TRENCH DAM SHALL BE CONSTRUCTED OF CLEAN CLAY MATERIAL OR CONTROLLED DENSITY FILL.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

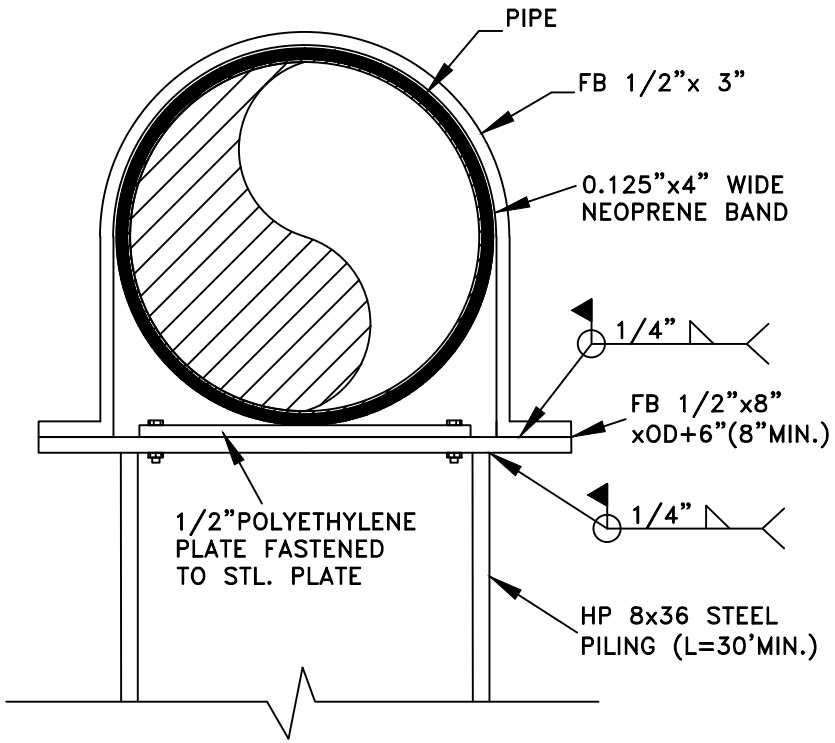
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

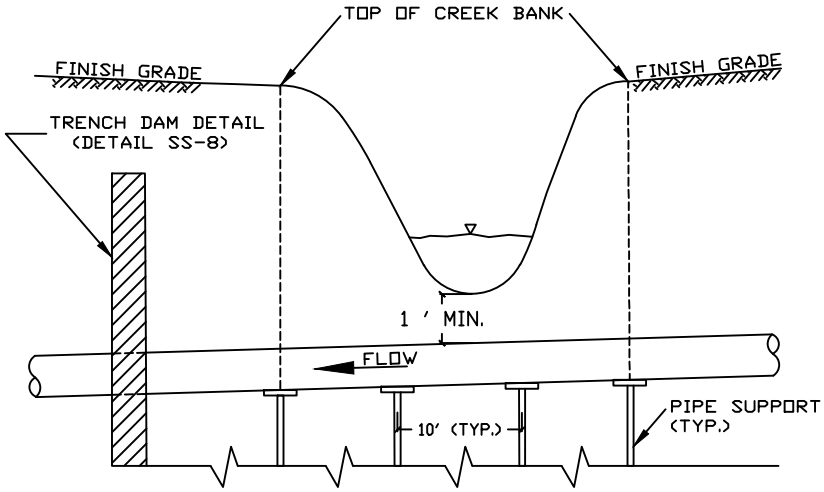
TRENCH DAM

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-8



PIPE SUPPORT DETAIL



CREEK CROSSING

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

MTRL. NOTES:

1. STRUCTURAL STL. SHALL BE A36 (Fy=36ksi)
2. WELDING RODS SHALL BE E70 (Fy=70ksi)

DESIGN NOTES:

1. PILES SHALL BE 10' ON CENTER BEGINNING AND ENDING AT CREEK BOTH SIDES "TOP OF BANK" AND AS NOTED ON THE PROJECT PLANS.

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

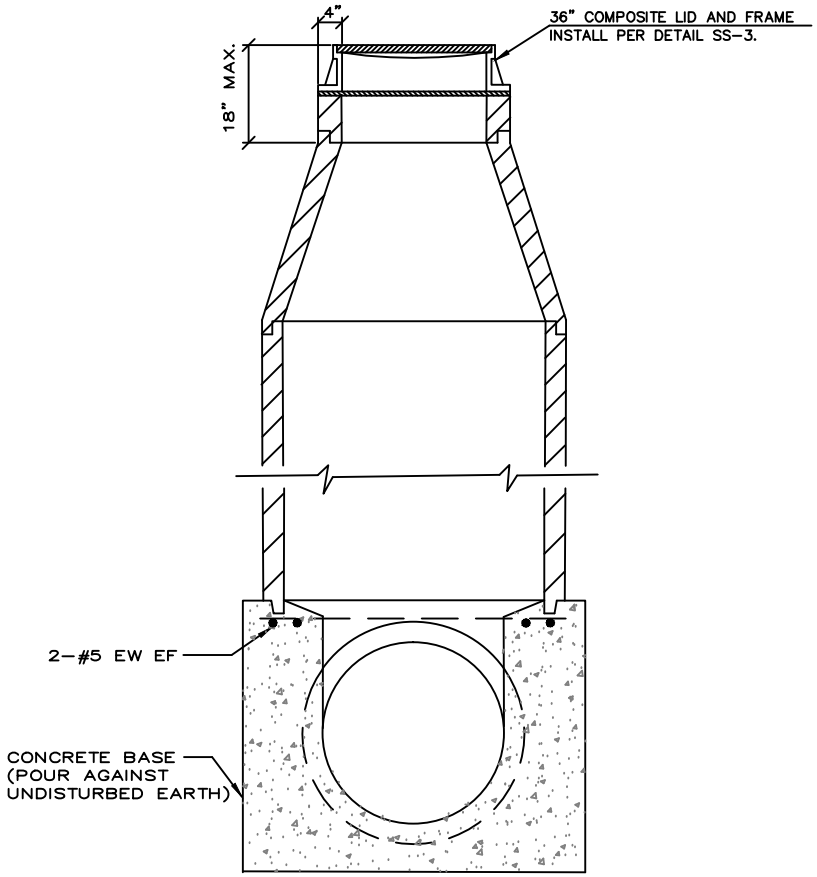
CREEK CROSSING SUPPORT

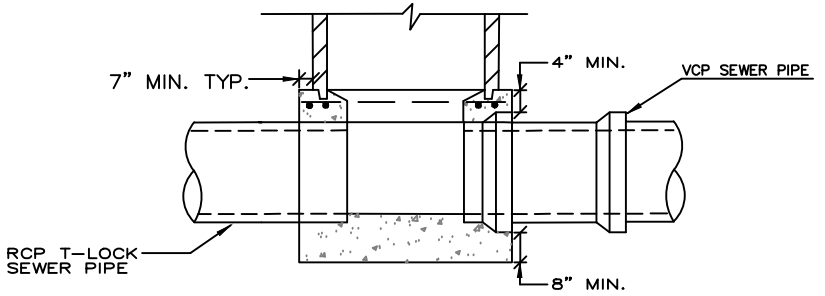
SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-9

NOTES

1. MANHOLE LID SHALL BE SEALED WITH AN APPROVED RUBBER GASKET.
2. JOINTS SHALL BE MORTARED INSIDE AND OUT.
3. APPLY EPOXY COATING TO INTERIOR SURFACES OF MANHOLE IN ACCORDANCE WITH CITY STANDARDS 91-10 K.
4. PROVIDE SPARK TEST OVER ENTIRE PROTECTIVE COATINGS AFTER INSTALLATION.
5. SEE STANDARD DETAIL SS-2 FOR ADDITIONAL REQUIREMENTS.





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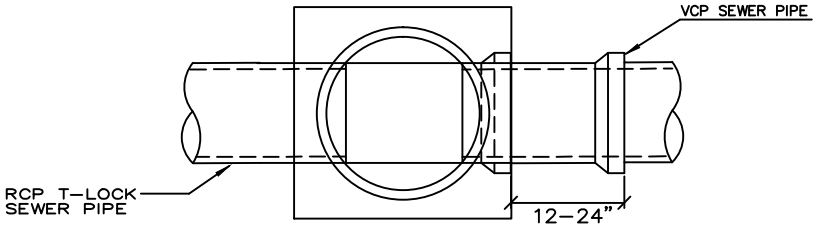


PLAN

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

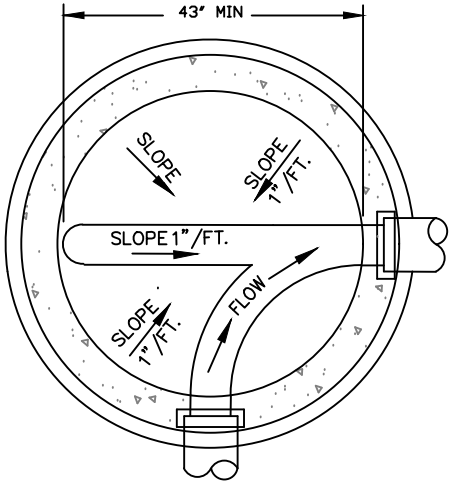
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

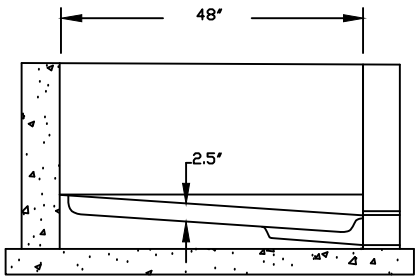
60"+ SEWER TRUNK MAIN MANHOLE

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

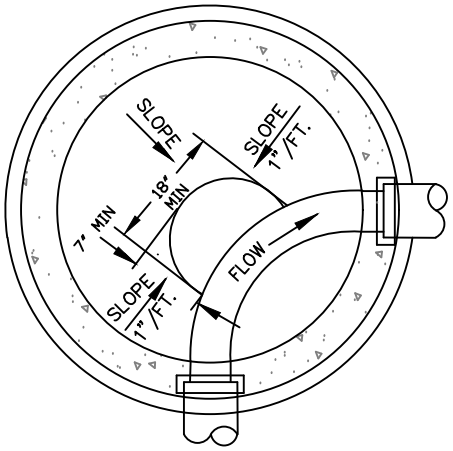
SS-10

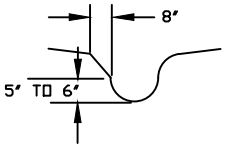


PLAN

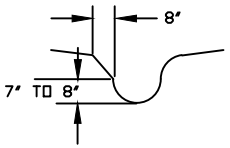


ELEVATION

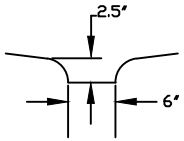


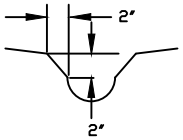


FOR 8" PIPE BASE



FOR 10" PIPE BASE





RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

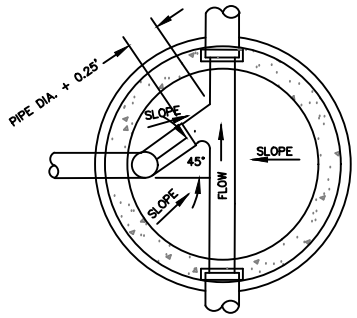
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

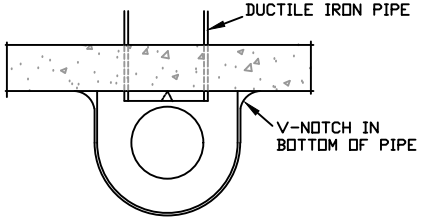
CAMERA CHANNEL MANHOLE

SCALE: NONE
REVISED: JANUARY 2018
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

SS-11



PLAN

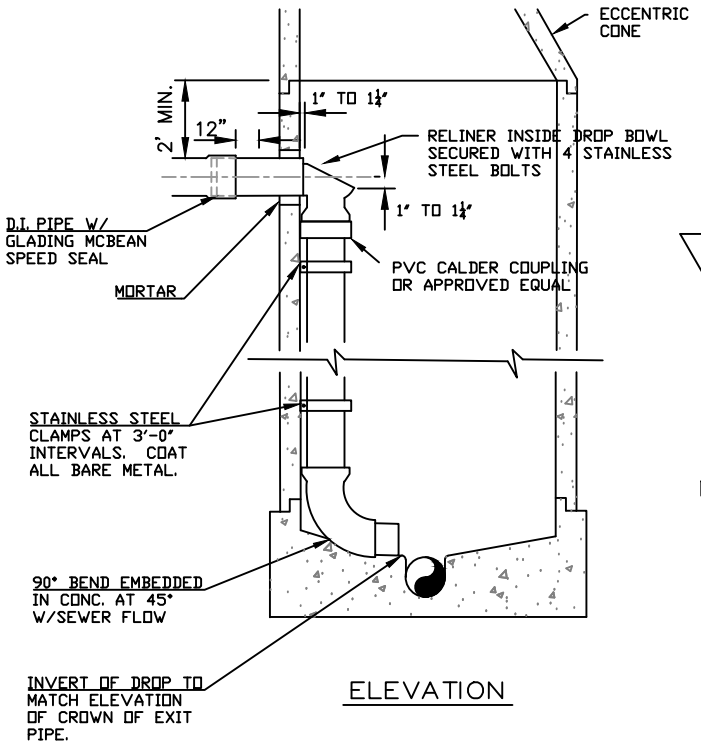


DROP BOWL
MOUNTING POSITION
TOP VIEW

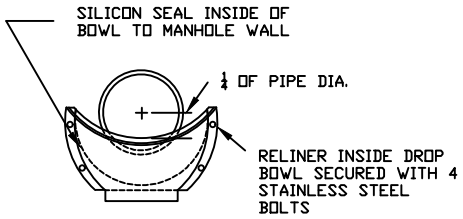
NOTES

1. INSIDE DROP PIPING SHALL BE P.V.C. PIPE, SCHEDULE 40.
2. PRIME AND CEMENT ALL JOINTS AS RECOMMENDED BY THE MANUFACTURER.
3. USE ECCENTRIC CONE WITH OPENING ALIGNED ABOVE DROP CONNECTION.
4. INSIDE DROP CONNECTION SHALL USE DROP BOWL AS PRODUCED BY RELINER DURAN, INC.
   53 MT ARCHER RD.
   LYME CT. 03671
   (860)434-0277 FAX: (860)434-3195 OR APPROVED EQUAL
   DROP BOWL MODEL "A-4" SHALL BE USED FOR ALL LINES UP THROUGH FULL 6" INLETS. DROP BOWL MODEL "A-6" SHALL BE USED FOR ALL 8" INLETS. DROP BOWL MODEL "B-8" SHALL BE USED FOR ALL 10" INLETS. DROP BOWL MODEL "B-10" SHALL BE USED FOR ALL 12" INLETS.
5. ATTACH DROP BOWL & EACH CLAMPING BRACKET TO THE MANHOLE WALL WITH STAINLESS STEEL $\frac{3}{8}$" X $\frac{3}{4}$" RAMSET/RED HEAD BOLTS. PRE-ROTO DRILL AND SET BOLTS IN PLACE WITH EPOXY PASTE. EPOXY PASTE SHALL MEET THE FOLLOWING REQUIREMENTS:

   A. EPOXY PASTE SHALL BE A TWO COMPONENT 100% SOLID SYSTEM. EPOXY SHALL BE SIKADUR 31 HI-MOD GEL BY SIKA CORPORATION PHONE (592) 941-0231 OR EQUAL.
   B. THE EPOXY PASTE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 5,000 PSI IN 28 DAYS WHEN TESTED IN ACCORDANCE WITH ATSM D695 AT 73 DEGREES.
   C. THE EPOXY PASTE SHALL DEVELOP A MINIMUM TENSILE STRENGTH OF 3,000 PSI IN 14 DAYS WHEN TESTED IN ACCORDANCE WITH ATSM D638.
   D. THE EPOXY PASTE SHALL DEVELOP A MINIMUM BOND STRENGTH OF 2,000 PSI IN 2 DAYS WHEN TESTED IN ACCORDANCE WITH ATSM C882 (HARDENED CONCRETE TO HARDENED CONCRETE).
   E. MANUFACTURER'S INSTRUCTION SHALL BE PRINTED ON EACH CONTAINER IN WHICH THE MATERIALS ARE PACKAGED.



ELEVATION



DROP BOWL
MOUNTING POSITION
FRONT VIEW

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

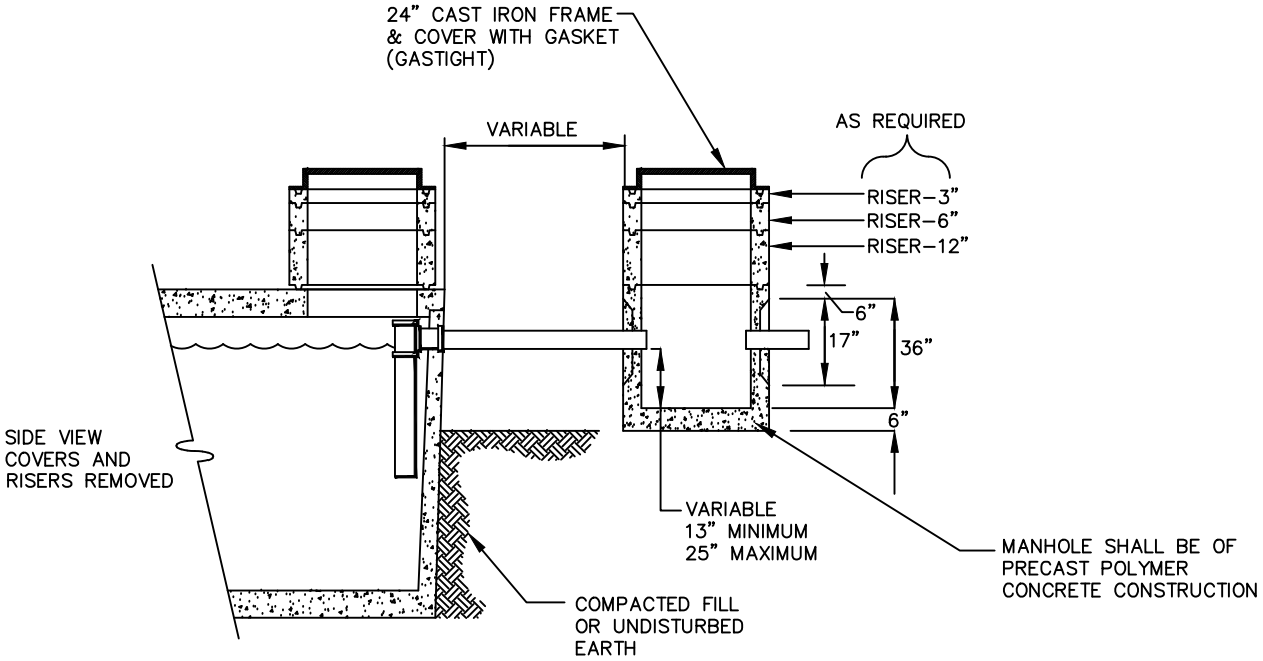
CITY OF ROSEVILLE CALIFORNIA

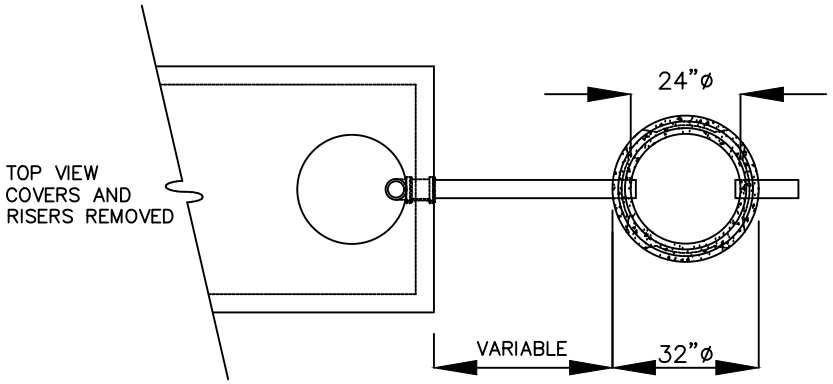
ENVIRONMENTAL UTILITIES DEPARTMENT

INSIDE DROP CONNECTION

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: D. SAMUELSON
APPROVED BY: RICHARD PLECKER

SS-12





NOTES

1. SAMPLING MANHOLE SHALL HAVE AN H–20 TRAFFIC RATING
2. THE SAMPLE MANHOLE MUST BE PLACED ON SUITBLE BASE OF COMPACTED SOIL OR UNDISTURBED EARTH IN TRAFFIC CONDITION.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

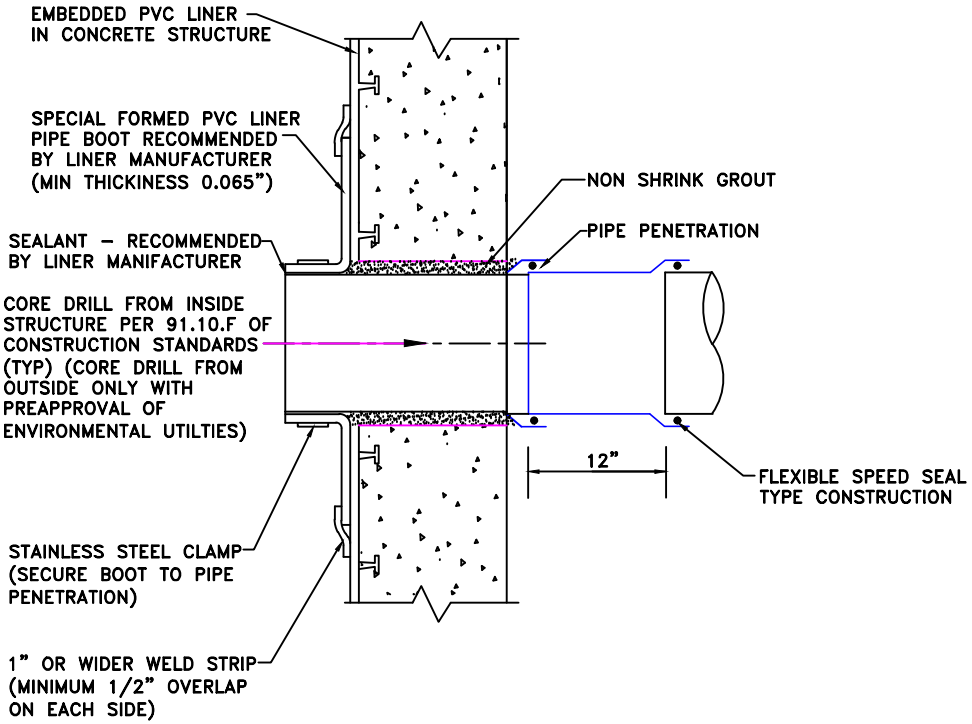
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

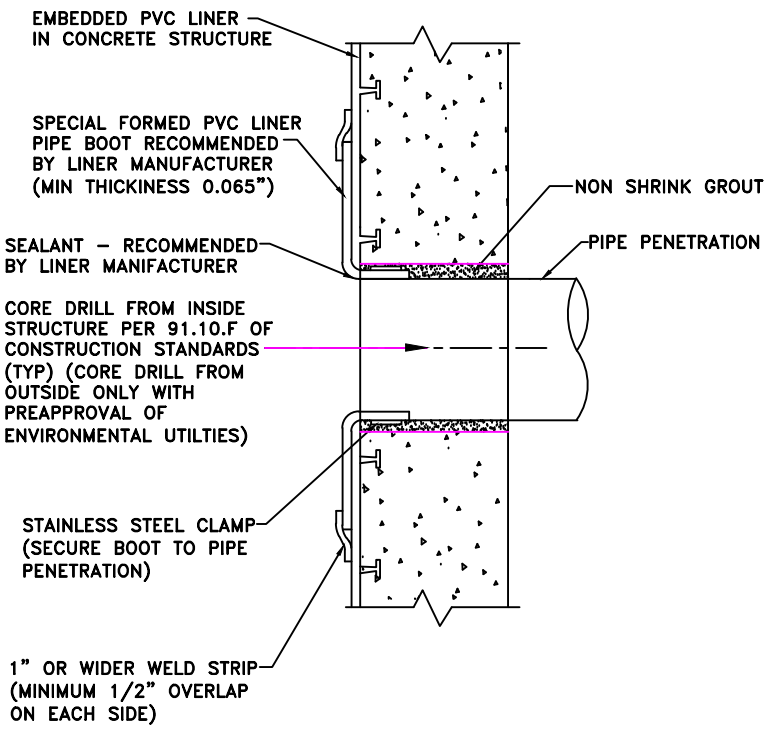
DOWNSTREAM SAMPLING MANHOLE FOR INTERCEPTORS

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J. VAROZZA
APPROVED BY: RICHARD PLECKER

SS–13



REVERSE BOOT TYPE 1



BOOT TYPE 2

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

1. ARMORLOK PVC PROTECTIVE LININGS OR EQUIVALENT PREAPPROVED UTILTIES.
2. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
3. ON BOOT TYPE 2 PENETRATIONS FOR REHABILITATIONS ON 24" AND ABOVE, A 1/8" WIDE X 1–1/2" DEEP GROOVE CAN BE SAW CUT AROUND PIPE AND A LINER SHEET CAN BE PUSHED INTO GROOVE, ONLY IF ORIGINAL LINER ANCHORAGE IS WITHIN 2" OF THE CIRCUMFERENCE OF THE PENETRATION. SMALLER PENETRATIONS MUST BE CHIPPED OUT AND CLAMP MUST BE APPLIED.

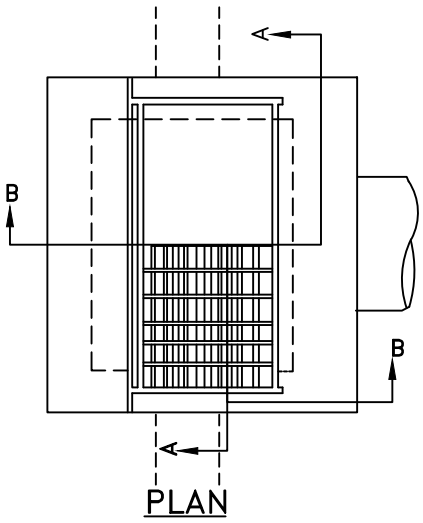
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

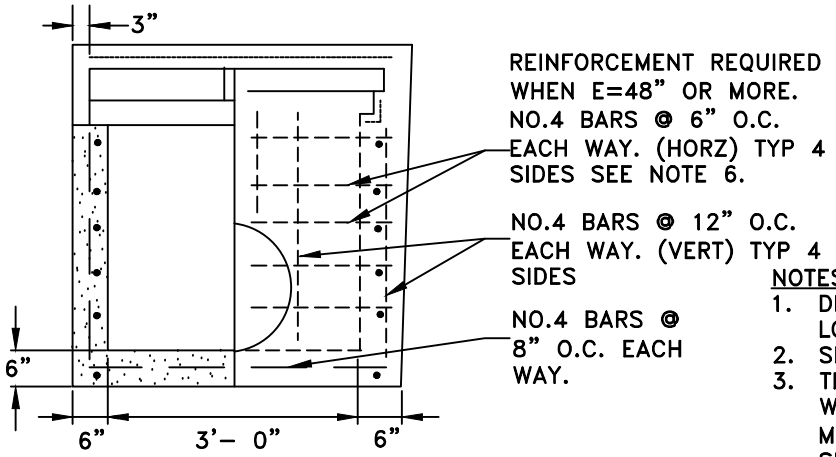
PVC LINER PENETRATION SEALING DETAIL

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: JACK VAROZZA
APPROVED BY: RICHARD PLECKER

SS–14



PLAN

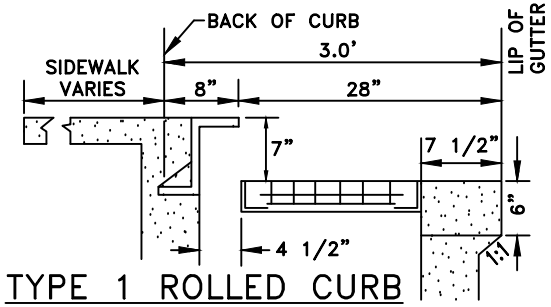


SECTION A–A

REINFORCEMENT REQUIRED WHEN E=48" OR MORE. NO.4 BARS @ 6" O.C. EACH WAY. (HORZ) TYP 4 SIDES SEE NOTE 6.

NO.4 BARS @ 12" O.C. EACH WAY. (VERT) TYP 4 SIDES

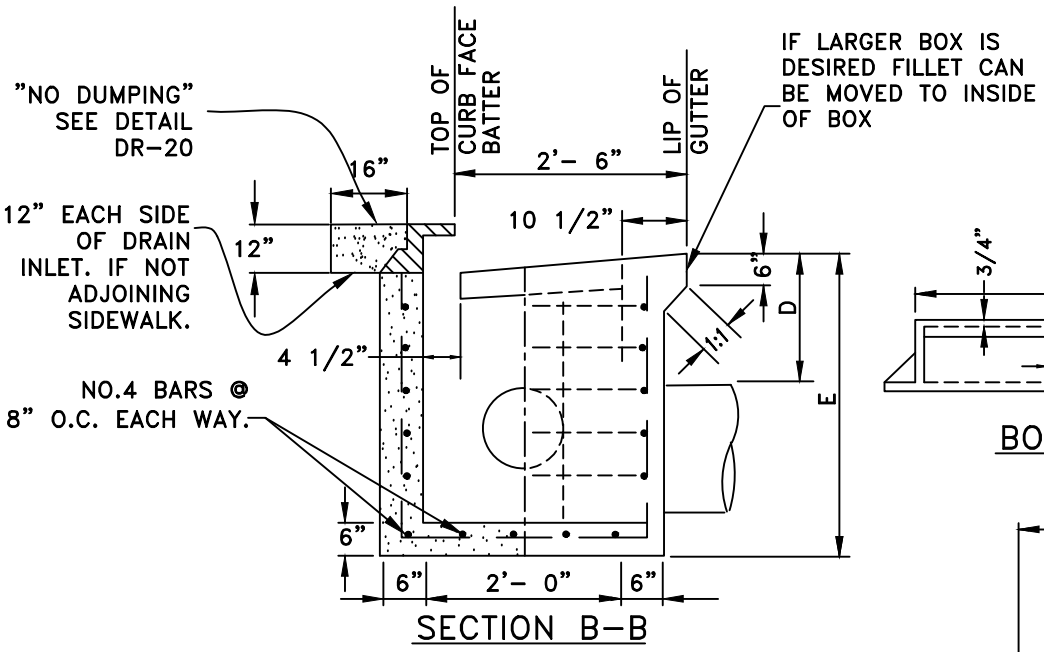
NO.4 BARS @ 8" O.C. EACH WAY.



