



# STREET DESIGN AND CONSTRUCTION STANDARDS

Adopted by the Santa Rosa City Council  
Resolution No. 25865  
January 13, 2004

RESOLUTION NO. 25865

RESOLUTION OF THE COUNCIL OF THE CITY OF SANTA ROSA ADOPTING REVISED STREET DESIGN AND CONSTRUCTION STANDARDS

WHEREAS, the Council by Resolution No. 10498, as amended by Resolutions Nos. 10902, 11135, 11401, 11780, 11971, 13219, 13621, 13879, 15218, 16586, 16814, 17832, 17832, 17943, 18034, 18342, 19420, and 22578 adopted Standard Street Design and Construction Standards for the City of Santa Rosa ("Standards"); and

WHEREAS, revisions are periodically made to the Standards pursuant to Santa Rosa City Code section 18-04.070; and

WHEREAS, the Council directed that the Standards, among other City policies and documents, be revised to conform with the City's Design Guidelines, as adopted by Council Resolution No. 25068 in December 2001; and

WHEREAS, the Standards were reviewed and have been revised by the Standards Committee to bring them into conformity with the City's Design Guidelines, as directed by the Council; and

WHEREAS, the Council, after review of the revised Standards finds that proposed Alley Standard 202A and proposed 45° Parking Bay Standard 214 require revisions and directs that they be removed and excluded from the revised Standards as presented by staff in proposed Exhibit "A" and be returned to the Standards Committee for further review and revision; and

WHEREAS, the Council directs that Neighborhood Street Standard 200D be reviewed by the Standards Committee to consider whether it should be revised to allow a neighborhood street to end in a cul-de-sac; and

WHEREAS, the Council directs that a committee be formed to address the street specific locations of medians and large planter strips and to propose Standards for each; and

WHEREAS, the Council directs that the property line in the Standards be located at the front of sidewalk.

NOW, THEREFORE, BE IT RESOLVED that the Council of the City of Santa Rosa approves and adopts the City of Santa Rosa "Street Design and Construction Standards", as set forth in Exhibit "A", which is attached to, and made a part of this resolution.

BE IT FURTHER RESOLVED that the "Street Design and Construction Standards", as set forth in Exhibit "A," shall be effective and shall be applied to any and all projects for which improvement plans are submitted to the City for review and approval on and after the 30<sup>th</sup> day from the date of adoption of this resolution. The Standards set forth in Exhibit "A" shall be the only Street Design and Construction Standards which shall be applied to projects and

improvement plans submitted on and after the 30<sup>th</sup> day. The Exhibit "A" Standards shall be available in book form in the Public Works Department for a fee of \$25.00, which fee is to include copies of future updates and revisions of the Standards, as set forth in Exhibit "A".

IN COUNCIL DULY PASSED this 13th day of January, 2004.

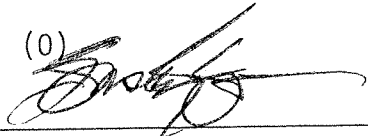
AYES: (7) Mayor Wright; Councilmembers Bender, Blanchard, Condron, Evans, Martini, Rabinowitsh

NOES: (0)

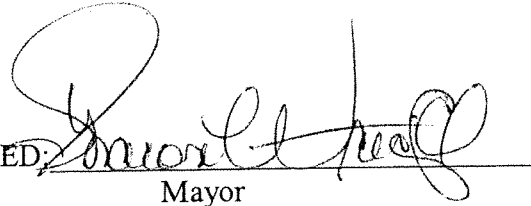
ABSENT: (0)

ABSTAIN: (0)

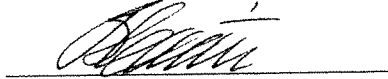
ATTEST:

  
\_\_\_\_\_  
City Clerk

APPROVED:

  
\_\_\_\_\_  
Mayor

APPROVED AS TO FORM:

  
\_\_\_\_\_  
City Attorney

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## STREET DESIGN STANDARDS

### I. Definitions

“**Alley**” means any unnamed street used primarily for vehicular service access to the back or side of properties, and for which normal building setbacks may not or do not apply.

“**Accessway**” is a private primary access to more than four residential units and less than eight with no through traffic.

“**Arterial/ Regional Streets**” (includes Parkways, and Boulevards) shall have the primary purpose of conducting large volumes of through traffic with minimal access and connect town centers to the greater region. Arterial/Regional Streets may be 2 to 4 lane. Side frontage streets parallel to arterials may be considered on a case by case basis by the City Engineer.

“**Avenue**” is a transitional street connecting residential neighborhoods to commercial centers, shopping centers, and other neighborhoods.

“**Bike lane**” means those on-street bikeways which are part of the normal street section and provide marked bike lanes which delineate the separate rights-of-way assigned to bicyclists and motorists.

“**Bike path**” means a separate, off-street bike path or trail which is not part of the normal street section.

“**Boulevard**” is a regional street that provides multi-lane access to commercial and mixed use land designations. Boulevards have medians and bike lanes.

“**City Engineer**” for the purposes of the Street Design Standards shall mean the City Engineer - Deputy Director of Community Development for private development projects, and the City Engineer - Deputy Director of Public Works and/or the City Engineer - Director of Utilities for public improvement projects, who shall be a civil engineer registered by the State of California and who shall be designated by the City Council to discharge those duties prescribed hereinafter to be performed by the City Engineer.

“**Collector/ Transitional street**” (includes Avenues and Main Streets) shall have the primary purpose of intercepting traffic from intersecting local streets and handling traffic to the nearest arterial/ regional street or intercepting traffic from one collector street and handling traffic to another collector street. It shall serve as an access to abutting properties. Collector/Transitional streets connect residential neighborhoods to commercial centers and service commercial districts.

“**Cul-de-sac street**” shall have the primary purpose of serving abutting land use and connecting to the nearest appropriate local street. It is a minor street with only one outlet.

