CITY OF ROSEVILLE
DESIGN STANDARDS
January 2023

Section 1: Purpose and Definitions

Section 2: General Requirements

Section 3: Plan Sheet Requirements

Section 4: VMT and Traffic Impact Standards

Section 7: Streets

Section 8: Domestic Water Supply System Design

Section 9: Sanitary Sewer Design

Section 10: Drainage

Section 13: Bikeways

Section 14: Recycled Water Infrastructure Design

Section 15: Solid Waste Design

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

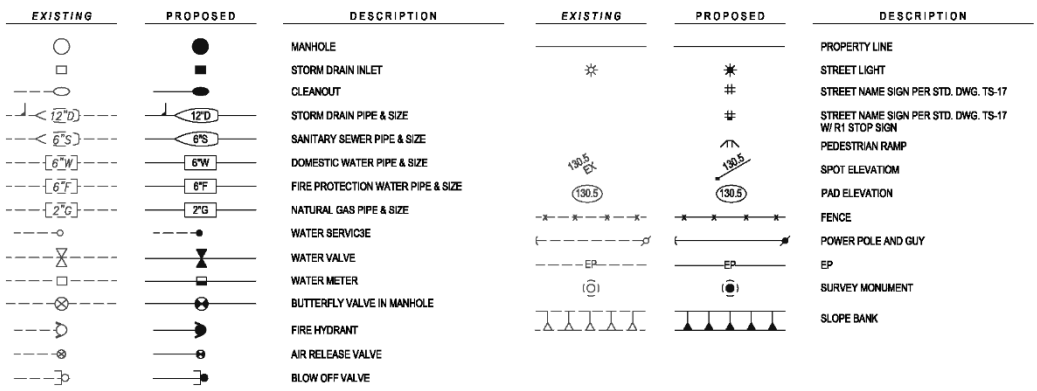
K. Typical street sections including TI and R values.

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).

