

September 4, 2015

Mr. Eric Flodine
Strata Equity Group, Inc.
4370 La Jolla Village Drive, Suite 960
San Diego, CA 92122

SUBJECT: RANCHO PALMA LITTLE LEAGUE DRIVE DESIGN PARAMETER REVIEW

Dear Mr. Eric Flodine:

Urban Crossroads, Inc. is pleased to submit this letter report documenting our review of the appropriate design parameters for Little League Drive in the vicinity of the Rancho Palma development (“Project”) located in the City of San Bernardino. The location of interest in this analysis is shown on Exhibit A.

EXISTING CONDITIONS

Although Little League Drive in the immediate vicinity of the Rancho Palma project site will be redesigned as part of the project, the remainder of Little League Drive north of the project site will retain its current configuration. Therefore, the design of Little League Drive in the vicinity of the project should consider multiple factors, including the General Plan Circulation Element designation, along with current sight distances and existing curve radii that will remain to the northwest of the project subsequent to project completion.

Little League Drive north of the Rancho Palma project site provides access to Guhin Park, the Blast Soccer Complex, and a local church. All of these uses take access to Little League Drive via a single access point located just northwest of the Rancho Palma project site. This access road serves traffic with the high intensity, short term “bursts” of traffic associated with these types of uses.

Exhibit B presents the key existing design characteristics of Little League Drive to the northeast of the Rancho Palma project site. Key existing design characteristics include the existing sight distance for the access road to the Blast Soccer Park, Guhin Park and church, as well as the existing curve radii between West Little League Drive and North Little League Drive.

The existing curve radii adjacent to the project site (just northwest of Palm Avenue) are approximately 230’ (227’ and 235’). These curves will be redesigned and reconstructed in conjunction with the proposed project.

The existing sight distance from the access road serving the existing park, church, and soccer field complex to the first curve to the northwest is approximately 400 feet. The two curves between this access roadway and North Little League Drive are constructed with radii of approximately 240 feet and 90 feet for the curve nearest the project and the curve nearest North Little League Drive, respectively.

DESIGN STANDARD REVIEW

The primary design standard used in the State of California is the California Department of Transportation (CALTRANS) Highway Design Manual (HDM). The City of San Bernardino has an adopted Traffic Engineering Design Policies and Procedures document. These policies explicitly reference the CALTRANS HDM. Excerpts from the CALTRANS HDM are provided as Attachment "A" to this letter. Attachment "A" also contains sight distance from the American Association of State Highway and Transportation Officials (AASHTO) publication Geometric Design of Highways and Streets. Excerpts from the City of San Bernardino Traffic Engineering Design Policies and Procedures document are provided as Attachment "B" to this letter.

As stated previously, the sight distance from the access road serving existing park, church, and soccer field complex is approximately 400 feet. This distance is consistent with the corner sight distance for a roadway with a 30 mile per hour (MPH) design speed, per the guidance of the (AASHTO) publication Geometric Design of Highways and Streets. The CALTRANS Highway Design Manual specifies a design speed of 35 MPH for a sight distance of 385 feet. The CALTRANS HDM design standard is more restrictive than the City of San Bernardino design standard, which cites a design speed of 40 MPH for a sight distance of 400'. The recommended curve radius per the CALTRANS HDM for a design speed of 30 MPH is 300 feet, while the recommended curve radius for a design speed of 40 MPH is 550 feet. The CALTRANS HDM (Topic 203.3 Alignment Consistency) also indicates that the design speed for successive curves should not vary by more than 10 MPH. The existing curve located northwest of the project has a radius of approximately 240 feet, which falls between the curve radii standards for a design speed of 20 MPH (130' radius) and 30 MPH (300' radius). This suggests an existing design speed of approximately 25 MPH.

The design standards for the County of San Bernardino have also been consulted as a part of this review. The standards for a Collector roadway located in the Valley area of San Bernardino County range from 470 feet horizontal curve radius (rolling terrain) to 820 feet (flat terrain).

