INDEX

ENGINEERING DESIGN STANDARD

SECTION 1: GENERAL

1.1 PURPOSE

The purpose of these Standards is to provide certain minimum standards for the design, construction, repair and alterations of streets, roadways, alleys, drainage, sewerage, water supply facilities and all appurtenances thereunto, within the City of Fairfield, where any portion of such improvement is to be transferred over to the City of Fairfield for operation and/or maintenance. Any items which are not included in these Standards shall be designed and constructed in accordance with the State Planning Manual, State Highway Design Manual, Subdivision Ordinance, Zoning Ordinance, or City Code as defined below, or as directed by the City Engineer.

1.2 DEFINITIONS

In these Standards, the intent and meaning of the terms that are used shall be as defined in Section 1 of the City General Provisions except as herein below specifically noted, revised or added.

A. AASHTO

Shall mean the American Association of State Highway and Transportation Officials (AASHTO), current edition.

B. Highway Design Manual

Shall mean the California Highway Design Manual published by the California Department of Transportation, current edition.

B. CA MUTCD

Shall mean the "California Manual on Uniform Traffic Control Devices" (CA MUTCD), published by the State of California Department of Transportation, current edition.

C. City

Shall mean the City of Fairfield, a municipal corporation.

D. City Engineer

Shall mean the City Engineer of the City of Fairfield, California or his designated representative.

E. Consulting Engineer

Any person or persons, firm, partnership, or corporation legally authorized to practice Civil Engineering in the State of California.

F. Contractor

Shall mean any person or persons engaged in the development of property, in whole or in part, by the placing of any improvements thereon, whether the property was previously developed in whole, in part or at all), or other duly authorized representative or agent appointed by the Contractor, contracting with the City of Fairfield, California, to perform such duly authorized work or construction for the City as may be entered upon; such persons or agents acting within the scope of said work or construction.

G. CVC

Shall mean the California Vehicle Code, current edition.

H. Design

Shall mean street alignment, grade, geometric section, structural section; sanitary sewer alignment, grade, size; water system alignment, size, valving, fire hydrant location; storm drain alignment, grade, size and miscellaneous improvements as required by the City Engineer.

I. Developer

Shall mean any person, firm, corporation, partnership or association engaged in the development of property in part or in whole by the placing of any improvements thereon, whether the property was previously developed in whole, in part, or at all.

J. Easement

Shall mean an easement dedicated to the City or Public Utility which shall be continuing and irrevocable unless formally abandoned.

K. Improvements

Refers to street work, sidewalk, curb, gutter, driveways, water mains, sanitary sewer, storm drainage, public utilities, landscaping, and fences to be installed by the developer or contractor on land to be used for public right of way.

L. MUTCD

Shall mean the Manual on Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration (FHWA), current edition

M. Soils Report

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

N. Standard Details and Specifications

Shall mean the Standard Details and Specifications of the City of Fairfield.

O. State Highway Design Manual

Shall mean the State of California Department of Transportation Highway Design Manual, current edition, unless otherwise stated.

P. State Materials Manual

Shall mean the Materials Manual of Testing and Control Procedures of the State of California, Public Transportation Laboratory Manual of Tests, Department of Transportation, current edition, unless otherwise stated.

Q. State Planning Manual

Shall mean the Planning Manual of Instructions of the State of California, Department of Public Works, Department of Transportation, Parts 1 - 8, current edition, unless otherwise stated.

R. State Specifications

Shall mean the Standard Specifications of the State of California Department of Transportation, current edition, unless otherwise stated.

S. Standard Plans (Details)

Shall mean the Standard Plans of the State of California Department of Transportation, current edition, unless otherwise stated.

T. Subdivision Ordinance

Shall mean Article III Section 25 of the City Code as adopted by the City Council of the City of Fairfield.

U. Traffic Engineer

Shall mean the Director of Public Works or his designee as identified in the City's municipal code.

V. Zoning Ordinance

Shall mean Ordinance No. 2008-08 as adopted by the City Council of the City of Fairfield, dated May 20, 2008, and as amended.

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SECTION 2: CONSTRUCTION PLANS

2.1 GENERAL

Complete plans and specifications for all proposed improvements including any necessary dedications and easements shall be submitted to the Department of Public Works for approval and must receive the required approval prior to the beginning of construction of any such improvements. This shall apply where it is the intent that any portion of such improvement will be transferred to the City of Fairfield. Such plans shall be prepared by or certified by a Registered Civil Engineer in accordance with the provisions of "Civil Engineer's Act" Chapter 7 - Division 3 of the Business and Professions Code, relating to the practice of Civil Engineering.

2.2 PREPARATION

Construction plans and specifications shall be prepared in accordance with the following requirements:

A. Dimensions - Construction plans shall be clearly and legibly drawn in ink on mylar 24 by 36 inches with a 1-1/2 inch clear margin on the left edge and 1 inch margins on all other edges.

B. Scale - Horizontal scale shall be 1" = 40'; vertical scale shall be 1" = 4' or as approved.

C. Form

1. Title Sheets

a. Name of Subdivision or Project.

b. Vicinity Map with North Arrow.

c. Index of sheets.

d. Title Block - located along lower edge or right edge of paper.

e. City Engineer's Signature Block.

f. Plan view showing the entire street right of way layout (Scale: 1" = 100'), proposed water and sewer mains, storm drainage system, lot numbers, street lights, sheet index, flow arrows, and other miscellaneous improvements to be installed.
   - For new Subdivisions: proposed utilities shall be shown on a separate sheet (Scale: 1” = 60’, or as approved)

g. Complete Legend.

h. Typical Street Section for each varying width street.

i. Temporary and permanent bench marks including their descriptions. All elevations shall be tied to the City of Fairfield Bench Mark and Monument system. No assumed or adjustments to elevations shall be allowed.

j. General and special notes relating to construction methods.

k. Soils engineer's, developer's, and design engineer's names, addresses and telephone numbers.

2. Street Plan and Profile

a. Plan view of each street to be improved shall be shown on separate sheets indicating existing improvements and contours/ elevations within 100 feet of the project boundary, proposed improvements and future improvements if known. Proposed improvements shall include sidewalk, curb, gutter, driveways, sewer mains, water mains, water service and sewer lateral locations, storm drains, manholes, valves, fire hydrants, fencing, barricades, monuments, survey stationing, face of curb data for all curves and other data as required by the City Engineer. The survey stationing shall normally read from left to right with the north arrow pointing either to the top or left edge of the sheet. All stationing shall be a continuation of existing improvements where possible. Plans shall also state the tested "R" value for the roadway

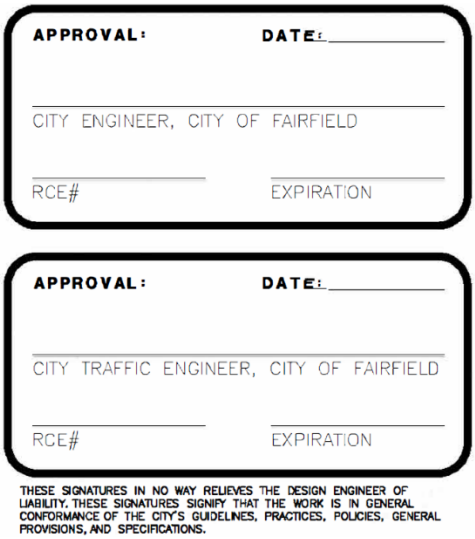
b. Profile view of each street shall be shown immediately below or above its plan view. The profile shall include existing grade lines, sewer mains, storm drains, water mains, public utility mains, all utility crossings, and top of curb. Discrete elevations shall be shown of top of curb, at grade break points, manhole and catch basin inverts, and water main crossings with other utilities, and at each lot line or every 100 feet whichever is less.

3. Site Development Plan

Site development plan shall include building pad, finished floor elevations, individual lot drainage pattern, adjacent land drainage, driveway size and locations, fencing, existing contours, existing trees, wells, ditches and other landmarks important in the construction of the improvements. In addition, adjacent lot grades shall be shown for a minimum of twenty-five feet from the project boundary. The site development plan shall conform to Federal Housing Administration (FHA) standards.

4. Lighting Plan

For all new lighting, the consulting engineer shall prepare and submit two (2) copies of the proposed lighting plan in conjunction with the initial submittal of the improvement plans. Prior to submitting the lighting plan, the consultant shall prepare a photometric study utilizing light emitting diode (LED) technology. The plan shall include a summary table identifying uniformity, average, maximum, and minimum lighting levels. The plan shall be incorporated within the improvement plans, but shall have a separate approval block for the Traffic Engineer as identified below.



The lighting plan shall be prepared at 1" = 40', 1" = 50' or 1" = 100' and shall include these elements but not limited to:

a. Locations of existing lights and PG&E identification badge number
b. Locations and spacing of proposed lights
c. Call out arrow identifying point of connection or service point (proposed)
d. Callout arrow with space to fill-in PG&E identification badge number
e. Manufacturer/model no. of the fixture and pole
f. Written description of fixture and pole material, shape, and finish
g. Conduit routing
h. Photometric calculations (separate)
i. Conduit and wire sizes and lengths shown in tabular (or schedule) form on the plans including all voltage drop calculations

The lighting plan shall be reviewed and approved by the Traffic Engineer before improvement plan approval by the City Engineer. Prior to approval signatures, the lighting plan shall show all existing PG&E badge numbers. Prior to project acceptance as complete, the lighting plan shall show all new PG&E badge numbers and formal as-built

drawings shall be submitted to the City on mylar, certified by the professional streetlight consultant.

Energizing of Street Lights shall follow these procedures once the lights have been installed:

a. The contractor/developer notifies City inspector that the lights are ready to be energized
b. The contractor/developer supplies the City a signed street light plan with all as built information.
c. City inspector completes inspection and prepares a punch-list.
d. Upon completion of the punch-list items, the City inspector contacts Traffic Engineering
e. Traffic Engineering prepares a letter with a copy of the signed plans to PG&E with copies to IT (GIS), construction management, and Capital Projects.
f. PG&E energizes the street lights.
g. The energy and maintenance shall continue to be the responsibility of the contractor/developer until such time the project has been accepted by City Council.

5. Pavement Delineation (PD) and Signing Plan

The consulting engineer shall design and submit two (2) copies of the proposed pavement delineation and /or signing plan with the initial submittal of the improvement plans, but shall be prepared on a separate sheet. In some cases, both the PD and signing plan can be combined with smaller infill type developments. All existing pavement delineation, signs within the project area shall be identified and the disposition of each, if relocated or remain in place, shall be clearly identified on the plan. The plan shall be incorporated within the improvement plans, but shall have a separate approval block for the Traffic Engineer as indicated in 2.2 (C) 4.

The plan shall be prepared at 1” = 40’, 1”=50’, or 1" = 100' and designed in accordance with the current version of the CA MUTCD Chapter 2 and 3 and the State of California Specifications and Standard Plans. The pavement delineation and/or striping plan shall be reviewed and approved by the Traffic Engineer before improvement plan approval by the City Engineer.

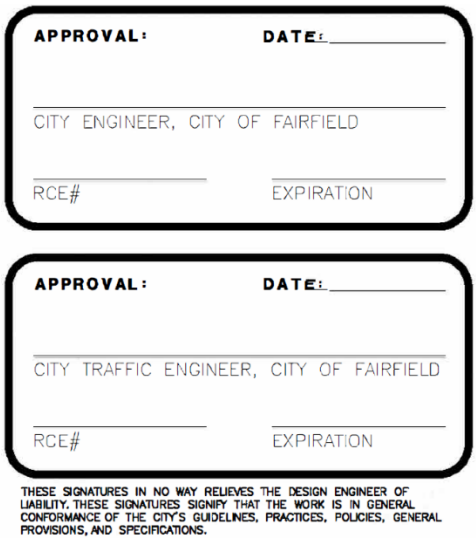
6. Work Zone Traffic Control Plan

The consulting engineer shall prepare and submit two (2) copes of the work zone traffic control plan including clear staging instructions as requested by the City Engineer. Under certain conditions, for localized projects (one to two City blocks), the contractor performing the work may submit a work zone traffic control plan on a 11" x 17" sheet at the time an application is submitted for an encroachment permit. Hand prepared traffic control plans are not permitted. Check the City's website for guidelines and instructions.