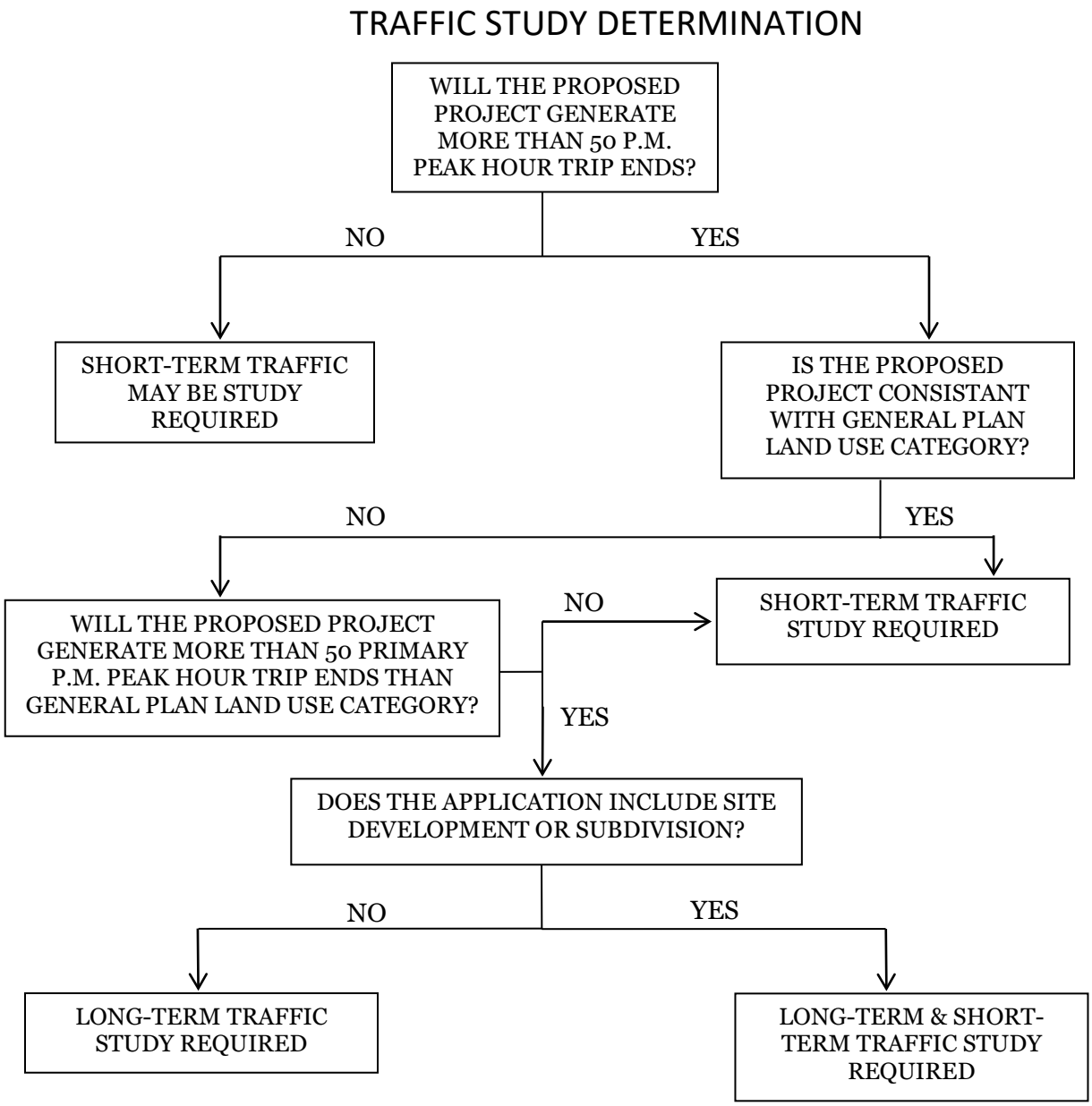


FIGURE 4-1

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.

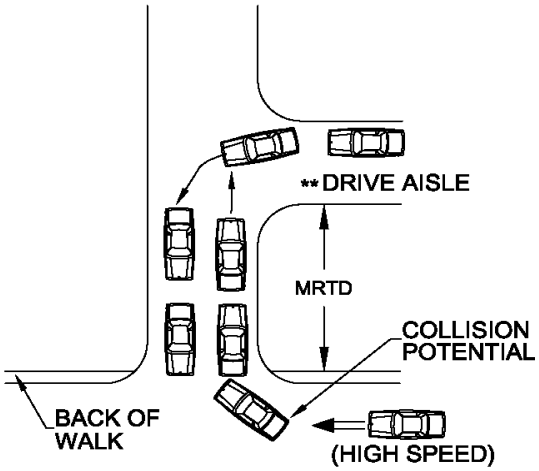
If the proposed project represents only a portion of a larger overall site, or if it is expected that vehicles generated by other than the project will use the access under study, then the total expected turning movement volumes at the subject access location shall be used in determining the MRTD.

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.

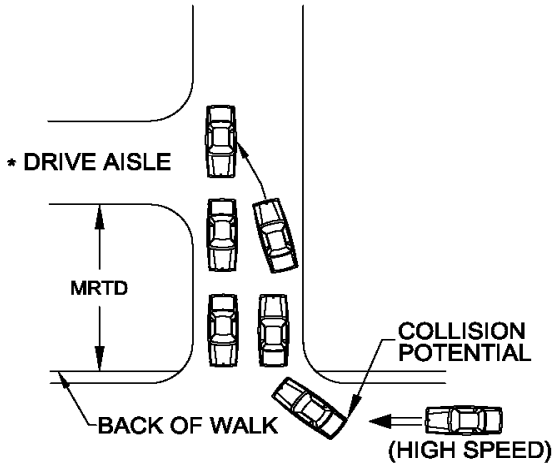
If the calculated MRTD is physically or unreasonable too long for the proposed development, then the traffic study shall suggest ways to reduce the MRTD by either reducing the egressing demand volume, or by increasing the movement capacity. Examples of reducing the egressing demand volume at an access 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);*