Based on the CALTRANS HDM guidance regarding alignment consistency and the existing curve to the northwest of the project site with a radius of 240 feet (corresponding to a design speed of approximately 25 MPH), it is recommended that a design speed of no more than 35 MPH be used to design the curves adjacent to the Rancho Palma project site. Based on interpolating from the CALTRANS HDM design radii for 30 MPH and 40 MPH, this corresponds to a curve radius of 400 feet.

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Page 3 of 3

SUMMARY AND CLOSING

Based on the existing design characteristics in the vicinity of the proposed Rancho Palma project, it is recommended that a curve radius of 400 feet be used for the design of the reconstruction of Little League Drive adjacent to the project site. This will provide alignment consistency with the existing curve located to the northwest of the project site. The recommended design concept is shown on Exhibit C. If you have any questions, please feel free to contact me directly at (949) 336-5981.

Respectfully submitted,



Carleton Waters, P.E.
Principal

Attachments

EXHIBIT A: LOCATION MAP



EXHIBIT B: EXISTING DESIGN CHARACTERISTICS

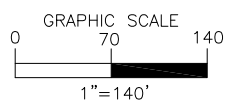


EXHIBIT C: LITTLE LEAGUE DRIVE PROPOSED ALIGNMENT CONCEPT (400' RADII)



ATTACHMENT A

AASHTO AND CALTRANS DESIGN GUIDANCE EXCERPTS

- CASE III A**
 A- SAFE SIGHT DISTANCE FOR P VEHICLE CROSSING 2-LANE HIGHWAY FROM STOP. (SEE DIAGRAM)
- CASE III B**
 B-1- SAFE SIGHT DISTANCE FOR P VEHICLE TURNING LEFT INTO 2-LANE HIGHWAY ACROSS P VEHICLE APPROACHING FROM LEFT (SEE DIAGRAM)
- CASE III B**
 B-2a- SAFE SIGHT DISTANCE FOR P VEHICLE TO TURN LEFT INTO 2-LANE HIGHWAY AND ATTAIN DESIGN SPEED WITHOUT BEING OVERTAKEN BY A VEHICLE APPROACHING FROM THE RIGHT AND MAINTAINING DESIGN SPEED
- CASE III B**
 B-2b- SAFE SIGHT DISTANCE FOR P VEHICLE TO TURN LEFT INTO 2-LANE HIGHWAY AND ATTAIN AVERAGE RUNNING SPEED WITHOUT BEING OVERTAKEN BY VEHICLE APPROACHING FROM THE RIGHT REDUCING SPEED FROM DESIGN SPEED TO AVERAGE RUNNING SPEED.(SEE DIAGRAM)
- CASE III C**
 C-0- SAFE SIGHT DISTANCE TO P VEHICLE TO TURN RIGHT INTO A 2-LANE HIGHWAY AND ATTAIN DESIGN SPEED WITHOUT BEING OVERTAKEN BY A P VEHICLE APPROACHING FROM THE LEFT TRAVELING AT DESIGN SPEED
- CASE III C**
 C-0- SAFE SIGHT DISTANCE FOR P VEHICLE TO TURN RIGHT INTO 2-LANE HIGHWAY AND ATTAIN AVERAGE RUNNING SPEED WITHOUT BEING OVERTAKEN BY VEHICLE APPROACHING FROM THE LEFT AND REDUCING FROM DESIGN SPEED TO AVERAGE RUNNING SPEED