“**Curb cut**” shall mean an opening or depression in the street curb installed and intended for

pedestrian or vehicular use. Curb cuts shall be measured across the “flat bottom” width of the opening or depression.

“**Development**” means and includes, but is not limited to, the subdivision of land, the construction of new structures or buildings, and changes or renovations to existing structures or buildings and the attendant construction of improvements, either of public or private nature, for which approval by the City of Santa Rosa is required prior to commencement.

“**Driveway**” For the purposes of single family detached housing, “driveway” means a way for vehicular traffic providing access to four or fewer lots or units over a common parcel or easement(s), and necessary service and emergency vehicles, but from which the general public may be excluded, and which are not maintained by a public agency. Driveways shall meet all provisions of the California Fire Code, as adopted by the City, with respect to Fire Department access where such serve as Fire Department access.

“**Hillside**” shall mean properties or portions of properties which have an average cross-slope of ten percent or greater, as computed by the following formula:

$$S = \frac{(I)(L)(.00229)}{A}$$

where,

S = average cross-slope (%)

I = contour interval in feet

L = combined length of all contours on the property or portion of property,

A = area of the property or portion of property in acres.

Properties or portions of properties to which this definition applies or which have other demonstrated hillside characteristics qualify for consideration for use of hillside design standards. Determination of the appropriateness of use of such standards shall rest with the City Engineer.

“**Hillside street**” shall have the primary purpose of providing access to hillside development. Street widths may be reduced to avoid excessive cuts or fills or tree removal if specifically approved by the City Engineer or City Council.

“**Industrial street**” shall have the primary purpose of handling industrial and manufacturing type business traffic. It is a street that provides access to or through an industrial zone, commercial zone, or an area of high truck and other large vehicle traffic.

“**Lane**” is a public or private access to ten residential units or less (see STD-200C).

“**Local streets**” (includes Minor and Neighborhood Streets, Lanes and Trails) provide access to neighborhood destinations and indirect connections between Transitional or Regional Streets.

**“Loop street”** shall be a one-way street providing access to a very limited number of residential houses. Use is extremely limited (see STD. 200B).

**“Main street”** provides access to neighborhood commercial and mixed use districts.

**“Major street”** (equivalent to Regional Streets, typically a Boulevard or Parkway) shall mean a street whose primary purpose is to facilitate movement of heavy traffic between major residential areas or major residential areas and commercial areas. Access is very limited.

**“Minor Street”** shall have the primary purpose of serving abutting land use and handling traffic to the nearest collector street.

**“Neighborhood Street”** shall have the primary purpose of providing access to small residential areas and shall specifically not be used for through traffic. The various streets within this designation are the one-way loop street, the lane, and the neighborhood street.

**“Pathway/ Trail (equestrian)”** shall mean a public or private paved or rock-surface path, excluding sidewalks, for the use of horses.

**“Pathway/ Trail (mixed use)”** shall mean a public or private paved or rock-surfaced path, excluding sidewalks, for the use of pedestrians and horses.

**“Pathway/ Trail (pedestrian)”** shall mean a public or private paved or rock-surfaced path, excluding sidewalks, for the use of pedestrians.

**“Parkway”** is a connection between towns or through a natural area and are not designed to accommodate adjoining development.

**“Private street”** means a way for vehicular traffic providing access to lots or units over a common parcel or private easement, primarily by the owners or occupants of the common parcel, and necessary service and emergency vehicles, but from which the general public may be excluded, and which are not maintained by a public agency.

Such streets may be designed and constructed to different standards than public streets in the following areas: surface treatment, street lighting hardware, signing and entry islands. Private streets should not connect two or more public streets (except when necessary for internal circulation or emergency vehicle access) and shall be designed and constructed to the standards of public streets in terms of minimum width (may be reduced when meeting specific criteria - see Standards 200 A through 200 L) structural section, curb, gutter, sidewalk, and all other aspects not specifically referenced above. No City enforcement of “no parking” signs or other such regulatory signs shall be provided for such streets. Access shall be through a standard curb cut.

**“Public street”** means a way for vehicular traffic, whether designated as a local, transitional, regional/ major thoroughfare, freeway, or other designation, which is improved to City standards, dedicated for general public use and maintained by a public agency. The term “street” shall include alleys as defined above.

**“Public way”** shall mean any street, channel, viaduct, subway, tunnel, bridge, easement, right-of-way or other way in which a public agency has a right of use.

**“Regional Streets”** (equivalent to Arterial or Major Streets; includes Parkways and Boulevards) See “Arterial/ Regional Streets.”

**“Sidewalk”** shall mean a Portland Cement Concrete (PCC) surfaced area for pedestrian usage located within the public or private street right of way or sidewalk easement and included as a standard element of a street section.

**“Street”** shall include avenues, highways, lanes, alleys, crossings or intersections and courts which have been dedicated and accepted according to the law or which have been in common and undisputed use by the public for a period of not less than five years next preceding, or which have been dedicated to a semi-public use.

**“Street right-of-way width”** shall mean the shortest distance between the lines delineating the right-of-way of a street.

**“Street width”** means the distance between the curb faces of a street or edge of pavement where a curb face may be omitted by approval of the City Engineer.

**“Transitional Streets”** (equivalent to Collector Streets) connect residential neighborhoods to commercial centers and service commercial districts. Streets in this category are the Avenue and the Main Street.

## **II. General**

A. For purposes of street layout and design, streets shall be classified as:

### Regional

1. Parkways/ Boulevards/ Major Streets
2. Industrial Streets

### Transitional

3. Main Streets, Avenues

### Local

4. Minor
5. Neighborhood
6. Lanes
7. Alleys
8. Utility Access Roads, Trails

- B. Street design standards shall be used for the design and construction of all private and public streets and for flat-land streets and hillside streets.
- C. Deviations from these standards may be granted by approval of the City Engineer.
- D. The standards are considered minimum and do not preclude the use of a higher standard.