All distances, spacing, sign designation, work areas, transitions, tapers, and other elements shall be in complete compliance with the current version of Chapter VI of the CA MUTCD. The consultant or contractor name and contact number shall be clearly identified on the plan with a cell phone number. The City may allow alternative driveway, pedestrian, or bicycle access points depending on circumstances. Provisions for alternative points of access shall be clearly identified on the plan. Attention should be directed to special events or schools that generate significant trips during any hour in the day, day in the week, or month in the year. The consultant or contractor shall verify and allow access to all commercial/office driveway and pedestrian/bicycle paths as appropriate and provide notification to the affected businesses, owners, or occupants. Alternative access maybe provided to the affected business if coordination with the property owner or occupant is accomplished.

7. Traffic Signal Plan

The consulting transportation/traffic engineer shall design and submit two (2) copies of any required traffic signal plan with the initial submittal of the improvement plans. The traffic signal plan shall be prepared on a 1" = 40 scale. Interconnect plans, depending on the limits of work can be prepared on 1" = 50 or 1" = 100 scale. Interconnect plans will include connectivity to the City's transportation network. Each signal plan will include closed circuit television camera and provisions for connectivity to the City's information technology network. The plan may be separate from the improvement plans, and shall have a separate title sheet with vicinity map and approval block for the Traffic Engineer. If the traffic signal is a modification, there shall be an inset on the plan sheet clearly identifying the disposition of each element of the existing traffic signal which is to be modified.



The traffic signal plans shall show the location of the proposed traffic signal poles and controller, intersection lighting, service pedestal, traffic phase diagram, location of proposed service point; location of pull boxes, and electrical details. Other information may be required subject to review by the Traffic Engineer. The traffic signal plan shall also show all conductors and poles in a separate schedule. Each pole/phase shall have separate conductors run to the controller assembly. The consultant shall clearly identify the disposition of each pole on the schedule. For any modified traffic signal, conduits shall be mandreled prior to any new conductors are to be pulled in. New conductors from each pole shall be pulled in the conduit and home run to the controller cabinet. An application shall be submitted to PG&E at the time the plans have been submitted to the City showing that coordination has begun. A design checklist for the consultant is available for use from the City's website.

8. Landscape Plans

A licensed Landscape Architect shall prepare and submit landscape planting and irrigation plans in conjunction with the improvement plans. The landscape plans may be incorporated within the improvement plans but shall have a separate approval block for the City Engineer and the Assistant Director of Planning. The landscape architect shall work cooperatively with the other disciplines, namely traffic, to assure traffic control devices are unobstructed in the future as vegetation growth matures. The landscape plans shall be prepared on 24" x 36" size sheets at a scale of 1" = 20' or as approved. Plans shall clearly delineate limits of publicly versus privately maintained landscaping and irrigation. North arrows shall be shown on all sheets and all streets shall be labeled. The plans shall include the locations and description of all plant material and irrigation components. Plans shall be coordinated with the engineer's grading, drainage, utilities, and street light plans. The landscape plans shall be reviewed and approved during the improvement plan approval. Plans shall be in compliance with the City of Fairfield Water Efficient Landscaping Ordinance.

2.3 SUBMISSION

For the first submittal of a proposed subdivision, the following shall be submitted to the City Engineer for checking to ensure compliance with these Standards, City of Fairfield Ordinances, and good engineering practice:

- PDFs, or similar digital copies, of the submitted construction plan package and final maps on USB, or similar data storage device.
- Three(3) sets of construction plans
- One (1) copy of the final subdivision map

Submitted plans shall include specifications, test data, materials list, drainage calculations, sewer calculations, soils report, lot closures, easement and right of way descriptions, ties to the City of Fairfield Bench Mark and Monument System, and other material as requested by the City Engineer.

A title report, current within the last sixty (60) days shall be submitted with the final map. The title report shall include the entire legal boundary of property being divided.

Closure calculations shall be provided at the time of initial map check submittal. All calculated points within the map shall be based upon one common set of coordinates. All information on the map shall be directly verifiable by information shown on the closure calculation print-out. The point(s) of beginning shall be clearly defined and all lot acreages shall be shown and verifiable from information shown on the closure calculation print-out.

Soils Reports shall be submitted in 8-1/2 x 11 inch bound folders. The analysis must at a minimum include a map of the subject area showing proposed and existing streets, contours and location and type of soils samples obtained. The results of all field data and laboratory tests shall be included. Design for proposed street sections shall be part of the report. Street structural section design shall include recommendations for: natural subgrade, subbase, and base compaction and pavement thickness to achieve design strength. The report shall also include corrosion analysis, if applicable.

Three copies of final parcel maps shall be submitted to the City Engineer.

A minimum of twenty (20) working days shall be allowed for review of Construction Plans and Final Subdivision Maps. Should there be required alterations or revisions to the plans submitted, one copy shall be returned by City with the required corrections indicated thereon. At such time as the consulting engineer has made the necessary revisions, the plans shall again be submitted for final checking, with a sufficient number of copies as required by the City. When the plans are approved, the developer shall be notified of the submission date to the City Council. However, plans shall not be considered approved until the City Engineer has signed in the approval block on the plans. There shall be no changes permitted to an approved set of plans unless such changes, corrections, or additions are resubmitted to the City Engineer for approval as previously described for original plans. Excepted from approval are any features of the plans that are contrary to, in conflict with, or do not conform to any California State Law, City of Fairfield Ordinance or Resolution 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 by the Department of Public Works.

After formal approval of the plans by the City Engineer, the following shall be submitted for filing in the City Engineer's office as official City records:

- AutoCAD files, or approved similar format, of the site plan, final map, and uitility plan on USB, or similar data storage device.
- Three (3) bond (paper) copies of the approved construction plans.
- One (1) mylar (polyester film 3 mil) sepia copy (with matte surface up)

Additional copies of reduced improvement plans (11" x 17" or 18" x 26") may be required by the City Engineer at his discretion and shall be furnished by the developer or his representative to the City without cost.

Three copies of the joint trench utility plans showing electric, gas, telephone, cable TV, and any other utilities constructed in the joint trench shall be submitted to the City Engineer prior to start of underground construction.

The Storm Water Pollution Prevention Plan (SWPPP) for the project shall be submitted to the City Engineer prior to start of construction. The SWPPP shall comply with the latest National Pollutant Discharge Elimination System (NPDES) Permit guidelines for "General Construction Activity."

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SECTION 3: STREET DESIGN

3.1 GENERAL

For purposes of geometric and structural design, streets shall be classified according to the following. Any deviation from the following standard shall require the approval of the City Engineer. The designer shall follow procedures defined in the most current Caltrans Highway Design Manual in determining the traffic index.

Class	Right of Way (Feet)	* Width Between Curbs (Feet)	Intersection Radius (Feet)		** Minimum Traffic Index	Minimum Street Section R=15 (Inches)	Max. Grade Range (%)	*** Minimum Centerline Radius for Horizontal Curve (Feet)
			Prop Line	Curb Line				
Arterial with Median	104	84	40	50	11	7.0 AC 27.5 AB	10	800
Collector > 2000 ADT	60	40	30	40	9	5.5 AC 22.0 AB	13	600
< 2000 ADT	60	40	30	40	8	4.5 AC 20.0 AB	13	600
Residential incl. Cul-de-Sacs	50	36	20	27	6	3.5 AC 14.0 AB	13	250
Heavy Industrial	60	52	30	40	11	7.0 AC 27.5 AB	10	250
Frontage	50	34	20	27	11	7.0 AC 27.5 AB	10	600

* May be reduced at the discretion of the City Engineer under special circumstances.

** May be raised at the discretion of the City Engineer if traffic warrants a higher value and in accordance to methodology shown in the California Highway Design Manual.

*** Actual design of horizontal curves shall be based on the design speed of the street in accordance to AASHTO (Geometric Design of Highways and Streets) and Highway Design Manual or as determined by the City Engineer.

For purposes of life cycle cost and the ability of the City to maintain the roadway, the traffic index shall be determined utilizing the 40 year pavement design life and in accordance to Table 612.2 in Chapter 600 of the California Highway Design Manual.

Street sections shall be calculated based on "R" values obtained from material gathered from the level of the proposed subgrade using the State of California Division of Highways design method except that the minimum street sections shall be as shown. Geotextile subgrade fabric, as specified in the Specific Provisions, shall be installed on all subgrade prior to placement of aggregate base (AB) or aggregate subbase (ASB) material. For classification not listed above, the minimum street section shall not be less than 3.5 inches of asphalt concrete and 14 inches of aggregate base. Aggregate base section may be comprised of an equivalent design section of aggregate base and aggregate subbase, as approved by the City Engineer.

3.2 GEOMETRICS

A. All streets shall intersect at as near right angles as practicable and more than two streets intersecting at or within 200 feet of the face of curb shall be avoided.

B. Curb line radii shall be tabulated in a box shown on the construction plans.

C. Gutter flow line grades shall have a minimum slope of 0.0032 feet per foot (0.005 feet per foot around curb returns) and maximum as determined by the City Engineer.

D. Cross slope on all streets shall be as shown on the standard details unless a deviation has been previously approved by the City Engineer.

E. The design of a vertical curve at the intersection of two grades shall be based on the design speed of the street and stopping sight distance using the Caltrans Highway Design Manual or AASHTO as approved by the City Engineer. However, vertical curves may be omitted where the algebraic difference in grades does not exceed 1.0 percent. The minimum vertical curve length allowable shall be 100 feet, except as approved by the City Engineer.

F. The minimum stopping sight distance over any segment of the roadway on residential, collector or arterial streets shall conform to the Highway Design Manual unless specific approval is received from the City Engineer.

3.3 APPURTENANCES

A. Driveways

1. No driveway shall be permitted within 2 feet of a property line on multi-family property and commercial property. Driveway locations for single family property shall not be permitted within 2 feet of a property line unless a property fronts on a cul-de-sac bulb in which case a driveway may be constructed up to the property line.
   Special consideration may be given to major and minor street driveway configurations of an unusual nature.

2. The maximum width for a driveway shall be 40 feet for commercial, except that major street driveways may be greater. Residential driveways shall be 24 feet for 2 car and 32 feet for 3 car as measured at the face of curb. The above widths include transitions at each side of the driveway.

3. Driveway grades shall not exceed 15%. Driveway grade breaks and vertical curves shall be designed so that vehicles requiring access to the site will not "bottom out."

4. The minimum distance between driveways serving the same parcel shall not be less than 20 feet as measured at the face of curb, including transitions.

5. All driveways shall conform to the standard City of Fairfield design, as shown on the Standard Detail S6, S7, S8 & S9.

6. All driveways and street corners in separated sidewalk areas shall be provided with two (2) irrigation sleeves at a depth of 24" to 36". One sleeve shall be 4" and the second 2" schedule 40 PVC pipe. Sleeves shall extend one foot beyond the edge of the driveway or corner crossing. Sleeves shall also be provided under the sidewalks at a depth of 24" in all locations where landscape is provided behind the sidewalk that is to be maintained by the City or a Landscape Maintenance District. Carrier pipe within irrigation sleeves shall have banded skids at all joints if the carrier pipe has ring-tite type joints.

7. Ideal driveway spacing promotes safety by minimizing left and right turning conflicts on roadways. No additional breaks in access will be allowed where restricted access points currently exist. Under extenuating circumstances, right in right out configuration could be used. Shared driveways shall always be considered when applicable. The chart below shows minimum spacing required to reduce collision potential.

85th % Speed Arterials (mph)	Centerline to Centerline Driveway Spacing (feet)	Approx Driveways per 500 Block Face
25	105	5
30	125	4
35	150	3
40	185	3
45	230	2
50	275	<2

8. Street spacing in residential areas for existing infill type residential projects should stay consistent with the surrounding conditions and

follow existing block lengths. For new projects, driveway spacing shall be maximized.

B. Traffic Calming in New Development

With undeveloped areas in its jurisdiction and street segments of 600' or more, the City requires incorporating traffic claming features in the design of residential and business neighborhoods such as housing tracts, office parks, and commercial/industrial complexes.