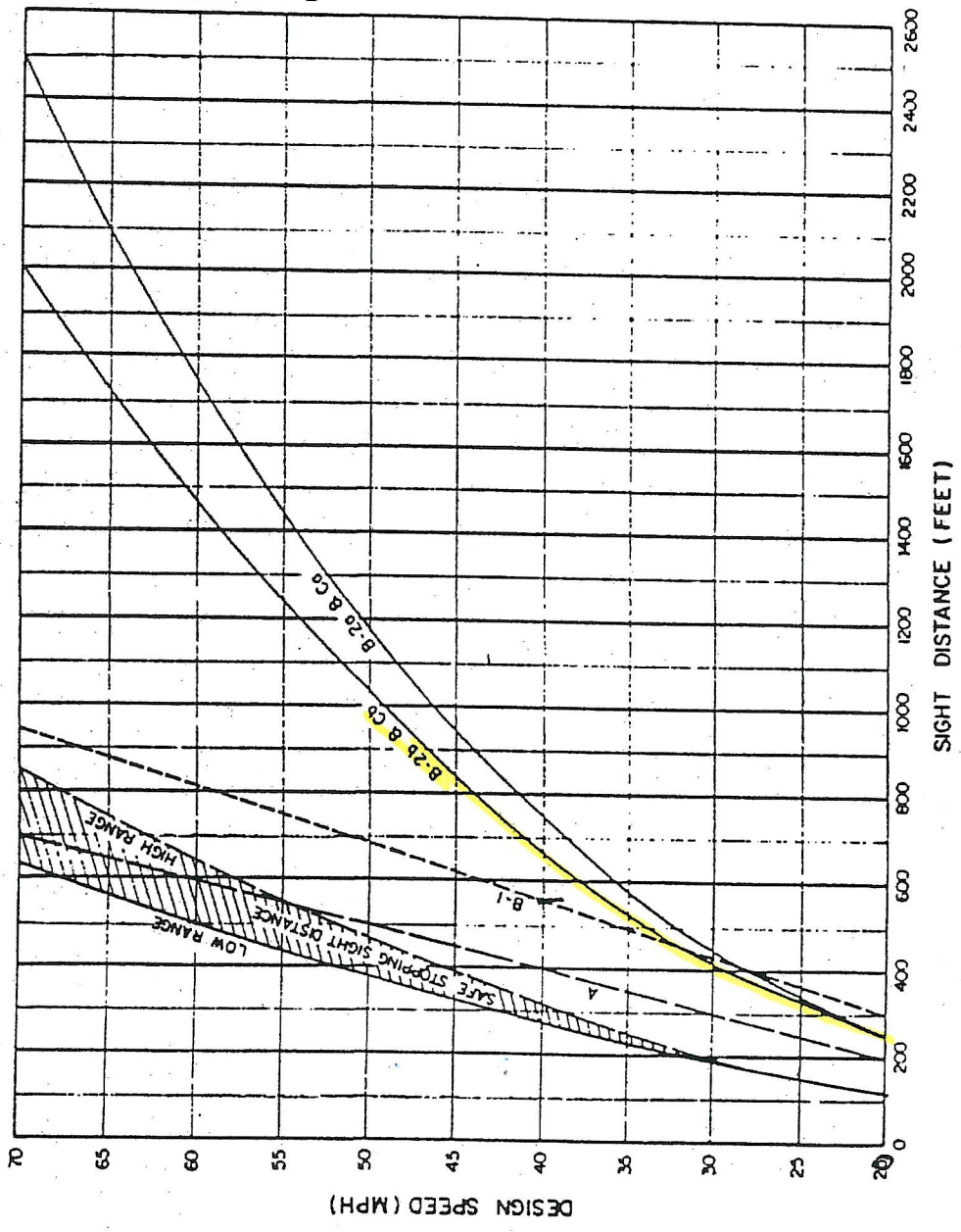


Figure 8-3 Intersection sight distance at at-grade intersection (case IIB and case IIIC).

CHAPTER 100 BASIC DESIGN POLICIES

Topic 101 - Design Speed

Index 101.1 - Selection of Highway Design Speed

Design speed is defined as: "a speed selected to establish specific minimum geometric design elements for a particular section of highway". These design elements include vertical and horizontal alignment, and sight distance. Other features such as widths of pavement and shoulders, horizontal clearances, etc., are generally not directly related to design speed.