### **III. Requirements for Submittal of Improvement plans**

The City has requirements for submittal of Improvement Plans and Parcel Maps/Final Maps. Figure 1 and Figure 2 show examples of submittal requirements. Current submittal requirements may be obtained from the Community Development Department.

The City requires a standard “City Engineer Approval Block” on the Improvement Plans. Figure 3 shows the requirements and block to be used.



**Department of  
Community  
Development**

CHECKLIST  
**IMPROVEMENT  
PLANS**  
Please Type or Print

File No.	Quad.
Related Files	
<b>Department Use Only</b>	

<b>G E N E R A L  I N F O</b>	LOCATION OF PROJECT (ADDRESS)	ASSESSOR'S PARCEL NUMBER(S)	NO. OF PROPOSED LOTS	
	NAME OF PROPOSED PROJECT			
	APPLICANT NAME	ADDRESS	APPLICANT'S PHONE ( ) -	
	PROPERTY OWNER'S NAME	ADDRESS	PHONE ( ) -	
	NAME OF ENGINEER/SURVEYOR		LICENSE NO.	
	ADDRESS		PHONE ( ) -	
<b>NOTE: Improvement Plans must be prepared by a registered civil engineer.</b>				
<b>S U B M I T T A L  R E Q U I R E M E N T S</b>	<input type="checkbox"/> FINAL MAP (Associated with these plans.) <input type="checkbox"/> PARCEL MAP (Associated with these plans.) <input type="checkbox"/> NO MAP (Associated with these plans.)  If a rezoning is associated with these improvement plans, has that rezoning been approved by the City Council? <input type="checkbox"/> YES <input type="checkbox"/> NO			
	<p style="text-align: center;"><b>NUMBER OF COPIES</b></p> <input type="checkbox"/> Six blue/line or black/line copies (24" x 36") folded into fourths (approximately 9" wide x 24" tall). <p style="text-align: center;"><b>GENERAL</b></p> <input type="checkbox"/> 1. North arrow (to be upward facing if practical) and sheet number (all sheets). <input type="checkbox"/> 2. Scale, written and graphic (all sheets). <input type="checkbox"/> 3. Location map (with north arrow upward facing). <input type="checkbox"/> 4. Benchmark (established City benchmark). <input type="checkbox"/> 5. Symbols legend. <input type="checkbox"/> 6. Abbreviation legend. <input type="checkbox"/> 7. Index to drawings. <input type="checkbox"/> 8. General Notes. <input type="checkbox"/> 9. Title block (all sheets): <input type="checkbox"/> a. Name of engineering firm. <input type="checkbox"/> b. Location for R.C.E. seal, signature, and expiration date. <input type="checkbox"/> c. City Engineer approval block. <input type="checkbox"/> d. Date prepared. <input type="checkbox"/> 10. Clear delineation of project boundaries <input type="checkbox"/> 11. Nature and dimension of existing and proposed easements: <input type="checkbox"/> a. To be in conformance with the final/parcel map. <input type="checkbox"/> b. Public and private easements clearly delineated. <input type="checkbox"/> 12. Typical section of all streets: <input type="checkbox"/> a. Width of street, property lines, easements, curb and sidewalk. <input type="checkbox"/> b. Crown and centerline locations. <input type="checkbox"/> c. Pavement and base type and thickness	<p style="text-align: center;"><b>STREETS</b></p> <p><u>Plan View:</u></p> <input type="checkbox"/> 13. Centerline and curb line data (submit calculations). <input type="checkbox"/> 14. Street names, widths. <input type="checkbox"/> 15. Property lines. <input type="checkbox"/> 16. Centerline stationing: <input type="checkbox"/> a. Conform to existing stationing if previously set. <input type="checkbox"/> b. All B.C.'s, E.C.'s, and grade breaks, driveways, etc. <input type="checkbox"/> 17. Gutter slopes (on curb returns & cul-de-sacs) and flow arrows. <input type="checkbox"/> 18. Top of curb elevations and stationing at curve points, grade breaks and crest or sag points. <input type="checkbox"/> 19. Required sidewalk. <input type="checkbox"/> 20. Monument locations at all E.C.'s, B.C.'s, or P.I.'s and street intersections. <p><u>Profile View:</u></p> <input type="checkbox"/> 21. Existing ground surface (100' each direction beyond improvements, 200' for major streets). <input type="checkbox"/> 22. Profile of improvement: <input type="checkbox"/> a. Stationing and elevation at all grade breaks. <input type="checkbox"/> b. Vertical curve data. <input type="checkbox"/> 23. Cross sections every 25 feet for all existing half streets: <input type="checkbox"/> a. Stationing. <input type="checkbox"/> b. Existing and proposed grades. <input type="checkbox"/> c. Existing and proposed cross-slopes. <input type="checkbox"/> d. Centerline, existing edge of pavement (conform) and top of curb elevations.		
DATE CHECKLIST RECEIVED	CHECKLIST RECEIVED BY	ENGINEERING & INSPECTION FEES: (Not applicable if this application is accompanied by a Final Map or Parcel Map application.)	Receipt No.	

**Figure 1**



**CITY ENGINEER APPROVAL BLOCK  
FOR PRIVATE DEVELOPMENT PLANS**

Figure 3

**OVERALL DIMENSIONS TO BE 13" x 3"  
(NOT SHOWN TO SCALE)**

STAFF APPRVL	REVISIONS					EXP. DATE	CITY ENG. DATE	PUBLIC IMPROVEMENTS APPROVED FOR CONSTRUCTION	
	NO.	REVISION	DATE	R.C.E.	DATE			CITY OF SANTA ROSA	
_____	_____	_____	_____	_____	_____	_____	_____	BY _____	
_____	_____	_____	_____	_____	_____	_____	_____	ANTHONY A. CABRERA      R.C.E. 41858	
_____	_____	_____	_____	_____	_____	_____	_____	CITY ENGINEER	
_____	_____	_____	_____	_____	_____	_____	_____	DEPUTY DIRECTOR ENGINEERING	
_____	_____	_____	_____	_____	_____	_____	_____	DATE _____	
_____	_____	_____	_____	_____	_____	_____	_____	CITY OF SANTA ROSA FILE NO. ____-____	

**NOTES**

1. Block to be located in lower right hand corner of sheet or (alternately) in lower right hand corner of the main field, and shall be oriented to read from the bottom of the sheet.
  