The neighborhood street network shall be designed and configured so that it discourages excessive speeding behavior, precludes congestion, and minimizes the potential for excessive cut-through traffic. Where the neighborhood street network design cannot be fully exploited for traffic calming purposes, roadway features that increase side friction and markedly impress the residential or business character of the neighborhood upon the motorist will likely be required as project approval conditions for tract maps, site plans, conditional use permits and other development review cases filed with the City for discretionary action.

1. Street Network Design Elements
   a. Short Segment - a straight, uninterrupted street segment should not exceed 660 feet between cross street centerlines. Short segments diminish the opportunity for vehicles to gather speed.
   b. Curve - horizontal and vertical curves should be utilized on longer, uninterrupted street segments. The curve should be of such radius as to limit the sight distance from any cross street between 150 and 300 feet. A limited sight distance forces slowing of vehicles traffic.
   c. Elbow and Tee - intersections should be limited to 90-degree elbows and tees whenever practical. Right angle turns force slowing.
   d. Dead End - a short stemmed dead end (e.g., cul de sac), serving as a greenbelt access point, can discourage cut-through while preserving a neighborhood's walkability. A dead end is short-stemmed if a driver along the cross street can tell that it is a dead end without the aid of signs and without having to turn into the dead end street. Dead end streets discourage cut-through traffic.

2. Roadway Design Features (horizontal deflection only)
   a. Median Island - a landscaped median island may be added to break a long and uninterrupted, straight segment of street, or at approaches to intersections.
   b. Curve - horizontal and vertical curves should be utilized on longer, uninterrupted street segments. The curve should be of such radius as to limit the sight distance from any cross street between 150 and 300 feet. A limited sight distance forces slowing of vehicles traffic.

c. Elbow and Tee - intersections should be limited to 90-degree elbows and tees whenever practical. Right angle turns force slowing.
d. Gateway - medians, curb bulb outs, curb extensions, mini-roundabouts, monuments and arches may be placed at entrances to residential neighborhoods to demarcate the local street network from the arterial roadway system, serving as visible reminder for motorists to adapt their driving attitude and behavior to the changed environment.
e. Paths and Trails - bike paths and trails within parkways promote human activity alongside the street, reinforcing the neighborhood's "peopled" character.

B. Parking

A minimum of one on-street parking space, 20 feet in length measured along the curb (or as identified by the most current version of the CA MUTCD), shall be provided within 200 feet of each single-family lot.

C. Valley Gutters

Valley gutters will not be allowed within the public right of way or public easement without written approval from the City Engineer.

D. Sidewalks, Curbs and Gutters

1. Sidewalks shall be a minimum of 4.5 feet wide on residential streets and 6.5 feet wide on collector, arterial, and industrial streets as measured from face of curb. Public Sidewalks and Walkways: final width of sidewalks and walkways shall be determined by the City Engineer or authorized designee depending on the uniformity and consistency of the area.

2. Sidewalk, curb and gutter shall be of the design as shown on the Standard Details or as required by the City Engineer.

3. Handicap ramps shall be installed at all street crossings and curb returns and of the design as shown on the Standard Details.

4. Sidewalks shall be incorporated on both sides of any City street section.

E. Survey Monuments

Survey monuments shall be installed as follows:

1. On the roadway centerline at intersections.

2. At all locations as required by the City Engineer.

3. A minimum of 2 monuments shall be installed in all subdivisions with California coordinates.

4. Lot line extensions shall be clearly marked with a "+" at the back of sidewalk in the concrete.

All monuments set shall be as shown on the Standard Details and shall clearly show the registration number of the licensed Civil Engineer or Land Surveyor who prepared the final or parcel map.

F. Street Name Signing

1. Street names shall require approval by the Planning Commission. Please contact the Community Development Department for more information. A street name exhibit, identifying approved street names, shall be submitted to the City Engineer or authorized designee.

2. Street name signs for public and private streets shall be furnished and installed by the contractor, developer, or subdivider. All street name signs shall be series C for sizes up to 48". Series B may be used if the size of the sign exceeds 48". The legend shall be 6 inch legend upper and lower case, white on green background with 3M Scotchlite Electrocut Series 1170 (green) on 3M high intensity prismatic 3930 (white) background or equal. White on brown background is used exclusively in the downtown area. A ¼" white border shall be used. The sign blank shall be minimum 9" height aluminum grade and a thickness of 0.080 inch. A sample mock shall be submitted and approved by the Traffic Engineer.

3. "No Parking" signs shall be furnished and installed by the contractor, developer or subdivider. All "No Parking" shall be 3M Scotchlite Electrocut Series 1170 (red) on 3M high intensity prismatic 3930 (white) background. The sign blank shall be aluminum grade with a thickness of 0.080 inch. A sample layout shall be submitted and approved by the Traffic Engineer.

4. All other regulatory and warning signs to control traffic shall conform to the CA MUTCD and the sign specifications shown, such as stop signs and speed zone signs. If sign sizes are not shown on the plans, the size shall be based on roadway type and the posted speed. The signs shall constructed of 3M Scotchlite Electrocut Series 1170 (white) on 3M high intensity prismatic 3930 (red) background and will be furnished and installed by the contractor, developer or subdivider.

5. Permanent barricades shall be installed where improvements cover only a portion of the ultimate development or as directed by the City Engineer. Terminations of sidewalks shall have sidewalk barricades such as those identified in the CA MUTCD or Department of Transportation Standard Plans, or approved equal, when in the opinion of the City Engineer it is necessary to protect against a specific condition. The barricade shall be constructed, erected, painted and signed in accordance with the CA MUTCD.

G. Easements

Public service, drainage, tree planting, and fence easements shall be located as required by the Utility companies and the City Engineer.

H. Conduits

The minimum depth for the installation of conduits for dry utilities as they cross streets shall be 42 inches.

I. Private Streets with Public Utilities

Private Streets that have Public Utilities shall be designed to meet minimum standards for street width and pavement section, as determined by the City Engineer.

J. Street Widths (Private Streets)

Street widths on private streets shall be no less than 34’ from the face of curb where there are front on driveways and parking on both sides. For residential collector type streets, the minimum width shall be 36’ from face of curb.

K. Lighting

Lighting shall be placed a minimum of 20’ from any street tree and at either the back of walk or between the back of curb and the walk within the landscape strip. The consultant performing the lighting analysis and design shall coordinate efforts with the landscape architect to prevent future tree growth from impacting the lighting from both a physical and visual perspective. There shall be a minimum of 24” clearance from the near edge surface of the pole to the back of curb.

A pull box shall accompany and be located 2 feet from each light pole. A concrete pad shall be included incorporating both the street light and the pull box as per the detail. Any changes in grade will be addressed in the form of a concrete retaining wall with details identified on the plans.

SECTION 4: STORM DRAINAGE

4.1 GENERAL

These standards are intended to insure that watercourse and surface water laws are complied with and that runoff from storms up to the 100 year return frequency are conveyed through storm facilities and disposed of in a manner which protects public and private improvements from flood hazards.

Creekside improvements including, but not necessarily limited to storm drain outfalls and grading operations along designated creeks shall comply with Section 25.900, "Creekside Protection Plan", of the City Code.

The diversion of natural drainage will be allowed only within the limits of a proposed improvement. All natural drainage must leave the improved area at its original horizontal and vertical alignment unless a special agreement, approved by the City Engineer, has been executed with adjoining property owners.

All proposed storm drainage facilities shall include provisions for future upstream development and no development shall discharge at a rate which exceeds the capacity of any portion of the existing downstream system. Calculations for storm drainage design within a development as well as calculations for runoff generated by upstream areas within the contributing watershed shall be submitted to the City Engineer for approval. These calculations are to be based upon the ultimate watershed development and shall include:

A. Topographic map showing the relationship between the proposed development and the remainder of the watershed, including acreages of all sub-areas.

B. Map of the proposed development indicating:

   1. All applicable existing and proposed improvements.

   2. Runoff coefficients for all areas where runoff was calculated.

   3. Time of concentration and intensity of rainfall at each hydraulic structure.

   4. The magnitude and direction (indicated by arrows) of flow in each pipe and flow to each structure contributed by its tributary area. All flow rates shall be in cubic feet per second (cfs).

   5. Elevation of pipe inverts at structures and the top of structure elevation at each structure.

6. Slopes of all stormwater conveyance structures and conduits.

C. Tabulation sheet which includes all of the above information and summarizes the design in a clear, concise, professional format.

All proposed improvements shall be designed such that, for the design storm, there is no surcharging in any conduit unless written approval is granted by the City Engineer. In those special cases where surcharging is permitted, the minimum hydraulic freeboard shall be 18 inches as measured from the top of curb or when applicable, as required by the Federal Emergency Management Agency (FEMA) and the Department of Water Resources (DWR) Division of Safety of Dams, whichever is greater.

Containment of flood waters within the public right-of-way is required at all times. Flood waters shall be confined to streets or other approved right-of-ways by grading, levees or alternative means acceptable to the City Engineer. In no instance shall an improvement be designed such that flood waters can reach a depth of 0.50 feet, as measured from the top-of-curb, before overland release occurs. Overland releases shall not be permitted between lots.

Storm drain systems and onsite grading shall be designed such that drainage from upstream properties and/or watercourses is not blocked or flooding is exacerbated.

The design of all bridges, box culverts, levees, detention basins, spillways, and other applicable structures shall comply with the latest FEMA and DWR Division of Safety of Dams regulations.

At intersections of pipes, the downstream pipe shall have a crown elevation which is less than or equal to the crowns of all upstream connecting pipes. Pipe diameters shall not decrease in the downstream direction.

Storm drain systems shall be designed to prevent contamination of creeks and streams with polluted or silt-laden storm drainage. Best management practices shall be employed in the design of storm drain systems so as to comply with the standards for the National Pollutant Discharge Elimination System as stipulated by the Environmental Protection Agency and the State Water Quality Control Board.

4.2 DESIGN

A. Design Storm

The following table shall be used to determine the required design storm for drainage calculations.

Design Area Or Item	Design Method	Design Return	Comments
Less than 640 Ac.	Rational Method	15 yr	Refer to these specifications and details.
Between 640 & 3200 Acres	Rational Method or Unit Hydr.	25 yr	Refer to Solano County Hydrology and Drainage Design Procedure Manual for local hydrograph data.
Greater than 3200 Ac	Unit Hydrograph	100 yr 24 hr	Rainfall depths shall be taken from NOAA Atlas 2, Volume XI, or Table 2.
Detention Basin	Unit Hydrograph	100 yr 24 hr	Peak discharge from a detention basin shall not exceed 90% of the undeveloped peak flow from the 24 hr., 100 yr event.

B. Capacity

All storm water conveyance structures, unless otherwise stated herein or directed by the City Engineer, shall be designed to function without surcharging for purposes of determining hydraulic capacity.

C. Storm Runoff

1. Rational Method - Storm runoff for areas smaller than 640 acres shall be computed using the Rational Method according to the formula:

$$Q = CIA$$

Where Q = design runoff, in cubic feet per second

C = coefficient of runoff based on ultimate development of the drainage area, as defined in Table 1

I = rainfall intensity from Table 2

A = area of drainage basin in acres

2. Unit Hydrograph - Detention basin capacity and storm runoff for areas larger than 3200 acres shall be computed using the Unit Hydrograph Method as defined by the Solano County Hydrology and Drainage Procedure Manual and as modified herein.

D. Pipe Materials

The minimum allowable inside diameter of any storm drain pipe shall be 12 inches and designed to flow with a minimum velocity of 2.5 feet per second when flowing full. The pipe materials which may be used for storm drainage improvements within the City right-of-way and easements are specified in Section 10.2 of the Specific Provisions.

E. Cover Requirements

All storm drain pipe alignments shall be designed so that the top of pipe lies 10 inches below street subgrade for major streets or to allow a minimum of 2 feet of cover as measured from top of curb to the inside top of pipe for other street standards. If, for sound engineering reasons, the above requirements cannot be met, the pipe shall either be encased in concrete or provided with a concrete cover as approved by the City Engineer.

