

## DESIGN CRITERIA AND IMPROVEMENT STANDARDS<sup>1</sup>

### Chapter:

**18R.04 Application and Definitions**

**18R.08 Design Criteria**

**18R.12 Improvement Standards**

**18R.36 Subdivision Improvement Requirements**

**Table: (Tables follow Chapter 18R.08)**

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### Chapter 18R.04

## APPLICATION AND DEFINITIONS

### Section:

**18R.04.010 Application of title.**

**18R.04.020 Definitions.**

#### **18R.04.010 Application of title.**

A. The design criteria set forth herein are provided for the purpose of insuring that subdivision and nonsubdivision public right-of-way and private street improvements constructed within the city are designed in such a manner that each meets or exceeds uniform levels of sound engineering practice and that the individual elements contained therein have a uniform level of development with no single element overdesigned to the detriment of another.

B. The improvement standards set forth herein are to insure that subdivision improvements and nonsubdivision public right-of-way and private street improvements are constructed in such a manner that they meet or exceed a uniform level of quality workmanship and construction.

C. The design criteria and improvement standards set forth herein may be modified by the advisory agency incident to approval of a subdivision or any other entitlement or authorization provided for in Title 18 of this code upon making any of the findings provided for in Section 18.44.020 of Title 18 of this code. In addition, the design criteria and improvement standards set forth herein may be modified by the community development or public works departments incident to approval of a building permit, encroachment permit or any other permit or authorization requiring their approval upon making any of the findings provided for in Section 14.14.075 of Title 14 of this code.

(Res. No. 9 77-78 (part), Res. No. 110 86-87 §1, Ord. 1935 §8, Res. No. 133 95-96 §8, Res. No. 150 96- 97, Res. No. 113-07, Res. No. 19-13)

#### **18R.04.020 Definitions.**

For the purpose of this title, the following words and phrases shall have the meanings defined in this section unless from the context a different meaning is intended; provided, however, that whenever any word or phrase used in this title is not defined, but is defined in Title 1, Title 14 or Title 18 of this code, such definitions are incorporated herein and shall be deemed to apply to such words and phrases when used in this title:

A. "Accessway" means a parcel of land not dedicated as a public street but intersecting or connecting with a public or private street for which a private easement for road purposes has been granted to the owners of the property contiguous or adjacent thereto.

B. "Backup lot" means a lot which has a rear yard which abuts an arterial street. See also Figure 1.

C. "Block" means a parcel of land, containing one or more lots, surrounded on all sides by a street.

D. "Construction specifications" means the construction specifications of the city.

E. "Contractor" means the person responsible for the actual construction of a subdivision or public right-of-way improvement.

- F. "Curb return" means that portion of a curb which provides a curved transition in alignment between two curbs on intersecting streets.
- G. "Culvert" means any storm drainage conduit (other than an open channel) including a storm drainage pipe and box culvert structure which conveys surface water runoff beneath a street, easement or right-of-way.
- H. "Dead-end street" means a street which is closed to through traffic.
- I. "Density" means the residential density established by the Chico General Plan Land Use Element expressed as a number or range of dwelling units per gross acre. The number or fraction of gross acres contained in a site shall include the entire lot area measured in a horizontal plane together with the area between the property line and centerline of all abutting streets.
- J. "Design speed" means the vehicular speed which serves as the basis for the horizontal and vertical alignment criteria of a street.
- K. "Double frontage lot" means a lot which has access to more than one street. See also Figure 1.
- L. "Easement" means an interest in, on or over land owned by another that entitles the holder to a specific limited use.
- M. "Engineer" means the public works director of the city or a qualified designee.
- N. "Flag lot" means a lot so shaped and designed that the main building site area is set back from the street on which it fronts and includes an accessway not less than fifteen feet in width at any point connecting such main building site area to the frontage street. See also Figure I.
- O. "Freeboard" means the distance between the design high water line and either the bottom surface of a bridge or a box culvert deck, the inside crown elevation of a storm drainage pipe or the top elevation of the bank of a storm drainage ditch containing the flow.
- P. "Functional street classification" means the classification of a street according to its function in the circulation pattern established by the general plan of the city.
- Q. "Grade" means the reference line by which the elevation for the pavement and other appurtenant features are established.
- R. "Highway Design Manual" means the Highway Design Manual of the State of California Department of Transportation.
- S. "Lateral" means the initial storm drain or sewer conduit connecting the source of the flow to the main line of the storm drain or sewer system.
- T. "Community development department" means the community development department of the city.
- U. "Private street" means a privately owned and maintained street which is not a part of the street system of the city.
- V. "Profile" shall be used interchangeably with "grade."
- W. "Reserve strip" means a narrow strip of land extending along the exterior boundary of a subdivision or at the dead end or side of a dedicated street.
- X. "R value" means a coefficient representing the resistance to a deformation of a saturated soil at a given density which is determined by State of California Department of Transportation Test Method No. 301-F.
- Y. "Side-on lot" means a lot which has a side yard which abuts an arterial street. See also Figure I.
- Z. "Soils report" means a soil investigation and geological reconnaissance report prepared by a registered civil engineer, engineering geologist or geologist specializing and recognized in soil mechanics and foundation engineering.
- AA. "Standard plans" means the standard plans of the city of Chico.
- BB. "Standard specifications" means the standard specifications of the State of California Department of Transportation.
- CC. "State standard plans" means the standard plans of the State of California, Department of Transportation.
- DD. "Street" means any public street, avenue, road, parkway, boulevard, thoroughfare, highway, square, crossing, intersection, lane, alley, court or any other public place or way of whatever nature, located within a right-of-way, publicly maintained and open for use by the public for the primary purposes of vehicular and/or pedestrian travel. "Street" includes street surfacing, concrete curb, gutters and sidewalks, and all other improvements constructed within such right-of-way which are commonly considered a part of the public street system of the city.
- EE. "Superelevation" means the cross-slope of a traveled street which counteracts the effect of centrifugal force on a vehicle.
- FF. "Traffic index" means a coefficient used in the design of a street structural section and which represents predicted truck traffic volumes.

## Chapter 18R.08

# DESIGN CRITERIA<sup>2</sup>

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### Section:

- 18R.08.010 Subdivision layout.**
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- 18R.08.090 Street trees and landscaping.**
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- 18R.08.120 Railroad crossings.**
- 18R.08.130 Public right-of-way improvements - Nonsubdivision.**
- 18R.08.140 Certificates - Final subdivision maps.**

### **18R.08.010 Subdivision layout.**

A. Subdivision Density. The maximum number of dwelling units permitted within a proposed subdivision shall not exceed the density established by the general plan for the area or the maximum number of dwelling units permitted by the applicable zoning districts, whichever is less, and may be further restricted by considerations of safety, traffic access or circulation, the slope of the natural terrain, the physical suitability of the site, the nature or extent of existing development, the availability of public facilities, utilities, or open spaces or any other provision set forth herein.

#### B. Blocks.

1. Size. Blocks shall be designed to allow for adequate building sites for the type of use proposed, to allow for convenient pedestrian and vehicular circulation, access, traffic control and safety, and with regard to limitations created by topography.

Block lengths shall be dependent upon intersection spacing as set forth in subsection G of Section 18R.08.020 of these criteria.

Block widths shall be sufficient to allow for two tiers of lots with rear easements as required.

2. Corners. At intersections, all block corners shall be rounded at the property line on a 20-foot radius curve. Greater radii may be required where necessary for traffic safety.

#### C. Lots Generally.

1. Width and Area. The minimum width the area of all lots shall conform to the requirements of the zoning districts in which the subdivision is located.

2. Depth. The depth of a residential lot, exclusive of flag lots, shall not be greater than three times the width of the lot. Minimum residential lot depth shall be 80 feet.

3. Lot Frontage. All lots within a proposed subdivision shall have frontage on a public or private street.

4. Lot Lines. The side lot lines wherever practical shall be at right angles or radial to street lines, except where the community development director determines an alternative design is acceptable.

5. Lots Adjoining City Limits. No lot shall be divided by a city boundary line.

6. Lot Grading. All lots shall be adequately drained. Surface water from each lot shall be conducted directly to the adjacent street or alley, or to underground storm drainage facilities or drainage channels.

#### D. Lot Configuration.

1. Flag Lots. Flag lots shall be approved only where required by topographic conditions or where there is no practical alternative design for the development of the interior portions of excessively deep parcels. Flag lots shall conform to all of the following requirements:

a. Flag lots shall conform to all of the requirements contained in these criteria except those provisions relating to lot line and lot frontages set forth in subsection C above, and shall have a minimum area of 6,000 square feet. The accessway serving the flag lot(s) shall not be included when calculating the required lot area of any lot.

b. The accessway to the rear lot(s) shall conform to the following design standards:

(1) An accessway serving one unit on a single lot shall be at least fifteen (15) feet wide, with twelve (12) feet thereof being paved. An accessway serving two or three lots, or a single lot with more than one unit, shall be at least twenty-five (25) feet wide with twenty (20) feet thereof paved the entire length of the accessway with an adequate turnaround provided at the end. The number of flag lots served by one accessway shall not exceed three, except that no more than two infill residential flag lots, as defined by section 19.76.180, shall be served by one accessway.

(2) Curbs and gutters may be required depending on drainage requirements, however, sidewalks shall not be required.

(3) The maximum length of a roadway serving one flag lot shall be 200 feet. The maximum length of a roadway serving two or three flag lots shall be 300 feet.

c. Each dwelling unit situated on a flag lot shall provide two (2) off-street parking spaces in addition to those spaces required by Title 19 of the Chico Municipal Code.

d. Prior to the time a flag lot is developed, the site plan therefor shall be reviewed and approved by the city fire chief for fire access and service requirements.

2. Double Frontage Lots. Double frontage lots will be approved only on collector and/or local streets and only if they meet at least one of the following requirements:

a. They are corner lots;

b. Their depth is greater than 200 feet;

c. Such lots are required by reason of unusual topographic or other physical conditions.

For lots which do not meet these requirements, the subdivider shall eliminate the double frontage condition by providing the city with an access waiver which waives all vehicular and pedestrian access rights to street along one of the two frontages. In addition, the subdivider shall provide an approved fence, landscaping, and sprinkler system along such non-access frontage. Maintenance of said landscaping shall be the responsibility of the subdivider and/or future subdivision lot owners.

Lots with triple frontages will not be authorized.

3. Backup or Side-on Lots. Backup (reverse frontage) or side-on lots may be approved in lieu of a frontage road adjacent to an arterial street. Where such lots are approved, access waivers of vehicular and pedestrian access rights to the arterial street over rear or side lot lines shall be required. The subdivider shall provide two (2) feet of additional right-of-way, landscaping, and a suitable fence or other approved barrier along such non-access frontage.

Rear lot lines are those lines adjacent to the arterial street.

4. Property Remnants and Reserve Strips. Remnants of property which do not conform to lot requirements or are not required for a public or private utility or other public use or approved access purpose shall not be created by a subdivision.

Reserve strips designed to provide private control of access to streets, alleys, easements, or other public ways shall not be permitted.

The advisory agency may require an access waiver to provide public control of access and to protect and facilitate the future development and extension of public rights-of-way.

#### E. Easements.

1. Public Utility and Cable Television Easements. Where alleys are not provided, the advisory agency, public utility agencies or cable television grantee may require public utility and/or cable television easements on each side of rear lot lines and/or side lot lines. Rear lot easements shall, as nearly as practicable, follow a direct course through the entire subdivision.

2. Storm Drain and Sanitary Sewer Easements. Storm drain and/or sanitary sewer easements, as described in the improvement standards, shall be dedicated as requested by the director. Easements of greater width may be required along natural water courses, conforming substantially to the lines of such channels.

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

(Res. No. 9 77-78 (part), Res. No. 57 82-83 §3, Res. No. 103 82-83 §§1, 2, Res. No. 127 86-87 §3, Res. No. 82 87-88 §2, Res. No. 105-07 §1, Res. No. 113-07, Res. No. 19-13)

## **18R.08.020 Public streets.**

### **A. Public Streets Generally.**

1. The subdivider shall provide a comprehensive trafficway system, designed and constructed in accordance with these criteria, applicable standards and ordinances, and the city of Chico general plan. Design of streets shall provide for safe vehicular operation at a specified design speed.

2. Public streets shall be required when the street is shown as an arterial or collector street on a master street and highway plan, the general plan, or any other specific or precise plan; or when the street will be used by the general public as a through access route; or when a public street is necessary for special needs including, but not limited to, bus routes, public service access, bike routes and pedestrian access.

### **B. Street Layout.**

1. Existing Streets and Unsubdivided Land. Streets shall be laid out to complement the alignment of existing streets in adjoining subdivisions and to provide a logical continuation of existing streets where the adjoining land is not subdivided.