2. Revisions shall be denoted both within the revision blocks on the title sheet and on the plan by a number circumscribed by a triangle. Revisions are to be numbered consecutively and in chronological order and are considered to be applicable to the entire set of plans, not just an individual sheet (numbering should not “start over” with each sheet).

## IV. Street Designs

### A. Geometric Standard Cross Sections

<u>Item</u>	<u>Minimum Width</u>	<u>Street Classification</u>
Center median	14 feet	Parkway
	12 feet	Boulevard
	12 feet	Avenue, Main Street
Travel lane	14 feet	Industrial
	11 feet	Parkway, Boulevard
	10 feet	Avenue, Main and Minor Street
	9 feet	Neighborhood Street
	12 feet (two-way)	Lane
Parking lane or shoulder	10 feet	Industrial
	8 feet	All others except Neighborhood Street
	6 feet	Neighborhood Street
Curb lane (no Parking or Bike lane)	2 feet increase to curb face	Local streets
	1 foot increase to curb face	All other streets
Bike lane	5 feet	All streets
Divider between frontage road and paralleling road	8 feet, curb to curb	All streets
Left turn lanes:		
Double	Two 12 foot lanes	All streets where required
Single	10 feet	All streets
2-Way	14 feet	All streets
Right turn lanes:	12 feet	All streets
Curb radius for Cul-de-sac	45 feet (with parking and no island)	Cul-de-sac

<u>Item</u>	<u>Minimum Width/Length</u>	<u>Street Classification</u>
Curb radius for Cul-de-sac (Continued)	45 feet (no parking and with an island)	Cul-de-sac
	40 feet (no parking and no island)	Cul-de-sac
Note: An island in a cul-de-sac (other than those shown in Standard Drawings), when proposed, will require review and approval by the City Engineer, who shall determine the use of the correct turning radius, compliance with required access for emergency vehicles, and any other required design criteria.		
Maximum length from projected curb or edge of pavement line of intersecting street to center of turnaround.	500 feet (or as approved by the City Engineer).	Cul-de-sac
Length of streets allowed with no Fire Department approved turnaround	150 feet from the projected curb or edge of pavement line of the cross street to end of dead-end street.	All streets
Planter strip (consistent with space requirements of master street tree plan)	8 feet	Parkway, Boulevard, Avenue
	6 feet	Minor
	5 feet	Neighborhood, Lane, Cul-de-sac bulb
Sidewalk	5 feet	All Local Streets (*see Lane note below), Avenue
Sidewalk	6 feet	Parkway, Boulevard
Sidewalks-contiguous with tree wells (where permitted or required per Standards)	9 feet	Main streets - required on both sides (widen at obstructing locations to provide 4 foot minimum clear sidewalk)
Sidewalks-contiguous	6 feet	All streets in PD, one-way loop-streets, and hillside or as approved by Planning Commission - required on both sides (widen at obstructing locations to provide 4 foot minimum clear sidewalk).
Sidewalk -meandering (Where permitted by Standards)	5 feet	Where applicable
Sidewalk easement	to .5' behind back of sidewalk	All streets where applicable
Public utility easement	13 feet behind right of way	All streets where required

\*Lane requires sidewalk for 5 or more homes , one side minimum.

Note: Sidewalk one side as approved by Planning Commission.

## **B. Access to Public Right-of-Way - Curb Cuts**

1. Each vehicular passage way to any parking or loading facility to or across a public right-of-way shall comply with the following requirements:
  - a. Curb cuts shall be a maximum of 41 feet in width for non-residential uses, except as otherwise approved by Conditional Use Permit. Minimum of 12 feet for one-way, 24 feet for two-way.
  - b. Driveway widths, within residential areas, shall be a minimum of 12 feet in width for single driveways, a minimum of 16 feet for double or triple driveways up to a maximum of 24 feet, except as otherwise approved by Conditional Use Permit.
  - c. Wherever feasible, curb cuts serving adjacent uses shall be combined to minimize the number of entrances onto a public right-of-way on any block. No curb island is allowed when it is less than 6 feet between uses.
  - d. Only one curb cut may be installed for any parking or loading facility, except that one or more additional curb cuts may be allowed if the City Engineer determines that each additional curb cut is necessary for the efficient operation of the facility and will not significantly reduce street capacity and traffic safety. Twenty feet top to top on the curb island is required between driveways on a single parcel.
  - e. Any curb cut in a residential area on a corner lot shall be located at the farthest point possible from the curb return and outside of the sight vision triangle, except as otherwise approved by the City Engineer.
  - f. In commercial/industrial area, a minimum of 200 feet required separation between driveway and the intersection of two major, industrial and/or collector streets, except as otherwise approved by City Engineer.
  - g. Except as otherwise approved by the City Engineer, curb cuts for any circular or "through" driveway must meet the following requirements.
    - (1) The curb cuts for such driveway shall be at least 20 feet apart top to top and a minimum of 10 feet from the side property line.
    - (2) The combined width of the curb cuts shall not exceed 50% of the lot frontage.

## **V. Street Alignment**

- A. Street alignment shall generally conform to the circulation element of the City's General Plan. Streets shall be aligned with adjacent existing streets by continuations of the centerlines thereof,

or by adjustment by curves, and shall be laid out for the most advantageous development of the entire area.

