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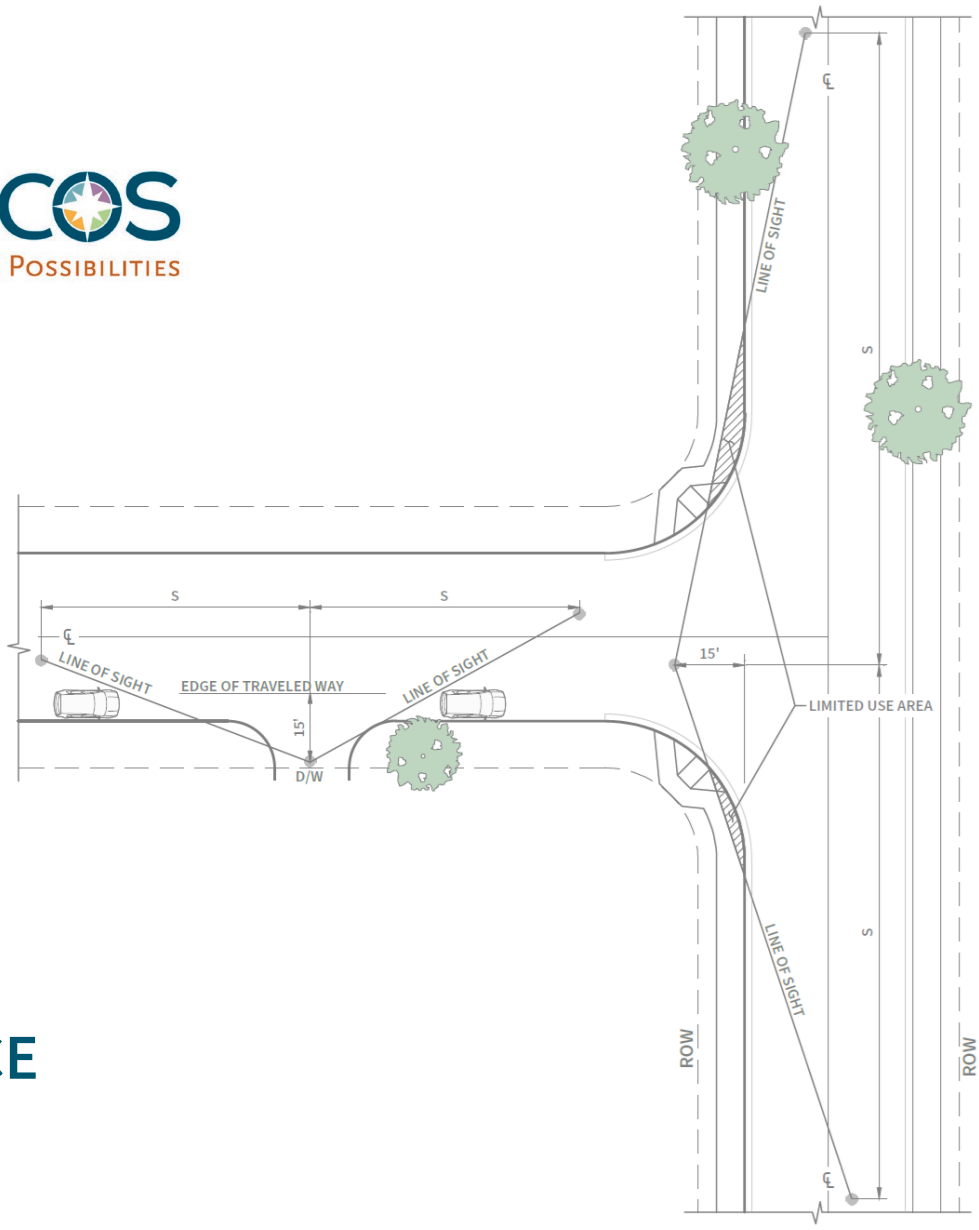