The advisory agency may require the realignment of streets in contemplation of the development or use of adjoining property and may require the provision of streets or dead-end street extensions to facilitate the subdivision of adjoining property.

Permanently dead-ended streets without cul-de-sacs shall not be approved. When a temporarily dead-ended street is extended to the boundary of the subdivision, a one-foot fee simple strip the width of the street right-of-way shall be dedicated to the city at the end of the street. A barricade, or temporary turning area, or temporary connection to another street shall be required for any such street.

2. Provision for Resubdivision. Where property is subdivided into lots substantially larger than the minimum size required by the zoning districts in which the subdivision is located, the advisory agency may require that streets and lots be laid out so as to permit future resubdivision in accordance with the provisions of these regulations.

3. Future Streets. Where determined necessary for the protection of the public welfare or substantial property rights, the advisory agency may require or approve the reservation of streets within a proposed subdivision for future public use; provided, that all land so reserved shall be dedicated in fee simple to the city.

4. Streets Parallel to Rights-of-Way. Where a subdivision borders on or contains a railroad right-of-way, canal, or limited access highway right-of-way, the advisory agency may require a street approximately parallel to such right-of-way at a distance suitable for the appropriate use of the intervening land. Such distance shall be determined with due regard for the requirements of approach grades and future grade separations.

5. Local Streets. Local streets shall be designed so that their use by through traffic will be discouraged. Excessively long, straight residential streets, conducive to high-speed traffic, shall not be approved.

C. Street Names. Proposed street names shall not be similar to present street names, except that streets that are a prolongation or approximate prolongation of existing streets shall be given the same names as the existing streets. No street shall be designated by the same name as any other street even though differentiated by a suffix (avenue, boulevard, way, place or other term), except that a frontage road shall be given the same name as the street on which it borders. Generally no street should change direction by more than 90 degrees without a change in street name.

All proposed street names must be approved by the city fire chief and the Butte County street coordinator.

### **D. Horizontal Alignment.**

1. Specific Requirements. The criteria for the following design elements for each functional street classification shall be as set forth in Table 1:

- a. Minimum design speed;
- b. Minimum curve radius at centerline;
- c. Minimum length of tangent between reversing curves; reversing curves without an intervening tangent shall not be permitted;
- d. Minimum stopping sight distance at the given design speed.

2. Superelevation. Superelevations other than those set forth in the standard plans will be acceptable only in extraordinary circumstances and will be designed on an individual basis.

### **E. Profile.**

1. Profile Generally. The grade line should coincide with the centerline of the street. To improve appearances and to reduce the number of sight distance restrictions, vertical curves should, when possible, be superimposed on horizontal curves. For safety reasons, the horizontal curve should lead the vertical curve. Sharp horizontal curves shall not be introduced at or near a pronounced grade sag or summit.

2. Minimum Grade. Minimum grades for all streets with paved gutters shall be 0.25%. Streets with unpaved gutters shall have a minimum grade along centerline of 0.50%.

3. Maximum Grades. Maximum grades shall be 6% for arterial and collector streets and 8% for local streets. A maximum grade of 4% is desirable whenever possible, especially at intersections.

4. Vertical Curves. Parabolic vertical curves shall be used when the algebraic difference in grade is greater than 1.0%. The criteria for the following design elements for each functional street classification and its corresponding minimum design speed shall be as set forth in Table 2:

a. Minimum length of vertical curve;

b. Minimum stopping sight distance;

c. Minimum passing sight distance;

d. Maximum rate of change of grade in percent per 100 feet at the minimum stopping sight distance. This criteria may dictate a vertical curve longer than the minimum stated in this section.

#### F. Cross Section.

1. Geometric Cross Section. Standard widths for street geometric cross sections shall be as set forth in the improvement standards.

Subdividers of subdivisions with five (5) or more lots shall be required to install full improvements on existing streets adjacent to the subdivision in accordance with the limits of construction required by the improvement standards. In the event that the subdivision will generate sufficient vehicular traffic to require additional traffic lanes or street extensions, the subdivider may be required to provide and improve these facilities.

Subdividers of subdivisions having fewer than five (5) lots shall be required to install full improvements on existing streets adjacent to the subdivisions from the subdivision property line to the existing edge of street pavement, or beyond as may be needed to maintain a maximum five percent (5%) shoulder cross slope, in accordance with the improvement standards.

2. Structural Section. The subdivider's engineer shall prepare a soils report and determine the R value of the proposed subgrade material. Minimum structural section thicknesses shall be as set forth in the improvement standards. These minimums are based upon a subgrade material having an R value of 25 or more. If the R value is less than 25, the structural section shall be increase accordingly.

The director will determine the traffic index and, if needed, will require an increase in the structural section. Pavement structural section design shall be in accordance with the methods shown in the Highway Design Manual.

3. Curb and Gutter. Curb and gutter shall be installed adjacent to streets in all subdivisions and shall be constructed in accordance with the improvement standards.

4. Sidewalks. Sidewalks shall be installed within all streets in all subdivisions and shall be constructed in accordance with the improvement standards. Sidewalks shall be separated from the adjacent curb and gutter by a parkway unless a contiguous sidewalk is specifically approved to save trees or to conform to an existing contiguous sidewalk configuration. All sidewalks shall be installed within the public right-of-way.

The advisory agency may require the installation of sidewalks outside of the subdivision to maintain continuity of pedestrian access from the subdivision to other areas in the immediate vicinity.

5. Half-streets. Half-streets shall not be approved.

#### G. Intersections.

1. Intersections Generally. The criteria for intersections set forth in this subsection shall be minimum requirements. Based upon traffic analysis, the director may require additional features such as speed change lanes, tapers, separate turning lanes, refuse areas and traffic-control devices. Intersections with more than four approaches shall not be approved.

2. Intersection Spacing. Intersection spacing shall be determined in accordance with these criteria and those set forth in subsection B above, entitled "Street Layout."

Maximum spacing between intersections shall be 1320 feet.

Minimum spacing of intersections shall be as follows:

a. Local streets, 250 feet;

b. Collector streets, 300 feet;

c. Arterial streets, 500 feet.

#### 3. Geometrics.

a. Alignment. A secondary street shall intersect a primary street at right angles (radial when the primary street is curved). The secondary street alignment shall be perpendicular to the primary street from the centerline of the primary

street to the end of the curb return on the secondary street.

b. Cross-Slope in Intersections. The criteria for treatment of cross-slope in intersection areas shall be as set forth in Figure 2.

c. Curb Returns. The standard curb return radius shall be 30 feet, measured to the face of curb.

d. Handicapped Ramp. The standard handicapped ramp shown in the improvement standards shall be installed at all curb returns.

H. Cul-de-Sacs. Cul-de-sac streets shall not exceed 500 feet in length.

The advisory agency may require reduced length, or may require the elimination of a proposed cul-de-sac in order to provide for the efficient circulation of traffic, the future development of the neighborhood street system, or the deployment of emergency services.

Cul-de-sacs shall be constructed in conformance with the improvement standards.

I. Access.

1. General. Street access control may be required by permitting ingress and egress only at specific locations determined by the advisory agency.

Access to arterial streets shall, in general, be permitted at intersections only. The advisory agency may require installation of backup (reverse frontage) lots, or side-on lots adjacent to arterial streets.

Access to other than arterial streets shall, in general, be limited to one opening per lot.

Access to the subdivision from adjacent streets shall be designed to utilize the most efficient circulation pattern within the subdivision.

2. Driveways. Driveways shall be constructed in accordance with the improvement standards.

J. Traffic Control and Safety Devices and Street Name Signs. Traffic control and safety devices shall be installed on all streets as required by the improvement standards and the public works director in order to promote traffic control and safety. Traffic control and safety devices shall include but not be limited to regulatory signs, warning signs, guide markers, construction signs, pavement markings, lane delineations and traffic signals. Street name signs shall be installed at all public, private and public/private intersections in accordance with the improvement standards.

K. Street Lights. City-owned street lights shall be installed on all public streets in accordance with the improvement standards. Street light spacing shall be as required by the public works director.

L. House Numbers. House and unit numbers shall be assigned by the building official and shall be placed and maintained in a manner which is clearly visible from the street.

(Res. No. 9 77-78 (part), Res. No. 57 82-83 §4, Res. No. 110 86-87 §§3-4, Res. No. 59 90-91 §§2-6, Res. No. 167 92-93 §1, Res. No. 113-07, Res. No. 19-13)

#### **18R.08.030 Other public ways.**

A. Alleys. Alleys may be required as part of a subdivision circulation system.

Alleys shall be constructed in accordance with the improvement standards.

Intersections of two alleys will be discouraged but may be acceptable in special instances.

B. Bicycle Paths, Pedestrian Ways and Equestrian Ways.

1. Generally. Bicycle paths, pedestrian ways, and equestrian ways may be required in conformance with an established city-wide plan or as required by the advisory agency. Design of said ways and paths shall be consistent with the principle of keeping separation between motorized vehicular traffic and other modes of traffic.

2. Bicycle Paths. Bicycle paths shall be constructed in accordance with the improvement standards. Recommended geometric criteria shall be as follows:

- a. Design speed, 20 mph;
- b. Sight distance, 120 feet;
- c. Minimum curve radius, 65 feet;
- d. Overhead clearance, 8 feet;
- e. Maximum grade, 5%.

Adequate access points and bicycle parking facilities shall be provided as necessary.

Bicycle stands conforming with the improvement standards shall be provided at parking facilities.

3. Pedestrian Ways. In addition to sidewalk required adjacent to public roadways, pedestrian ways may be required where needed for traffic safety; and access to schools, playgrounds, shopping facilities, or other community facilities. The required width and location shall be as determined by the advisory agency.

4. Equestrian Ways. The minimum required typical section shall be as shown in the improvement standards. Minimum vertical clearance shall be 10 feet.

(Res. No. 9 77-78)

**18R.08.035 Private streets.**

A. Private Streets Generally. Private streets may be permitted subject to compliance with the following design criteria and improvement standards of this chapter, Title 18 of this code, and Standard Plan No. S-18F.

B. Private Street Length.

1. Cul-de-sacs. Private street cul-de-sacs shall not exceed 500 feet in length.

2. Loop Streets. Private loop streets improved to the standards set forth in this section shall not exceed 1,000 feet in length.

3. Standards for private streets exceeding 1,000 feet in length shall be determined on a case-by-case basis.

C. Horizontal Alignment. Private streets shall conform to the following minimum standards:

1. Minimum curve radius at centerline shall be 50 feet.

2. Minimum cul-de-sac or turnaround radius to face of curb shall be 46 feet.

D. Profile. The maximum grade for a private street shall not exceed 8%. The minimum grade shall correspond to the standards for a public street.

E. Cross Section.

1. Geometric cross section.

a. Private streets servicing less than 26 lots shall have a minimum street width of 24 feet without on-street parking and 36 feet with on-street parking.

b. Private streets serving 26 lots or more shall have a minimum street width of 30 feet without on-street parking and 40 feet with on-street parking.

c. Private streets may be either crowned streets or valley gutter streets. Valley gutters shall not be used on streets serving 26 lots or more.

2. Curb and Gutter.

a. Crowned Streets. Curb and gutter shall be constructed in accordance with city of Chico public street improvement standards.

b. Valley Gutter Streets. Curb and gutter may be constructed in accordance with the public street improvement standards, or curbing with a minimum width of 6 inches above the surfaced section of the private street at the curb line may be constructed. A 4-foot wide longitudinal P.C.C. valley gutter shall be constructed along the street centerline when the slope is less than 1%.

3. Structural Section. The subdivider's engineer shall prepare a soils report and determine the "R" value. If the "R" value is 25 or more, the minimum structural section shall consist of four inches of compacted aggregate base with a one and one-half inch asphalt concrete overlay, or an equivalent full depth asphalt section as approved by the public works director. If the "R" value is less than 25, the structural section shall be as determined by the public works director.

F. Intersection with Public Street.

1. A private street shall intersect a public street at right angles.

2. Private streets shall have standard driveway approaches installed at intersections with public streets, unless curb returns are authorized by the public works director.

G. Sidewalks. Pedestrian access shall be provided either by constructing sidewalks in accordance with the design criteria, or pedestrian access may be provided by a comprehensive on-site pedestrian access system approved as part of a subdivision, zoning or permit approval.

H. Street Lights. Street lights shall be installed as required by the public works director.

I. Street Names. Proposed street names shall not be similar to present street names, except that streets that are a prolongation or approximate prolongation of existing streets shall be given the same names as the existing streets. No street shall be designated by the same name as any other street even though differentiated by a suffix (Terrace, Court, Lane, Place, or other term). Generally, no street should change direction by more than 90 degrees without a change in street name. Private street names shall be suffixed "Terrace," "Court," "Lane," or "Place."