RCP - Class IV pipe shall be required for all installations except when depth of cover, as measured from the inside top of pipe to either the top of curb or finished grade, exceeds 11.9 feet. For these installations, Class V will be required.

Any storm drain pipe which lies wholly or in part within the aggregate base section of a street shall be Class V.

CIPP - Cast-in-place concrete pipe shall have a minimum cover in conformance with the following:

1. Cast-in-place concrete pipe shall not be used if the street subgrade is less than 10 inches above the top of pipe. In addition, CIPP shall not be used at grade changes or for any street crossings.

2. If the street subgrade is 10 inches or more above the top of pipe, backfill shall be placed in accordance with the City of Fairfield Standard backfill requirements for utility trenches.

3. The City Engineer may seasonally or permanently deny the use of cast-in-place concrete pipe if, in his judgment, local conditions make the use of said pipe undesirable.

F. Horizontal Alignments

Storm drainage lines shall be parallel with the centerline of the street, with the centerline of the pipe directly under the face of curb where separated sidewalk is required, or the centerline of the pipe shall lie 18" behind the face of the curb for monolithic sidewalk. Although deflection into and out of Type II catch basins will be necessary, unnecessary meandering and angular changes shall be avoided. Pipe curvature shall not exceed manufacturer's recommendations.

G. Open Channels

For the purposes of these specifications, a ditch shall be classified as an open channel when its capacity exceeds 25 cfs.

Drainage may not be conveyed through a development in open channels without the written approval of the City Engineer. Open channels shall be designed in accordance with the following:

1. Velocity range shall be between 2.5 and 6.0 feet per second in unlined open channels and between 3.0 and 12.0 feet per second in lined open channels.

2. Channel lining shall be either finished concrete or rock riprap,. The minimum weight of rock shall be determined from Figure 2. For use in this figure, impinging velocities shall be (1.4 x mean velocity) and tangent velocities shall be (0.75 x mean velocity).

3. All open channels shall be designed to carry the 100-year frequency flood. The hydraulic grade line shall be calculated and plotted on all channel profiles. All computations, including a narrative of the design shall be clearly documented and submitted to the City Engineer for approval.

4. Freeboard shall be a minimum of 1.0 feet for the 100-year event and comply with the latest FEMA regulations. Additional freeboard at bridge crossings and for levee situations shall be per FEMA regulations.

5. Side slopes shall be 2 feet horizontal to 1 foot vertical or flatter and the minimum bottom width of the channel shall be twice the channel depth.

6. Profile of existing channel for a minimum of 1,000 feet at each end of the development shall be shown on the construction plans to establish an average profile grade.

7. Maintenance roads on one or both sides may be required as directed by the City Engineer. See Section K.2. for additional information.

H. Bench Drains and Diversion Ditches

A ditch shall be considered a bench drain or diversion ditch as long as its design capacity does not exceed 25 cfs. Any ditch which has a capacity greater than 25 cfs shall be considered an open channel and designed in accordance with Section G.

Bench drains and diversion ditches shall be concrete or gunite lined and designed in accordance with the following:

1. Velocity range shall be between 3.0 and 20.0 feet per second.

2. At changes in alignment and at inlets, adequate measures such as banking, circular curves or energy dissipaters shall be used to confine water to the channel.

3. At locations where, in the opinion of the City Engineer, the overflow of a bench drain or diversion ditch could cause flooding, erosion or other damage, the channel section shall be designed to carry the 100 year runoff.

I. Drainage Structures

1. Manholes and Junction Boxes - Shall conform to City of Fairfield Standard Details. They shall be located at changes in grade or conduit size, at junction points, on curved pipe at the EC or BC of the curve, and at 300 foot intervals along the curve.

2. Catch basins - Shall conform to the City Standard Details. Type II catch basins shall be used, unless otherwise approved. Catch basins shall be designed and spaced such that they intercept and fully contain the 15 year storm. Under no circumstance shall the spacing of catch basins exceed 1,000 feet. Figure 3, shall be used to determine curb inlet capacity for catch basins located on a continuous slope.

3. Box Culverts - Shall be required when specified by the City Engineer and designed on an individual basis.

4. Headwalls, Wingwalls, Endwalls, Etc. - Shall be considered on an individual basis, and in general, designed in accordance with Section 51 of the State Specifications.

5. Drainage Pump Stations - May be permitted on an individual basis with the written approval of the City Engineer.

6. Temporary Inlets and Outlets - Shall conform to good engineering practice and shall be specifically designed and detailed on the plans.

7. Gutters - Storm water runoff in gutters shall be conveyed in underground structures when any one of the following criteria is met:

   a. Gutter runoff exceeds 3.0 cfs.

   b. Length of gutter exceeds 1000 feet

   c. Water depth in gutter reaches the top of curb.

J. Easements

Publicly owned drainage conduits and channels will not be allowed on private property unless they lie within a dedicated public easement. Where minor improvement of a drainage channel falls on adjacent property (such as

daylighting a ditch profile) written permission from the adjacent property owner(s) for such construction shall be required. A copy of the document which grants said approval shall be submitted to the City Engineer prior to the approval of the improvement plans.

Easements for closed conduits shall meet both of the following width criteria:

1. Minimum width of any easement for a closed conduit shall be 15 feet.

2. All easements for closed conduits shall have a minimum width in feet 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 conduits shall be centered within their easements.

Drainage easements for open channels shall have sufficient width to contain the open channel and a 17 foot wide service road. The toe of a bank shall not be within 5 feet of an easement boundary. Easement boundary lines shall, at changes of alignment, have a radius sufficient enough to provide turning room for vehicles operating on the service road.

K. Miscellaneous Items

1. Fencing

All open channels shall be enclosed by a chain link fence with access gates complying with the City Standard Details and Specifications. The fence shall be located a minimum of 6 inches within the required easement boundary.

2. Service Road

A service road shall be provided within the boundary of all open channels. It shall be a minimum of 17 feet wide, graded for vehicular traffic and clear of trees, shrubbery, and other obstructions for its full width. Fourteen feet of the road's width shall be paved or graveled (surface type to be determined by the City Engineer) with a minimum unpaved shoulder width of 1.5 foot on each side of the roadway. Service roads may be required on both sides of the channel as determined by the City Engineer.

3. Floodways

There shall be no floodways allowed between lots.

4. Curb Drains

All lots shall be provided with two 2-inch Schedule 40 PVC "through curb" drains, one each on either side of the driveway approach. In addition, a bubble-up drain shall be provided at the back of sidewalk on each drain line.

4.3 STORMWATER QUALITY

A. General

The City of Fairfield has a Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit with the California Regional Water Quality Control Board. As part of that permit, the City must ensure that all new development must incorporate stormwater quality measures both during construction and post-construction. All erosion control and stormwater quality measures must be designed in accordance with the most recent NPDES permit in effect at the time the project is deemed complete.

B. Erosion Control/SWPPP

1. An Erosion Control Plan shall be included with the improvement plans. All projects shall include erosion control measures during construction. Typical erosion control measures shall include but not be limited to:

    a. Stabilized construction site access
    b. Perimeter protection, such as with fiber rolls or straw wattles
    c. Protection of drain inlets
    d. Protection of slopes

2. A Stormwater Pollution & Prevention Plan (SWPPP) shall be prepared for all projects that meet a minimum threshold in project size. The main elements of a SWPPP shall include the above measures found within the Erosion Control Plan, including the following:

    a. Concrete washout areas
    b. Material storage areas
    c. Waste disposal areas

    The SWPPP shall also include the following information:

    a. WDID Number associated with the Notice of Intent filed with the State Water Resources Control Board
    b. Site and Vicinity Map
    c. Site Description and Construction Activities
    d. Construction Site Pollutants and Control Practices
    e. Erosion and Sediment Control Practices
    f. Construction Monitoring Program and Reporting

    The SWPPP shall be kept onsite and made available for review at all times.

C. Post-Development Stormwater Quality

All new development projects shall be designed to treat post-development stormwater to the maximum extent practicable, in accordance with the City's most recent NPDES permit (Provision C.3) in effect at the time the project is deemed complete.

For all projects that meet a minimum threshold in project size, Post-Development Best Management Practices (BMP's) shall be included in the project design. These BMP's shall either be flow-based or volume-based. Examples of flow-based treatment measures are: vegetated swales, media filters, and hydrodynamic separators. Examples of volume-based treatment measures are: dry detention basins, wet ponds, and bioretention areas.

The sizing criteria for post-development BMP's can be found in Appendix C of the Fairfield-Suisun Urban Runoff Management Program's Stormwater Requirements for Development Projects, available at both the City of Fairfield Public Works Department and the Fairfield-Suisun Sewer District.

Depending on the project size, a Stormwater Treatment Measures Maintenance (O&M) Agreement may be required to ensure the ongoing operation, maintenance, and inspection of post-development BMP's. The O&M Agreement can be found in Appendix D of the Fairfield-Suisun Urban Runoff Management Program's Stormwater Requirements for Development Projects.

TABLE 1

RUNOFF COEFFICIENTS FOR RATIONAL METHOD

SURFACE OR AREA TYPE	RUNOFF COEFFICIENT, C
Paved areas (asphalt or concrete)	0.95
Industrial areas	0.85
Commercial areas	0.85
Residential areas	
Single family, avg. slope less than 2%	0.50
Single family, avg. slope between 2% and 7%	0.55
Single family, avg. slope greater than 7%	0.65
Multi-family, detached	0.65
Multi-family, attached	0.70
Schools	0.45
Agricultural land	0.45
Undeveloped open spaces, including pasture	
Average slope less than 2%	0.40
Average slope between 2% and 7%	0.47
Average slope greater than 7%	0.55
Oak timber and heavy brush	
Average slope less than 2%	0.35
Average slope between 2% and 7%	0.42
Average slope greater than 7%	0.50

These coefficients are to be used for a return period of 15 years. For return periods of 25 and 100 years, modify the table values as follows:

25 YEAR RETURN: C = TABLE VALUE X (1.07)
100 YEAR RETURN: C = TABLE VALUE X (1.25)

NOTE: No value of "C" shall be modified beyond 1.0.