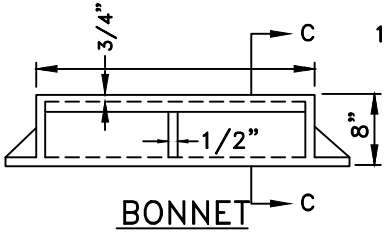
TYPE 1 ROLLED CURB

NOTES:

1. DIMENSIONS D AND E MAY VARY WITH EACH LOCATION.
2. SEE STANDARD DETAIL DR–9 FOR INLET GRATE.
3. THE INSIDE SURFACE OF FRONT AND BACK WALLS OF THE CATCH BASIN SHALL NOT DEVIATE MORE THEN 2" IN ALIGNMENT FROM INSIDE SURFACE OF THE WALLS OF THE TOP INLET PORTION.
4. SLOPE FLOOR 2" TO OUTLET.
5. CONCRETE SHALL BE "MINOR CONCRETE" AS DESCRIBED IN 71–5B OF THESE STANDARDS.
6. 6X6, 4 GUAGE WELDED WIRE FABRIC MAY BE USED IN LIEU OF #4 REBAR.
7. ALL REINFORCEMENT BAR SHALL BE GRADE 60.
8. CURB TRANSITION LENGTH FROM EACH SIDE OF DROP INLET TO STANDARD HEIGHT CURB SHALL BE 4'. MATCH DEEP TOOL JOINTS AND SCORE MARKS WITH CURB, GUTTER, AND SIDEWALK AS APPROPRIATE.
10. PIPE CONNECTIONS TO STRUCTURE SHALL BE MADE BY 12"X12" MINOR CONCRETE COLLARS.



SECTION B–B



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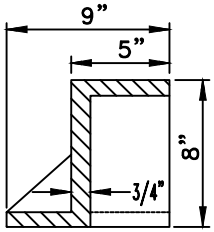


SECTION C–C

FRAME, HOOD AND GRATE (OR APPROVED EQUAL APPLIES)
D&L SUPPLY: #FA–8543–R1 (FRAME), #FA–8543–02 (GRATE), #13541 (HOOD)
SOUTH BAY FOUNDRY: #1904 (FRAME, GRATE, HOOD)
HALM METAL FAB:#13542(FRAME), #13543 (GRATE), #13541 (HOOD)

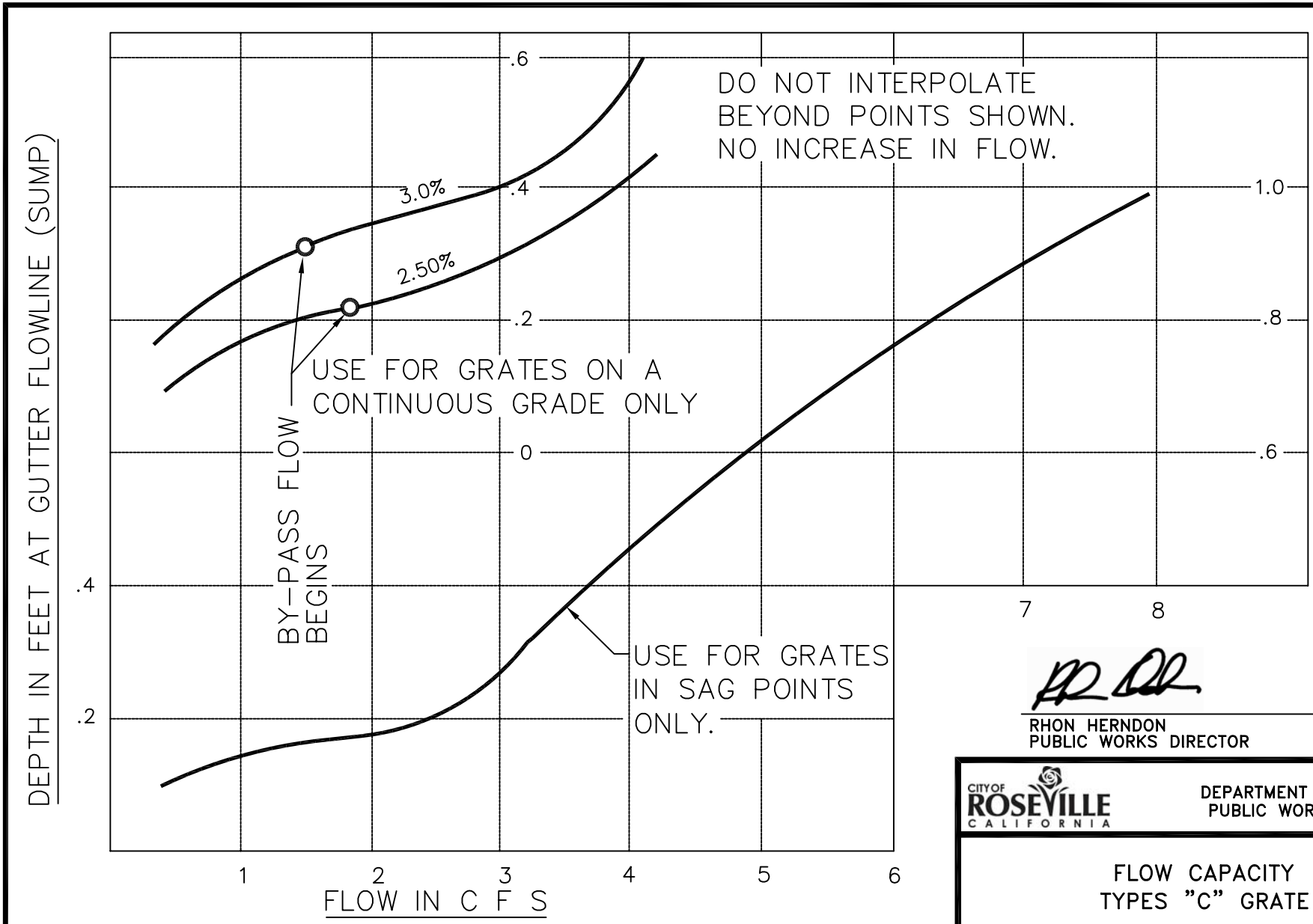
MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA
DEVELOPMENT SERVICES DEPARTMENT

DROP INLET TYPE "C"

SCALE: NONE
REVISED: May 10, 2021
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

DR–1



RHON HERNDON
PUBLIC WORKS DIRECTOR

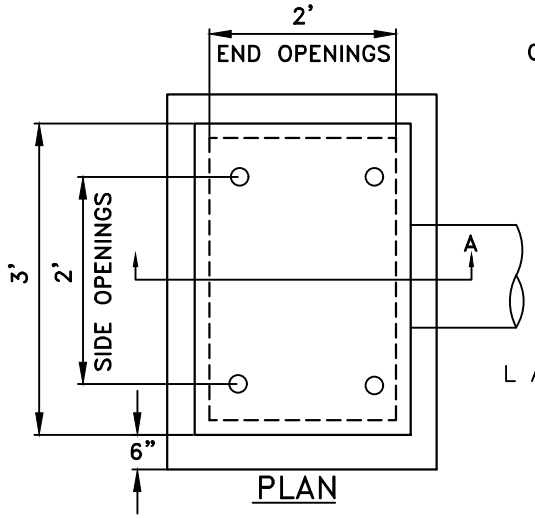
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

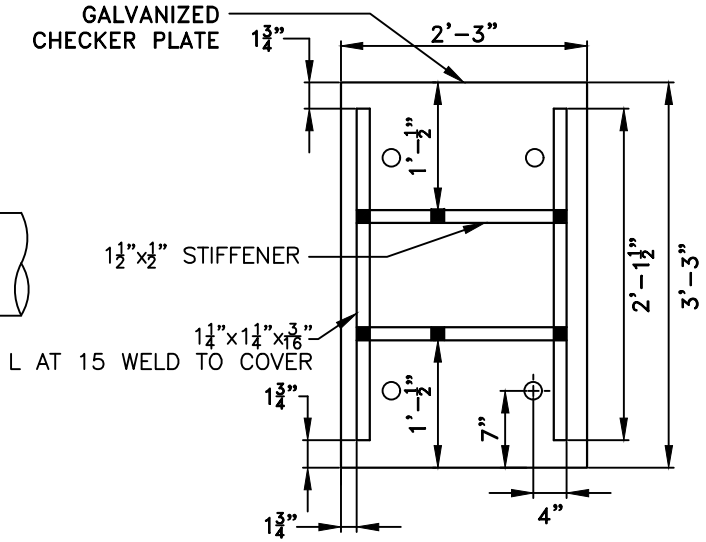
FLOW CAPACITY
TYPES "C" GRATE

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

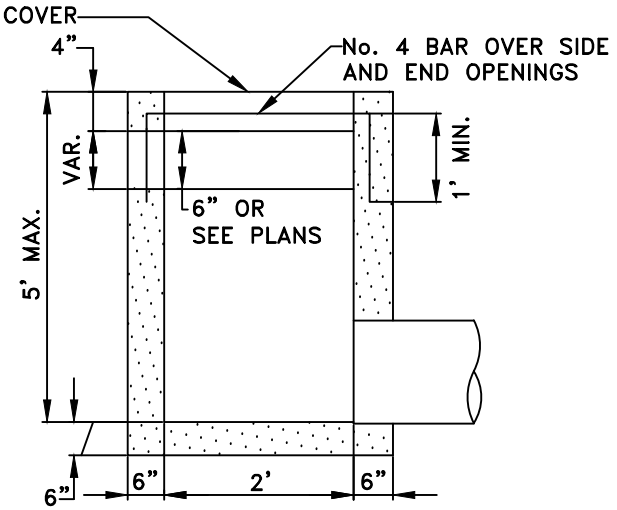
DR-2



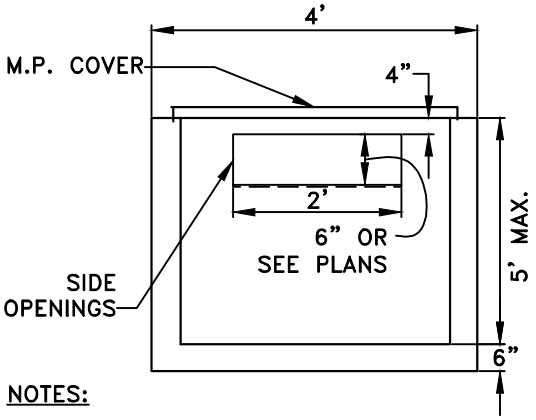
PLAN

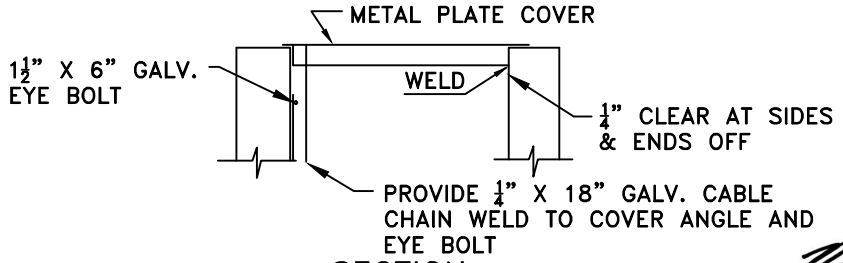


(UNDERSIDE)
PLAN



SECTION A–A





SECTION
METAL PLATE COVER

NOTE: METAL PLATE COVER TO BE D&L SUPPLY (FA–8452–01) OR APPROVED EQUAL)

NOTES:

1. METAL PLATE COVER TO BE GALVANIZED.
2. THIS STRUCTURE TO BE USED ONLY TO PICKUP ON SITE DRAINAGE ON PRIVATE PROPERTY UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR.
3. DRAIN INLETS NOT WITHIN A PAVED AREA SHALL HAVE A 12" WIDE COLLAR OF 6" THICK CONCRETE.
4. THE INSIDE SURFACE OF FRONT AND BACK WALLS OF THE CATCH BASIN SHALL NOT DEVIATE MORE THEN 2" OF VERTICAL ALIGNMENT.
5. SLOPE FLOOR 2" TO OUTLET.
6. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS.
7. PROVIDE END OR SIDE OPENINGS AS SHOWN ELSEWHERE ON PLANS OR CROSS SECTIONS.
8. TOP OF ALL WALLS SHALL BE FINISHED TO A LEVEL PAN TO PROVIDE EVEN BEARING FOR PLATE COVER.
9. SEE DETAIL DR–1 FOR REINFORCEMENT REQUIREMENTS.
10. PIPE CONNECTIONS TO STRUCTURE SHALL BE MADE BY 12"X12" MINOR CONCRETE COLLARS.

MARC STOUT
CITY ENGINEER

CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

DROP INLET TYPE "F"

SCALE: NONE
REVISED: JANUARY 1, 2020
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

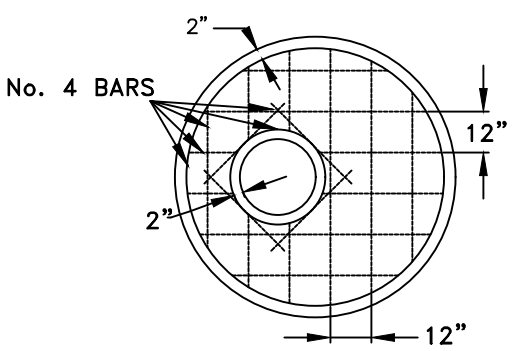
DR–3

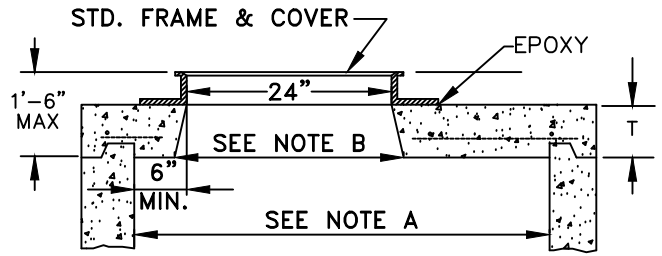
TABLE OF DIMENSIONS

A	B	T MIN.	BASE
48"	18"	6"	6"
60"	30"	8"	8"
72"	42"	8"	8"
84"	54"	12"	8"
96"	12" (FLAT)	12"	8"

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

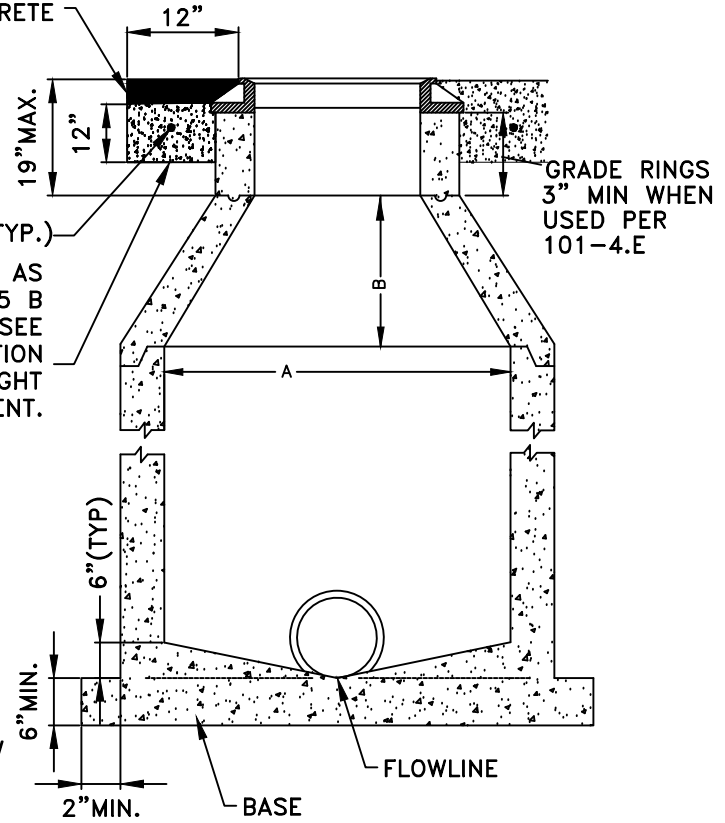




A. A FLAT TOP SLAB SHALL BE USED WHEN A SHALLOW LINE DOES NOT PERMIT USE OF A TAPERED CONE. NO CONCRETE COLLAR REQUIRED.

B. 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.

3" PAVEMENT PATCH OR MINOR CONCRETE PER SECTION 101-4.F FOR FINISH GRADE REQUIREMENTS



FLAT TOP SLAB

MARC STOUT
CITY ENGINEER

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 101-8 (MATERIALS) FOR JOINT COMPOUND. (ALL MANHOLE JOINTS)
4. TOP OF FRAME SHALL BE 1/8 INCH BELOW ADJACENT PAVEMENT. (PER 101-4.F)
5. 0.20 FOOT MINIMUM FALL THROUGH MANHOLE.
6. O.D. OF PIPE SHALL NOT EXCEED I.D. OF ITS MANHOLE BARREL.
7. WHERE SHORT 24" FRAMES ARE USED, TO ACHIEVE FULL 3 INCH PAVEMENT PATCH SLOPE CONCRETE FROM BASE OF FRAME TO 3 INCHES BELOW FINISH GRADE.
8. PIPE CONNECTIONS TO STRUCTURE SHALL BE MADE BY 12"X12" MINOR CONCRETE COLLARS.
9. CONCRETE COLLAR AROUND RIM SHALL BE BROUGHT TO SURFACE FINISH GRADE FOR ALL COLLECTORS AND ARTERIALS, OPTIONAL IN ALL OTHER ROADWAYS. FINISH SURFACE SHALL BE MEDIUM BROOM FINISH WITH PATTERN PERPENDICULAR TO VEHICLE TRAVEL DIRECTION.

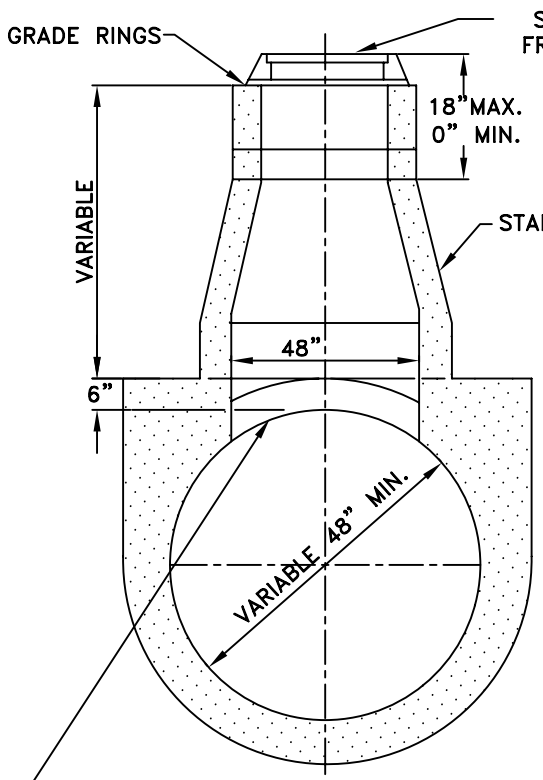
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

STANDARD PRECAST MANHOLE (DRAINAGE)

SCALE: NONE
REVISED: MARCH 1 , 2024
DRAWN BY: R MEDINA
APPROVED BY: MARC STOUT

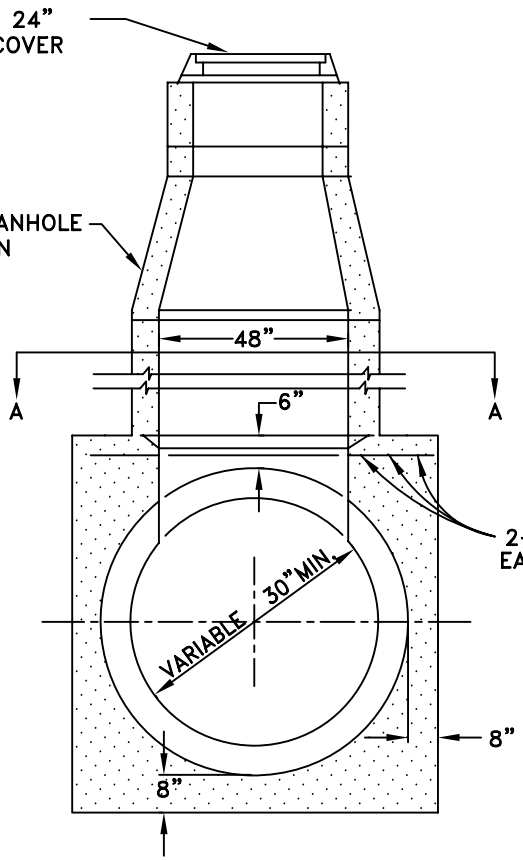
DR-4



TYPE A
CAST–IN–PLACE PIPE ONLY

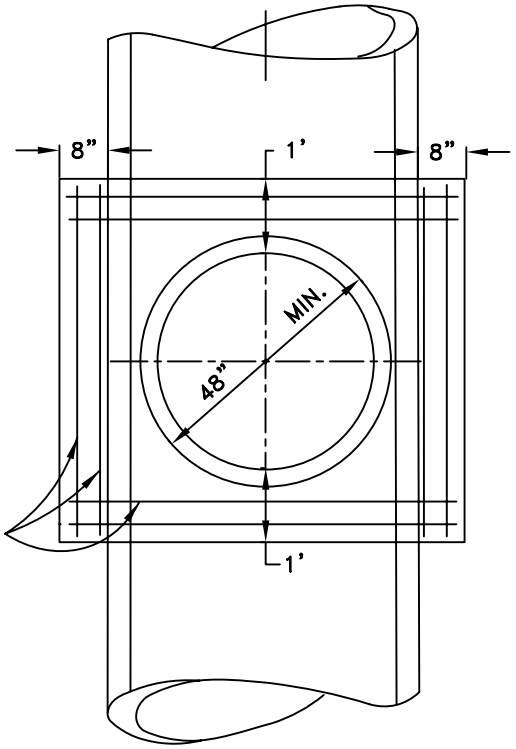
NOTE:
REMOVE CONCRETE IN MANHOLE OPENING AND CONSTRUCTION RISER BASE WHILE CONCRETE IS STILL FRESH

PLACE RISER SECTION AFTER CONCRETE HAS SET



TYPE B

1. ALL PIPE OTHER THAN CAST–IN–PLACE PIPE
2. CAST–IN–PLACE PIPE LESS THAN 48" DIA.



SECTION A–A

RHON HERNDON
PUBLIC WORKS DIRECTOR

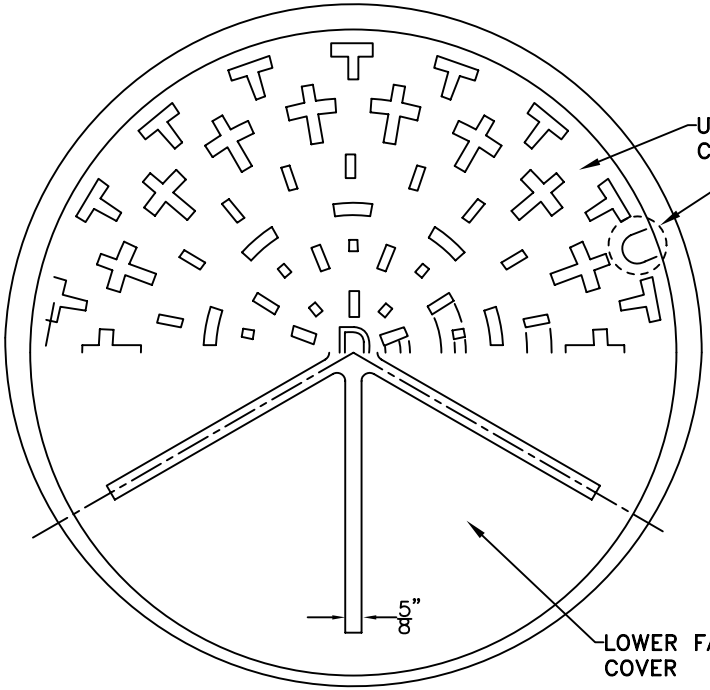
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TYPE A & B SADDLE MANHOLE

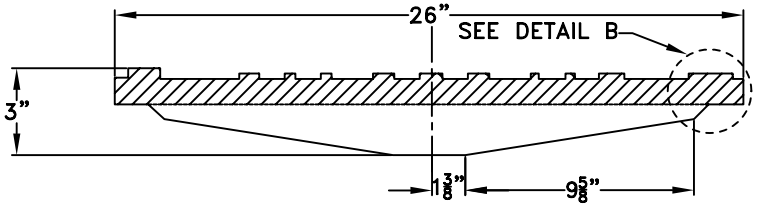
SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR–5

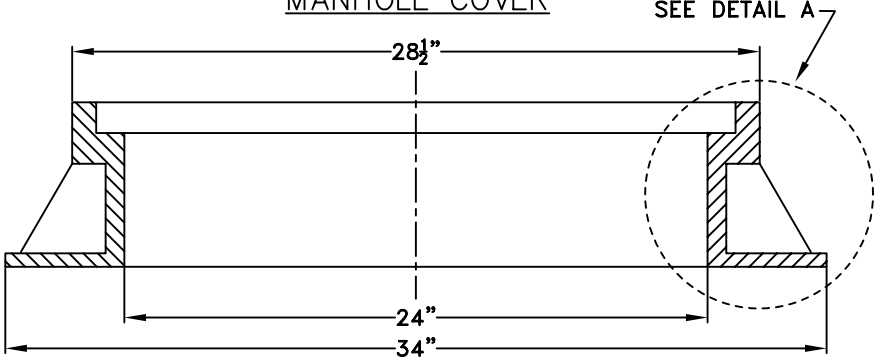


HALF PLAN OF HEAD AND COVER

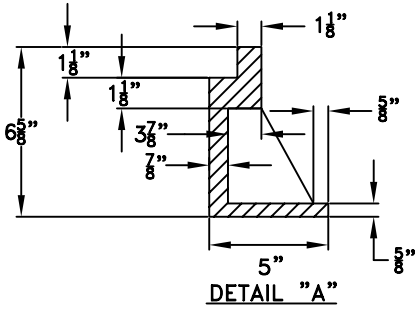
LETTER 'D' AT CENTER OF COVER



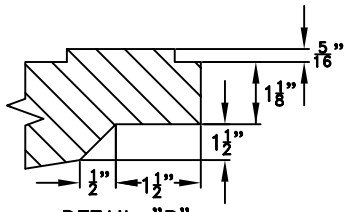
MANHOLE COVER



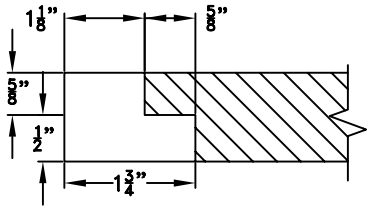
MANHOLE FRAME



DETAIL "A"



DETAIL "B"



DETAIL "C"
SECTION THROUGH
CENTER OF PICK HOLE

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

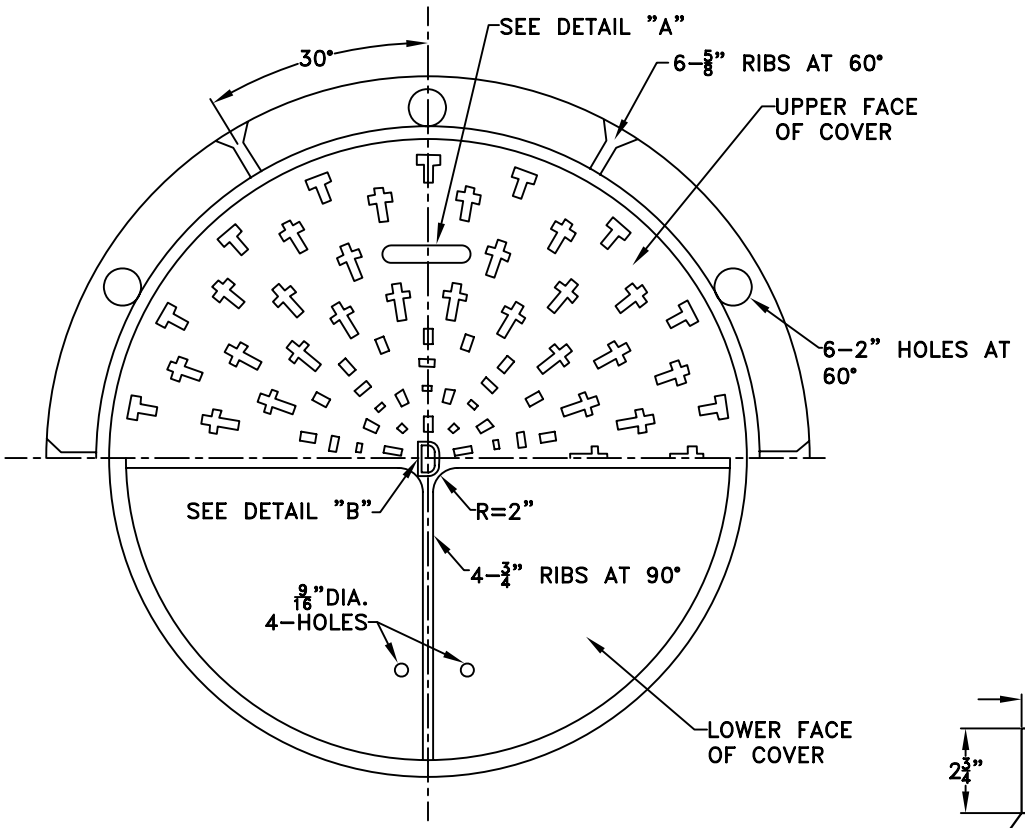
STANDARD DRAINAGE MANHOLE FRAME AND COVER

NOTES:

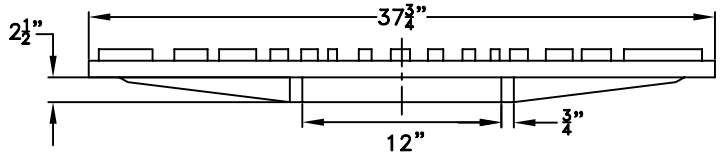
1. REMOVE CONCRETE IN MANHOLE OPENING AND CONSTRUCTION RISER BASE WHILE CONCRETE IS STILL FRESH
2. PLACE RISER SECTION AFTER CONCRETE HAS SET.
3. A SHORT FRAME REQUIRES APPROVAL OF THE PUBLIC WORKS INSPECTOR.
4. ALL MANHOLE COVERS ARE TO HAVE A ANTI SKID PATTERN
5. SEE SECTION 101-8 MATERIALS OF THE THESE CONSTRUCTION STANDARDS (DR 9 of11) FOR APPROVED FRAME AND COVERS.