J. Signs. Street signs shall be installed at all street intersections in accordance with city of Chico public street improvement standards. The street sign shall clearly indicate that the street is a private street. Stop signs shall be installed on all private streets that intersect a public street.

J. House Numbers. House and unit numbers shall be assigned by the building official and shall be placed and maintained in a manner which is clearly visible from the street.

L. Parking.

1. All private streets approved for no on-street parking shall be signed for "NO PARKING" and all curbs within 15 feet of any fire hydrant shall be painted red.

2. All private streets providing emergency vehicle access shall provide additional signage and markings as directed by the fire chief and chief of police.

3. All development utilizing private streets without on-street parking shall provide off-street parking in the amount specified in Title 19 of this code plus two (2) additional spaces for each residential unit.

4. At the time the private street is created, a statement shall be included in the conditions, covenants and restrictions or other recorded document approved by the city attorney that sets forth the following:

- a. On-street parking is prohibited on private streets (if appropriate).
- b. The California Vehicle Code does not apply to routine traffic matters on private streets.
- c. The city of Chico police department does not enforce or respond to routine traffic matters on private streets.

M. Setbacks. On any lot abutting a private street, any setback required by this code shall be measured from the edge of the private street easement.

N. Private Street Maintenance. Whenever private streets are approved for a residential subdivision, the developer or subdivider through recorded conditions, covenants and restrictions, or other instrument approved by the city attorney shall provide for the following:

1. Maintenance of the private street and related private facilities, including but not limited to the following:

- a. Street;
- b. Street lights;
- c. Traffic-control devices, if any;
- d. Sanitary sewer facilities;
- e. Storm drainage facilities.

2. If the private street and related private facilities are not adequately maintained, the city, after prior notice to the organization responsible for maintenance and property owners, shall have the right to:

- a. Enter upon and maintain and repair the facilities, and to recover the prorata costs of such maintenance or repairs from each owner of a lot having access to a private street or utilizing private facilities, which costs shall constitute a lien upon the lot until paid; and/or
- b. Form a maintenance district or benefit assessment district to provide for the maintenance of such private streets or facilities.

3. A private homeowners' association shall be formed to maintain all private streets and other related private facilities whenever conditions, covenants and restrictions are prepared for a residential subdivision containing five or more lots.

(Res. No. 110 86-87 §5, Res. No. 22 88-89, Res. No. 59 90-91 §§6-7, Res. No. 67 90-91, Res. No. 167 92- 93 §2, Res. No. 113-07)

**18R.08.040 Major structures.**

The subdivider may be required to provide major structures such as retaining walls, bridges or dams. Each structure shall be designed and approved on an individual basis. The subdivider shall provide the city with all engineering calculations used in the design of a major structure.

(Res. No. 9 77-78 (part))

**18R.08.050 Storm drainage.**

A. General Requirements. The subdivider shall provide storm drainage facilities that will convey stormwater runoff, whether originating within the subdivision or in adjacent areas, to an existing drainage channel or drainage system. Adequate access for maintenance of the system shall be provided. The capacity of an existing drainage system must be large enough to accommodate the additional runoff generated by the subdivision. Drainage patterns existing prior to construction of the subdivision shall be maintained, and full consideration must be given to the rights of adjacent property owners with regard to surface water drainage.

The city will determine the capacity of an existing storm drain system.

The subdivider's engineer shall prepare an analysis and design of the proposed storm drainage system. When stage construction is proposed, the analysis shall provide for the design of the entire storm drainage system.

The analysis shall consider all existing and future contributory drainage area, regardless of whether or not said area is in the subdivision.

The preliminary analysis shall accompany the tentative map.

#### B. Hydrology.

1. Storm Runoff. Runoff shall be computed by the rational method.

( $Q = CIA$ ) where:

Q = rate of runoff in cfs

C = coefficient of runoff

I = intensity of rainfall in inches/hr during the time of concentration  $t_c$  (min.) – the elapsed time between the beginning of the storm and peak flow at the drainage structure

A = drainage area, acres

Computations should be clear and complete with all assumptions clearly stated. In making such computations, the following information shall be used:

a. Coefficient of Runoff. Typical values for runoff coefficients are set forth in Table 3.

b. Intensity of Rainfall. A rainfall intensity versus duration design chart for the Chico area is shown on Table 4. A minimum time of concentration of 10 minutes should be used whenever computations indicate a shorter time. For urban area drainage, the maximum initial time of concentration to the first drainage facility shall be 20 minutes. For unimproved areas, drainage time of concentration shall be determined by the method shown for small basins in the Highway Design Manual. The method of computation of time of concentration should be clearly indicated.

c. Design Storm Frequency. The design storm frequency shall be as follows:

- (1) Bridges, 200 years;
- (2) Open channels, 10 years;
- (3) Culverts, 10 years;
- (4) Major outfall lines, 10 years;
- (5) Collector lines, 5 years;
- (6) Local lines, 2 years.

A minimum freeboard of three feet shall be provided for bridges and box culverts, two feet for open channels, and one foot for storm drainage pipe inlets and outlets.

#### C. Roadway Drainage.

1. Grade. The minimum grade for side ditches and gutters will be 0.25% if paved, 0.50% if earth.

2. Limits of Flooding. Street drainage facilities shall be designed to keep flooding within six (6) feet of the face of curb for a design storm frequency of two (2) years for local streets and ten (10) years for all other streets. The depth of flow at gutter flow line shall not exceed 0.25 feet.

Concentrated flow across the traveled way is prohibited.

#### D. Conduit Design.

1. Type. For storm drain systems, circular pipes of reinforced concrete or cast-in-place concrete may be used. Class II pipe shall be the minimum for nonroadway areas. The minimum required strength for all pipe in the roadway area shall be Class III as designated by ASTM Specification C-76.

Culverts may be of any of the above materials in any standard manufactured shape. Reinforced concrete box culverts, if used shall be constructed in accordance with state standard plans.

2. Size. Pipes shall have a minimum diameter of 10 inches. For flows exceeding the capacity of 54-inch diameter pipe, open channels meeting the requirements of subsection H below may be acceptable.

3. Slope. Slope will be controlled by physical conditions and velocity criteria. Abrupt changes in slope are undesirable and are to be avoided wherever possible.

4. Velocity. Minimum velocity at full flow shall be two (2) feet per second (fps). The maximum velocity for storm drains shall be critical velocity at full flow. Culverts may have velocities greater than critical provided full consideration is given to

the effects of abrasion.

5. Head and Head Losses. To facilitate the passage of debris and detritus, storm drains shall, unless otherwise approved, be designed to pass the design flow with a free water surface. Culverts shall be designed to provide a minimum freeboard of one foot from top of culvert to top of ditch bank at the entrance and exit points.

6. Roughness Coefficient. Suggested values for Manning's roughness coefficient (n) are:

Reinforced concrete pipe . . . . .0.012

Cast-in-place concrete pipe . . . . 0.013

7. Alignment. Alignment should be as straight as possible without undue bends and angle points. Where dictated by physical conditions, curved alignment is permissible as long as there is no reduction in the quality and soundness of joints. The minimum radius of curvature shall be 500 feet.

8. Cover. Except for culverts, outside the hinge point, the minimum cover shall be two (2) feet, measured from the top of the pipe to the roadway or ground surface. Cast-in-place concrete pipes shall have a minimum cover of two and one-half (2.5) feet except under roadways where three (3) feet is required. Where less than minimum cover is necessary the concrete cradle shown in the improvement standards shall be used.

9. Pipe Strength. The class of conduit recommended should be adequate for most conditions. Unusual situations may dictate selection of a higher strength conduit.

10. Location. The location of storm drains relative to roadway centerline shall be in accordance with the improvement standards. Care should be taken that storm drains and other underground facilities do not conflict with each other. Location and elevation of existing and proposed sanitary sewer laterals shall be a primary consideration in the design of the storm drainage facility.

#### E. Drop Inlets.

1. Types. The standard S-7 drop inlet as set forth in the improvement standards shall be used with pipes up to 30 inches in diameter. A modified S-7 drop inlet or a manhole will be used for pipe larger than 30 inches. Special situation drop inlets are shown in Standards S-7A and S-26.

2. Laterals. Laterals shall have a minimum slope 1%.

3. Location. Drop inlets shall be installed at all gutter low points and at locations such that the flooding limitations of subsection C above are met. They should not be spaced further than 500 feet apart.

#### F. Manholes.

1. Type. The type of manhole to be utilized shall be as set forth in the improvement standards.

2. Location. Manholes shall be placed:

- a. Where two or more storm drain pipes join;
- b. Where the conduit changes in size;
- c. At angle points;
- d. At points where a change of slope in the conduit occurs;
- e. At changes in type of pipe.

3. Spacing. The maximum manhole spacing shall be 1,200 feet for pipe diameters of 48 inches or more. Spacing may vary from 350 to 700 feet for diameters less than 48 inches to 33 inches. Maximum spacing shall be 350 feet for conduit 30 inches or smaller.

4. Access Shaft. The access shaft shall be centered over the axis of the drain for conduits less than 42 inches in diameter. The shaft shall be offset and made tangent to one side of the pipe when the drain diameter exceeds 42 inches.

5. Special Structures. Special structures may be required for larger diameter pipes and shall be designed on an individual basis.

6. Grade. The crowns of all conduits intersecting at a manhole shall generally match. A minimum fall of 0.10 foot across the manhole shall be provided except in cases where the conduit is continuous through the manhole.

#### G. End Structures.

1. General. Headwalls and other end structures shall be installed to increase hydraulic efficiency, prevent erosion adjacent to the conduit and provide a counterweight to prevent flotation.

2. Entrances. When a drop inlet is not installed, flared end sections should be used. Headwalls may be used where dictated by physical conditions. Both installations shall conform to the state standard plans.

3. Exits. Where exists are installed, headwalls or flared end sections should be used for culverts. Where drainage systems discharge into a channel, standard headwalls shall be installed in accordance with the improvement standards.

An approved energy dissipater shall be installed at outlets where velocities are erosive.

H. Open Channels. The director may approve the use of open channels on an individual basis.

The finished channel shall have maintenance free bottom and sides. Minimum bottom width shall be three feet. Side slopes shall be no steeper than 1-1/2:1.

All open channels shall be located in dedicated easements. An access road 12 feet wide shall be provided adjacent to the channel.

I. Bank Protection. Bank protection such as slope paving, sacked riprap, and facing rock may be required to protect drainage facilities, property or structures. The need and nature of bank protection will be determined by the director on an individual basis.

J. Temporary Leach Field Type Storm Drainage System. In accordance with the provisions of the "Nitrate Action Plan - Greater Chico Urban Area - Butte County," adopted by city council Resolution No. 141 84-85 on March 19, 1985 as subsequently amended, temporary leach field type storm drainage systems may be installed for temporary use in cases where the public works director determines that storm water cannot be conveyed to the city's storm drainage system or drainage channel because facilities are not available. The following criteria shall apply to design of such systems:

1. Percolation tests shall be conducted in accordance with environmental health department procedures. Tests shall be taken at the proposed depth of the drainage trench(es) at such locations as required by the public works director to verify the drainage capacity of the soil. Percolation rate shall be converted from minutes/inch to cubic feet per second/square foot.

2. The trench(es) shall be designed to contain a one-in-ten year frequency storm.

3. The bottom of the trench(es) shall be at least ten feet above the high water table and there shall be at least ten feet of soil capable of percolation below the bottom of the trench(es).

4. The rational formula,  $Q=CIA$ , shall be used to determine inflow into trench(es).

5. One-third of the trench(es) volume as void area shall be used in computing amount of storm water storage available in trench(es). Rock size in trench(es) shall be from one-half inch to four inches in size.

6. Fifty percent of the trench(es) bottom area and one-half of the depth of the trench(es) side walls and end walls shall be used in determining the area available for percolation out of the trench(es).

7. Where more than one trench is utilized, there shall be a minimum separation of four (4) feet between trench walls.

8. Limitation on Use of Infiltration Best Management Practices (BMPs). Three factors significantly influence the potential for storm water to contaminate ground water. They are: (i) pollutant mobility, (ii) pollutant abundance in storm water, and (iii) soluble fraction of pollutant. In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet in depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic. Site specific conditions must be evaluated when determining the most appropriate BMP. Additionally, monitoring and maintenance must be provided to ensure groundwater is protected and that the infiltration BMP is not rendered ineffective by overload. This is especially important for infiltration BMPs in areas of industrial activity or areas subject to high vehicular traffic (25,000 or greater average daily traffic (ADT) on a main roadway or 15,000 or more ADT on any intersecting roadway). In some cases pretreatment may be necessary.