TABLE 2

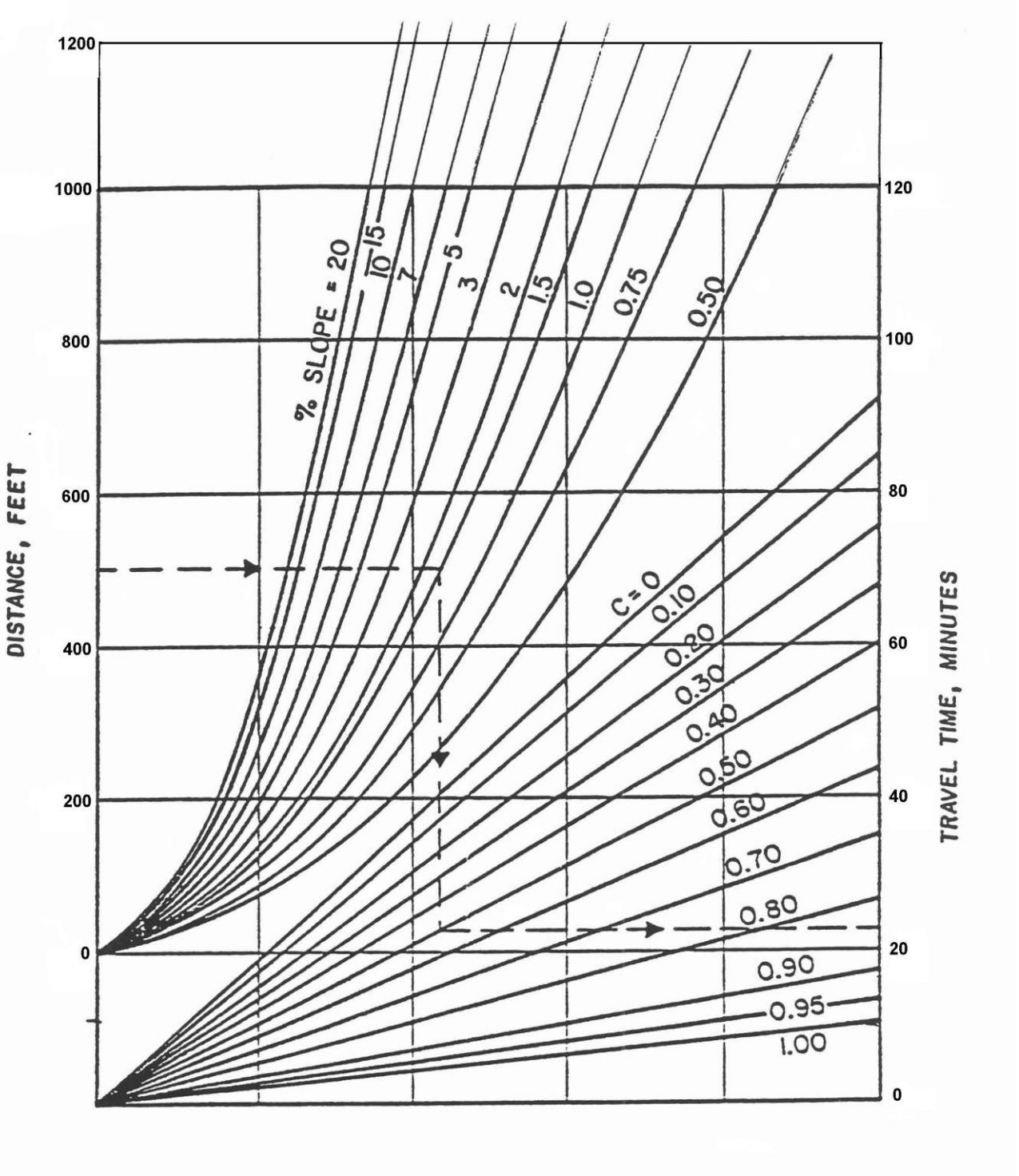
TIME OF CONCENTRATION IN MINUTES	INTENSITY OF RAINFALL IN INCHES PER HR.			TIME OF CONCENTRATION IN MINUTES	INTENSITY OF RAINFALL IN INCHES PER HR.		
	15YR	25YR	100YR		15YR	25YR	100YR
5	3.13	3.76	4.93	36	1.16	1.40	1.82
6	2.84	3.41	4.48	37	1.14	1.38	1.80
7	2.65	3.19	4.18	38	1.12	1.34	1.76
8	2.50	3.00	3.95	39	1.11	1.33	1.74
9	2.37	2.85	3.74	40	1.09	1.32	1.72
10	2.26	2.71	3.53	41	1.08	1.30	1.70
11	2.16	2.60	3.38	42	1.06	1.28	1.67
12	2.07	2.49	3.25	43	1.05	1.27	1.66
13	1.99	2.40	3.14	44	1.03	1.24	1.62
14	1.91	2.30	3.01	45	1.02	1.22	1.61
15	1.84	2.21	2.90	46	1.01	1.21	1.60
16	1.78	2.15	2.81	47	1.00	1.20	1.57
17	1.72	2.07	2.71	48	0.99	1.19	1.56
18	1.67	2.01	2.64	49	0.97	1.17	1.54
19	1.62	1.95	2.52	50	0.96	1.16	1.52
20	1.57	1.88	2.47	51	0.95	1.15	1.50
21	1.53	1.84	2.41	52	0.94	1.14	1.48
22	1.49	1.79	2.35	53	0.93	1.13	1.46
23	1.45	1.74	2.29	54	0.92	1.12	1.45
24	1.42	1.71	2.24	55	0.91	1.10	1.44
25	1.39	1.67	2.20	56	0.90	1.09	1.43
26	1.36	1.64	2.15	57	0.89	1.07	1.42
27	1.34	1.61	2.11	58	0.89	1.06	1.41
28	1.32	1.58	2.09	59	0.88	1.05	1.40
29	1.30	1.56	2.05	60	0.87	1.04	1.38
30	1.28	1.54	2.02	70	0.80	0.96	1.26
31	1.26	1.52	1.99	80	0.74	0.89	1.16
32	1.24	1.50	1.96	90	0.69	0.83	1.09
33	1.22	1.46	1.92	100	0.65	0.78	1.02
34	1.19	1.43	1.87	110	0.62	0.75	0.98
35	1.17	1.41	1.85	120	0.59	0.70	0.94

Roof-to-gutter time shall be taken as 9 minutes for residential areas and 5 minutes to on-site facilities for commercial and industrial sites.

The time of concentration shall be derived from a combination of the overland flow travel time from Figure 1, and the channel flow time to the design point.

Rainfall intensities obtained from this table are based on a mean annual precipitation of 21 inches. To correct these values for areas with different mean annual precipitation (MAP), apply the following correction to the tabulated intensities:
corrected intensity = (table value) x (actual MAP) / (21)

FIGURE 1



TRAVEL TIME FOR OVERLAND FLOW

FIGURE 2

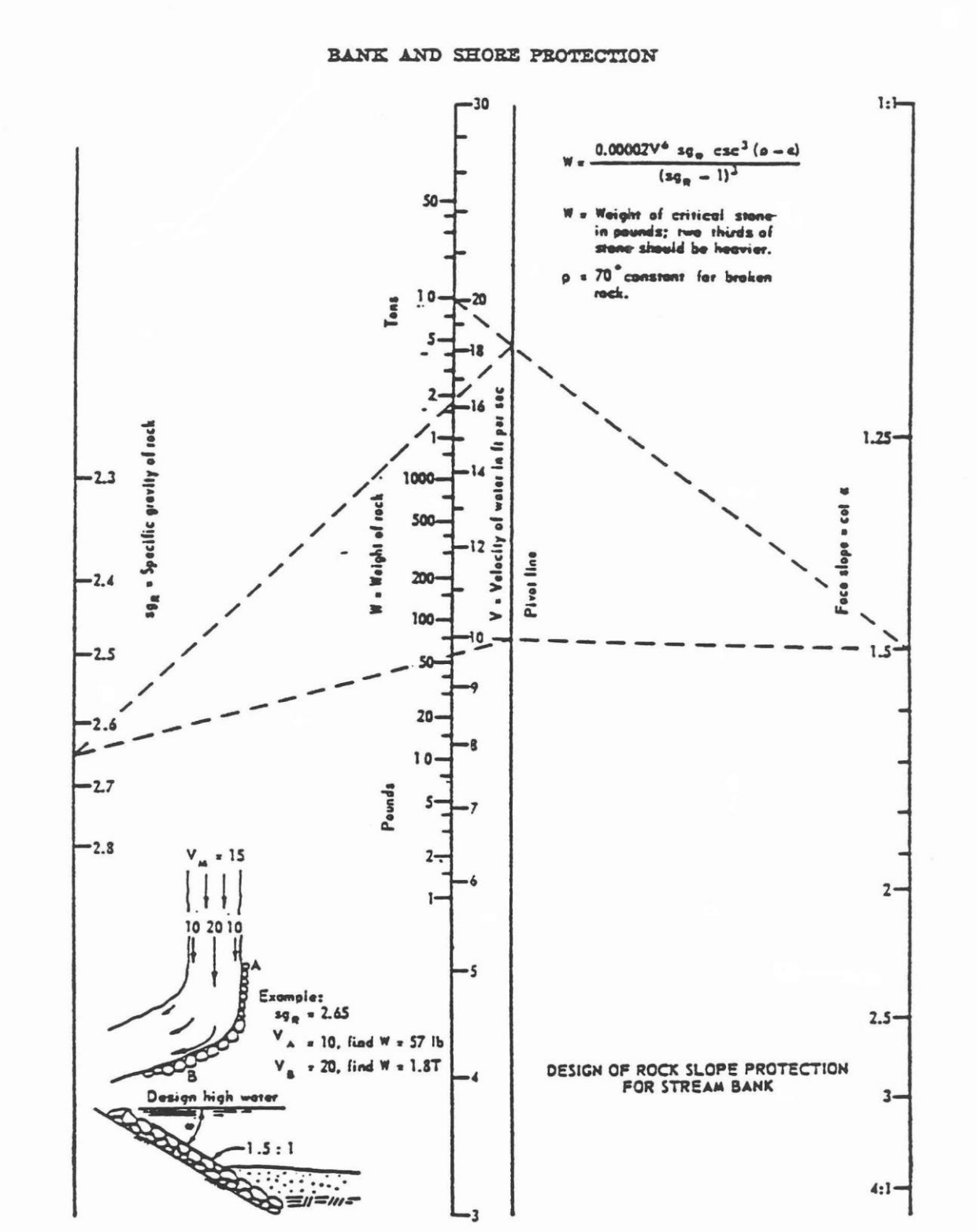
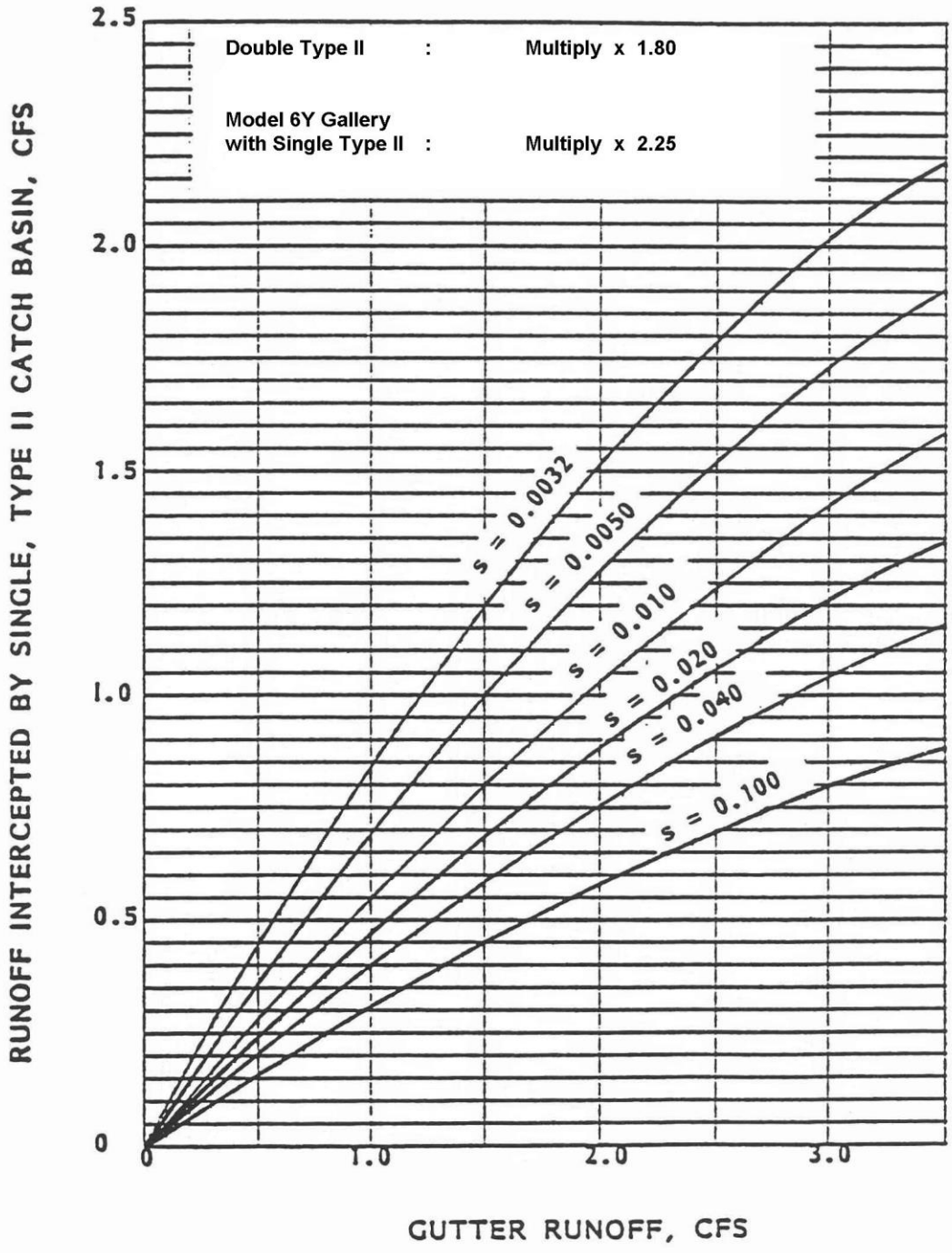

BANK AND SHORE PROTECTION
$W = \frac{0.00002V^6 \, sg_s \, \csc^3(\rho - \alpha)}{(sg_R - 1)^3}$
W = Weight of critical stone in pounds; two thirds of stone should be heavier.
ρ = 70° constant for broken rock.
sg_R = Specific gravity of rock
W = Weight of rock
V = Velocity of water in ft per sec
Pivot line
Face slope = cot α
Tons
Pounds
2.3
2.4
2.5
2.6
2.7
2.8
30
50
10
5
2
1
1000
500
200
100
50
20
10
5
2
1
20
18
16
14
12
10
9
8
7
6
5
4
3
1:1
1.25
1.5
2
2.5
3
4:1
V_M = 15
10 20 10
A
B
Example:
sg_R = 2.65
V_A = 10, find W = 57 lb
V_B = 20, find W = 1.8T
Design high water
1.5 : 1
DESIGN OF ROCK SLOPE PROTECTION FOR STREAM BANK

FIGURE 3

CURB INLET CAPACITY



SECTION 5: SANITARY SEWERS

5.1 GENERAL

A. System Design

Sanitary sewer system design within a developing area must include provisions for size and capacity to adequately convey all domestic and industrial waste that can be reasonably anticipated under conditions of full ultimate development. Engineering calculations to support the sewer system design shall be submitted to the City Engineer for approval. The calculations shall include:

1. Map indicating service area within the sewer system including any future contributing development with projected land use, zoning, and any physical features contributing to the sewer system design.