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

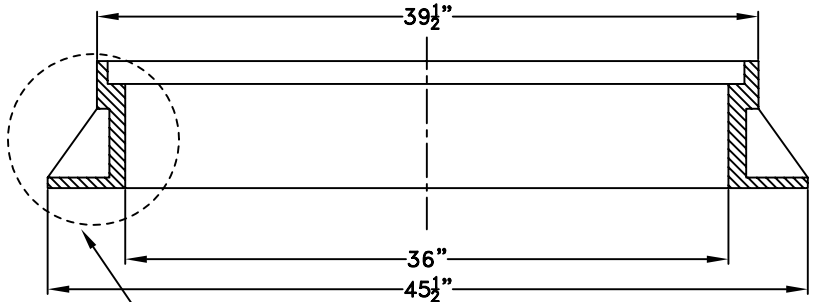
DR-6



HALF PLAN OF MANHOLE COVER AND FRAME



MANHOLE COVER



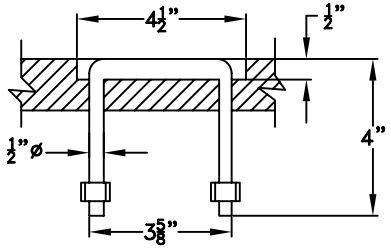
MANHOLE FRAME

SEE DETAIL "C"

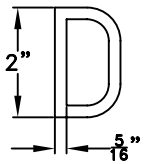
NOTE:

FRAME WT. APPROX. 300 LBS.

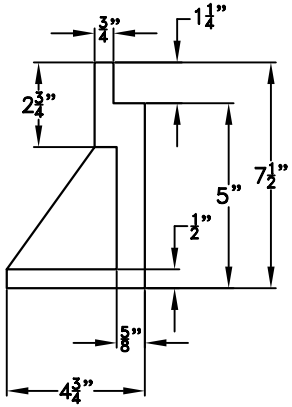
COVER WT. APPROX. 375 LBS.



DETAIL "A" HANDLE



DETAIL "B"
LETTER 'D' AT CENTER OF COVER



DETAIL "C"

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

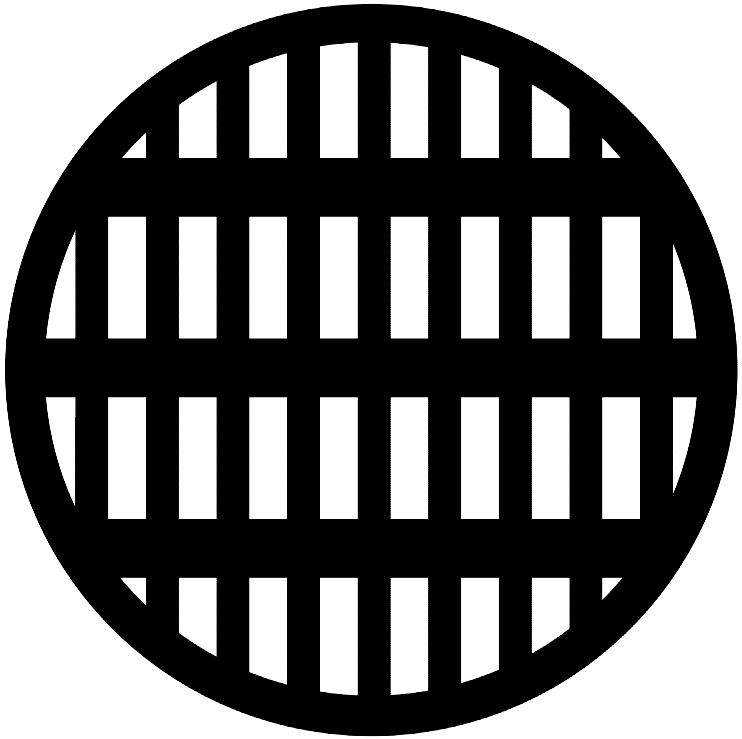
STANDARD 36" MANHOLE FRAME AND COVER

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR–7

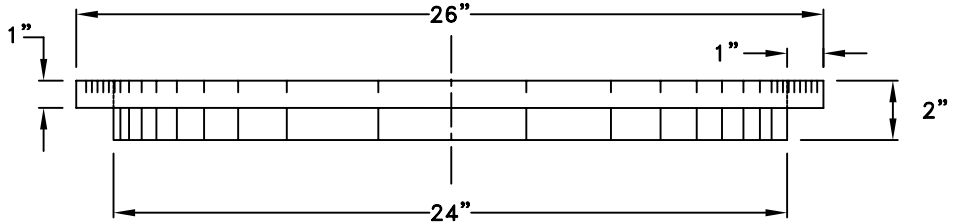
NOTES:

1. ALL MANHOLE COVERS ARE TO HAVE A ANTI SKID PATTERN
2. SEE SECTION 101–8 MATERIALS OF THE THESE CONSTRUCTION STANDARDS (DR 9 of11) FOR APPROVED FRAME AND COVERS.



DRAIN INLET FRAME AND COVER ASSEMBLIES
(OR APPROVED EQUAL APPLIES)

D&L SUPPLY: #C-2660 (6 5/8 INCH HIGH STANDARD CASTING), #C-2661 (5 INCH), #C-2662 (3 INCH)
SOUTH BAY FOUNDRY: #1920 (6 5/8 INCH). #1922 (5 INCH), #1923 (3 INCH), (SPECIFY DRAIN INLET TYPE)



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

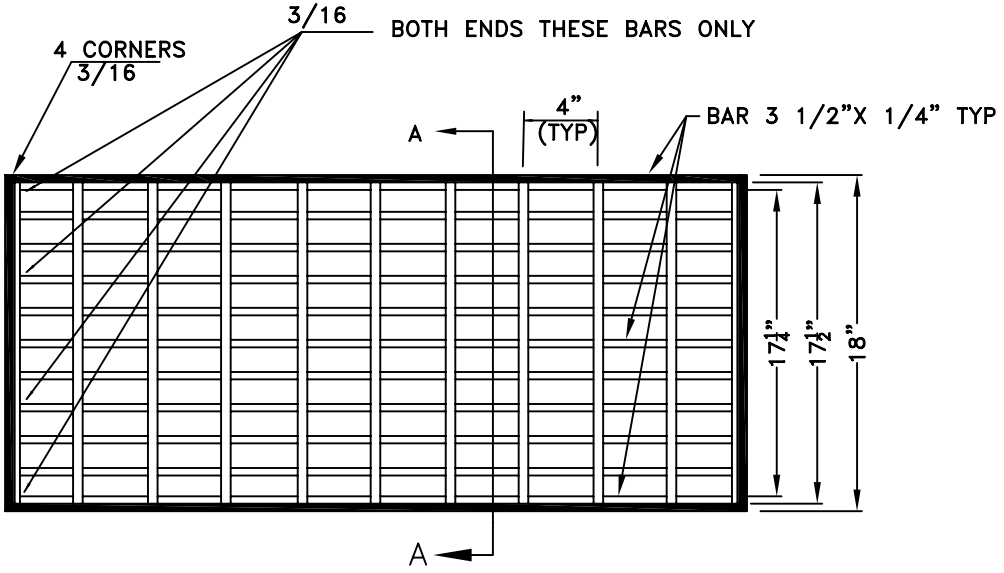
GRATE TYPE MANHOLE COVER

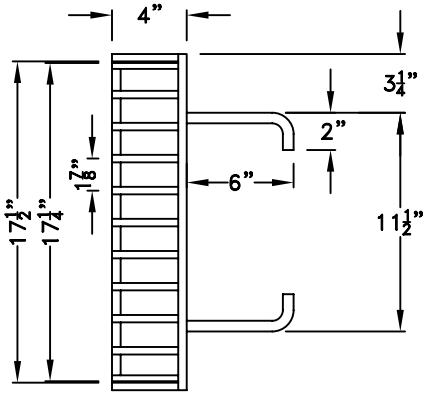
NOTES:

1. DRAIN INLET AND NON DRAIN INLET FRAMES ARE IDENTICAL.
2. A SHORT FRAME REQUIRES APPROVAL OF THE PUBLIC WORKS INSPECTOR

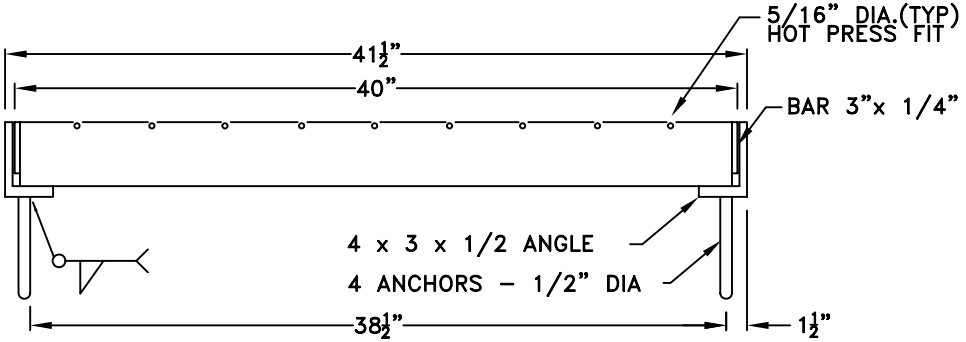
SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR-8





SECTION A–A



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

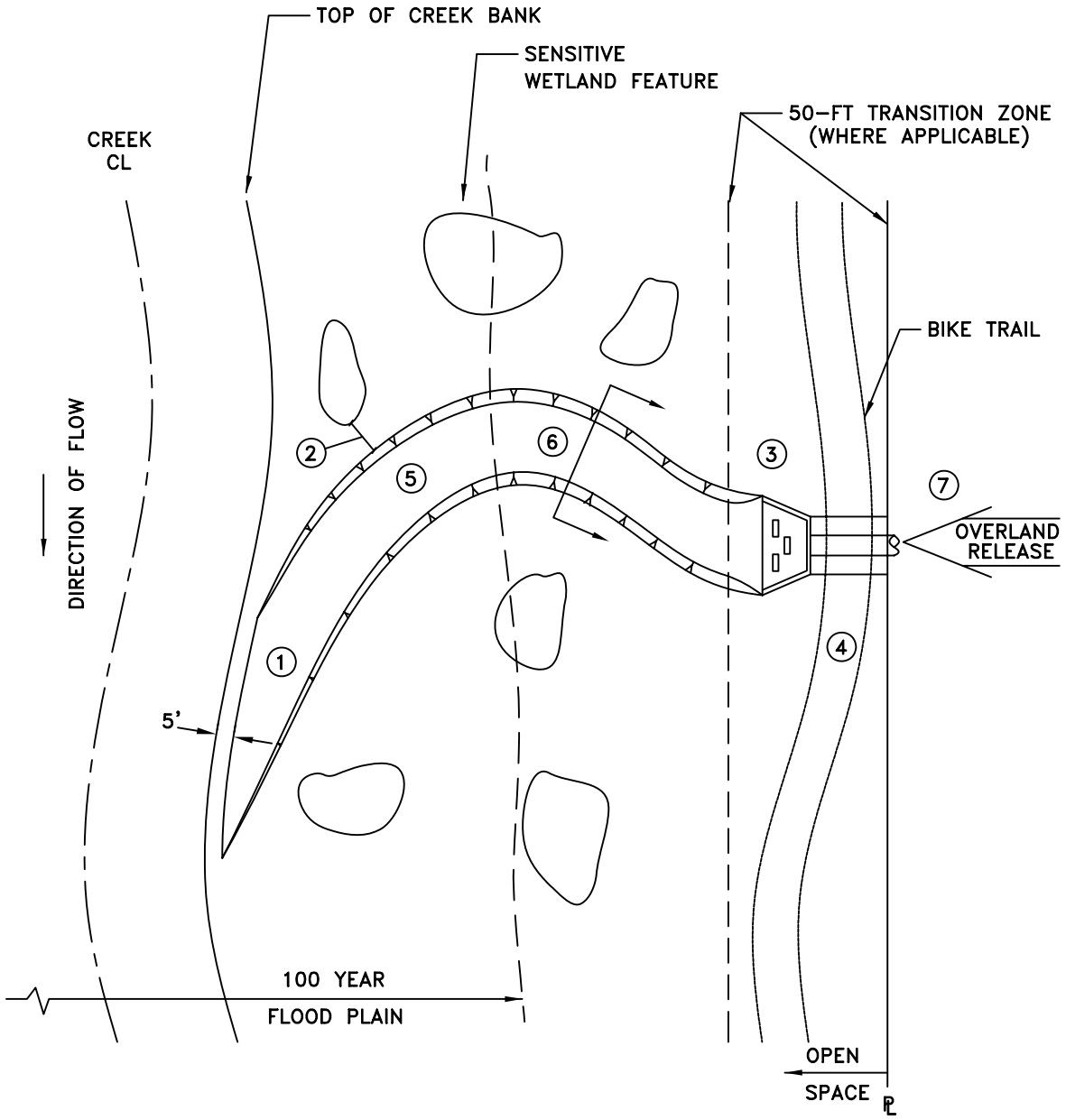
DROP INLET FRAME AND GRATE FOR TYPE "C" INLETS

NOTES:

1. FOR CATCH BASINS EXCEEDING FOUR FEET IN DEPTH, AN 18 INCH LONG, 1/4 INCH X 1/8 INCH PROOF COIL CHAIN SHALL CONNECT THE GRATE AND FRAME. THE CHAIN SHALL BE WELDED TO THE STREET SIDE OF THE FRAME AND THE CURB SIDE OF THE GRATE AT THE SAME END.
2. AT THE CONTRACTOR'S OPTION, END SPACING OF 5/16" CROSS RODS MAY BE 2". INTERIOR SPACING SHALL REMAIN 4".

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR–9



NOTES:

1. DRAINAGE SWALE (DR–11) SHALL DAYLIGHT 5–FT PRIOR TO TOP OF CREEK BANK. FLOW VELOCITY SHALL BE AT 2 FPS PRIOR TO DAYLIGHT.
2. EDGE OF DRAINAGE SWALE SHALL REMAIN A MINIMUM OF 5–FT FROM ANY SENSITIVE WETLAND FEATURES.
3. OUTFALL STRUCTURE (DR–12) MAY BE PLACED WITHIN 50–FT TRANSITION ZONE. IN AREAS WHERE A TRANSITION ZONE DOES NOT EXIST, THE LOCATION OF THE OUTFALL STRUCTURE SHALL BE ONSITE OR AS APPROVED BY THE CITY ENGINEER.
4. IF A BIKE TRAIL IS LOCATED WITHIN THE OPEN SPACE, THEN THE OUTFALL STRUCTURE SHALL BE PLACED ON THE STREAM SIDE OF THE BIKE TRAIL.
5. VELOCITY CHECK DAMS DR–14 SHALL BE USED WHEN DESIGN FLOW VELOCITY EXCEEDS 5 FPS.
6. SEE STANDARD DETAIL DR–11 FOR SWALE CROSS SECTION.
7. OVERLAND RELEASE SHALL TIE INTO HEADWALL STRUCTURE PER DETAIL DR–12.
8. SWALE LENGTH IS A FUNCTION OF CONTACT TIME AS REQUIRED FOR STORM WATER TREATMENT.

RHON HERNDON
PUBLIC WORKS DIRECTOR

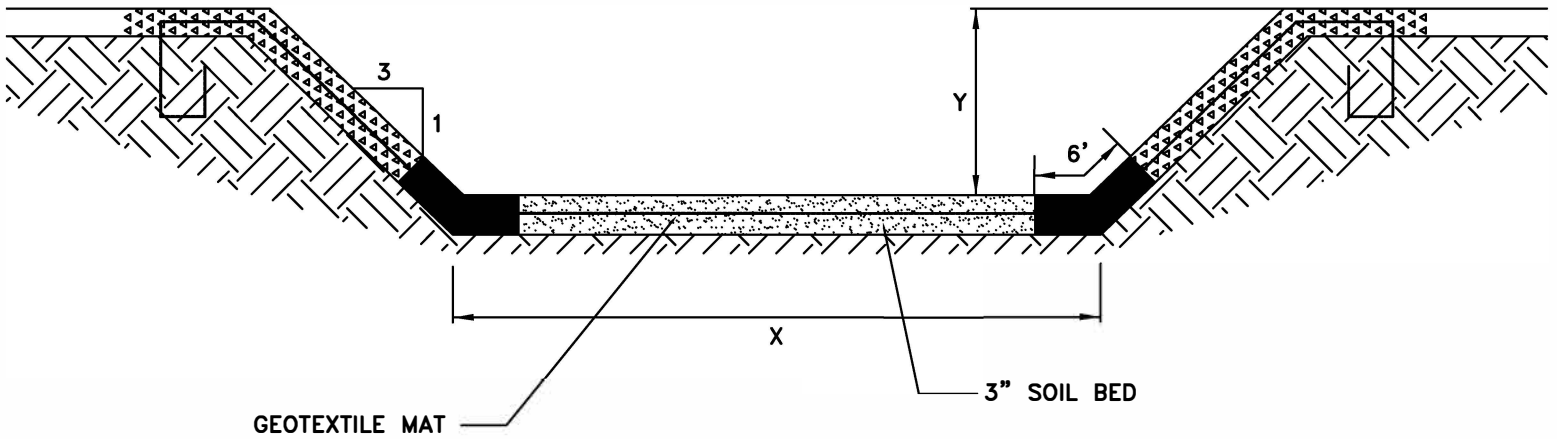
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

WATER QUALITY OUTFALL SWALE WITHIN OPEN SPACE

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR–10



KEY:

SWALE/WET NATIVE SEED MIX
(SEE SECTION 11, GRADING FOR SEED MIX)

DRY NATIVE SEED MIX
(SEE SECTION 11, GRADING FOR SEED MIX)

SWALE/WET AND DRY SEED MIX

X CHANNEL BASE

Y CHANNEL DEPTH

NOTES

1. PYRAMAT HPTRM OR APPROVED EQUAL SHALL BE PLACED ON TOP OF 3-IN SEEDED SOIL BED AND WILL BE INSTALLED PER THE MANUFACTURE'S SPECIFICATIONS. FOR CHANNEL VELOCITIES LESS THAN 5 FPS, THE PYRAMAT HTRM MAY BE REPLACED WITH A BIODEGRADABLE MATTING (I.E. COCONUT MATTING) THE BIODEGRADABLE MATTING SHALL A MINIMUM 3 YEAR LIFE.
2. WETLAND AND UPLAND SEEDING SHALL OVERLAP AT THE TRAPEZOIDAL HINGE POINT.
3. IF SWALE IS BEING USED FOR STORM WATER TREATMENT, THEN THE CHANNEL GEOMETRIC DESIGN SHALL FOLLOW THE GUIDLINES FOR CONTACT TIME FROM THE STORMWATER QUALITY DESIGN MANUAL FOR THE SACRAMENTO AND SOUTH PLACER REGIONS.
4. ALL SWALES SHALL BE DESIGNED TO CONVEY THE 10-YEAR STORM EVENT.

MARC STOUT
CITY ENGINEER

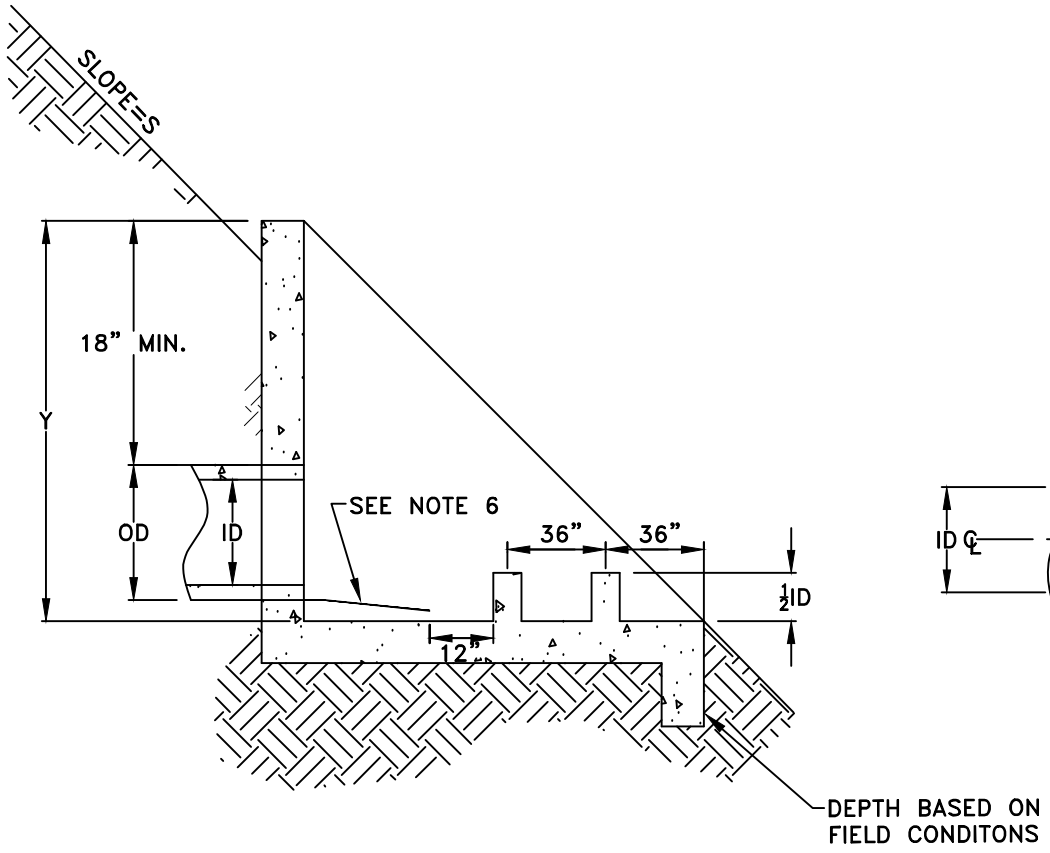
CITY OF ROSEVILLE CALIFORNIA

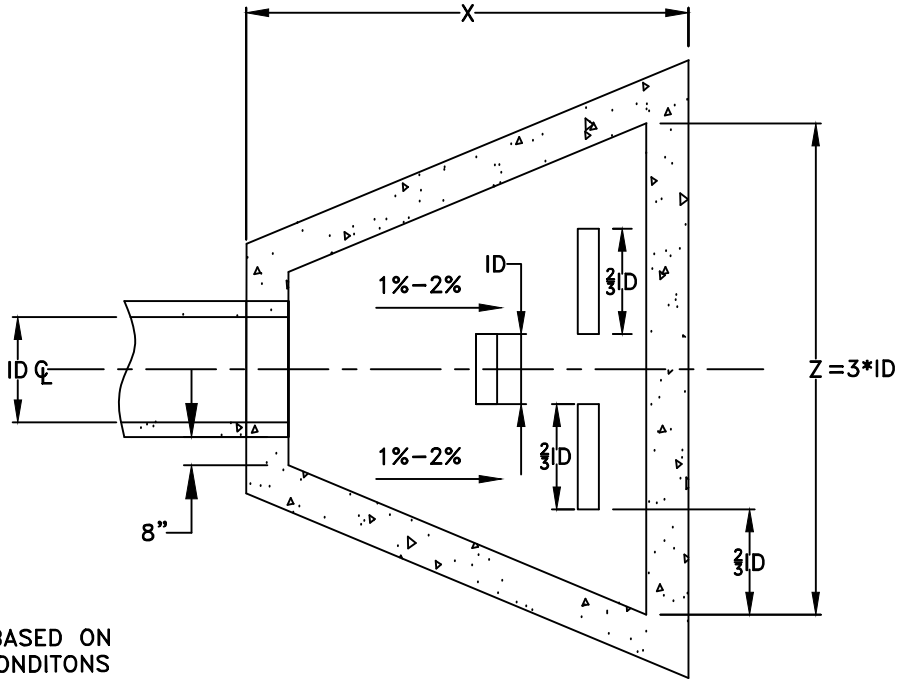
DEVELOPMENT SERVICES DEPARTMENT

WATER QUALITY OUTFALL SWALE

SCALE: NONE
REVISED: FEBRUARY 1, 2020
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

DR-11





MARC STOUT
CITY ENGINEER

NOTES:

1. HEADWALL DESIGN MUST MEET THE FOLLOWING CRITERIA:
   A. X = SY (IF FLAT SLOPE S=1)
   B. X ≥ ID+6(FT)
   C. Y ≥ OD+2(FT)
2. ALL CONCRETE SHALL BE MINIMUM 8" THICK
3. DESIGN ENGINEER SHALL PROVIDE A REBAR SCHEDULE FOR HEADWALLS LESS THAN 4 FEET IN HEIGHT
4. STRUCTURAL CALCULATIONS SHALL BE SUBMITTED FOR HEADWALLS 4 FEET OR GREATER IN HEIGHT
5. ALL CONCRETE TO BE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS
6. REFER TO STANDARD DETAIL DR–16 FOR ACCESS CONTROL RACK REQUIREMENTS.
7. REFER TO DESIGN ENGINEER (STRUCTURAL) DESIGN WHERE FENCING IS REQUIRED.

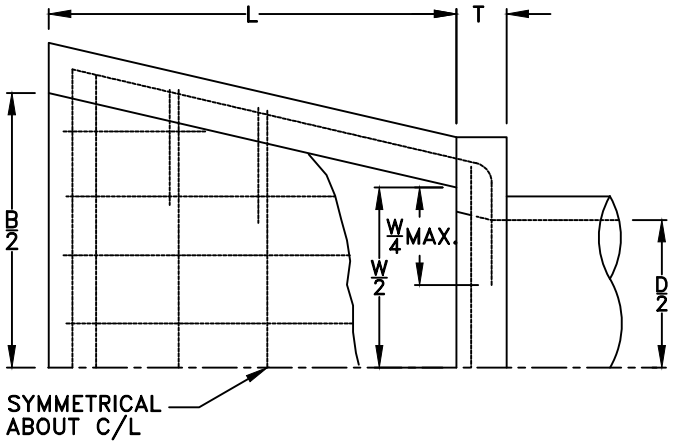
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

HEADWALL

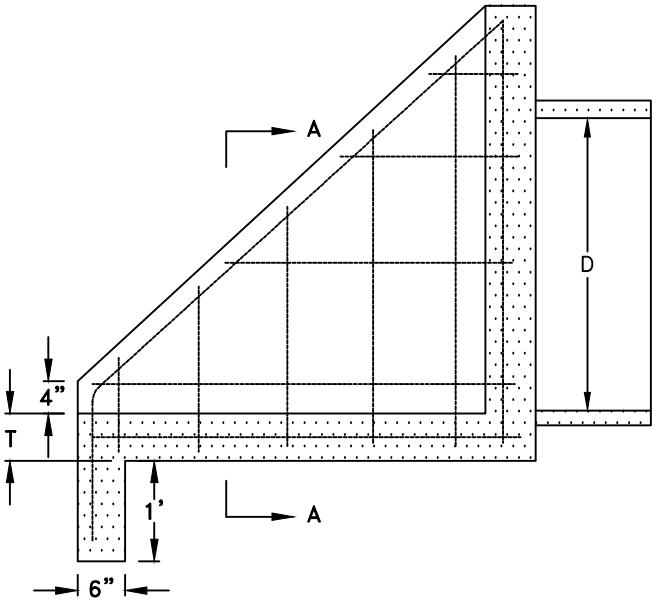
SCALE: NONE
REVISED: JANUARY 1, 2025
DRAWN BY: J MCKINNEY
APPROVED BY: MARC STOUT

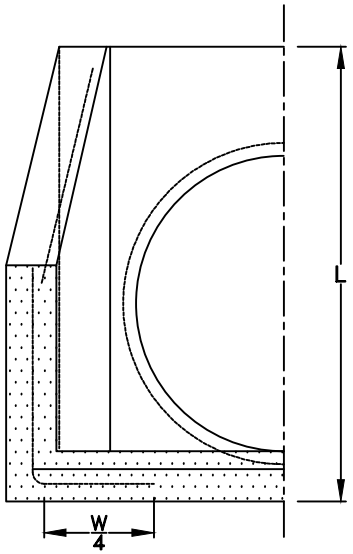
DR–12



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

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

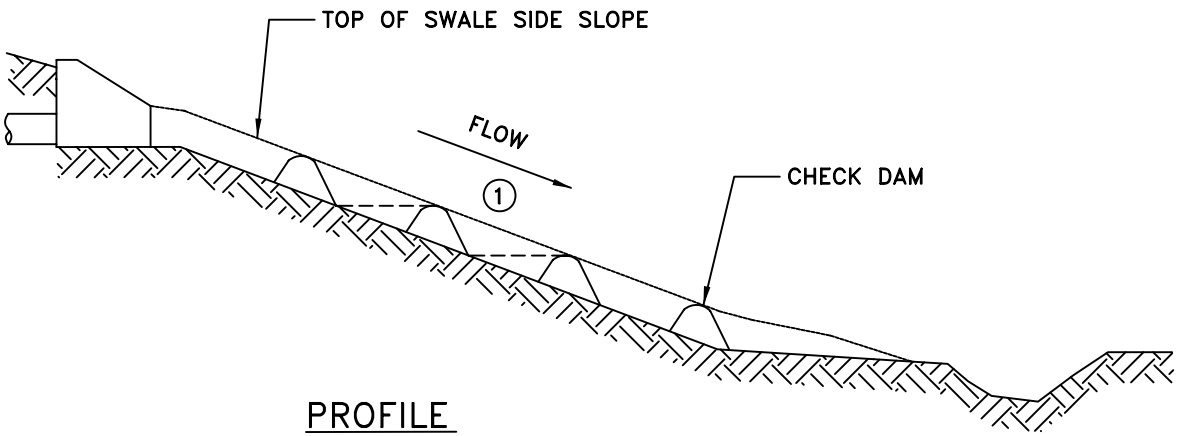
PIPE INLET STRUCTURE

NOTES:

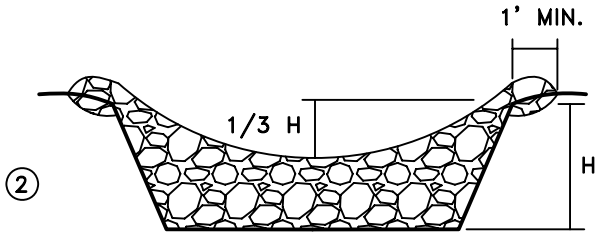
1. "B" MAY BE REDUCED IF REQUIRED BY CHANNEL DIMENSIONS
2. REINFORCING BAR SPACING SHOWN IS MAXIMUM SPACING.
3. ALL CONCRETE TO BE "MINOR CONCRETE" AS DEFINED IN SECTION 71–5B OF THESE STANDARDS.
4. SEE DR–15 FOR TRASH RACK DETAIL.
5. REFER TO DESIGN ENGINEER'S (STRUCTURAL) DESIGN, WHERE FENCING IS REQUIRED.