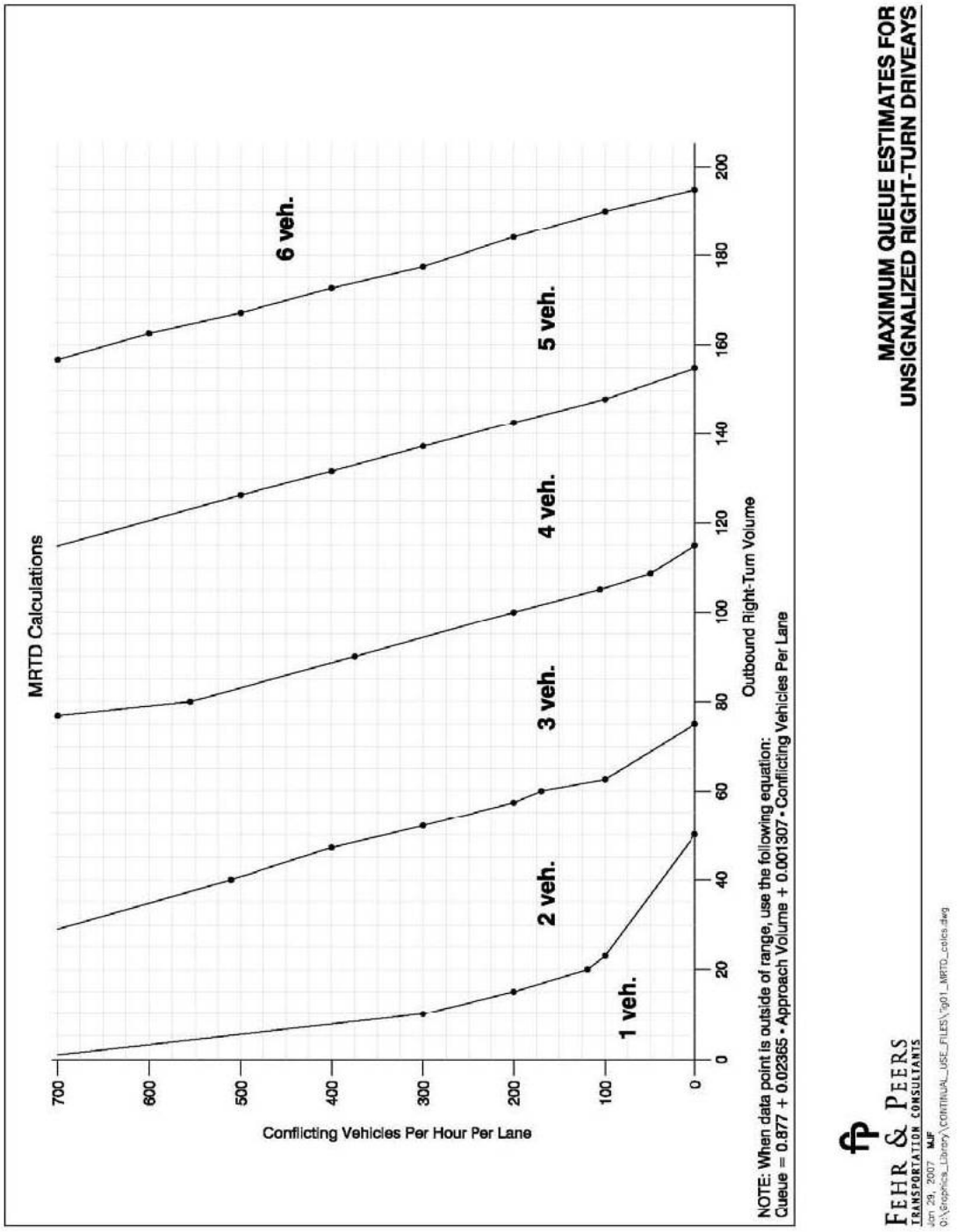
TS = a dummy variable with a value of 1 if a traffic signal is located on the major street within one-quarter mile of the subject intersection and 0 otherwise;

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	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 and Ped. Push Button posts.

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 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.
   i. For new and modified signal pole locations with triple lefts, two 3-section all arrow MAT are to be used centered on lane lines.

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. Flashing Yellow Arrow (FYA) Left Turn Phasing – FYA left turn phasing may be considered under the following conditions:

1. Sight Distance(SD) meets AASHTO/FHWA recommended intersection SD for permissive left turns.

2. Implemented on single approach lane only.

3. Number of opposing thru lanes ≤3.

4. Shall conform to current CA MUCTD guidelines.

H. 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.

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 Caltrans Type B and shall not be spliced between the termination point (pull box adjacent to detector loop) and the controller cabinet terminals. 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.
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.

I. 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) 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 CAT5 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 CAT5 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.

J. 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.

K. 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.

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 insure 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.

L. Traffic Signal Pull Boxes: All pull boxes shall be No. 6 Fiberlyte FL36 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.