2. Sanitary sewer waste volumes either existing or proposed within the service area of the system.

3. Size and slope of each pipe between appurtenant structures.

4. Invert and rim elevations of each pipe and appurtenant structure.

B. Line Size and Service Policy

1. The line size and service policy requires that the minimum size of any new public sewer main shall be 8 inches in diameter.

2. All side sewers (laterals) 8 inches and larger shall be connected by or at a manhole along the sewer main.

3. The minimum lateral size is 4 inches where grade requirements can be met and the lateral's intended use is to serve single family residences. Six inch or larger laterals shall be installed where intended use is industrial, commercial or greater than single family residential flows. Joint use of laterals will not be permitted except in multi-family residential uses or commercial developments if approved by the City Engineer.

4. Laterals connecting residential, commercial, or industrial lots having a finished floor elevation 12 inches or less above the highest elevation of the nearest upstream structure shall require installation of an approved backflow prevention device next to and immediately upstream of the cleanout.

5. Sewers 12 inches and larger shall be designed in accordance with the Fairfield-Suisun Sewer District standards.

C. Separation of Sewer and Water Lines

Sanitary sewer design shall comply with the standards for the separation of water mains and sanitary sewers as stipulated by the California Department of Public Health and outlined in Section 64572,Title 22, of the California Administrative Code. Where the horizontal separation between sewer and water lines is less than 10 feet, from outside of pipe to outside of pipe, or where a sewer crosses over the top of a water line, special requirements shall apply for the type of pipe used and the location of joints.

D. Right of Way Policy

The right of way policy requires that all public sewers be in easements or rights of way granted or dedicated for sewers and/or public use. In the case of public right-of-way for streets, further dedication is not necessary.

Easements for sanitary sewers shall meet both of the following width criteria:

1. Minimum width of any easement shall be 15 feet.

2. All easements shall have a minimum width in feet 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 sewer pipes shall be centered within their easements.

3. Public sewer lines shall not be located between residential lots, unless otherwise approved by the City Engineer.

E. Annexation Policy

The service policy of the Fairfield-Suisun Sewer District requires that all properties served must annex to the City of Fairfield. Upon annexation to the City, all buildings inhabited or used by human beings within 200 feet of a sewer main shall be required to connect to the sewer system within 30 days.

5.2 DESIGN

A. Flow

The design sanitary sewer flow shall be computed using the following formula:

$$Q_D = Q_P + I$$

Where: Q_D = design flow (gallons per day)

Q_P = peak flow (residential only)

I = infiltration

The peak flow (Q_P) for residential service areas is defined as three times the average flow, with the average flow for the service area being computed from two basic assumptions:

1. 350 gallons per unit per day for single family dwellings, and

2. 280 gallons per unit per day for multi-family dwellings.

Acreage flow estimates for other than residential service areas are as follows. For other types of use not listed below, sewage flow rates shall be determined on a case-by-case basis:

	Average Flow (Gal./Acre/Day)	Peak Flow (Gal./Acre/Day)
Commercial Areas	1500	4500
Light Industrial Areas	2000	4000
Heavy Industrial Areas -	Sewage flow rate shall be considered on a case by case basis and may require special design.	

Infiltration and inflow (I & I) shall be computed by using 4000 gallons per inch diameter mile per day for sewer mains and laterals. Residential laterals shall be assumed to be a minimum of 75 feet in length.

B. Pipe Capacity

1. Manning's Formula $Q = A\ (1.49/n)\ R^{2/3}\ S^{1/2}$ shall be used to determine pipe capacity. The "n" value shall be 0.013 or the pipe manufacturer's recommendation, whichever is greater.

2. a. All main sewers shall be sized to carry the design flows at 70% of pipe capacity.

   b. Design capacities for trunk sewers 12 inches and larger, force mains, and sewer lift stations shall require approval by the Fairfield Suisun Sewer District Engineer.

C. Velocity

Sewer velocity shall be equal to or greater than 2 feet per second for all sewers when flowing full. Sewers which will exceed 50% full at ultimate development shall have their minimum design slope determined using a minimum velocity flowing full of 2 feet per second. Sewers which will not exceed 50% full at ultimate development shall have a minimum design velocity flowing full of 2.5 feet per second. Where design velocities for main sewers exceed 10 feet per second, polyethylene lined ductile iron pipe conforming to Section 12 of the Specific Provisions shall be used. The ductile iron pipe shall be wrapped with a 40 mil polyethylene blanket.

D. Pipe Cover and Clearances

1. Minimum pipe cover and clearance shall be maintained in the design of sanitary sewers. If certain conditions exist which make it impractical to meet the minimum cover and clearance requirements, the conditions and locations shall be specifically noted above the sewer profile on the plans. Each location not meeting the minimum cover and clearance requirements will require special approval. Any planned condition being specially approved with less than minimum cover will require special pipe, bedding and/or backfill as directed by the City Engineer.

   Other utilities shall not, under any circumstances, be installed directly over and parallel to any sanitary sewer line installation.

2. Main and trunk sewers shall have a minimum depth of 6 feet as measured from the top of the pipe to the finished grade.

3. Laterals shall have a minimum cover of 5 feet from the top of the pipe to the top of curb at the face of curb.

4. Pipe shall be laid with a minimum of 12 inches vertical clearance from water lines and 6 inches clearance from all other improvements and utilities, unless otherwise approved by the City Engineer.

E. Horizontal and Vertical Curves

1. Except for frontage roads, the location of sewer mains and trunks relative to the centerline of sewer main and trunk, shall be located 6 feet from the centerline of the street on the southerly or westerly side of the street.

2. Sanitary sewer mains shall be on a straight line between manholes, unless otherwise approved by the City Engineer. Whenever it is essential that a curved alignment be used, a minimum radius of 200 feet shall be required, but shall be greater whenever possible. The radius and delta of all curves shall be indicated on the plans adjacent to the curve.

3. The deflection in the joint between any two successive pipe sections shall not exceed eighty 80% of the maximum deflection as recommended in writing by the pipe manufacturer. Minimum 2 foot pipe lengths may be used to install short radius curves providing the requirements specified herein are met.

F. Lateral Sewers

Laterals are those portions of the sewer system between the sewer main and the portions of the sewer maintained by the property owner. The usual location

of the line of responsibility is the back of sidewalk cleanout. In all cases, City maintained sewer lines will lie in a street right-of-way or dedicated public easement. In all new subdivision work, the house lateral line including cleanout from the sewer main to the property line shall be installed at the time the sewer main is constructed. Whenever a sanitary sewer is installed which will serve existing houses or other buildings, a lateral line shall be constructed for each existing individual house or building. Each lateral line shall be referenced to the improvement plan stationing. Each individual single-family residential building shall be serviced by a separate lateral to the sewer main.

1. All laterals, from property line or edge of easement to the point of connection with the main line or a manhole shall have an alignment that provides an angle of intersection with the downstream section of the main sewer of no more than 90°.

2. The maximum deflection at any one point in a lateral, not including fittings at saddle or wye connection to main sewer or at angle points having clean outs, shall be 22-1/2° (1/16 bend) and any two consecutive deflections (bends) shall not be less than 2 feet apart.

3. Cleanouts shall be provided in the lateral sewer within the City right-of-way at the back of sidewalk as shown on the Standard Details.

4. Cleanouts shall be constructed and located in conformance with the City Standard Details.

5. Backflow prevention devices may be required as specified in Section 5.1 B.

G. Appurtenances

Manholes - Normal maximum spacing for manholes shall be 500 feet. Where the location of two manholes is determined by intersecting lines, the distances between intervening manholes shall be approximately equal. Sewers on curved alignment with a radius of less than 400 feet shall have manholes spaced at a maximum of 300 feet on the BC or EC of the curve or adjusted to fit the individual case.

The spacing of manholes on trunk sewer lines 12 inches and larger in diameter shall be proposed for each individual case and shall be approved by the Fairfield Suisun Sewer District Engineer.

Whenever, at manholes, a change in the size of pipe, or an angle of 20° or more in alignment occurs, the flow line of the incoming pipe shall be a minimum of .17 feet above the flow line of the outgoing pipe, or an amount necessary to match inside pipe crowns. The Consulting Engineer shall show invert in and invert out of the proposed manhole.

Drop manholes will not be allowed; furthermore, drops in excess of 2 feet will not be permitted on an 8-inch or 10-inch sewer line – The Fairfield Suisun Sewer District may approve drop manholes on sewer lines 12 inches and larger.

Manholes shall be used at the termination of all sewer mains including cul-de-sacs and those lines which may be extended in the future. Laterals may be connected to this manhole for services to adjacent properties within the cul-de-sac.

Paved vehicular access shall be provided to all sewer manholes.

H. Unusual Design

Special design of sewer lift stations, force mains or other unusual features or structures require individual study and approval by the City Engineer and the Fairfield-Suisun Sewer District Engineer.

SECTION 6: WATER SYSTEM

6.1 GENERAL

A. Water system design within a development area and all improvements including extensions, replacements, and repairs shall conform to the requirements of the Uniform Plumbing Code, National Board of Fire Underwriters, American Water Works Association Standards, State Health Department, Fairfield Administrative Regulations, the Code of the City of Fairfield, and these Standard Specifications and Details of the City of Fairfield.

B. Water system design shall comply with the criteria for the separation of water mains and sanitary sewers as stipulated by the California Department of Public Health and outlined in Section 64572, Title 22, of the California Administrative Code. Where the horizontal separation between sewer and water lines is less than 10 feet or where a sewer crosses over the top of a water line, special requirements shall apply for the type of pipe used and the location of joints.

C. The existing City of Fairfield water system supplies treated water within the developed area of the City including those properties in Cordelia within the City boundary. Fairfield uses a reservoir gravity network including pump stations to pressurize its distribution system. Pressure zones are determined as follows:

Pressure Zone	Elevations Served (ft)
I	0 - 100
II	100 - 200
III	200 - 300
IV	300 - 400

Elevations are based on the building pad elevation. Occasionally, pump stations alone are allowed to serve areas (without a reservoir), as approved by the City Engineer.

D. All City owned water system facilities shall be installed only in public streets, easements or right of way.

A single service connection shall not serve more than one premise except in multi-family dwellings. Separate premises under a single ownership, control or management shall be supplied water through separate service connections.

More than one service shall not be supplied to a single property for the purpose of avoiding water connection charges.