SCALE: NONE
REVISED: JANUARY 1, 2021
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

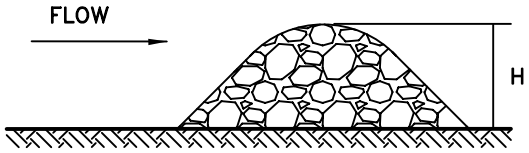
DR–13



PROFILE



FRONT VIEW



SIDE VIEW

RHON HERNDON
PUBLIC WORKS DIRECTOR

NOTES:

1. CHECK DAMS SHALL BE SPACED SUCH THAT THE TOP OF THE DOWNSTREAM CHECK DAM ALIGNS WITH THE BOTTOM OF THE UPSTREAM CHECK DAM.
2. RIP-RAP SHALL BE 4-INCH TO 6-INCH ANGULAR ROCK.
3. H = CHANNEL DEPTH

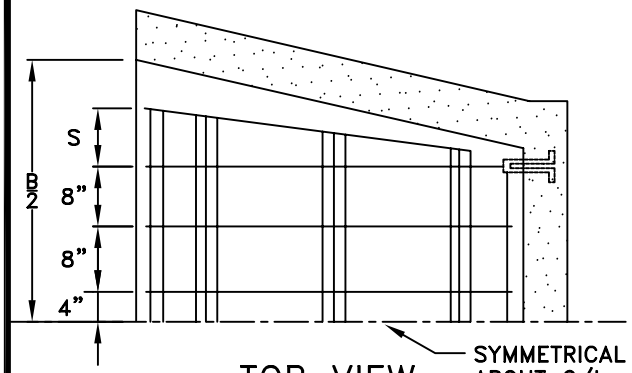
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

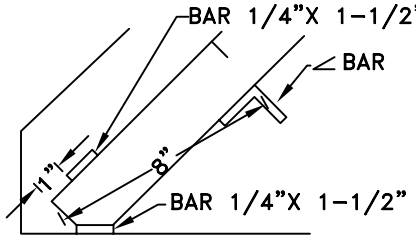
VELOCITY CHECK DAM

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR-14



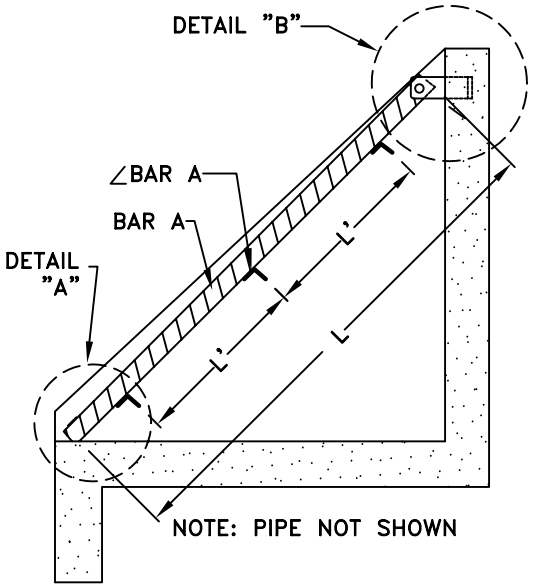
TOP VIEW



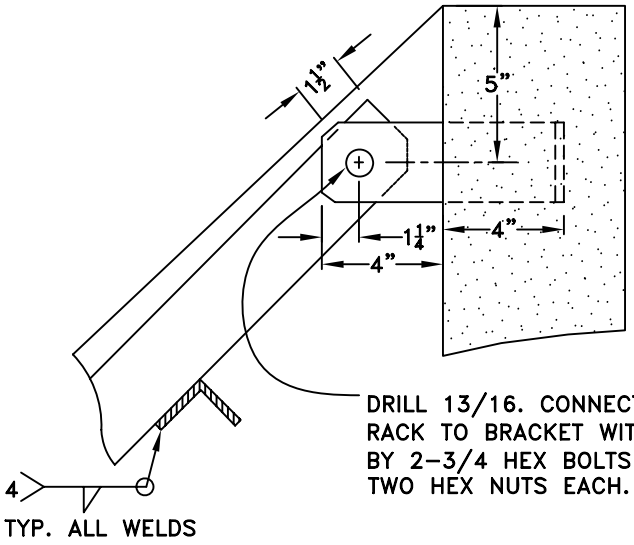
DETAIL A

TRASH RACK DEMENSIONS

DIA.	NUMBER & SIZE		L	L'	S	H
	BAR A	L BAR				
33"	8-3/8 X 2 1/2	3-2 X 2 X 1/4	5'-1"	1'-10"	8"	3"-8"
36"	"	"	5'-4"	1'-11"	8"	3'-10"
42"	9-3/8 X 2 1/2	"	5'-11"	2'-3"	9"	4'-4"
48"	"	4-2 X 2 X 1/4	6'-7"	1'-9"	10"	4'-10"
54"	10-3/8 X 3	4-3 X 3 X 1/4	7'-9"	2'-1 1/2"	10 1/2"	5'-8"
60"	11-3/8 X 3 1/2	"	8'-5"	2'-4"	11"	6'-2"



SIDE VIEW



DETAIL B

RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

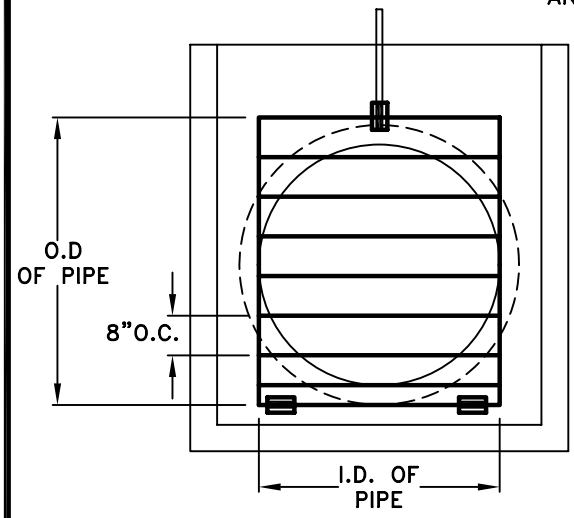
INLET TRASH RACK 33" PIPE OR LARGER

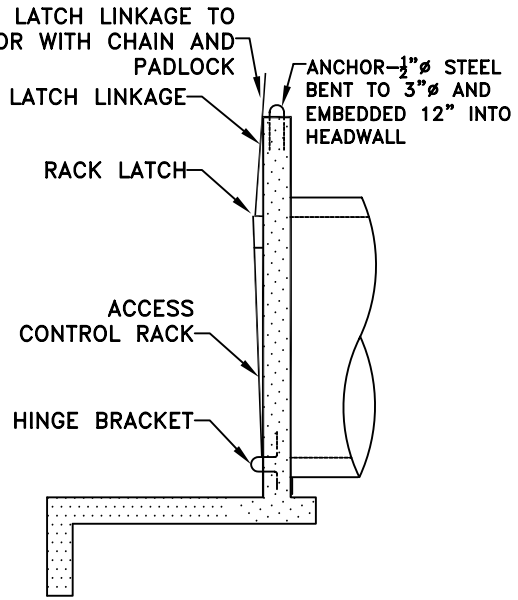
SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR-15

NOTES

1. THIS TRASH RACK MAY BE USED WITH PIPE INLET STRUCTURES.
2. MATERIAL TO CONFORM TO ASTM DESIGNATION A-36.
3. 'S' MAY VARY WITH 'B'. SEE PLATE.
4. ALL FILLET WELDS TO BE 3/16"
5. TWO HINGES REQUIRED FOR 33, 36 & 42 INCH PIPES. THREE HINGES REQUIRED FOR 48, 54 & 60 INCH PIPES.

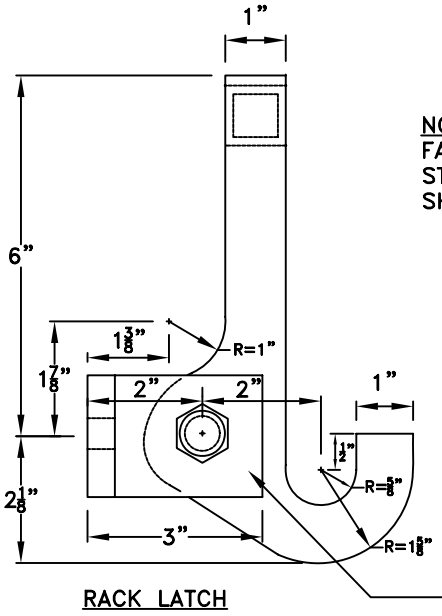




NOTES

1. ENTIRE RACK TO BE WELDED REINFORCING STEEL OR ROUND BARS OF EQUAL DIAMETER WITH HORIZONTAL BARS BEING 8" CENTER TO CENTER.
2. ROOM SHALL BE PROVIDED DOWNSTREAM TO LAY RACK FLAT.
3. FASTEN LATCH BRACKET TO HEADWALL WITH 1/2" X 6" BOLTS WITH HEX NUTS, OR 1/2" EXPANSION BOLTS.
4. 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.
5. FABRICATE HINGE BRACKET FROM #4 RE–BAR.

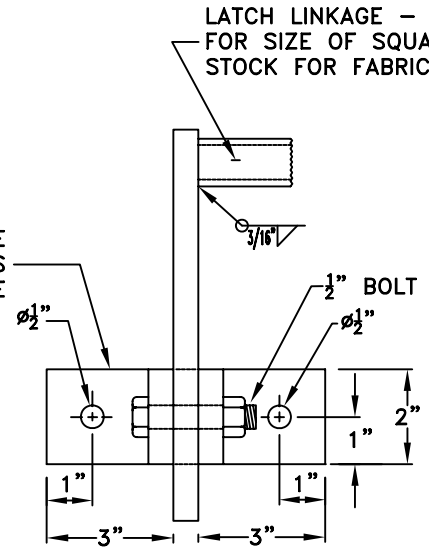
PIPE SIZE	RACK BAR SIZE	LATCH PLATE THICKNESS	LATCH LINKAGE SIZE
21"–27"	#4	1/4"	1", .095" THICK
30"–36"	#6	3/8"	1", .095" THICK
42"–54"	#7	1/2"	1", .133" THICK
60"–84"	#8	1/2"	1", .133" THICK



RACK LATCH

NOTE
FABRICATE LATCH FROM STEEL PLATE, THICKNESS SHOWN IN TABLE

3"X3" STEEL ANGLE
SAME PLATE THICKNESS
AS LATCH PLATE



MOUNTING BRACKET
FOR HINGE & RACK LATCH

3"X3" STEEL ANGLE
SAME PLATE THICKNESS
AS LATCH PLATE

RHON HERNDON
PUBLIC WORKS DIRECTOR

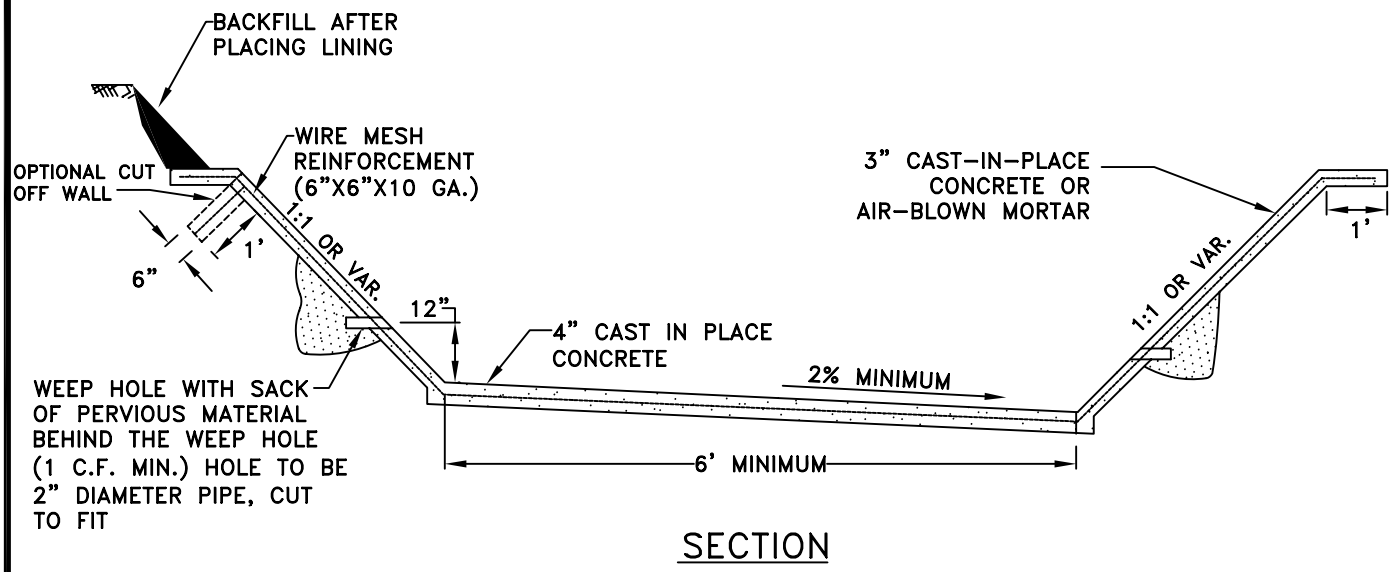
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

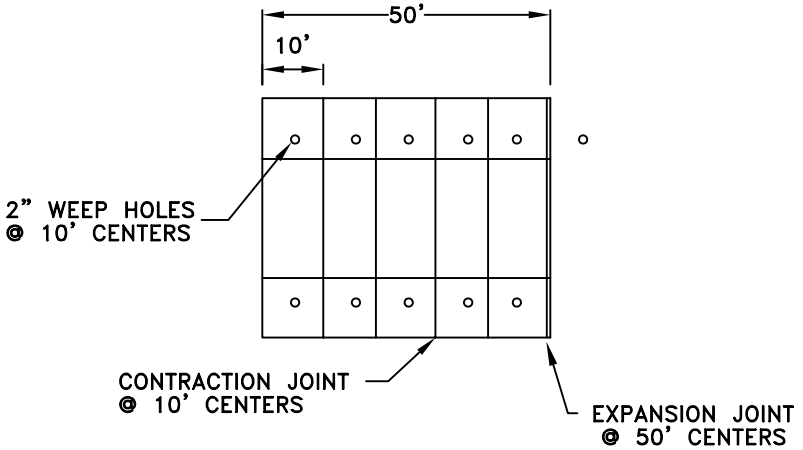
TRASH RACK

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR–16



SECTION



PLAN

NOTE:

1. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.

RHON HERNDON
PUBLIC WORKS DIRECTOR

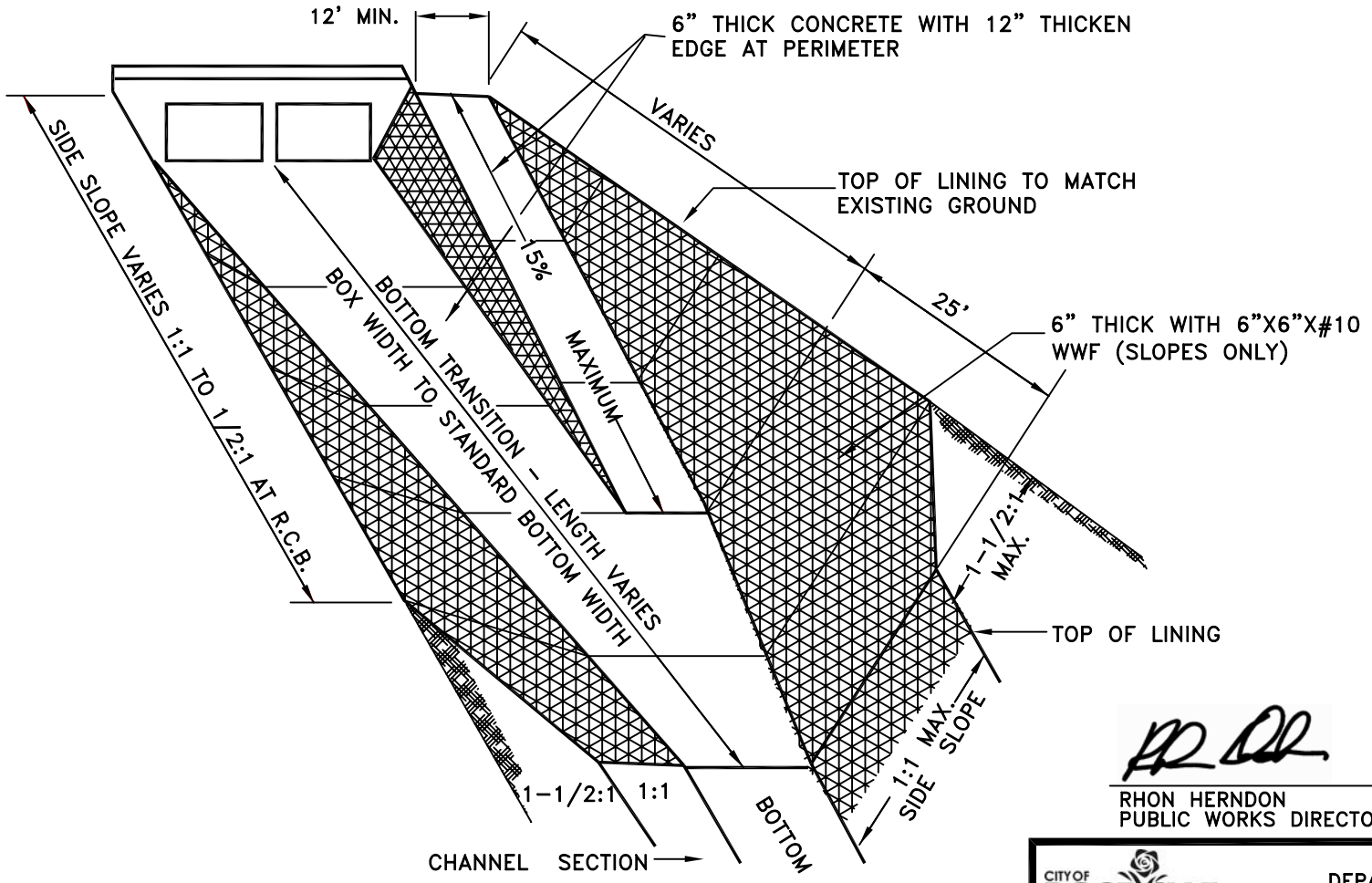
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

LINED CHANNEL SECTION

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR-17



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

TYPICAL RAMP & TRANSITION

SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR-18

NOTES:

1. BOTTOM TRANSITION 25' MINIMUM LENGTH WITH NO RAMP.
2. WEEP HOLES AND JOINTS AS REQUIRED FOR ALL LINED CHANNEL SECTIONS (SEE DETAIL DR-17).
3. LOW SIDE OF CHANNEL TO BE OPPOSITE RAMP.
4. SIDE SLOPE LINING MAY BE DELETED ON CHANNELS WITH BOTTOM LINING ONLY
5. ALL CONCRETE SHALL BE "MINOR CONCRETE" AS DEFINED IN SECTION 71-5B OF THESE STANDARDS.

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
PVC PIPE		36	24

NOTES:

1. 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.
2. TRENCH WIDTH EQUALS O.D. OF PIPE PLUS 24" FOR PIPE 36" AND LARGER IN INSIDE DIAMETER. TRENCH WIDTH MEASURED AT TOP OF PIPE.

RHON HERNDON
PUBLIC WORKS DIRECTOR

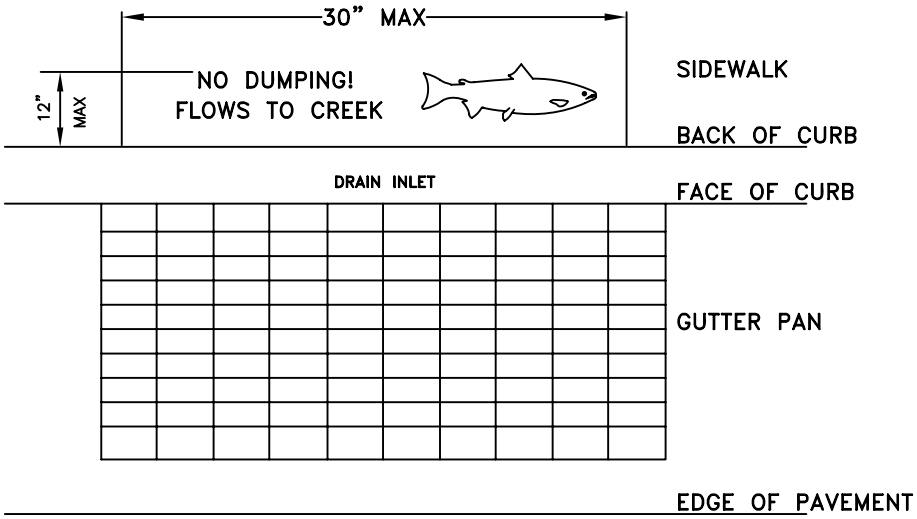
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

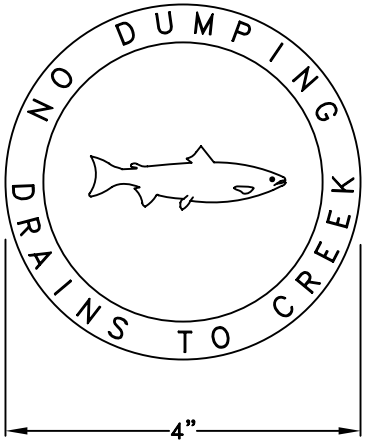
TRENCH DEPTH AND MINIMUM COVER REQUIREMENTS

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR–19



DETAIL "A"



DETAIL "B"

NOTES:

1. DETAIL "A" LETTERING SHALL BE 1 1/4 TO 1 1/2 INCHES HIGH. THE MESSAGE AND SYMBOL SHALL BE DEPRESSED 1/8 TO 1/4 INCH INTO THE CONCRETE. THE FISH SYMBOL SHALL BE A MINIMUM OF 11 INCHES LONG AND 3 1/2 INCHES HIGH.
2. DETAIL "A" SHALL BE PRE APPROVED BY THE CONSTRUCTION INSPECTOR PRIOR TO ITS USE.
3. DETAIL "A" SHALL APPLY TO ALL DRAIN INLET DESIGNS. WHERE THE SIDEWALK DOES NOT ADJOIN THE BACK OF CURB, THE NOTICE SHALL BE STAMPED IN THE CONCRETE BACKUP, BEHIND THE DRAIN INLET. WHERE THE DRAIN INLET IS PLACED IN A "V" GUTTER WITHOUT A CURB INLET, THE NOTICE SHALL BE STAMPED ON ONE SIDE OR THE OTHER, PARALLEL TO THE LENGTH OF THE INLET.
4. DETAIL "B" MAY BE PLACED WHERE DETAIL "A" DOES NOT WARRANT INSTALLATION AT THE DISCRETION OF THE PUBLIC WORKS CONSTRUCTION INSPECTOR. SEE DRAINAGE SECTION 101-8 OF THE DESIGN AND CONSTRUCTION STANDARDS FOR SPECIFICATIONS.
5. THE MESSAGE SHALL BE FREE OF BLEMISHES, LEGIBLE AND ACCEPTABLE TO THE CONSTRUCTION INSPECTOR.

RHON HERNDON
PUBLIC WORKS DIRECTOR

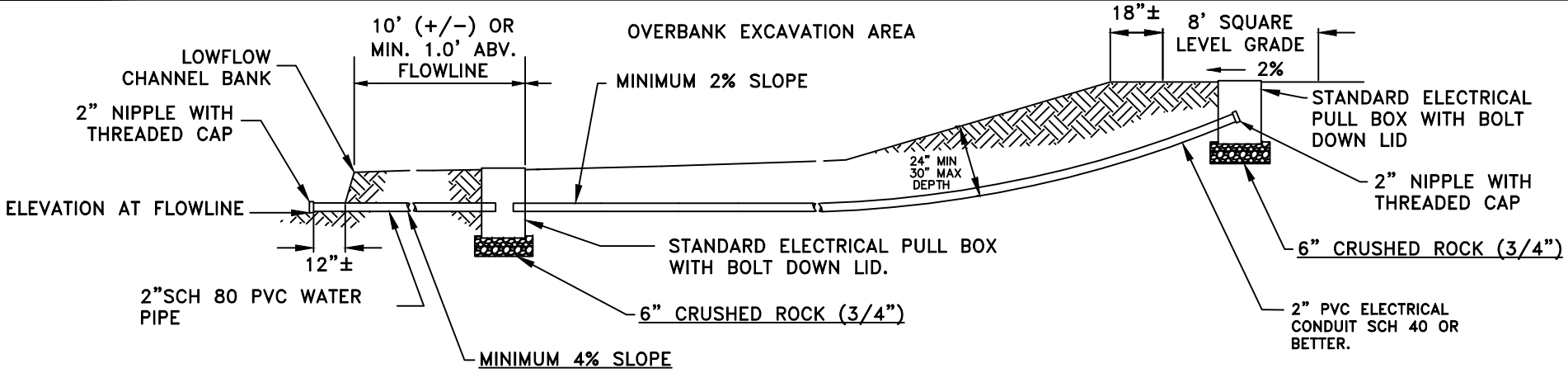
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

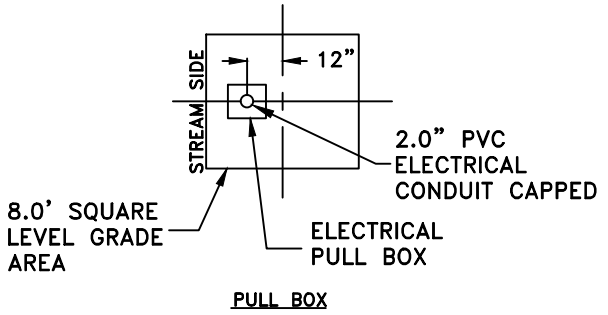
"NO DUMPING" PUBLIC NOTICE

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

DR-20



NOTE:
SLOPE PIPES TOWARD THE CREEK.



NOTES ON TYPICAL STREAM GAUGING PAD ADJACENT TO NEW BRIDGE CONSTRUCTION OVER CITY OF ROSEVILLE CREEKS.

EACH STREAM GAUGING CONDUIT WILL HAVE FOUR COMMON PRINCIPAL COMPONENTS:

1. A PAD GRADE AREA 8.0 FEET SQUARE WITH 2% SLOPE TOWARD THE STREAM SIDE. AN ELECTRICAL PULL BOX WILL BE INSTALLED 12 INCHES OFF CENTER OF THE PAD TOWARD THE STREAM SIDE.

2. TWO INCH ELECTRICAL PVC CONDUIT SCH. 40 OR BETTER COMMENCING AT THE ELECTRICAL PULL BOX ON THE PAD AND TERMINATING IN AN ELECTRICAL PULL BOX 10 FEET +/- FROM THE LOW FLOW CHANNEL BANK OR 1 FOOT +/- ABOVE THE LOW FLOW. THE CONDUIT SHOULD NOT INCLUDE ONLY LONG RADIUS ELBOWS TO DROP IT DOWN TO THE APPROPRIATE ELEVATION. A PULL STRING 1/4" NYLON PULL ROPE SHALL BE BLOWN INTO THE CONDUIT FROM THE ELECTRICAL PULL BOX ON THE PAD AREA TO THE ELECTRICAL PULL BOX ADJACENT TO THE LOW FLOW CHANNEL.