INTERSECTION SIGHT DISTANCE GUIDELINES

Engineering Division

Last updated: July 1, 2024

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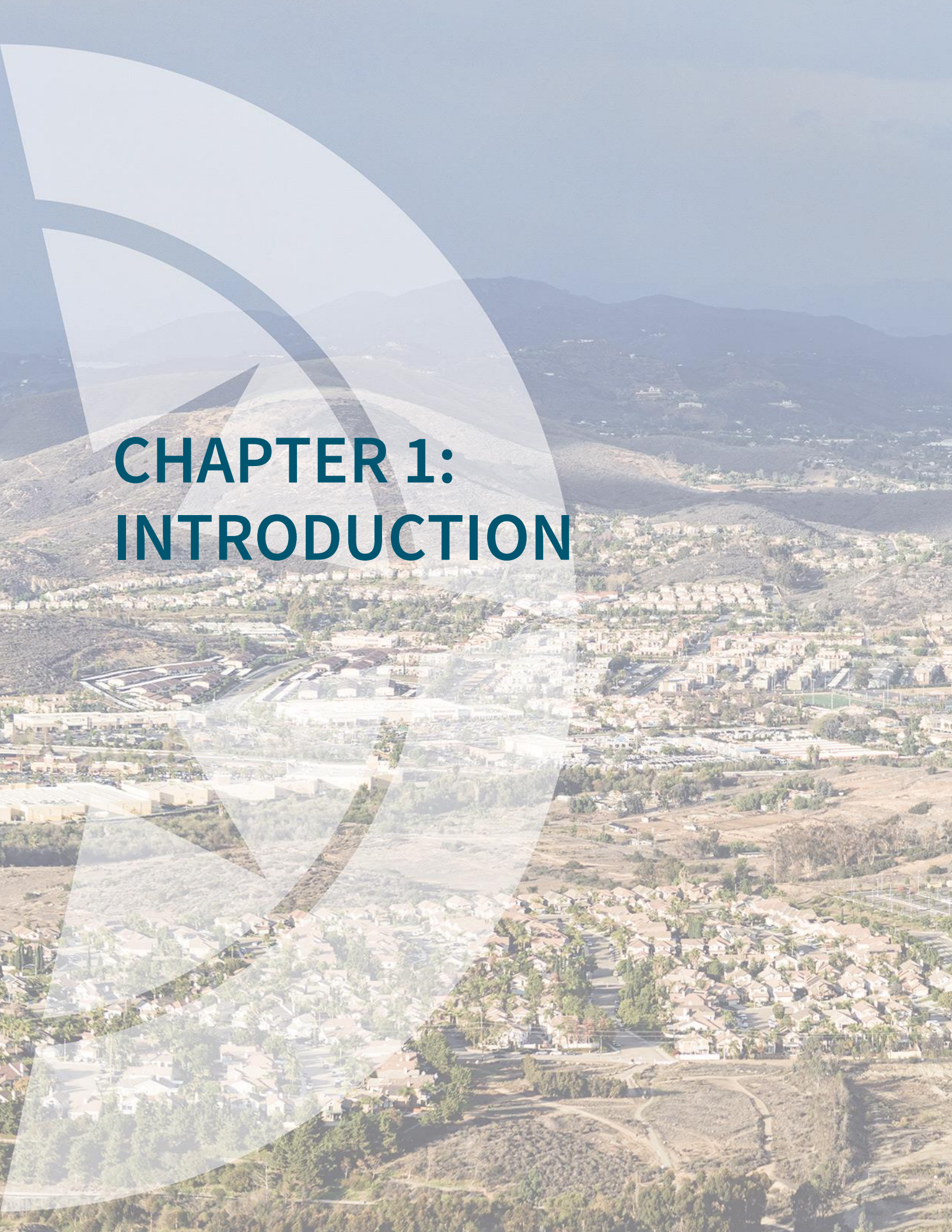

CHAPTER 1: INTRODUCTION

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Sight distance is the length of roadway visible to a driver. The purpose of a sight distance analysis is to provide adequate time to a driver to visually identify and stop for an unforeseen roadway hazard or pass a slower vehicle without conflicting with opposing traffic.

Sight distance shall be conducted in accordance with this document and meet minimum sight distance. The City Traffic Engineer, at their discretion, may permit deviations from the established sight distance standards when warranted by specific site conditions or other pertinent factors. Such deviations will be considered on a case-by-case basis to ensure that safety and operational efficiency are maintained while accommodating unique circumstances.

The four types of sight distance most common in roadway design are stopping sight distance, corner sight distance, passing sight distance, and vertical sight distance.