Reference is also made to Title 17, Chapter V, Sections 7583 - 7622 inclusive of the California Administrative Code, regulating the construction of cross connections between drinking water systems and other sources of water. All construction shall be in strict compliance with said regulations and City of Fairfield Municipal Utilities Administrative Regulations.

6.2 DESIGN

A. Layout of Mains

The distribution system, whenever possible, shall employ the "Gridiron System" of water circulation so as to allow pressure equalization. All water pipelines designed for the transmission or distribution of domestic water supply shall be constructed and installed within the right-of-way of public streets or roads, unless such construction or installation is determined to be impractical by the City Engineer.

The location of the water main in any street shall be 5 feet from the centerline of the street on the northerly or easterly side of the street.

The Consulting Engineer shall show, on the profile of improvement plans, inverts of pipe at all changes in grade and in all areas where conflicts with other utilities might arise, he shall also show the top of pipe. A detail shall be drawn of such conflicts with sufficient information shown that the City Engineer can make a determination as to the adequacy of the solution shown.

B. Sizes

In general, the minimum size water main shall be 8 inches in diameter. The installation of 6 inch mains may be permitted in cul-de-sacs where there is no fire hydrant installed within the court. All dead end mains shall be provided with a standard blow-off or other acceptable means of flushing.

In all cases, water mains shall be of sufficient size to meet fire flow requirements as outlined by the requirements of the Insurance Services Office.

C. Pipe Materials

Allowable materials are those specified in Section 12.2 of the Specific Provisions.

D. Corrosion Analysis and Cathodic Protection

Corrosion analysis will be required for all water mains that include material susceptible to corrosion (such as Mortar Lined and Coated or Concrete Cylinder Steel Pipe). Cathodic Protection shall be designed into the overall water system as necessary.

E. Valves

The distribution system shall be equipped with a sufficient number of valves so that no single shutdown will result in shutting down a transmission main, or necessitate the removal from service a length of pipe greater than 500 feet in high density districts or greater than 800 feet in other districts; additionally, in no case shall more than two fire hydrants be removed from service. The valves should be so located that any section of main can be shut down without going to more than three locations to close valves. All tees shall have two valves and all crosses shall have three valves. Valves, incorporating a blow-off device, shall be installed at the boundary of development. A valve shall be installed on each side of services to all hospitals, schools and major industrial sites as directed by the City Engineer. Air Release Valves shall be required at every high-point along the water main or as approved by the City Engineer. Valves that require a kicker shall be wrapped with 6mil plastic to protect the valves and bolts from the concrete.

F. Fire Hydrants

Fire hydrants shall be placed at street intersections whenever possible at a maximum spacing of 500 feet measured along the street frontage. Fire hydrants on streets without fronting lots shall have a maximum spacing of 1,000 feet. The minimum size water main serving a fire hydrant shall be 8 inches and no more than two hydrants will be allowed on any 8 inch line between intersecting lines. Fire hydrant spacing and location shall be reviewed and approved by the Fire Marshal.

Fire hydrants shall be installed as specified in the City Standard Details.

G. Fire Sprinklers

Fire sprinklers will be required in all residential structures, unless otherwise approved by the Fire Marshal.

H. Services

Service lines from the water main to the property line shall normally be installed at the time the main is constructed to avoid frequent cutting of the street. The service line from the water meter to the water main shall be perpendicular to the street and be one straight line with no angles or bends.

In all new subdivisions, the residential service line shall be located near the centerline of the lot to be served, outside of the driveway. The service line to existing buildings shall be located so as to make the most direct connection to the existing structure.

Pressure reducing valves shall be required on all structures where pressure exceeds 80 psi. The pressure reducing valves shall be installed on the water entrance side of and at the location of the house gate valve. The pressure shall be set at 80 psi at the time of installation. It will be the responsibility of the

consulting engineer to show which structures will not exceed the 80 psi pressure.

All water pipelines shall be designed such that for a given class of pipe, there is a minimum 50 psi safety factor between maximum static pressure of the installed pipe and its rated working pressure.

The water service manifold is intended for sites where there is limited frontage space for driveways, utilities, trees, etc. Points of connection upstream of the City's water meter shall not be allowed. The City Engineer reserves the right during the review/approval process to determine whether a manifold may be installed. The City Engineer may require the installation of a manifold at site(s) for the sole convenience of the City. Each water service shall be sized appropriately and is intended to serve an individual unit (i.e. water services shall not be connected together downstream of the backflow device). An approved backflow preventer must be installed on each water service.

I. Backflow Prevention Devices

All backflow prevention devices shall be lead-free and approved by the California Department of Public Health and the USC Foundation for Cross Connection Control. Backflow prevention devices shall be installed to protect the public water supply from contamination where back pressure or back siphonage may exist between the City water system and the system on the customer's side of the water meter. An approved backflow prevention device shall be installed on the customer service line for premises:

1. Having an auxiliary water supply.

2. On which any hazardous fluids or pollutants are handled or stored which create a potential contamination hazard to the City water system.

3. Having intricate plumbing and piping arrangements or where it is difficult to ascertain whether or not dangerous cross connections exist.

4. Having internal cross connections that cannot be permanently corrected and controlled.

5. Having an irrigation system connected to the City water system.

6. Having a non-residential fire protection system connected to the City water system.

The type of backflow prevention device to be installed shall be commensurate with the degree of hazard. Section 37, "Cross Connection Control Requirements," of the Fairfield Municipal Utilities Administrative Regulations provides guidelines for the selection of the appropriate backflow prevention device. As a general rule, the following guidelines shall apply:

1. Double-Check Valve: Shall be installed for fire protection purposes only, and where there is no possibility of hazardous fluids or pollutants entering the public water system.

2. Reduced Pressure Principal Device (RP): Shall be installed where there is the potential for hazardous fluids or pollutants entering the public water supply.

3. Detector Check Valve: Shall be installed on fire lines serving only private fire hydrants where there is no fire truck pumper connection.

4. Double-Check Detector Check Valve Assembly: Shall be installed on fire lines serving building sprinkler systems where there is a fire truck pumper connection on the fire line.

Backflow prevention devices shall be located near the curb or back of sidewalk, installed perpendicular to the street or sidewalk, and shall be visually screened with landscaping. Landscaping shall be installed so as not to preclude access for testing and maintenance. Backflow prevention devices shall not be located in driveways or parking areas. Bollards or protective walls shall be installed as needed to protect backflow prevention devices.

Backflow prevention devices shall be equipped with an insulated cover to help protect the devices from extreme temperatures.

J. Anchors

Concrete anchors or thrust blocks shall be provided at all bends, behind tees, fire hydrants, crosses which are valved in such a manner that they can be used as tees, and at valves, as shown in the City Standard Details.

K. Fittings

Standard approved fittings shall be used at all bends of 11-1/4 degrees and greater. Deflections shall not exceed 80% of manufacturer's recommended values.

L. Cover Requirements

Water mains and services shall be installed at a depth which will provide a minimum of 48 inches from the top of the pipe to finished grade or a minimum of 24 inches from the top of pipe to the street subgrade, whichever is greater.

M. Easement Requirements

On-site interior water lines outside the public right-of-way to be dedicated to the City shall require easement dedication. Easements for water lines shall meet both of the following width criteria:

1. Minimum width of any easement shall be 10 feet.

2. All easements shall have a minimum width in feet 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 lines shall be centered within their easements.

N. Unusual Design

Special design of water mains, such as crossings of seismic faulty zones, requires individual study and approval by the City Engineer.

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SECTION 7: LIGHTING

7.1 GENERAL

A. These specifications shall cover the design and installation of lighting, both themed and standard, and all other related appurtenances. The City owns and maintains the entire public street light network under the PG&E LS-2 tariff. As such, the street light system shall be designed and constructed to the specifications identified herein.

B. For the purposes of these specifications, standard lighting and intersection shall be defined as the "Cobra Head" style luminaires (or equivalent) with tapered spun aluminum shafts. Theme lighting shall be defined as special architectural lighting of various styles. Lighting for public streets can be both “Cobra Head” style or “themed” architectural.

C. The lighting shall be submitted to the Traffic Engineer for review/approval in accordance with Section 2.2 (C)4.

D. The cost for all PG&E services and conduit to the point of connection shall be paid for by the developer at which time the City officially accepts the project through final City Council approval. This shall include any PG&E coordination, application and the connection charge for energizing all lights.

7.2 DESIGN

A. General Lighting Requirements

1. Design (Public Streets)

All new intersection and non-intersection cobra head style and theme (decorative)lighting shall be Light Emitting Diode (LED) and designed to the RP-8-18 Illuminating Engineering Society (IES) of North America recommended practices published by American National Standards Institute or the current revision. The Traffic Engineer will approve final spacing.

In general, the spacing, intensity, and mounting height such that the following minimum luminance (L_{avg}-cd/m^2) levels and uniformity are maintained:

	Minimum Footcandle (fc)	Uniformity
Residential	0.07	6/1
Collector	0.10	4/1
Arterial	0.12	3/1

The City reserves the right to make deviations of the light locations on the photometric plan based on practicality, proximity to other structures, or roadway geometry. All fixtures shall be tested under the US Department of Energy LM 79 criteria providing actual input watts and overall fixture performance. The overall performance shall be meet those identified by the fixture in this section. The individual LEDs shall be tested under the US Department of Energy LM 80 criteria LED testing with the TM-21 process used to project long term lumen depreciation.

General spacing guidelines will range between 100-200 feet depending on fixture type, distribution, fixture intensity, number of lanes, and width of medians.

For purposes of the street light photometric calculation, the following shall apply:

a. Lateral distribution: Type II for residential and collectors
Type III for arterial and intersections

b. Total LLF = 0.85
   i. Lamp Lumen Depreciation = 0.944
   ii. Dirt Depreciation = 0.90

c. Lamp type: Light Emitting Diode

d. Lamp Life: L_{85} – 100,000 hours

e. Luminaire Warranty: 10 years

f. Color Correlated Temperature - 4000k – 4500k

g. Individual LEDs – Shall be Cree, Lumileds neutral white.

h. City approved cobrahead style street lighting shall be Leotek or Beta

i. City approved themed, architectural lighting shall be Hadco or Lumec for interchangeability of parts and equipment.

Other variables necessary to complete the photometric calculation shall be determined as the design condition dictates. Variation from the aforementioned requirements may be approved on an individual basis by the City Engineer.

2. Location of Lights (Public Streets) – The photometric plan shall dictate location or placement of the street light; however, the designer shall consider these elements:

a. Whenever possible, street lights shall be located on a property line.

b. On streets with separated sidewalks, lights can be located at the back of curb within the parkway strip but no less than 24” from the pole to the back of the curb, while maintaining a clear ADA path of travel.

c. On streets with monolithic curb, gutter, and sidewalk, lights shall be located at the back of sidewalk. The edge of the pole foundation shall meet the back of sidewalk.

d. Where there is only curb and gutter, the center of the street light foundation shall be located a minimum as required by ADA for clear unobstructed travel from the back of curb.

e. Other Considerations:

i. T intersections - A street light located on the through street along the projected centerline of the intersecting street.
ii. Four way signalized intersection/major streets - Street lights shall be located at all curb returns or on the signal standards.
iii. Four way un-signalized intersection/major and minor street - Street lights located at the far right curb returns of the major street in the direction of travel.
iv. Four way intersection/minor streets - A street light located at one of the returns.
v. Mailbox enclosures areas
vi. Trash enclosures areas
vii. Opposite reverse of residential knuckles

f. Lights will normally be staggered or direct opposite sides of the street and designed around 120V system with #8 American Wire Gauge (AWG) in accordance to the photometric output.

g. Higher voltages, such as 240V and 277v can be considered in public parks and pathways or other on-site City owned facilities at the request of the City Engineer.