M. 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 in commercial and high pedestrian areas or as directed by the City. 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.

N. 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.

O. 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.

P. 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.

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.

1. Refer to City of Roseville Construction Standards Section 56 "Signs".

2. Internally Illuminated Street Name Signs (IISNS)

a. All proofs require a City approved layout matching existing City LED IISNI's prior to ordering.

b. IISNS name panels shall be manufactured as follows:

- Sign panel material shall be clear (not opaque) poly. Thickness of the panel shall be 3.5 mm /6.0 mm maximum.
- Sign panels background sheeting shall be: 3M DG_3 (Diamond Grade) series 4090. Color (White).
- Etched sheeting (Street name and City of Roseville logo) shall be 3M EC 1177_c material. Color (Green).
- Manufacturer shall warranty, no chemical reaction, shall be exhibited between the background sheeting and etched sheeting components.
- The IISNS shall be double sided with street names on both sides.

3. 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.

4. 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.

Q. 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 (latest edition). Non reflective pavement markers shall consist of ceramic markers only conforming to Section 85-1.04A 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.

The following permanent traffic lane striping shall be thermoplastic, and placed as one of the following types: Detail 25, 27B, 38, 39, 39A and Detail 40. Pavement Markers are 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.

R. 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.

S. 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. NEMA Type P or Caltrans 332 cabinet (fully equipped)

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

3. 2070L controller

4. Communications equipment

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

6. CCTV camera

7. WiFi communications equipment

T. 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) category 5E 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.

U. 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.

V. 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.

W. 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.

X. 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

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 <u>Entering</u> 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).

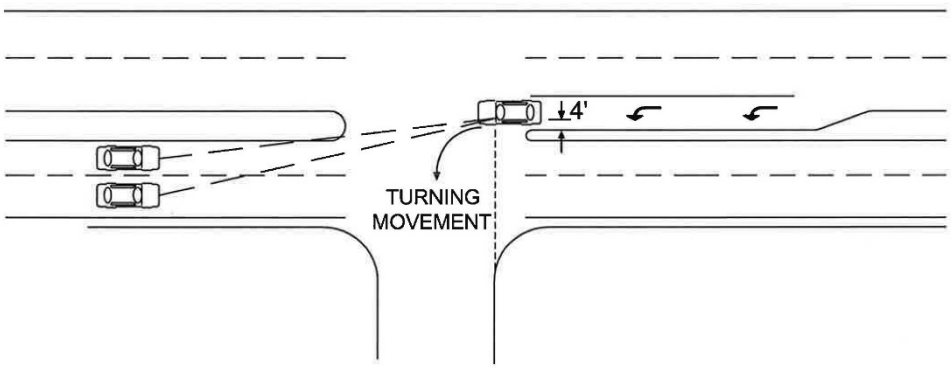
TABLE 7-5
SIGHT DISTANCE FOR CARS ENTERING STREETS/ DRIVEWAYS BY LEFT TURN

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 <u>ENTERING</u> SIDE STREETS OR DRIVEWAYS VIA LEFT TURNS.



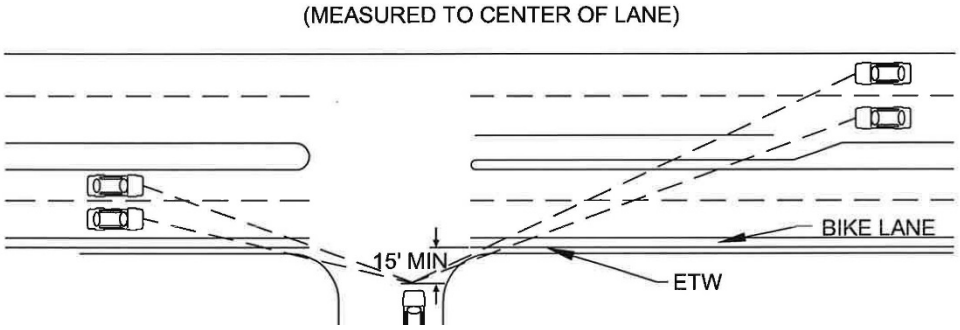
Sight Distance is based on a 3.5 foot height at the location of the driver and a 3.5 foot object height in the center of the approaching lane of the major road. The left turn driver measurement is taken 4 feet from the left edge of the turn lane at the projected edge of the curb return (as shown above). 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 <u>Exiting</u> 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 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 or overlayed within the last five years (Moratorium Streets). The City Engineer under unusual circumstances may give special consideration.