3. STANDARD NO. 5 ELECTRICAL PULL BOXES WITH BOLT DOWN LIDS WILL BE USED. THE BOTTOMS OF PULL BOXES SHALL BE BEDDED IN 6 INCHES OF CLEAN CRUSHED ROCK. CONDUIT TERMINATION IN THE PULL BOX SHALL BE A MINIMUM OF 2 INCHES FROM THE SIDES OF THE PULL BOX, 6 INCHES ABOVE THE CRUSHED ROCK. PULL BOX RIM AND LID SHALL BE 1 ½" ABOVE FINISH GRADE.

4. LOCATION OF THIS STRUCTURE SHOULD BE ON THE UPSTREAM SIDE OF THE BRIDGE AND BE ACCESSIBLE BY FOOT AT ALL POINTS FROM THE LEVEL GRADE AREA TO THE TERMINATION AT THE LOW FLOW CHANNEL. TRUCK ACCESS IS NECESSARY TO THE 8.0 SQUARE FOOT PAD AREA BUT NOT TO OTHER POINTS ALONG THE CONDUIT. ALONG WITH THIS PHYSICAL ACCESS CONCOMITANT RIGHTS OF ACCESS AND/OR EASEMENTS WILL BE GRANTED BY PROPERTY OWNER TO ALLOW FOR MAINTENANCE OF CITY EQUIPMENT INSTALLED ON THIS SITE.

MARC STOUT
CITY ENGINEER

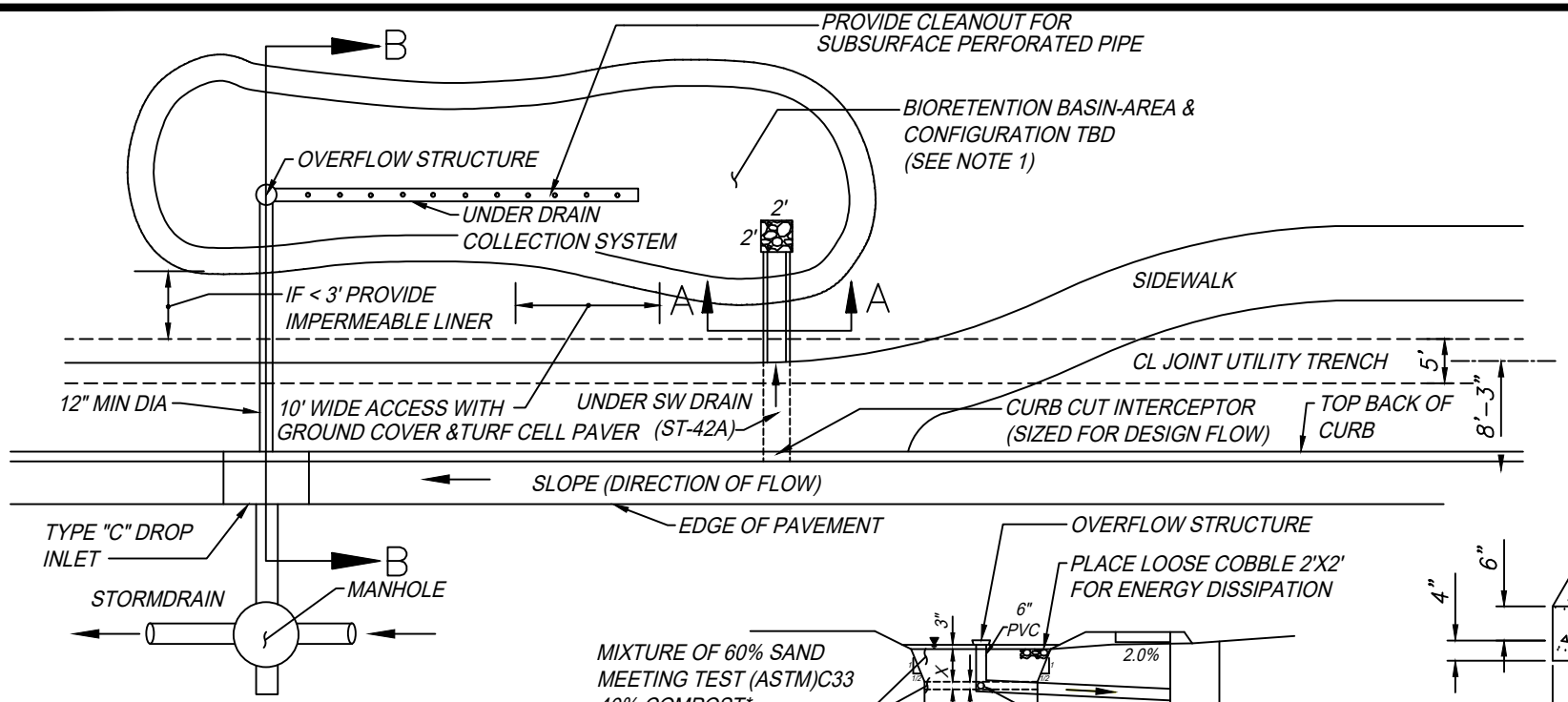
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

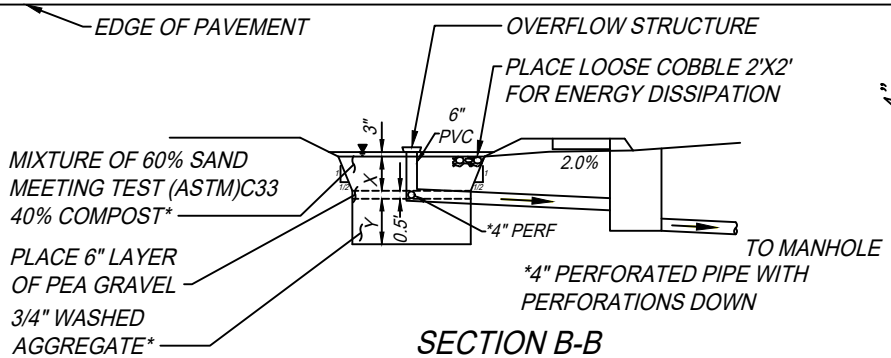
STREAM GAUGING STATION

SCALE: NONE
REVISED: JANUARY 1, 2016
DRAWN BY: J HENDRIX
APPROVED BY: MARC STOUT

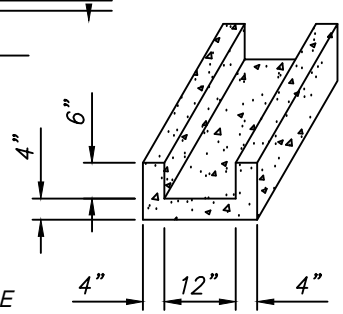
DR-21



* DEPTH OF MATERIAL TO BE DETERMINED BY DESIGN. SEE NOTE 1.



SECTION B-B
NTS



SECTION A-A
NTS

NOTES:

1. REFER TO THE WEST PLACER STORM WATER QUALITY DESIGN MANUAL (SWQDM) FOR THE DESIGN AND SIZING CRITERIA OF THE BIORENTENTION BASIN. CURB CUT INTERCEPTOR, UNDER SIDEWALK DRAIN, AND INLET CHANNEL TO BE SIZED FOR DESIGN FLOW. SHAPE AND SIZE IS CONCEPTUAL ONLY. ACTUAL SIZE AND SHAPE TO BE DETERMINED BASED ON NEED.
2. GRADING TO CONFORM TO SURROUNDING AREA.
3. BASINS TO BE LINED WITH BIOFILTRATION SOD FROM DELTA BLUEGRASS (OR APPROVED EQUAL)
4. WHEN LESS THAN 3' JOINT FROM UTILITY TRENCH, INSTALL 30 MIL LINER ALONG ADJACENT SIDE OF BIORETENTION BASIN PER SWQDM.
5. CONCRETE SHALL CONFORM TO SECTION 71-5B OF THE CITY CONSTRUCTION STANDARDS.
6. PENETRATE HARDPAN (IF IT EXISTS) TO ALLOW FOR BETTER PERCOLATION.
7. ALL IRRIGATION SHALL BE LOCATED OUTSIDE OF THE BASIN.
8. THE OVERFLOW INLET SHALL HAVE A SCREEN WITH 5 mm MAX OPENINGS TO PREVENT TRASH FROM ENTERING THE SYSTEM

MARC STOUT
CITY ENGINEER

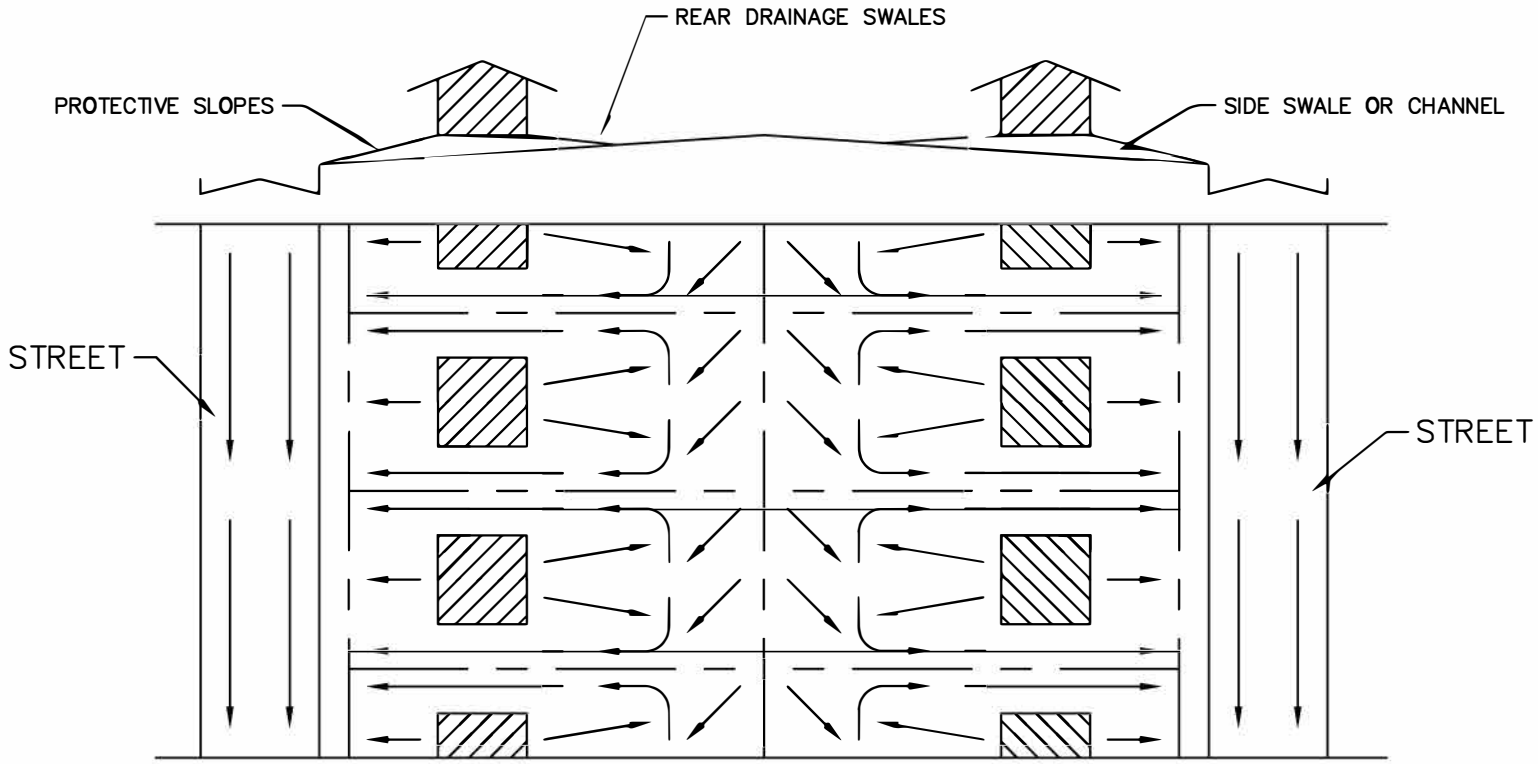
CITY OF ROSEVILLE CALIFORNIA

DEVELOPMENT SERVICES DEPARTMENT

STREET-SIDE STORM WATER BIORETENTION BASIN

SCALE: NONE
REVISED: JANUARY 1, 2024
DRAWN BY: J. THOMPSON
APPROVED BY: M. STOUT

DR-23



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

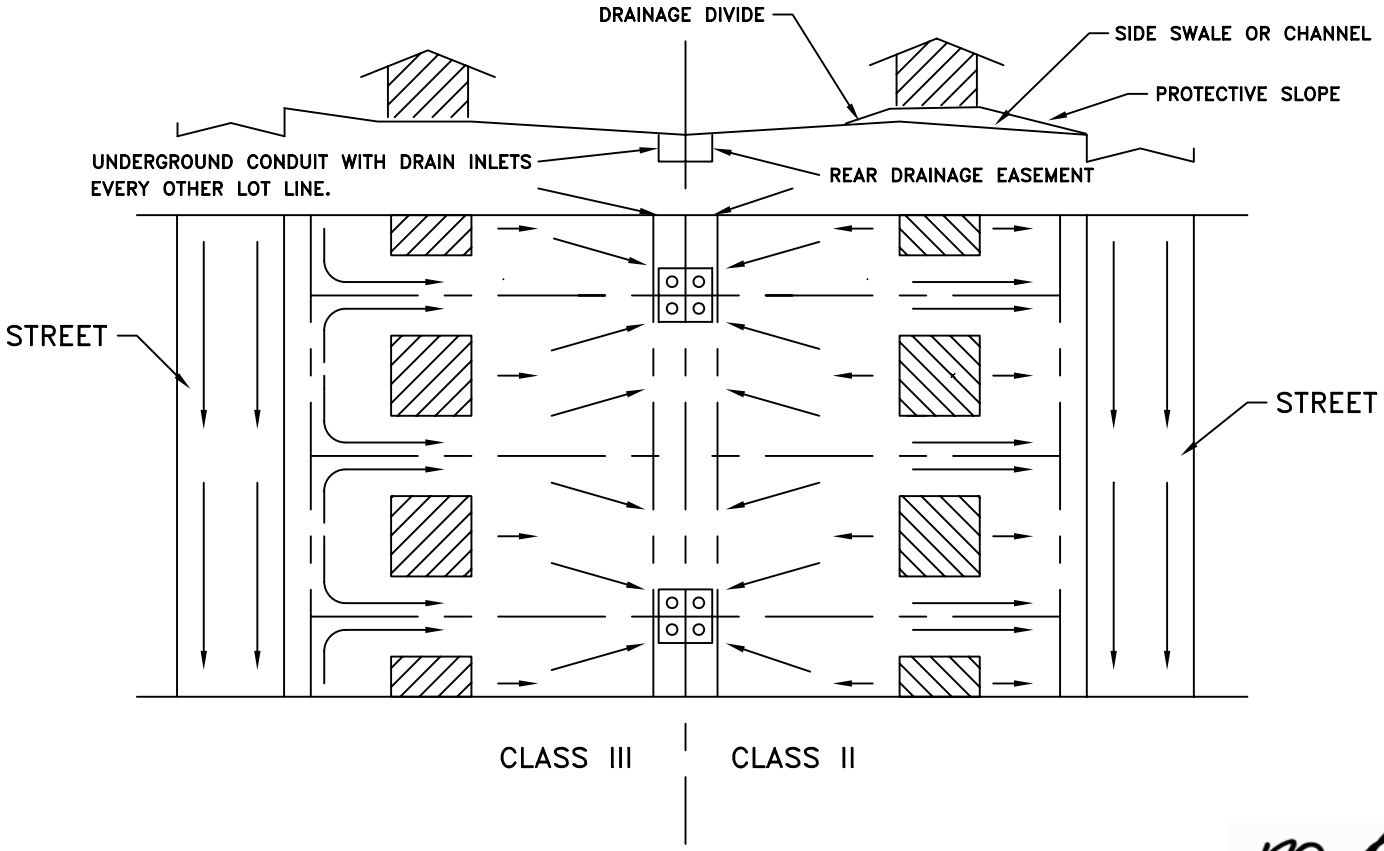
CLASS 1 LOT GRADING

NOTES:

1. LOTS CAN BE GRADED AS A PAD WITH A MINIMUM 1% GRADE TOWARD THE STREET –OR– LOTS CAN GRADED FLAT WITH DRAINAGE DITCHES EXTENDING THE LENGTH OF THE SIDE LOT LINE WITH A MINIMUM 1% GRADE TOWARD THE STREET.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

GR–1



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

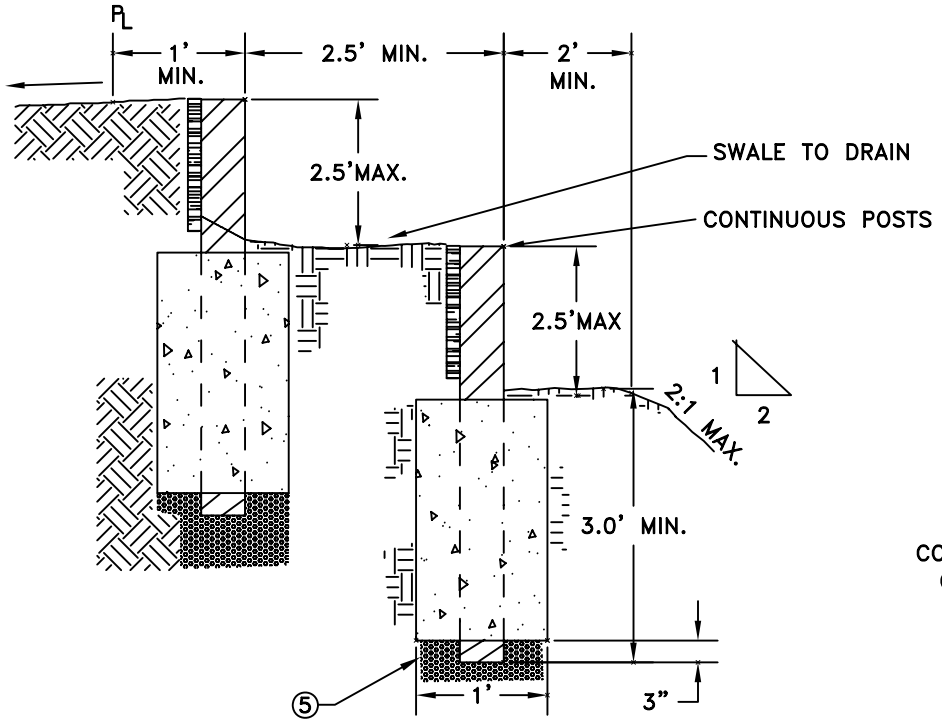
LOT GRADING CLASS II AND III

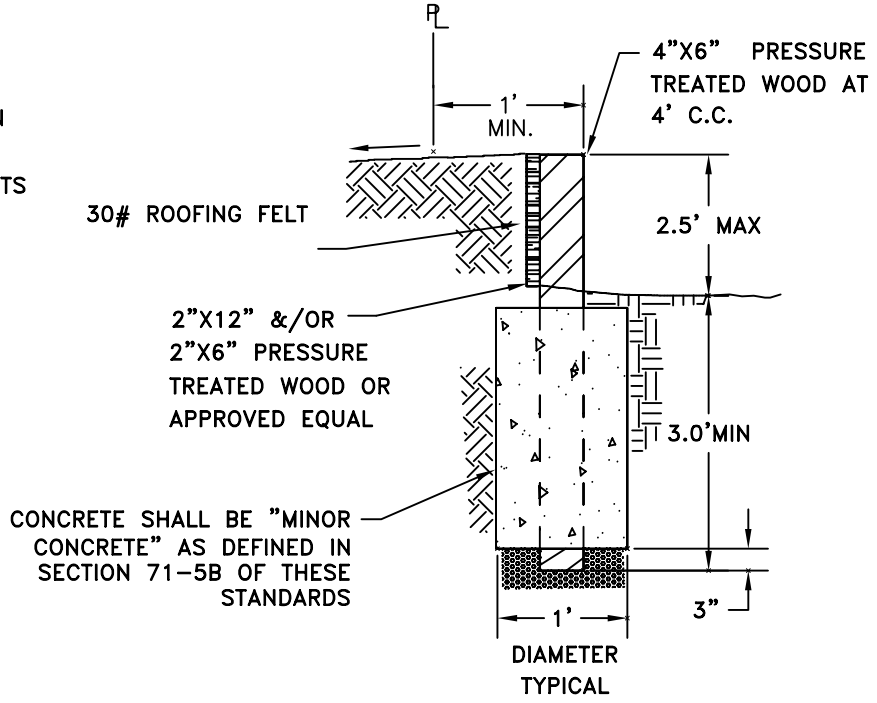
NOTES:

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.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

GR–2





RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

WOOD RETAINING WALL

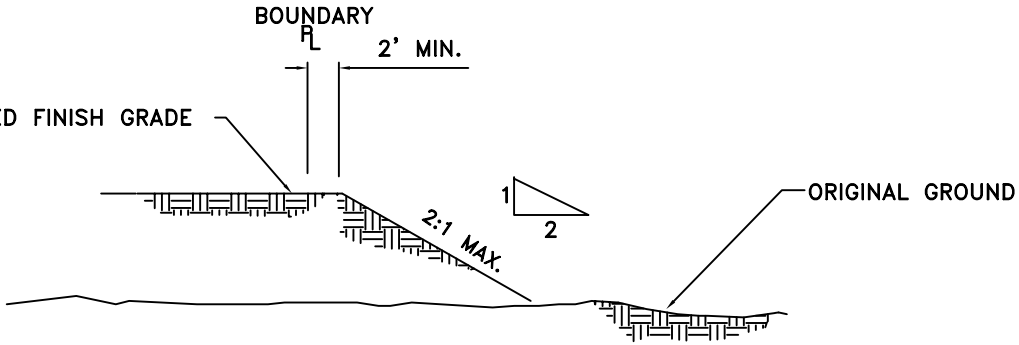
NOTES:

1. MATERIAL FOR WOODEN WALLS SHALL BE PRESSURE TREATED WOOD OR APPROVED EQUAL BY THE CITY ENGINEER PRIOR TO INSTALLATION.
2. ALL METAL HARDWARE TO BE CORROSIVE RESISTANT PER UBC STANDARDS.
3. WOODEN WALLS SHALL NOT BE USED ADJACENT TO STREET RIGHT OF WAYS.
4. 4" X 6" POSTS AT 4' CENTERS SHALL BE USED WHEN FENCES ARE ATTACHED TO RETAINING WALLS; MINIMUM EMBEDMENT FOR POSTS SHALL BE 3.0'. -MEETS U.B.C. STANDARDS
5. DRAIN ROCK SHALL BE PLACED AT BASE OF ALL POST HOLES.

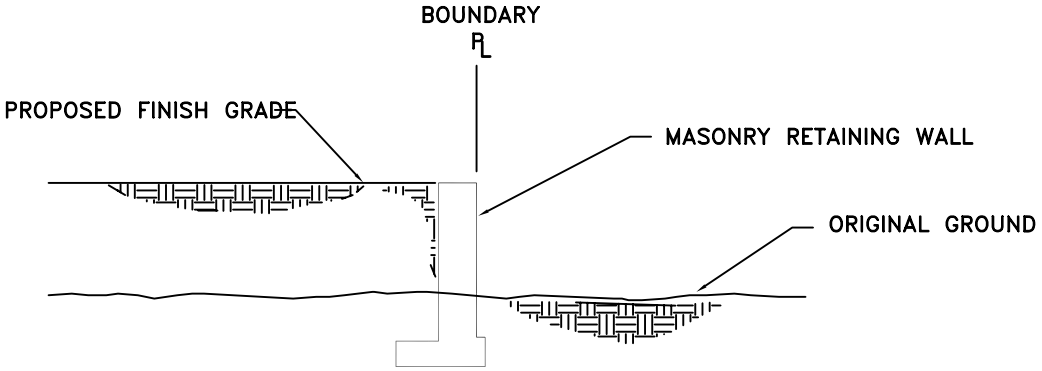
SCALE: NONE
REVISED: JANUARY 1, 2013
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

GR-3

OPTION 1



OPTION 2



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

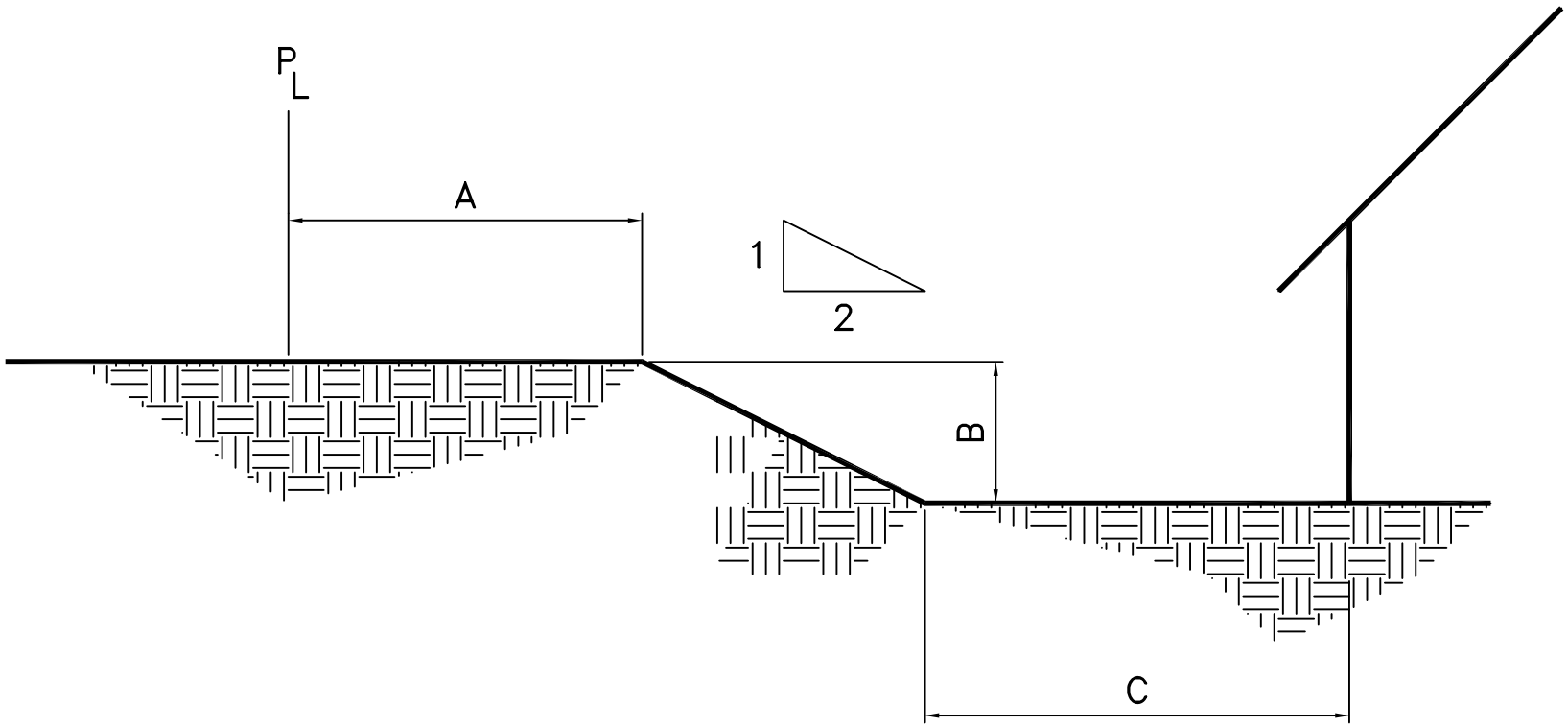
EXTERIOR PERIMETER PROPERTY LINE GRADING

NOTE:

1. A NOTARIZED RIGHT OF ENTRY IS REQUIRED FROM ADJACENT PROPERTY OWNER FOR OPTION 1.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

GR–4



RHON HERNDON
PUBLIC WORKS DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

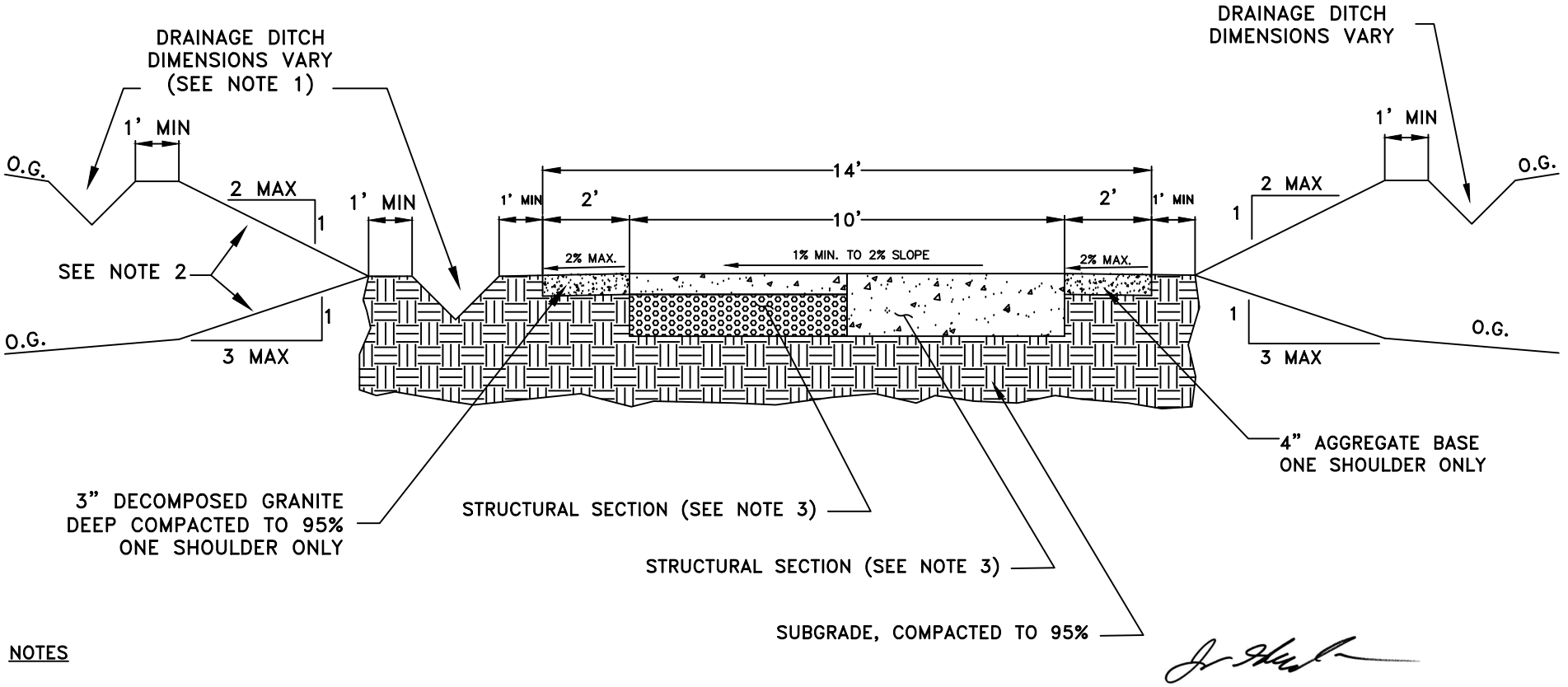
INTERIOR PROPERTY LINE GRADING

NOTES:

1. WHEN "B" IS LESS THAN OR EQUAL TO 0.5 FEET, "A" = 1.0 FEET.
2. WHEN "B" IS GREATER THAN 0.5 FEET, A RETAINING WALL IS REQUIRED OR A STANDARD LOT SETBACK GUARANTEE PROVIDED. N SUCH CASE, "A" SHALL EQUAL 2.0 FEET AND "C" SHALL BE A MINIMUM OF 3.0 FEET.