Most sight distance analysis requests are related to corner and stopping sight distance. Therefore, these guidelines focus on the analysis of these two sight distances. Prior to the preparation of any sight distance study, the project applicant shall coordinate with City staff to determine whether additional sight distance analyses would be required.

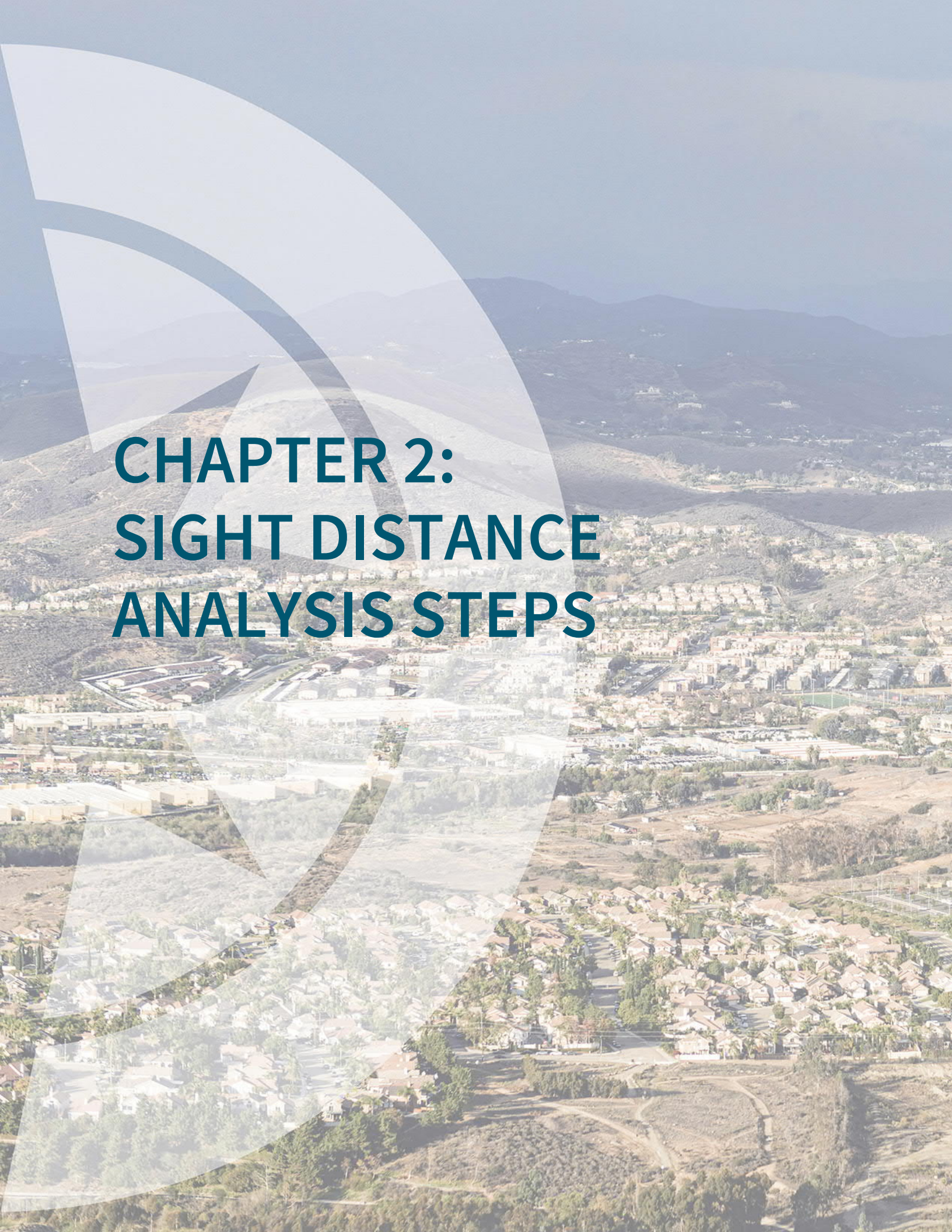
See **Attachment A** for a detailed discussion of other sight distance analyses. All sight distance analyses must be certified by a registered traffic engineer or civil engineer.

Sight Distance Definitions

Stopping The distance traveled in the time it takes a driver to recognize an object ahead, decide to stop, and then stop their vehicle.

Corner The distance a driver stopped on the minor road can see approaching vehicles on the major road before their line of sight is blocked by an obstruction near the intersection.