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

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.

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 18feet fully restrained ductile iron pipe originating from the water main.

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.

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 be provided with a larger service subject to approval by the Environmental Utilities Director.

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. 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

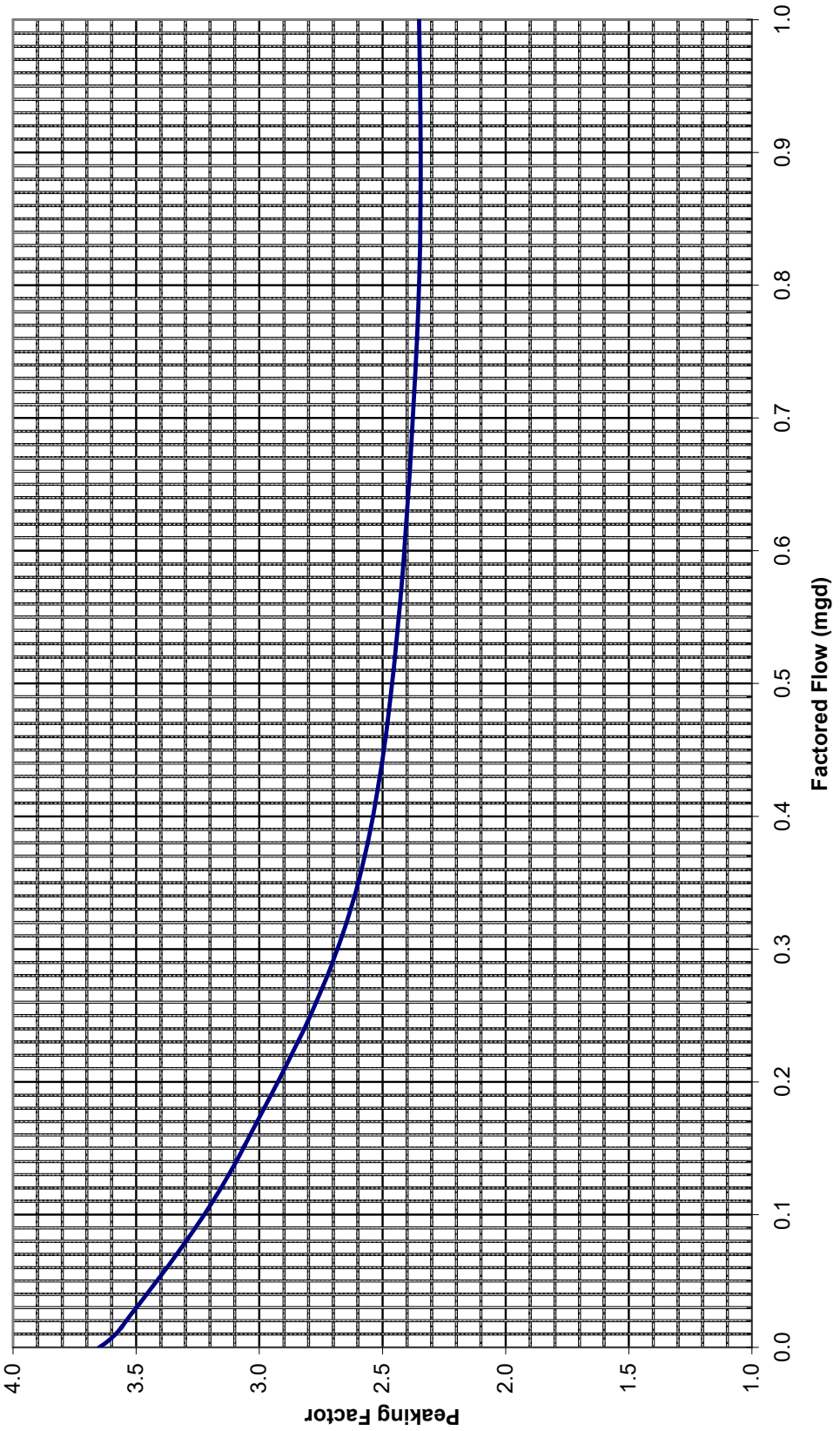
Residential Multiple DU[2]	gpd per acre *or* gpd per DU	2,040 *or* 130
Open Space	gpd per acre	0
Parks> 10 Acres	gpd per acre	10
Vacant	gpd per acre	0

[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.