K. Post-Construction Structural or Treatment Control Best Management Practices. Post- construction treatment control Best Management Practices (BMPs) shall incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

1. Volumetric Treatment Control BMPs

a. The maximized capture storm water volume for the tributary area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87 (1998) pages 175-178 (approximately the 85th percentile 24-hour storm runoff event); or

b. The volume of annual runoff to achieve 80 percent or more capture, determined in accordance with the methodology in Section 5 of the CASQA Storm Water Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data; or

2. Flow Based Treatment Control BMPs:

a. The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity as determined from local rainfall records; or

b. The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity.

(Res. No. 9 77-78 (part), Res. No. 57 82-83 §5, Res. No. 201 84-85 §1, Res. No. 59 90-91 §§8-10, Res. No. 11 95-96 §1, Res. No. 113-07, Res. No. 65-08, Ord. 2468 §6)

**18R.08.060 Sanitary sewers.**

A. Generally. The subdivider shall provide a sanitary sewer system in accordance with the following criteria:

1. The system shall be of a size not less than that which is specified by the sanitary sewer master plan on file with the public works director.
2. The system shall have adequate capacity to serve the subdivision and the full service area tributary thereto in accordance with the city design standards. The tributary area shall be determined by the public works director.
3. When required, the subdivider shall provide a pumping plant to convey the effluent to an existing system.

The director will determine the point of connection to the existing sewer system. The subdivider's engineer shall prepare a design analysis of the proposed sanitary sewer system in accordance with the sanitary sewer master plan on file with the public works director. When staged construction is proposed, the analysis shall thoroughly cover the design of the entire system.

B. Design Flow. Recommended design criteria for the determination of the sanitary sewer design flow for residential and commercial development are given in Table 5.

The director will determine on all individual basis if industrial waste will be accepted into the city system or if other provision for its on-site disposal will be made.

C. Conduit Design.

1. Type. Sewer conduits shall be extra-strength vitrified clay pipe conforming to ASTM Designation C 200, with plastisol, or equal, compression joints, or polyvinyl chloride (PVC) sewer pipe with a maximum DR of 35, conforming to ASTM Designations D 2784 and D 3034, with flexible elastomeric seals conforming to ASTM Designation D 3212.

In new sewer line construction, wyes to tees for house service connections shall be complete fittings. Saddle type connections will not be permitted.

2. Size. The minimum sanitary sewer size shall be eight (8) inches in diameter except that six (6) inch pipe may be used in the last run in residential areas on cul- de-sacs and in locations where no future extensions of the main are intended.

No sewer pipe shall have a diameter less than that of the pipe immediately upstream from it.

3. Slope. Slope will be controlled by physical conditions and velocity criteria. Abrupt changes in slope are undesirable and should be avoided wherever possible.

4. Velocity. The minimum velocity shall be 1.8 fps when the pipe is flowing full and/or half-full.

5. Head and Head Losses. Sanitary sewers shall be designed to pass the design flow with a free water surface. Proper consideration shall be given to minor head losses.

6. Alignment. Alignment will be straight between manholes with no bends except that curved alignment with a minimum radius of 500 feet may be used in special cases.

7. Location. The location of sanitary sewers relative to roadway centerline shall be in accordance with the improvement standards. Care should be taken that sanitary sewers and other underground facilities do not conflict with each other.

8. Depth. Minimum sewer depth shall be four and one-half (4.5) feet from flowline to finish grade. For unimproved streets where street grades have not been set, the minimum depth shall be five (5) feet from the flowline to existing grade.

D. Manholes.

1. Type. The type of manholes to be utilized shall be as set forth in the improvement standards.

2. Location. Manholes shall be placed:

- a. Where two or more sewer mains join;
- b. Where the conduit changes in size;
- c. At angle points;
- d. At points where a change of slope in the conduit occurs.

3. Spacing. Manholes shall be spaced no farther than 350 feet apart.

4. Grade. The crowns of all conduits intersecting at a manhole shall match.

E. Flushing Holes. Flushing holes shall be of the type shown in the improvement standards and shall be placed in accordance with the improvement standards. They shall not be used except in cul-de-sacs or at temporary ends of lines if the end of line does not occur at a manhole. Flushing holes shall be placed no more than 150 feet from a manhole.

F. Laterals.

1. Size. Minimum lateral size for single-family dwellings shall be four (4) inches in diameter. All others will require

special design, and design calculations shall be submitted for approval.

2. Slope. Laterals shall have a minimum slope of two (2) percent.

3. Location. Laterals shall be provided for every lot and shall generally be centered on each lot. They shall be at right angles or radial to the sanitary sewer main.

Laterals shall be installed to a point at least five (5) feet into the property prior to other utility installation, pressure testing and subsequent connection to the effluent source.

4. Depth. Laterals shall have a three (3) foot minimum cover at the back of the sidewalk. Where the sewer main is ten (10) feet or greater in depth, deep sewer risers shall be installed.

G. Temporary Pumping Plants. The subdivider's engineer shall design any needed pumping plants subject to the approval of the director. Each design will be considered on an individual basis.

(Res. No. 9 77-78 (part), Res. No. 87 86-87 §1, Res. No. 86 87-88, Res. No. 113-07, Res. No. 19-13)

#### **18R.08.070 Water supply.**

A. Size and Type. The size and type of water main pipe shall be determined by California Water Service Company. The sizing shall be based upon the company's distribution needs and fire flow requirements determined by the city fire department. The type of pipe will be determined by the California Water Service Company.

B. Installation. Installation of water main and services shall be the responsibility of the subdivider. Trench backfill and surfacing shall be in accordance with the city of Chico improvement standards.

C. Certification. Prior to filing the final map, the subdivider shall provide the city with the certification from California Water Service Company. This certification shall state that the company will provide water service to the subdivision and that the subdivider has met all of the company's conditions necessary to provide water service.

(Res. No. 9 77-78 (part))

#### **18R.08.075 Fire hydrants.**

A. Installation; Location; Number. Installation of fire hydrants shall be the responsibility of the subdivider.

The number and location of fire hydrants connected to a water supply capable of delivering the required fire flow shall be provided on the public right-of-way and/or on the site to be protected as determined by the fire chief. Standard hydrant spacing shall be at 300-foot intervals in all areas except areas containing only single-story single-family or duplex dwellings, in which case standard hydrant spacing shall be at 500-foot intervals.

When the fire chief determines that it would not be adverse to the city's fire protection capabilities, the fire chief shall have the authority to make minor modifications to the hydrant placement distances set forth above. In no case shall fire hydrants be spaced closer than 300-foot intervals.

B. Hydrant Type. Approved fire hydrant models are the Long Beach Iron Works Model 614 and 615 or Clow Model 950 or 960. Other hydrant models may be utilized upon approval of the fire chief.

C. Method of Installation. The subdivider shall make all arrangements for the installation and inspection of all fire hydrants with the California Water Service Company.

(Res. No. 9 77-78 (part), Res. No. 149 78-79 §1, Res. No. 196 80-81 §1, Res. No. 59 90-91 §11, Res. No. 02 03-04)

#### **18R.08.080 Utility services.**

A. Location and Capacity. All utilities (gas, water, electric, telephone and cable TV) shall be installed and placed underground. Their location shall be subject to the requirements of the improvement standards, the recommendation of the utility company and the approval of the director.

B. Access. The location of all utilities shall allow satisfactory equipment and personnel access for maintenance and operation.

C. Certification. Prior to filing the final map, the subdivider shall provide the city with a certification from each appropriate utility company. This certification shall state that the company will provide its service to the subdivision and that the subdivider has met all of the company's conditions necessary to provide the service.

D. Cost. Unless such is required by federal or state law and/or regulation, nothing in this code shall be construed to require a subdivider to absorb the cost of such installation at their sole cost.

(Res. No. 9 77-78 (part), Res. No. 89 87-88, Res. No. 59 90-91 §12, Res. No. 40-18 §1)

#### **18R.08.090 Street trees and landscaping.**

A. Street Tree Requirements. Street trees shall be planted as directed by the public works director. In lieu of planting the trees, the subdivider shall deposit with the city a street tree fee. Such fee shall provide the tree purchasing and planting by the city and shall relieve the subdivider of any further street tree obligation.

B. Landscape Requirements. Landscaping may be required by the advisory agency. All such landscaping shall be installed and maintained by the subdivider until the city accepts the subdivision. In addition, the subdivider may be required to provide irrigation facilities for the landscaping.

C. Planting and Installation Guidelines. All street trees and landscaping required within a public right-of-way or public service easement or on other city property shall be planted and installed in compliance with the following guidelines:

1. All trees, shrubs, ground covers, vines and turf shall be of a type approved by the public works director and, to the greatest extent practicable, shall be of a drought-resistant and drought-tolerant type of variety.

2. Irrigation controllers shall be equipped with independent station control, multiple start time and multiple program capabilities.

3. All irrigation systems shall include independent station or "zone" moisture sensors. Plant materials with similar watering requirements shall be irrigated using common controller circuits.

4. Irrigation systems shall be designed to match precipitation rate to evapo-transpiration potential of selected plant materials given soil percolation rates.

5. Whenever possible, irrigation systems shall include drip irrigation, individual adjustable bubblers, weep-tubing, matched precipitation sprinkler heads and other low volume systems.

6. Wind direction and wind speed shall be considered as a design element for the purpose of minimizing overspray and to provide even precipitation distribution.

7. A water audit shall be performed before installing plant material, to ensure equal precipitation rate.

8. Wherever practical, landscape installations shall be performed with minimum soil compaction. All attempts shall be made by the landscape contractor to keep construction equipment and vehicles off the landscape site once final soil tilling and grading is complete.

(Res. No. 9 77-78 (part), Res. No. 102 92-93, Res. No. 19-13)

#### **18R.08.100 Traffic signals.**

If the anticipated traffic demand created by the subdivision warrants the installation of traffic signals, the subdivider shall install same.

Determination of the need for traffic signals, and their subsequent design, will be the responsibility of the director. The subdivider shall provide and install these facilities in accordance with requirements of the director.

(Res. No. 9 77-78 (part))

#### **18R.08.110 Monuments.**

The installation and the type of monuments shall be in accordance with the pertinent provisions of the Subdivision Map Act, Title 18 of the Chico Municipal Code, and the improvement standards.

(Res. No. 9 77-78 (part))

#### **18R.08.120 Railroad crossings.**

The design of crossing protection facilities shall be the subdivider's responsibility subject to the requirements of the State of California Public Utilities Commission. The facilities shall be installed by the affected railroad company subject to any necessary permits and agreements.

(Res. No. 9 77-78 (part))

#### **18R.08.130 Public right-of-way improvements - Nonsubdivision.**

Public right-of-way improvements, as required by Title 14 of this code and which are not part of a subdivision, shall be constructed in accordance with these design criteria and improvement standards except as follows:

A. Street improvements (including but not limited to curb, gutter, sidewalk, storm drainage facilities, and street lighting) shall be required from lot or parcel property line to the edge of existing street pavement, or beyond as may be needed to maintain a maximum five percent (5%) shoulder cross slope on said existing street.

B. In lieu of constructing alley improvements, an alley improvement fee shall be paid as established by resolution of the city council, except that alley improvements shall be constructed in the following cases:

1. All non-residential development;

2. All property uses permitted subject to a use permit in an R-3 high density residence district, and all residential development of four (4) or more dwelling units on a parcel, which utilize the adjacent alley for access.

When improvement of an alley is required, it shall be constructed between the property and the nearest street as well as along the full width of the property abutting the alley. The community development director may determine that an alley

improvement fee be paid where alley construction would otherwise be required in the event it is determined that grade constraints or extensive storm drainage requirements make construction impractical.

C. Where adjacent existing improvements do not meet current criteria, the director may elect to alter the criteria so that proposed improvements match existing improvements in the most practical, yet satisfactory manner.

(Res. No. 9 77-78 (part), Res. No. 57 82-83 §6, Res. No. 88 84-85 §1, Res. No. 113-07, Res. No. 19- 13)

**18R.08.140 Certificates - Final subdivision maps.**

The following certificates shall be included upon all final subdivision maps filed with the city, as applicable:

A. City Clerk’s Certificate When Dedication of Real Property Not Made. When offer of dedication of real property to the city for street and/or public easement purposes is not made as part of the final map, the certificate shall read as follows:

“I hereby certify that on the ..... day of ....., 20..., the City Council of the City of Chico officially approved this map, subject to the installation and completion of

all required subdivision improvements (if applicable).

.....”

Date City Clerk

B. City Clerk’s Certificate When Dedication of Real Property is Made. When an offer for the dedication of real property to the city for street and/or public utility easement purposes is made as part of the final map, the certificate shall read as follows:

“I hereby certify that on the .... day of ....., 20..., the City Council of the City of Chico officially approved this map, subject to the installation and completion of all required subdivision improvements (if applicable), and accepted (describe area(s) of dedication) for dedication to the City of Chico on behalf of the public.