In California the majority of projects only modify existing facilities. On those projects observed motor vehicle speed (operating speed) is the primary factor requiring consideration by the designer. Generally the posted speed is a reliable indicator of operating speed although operating speeds frequently exceed posted speeds. Speed limits and speed zones are discussed in Chapter 2 of the California MUTCD, which include references to the California Vehicle Code.

On projects where posted speeds or observational data is not available, the choice of design speed is influenced principally by the character of terrain, economic considerations, environmental factors, type and anticipated volume of vehicular traffic, presence of non-motorized traffic, functional classification of the highway, existing and future adjacent land use, and whether the area is rural or urban. A highway in level or rolling terrain justifies a higher design speed than one in mountainous terrain. As discussed under Topic 109, scenic values are also a consideration in the selection of a design speed.

In addition, the selected design speed should be consistent with the operating speeds that are likely to be expected on a given highway facility. Drivers and bicyclists adjust their speed based on their perception of the physical limitations of the highway and its vehicular and bicycle traffic. In addition, bicycling and walking can be encouraged

when bicyclists and pedestrians perceive an increase in safety due to lower design speeds.

Where a reason for limiting speed is obvious to approaching drivers or bicyclists, they are more apt to accept a lower operating speed than where there is no apparent reason for it.

A highway carrying a higher volume of traffic may justify a higher design speed than a lower classification facility in similar topography, particularly where the savings in user operation and other costs are sufficient to offset the increased cost of right of way and construction. A lower design speed; however, should not be assumed for a secondary road where the topography is such that drivers are likely to travel at higher speeds.

Subject to the above discussion, on high-speed facilities as high a design speed as feasible should be used. Highway context in terms of area place type, land use, types of users, etc. need to also be considered when determining the appropriate design speed for lower speed facilities.

It is preferable that the design speed for any section of highway be a constant value. However, during the detailed design phase of a project, special situations may arise in which engineering, economic, environmental, or other considerations make it impractical to provide the minimum elements established by the design speed. See Index 82 for documenting localized exception to features preventing the standard design speed.

The cost to correct such restrictions may not be justified. Technically, this will result in a reduction in the effective design speed at the location in question. **Such technical reductions in design speed shall be discussed with and documented as required by the Design Coordinator.**

Local streets or roads within the State right of way, including facilities which will be relinquished after construction (such as frontage roads), shall have minimum design speeds conforming to AASHTO standards, as per the functional classification of the facility in question. If the local agency having jurisdiction over the facility in question maintains design standards that exceed AASHTO standards, then the local agency standards should apply.

203.2 Standards for Curvature

Table 203.2 shall be the minimum radius of curve for specific design speeds on highways. This table is based upon speed alone; it does not address the sight distance factor. **If the minimum radii indicated in Table 203.2 does not provide the desired lateral clearance to an obstruction, Figure 201.6 shall govern.**

Every effort should be made to exceed minimum values, and such minimum radii should be used only when the cost or other adverse effects of realizing a higher standard are inconsistent with the benefits. As an aid to designers, Figure 202.2 displays the maximum comfortable speed for various curve radii and superelevation rates. Use of Figure 202.2, in lieu of the above standards must be documented as discussed in Index 82.2.

The recommended minimum radii for freeways are 5,000 feet in rural areas and 3,000 feet in urban areas.

If a glare screen or a median barrier is contemplated, either initially or ultimately, adjustments may be necessary to maintain the required sight distance on curves on divided highways. In such cases, a larger curve radius or a wider median may be required throughout the length of the curve. For design purposes, a planting screen is presumed to be 8 feet wide. See Chapter 7 of the Traffic Manual for glare screen criteria.