SCALE: NONE
REVISED: JANUARY 1, 2010
DRAWN BY: J MCKINNEY
APPROVED BY: RHON HERNDON

GR–5



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.
2. MAXIMUM SLOPE RATE FOR CUT AND FILL SLOPES SHALL BE PER THE RECOMMENDATIONS OF A LICENSED GEOTECHNICAL ENGINEER OR AS MODIFIED BY THE APPROVED PLANS. IN LOCATIONS ADJACENT TO CREEKS, DITCHES, OR DOWN–SLOPES GREATER THAN 3 FEET HORIZONTAL TO 1 FOOT VERTICAL, A MINIMUM SHOULDER WIDTH OF 5 FEET FROM THE EDGE OF PAVEMENT TO THE TOP OF SLOPE IS REQUIRED.
3. SEE SECTION 13–4 OF THESE STANDARDS FOR BIKEWAY PAVEMENT REQUIREMENTS.
4. WHEN FIRE DEPARTMENT REQUIRES ACCESS ON BIKEWAYS, STRUCTURAL SECTION SHALL BE CAPABLE OF SUPPORTING A MINIMUM GROSS VEHICULAR WEIGHT OF 30,000 POUNDS. IF SOILS ANALYSIS IDENTIFIES AN R–VALUE LESS THAN 10, THE STRUCTURAL SECTION SHALL BE MODIFIED AS NECESSARY TO SUPPORT 30,000 POUNDS.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

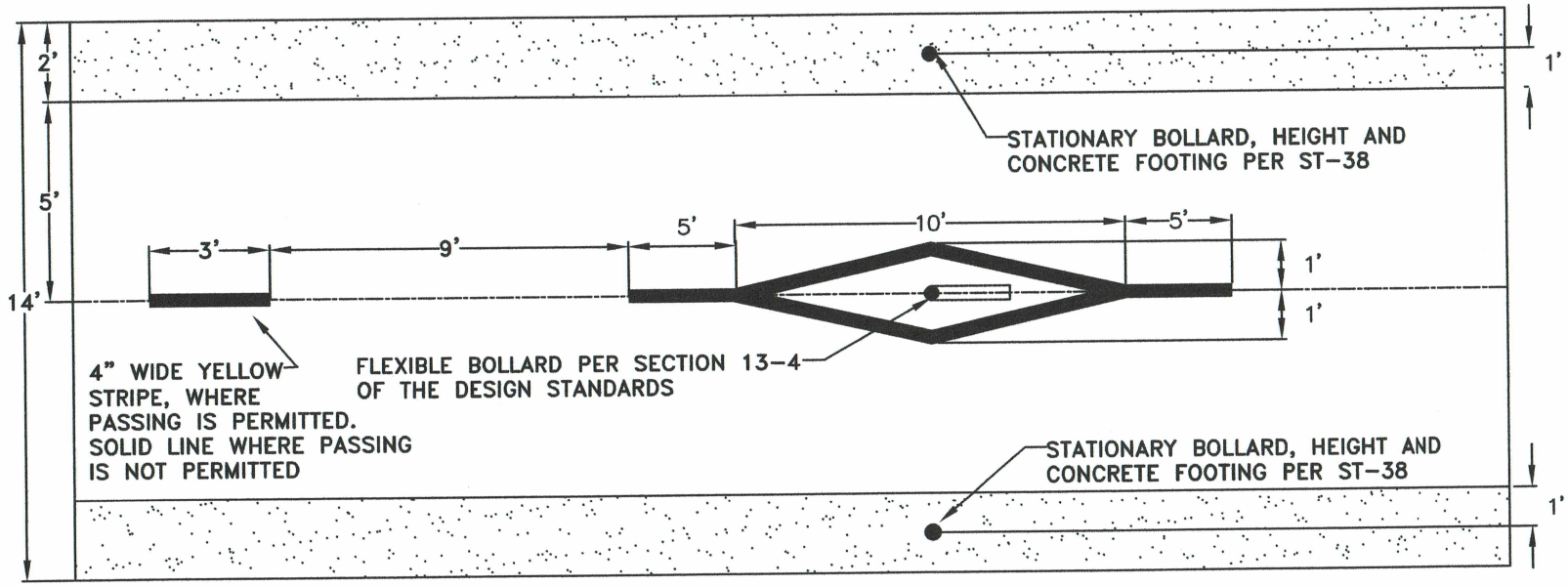
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF
PUBLIC WORKS

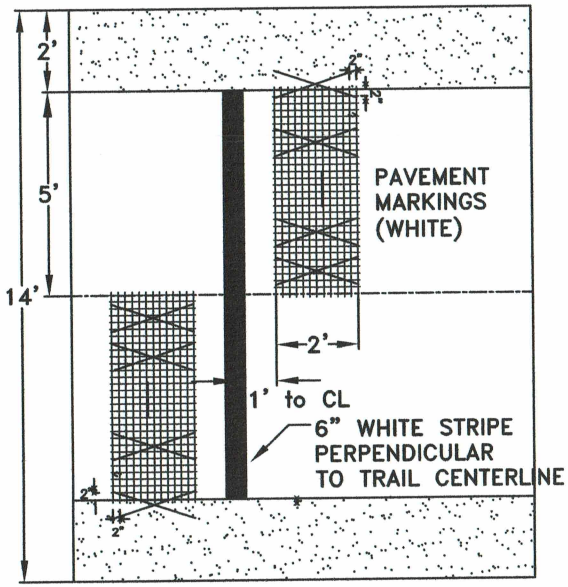
CLASS 1 BIKEWAY GRADING

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: J MCKINNEY
APPROVED BY: JASON SHYKOWSKI

BK–1



BIKEWAY AND BOLLARD STRIPING DETAIL



MILEAGE MARKER DETAIL

NOTES:

1. ALL STRIPING AND PAVEMENT MARKINGS SHALL BE CONSTRUCTED WITH PAINT PER CALTRANS STANDARD SPECIFICATIONS SECTION 84-3.
2. BOLLARD STRIPING SHALL CONFORM WITH CALTRANS HIGHWAY DESIGN MANUAL, SECTION 1003.1.15 AND THE CALIFORNIA MUTCD SECTION 9C.101
3. INSTALL RETROREFLECTIVE MARKERS ON ALL BOLLARDS PER CALIFORNIA MUTCD SECTION 9C.101
4. MILEAGE MARKER DESIGNATIONS AND LOCATIONS SHALL BE APPROVED BY THE DEPARTMENT OF PUBLIC WORKS.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

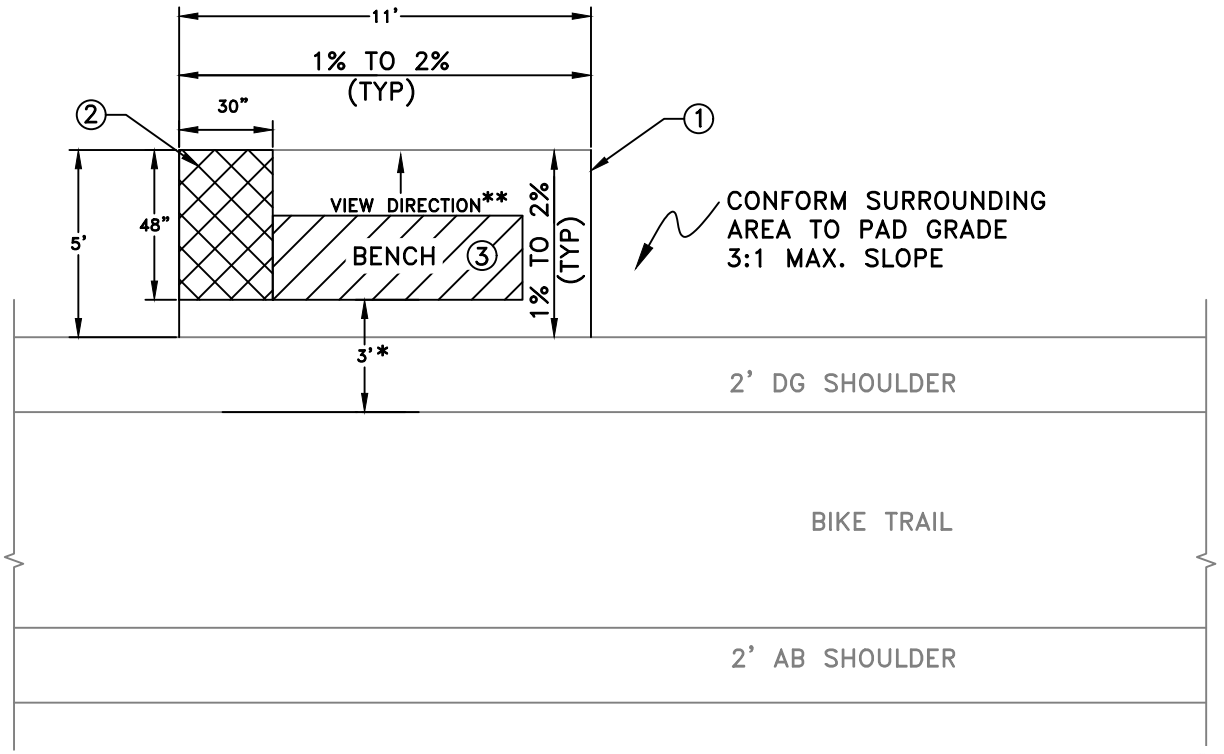
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

CLASS 1 BIKEWAY STRIPING DETAILS

SCALE: NONE
REVISED: JANUARY, 2021
DRAWN BY: J MCKINNEY
APPROVED BY: JASON SHYKOWSKI

BK-2



NOTES:

1. 5' X 11' DECOMPOSED GRANITE PAD. DECOMPOSED GRANITE TO BE 3" THICK, COMPACTED TO 95%.
2. 30" X 48" MINIMUM CLEAR SPACE TO BE PROVIDED AT ONE END OF THE BENCH.
3. INSTALL BENCH PER MANUFACTURERS INSTRUCTIONS. REFER TO PARKS CONSTRUCTION STANDARDS FOR APPROVED BENCHES.
4. BENCH LOCATIONS PER APPROVED PLANS AND TO BE LAID OUT BY THE CONTRACTOR AND INSPECTED BY THE CITY PRIOR TO GRADING.

* 3 FOOT CLEARANCE (MINIMUM) BETWEEN EDGE OF PAVEMENT AND BENCH

** SEE PLANS FOR VIEW DIRECTION OF BENCH. IF VIEW DIRECTION IS REVERSED, MOVE BENCH TO REAR OF PAD.

JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

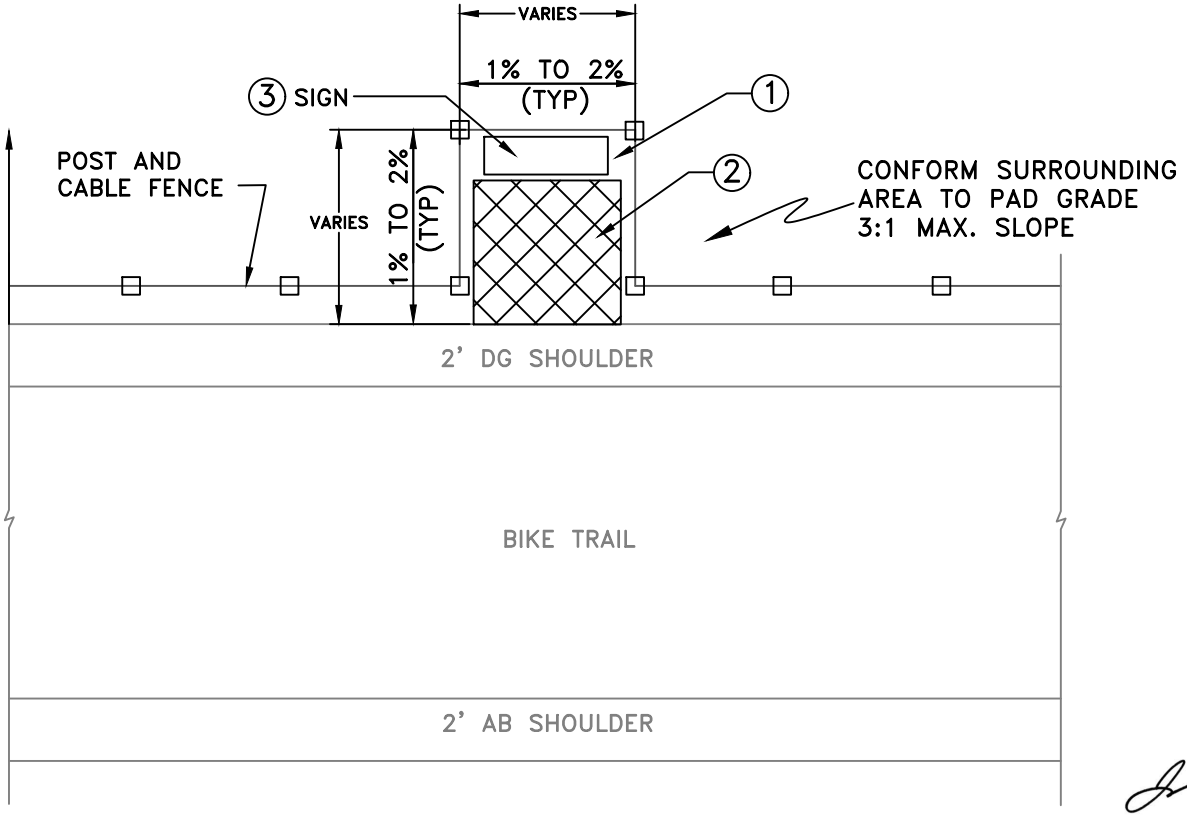
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

BENCH INSTALLATION DETAIL ADJACENT TO BIKE TRAIL

SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: C GOSALVEZ
APPROVED BY: JASON SHYKOWSKI

BK-3



JASON SHYKOWSKI
PUBLIC WORKS DIRECTOR

NOTES:

1. DECOMPOSED GRANITE PAD, SIZE VARIES DEPENDING ON SIGN. DECOMPOSED GRANITE TO BE 3" THICK, COMPACTED TO 95%.
2. 5' X 5' MINIMUM CLEAR SPACE TO BE PROVIDED IN FRONT OF SIGN.
3. INSTALL SIGN PER MANUFACTURERS INSTRUCTIONS. HEIGHT OF SIGN TO COMPLY WITH CURRENT ADA STANDARDS.
4. SIGN LOCATIONS PER APPROVED PLANS AND TO BE LAID OUT BY THE CONTRACTOR AND INSPECTED BY THE CITY PRIOR TO GRADING

CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

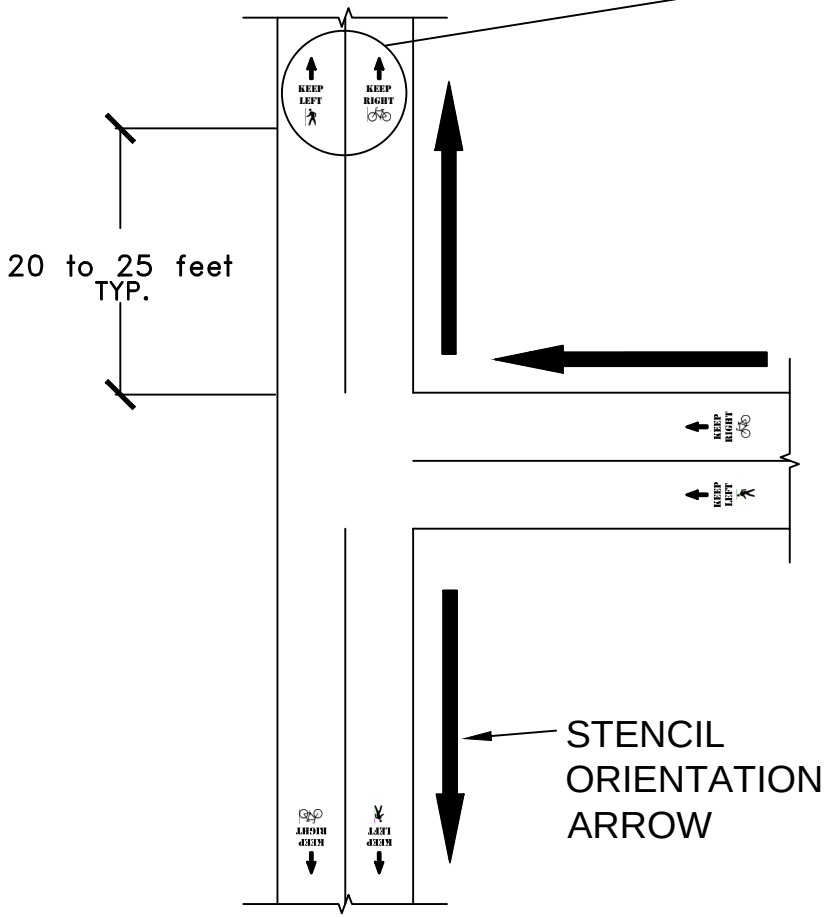
INTERPRETIVE SIGN INSTALLATION ADJACENT TO BIKE TRAIL

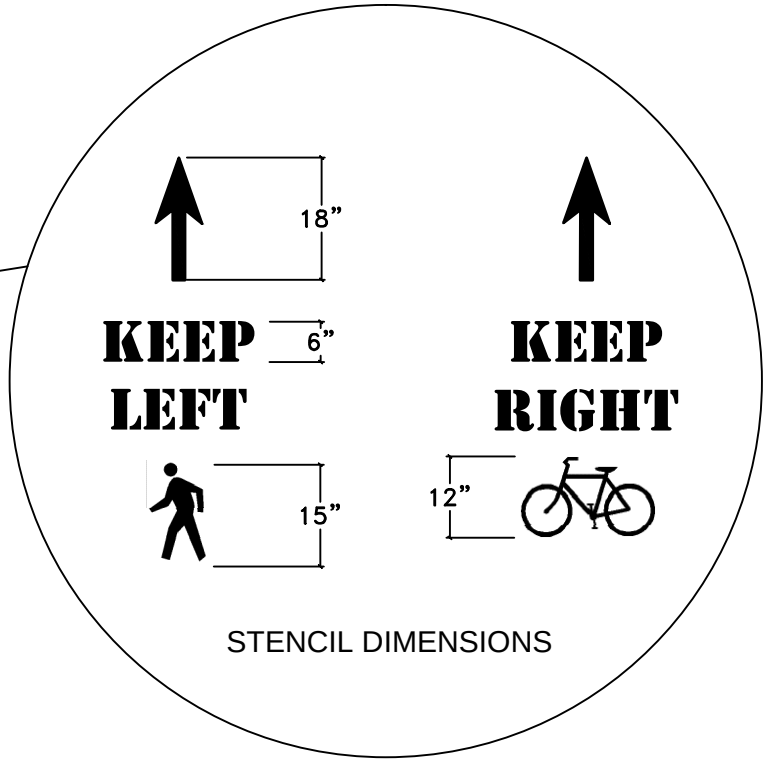
SCALE: NONE
REVISED: FEBRUARY 2021
DRAWN BY: C GOSALVEZ
APPROVED BY: JASON SHYKOWSKI

BK–4

NOTES:

1. INSTALL STENCILS AT LOCATIONS SHOWN ON APPROVED PLANS.
2. ALL PAVEMENT MARKINGS SHALL BE CONSTRUCTED WITH PAINT PER CALTRANS STANDARD SPECIFICATIONS SECTION 84-3.





RHON HERNDON
PUBLIC WORKS DIRECTOR

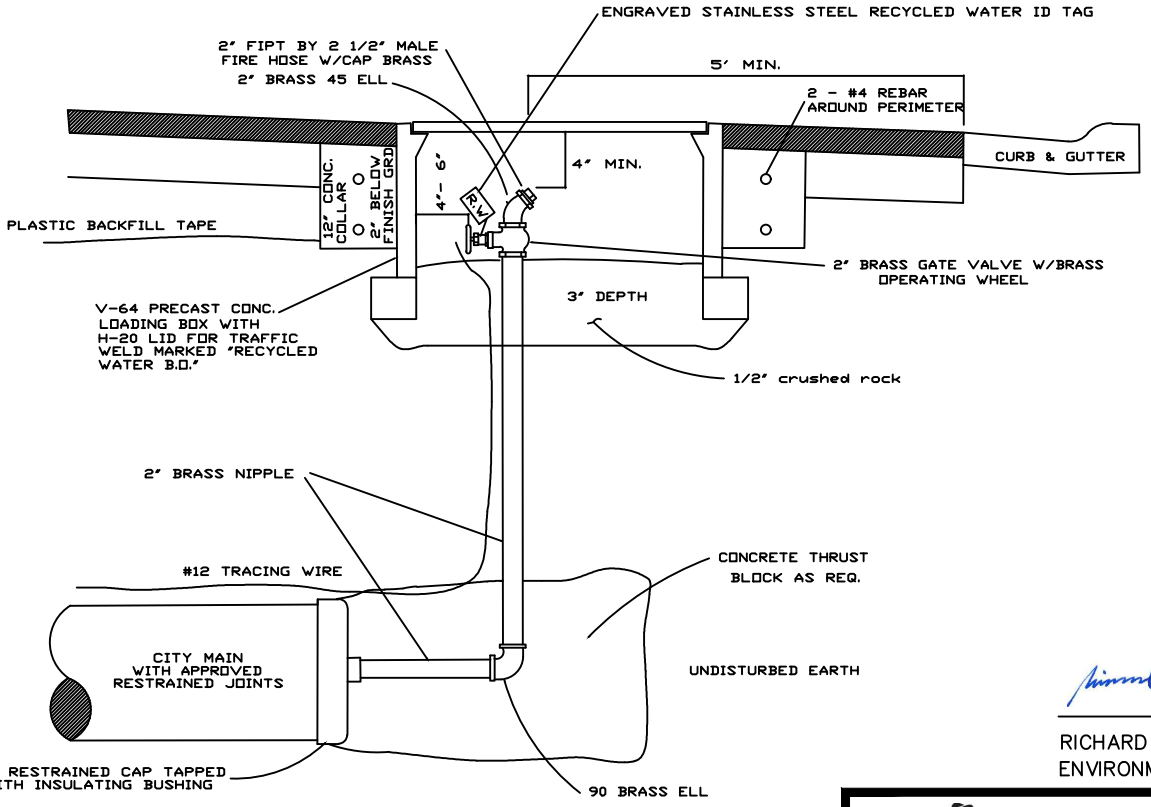
CITY OF ROSEVILLE CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

BIKE TRAIL STENCIL

SCALE: NONE
DATE: JANUARY 1, 2019
DRAWN BY: C GOSALVEZ
APPROVED BY: RHON HERNDON

BK-5



NOTE: ALL PIPING INCLUDING BRASS TO BE 8 MIL POLY SEALED.
WRAP BRASS SPOOLS WITH RECYCLED WATER ID TAPE. TAPE TO BE PLACED OUTSIDE OF POLY SEAL.
INSTALL RECYCLED WATER TAG TO VALVE STEM.

BLOWOFFS OUTSIDE OF PAVED AREAS SHALL BE A MINIMUM OF 6" ABOVE GRADE AND MARKED WITH A CARSONITE MARKER.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

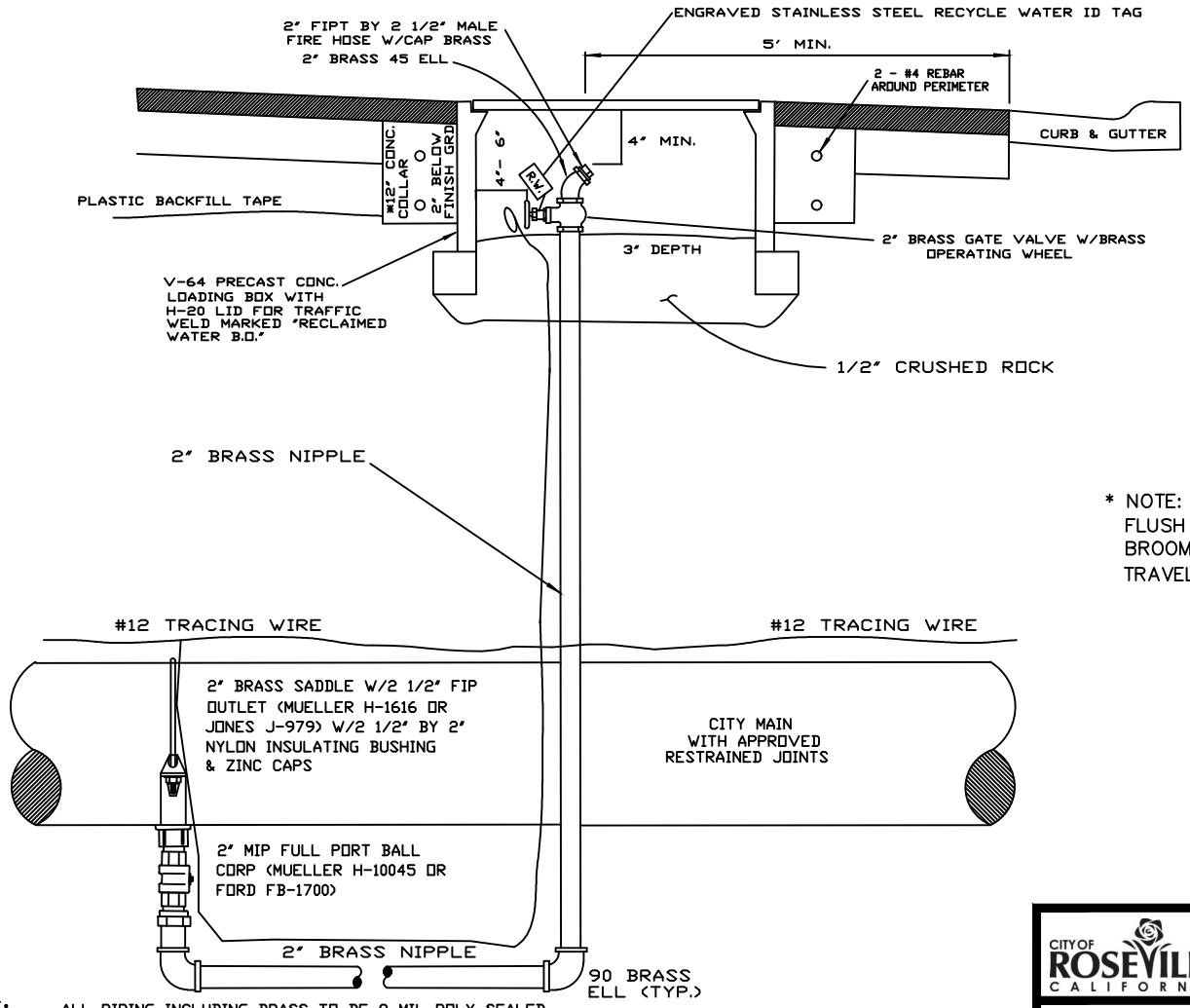
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

RECYCLED WATER 2" INCH BLOWOFF ASSEMBLY (ALL BRASS)

SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW-1



* NOTE: CONCRETE COLLAR MAY BE PLACED FLUSH TO FINISHED SURFACE WITH MEDIUM BROOM FINISH PERPENDICULAR TO VEHICLE TRAVEL DIRECTION.

NOTES:

ALL PIPING INCLUDING BRASS TO BE 8 MIL POLY SEALED. WRAP BRASS WITH RECYCLED WATER ID TAPE. TAPE TO BE PLACED OUTSIDE OF POLY SEAL.

INSTALL RECYCLED WATER TAG TO VALVE OPERATOR STEM.