.....”

Date City Clerk

C. City Manager’s Certificate When Dedication of Real Property is Made as Part of a Non-City Subdivision. When a final map is filed for a subdivision not within the city but which is adjacent to a city roadway, and an offer for the dedication of real property to the city for street and/or public utility easement purposes is made, the certificate shall read as follows:

“I hereby certify that (describe area(s) of dedication), as shown hereon and herein offered for dedication to the City of Chico, is accepted by the undersigned officer on behalf of the City Council of the City of Chico pursuant to the authority conferred by Resolution No. 79 61-62 of the City Council of the City of Chico, adopted March 6, 1962, and that the grantee consents to the recordation thereof by its duly authorized officer.

.....”

Date City Manager

(Res. No. 9 77-78 (part))

**Table 1**

**HORIZONTAL ALIGNMENT CRITERIA**

Type of Street	Arterial	Collector	Local
Minimum Design Speed (mph)	40	35	25
Minimum Curve Radius at Centerline	600'	450'	200'
Minimum Tangent between Reversing Curves	200'	150'	100'
Minimum Stopping Sight Distance	275'	240'	165'

**Table 2**

**VERTICAL CURVE CRITERIA**

Type of Street	Design Speed (mph)	Min. Length Vertical Curve	Min. Stopping Sight Distance	At Min. Stopping Crest V.C. - Max. Rate of Change-%/100'	Sight Distance Sag. V.C. - Max. Rate of Change-%/100'	Passing Sight Distance*
Arterial	40	200'	275'	1.80	1.80	1500'
Collector	35	150'	240'	2.50	2.20	1300'
Local	25	100'	165'	5.25	3.70	900'

\*Passing sight distance criteria do not apply to sag vertical curves. For design of crest vertical curves that meet passing sight distance criteria, refer to "Caltrans Highway Design Manual of Instructions" or "AASHTO Policy on Geometric Design of Rural Highways."

**Table 3**

**RUNOFF COEFFICIENTS**

Land Use	C
Landscaped area	0.25
Residential	
Rural (up to 2 units/acre)	0.35
Low-density (2+ to 6 units/acre)	0.50
Medium-density (6+ to 14 units/acre)	0.60
High-density (14+ and up)	0.75
Public	0.40 - 0.70
Schools, Hospitals	0.35 - 0.70
Commercial	0.70 - 0.90
Industrial	0.70 - 0.90
Highway	0.80 - 0.90

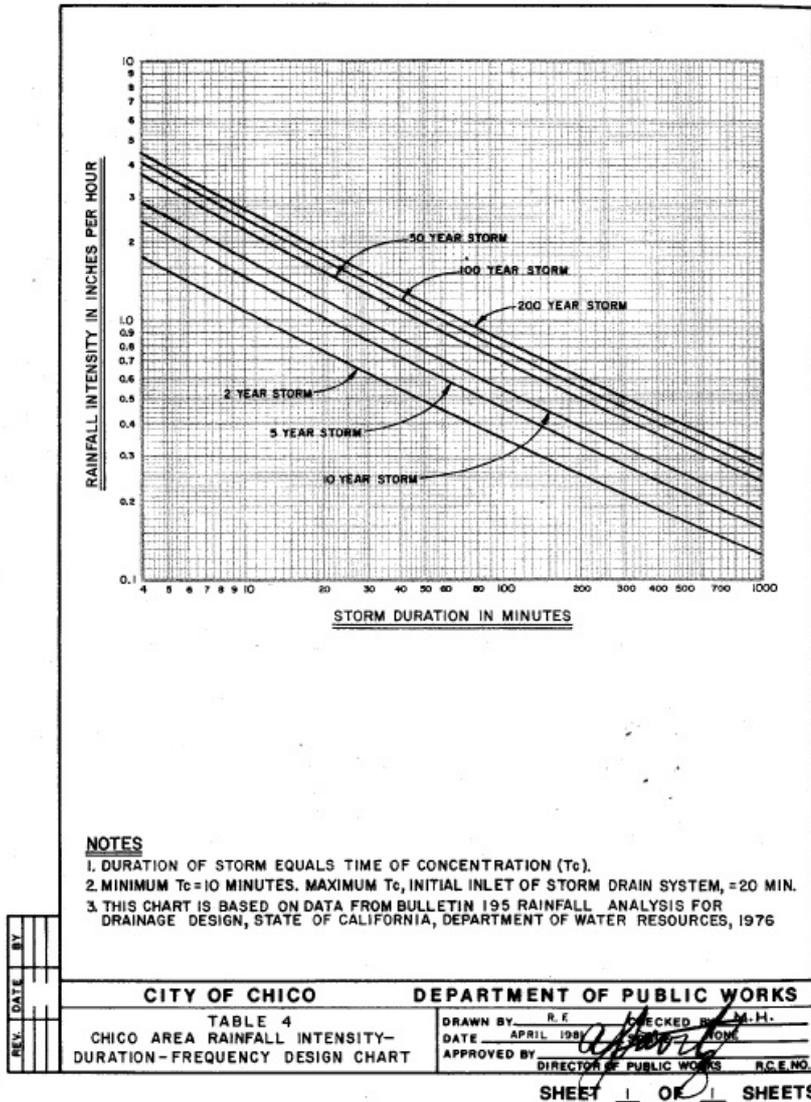


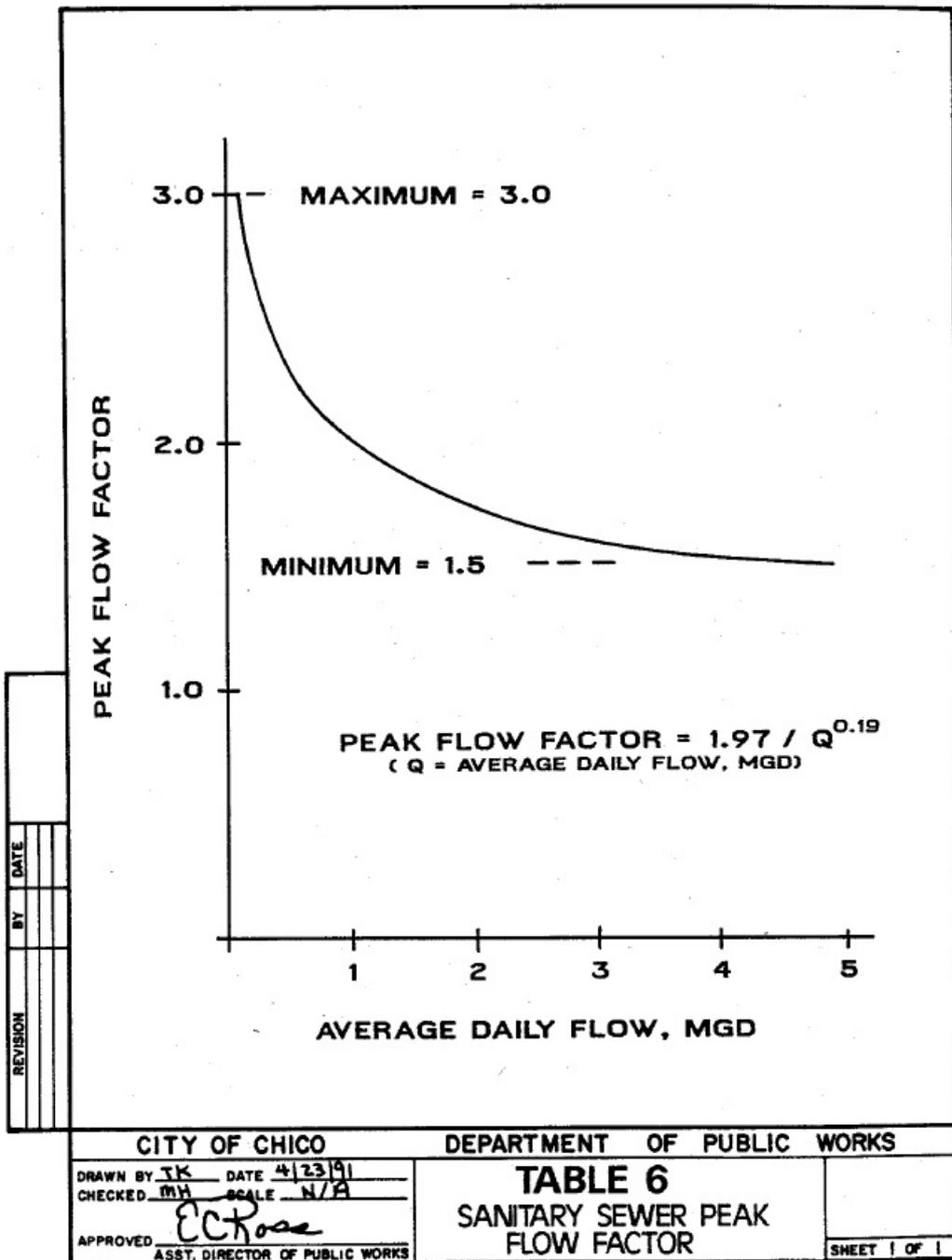
Table 4: To print a PDF copy of this Table, click [TABLE 4](#)

Table 5

**DESIGN CRITERIA FOR SANITARY SEWERS**

ZONING	DESIGN CRITERIA
<b>RESIDENTIAL</b>	
Domestic flow	80 gpcd (average)
Infiltration	650 gad
Peak flow factor	1.5 - 3.0 (see Table 6)
<b>1. Rural Density</b>	
Units/acre	2
People/unit	3.6
Peak design flow	$[(80)(3)(2)(3.6)] + 650 = 2,378$
	Use 2,400 gad
<b>2. Low Density (R-1)</b>	
Units/acre	5
People/unit	3.6
Peak design flow	$[(80)(3)(5)(3.6)] + 650 = 4,970$
	Use 5,000 gad
<b>3. Medium Density (R-2)</b>	
Units/acre	13
People/unit	2.3

Peak design flow	$[(80)(3)(13)(2.3)] + 650 = 7,826$
	Use 7,800 gad
<b>4. High Density (R-3)</b>	
Units/acre	24
People/unit	2.0
Peak design flow	$[(80)(3)(24)(2.0)] + 650 = 12,170$
	Use 12,200 gad
<b>COMMERCIAL/INDUSTRIAL</b>	
Average flow	1,500 gad
Peak flow	3,000 gad
gpcd = gallons per capita per day	
gad = gallons per acre per day	



<b>CITY OF CHICO</b>		<b>DEPARTMENT OF PUBLIC WORKS</b>	
DRAWN BY <u>JK</u>	DATE <u>4/23/91</u>	<b>TABLE 6</b>	
CHECKED <u>MH</u>	SCALE <u>N/A</u>		
APPROVED <u>EC Rose</u>		<b>SANITARY SEWER PEAK FLOW FACTOR</b>	
<small>ASST. DIRECTOR OF PUBLIC WORKS</small>			<small>SHEET 1 OF 1</small>

Table 6

## Chapter 18R.12

### IMPROVEMENT STANDARDS<sup>3</sup>

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#### Section:

**18R.12.010 Construction specifications.**

**18R.12.020 Standard plans.**

**18R.12.030 Standard plans - TND zoning district.**

#### **18R.12.010 Construction specifications.**

##### A. Roadway Grading.

1. Roadway Grading. Roadway grading shall consist of performing all operations necessary to excavate earth, rock and all other materials upon which the imported borrow, selected fill, aggregate base, cement treated base or other material is to be constructed; to build embankment in the location and to the elevation and form required; to backfill ditches and depressions caused by the removal of obstructions; to furnish all equipment necessary for these operations, and the performance of all incidental work of whatsoever nature may be required to build the grade and maintain it in the form specified.

2. Roadway Earthwork. All roadway earthwork shall be constructed and maintained as specified in Section 19 of the standard specifications.

3. Surplus Excavation. Surplus material from excavation shall be disposed of by the contractor, unless special instructions for such disposal are shown on the plans or in the special provisions.

B. Aggregate Base - Class No. 2. Aggregate Base - Class No. 2, shall be constructed as provided in Section 26 of the standard specifications. The thickness shall be of the dimensions indicated on the plans and shall conform to the grading specifications set forth in the standard specifications. The size of aggregate shall be three-quarter (3/4) inch (maximum) as set forth in Section 26, or as specified by the engineer.

##### C. Asphalt Concrete.

1. Asphalt Concrete. Asphalt concrete shall be constructed according to the shape and thickness between curbs and gutters as shown on the plans and as herein specified, and otherwise shall conform to the requirements of Section 39 of the standard specifications. Asphalt concrete shall be Type "B." Paving asphalt shall be of the penetration range specified by the engineer.