Table 203.2
Standards for Curve Radius

Design Speed mph	Minimum Radius of Curve (ft)
20	130
30	300
40	550
50	850
60	1,150
70	2,100
80	3,900

203.3 Alignment Consistency

Sudden reductions in alignment standards should be avoided. Where physical restrictions on curve radius cannot be overcome and it becomes necessary to introduce curvature of lower standard than the design speed for the project, the design speed between successive curves should change not more than 10 miles per hour. Introduction of curves with lower design speeds should be avoided at the end of long tangents, steep downgrades, or at other locations where high approach speeds may be anticipated.

The horizontal and vertical alignments should be coordinated such that horizontal curves are not hidden behind crest vertical curves. Sharp horizontal curves should not follow long tangents because some drivers tend to develop higher speeds on the tangent and could over drive the curve.

See “Combination of Horizontal and Vertical Alignment” in Chapter III of AASHTO, A Policy on Geometric Design of Highways and Streets, for further guidance on alignment consistency.

203.4 Curve Length and Central Angle

The minimum curve length for central angles less than 10 degrees should be 800 feet to avoid the appearance of a kink. For central angles smaller than 30 minutes, no curve is required. Above a 20,000 -foot radius, a parabolic curve may be used. In no event should sight distance or other safety considerations be sacrificed to meet the above requirements.

On 2-lane roads a curve should not exceed a length of one-half mile and should be no shorter than 500 feet.

203.5 Compound Curves

Compound curves should be avoided because drivers who have adjusted to the first curve could over drive the second curve if the second curve has a smaller radius than the first. Exceptions can occur in mountainous terrain or other situations where use of a simple curve would result in excessive cost. Where compound curves are necessary, the shorter radius should be at least two-thirds the longer radius when the shorter radius is 1,000 feet or less. On

required to adjust for flat spots or unsightly sags and humps, or when conforming to existing roadway.

- (3) *Restrictive Situations.* In restrictive situations, such as on two lane highways in mountainous terrain, interchange ramps, collector roads, frontage roads, etc., where curve radius and length and tangents between curves are short, standard superelevation rates and/or transitions may not be attainable. In such situations the highest possible superelevation rate(s) and transition length should be used, but the rate of change of cross slope should not exceed 6 percent per 100 feet.
- (4) *Superelevation Transitions on Bridges.* Superelevation transitions on bridges should be avoided whenever possible (See Index 203.9).
- (5) *Shoulder Transitions.* The shoulder plane rotates about the adjacent edge of traveled way as well as the rotational axis of the traveled way. Shoulder superelevation transitions should be smooth and compatible with the transition of the adjacent pavements.

202.6 Superelevation of Compound Curves

Superelevation of compound curves should follow the procedure as shown in Figure 202.6. Where feasible, the criteria in Index 202.5 should apply.

202.7 Superelevation on City Streets and County Roads

Superelevation rates of local streets and roads which are within the State right of way (with or without connection to State facilities) shall conform to AASHTO standards, for the functional classification of the facility in question. If the local agency having jurisdiction over the local facility in question maintains standards that exceed AASHTO standards, then the local agency standards should prevail.

See Index 202.2 and Table 202.2 for Frontage Roads within the State right of way. Frontage roads that will be relinquished after construction should follow AASHTO or local standards as stated above.

Topic 203 - Horizontal Alignment

203.1 General Controls

Horizontal alignment should provide for safe and continuous operation at a uniform design speed for substantial lengths of highway. The standards which follow apply to curvature on both 2-lane and multilane highways except when otherwise noted. These standards also apply to portions of local streets and roads within the State right of way which connect directly to a freeway or expressway, or are expected to do so in the foreseeable future. **For local facilities which are within the State right of way and where there is no connection or the connection is to a non-controlled access facility (conventional highway), AASHTO standards shall prevail.** If the local agency having jurisdiction over the local facility in question maintains standards that exceed AASHTO standards, then the local agency standards should prevail.