Note: Other sight distance analyses may be required, such as vertical and horizonal stopping sight distance. Coordination with City staff to determine if additional sight distance analysis would be required.



CHAPTER 2: SIGHT DISTANCE ANALYSIS STEPS

CHAPTER 2: SIGHT DISTANCE ANALYSIS STEPS

1. Coordinate with City staff to determine sight distance analysis requirements. See **Attachment B** for Sight Distance Evaluation Form.

2. Determine the operating speed on each approach which is assumed to be the 85th percentile speed[1]; Sight distance measurement must meet the requirements in the table.

3. Conduct sight distance analysis at the intersection or driveway location, record observations, document obstructions, and recommend mitigation measures, if needed. Any object within the sight triangle that would obstruct the driver's view of an approaching vehicle should be removed, modified or appropriate traffic control devices should be installed as per the *California Manual Uniform Traffic Control Devices*. Obstructions within sight triangles could be buildings, vehicles, hedges, trees, bushes, tall crops, walls, fences, etc. Mitigation measures shall be feasible measures to ensure that the sight distance requirements are met. Examples of feasible mitigation measures include trimming overgrown vegetation, removal of signs, relocation of street furniture, etc.

4. New development projects shall follow the visibility triangle guidelines per the City of San Marcos Development code. See **Attachment C** for more details.

Detailed sight distance analysis requirements are provided later in this guideline, which is available on the City's website at: Application Documents & Design Standards | San Marcos, CA

Figure 1 displays the minimum sight distance requirements and example of sight distance analysis.

[1] 85th percentile speed should be determined based on a 24-hour speed survey (tube counts) or 4 hours radar during non-peak hours. Any other method of data collection must be approved by City's staff prior to conducting sight distance analysis.

The analysis of intersection sight distance consists of comparing the minimum required sight distance, as seen in Table 1, to the measured sight distance. The measured sight distance should be equal to or greater than the recommended stopping sight distance or corner sight distance. If the measured sight distance is less than the recommended sight distance, mitigation measures may be required. When the criteria for sight distances cannot be met, the City will prohibit turns by exiting vehicles when appropriate or require additional speed change lane length.

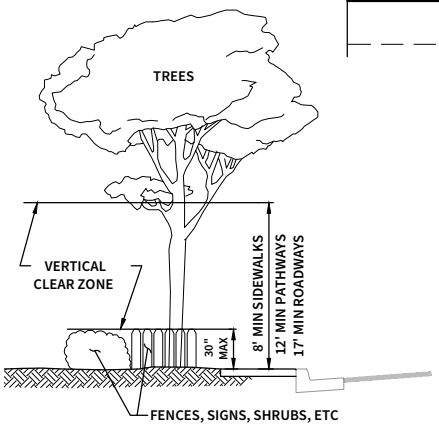
TABLE 1 MINIMUM SIGHT DISTANCE REQUIREMENTS

DESIGN SPEED	INTERSECTION SIGHT DISTANCE (LEFT)	INTERSECTION SIGHT DISTANCE (RIGHT)	STOPPING SIGHT DISTANCE (FT)	DOWNGRADES STEEPER THAN 3%
20	220	190	125	150
25	275	240	150	180
30	330	285	200	240
35	385	335	250	300
40	440	380	300	360
45	495	430	360	430
50	550	480	430	520

For speeds not identified in the table, refer to Section 405.1 of the Highway Design Manual

STOPPING SIGHT DISTANCE DIAGRAM

INTERSECTION & DRIVEWAY SIGHT DISTANCE



VERTICAL CLEAR ZONE

Notes:

1. Limited use area to be shown on line of sight exhibits. Used for the purpose of prohibiting or clearing obstructions to maintain adequate sight distance at intersections.

2. Line of sight shall be shown on all landscaping plans, grading plans, and tentative tract plans where safe sight distance is questionable. In cases where an intersection is location on a vertical curve, a profile of the sight line may be required.