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, manholes designed with inside drops, 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.

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. 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 concrete pre cast tanks, buried outside. 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. Automatic grease removal devices and hydromechanical grease interceptors shall comply with the requirements of the City of Roseville.
3. Automatic grease removal devices shall be designed, tested, and certified in accordance with ASME A112.14.4 and/or CSA B481.5.
4. Hydromechanical grease interceptors shall be designed, tested, and certified in accordance with ASME A112.14.3, CSA B481.1, or PDI G101.
5. Automatic grease removal devices and 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.
6. Existing hydromechanical grease interceptors shall be maintained in efficient operating condition.

7. Automatic grease removal devices and Hydromechanical grease interceptors shall be maintained free of all food residues and any FOG waste removed during the cleaning and scraping process.
8. Automatic grease removal devices and 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.

H. 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.

I. 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.

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, with a total drainage area of greater than 300 acres. Precise boundaries shall be as approved by the Public Works Director.

Residential lots developed in or adjacent to the City's Regulatory Floodplain 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 area on Cirby Creek, Strap Ravine, and Pleasant Grove Creek South Branch Sierra View Tributary, the above freeboard requirements 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 shall be submitting to the Engineering Division prior to plan approval, or issuance of a building permit. The Guarantee letter 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.

10-4 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)

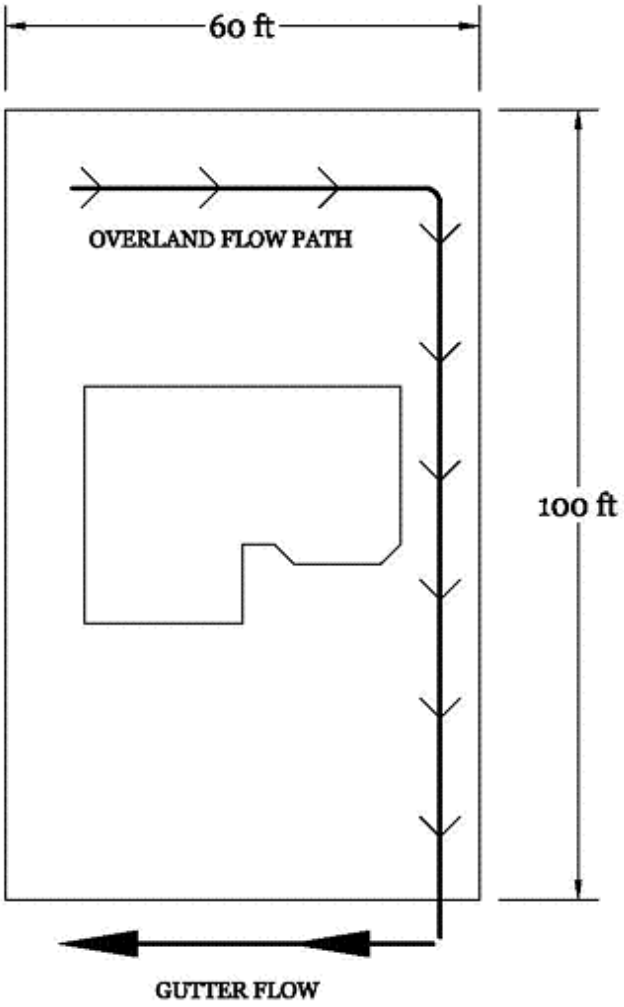
From Equation 10-4, $F_i = 1.7*1$
F_i = 0.21

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.

10-11 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.

10-12 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.

10-13 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.

10-14 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.

10-15 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.

10-16 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.

10-17 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.

10-18 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.

10-19 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 in the design of bridges or culverts that cross a channel or stream with a drainage area that exceeds 300 acres.

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.

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:

$$L_1 = L * \left[\frac{n_1}{n} \right]^2$$

10-20 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.

10-21 ACCESS FOR MAINTENANCE

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.

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. Forty-eight (48) hours notice is required before 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 ~~on diskette~~ 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. 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.

2. No back up distance allowed for the organics truck.