The major considerations in horizontal alignment design are safety, profile, type of facility, design speed, geotechnical features, topography, right of way cost and construction cost. In design, safety is always considered, either directly or indirectly. On freeways in metropolitan areas, alternative studies often indicate that right of way considerations influence alignment more than any other single factor. Topography controls both curve radius and design speed to a large extent. The design speed, in turn, controls sight distance, but sight distance must be considered concurrently with topography because it often demands a larger radius than the design speed. All these factors must be balanced to produce an alignment which optimizes the achievement of various objectives such as safety, cost, harmony with the natural contour of the land, and at the same time adequate for the design classification of the highway.

Horizontal alignment shall provide at least the minimum stopping sight distance for the chosen design speed at all points on the highway, as given in Table 201.1 and explained in Index 201.3. See Index 101.1 for technical reductions in design speed.

may be excessive. High costs may be attributable to right of way acquisition, building removal, extensive excavation, or immitigable environmental impacts. In such cases a lesser value of corner sight distance, as described under the following headings, may be used.

- (b) Public Road Intersections (Refer to Topic 205)--At unsignalized public road intersections (see Index 405.7) corner sight distance values given in Table 405.1A should be provided.

At signalized intersections the values for corner sight distances given in Table 405.1A should also be applied whenever possible. Even though traffic flows are designed to move at separate times, unanticipated conflicts can occur due to violation of signal, right turns on red, malfunction of the signal, or use of flashing red/yellow mode.

**Table 405.1A
Corner Sight Distance
(7-1/2 Second Criteria)**

Design Speed (mph)	Corner Sight Distance (ft)
25	275
30	330
35	385
40	440
45	495
50	550
55	605
60	660
65	715
70	770

Where restrictive conditions exist, similar to those listed in Index 405.1(2)(a), the minimum value for corner sight distance at both signalized and unsignalized intersections shall be equal to the stopping sight distance as given in Table 201.1, measured as previously described.

- (c) Private Road Intersections (Refer to Index 205.2) and Rural Driveways (Refer to Index 205.4)--**The minimum corner sight distance shall be equal to the stopping sight distance as given in Table 201.1, measured as previously described.**

- (d) Urban Driveways (Refer to Index 205.3)--Corner sight distance requirements as described above are not applied to urban driveways.

- (3) *Decision Sight Distance.* At intersections where the State route turns or crosses another State route, the decision sight distance values given in Table 201.7 should be used. In computing and measuring decision sight distance, the 3.5-foot eye height and the 0.5-foot object height should be used, the object being located on the side of the intersection nearest the approaching driver.

The application of the various sight distance requirements for the different types of intersections is summarized in Table 405.1B.

- (4) *Acceleration Lanes for Turning Moves onto State Highways.* At rural intersections, with “STOP” control on the local cross road, acceleration lanes for left and right turns onto the State facility should be considered. At a minimum, the following features should be evaluated for both the major highway and the cross road:

- divided versus undivided
- number of lanes
- design speed
- gradient
- lane, shoulder and median width
- traffic volume and composition of highway users, including trucks and transit vehicles
- turning volumes
- horizontal curve radii
- sight distance
- proximity of adjacent intersections
- types of adjacent intersections

ATTACHMENT B

CITY OF SAN BERNARDINO DESIGN GUIDANCE EXCERPTS

DIVISION I — AUTHORITY

This policy paper is prepared to serve as a guide for the preparation of traffic reports, traffic related improvement plans and to assist the developer in preparing information and plans that meet the criteria of the City of San Bernardino.

It does not replace the Standard Drawings and is not intended to be all inclusive. It provides the minimum level expected on a project, but all projects must be based on sound engineering judgement and be acceptable to the Director of Public Works/City Engineer.