2. Prime Coat and Paint Binder. A prime coat of liquid asphalt or a paint binder of asphaltic emulsion shall be applied to the areas to be surfaced in accordance with Section 39-4 of the standard specifications. Prime coat will be required on all base rock.

3. Leveling Course. Leveling course shall consist of surface course material and shall be placed as specified in Section 39-6 of the standard specifications.

4. Base Course. The base course shall be of the thickness as shown on the plans and shall conform to the requirements of the standard specifications.

5. Surface Course. The surface course shall be of the thickness as shown on the plans and shall conform to the requirements of the standard specifications. The aggregate for the surface course shall conform to the grading specified for 1/2-inch maximum (medium) grading.

D. Seal Coat. Seal coat shall consist of the material and shall be placed as specified in Section 37 of the standard specifications. The bituminous binder shall be 200-300 grade paving asphalt or emulsion spread at the rate as set forth in the standard specifications and as specified by the engineer. The preparation of surface prior to seal coating shall be as specified in Section 37 of the standard specifications.

E. Pavement Replacement. Pavement replacement shall consist of Type "A" Alternate 1, Type "A" Alternate 2, Type "B," Type "C" or Type "D" as shown on the city of Chico Standard Plan No. S-17. The specific type of pavement replacement shall be as shown on the plans.

All work necessary to complete the pavement replacement, as shown on said Standard Plan, shall be done in accordance with the applicable sections of the standard specifications.

F. Tapering Into Adjacent Streets. The contractor shall construct smooth tapers into all adjacent streets. The exact length of taper and the grade of the taper shall be under the direction of the engineer. The contractor shall butt all pavement tapers as directed by the engineer. The tapers shall consist of a minimum of six (6) inches aggregate base and two (2) inches asphalt concrete.

G. Portland Cement Concrete Curbs, Gutters, Sidewalks, Driveways, Accessible Ramps, and Alleys.

1. General. Portland cement concrete curbs, gutters, sidewalks, driveways, handicapped ramps, and alleys shall be constructed at the location shown on the plans, or as directed by the engineer, and shall conform to the details and dimensions as shown on the following city of Chico, standard plans:

- a. Standard Plan No. S-1, "P.C.C. Sidewalk Details";
- b. Standard Plan No. S-2, "P.C.C. Curb and Gutter";
- c. Standard Plan No. S-2A, "Curb, Gutter & Sidewalk Installation at Trees";
- d. Standard Plan No. S-3, "Existing Curb and/or Gutter - Replacement Details";
- e. Standard Plan No. S-5, "Residential Driveway Approach";
- f. Standard Plan No. S-5A, "Commercial Driveway Approach";
- g. Standard Plan No. S-5B, "Curb, Gutter, & Driveway Details";
- h. Standard Plan No. S-5C, "Curbed Driveway Entrance";
- i. Standard Plan No. S-9, "Alley Pavement";
- j. Standard Plan No. S-27, "P.C.C. Accessible Ramp";
- k. Standard Plan No. S-27-A, "P.C.C. Accessible Ramp."

2. Materials.

a. Concrete. Construction of all curbs, gutters, sidewalks, driveways, accessible ramps, and alleys shall be of class "A" Portland cement concrete as specified in Section 90, "Portland Cement Concrete" of the standard specifications, and shall conform to the provisions of Section 90-10, "Minor Concrete" of the standard specifications.

b. Adhesives. Adhesives or bonding agents used to join new concrete to existing concrete shall be approved by the engineer prior to use in the work.

c. Lampblack. Lampblack of approved quality shall be mixed with all of one pound per cubic yard of concrete.

d. Joint Filler. Premolded expansion joint filler shall conform to the provisions of Section 51-1.12C of the standard specifications.

e. Dowels. Steel dowels, where specified, shall conform to the provisions of Section 51-1.13 and 52-1.02A of the standard specifications.

f. Curing. The curing method for Portland cement concrete shall conform to Section 90-7.01B of the standard specifications. The curing compound shall consist of the compound specified in Section 90-7.01B(4) of the standard specifications.

3. Construction.

a. Construction of all curbs, gutters, sidewalks, driveways, and accessible ramps shall conform to the provisions of Section 73, "Concrete Curbs and Sidewalks" of the standard specifications.

b. Construction of all alleys shall conform to the provisions of Section 90-10, "Minor Concrete" of the standard specifications.

c. Subgrade preparation shall conform to the provisions of Section 73-1.02 of the standard specifications. Where subgrade occurs in a fill section, the base material shall be compacted to a relative density of 95 percent in conformance with California Test Method No. 216.

d. No concrete shall be placed until the subgrade and forms have been reviewed for satisfactory compaction, alignment, and grade and approved by the engineer.

e. Premolded expansion joints, 1/4 inch wide, shall be installed in all curbs, gutters, driveways and sidewalks as follows:

- (1) As shown on city of Chico Standard Plans S-1, S-2, S-2A, S-3, S-5, S-5A, S-5C, S-7, S-27 and S-27A;
- (2) At maximum 48-foot intervals in all new curb and gutter constructions;
- (3) At locations of expansion joints in existing sidewalks, curbs or gutters.

f. Control joints, 1/8-inch wide, scored at least 1/10 the depth of concrete being placed, shall be constructed at

maximum 12-foot intervals in all new curbs, gutters and sidewalks.

g. Extruded curb construction shall not be used without a prior test demonstration of proposed equipment and procedures, off the side of work, and shall not be used without prior approval by the engineer.

H. Standard Fence. Standard fence shall conform to the requirements of Section 80-2 of the standard specifications except as provided herein.

New fence shall be 32-inch wire mesh fabric, as specified in Section 80-2.01E, with 3-strand barbed wire on top, with steel posts at 12 feet center to center, set a minimum of 2.5 feet into the ground.

All fencing removed shall become the property of the contractor and shall be removed from the premises.

I. Bore and Jack Pipe. Bore and jack pipe shall consist of boring and jacking casing and installing pipe inside the casing at locations shown on the plans. Casing and pipe shall be of the types and sizes shown on the plans.

The casing designated in the contract item will be determined for vertical load only. Additional reinforcement or strength of casing required to withstand jacking pressure shall be determined and furnished at the contractor's expense.

Variations from theoretical grade at the time of completion of placing shall not exceed 0.1 foot for each 30 feet of casing placed.

The excavated hole shall not be more than 0.1 feet greater than the outside limits of the casing. Sluicing and jetting with water will not be permitted. When material tends to cave in from outside these limits, a metal shield shall be used ahead of the first section of casing.

Areas resulting from caving or excavation outside the above limits and the area between the casing and the pipe shall be backfilled with sand or grout by a method which will fill the voids.

J. Cast Iron Pipe. Cast iron pipe shall be heavy duty cast iron soil pipe. Pipe joints shall be in accordance with applicable provisions of the Uniform Plumbing Code.

The pipe shall be installed in strict accordance with the manufacturer's instructions.

K. Reinforced Concrete Pipe. Reinforced concrete pipe shall conform to the requirements for materials and methods of installation as set forth in Section 65 of the standard specifications. Reinforced concrete pipe shall be of the class shown on the plans. Backfill shall be in accordance with subsection L below.

L. Trench Backfill. Trench backfill for storm drainage, sanitary sewers, or any other underground utility installation shall conform to, and be constructed in conformance with the requirements as set forth below:

1. New Street Constructions.

a. For any portion of the street right-of-way upon which aggregate sub-base, aggregate base, asphalt concrete or P.C.C. curb and gutter will be constructed, the following materials and installation procedures shall be used:

(1) Backfill material, from the bottom of the trench to a plane two (2) feet below subgrade may consist of trench excavation free from stones and lumps exceeding three (3) inches in greatest dimension, vegetable matter, or other unsatisfactory material. The material shall be compacted to a relative compaction of 90% and shall be placed in conformance with the requirements of Section 19-3.06 of the standard specifications.

(2) Backfill material from two (2) feet below subgrade to subgrade shall conform to the requirements of Section 19-3.06 of the standard specifications.

b. For remaining portions of a new street right-of-way, the following materials and installation procedures shall be used: Backfill material, from the bottom of the trench to finished grade, and installation, shall conform to the requirements of paragraph 1a(1) of this subsection.

2. Existing Street, Alley, Easement Construction.

a. For any portion of a public right-of-way which has any existing improvements for vehicular traffic, the following materials and installation procedures shall be used:

(1) Backfill material, from the bottom of the trench to bottom of the section depicted in Standard S-17, Pavement Replacement, as noted on the plans, shall conform to the requirements of paragraph 1a(1) of this subsection.

(2) Compaction of backfill material by ponding or jetting will not be allowed unless specifically authorized by the engineer.

3. State Highways.

a. For any existing state highways, any future state highways or freeways, the following materials and installation procedures shall be used: Backfill material shall conform to and be placed in accordance with the requirements of Section 19-3.06 of the standard specifications.

M. Standard Precast Concrete Manholes.

1. Manholes.

a. The contractor shall furnish all materials for the construction, complete, of all standard and other manholes shown on the plans and specifications and all manholes shall be constructed either of precast concrete sections or reinforced concrete. The contractor shall furnish all materials, labor, tools, equipment, and do all the work involved and necessary to complete the manholes as shown on city of Chico Plans S-10 and S-11.

b. Frames and Covers. All manhole frames and covers shall be of the dimensions and weights shown on city of Chico Standard Plans S-14 and S-14A. Each frame and cover shall have its weight indicated on the bottom outside rim of the cover. The seat of the frame shall in each case be machined sufficiently so that the cover will sit evenly and firmly in place without rocking.

## 2. Portland Cement Concrete Precast.

a. Manholes shall be constructed along the sewer line at such places as shown on the plans.

Manholes shall consist of precast concrete sections set on a concrete base, with cast iron cover as shown on the Standard Plans.

"Kent Seal," "Ram Neck" or an approved equal, shall be installed at all manhole joints.

Manufacture of these sections shall be governed by specifications for reinforced concrete sewer pipe, ASTM Designation C-76.

b. Portland Cement. Portland cement shall be of standard accepted brand and shall fully meet the requirements of the ASTM specifications for Portland cement, Designation C-150.

c. Coarse Aggregate. Coarse aggregate shall consist of clean, hard, durable screened and washed gravel, or crushed rock, free from organic matter. Aggregate shall be properly graded in conformity with the class of concrete specified, and to secure concrete of not less than twenty-five hundred (2500) pounds per square inch at twenty-eight (28) days.

d. Fine Aggregate. Fine aggregate shall consist of well-graded, hard, durable, clean, natural sand free from all deleterious matter. Use of bank sand, fine river sand, or any other uniformly fine sand, shall not be permitted.

e. Mixing. All concrete mixing shall be done in machine batch mixers of approved type, having a capacity of not less than a full one-sack batch. Each batch shall be run long enough for the conglomerate to become a homogenous mixture, continuing a minimum time of one and one-half (1½) minutes after the last aggregate has been placed in the mixer.

Placing of concrete shall be done immediately after mixing. No concrete shall be placed or used after it has begun to set and no retempering will be allowed.

The ratio of water to cement shall not exceed seven and one-half (7½) gallons of water per sack of cement used, including the water in the aggregates, in order to obtain a concrete having an ultimate strength not less than 2500 pounds per square inch at twenty-eight (28) days.

N. Tree Removal. Tree removal shall consist of removing all trees as shown on the plans and as designated by the engineer. Tree removal shall be performed as herein specified.

All roots of trees to be removed shall be cleared to a point not less than two (2) feet below the surface of the parkway between the back of existing curb and existing sidewalk. Root void shall be backfilled to surface of parkway with native material and shall be jetted into place.

All portions of trees shall be removed from the public right-of-way. The sidewalk, parkway and street areas shall be left in a condition equal to or better than prior to start of work.

O. Portland Cement Concrete Drop Inlets. Portland cement concrete drop inlets shall be of Class "A" Portland cement concrete as per Section 90 and shall be mixed and placed as specified in Section 51 of the standard specifications.

Portland cement concrete drop inlets shall be of the dimensions as shown on the city of Chico, public works department, Standard Plans S-7, S-7A and S-26.

## P. Materials for Sewer Lines and Sewer Line Construction.

1. Work to be Done. The work to be done under this section comprises the furnishings of all materials, labor, tools, implements and equipment necessary for construction of the sewer lines, complete and ready for operation. All work shall be in accordance with the details shown on the plans and the provisions of these improvement standards and in conformity with the highest standards of workmanship of this type of construction.

The work shall include the following items and related construction:

- a. The construction of all portions of the intercepting and main sewer lines under this contract;
- b. Cutting of pavement over trenches;
- c. Excavating and dewatering of all trenches;
- d. Bracing and shoring of trenches;
- e. Bedding, laying and jointing of pipe;

- f. Backfill and compaction of backfill;
- g. Disposal of excess materials.