POUR (1) FOOT DEEP BY 6' WIDE CONCRETE COLLAR AROUND UTILITY BOX IF OUTSIDE PAVEMENT AREA.

BLOWOFFS OUTSIDE OF PAVED AREAS SHALL BE A MINIMUM OF 6' ABOVE GRADE AND MARKED WITH A CARSONITE MARKER.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

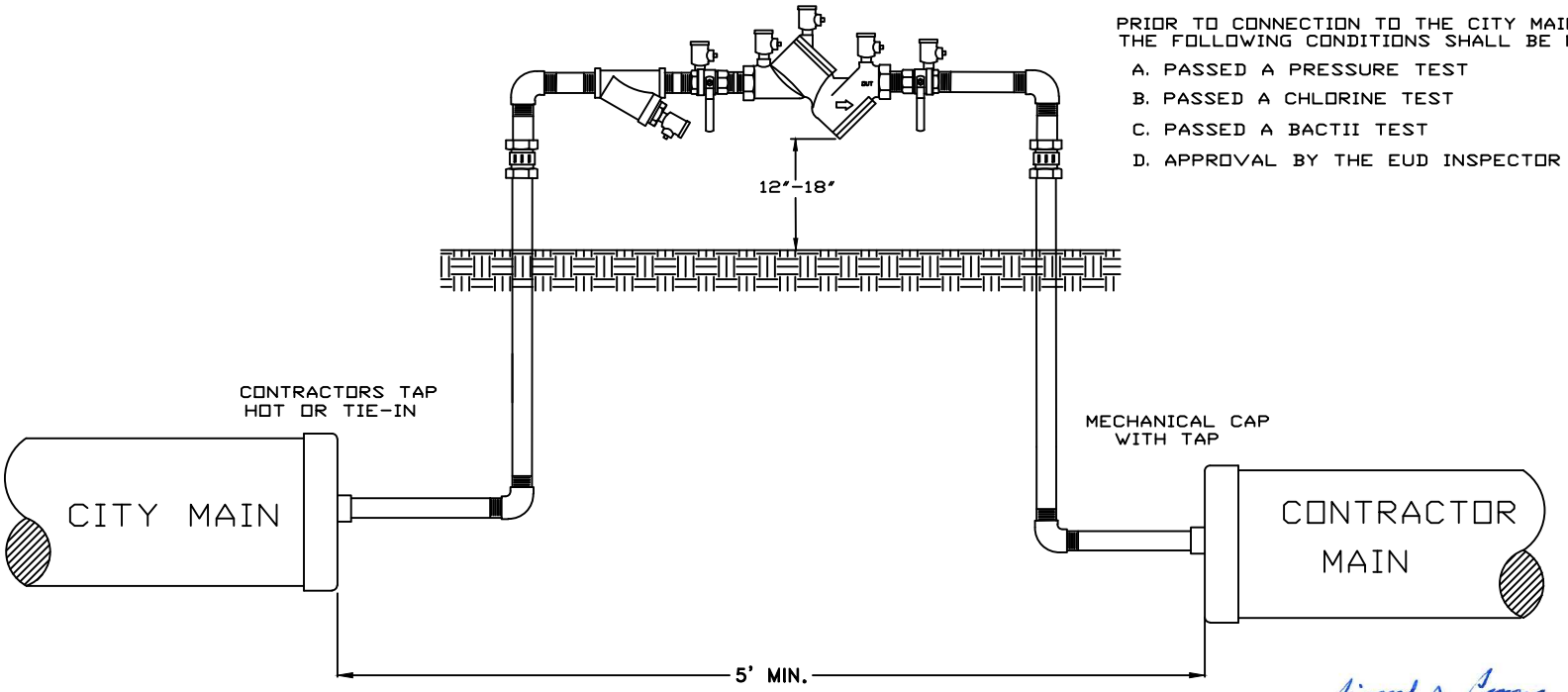
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

RECYCLED WATER INLINE 2" BLOWOFF ASSEMBLY (ALL BRASS)

SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW-2



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

A. PASSED A PRESSURE TEST
B. PASSED A CHLORINE TEST
C. PASSED A BACTII TEST
D. APPROVAL BY THE EUD INSPECTOR

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

WATER SHALL ONLY BE DRAWN INTO THE CONTRACTORS MAIN THROUGH A CITY APPROVED RP TYPE BACKFLOW DEVICE WHICH HAS BEEN TESTED BY THE ENVIRONMENTAL UTILITIES DEPARTMENT.

FINAL SYSTEM COMPONENTS NECESSARY FOR TIE-IN SHALL BE PRE-CHLORINATED AND PRE-FLUSHED IN THE PRESENCE OF AN ENVIRONMENTAL UTILITIES DEPARTMENT INSPECTOR.

UPON COMPLETION OF THE CONDITIONS NOTED ABOVE AND WITH THE APPROVAL OF THE EUD INSPECTOR, CONNECTION TO THE CITY SYSTEM MAY BE MADE. THE EUD INSPECTOR SHALL BE NOTIFIED 48 HOURS PRIOR TO THE START OF WORK.

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

RECYCLED WATER CONSTRUCTION WATER

SCALE: NONE
REVISED: JANUARY 2016
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW-3

NOTES:

NO WATER IS TO BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY THE ENVIRONMENTAL UTILITIES DEPT.

PIPE SHALL BE DUCTILE IRON.

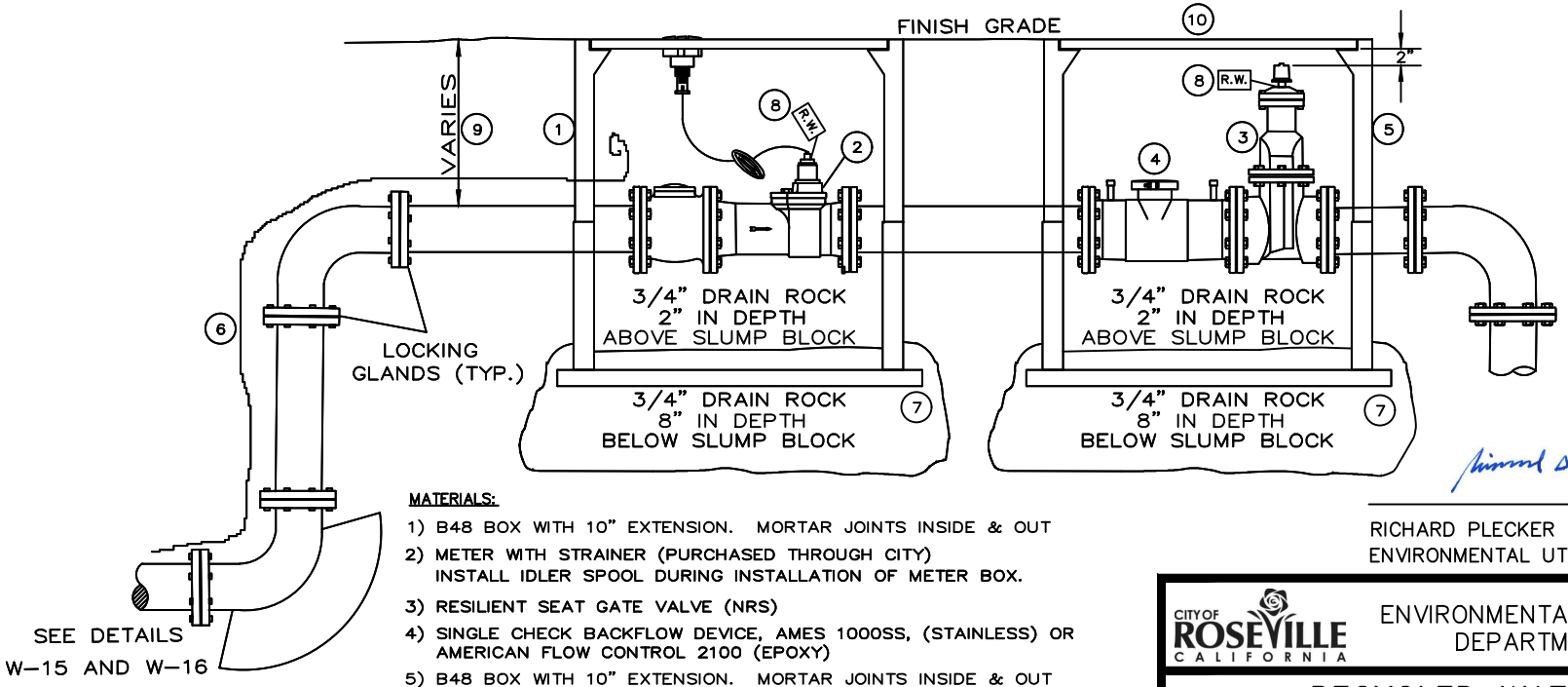
SPOOLS UPSTREAM & DOWNSTREAM OF METER SHALL BE 5X THE PIPE DIAMETER

PIPE AND FITTINGS SHALL BE WRAPPED 8 MIL POLYETHYLENE

USE CITY APPROVED RESTRAINED JOINTS OR FLANGED SPOOLS

WATER METER SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.

BOXES SHALL HAVE METAL LIDS MARKED "RECYCLED WATER" WITH 2" LETTERS



MATERIALS:

1) B48 BOX WITH 10" EXTENSION. MORTAR JOINTS INSIDE & OUT
2) METER WITH STRAINER (PURCHASED THROUGH CITY) INSTALL IDLER SPOOL DURING INSTALLATION OF METER BOX.
3) RESILIENT SEAT GATE VALVE (NRS)
4) SINGLE CHECK BACKFLOW DEVICE, AMES 1000SS, (STAINLESS) OR AMERICAN FLOW CONTROL 2100 (EPOXY)
5) B48 BOX WITH 10" EXTENSION. MORTAR JOINTS INSIDE & OUT
6) CITY APPROVED TRACING WIRE
7) INSTALL CONCRETE BRICK (3" X 5") UNDER ENTIRE PERIMETER OF BOXES
8) ENGRAVED STAINLESS STEEL RECYCLED WATER ID TAG
9) 3"–6" PIPE SHALL BE 16" MIN. TO 20" MAX. 8" OR 10" PIPE SHALL BE 22" MIN. TO 26" MAX.
10) ENGRAVED STAINLESS STEEL ADDRESS TAG AFFIXED TO WATER METER LID.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

RECYCLED WATER 3" & LARGER SERVICE

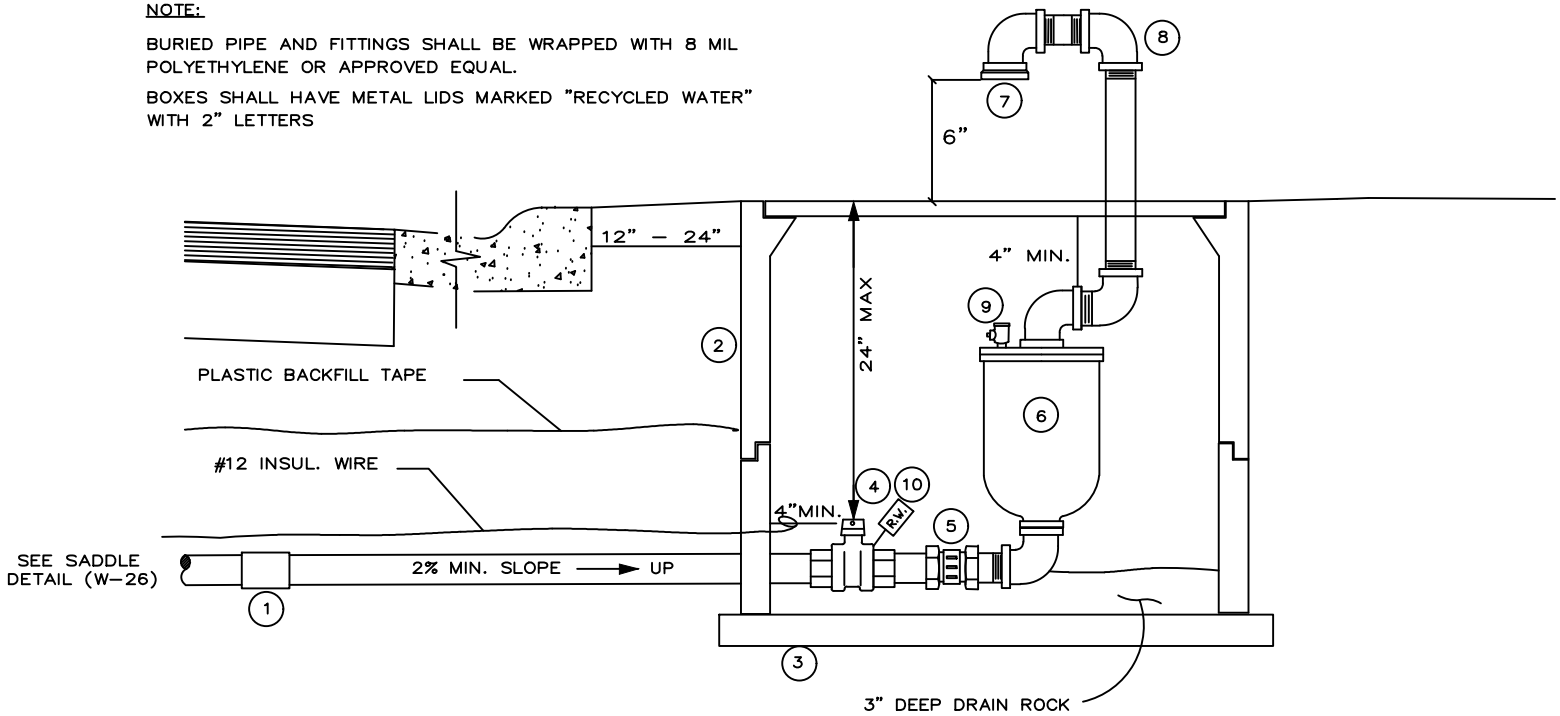
SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW–4

NOTE:

BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.

BOXES SHALL HAVE METAL LIDS MARKED "RECYCLED WATER" WITH 2" LETTERS



1) BRASS THREADED COUPLING (IF REQUIRED)
2) B–40 UTILITY BOX W/TRAFFIC COVER MARKED, "RECYCLED WATER ARV". IF EXTENSION IS REQ. MORTAR EXTENSION JOINT INSIDE & OUT.
3) CONCRETE BRICK (3"X5") UNDER ENTIRE PERIMETER OF UTILITY BOX.
4) CURB STOP
5) BRASS UNION
6) COMBINATION AIR / VACUUM VALVE (REFER TO CONSTRUCTION STANDARDS 91–16.F.1 FOR APPROVED ARV MODELS FOR POTABLE WATER)
7) PVC TERMINATION WITH INSECT/RODENT SCREEN.
8) USE SCH 80 PVC PIPE AND FITTINGS ABOVE GROUND. EXPOSED PIPE AND FITTINGS SHALL BE PAINTED PURPLE TO MATCH PANTONE 522.
9) 1/4" TEST COCK
10) ENGRAVED STAINLESS STEEL RECYCLED WATER I.D. TAG

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

1" AND 2" AIR RELEASE VALVE ASSEMBLY

SCALE: NONE
REVISED: JANUARY 2024
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW–5

1) CONCRETE VALVE BOX (G–5 PER DETAIL W–16)
BOX LID SHALL BE MARKED "RECYCLED WATER"

2) 6" CONTINUOUS RISER (NOTCHED OVER PIPE AT BASE)

3) CURB STOP (COMPRESSION X FIPT)

4) CONCRETE COLLAR (SEE DETAIL W–16)

5) METER SETTER WITH IDLER

6) N–16 UTILITY BOX OR APPROVED EQUAL FOR 3/4"
N–30 UTILITY BOX OR APPROVED EQUAL FOR 1"

7) METER (PURCHASED THROUGH CITY)

8) ENGRAVED STAINLESS STEEL RECYCLED WATER I.D. TAG

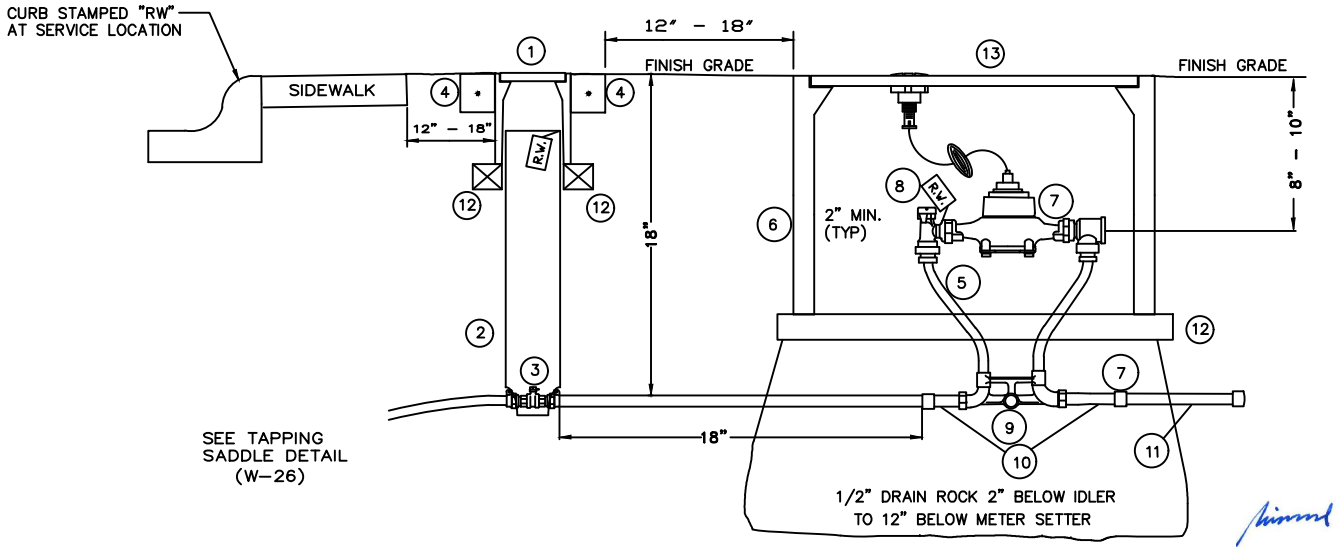
9) SCH. 40 PVC THROUGH PIPE EYE

10) METER SPUD

11) 18" BRASS NIPPLE WITH END CAP

12) INSTALL CONCRETE BLOCKING
(4" X 4" X 15 1/2")
UNDER ENTIRE PERIMETER OF BOXES

13) ENGRAVED STAINLESS STEEL ADDRESS TAG AFFIXED TO METER BOX LID.



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

ALL FITTINGS AND PIPING SHALL BE BRASS BEGINNING AT THE CURB STOP

WATER METERS SHALL BE PURCHASED THROUGH THE CITY PURCHASE INCLUDES INSTALLATION.

BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.

BOXES SHALL HAVE METAL LIDS AND WILL BE MARKED "RECYCLED WATER" WITH 2" LETTERS

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

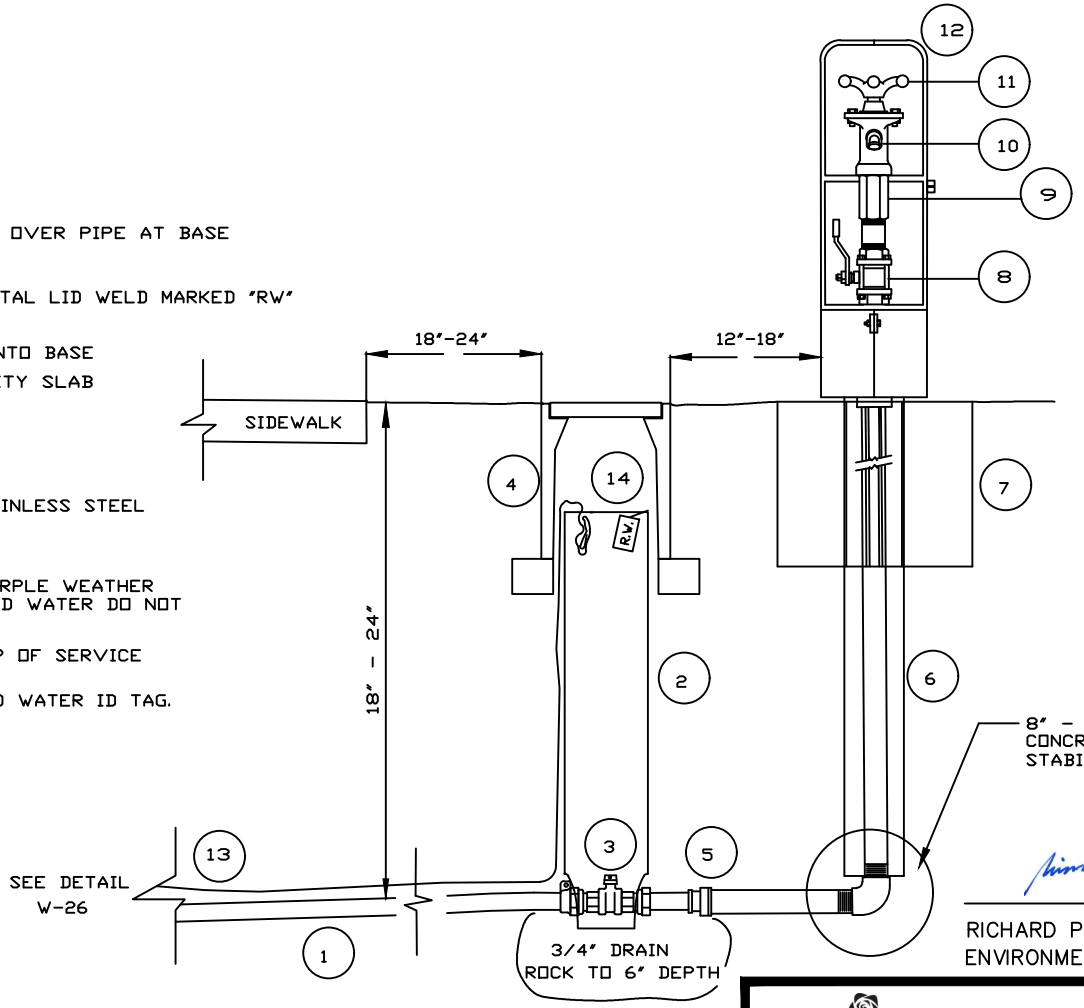
3/4" & 1" SERVICE LINE

SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW–6

MATERIALS:

1) 3/4" COPPER SERVICE LINE - TYPE K
2) 6" DIA. SCHEDULE 40 RISER NOTCHED OVER PIPE AT BASE
3) CURB STOP
4) CHRISTY G-5 TRAFFIC BOX W/ ALL METAL LID WELD MARKED "RW"
5) 3/4" TO 1" REDUCER ALL BRASS
6) 4" LIGHT WELL STEEL PIPE BOLTED INTO BASE
7) 12" BY 12" BY 12" CONCRETE STABILITY SLAB
8) 1" BRASS BALL VALVE
9) HYDRANT STYLE BRASS VALVE
10) UNTHREADED BRASS NOZZLE
11) HANDLE OPERATOR WITH ENGRAVED STAINLESS STEEL RECYCLED WATER ID TAG ATTACHED.
12) ALUMINUM CAST BOX PAINTED WITH PURPLE WEATHER PROOF PAINT. STENCIL MARK "RECYCLED WATER DO NOT DRINK" ON MINIMUM OF (2) SIDES
13) LAY RECYCLED WATER ID TAPE ON TOP OF SERVICE
14) ENGRAVED STAINLESS STEEL RECYCLED WATER ID TAG.



RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

NOTES:

INSTALL CONCRETE BRICK (3" X 5") UNDER ENTIRE PERIMETER OF THE BOX.

ALL PIPING FROM REDUCER THROUGH TEST STATION TO BE 1" BRASS

ALL FITTINGS TO BE BRASS

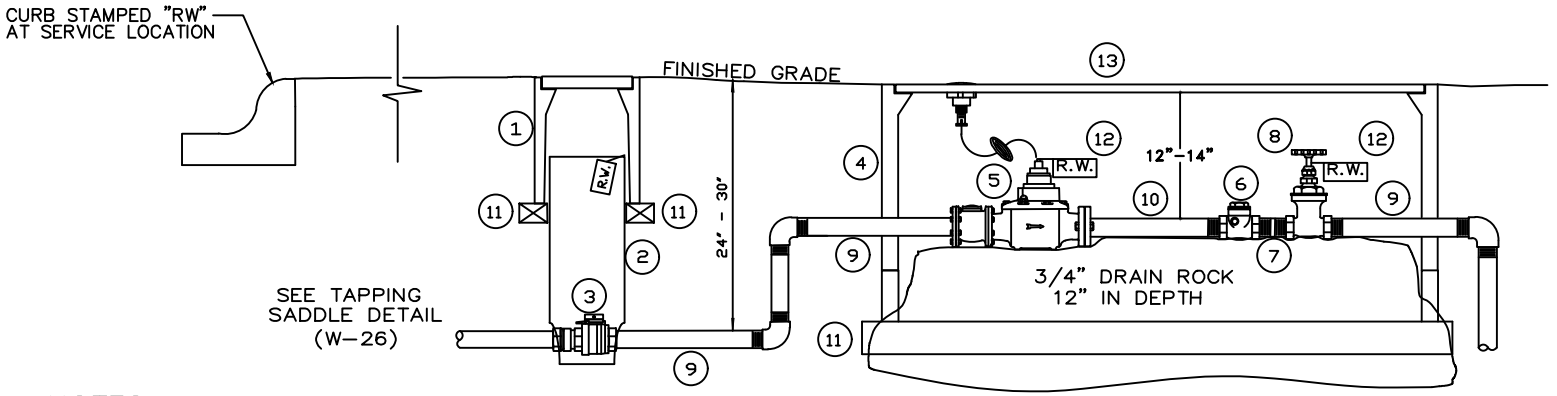
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

RECYCLED WATER #88-V ECLIPSE SAMPLING STATION FOR WARM CLIMATES

SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW-7



NOTES:

NO WATER SHALL BE DRAWN THROUGH THE BACKFLOW DEVICE UNTIL IT HAS BEEN TESTED BY THE ENVIRONMENTAL UTILITIES DEPT.

CONTRACTOR SHALL LAY 3/4" DRAIN ROCK TO 12" DEPTH UNDER CONCRETE BLOCKING AT METER

WATER METERS SHALL BE PURCHASED THROUGH THE CITY. PURCHASE INCLUDES INSTALLATION.

THERE SHALL BE NO FLOW ALTERING DEVICES 5X THE PIPE DIAMETER UPSTREAM AND DOWNSTREAM OF THE METER.

CURBSTOP SHALL BE BETWEEN 12"& 18" OF EASEMENT.

BURIED PIPE AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYETHYLENE OR APPROVED EQUAL.

SINGLE CHECK BACKFLOWS: WATTS CVY (BRONZE), WATTS WCV -2 (BRASS W/RUBBER DISK SEALS) WATTS 806 (316 STAINLESS STL.), MATCO/NORCA MODEL 530 (BRONZE)

BOXES SHALL HAVE METAL LIDS MARKED "RECYCLED WATER" WITH 2" LETTERS.

1) G-5 VALVE BOX (PER DETAIL W-16)
2) 6"CONTINUOUS RISER (NOTCHED OVER PIPE AT BASE)
3) CURB STOP COMPRESSION X FIPT
4) B-48 UTILITY BOX W/ EXTENSION (MORTAR JOINTS INSIDE & OUT)
5) TURBO METER WITH STRAINER (PURCHASED THROUGH CITY). INSTALL IDLER SPOOL DURING INSTALLATION OF METER BOX.
6) SINGLE CHECK (SEE NOTES)
7) 3" BRASS NIPPLE
8) ALL BRASS GATE VALVE (FIPT X FIPT)
9) 12" BRASS NIPPLE
10) 6" BRASS NIPPLE
11) INSTALL CONCRETE BRICK(3" X 5") UNDER ENTIRE PERIMETER OF UTILITY BOXES
12) ENGRAVED STAINLESS STEEL RECYCLED WATER ID TAG.
13) ENGRAVED STAINLESS STEEL ADDRESS TAG AFFIXED TO WATER METER BOX LID.