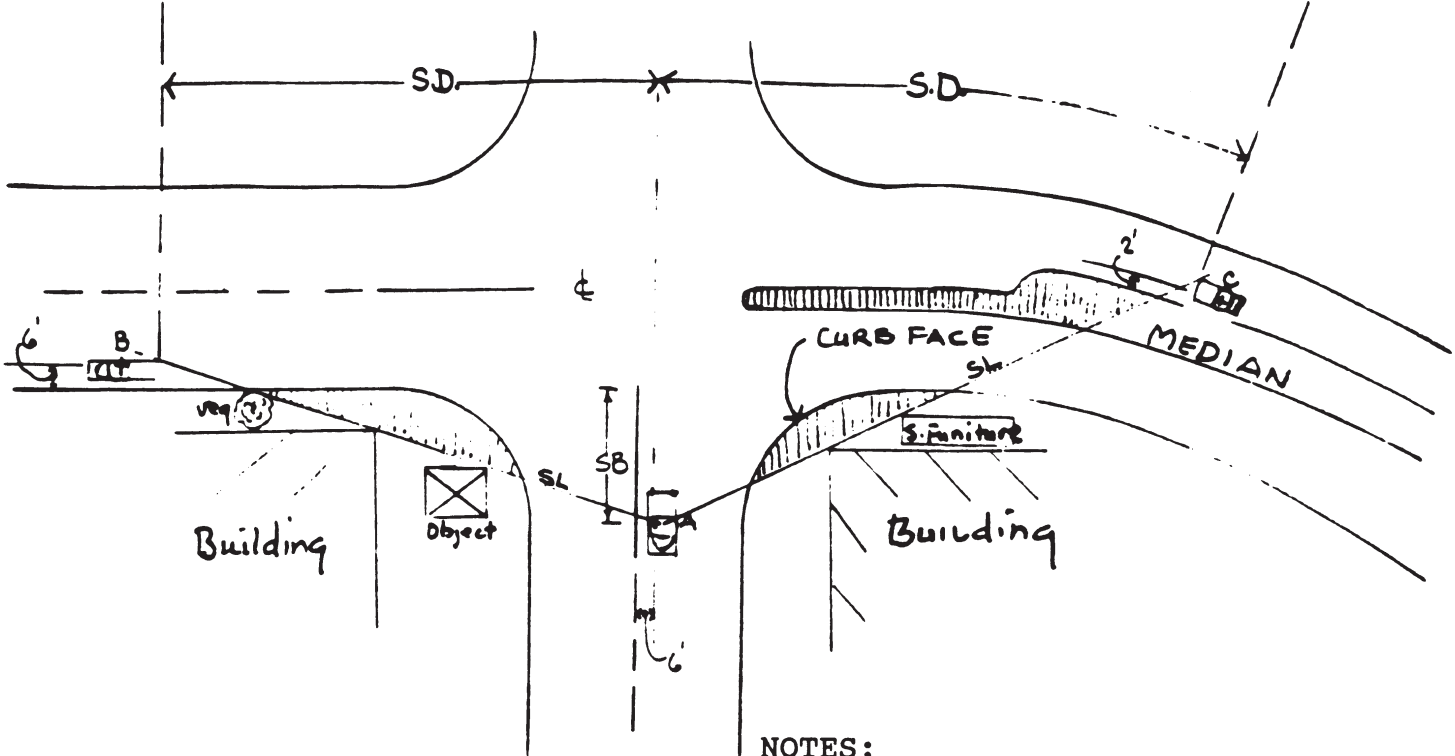
Authority for the traffic policy is contained in the City of San Bernardino municipal Code in the following sections:

- Section 2.14
- Section 3.26
- Title 10
- Title 12
- Development Code

In addition to the above, the City of San Bernardino has adopted a General Plan with the Circulation Element, area plans, overlay zoning, the "Standard Specifications for Public Works Construction" (Green Book), Caltrans Standard Specifications and its own Standard Drawings for Public Works Improvements. Also, the City uses as a standard reference the Manual of Uniform Traffic Control Devices, the ITE Trip Generation Report, the ITE Parking Report, Caltrans Traffic Design Manual, 1985 Highway Capacity Manual, AASHTO manuals, WATCH manual, CAPSSI and PASSER programs and its own transportation planning program, based on TRANPIAN.