1. Minimum centerline horizontal curve radii shall be as follows:

Regional

- |              |          |
|--------------|----------|
| a. Parkway   | 500 feet |
| b. Boulevard | 500 feet |

Industrial

- |                      |          |
|----------------------|----------|
| c. Industrial Street | 300 feet |
|----------------------|----------|

Transitional

- |                |          |
|----------------|----------|
| d. Main Street | 300 feet |
| e. Avenue      | 300 feet |

Local

- |                        |          |
|------------------------|----------|
| f. Minor Street        | 150 feet |
| g. Neighborhood Street | 100 feet |
| h. Lane                | 90 feet  |
| i. Alley               | 40 feet  |

2. Lesser radii may be used only when sufficient evidence is presented to the City Engineer to show that the radii described above are not practicable. Any deviations require specific City Engineer's approval.
3. Super-elevations are required on curves for the design of all major streets and for any other street with a design speed above 25 miles per hour, except as otherwise approved by the City Engineer.

- B. Where necessary to give access to or permit satisfactory future subdivision of adjoining land, streets shall extend to the boundary of the property and resulting dead-end streets greater than 150 feet (measured from the projected curb or edge of pavement line of the cross street) shall have a temporary turnaround. Design of turnarounds other than the standard temporary turnarounds in the standard drawings requires specific approval by the City Engineer.

## VI. Street Grades

- A. All street grades shown on improvement plans shall refer to the City of Santa Rosa Bench Marks as established in the City of Santa Rosa.
1. All Major/Arterial/Regional and Industrial Streets shall have no grade rate in excess of 7%.
  2. Collector/ Transitional, Minor, and Cul-de-sac Streets in the flatland shall have no grade rate in excess of 10%, except as specifically approved by the City Engineer.
  3. Collector, Minor and Cul-de-Sac Streets in the hillside shall have no grade rate in excess of 15%, except for 20% point grades or as specifically approved by the City Engineer.

4. Minimum grade rate for all streets shall be 0.5%.
5. The grade of the pavement surface across an intersection shall not be more than 7%, except as approved by the City Engineer.
6. The gradient of each street entering an intersection shall not be more than 7% within a distance of 25 feet from the near curb line of the crossing street, except as approved by the City Engineer.
7. Vertical parabolic curves shall be used to connect grade profiles where the algebraic difference in grade rates exceeds 1% (does not apply at intersecting streets). The length of vertical curve required shall be determined by the following:

	<u>Minimum Sight Distance</u>	<u>Minimum Length of Curve</u>
Regional/ Major & Industrial Streets	350 feet	200 feet
Transitional/ Collector Streets	200 feet	100 feet
Local Streets	100 feet	100 feet

8. Minimum cross-slope for all streets shall be 2%. Maximum cross-slopes shall be 5% (offset crown may require tilt section, minimum 2% cross-slope).
9. Maximum cross-slopes in cul-de-sac bulbs shall be 5% in flat-land and 8% in hillside.
10. Exceptions to this section require specific approval by the City Engineer.

## **VII. Intersections**

- A. All streets entering upon any given street shall have their centerlines directly opposite each other or separated by at least 200 feet, except as otherwise authorized by the City Engineer. The 16 foot one-way loop street may have a separation of 120 feet if entry and exit is to the same street.
- B. All streets shall intersect at right angles, or along radial lines when the intersection is within a curve, and shall have at least 50 feet of centerline tangent adjacent to the intersection, except as specifically approved by the City Engineer.
- C. Curb return radii:

Regional:	Boulevard, Parkway	35 feet
Transitional:	Main Street, Avenue	25 feet
Local:	Minor	20 feet
	Neighborhood Street, Lane	10-20 feet

At all intersections, the curb return radius to be utilized will be determined by the highest street classification (e.g., a local-regional street intersection will require 35 foot radius).

## VIII. Typical Sections

- A. Typical sections for the improvement of streets and alleys shall be shown on the improvement plans. Curb and gutter sections, curb return radii, parking strip widths, and sidewalk widths may be modified where these improvements have been constructed in a portion of a block to other than the sections shown. However, any modifications require the specific approval of the City Engineer.

## IX. Pavement Design

Design of the structural section for all streets shall be in accordance with the following criteria:

### A. Traffic Index

- 1. Street classification shall be determined by the City Engineer.
- 2. Within subdivisions for residential and residential collector streets, use Chart No. 1, "Traffic Index Chart for Flexible Pavements." For all other streets the T.I. will be determined by the City Engineer.
- 3. In no instance will the T.I. be less than the following:

Regional/Major and Industrial	a minimum T.I. of 9.0
Transitional/Collector	a minimum T.I. of 7.0
All other streets	a minimum T.I. of 5.0
- 4. For all street design, use Chart No. 2 (3 sheets), "Structural Design Chart for Flexible Pavements."

### B. Soils Reports

- 1. Resistance "R" Values
  - a. A qualified Soils Engineer shall obtain sufficient soils samples within the proposed street construction to permit determination of the "R" Value of the various materials which lie immediately under the planned structural section. The cost of sampling and testing shall be at the owner's expense.
  - b. The basement soil shall be tested according to California Test 301 "Method for Determination of the Resistance "R" Value of Treated and Untreated Bases, Sub-bases, and Basement Soils by the Stabilometer: in use by the California Department of Transportation, Transportation Laboratory. Design of the structural section for a particular street will normally be based on the lowest "R" Value material encountered.
  - c. If the engineer elects to utilize an "R" Value of 5, then "R" Value tests will not be required.

- d. The owner’s soil engineer shall submit to the City a Materials report showing the location and elevation of sampling points, “R” Value data, and Expansion Index Tests. The owner’s soils engineer may be required to make a field survey of soil conditions when rough subgrade has been cut to verify data presented to the Materials Report. The cost of any additional sampling and testing shall be at the owner’s expense.