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

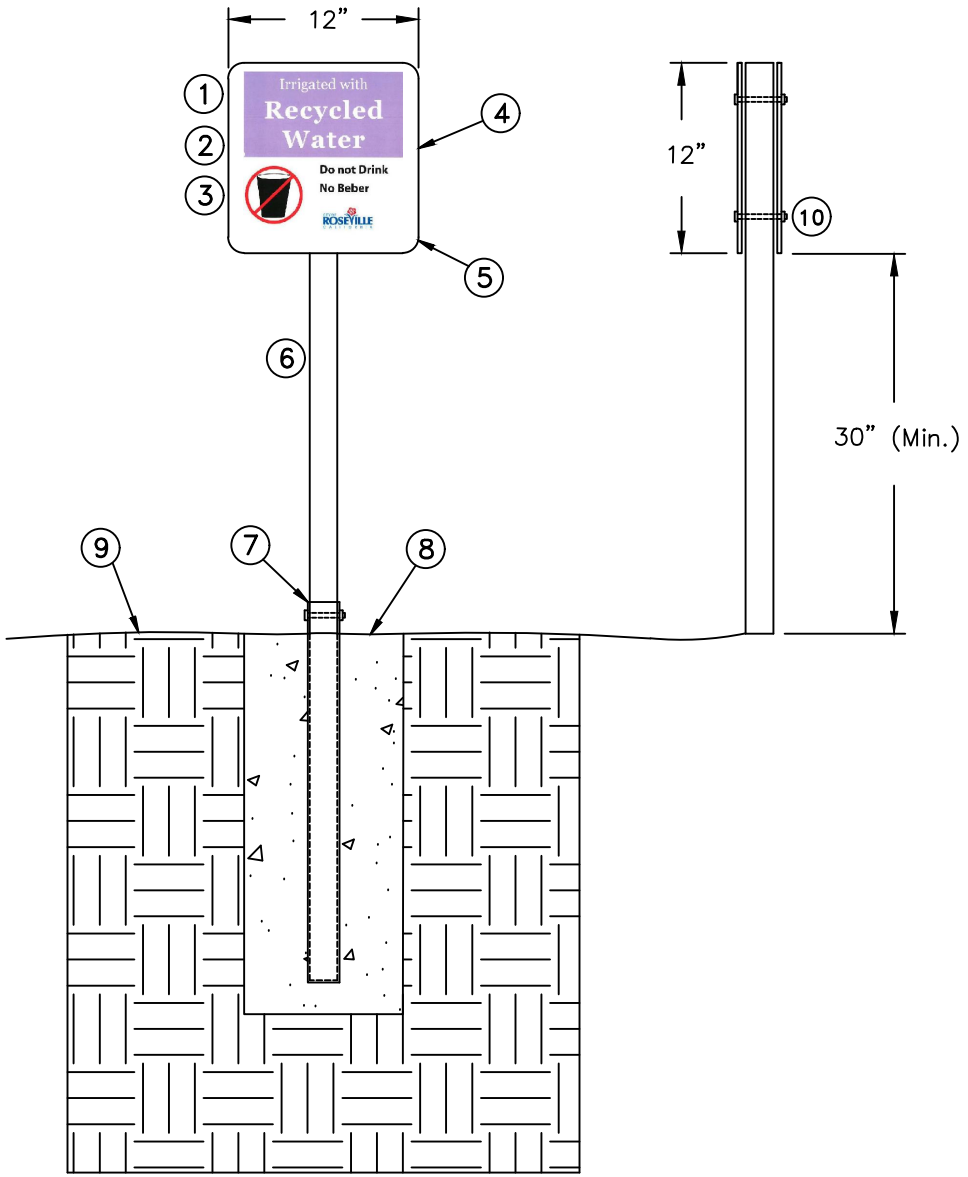
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

1 1/2" & 2" RECYCLED WATER SERVICE

SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW-8



1) SIGN: BLANKS TO BE ENGINEER GRADE ALUMINUM SHEETING ALLOY 0.80 GAUGE CORNERS TO HAVE 1" RADIUS ARC. SIGNS TO BE PAINTED AS SHOWN WITH WHITE BACK. TWO SIGNS PER POST.

2) THE PURPLE AREA AS SHOWN SHALL BE PER THE FOLLOWING: ALL LETTERS WHITE, FONT TYPE GEORGIA, "Irrigated with" SHALL BE 72 PT AND "Recycled Water" SHALL BE 120 PT. BOLD MATCH CASE.

3) INTERNATIONAL "DO NOT DRINK" SYMBOL: BLACK CUP 3" IN HT. SYMBOL WITH RED CIRCLE 3 1/2" DIA. AND SLASH.

4) THE BLACK LETTERING AS SHOWN SHALL BE PER THE FOLLOWING: ALL LETTERS BLACK, FONT TYPE ARIAL AND 60 PT. BOLD, MATCH CASE.

5) CURRENT APPROVED CITY OF ROSEVILLE LOGO PLACED AS SHOWN.

6) 1 3/4" SQUARE PERFORATED STEEL POST POWDER COATED WHITE.

7) 2" SQUARE GALV. STEEL ANCHOR SLEEVE MIN. 24" DEEP. SET SLEEVE 2" ABOVE FINISH GRADE AND PROVIDE HOLES FOR THE 5/16" HEX HEAD CAP BOLT.

8) 10" DIAMETER BY 24" DEEP CONCRETE FOOTING.

9) FINISHED GRADE.

10) 5/16" GALV. STL. HEX HEAD CAP BOLTS WITH NUTS

11) MOUNTING HARDWARE SHALL NOT OBSTRUCT THE VIEW OF ANY LETTERING LOGOS, OR SYMBOLS.

12) RECYCLED WATER SIGNS SHALL BE PROVIDED BY THE CONTRACTOR. SIGNS CAN BE PURCHASED FROM INTERSTATE SALES (530-823-6070) OR ZAP MANUFACTURING (530-272-8855).

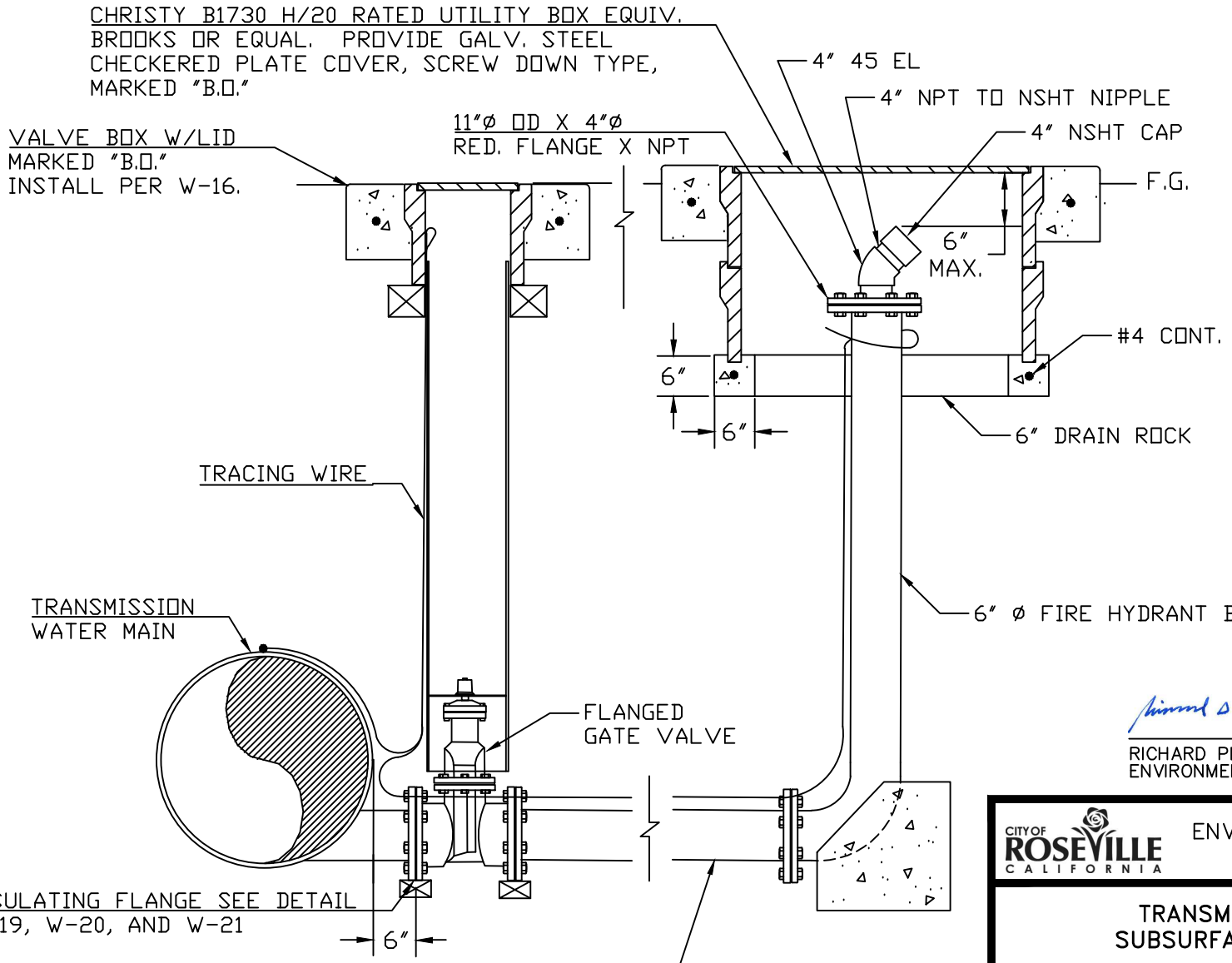
RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA
ENVIRONMENTAL UTILITIES DEPARTMENT

RECYCLED WATER USE SIGNAGE

SCALE: NONE
REVISED: JANUARY 2021
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

RW-9



NOTE:

ALL THREADED PIPE FITTINGS SHALL BE BRASS

CONCRETE INSTALLED FOR STABILITY

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

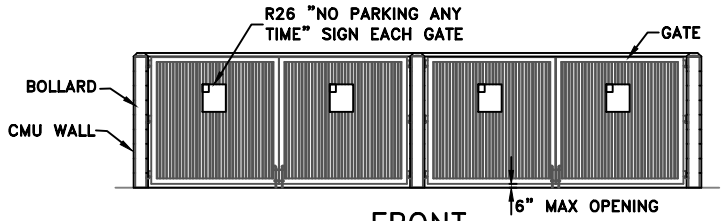
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

TRANSMISSION MAIN SUBSURFACE BLOW OFF

SCALE: NONE
REVISED: JANUARY 2023
DRAWN BY: J. THOMPSON
APPROVED BY: RICHARD PLECKER

RW-10



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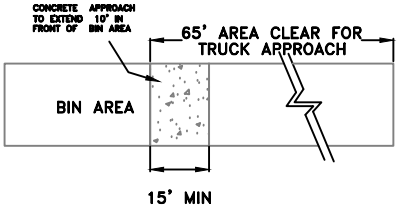
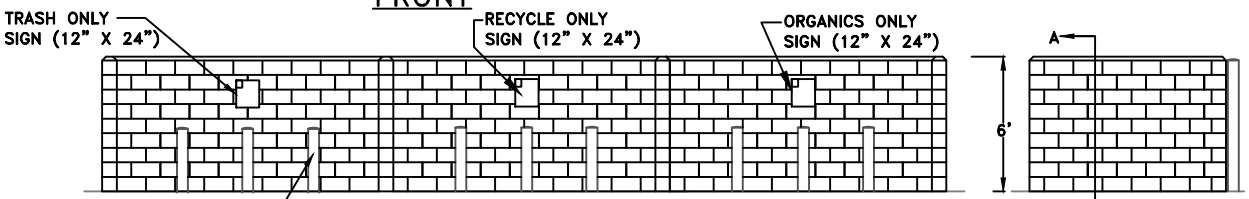
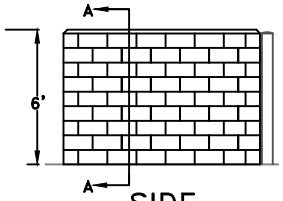


NOTES:

1. SINGLE ENCLOSURE IS 12' WIDE (INTERIOR)
2. THE EXTERIOR FINISH AND COLOR OF THE ENCLOSURE SHALL MATCH THE BUILDING PER THE DESIGN REVIEW PERMIT EXHIBITS AND/OR CONDITIONS OF APPROVAL
3. GREASE/TALLOW BIN ENCLOSURE MAY BE ATTACHED TO THE TRASH ENCLOSURE OR BE CONSTRUCTED SEPARATELY. THE GREASE/TALLOW BIN MUST NOT BE LOCATED WITHIN THE TRASH/RECYCLING ENCLOSURE.
4. NO. 4 REBAR, 12 INCHES O.C. EACH WAY, 3 INCH DOBIES WITH WIRE TIES AT 3' INTERVALS, EACH WAY.



SECTION A
BOLLARD CONFIGURATION



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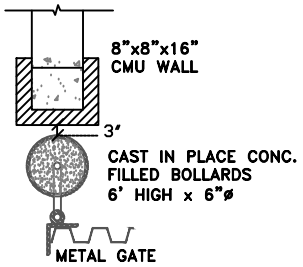
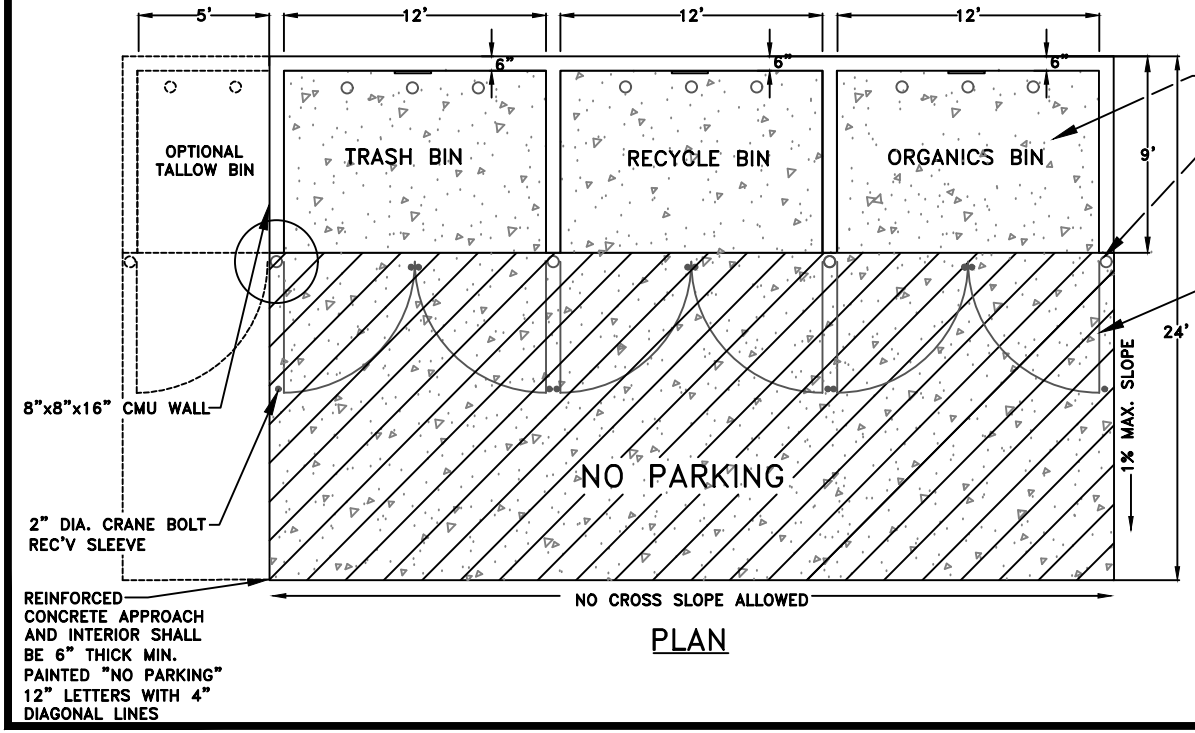


BOLLARD GATE DETAIL



PLAN

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

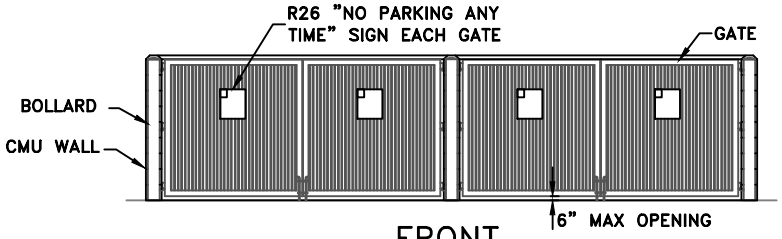
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

STANDARD TRASH ENCLOSURE

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J THOMPSON
APPROVED BY: RICHARD PLECKER

SW-1



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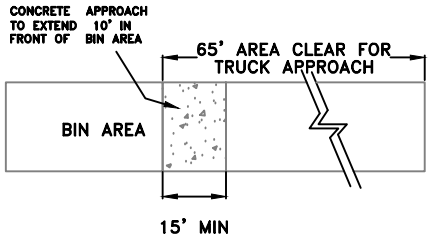
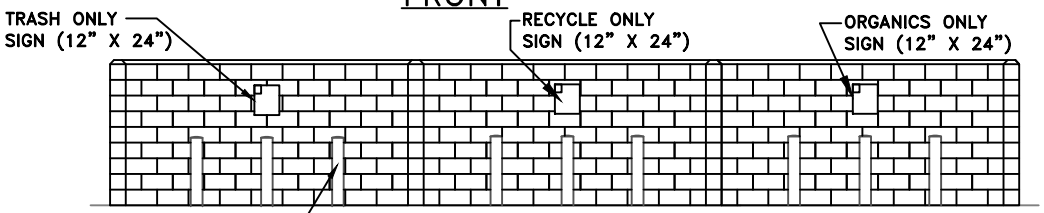
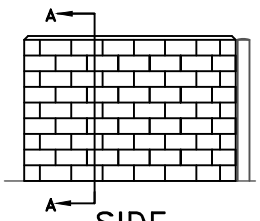


NOTES:

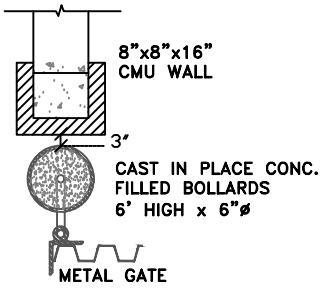
1. SINGLE ENCLOSURE IS 12' WIDE (INTERIOR)
2. THE EXTERIOR FINISH AND COLOR OF THE ENCLOSURE SHALL MATCH THE BUILDING PER THE DESIGN REVIEW PERMIT EXHIBITS AND/OR CONDITIONS OF APPROVAL
3. GREASE/TALLOW BIN ENCLOSURE MAY BE ATTACHED TO THE TRASH ENCLOSURE OR BE CONSTRUCTED SEPARATELY. THE GREASE/TALLOW BIN MUST NOT BE LOCATED WITHIN THE TRASH/RECYCLING ENCLOSURE.



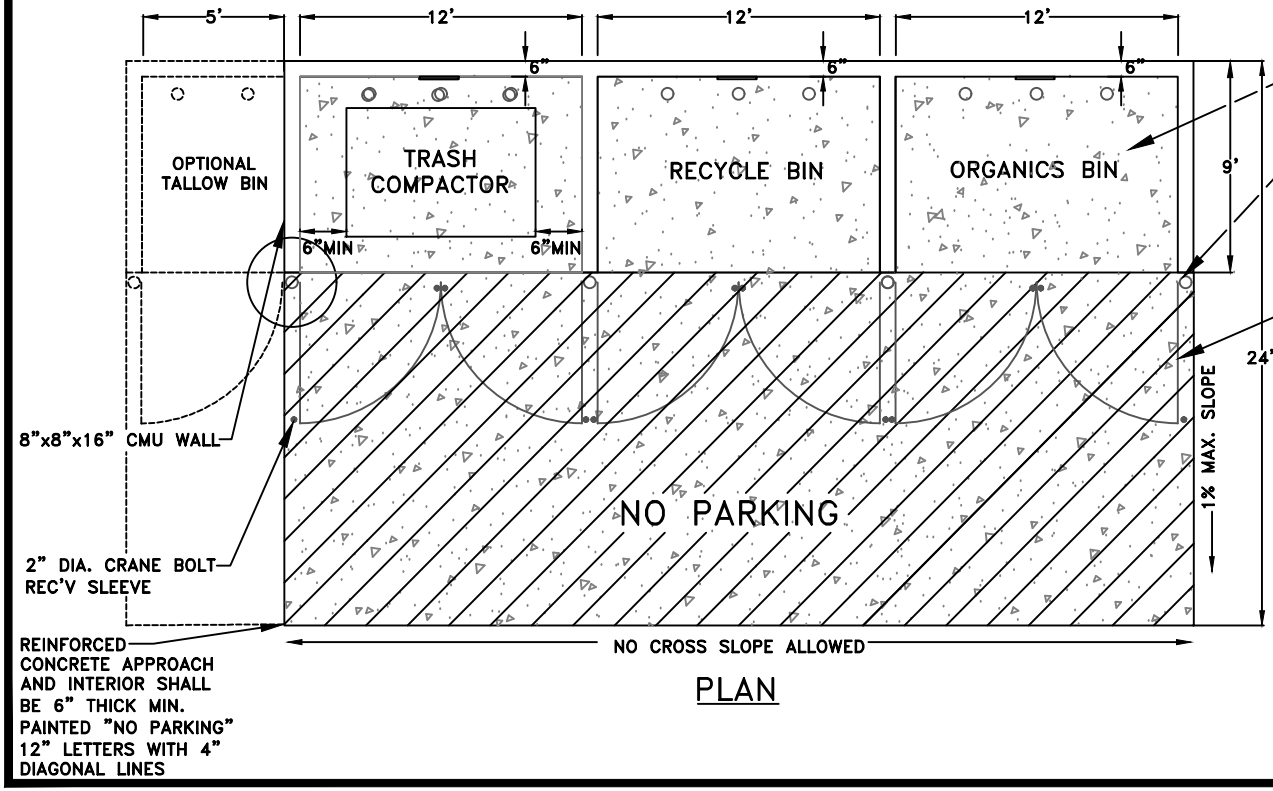
SECTION A
BOLLARD CONFIGURATION



SIDE



BOLLARD GATE DETAIL



PLAN

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

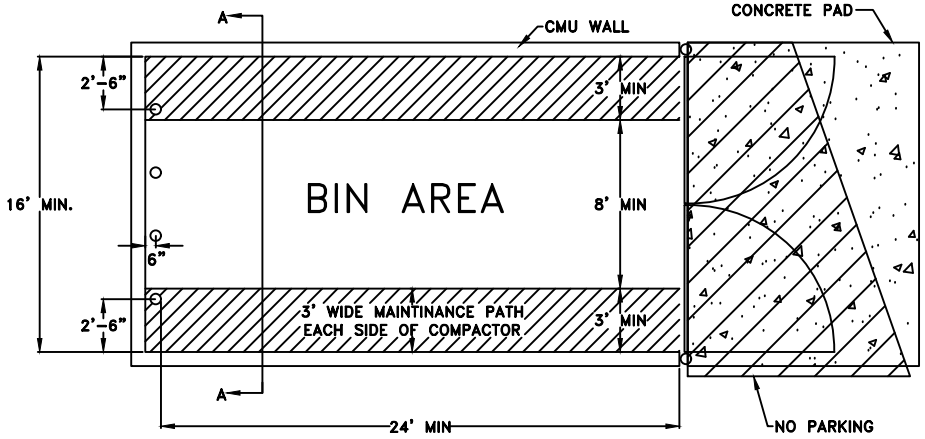
CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

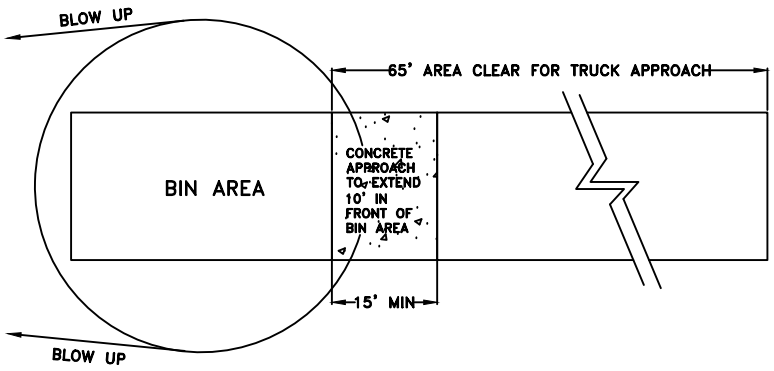
FRONT LOADING COMPACTOR ENCLOSURE

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: J. THOMPSON
APPROVED BY: RICHARD PLECKER

SW-2



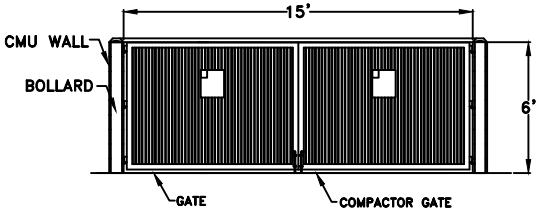
PLAN
COMPACTOR BIN



PLAN
BIN & APPROACH

NOTES:

1. APPROACH SHALL BE 6" THICK REINFORCED CONCRETE SLAB ON GRADE. IT SHALL BE PAINTED "NO PARKING" IN 12" LETTERS AND STRIPED WITH 4" DIAGONAL LINES.
2. THE EXTERIOR FINISH AND COLOR OF THE ENCLOSURE SHALL MATCH THE BUILDING PER THE DESIGN REVIEW PERMIT EXHIBITS AND/OR CONDITIONS OF APPROVAL



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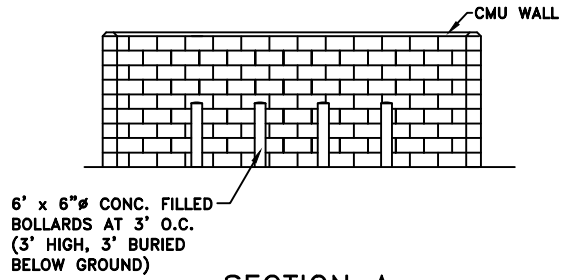


SECTION A
BOLLARD CONFIGURATION

'ELEVATIONS

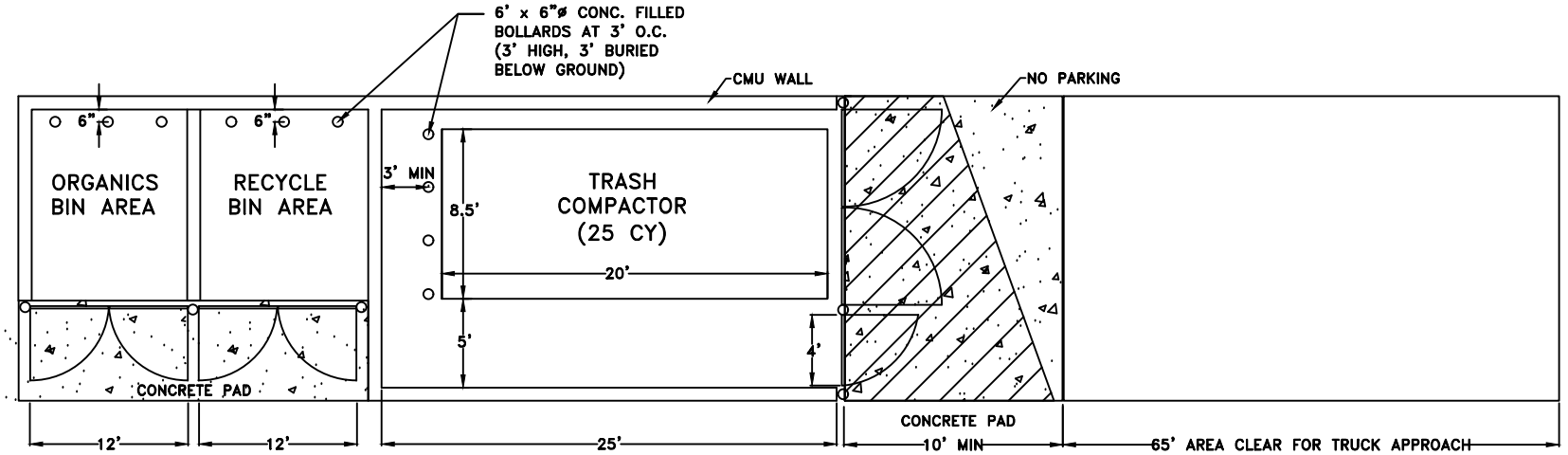
RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA
ENVIRONMENTAL UTILITIES DEPARTMENT

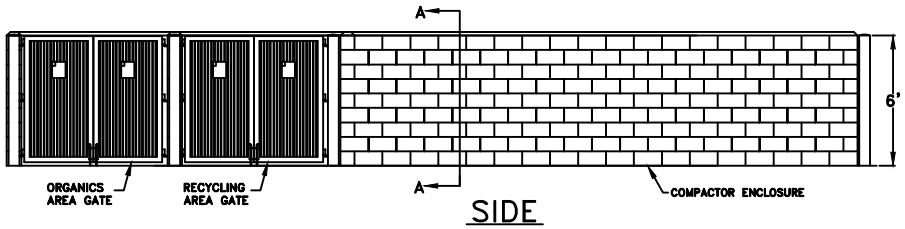
COMMERCIAL COMPACTOR ENCLOSURE

SCALE: NONE
REVISED: JANUARY 2025
DRAWN BY: R. VAN NESS
APPROVED BY: RICHARD PLECKER

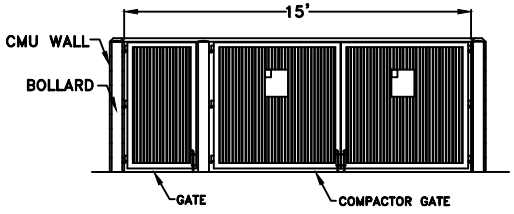
SW-3



PLAN
COMPACTOR BIN



SIDE



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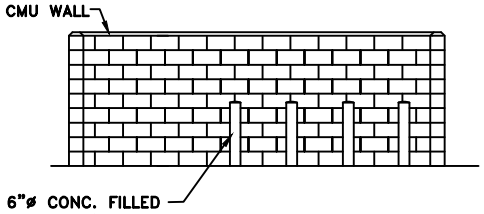

SECTION A
BOLLARD CONFIGURATION (TRASH COMPACTOR)

NOTES:

1. APPROACH SHALL BE 6" THICK REINFORCED CONCRETE SLAB ON GRADE. IT SHALL BE PAINTED "NO PARKING" IN 12" LETTERS AND STRIPED WITH 4" DIAGONAL LINES.
2. THE EXTERIOR FINISH AND COLOR OF THE ENCLOSURE SHALL MATCH THE BUILDING PER THE DESIGN REVIEW PERMIT EXHIBITS AND/OR CONDITIONS OF APPROVAL
3. IF GREASE/TALLOW BIN IS REQUIRED, SEE SW-1 AND SW-2 FOR DETAILS

RICHARD PLECKER
ENVIRONMENTAL UTILITIES DIRECTOR

CITY OF ROSEVILLE CALIFORNIA

ENVIRONMENTAL UTILITIES DEPARTMENT

RESIDENTIAL/COMMERCIAL COMPACTOR ENCLOSURE

SCALE: NONE
REVISED: APRIL 2022
DRAWN BY: D.SAMUELSON
APPROVED BY: RICHARD PLECKER

SW-4