The referenced code sections also refer to many varied resolutions and ordinances adopted by the Mayor and common Council in which fees are established, including a traffic systems fee, for services or-impacts.

This authority is established as the minimum requirement of the City of San Bernardino with all material subject to the review and approval of the Director of Public Works/City Engineer for conformance to acceptable design practices and sound engineering judgement. All plans and reports must receive approval of the Director of Public Works/City Engineer prior to approval of the project and for the recordation of any maps.



NOTES:

1) SB = 18' at intersections
 SB = 10' at driveways
 (Under special conditions lesser SB. Values may be approved by Traffic Engineer)

2) V = Speed (MPH) = 85th Percentile i.e., prevailing speed or as determined by Traffic Engineer

3) S.D. = Minimum Sight Distance

Speed = V (MPH)	Minimum Sight Distance (feet)
30	300
35	350
40	400
45	450
50	500
55	550

5) SL = Line of Sight

5) ///// = Area of Limited Use

**Refer to the City of San Bernardino Traffic Engineering Policy Paper for further detail.

- (a) There shall be no obstruction within the limited use area. Area of limited use shall be determined geophysically using appropriate distances given in the Minimum Sight Distance Table (4).
- (b) Obstructions shall include, but not be limited to, any signs or objects higher than 2.5' measured from pavement within the area of limited use. Example, block walls, utility vents, and cabinets, sign street furnitures, mature landscaping, etc.
- (c) Developer's Engineer shall evaluate and show sight lines at proposed intersections/driveways, grading plans, tentative tract maps and landscaping plans where sight distance is questionable.
- (d) Where existing sign, vegetation or objects constitute a sight distance hazard, property owner or occupant shall be notified/-required to meet minimum sight distance requirements within 15 days and maintain same thereafter.

SIGHT DISTANCE REQUIREMENTS AT CONTROLLED INTERSECTIONS AND DRIVEWAYS

ATTACHMENT C

COUNTY OF SAN BERNARDINO DESIGN GUIDANCE EXCERPTS

STREET DESIGNATIONS

		LOCAL STREET (> 500 ADT)	LOCAL STREET	COLLECTOR	SECONDARY HIGHWAY *	MAJOR HIGHWAY *	MAJOR DIVIDED *	MAJOR ARTERIAL *
RIGHT OF WAY		50	60	66	88	104	120	120
SURFACED WIDTH CURB TO CURB		36	40	44	64	80	94	104
RADII (HORIZ.)	FLAT: 0.5% - 4%	300	470	820	1400	2200	-	-
	ROLLING: 4% - 9%	180	300	470	1100	1800	-	-
MAX. GRADE	FLAT	4	4	4	4	4	-	-
	ROLLING	9	9	8	7	6	-	-
DESIGN SPEED (MIN.)	FLAT	30	35	40	50	60	-	-
	ROLLING	25	30	35	45	55	-	-
INTERSECTION INTERVALS (a) (MIN.)		200	250	660	1320	2640	-	-

NOTES:

1. Minimum street grade 0.5%.
 2. Roadway design less than shown requires Transportation Department approval.
 3. Part-width streets shall have a minimum of 40' R/W and 26' paving for residential and 50' R/W and 36' paving for industrial.
 4. Radii based on "Geometric Design of Highways and Streets" for speeds 35 MPH or less (-2% super elevation). Radii based on Caltrans "Comfortable Speed" for speeds 40 MPH or more (-2% elevation).
- * Direct vehicular access restricted.
- (a) Additional distance may be required when left turns are necessary or when directed by Director of Transportation.

SAN BERNARDINO COUNTY TRANS. DEPT.		VALLEY DESIGN GUIDELINES	TABLE 7-1
KEN A. MILLER Director of Transportation			