2. Active Soils

- a. Irrespective of the “R” Value used, an Expansion Index Test shall be required.
- b. A soil will be classified as active if the Expansion Index is 50 or greater as measured by the Uniform Building Code Standard 29-2, “Expansion Index Test.”
- c. The design of all streets constructed on active soils must include measures such as cut-off walls to prevent pavement structure damage resulting from shrink-swell movement of these soils. The structural section required, in some cases, may be governed by the expansion-shrinkage properties of the soil rather than traffic and soil-bearing criteria.
- d. The soils report for any project which contains active soils shall be referred to the City Materials Laboratory. The City Materials Laboratory will review the proposed measures to determine if they will be adequate.

C. Gravel Equivalents

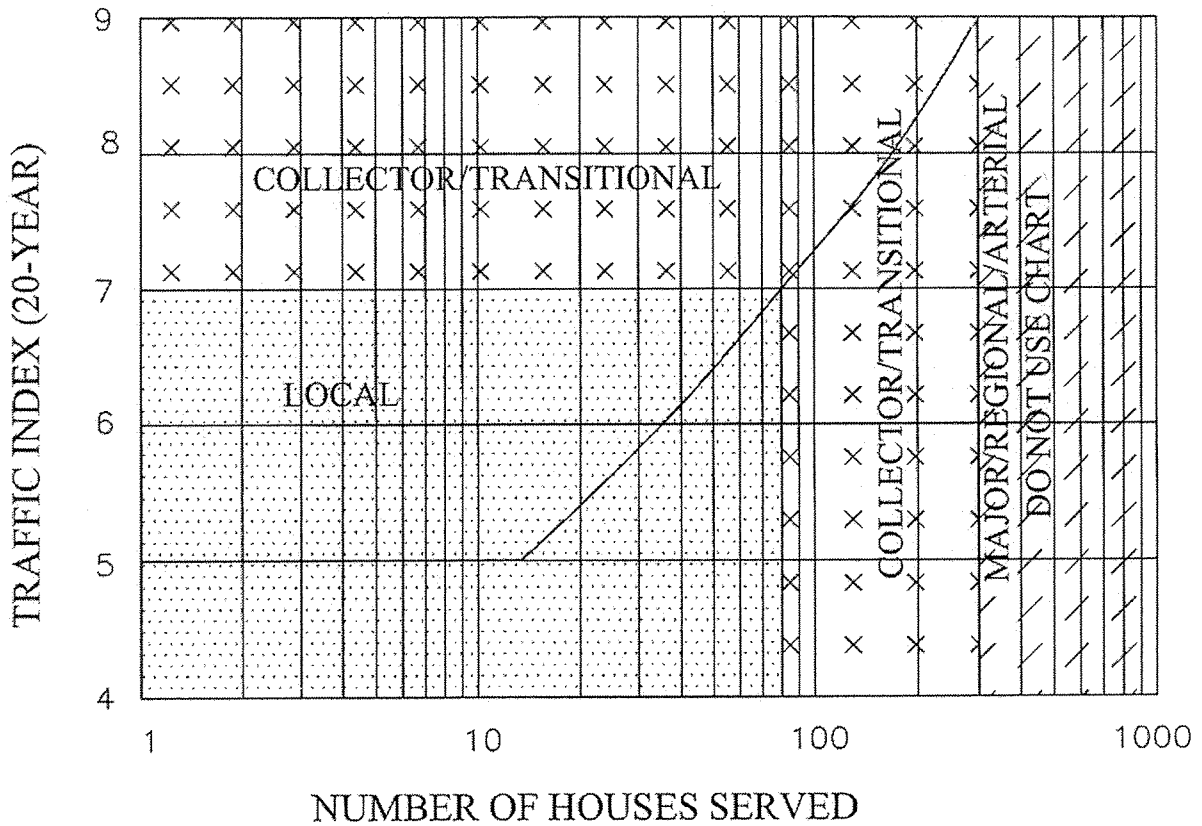
- 1. Structural sections are to be determined from Chart No. 2 utilizing traffic indexes and known basement soil “R” Values. Gravel equivalents are to be converted into structural sections using gravel equivalents factors (Gf) for the various construction materials as shown on Chart No. 2.
- 2. All streets shall have a safety factor included in the design. Structural sections using aggregate base shall have the gravel equivalent of the asphalt concrete layer increased by 0.2 feet. Contact City Materials Laboratory for safety factors to be used with other types of base layers.
- 3. In no instance shall a structural section be less than follows:

Regional/Major and Industrial Streets	0.45 feet asphalt concrete 0.80 feet Class II aggregate base
Transitional/Collector Streets	0.35 feet asphalt concrete 0.60 feet Class II aggregate base
Local Streets	0.25 feet asphalt concrete 0.50 feet Class II aggregate base

**D. Improvement Plan Notation**

1. All improvement plans shall include the design “R” Value, Expansion Index, and the Traffic Index. This information shall be included in the typical section or in a note or table on the same sheet as the typical sections.

CHART FOR ESTIMATION OF TRAFFIC INDEX  
USING A HOUSE COUNT



\* T.I. = 3.091 (HOUSES)<sup>0.1871</sup>                      MINIMUM T.I. = 5.0

NOTES: For use only within subdivisions for residential and residential collector streets.  
For all other streets, the T.I. will be determined by the City Engineer. Chart is based on a 20-year design life.