B. Standard Lighting (Public Streets)

1. Single Arm Lights ("Cobra Heads") at intersection and non-intersection shall be aluminum and have a 28’-6” mounting heights:

2. All lights shall have a single 8’ arm including those located in median islands.

3. Light height, luminaire model, and arm length shall be as shown in the standard details.

C. Themed (decorative) Lighting (Public Streets)

1. Theme street lighting is specialized in nature, reflecting community design, the surrounding environment, or other architecturally pertinent factors. For interchangeability, the City uses Lumec and Hadco. When theme lighting is desired, it will be the consultant engineer's responsibility to show that the proposed street lighting system meets the requirements of Section 7.2.A of these standards. Concrete poles are not permitted on public streets. Concrete poles are utilized in park and park pathways only. The following criteria shall be adhered to when designing theme street lighting:

   a. Components such as ballasts, refractors, photocells, etc. shall be compatible with theme street lights already in use throughout the City utilizing tool-less access.

   b. Street lights shall have bolted bases with separate foundations. Direct burial poles will not be allowed under any circumstances on street frontages.

D. Themed (decorative) Lighting (Pedestrian Park Pathway-Direct Buried Foundations)

1. Themed pedestrian park pathway lighting is specialized in nature, reflecting community design, the surrounding environment, or other architecturally pertinent factors. When theme pedestrian park pathway lighting is proposed as a part of the project, it will be the engineer's responsibility to show that the proposed lighting system meets the requirements as set forth below. The following criteria shall be adhered to when designing theme pedestrian park pathway lighting:

   a. Shall be Lumiled™ technology
   b. The LEDs will be driven at no more than 75% of its maximum milliamp rating for an L_{85} = 100,000 hours lamp life depreciation
   c. The enclosure shall be a minimum of IP66 sealed enclosure
   d. Shall be LED light fixture- Lumec™ Domas Series Model #DMS50-90W49LED4K-ES-[LE2F-001]-(120-277)-ACDR-BRTX, Bronze finish, LED fixture with Type 2 Distribution cut-off, Flat Polycarbonate Lens or equal prior to bidding.
   e. Lamps- (120-277) volt, 95w LED
   f. Arm- Lumec™ Model CN1-1A-OV-RC-BRTX with custom pole adapter or equal prior to bid.
   g. Pole- Ameron, MEO05SPL-BZ-2
   h. Pole finish- Bronze
   i. The park pathway light spacing shall be about 100 feet o.c., staggered.

j. The fixture shall be a tool-less entry
k. The individual LEDs shall be tested under the US Department of Energy LM 80 criteria maximum milliamp rating for 6,000 hours at 113 degrees C.
l. Maximum 4,500 K
m. The fixture shall be tested under the US Department of Energy LM 79 criteria providing actual input watts and overall fixture performance. The overall performance shall be meet those identified by the fixture in this section.

E. Themed Lighting (Park Parking Lot Lighting)

1. Themed parking lot lighting is specialized in nature, reflecting community design, the surrounding environment, or other architecturally pertinent factors within the park. When required, it will be the engineer's responsibility to show that the proposed themed parking lot lighting system meets the requirements as indicated below of these standards. The following criteria shall be adhered to when designing theme park parking lot lighting:

a. LED light fixture- Lumec Domas Series
    a. Shall be lumiled technology
    b. Double Head – Model #DMS50-90W49LED4K-ES-[LE4F-001]-(120-277)-SMB-RC-BRTX, Bronze finish, LED fixture with Type 4 Distribution cut-off, Flat Polycarbonate Lens or equal prior to bid.
    c. Single Head – Model #DMS50-90W49LED4K-ES-[LE4F-001] -(120-277)-RC-HS-BRTX, Bronze finish, LED fixture with Type 4 Distribution cut-off, Flat Polycarbonate Lens with internal house side shield or equal prior to bid.
b. Lamps- (120-277) volt, 95w LED
c. The LEDs will be driven at no more than 75% of its maximum milliamp rating for an L_{70} = 70,000 hours lamp life depreciation
d. The enclosure shall be a minimum of IP66 sealed enclosure
e. Shall be lumiled technology
f. Pole (single)- Ameron Mode: MBO06-BZ-2, Arm : MOAP4A
g. Pole (double)-Ameron Model: MBO06-BZ-2, Arm : MOAP4DA
a. Pole finish- Bronze
b. Maximum 4,500 K
c. Typical Parking Lot light spacing is about 80 feet o.c.
d. The fixture shall be a tool-less entry
e. The individual LEDs shall be tested under the US Department of Energy LM 80 criteria maximum milliamp rating for 6,000 hours at 113 degrees C. Only CREE or Lumileds are permitted.
f. The fixture shall be tested under the US Department of Energy LM 79 criteria providing actual input watts and overall fixture performance. The overall performance shall meet those identified by the fixture in this section.

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SECTION 8: TEMPORARY TRAFFIC CONTROL

8.1 GENERAL

A. Design

The design and installation of all temporary traffic control shall conform to these specifications, the Code of the City of Fairfield, Section 86 of the California State Specifications and Standard Details, and the current version of Chapter 6 of the CA MUTCD.

Temporary Traffic Control Devices design shall include, but not be limited to, lane/parking delineation or channelization and markings, signage, and traffic signals. Bicycle, pedestrian, and driveway access shall be maintained at all times. If access cannot be maintained, an alternative maybe submitted to City. The designer shall take into consideration special events and how the traffic may impact the work site.

The developer or consultant will be responsible for the design and layout of all necessary temporary traffic control devices, including, but not limited to: signs, pavement striping, pavement markings, traffic signals, channelization, and raised pavement markers for development projects.

For small or localized projects, the contractor shall be responsible for submitting a traffic control plan in accordance with these City requirements. Requirements can be obtained from the City's website.

Temporary traffic control devices shall be designed in accordance with the CA MUTCD and as directed by the City Engineer and/or City Traffic Engineer.

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SECTION 9: NON-POTABLE WATER SYSTEM

9.1 GENERAL

A. Design of non-potable water system facilities shall conform to the requirements of Section 6, WATER SYSTEM, of these standards and the AWWA Guidelines for Distribution of Non-potable Water except as modified or expanded upon in this section.

B. Non-potable water system design within a development area shall conform to the City of Fairfield Water Reclamation Study, 1987, or more recent City planning documents.

C. The non-potable water system supplies untreated water (raw water) or treated wastewater (reclaimed water) to designated areas of the City of Fairfield for irrigation, industrial processes, construction or other uses as may be determined by the City. The areas served and acceptable uses shall be determined by the City in accordance with the standards of treatment and water quality requirements set forth in Title 22, Chapter 4 of the California Administrative Code, with the intent of the City to protect public health, and subject to the availability and/or feasibility of making available non-potable water.

9.2 CONVERSION FROM POTABLE TO NON-POTABLE SUPPLY

A. Any system converting from potable to non-potable supply shall conform to all requirements for a non-potable system as set forth in these standards.

B. The system to be converted shall be investigated in detail to determine the measures necessary to bring the system into full compliance with these standards and to insure that it can be completely isolated from the potable system.

C. Approved backflow prevention devices shall be required on any potable supply to the premises that is to remain in service.

D. Backflow prevention devices may be required on non-potable water systems serving commercial and industrial sites, as determined by the City Engineer. Backflow prevention devices shall be removed from potable water systems when they are converted to non-potable water supply as directed by the City Engineer.

9.3 CONVERSION FROM NON-POTABLE TO POTABLE SUPPLY

A. Any system converting from non-potable to potable supply shall conform to all requirements for a potable system as set forth in these standards.

B. The non-potable supply shall be completely isolated. The service line shall be removed and plugged at the City main or abandoned in a manner approved by the City.

C. Approved backflow devices shall be installed as required.

D. All warning signs, labels, special couplings or other devices intended to indicate the presence of non-potable water shall be removed.

E. The system shall be flushed and sanitized prior to connecting to the potable water supply.

9.4 DESIGN OF MAINS

A. Layout of Mains

Non-potable water mains shall normally be located on the southerly or westerly side of the street, 10 feet from the sanitary sewer line or midway between the sanitary sewer and the storm drain where less than 10 feet is available. In not case shall the non-potable water line be less than 3 feet from a sanitary sewer or 10 feet from a potable water line without City approval.

Normally, potable water, non-potable water, and sewer lines shall be located vertically with the higher quality at the top and proceeding downward. Minimum depth of cover shall be 4 feet. Whenever a crossing must occur where a non-potable water main passes within 3 feet of a potable water main or sewer main, special construction shall be required. Encasement shall be one of the following types:

1. Reinforced concrete with a minimum thickness of 6 inches.

2. A continuous steel casing, with a minimum wall thickness of 1/4 inch and with all voids between pipe and casing pressure grouted with sand-cement grout. Protective coatings and casing size shall require approval by the City Engineer.

B. Sizes

The minimum size for non-potable water mains shall be 6-inch. Specific sizes for any case shall be determined by the City Engineer.

C. Fire Hydrants

Fire hydrants shall not be installed on non-potable water mains.

9.5 IDENTIFICATION

All non-potable water pipelines and related facilities shall be provided with an identification tape and stenciled pipe. Onsite facilities provided with non-potable water shall have suitable signs posted to notify the public that non-potable water is being used. A detailed signing plan shall be prepared and submitted with the construction plans showing placement, wording, and size of all signs.

9.6 ONSITE FACILITIES

A. Design of Non-potable Water Facilities with Temporary Potable Water Service

Where non-potable water is not immediately available for use when the facilities are ready for construction, and if the City Engineer has determined that non-potable water will be supplied in the future, the onsite facilities shall be designed to use non-potable water and shall conform to the City's standards as set forth herein. Provisions shall be made as directed by the City Engineer and theses specifications to allow for connection to the non-potable water system when such service becomes available. In the interim, potable water will be supplied to the non-potable water facilities through a temporary potable water meter connection. Until non-potable water becomes available, potable water rates will be charged.

A backflow prevention device acceptable to the City Engineer will be required as long as the onsite facilities use potable water. The backflow prevention device shall be downstream of the meter and a part of the onsite facilities. When non-potable water becomes available, the Owner may be allowed to remove the backflow prevention device. All work associated with the removal of the system shall be the responsibility of the Owner. A City Encroachment Permit will be required.

B. Construction Plans

Construction Plans prepared in accordance with the requirements of Section 2, Construction Plans, shall be submitted for onsite facilities that are to be supplied with non-potable water.

Plans must include the location and size of all pipe and irrigation facilities including sprinkler manufacturer, model, sprinkler radius and pattern, operating pressure and flow rate. Plans must also show any drinking fountains or eating facilities in the area. If no such facilities exist or are planned it shall be so noted on the plans.

C. Prohibitions and Limitations

Design of onsite non-potable water facilities shall conform to the following:

1. The non-potable water system shall be separate and independent of any potable water system. Cross connections between potable and non-potable water facilities are forbidden.

2. Hose bibs and fire hydrants are prohibited on non-potable water systems.

3. Non-potable water uses shall be limited to approved uses and irrigation of designated areas.

4. Non-potable water shall not be used to irrigate any enclosed private rear yard, patio, indoor atrium or planter.

D. Facilities shall be designed to limit or prevent overspray and runoff. The use of subsurface or drip irrigation is encouraged to minimize water usage and control runoff. Irrigation systems shall be designed to conform to the following:

1. The system shall be designed to meet the peak moisture demand of all plant materials to be irrigated. The use of moisture sensors is encouraged.

2. Discharge to areas outside the designated irrigation area shall be prevented.

3. Application rates shall not exceed the infiltration rate of the soil. Where soil types vary, the system shall be designed to be compatible with the lowest infiltration rate in the area. Copies of the soils test reports shall be provided to the City Engineer by the owner on request.

4. Drinking fountains and picnic tables in an area to be irrigated by non-potable water shall be protected from windblown spray in a manner approved by the City Engineer.

E. Non-potable water lines shall not be installed in the same trench as potable water lines. A minimum of 10-feet horizontal and 1-foot vertical shall be maintained between non-potable and potable water lines with the potable water line above the non-potable water line.

Where non-potable and potable water lines 6-inches or larger in diameter cross, the provisions of Section 9.4.A shall apply. If the lines are less than 6-inches in diameter the non-potable water line shall be installed in a PVC Class 200 pipe sleeve which extends a minimum of 5 feet on either side of the potable water line. A minimum of 6-inches of vertical clearance shall be provided.

F. Strainers shall be provided immediately downstream of the meter. The strainer shall have a 30-mesh screen or finer. The landscape architect shall be responsible for determining the need for a finer screen depending on the requirements of the irrigation system.