2. Excavation for Sewers. The excavation for sewer pipe shall not be made further in advance of laying the pipe than is practical to complete the pipe laying and backfill operation each day.

a. Excavation for Laying Pipe. Pipe shall, unless otherwise directed, be laid in open cut. All trenches shall have vertical sides from the bottom to a point at least six (6) inches above the top of the pipe. Above this point in unstable ground, with the written consent of the engineer, the trench may be sloped as directed. Trenches shall be six (6) inches wider on each side, or a total of twelve (12) inches wider than the exterior diameter of the pipe, exclusive of sockets. In the event that sheeting is required, the width of the trench shall be increased sufficiently to accommodate the sheeting. Sheeting shall not be driven below the invert grade of the pipe unless absolutely necessary due to ground conditions, as sheeting is to be removed in conjunction with the backfilling. If sheeting is driven below the invert grade as required above, it shall remain in place, except that portion two (2) feet above the top of pipe, which shall be cut off and removed as the backfilling is completed.

When using movable trench support, care shall be exercised not to disturb the pipe locations, jointing or embedment. Any voids left in the embedment material by support removal shall be carefully fitted with compacted granular material. Removal of any bracing between sheeting, trench boxes or shields shall only be done where backfilling procedures permit removal without loss of trench support. Any longitudinal movement or disjuncting of pipe which results from movement of trench boxes or shields shall be corrected before additional pipe is placed.

b. Trenches in Rock. Every trench in rock shall be fully opened to a final depth at least thirty (30) feet in advance of any place where pipe is being laid. In rock the trench shall be carried six (6) inches below the external diameter of the pipe. Gravel, as herein specified, shall be placed, spread and compacted to provide a firm uniform bed for supporting the pipe.

c. Soil Testing. Should soil conditions such as running water or unstable soils be encountered during trench excavation, the director may require testing in advance of excavation to determine the nature and extent of the conditions. After such determination is made, the director may require modified trenching and embedment procedures, as required by soil conditions.

d. Preparation of Subgrade. Rough excavation in trenches shall not be carried lower than a distance equal to one-tenth (1/10) of the internal diameter of the pipe above the specified grade elevation, and the remainder of the excavation shall be done as the pipe subgrade is prepared and immediately prior to installing the pipe. As an alternate method, the trench may be excavated to depth four (4) inches below the elevation of the outside of the pipe barrel, and embedment material placed and compacted the full width of the trench to the elevation of the outside of the pipe barrel. The subgrade for pipe shall be so prepared that the entire length of each section of pipe shall have a firm and uniform bearing except for such distance as is necessary for bell holes and the proper seating of the pipe joints. Bell holes of below the elevations of the pipe subgrade shall not be larger than one-fourth (1/4) of the distance between pipe joints.

3. Overcut. Excavations shall be carried to the exact depth indicated on the plans or as specified. Should the contractor, through the contractor's negligence or other fault, excavate below the designated lines, the contractor shall replace such excavation with approved materials at the contractor's own expense.

4. Protection of Excavation. The contractor shall, where necessary, protect excavations from caving by installing suitable shoring. Any damage resulting from failure to provide shoring shall be repaired at the contractor's own expense. All shoring shall be removed unless otherwise specifically authorized.

5. Approval of Excavations. The contractor shall notify the engineer where excavations for structure or pipes are completed, and no concrete shall be deposited or pipes laid until the excavations are approved.

6. Vitrified Clay Pipe. All vitrified clay pipe for sanitary sewers shall comply with ASTM Specification 200-69 requirements for absorption, straightness and permissible cracks, chips, fractures and blisters and will also comply with the chemical resistance tests.

All vitrified clay pipe shall be extra strength unglazed vitrified clay pipe meeting the requirements of extra strength pipe for crushing strength, barrel thickness, and other measurements as set forth in the "Clay Pipe Engineering Manual," issued by the National Clay Pipe Institute.

7. Polyvinyl Chloride (PVC) Pipe. All polyvinyl chloride sewer pipe, sizes 4-inch through 15-inch, shall be DR 35 maximum and shall conform to the requirements of ASTM D 3034.

All joints shall be made with flexible elastomeric seals meeting the requirements of ASTM D 3212, and shall be capable of passing all tests specified in said standards and in these specifications. A factory applied reference mark shall be provided on the spigot end of each pipe to insure proper positioning in the receiving bell.

8. Quality Control Tests and Certification. Written certification by the manufacturer shall be submitted for all sewer pipe stating that the pipe conforms to all specifications referenced herein.

The director may select pipe specimens at random at the point of delivery or at the job site for testing. Tests on these specimens shall be made at a testing facility approved by the director. Tests shall be in accordance with applicable ASTM designations. The cost of all failing tests shall be borne by the contractor.

9. Handling and Storage. Care shall be taken during transporting of the pipe to insure that the binding and tiedown

methods do not cut or crack the pipe. Pipe bowed, deformed, cracked or otherwise damaged during shipping or storage shall be rejected. Polyvinyl chloride pipe which shows any change in color or surface finish due to exposure to ultraviolet light shall not be used without the approval of the director.

10. Inspection of Sewer Pipe. Wherever possible, the contractor shall avoid distribution of pipe to the job site too far in advance of laying operations. The contractor shall also supply experienced help for the unloading of the pipe so as to avoid damage caused by unloading operations. Immediately preceding placing and laying of the sewer pipe, it shall be checked for defects in accordance with these improvement standards.

11. Laying Sewer Pipe. Each sewer pipe shall be laid uphill in perfect conformity with the lines and grades as given by the engineer from stakes which the engineer has previously set for the purpose.

The grade line of the pipe shall be obtained by use of batter boards and a "top" line stretched tight and supported every 25 feet, and the contractor will be required at all times to maintain the top lines for a distance covering at least three grade stakes. The contractor shall at all times have available one competent person, whose duty it shall be to set and maintain the top line and to give the line and grade for the pipe.

With the approval of the director, the grade line may be set by use of a construction laser, installed in the trench.

After the trench for pipe sewers has been brought to the proper line and grade in the manner above specified, the pipe shall be laid therein in the following manner:

a. Before any pipe is put in place, the trench bottom shall be prepared so that each pipe shall have a firm and uniform bearing over its entire length. All adjustment to line and grade must be made by scraping away the earth or rock under the body of the pipe as herein specified, and not by wedging or blocking up any portion of the pipe.

b. Bell holes shall be excavated in subgrade and made as small as possible still permitting un-obstructed placing of the jointing material and joint runner and not allowing foreign material to enter the joint. The length of the bell hole shall not exceed one-fourth (1/4) the length of the pipe.

c. The pipe shall be lowered into place in a manner that will insure that the pipe remains clean, care being exercised not to disturb the top line. The pipe shall not be lowered by sliding it down the side of the trench.

d. All pipe shall be fitted together and matched while being laid so that when joined, the inverted forms a true straight grade line. The ends of the pipe shall be brought in contact with each other.

e. If water is encountered in the trench, it shall be kept below the bottom of the bell of the unjoined pipe, and not allowed to come in contact with any part of the pipe forming the joint until after the joint is completely filled with the specified jointing compounds. Should the water, through neglect or otherwise, raise in the trench and enter the annular space in the pipe before the joining operation is completed, the annular space in all pipe so affected shall be freed of all water and foreign matter and thoroughly cleaned, before completing the jointing operation.

f. The pipe shall be checked for position in the trench by using a plumb bob below the "top" line for alignment and the grade shall be obtained by means of a "grade pole" held vertically with one side touching the "top" line and a right angle bracket at the bottom extending and resting on the invert of the pipe in its final position. The vertical distance from the "top" line to the pipe invert grade shall be a multiple of one (1) foot, at a distance above the invert as approved by the engineer.

If the use of a construction laser has been approved, line and grade shall be checked by means of the laser beam.

12. Sewer Pipe Jointing. Unless otherwise approved by the engineer in writing, the jointing material for all sewer pipe, under all conditions of laying, shall be as hereinafter described.

13. Plastisol Joints. Mechanical compression joints shall be an approved type of interlocking, self-centering, resilient, push-type mechanical compression joint, formed or fused on the pipe at the factory, made of plastisol (polyvinyl chloride) to specifications established by the National Clay Pipe Research Corporation.

The annular space shall be controlled either by precision grinding the bell and spigot, or by casting an approved material onto the outside of the spigot and on the inside of the bell, or by a combination of these methods.

The seal shall be obtained by compressing a rubber, plastisol (polyvinyl chloride) or other approved resilient element as the joint is assembled.

Vitrified clay pipe utilizing mechanical compression joints shall be "Wedge-Lock" as manufactured by Pacific Coast Clay Products, or "Speed-Seal Mainline" as manufactured by Gladding McBean Company. No other make of plastisol joint pipe will be permitted except as approved in writing by the engineer.

Pipe shall be installed in strict accordance with the manufacturer's instructions.

14. Elastomeric Joints. Elastomeric joints shall conform to ASTM D 3212 and shall utilize a single gasket for sealing. All joints shall be made in conformance with the manufacturer's recommendations and shall be closed to align the reference mark with the pipe bell.

15. Embedment Materials. Embedment material shall be one of the following types:

a. Clean washed sand, with a maximum particle size of 1/4 inch, and with a minimum of 70 percent passing a No. 20 screen.

b. Graded sand and gravel, with a maximum particle size of 3/4 inch, conforming to the gradation requirements for Class 2 aggregate base contained in Section 26 of the state standard specifications.

16. Embedment Procedure.

a. After excavating the trench to a grade at least 4 inches below the pipe barrel elevation, carefully place bedding material the full width of the trench to provide uniform support along the entire length of pipe to be installed.

b. After installing the pipe, place and compact embedment material to the spring line of the pipe, taking care to work the material under the haunches of the pipe and to avoid displacement of the pipe.

c. Place and compact embedment material to the top of the pipe.

d. Place and compact embedment material to a minimum depth of 6 inches over the top of the pipe.

17. Alternate Embedment Procedure. With the approval of the engineer, the following alternate embedment procedure may be used, at the option of the contractor:

a. Excavate the trench and place bedding material as described in subsection P16a of this section;

b. After installing the pipe, place embedment material to a depth at least 8 inches above the top of the pipe;

c. Flood the embedment zone with water by either puddling or jetting. Adequate water must be applied to insure that the entire embedment zone is saturated;

d. Consolidate the embedment material with internal vibrators, applied at sufficiently close intervals that the visible effects of the vibration overlap. Care shall be exercised to avoid disturbance of the pipe during vibration, or contacting the pipe with the vibrator;

e. Allow sufficient drying time that the embedment material will support a man's weight before placing backfill.

18. Straightness. The full diameter of the pipe shall be visible when viewed between consecutive manholes, unless curved alignment is specified. Testing may be by photography or by lamping with lights or mirrors.

19. Manhole Connections. Sewer pipe shall be connected to manhole bases in a manner which will provide a watertight seal. With polyvinyl chloride sewers, special adaptors with resilient seals or waterstops shall be installed in manhole bases to provide a flexible, watertight connection.

20. Test for Leakage. On the completion of each section of the sewer between structures, where the soil is wet due to ground water, the end of the sewer at the upper manhole or structure shall be closed sufficiently to prevent the entrance of water, and the sewer tested for leakage, which if found to occur, shall be located, uncovered, and stopped. Where such leaks are discovered before the completion of the sewer, the sewer shall be immediately uncovered and the leaks stopped. Leakage shall be tested with an air pressure test. The pipeline to be tested shall be suitably plugged at all openings.

Test procedures and allowable pressure loss for vitrified clay sewers shall be as specified by the pamphlet entitled "Low Pressure Air Test for Sanitary Sewers," published by the National Clay Pipe Institute. Polyvinyl chloride sewers shall be pressurized to 4.0 PSI greater than the average pressure of any groundwater which may submerge the pipe. At least 2 minutes shall be allowed for pressure stabilization. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.0 to 2.5 PSI above the average pressure of any groundwater submerging the pipe. The pipeline shall be considered acceptable when the pressure drop described above occurs over a time period of at least  $(36.3 \text{ seconds}) \times (\text{pipe diameter in inches})$ .

If air pressure testing equipment is not available, water testing may be substituted. Permissible leakage for vitrified clay and polyvinyl chloride sewers will not exceed that allowed by the National Clay Pipe Institute's pamphlet listed above.

Final tests of sewers shall be made by the contractor under the direction of the engineer.

All tools, materials and appurtenances required for testing the sewers as specified shall be furnished by the contractor.

Unsatisfactory conditions shall be required to be corrected prior to acceptance of the project by the Engineer.

Noncompliance with plans and specifications, excessive leakage by infiltration or exfiltration, or similar causes shall be basis of nonacceptance.

21. Backfilling. Backfilling shall be done in accordance with subsection L of this section. Compaction of backfill material by ponding or jetting will not be allowed unless specifically approved by the engineer.