CHART I.  
Traffic Index Chart for Flexible Pavements

# STRUCTURAL DESIGN CHART FOR FLEXIBLE PAVEMENTS

EQUATION:

$$G.E. = 0.0032 (T.I.)(100 - R)$$

G.E. = GRAVEL EQUIVALENT  
T.I. = TRAFFIC INDEX  
R. = RESISTANCE VALUE

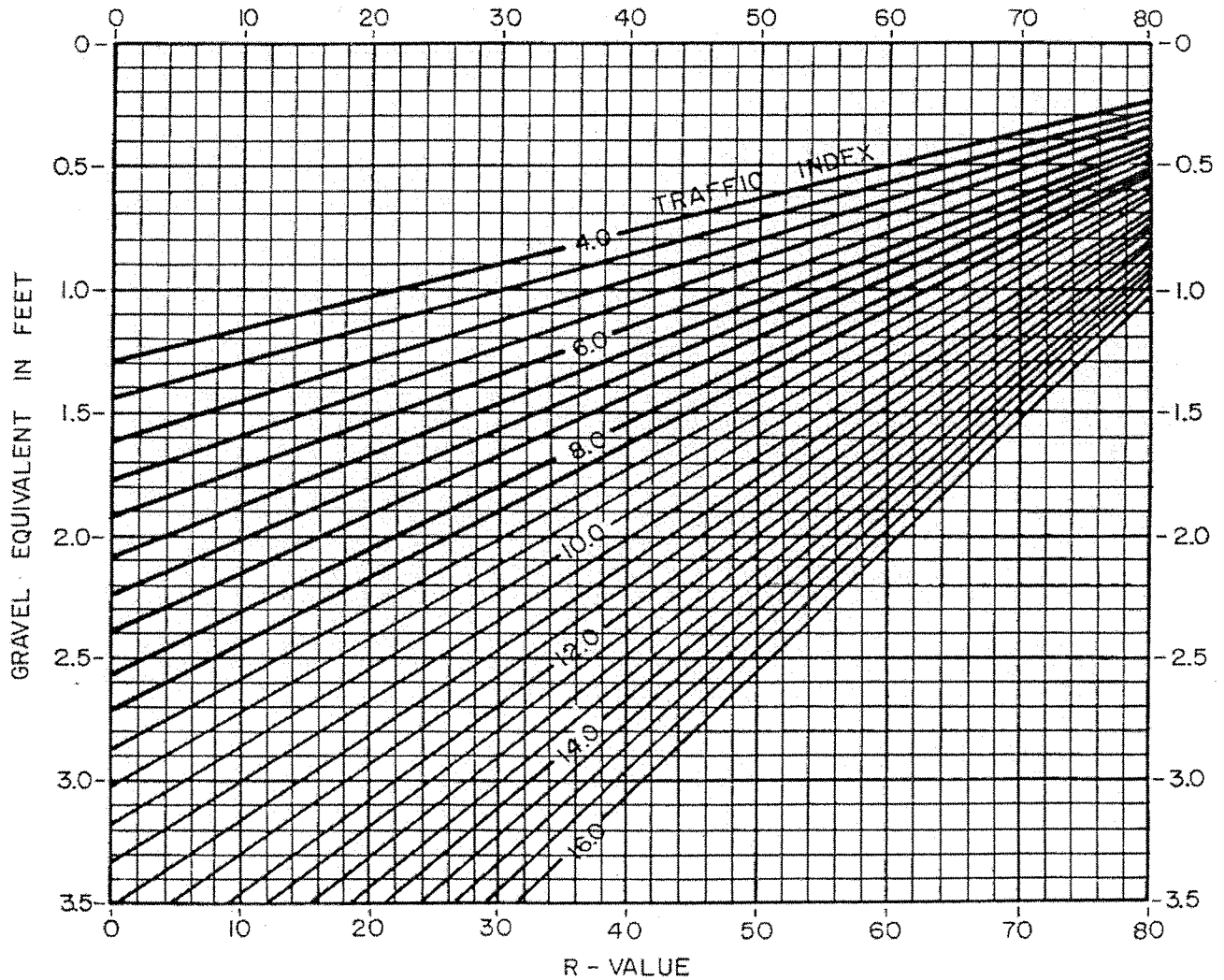
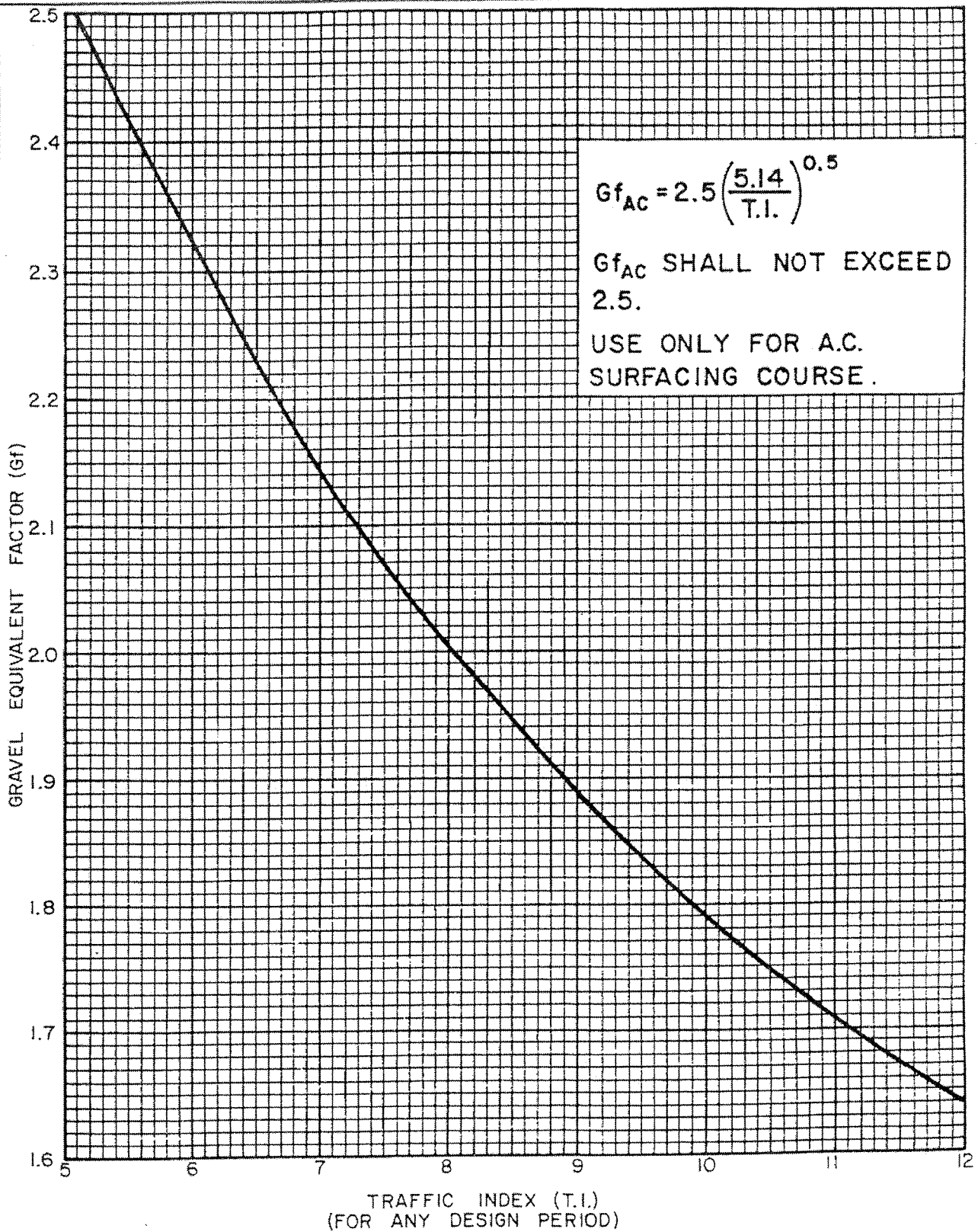