Where the sewer crosses streets or highways, ponding or jetting will not be permitted.

If, at any time during the continuance of the contractor's responsibility, there shall be any settlement of the trenches requiring that repairs be made in any street or highway, or should any defect appear in the system due to negligence or carelessness on the part of the contractor, the engineer may notify the contractor to make such repairs as may be necessary, and should the nature of such defect be such as to require immediate attention, the engineer shall make such repairs as may be necessary and submit a statement of the actual cost of such repairs to the contractor, who shall reimburse the city by cash payment.

22. Test for Deflection. Polyvinyl chloride (PVC) sewers shall be tested for deflection after final backfill and compaction

has been completed, but before paving is placed. A rigid mandrel having an outside diameter of 95% of the "average inside diameter" of the pipe, as defined in ASTM D 3034, shall be pulled through the pipeline. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe.

If the mandrel does not pass freely through the pipe, the pipe shall be reexcavated, bedded and backfilled to adequately support the pipe and reduce the deflection to 5% or less of the average inside diameter of the pipe. The pipeline shall then be retested for both leakage and deflection.

Should tests performed by the city, within one year of the original testing and acceptance, show deflection in excess of 7.5% of the average inside diameter of the pipe, the contractor shall reexcavate, bed and backfill the pipe to provide adequate support and reduce the deflection to 5% or less. The pipeline shall be retested for deflection. The contractor shall reimburse the city's cost of testing for all lines which require repair.

23. Disposal of Excess Material. Excess materials which have been excavated from trenches, and which cannot be utilized for backfill, or spread adjacent to the work, shall be removed by the contractor.

24. Protection of Work. The maintaining of a clean and dry joint during construction is essential in order that leakage may be eliminated in the completed sewer. Toward that end, the provisions of these improvement standards shall be rigidly adhered to in order to secure sewers free from leakage.

Whenever the work ceases for any reason, the unfinished end of the sewer shall be sufficiently closed to prevent the entry of dirt or trash, but under no circumstances made watertight.

The interior of the sewer shall be kept free from all dirt and foreign material as the work progresses, and left clean at its completion.

Upon completion of the sewers and prior to the final inspection and before acceptance, when ordered by the engineer, the contractor shall, at the contractor's own expense, flush and cleanse the sewers of all dirt clods, small rocks, sand or silt deposits and any other materials that may be detrimental to the proper flow and operation of the sewer. The outlet end of the lowest manhole in the system shall be tightly plugged and a pump suction line placed in the manhole ready for use.

A fire hose shall be connected to a fire hydrant nearest to the last structure in the upper end of the system and the fire hose inserted in the sewer pipe as a jet.

The volumes and velocity obtained from the water system should be sufficient to flush any materials in the pipe to the lowest manhole where the pumps will be put into operation to remove the wash water and suspended solids. Disposal of this wash water shall be into the nearest storm drain.

When, in the opinion of the engineer, the wash water is sufficiently clear to indicate that the sewer is clean, the water shall be shut off and the sewer line allowed to drain down. When the lower manhole has been pumped and/ or bailed dry, the remaining residue shall be removed and the manhole left clean.

#### Q. Trench Sheet piling, Shoring and Bracing.

1. Trench sheet piling, shoring and bracing shall be installed for any trench or boring and jacking pit five feet or more in depth. Shoring system shall conform to the latest edition of the State Division of Industrial Safety Construction Safety Orders, Sections 1539, 1540, 1541 and 1542 pursuant to State Assembly Bill No. 150 dated October 2, 1973.

2. Permits. The contractor is required to obtain a permit from the State Division of Industrial Safety prior to the excavation of any trench or boring and jacking pit five feet or more in depth.

3. Shoring and Bracing Plans. The contractor shall be required to submit to the public works department, prior to excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from hazard of caving ground during the excavation of trench or trenches. If such plan varies from the shoring system standards of the State Division of Industrial Safety Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer.

#### R. Maintenance of Trees. Any excavation within the drip line of any trees shall conform to the following requirements:

1. No trees shall be removed unless specifically so designated on the plans or in the special provisions.
2. No roots over two (2) inches in diameter shall be cut.
3. Hand trenching and tunneling will be required when excavation exposes roots two (2) inches in diameter or larger.
4. Roots two (2) inches in diameter or larger which are exposed to the air shall be kept moist.
5. Roots two (2) inches in diameter or larger which are accidentally damaged shall be treated with material approved by the city of Chico park superintendent.
6. If roots two (2) inches in diameter or larger are accidentally cut or broken, the tree shall be trimmed to compensate for the decreased root system. Such trimming shall be done to the satisfaction of the park superintendent.
7. Boring pits shall not be installed within twenty (20) feet of any tree trunk.
8. All work shall be done to the satisfaction of the engineer.

(Res. No. 9 77-78 (part), Res. No. 87 86-87 §2, Res. No. 92 89-90, Res. No. 59 90-91 §§13-17, Res. No. 11 95-96 §§2-3, Res. No. 48 97-98 §§5-6, Res. No. 02 03-04, Res. No. 113-07, Res. No. 19-13)

### **18R.12.020 Standard plans.**

The following plans, copies of which are incorporated into this section, are hereby adopted as the Standard Plans of the City of Chico:

**Note: These plans are available in PDF by clicking on the Plan No.**

<u>Plan No.</u>	<u>Title</u>
<a href="#">S-1</a>	P.C.C. Sidewalk Details
<a href="#">S-2</a>	P.C.C. Curb and Gutter
<a href="#">S-2A</a>	Curb, Gutter & Sidewalk Installation at Trees
<a href="#">S-3</a>	Existing Curb and/or Gutter Replacement Details
S-4	Deleted
<a href="#">S-5</a>	Residential Driveway Approach
<a href="#">S-5A</a>	Commercial Driveway Approach
<a href="#">S-5B</a>	Curb, Gutter & Driveway Details
<a href="#">S-5C</a>	Curbed Driveway Entrance
<a href="#">S-6</a>	Storm Drain Headwall
<a href="#">S-7</a>	36" Drop Inlet (Caltrans "G-O") & Grate Detail (Sht. 1 & 2)
<a href="#">S-7A</a>	Flat Grate Inlet (Caltrans "G-I")
S-8	Deleted
S-9	Deleted
<a href="#">S-10</a>	Storm Drain and Sanitary Sewer Manhole
<a href="#">S-11</a>	Drop Manhole
<a href="#">S-12</a>	Approved Methods of Laying Pipe
<a href="#">S-12A</a>	Pipe Crossing Cradle
<a href="#">S-12M</a>	Modified Concrete Cradle
<a href="#">S-13</a>	Typical Method for Setting Appurtenances
<a href="#">S-14</a>	Bolt Down Manhole Frame & Cover Details
S-14A	(Repealed)
<a href="#">S-15</a>	Flushing Hole - Cast Iron Frame and Cover
<a href="#">S-16</a>	Street Name Sign Details
<a href="#">S-17</a>	Typical Details of Pavement Replacement
<a href="#">S-18A</a>	Typical Cross-Section - Streets (2 plans)
<a href="#">S-18B</a>	Typical Cul-De-Sac
<a href="#">S-18D</a>	Improvement of Existing Street (2 plans)
<a href="#">S-18E</a>	Typical Cross-Section - Other Public Ways
<a href="#">S-18F</a>	Typical Cross-Section - Private Streets
<a href="#">S-19</a>	Alley Pavement
<a href="#">S-20</a>	City Monuments, Construction & Location
<a href="#">S-21</a>	Street Barricades
<a href="#">S-26</a>	Flat Grate Inlet
<a href="#">S-27</a>	P.C.C. Handicapped Ramp
<a href="#">S-27A</a>	P.C.C. Handicapped Ramp

- [S-28](#) Bus Turnout
- [S-35](#) Bicycle Barrier Post
- [SL-1](#) Street Lights (11 plans)
- [LS-1](#) Fifteen Gallon Tree Planting Detail (2 plans)
- [LS-2](#) Fifteen Gallon Tree Planting Detail with Stamped Concrete
- [LS-3](#) Containerized Shrub Planting Detail
- [LS-4](#) Ground Cover Planting Detail
- [LS-5](#) Header Detail (2 plans)
- LS-6 Deleted
- [LS-7](#) Reduced Pressure Backflow Preventer
- [LS-8](#) Remote Control Valve (2 plans)
- [LS-9](#) Remote Control Valve in Paving (Non Vehicular)
- [LS-10](#) Quick Coupling Valve
- [LS-11](#) Tru-Union Ball Valve
- [LS-12](#) Controller Enclosure with Fan
- [LS-13](#) Controller Service Pull Box
- [LS-14](#) Trenching Detail (3 plans)
- [LS-15](#) Typical Thrust Block Details for Ring-Tite and Solvent Weld Pipe
- [LS-16](#) Impact Riser with Swing Joint
- [LS-17](#) Sprinkler/Bubbler Pop-Up
- [LS-18](#) Turf Impact Rotor with Swing Joint
- [LS-19](#) Subterranean Drip Spacing
- [LS-20](#) Subterranean Dripline Layout
- [LS-21](#) Dripline Flushing Valve
- [LS-22](#) Air/Vacuum Relief Valve
- [LS-23](#) Dripline Layout for Trees
- [LS-24](#) Sight Distance Clearance at Non-Signalized Intersections
- [LS-25](#) Tree and Pavement Layout in Median Island
- [LS-26](#) Stamped Concrete Bullnose and Mow Band
- [LS-27](#) Metered Electrical Service Enclosure (2 plans)

(Res. No. 59 90-91 §19, Res. No. 167 92-93 §3, Res. No. 60 95-96, Res. No. 26 97-98; Res. No. 42 99-00 §§1 & 2, Res. No. 118 00-01, Res. No. 120-06, Res. No. 39-07, Res. No. 107-07, Res. No. 55-09, Res. No. 69-09, Res. No. 20-16)

**18R.12.030 Standard plans - TND zoning district.**

The following plans, copies of which are incorporated into this section, are hereby adopted as the Standard Plans of the city of Chico for use in the TND zoning district. These plans shall not be used for any improvements constructed outside of the TND zoning district.

**Note: These plans are available in PDF by clicking on the Plan No.**

<u>Plan No.</u>	<u>Title</u>
<a href="#">TN-1</a>	High Capacity Boulevard with Frontage Lanes
<a href="#">TN-2</a>	Boulevard with Frontage Lanes
<a href="#">TN-3</a>	Boulevard
<a href="#">TN-4</a>	36' Avenue
<a href="#">TN-5</a>	32' Interior Street

<a href="#">TN-6</a>	27' Interior Street
<a href="#">TN-7</a>	27" Drive at Greenway
<a href="#">TN-8</a>	26' Interior Street (One Way)
<a href="#">TN-9</a>	19' Interior Street (One Way)
<a href="#">TN-10</a>	19' Interior Street (One Way on Neighborhood Green)
<a href="#">TN-11</a>	Alley Commercial
<a href="#">TN-12</a>	Alley
<a href="#">TN-13</a>	Typical Plan View Neighborhood General Alley
<a href="#">TN-14</a>	Pedestrian Passage
<a href="#">TN-15</a>	Mid-block Passage
<a href="#">TN-16</a>	Street - Existing Modified Arterial Intersection on Network
<a href="#">TN-17</a>	Street - Existing Arterial Intersection on Network
<a href="#">TN-18</a>	Boulevard - Avenue Intersection on Network
<a href="#">TN-19</a>	Avenue - Street Intersection on Network
<a href="#">TN-20</a>	Street - "T" Intersection off Network
<a href="#">TN-21</a>	Street - Alley Intersection off Network
<a href="#">TN-22</a>	Sidewalk Details: Planter and Tree Grate Options

(Res. No. 85-07)

## Chapter 18R.36

### SUBDIVISION IMPROVEMENT REQUIREMENTS

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**Section:**

**18R.36.010 Schedule of unit costs to be utilized in developing estimates of cost for improvement guarantees.**

**18R.36.010 Schedule of unit costs to be utilized in developing estimates of cost for improvement guarantees.**

The unit costs to be utilized by the public works director in determining the estimate of cost for required improvements to be guaranteed by the improvement security shall be as set forth in Section 14R.14.010 of this code.

(Res. No. 58 79-80 (part), Res. No. 113-07)

### TITLE 18R FOOTNOTES

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1. For statutory provisions on local regulations of land divisions, see Government Code §66410 et seq. For additional provisions regarding divisions of land, see Title 18 of this code.
2. For code provisions authorizing subdivision design criteria to be promulgated by the director of public works and the city planner and approved by resolution of the council, see §18.35.020.
3. For code provisions authorizing subdivision improvement standards to be promulgated by the director of public works and the city planner and approved by the council by resolution, see §18.35.020.