CHART 2.  
Structural Design Chart for Flexible Pavements  
( 1 of 3)



RELATIONSHIP BETWEEN  
 GRAVEL EQUIVALENT FACTOR  
 FOR ASPHALT CONCRETE  
 AND TRAFFIC INDEX

CHART 2.  
 (2 of 3)

GRAVEL EQUIVALENT FACTORS

MATERIAL	GRAVEL EQUIVALENT FACTOR (Gf)
Lean Concrete Base (LCB)	1.9
Class A Cement Treated Base (CTB)	1.7
Asphalt Treated Permeable Material (ATPM)	1.4
Open Graded Asphalt Concrete (OGAC)	1.4
Class B Cement Treated Base (CTB)	1.2
Asphalt Treated Base	1.2
Soil Cement	1.2
Aggregate Base	1.1
Aggregate Subbase	1.0
Lime Treated Base (LTB)	0.9 + (unconfined compressive strength in psi ÷ 1000)

Gravel Equivalents of Full Depth Asphalt Concrete

AC Thickness (Ft.)	Traffic Index *								
	6	7	8	9	10	11	12	13	14
0.55	1.30	1.20	1.12	1.05	1.00	0.95	0.92	0.87	0.85
0.60	1.44	1.33	1.24	1.17	1.10	1.06	1.02	0.97	0.94
0.65	1.60	1.48	1.38	1.30	1.23	1.17	1.13	1.08	1.05
0.70	1.79	1.65	1.54	1.45	1.37	1.31	1.26	1.20	1.17
0.75	1.97	1.82	1.70	1.60	1.52	1.45	1.39	1.33	1.29
0.80		1.99	1.86	1.75	1.66	1.59	1.53	1.46	1.41
0.85		2.14	2.00	1.88	1.78	1.70	1.64	1.56	1.52
0.90		2.31	2.17	2.04	1.93	1.84	1.77	1.59	1.64
0.95			2.35	2.21	2.09	2.00	1.92	1.83	1.78
1.00			2.51	2.36	2.23	2.13	2.05	1.96	1.90
1.05			2.67	2.51	2.38	2.27	2.18	2.08	2.02
1.10				2.68	2.54	2.42	2.33	2.22	2.16
1.15				2.83	2.68	2.56	2.46	2.35	2.38
1.20					2.82	2.70	2.59	2.48	2.40
1.25					2.98	2.85	2.74	2.62	2.54
1.30					3.15	3.00	2.89	2.76	2.68
1.35						3.16	3.03	2.90	2.81
1.40						3.31	3.18	3.04	2.95
1.45						3.47	3.33	3.18	3.09
1.50							3.48	3.32	3.22
1.55							3.62	3.46	3.36
1.60							3.77	3.61	3.50
1.65								3.76	3.65
1.70								3.90	3.78
1.75								4.06	3.94

\* Safety Factor of 0.10 to be added to total GE before entering TI Column.

R-value :	Class B CTB = 80	ASB Class 1 = 60
	AB = 78	ASB Class 2 = 50
		ASB Class 3 = 40
		ASB Class 4 = 50

CHART 2.  
(3 of 3)

**X. Requirements for Emergency Access During Construction**

**A. Subgrade Conditions**

	<u>Good Subgrade</u>	<u>Poor Subgrade</u>
Summer April 1 - September 30	Excavated and drained subgrade	Excavated and drained subgrade
Winter October 1 - March 31	6 inches rock	6 inches rock and fabric

1. For structures with a ridge line of at least 35 feet above adjacent rough fire access grade, or for structures with 3 or more stories, 1.5 inches of asphalt base over 4 inches of aggregate base shall be provided in all proposed and approved fire access areas.
2. Winter conditions shall take effect and be enforced by the City Engineer on October 1. The City Engineer shall have the authority to move this date up to as early as September 1, depending on the particular season’s rainfall and projections.
3. Subgrade defined as native soil at bottom of street section (base and paving), excavated to the approximate lines and grades shown on the project grading plan, and provided with a discharge for collected water, as approved by the City Engineer.
4. Base shall be Class II aggregate base or alternative recommended by the soils engineer and approved by the City Engineer.
5. Poor subgrade defined as “R” Value of 10 or less.
6. Base shall be placed only on an unyielding excavated and drained subgrade, and to be compacted to at least 90% relative compaction.
7. Fabric to be a ground stabilization fabric such as Mirafi 600X or equivalent