3. Walls or any obstructions restricting the view within the limited use area shall not be permitted.

4. The toe of the slope shall not encroach into the limited use area.

5. The limited use area shall be as near level as possible yet maintain proper drainage.

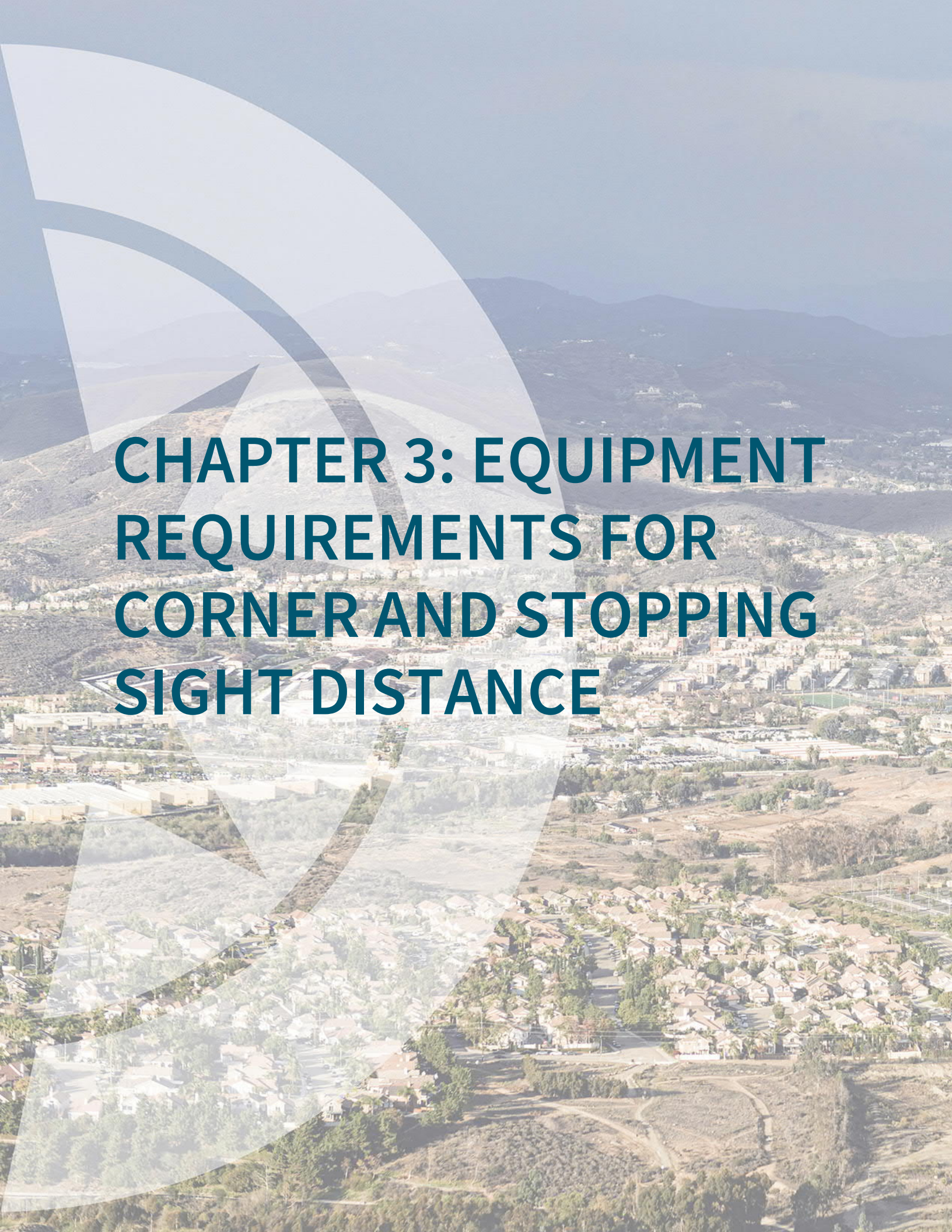
6. Plants and shrubs within the limited use area shall be limited to 30-inches in height above the curb adjacent to the limited use area.

7. The maximum tree size and minimum tree spacing in the limited use area for all major streets shall be 24-inch caliper tree trunks (maximum size at maturity) spaced at 60-feet on center. There shall be no trees within 200 feet of a traffic signalized intersection on a major or collector street.

8. For local and collector streets, 24-inch caliper tree trunks spaced at 20-feet on center.

9. At traffic signalized intersections, stopping sight distance shall be used.

10. Plants, tree, and shrubs shall not be within 200-feet of approaching a traffic signal intersection.



CHAPTER 3: EQUIPMENT REQUIREMENTS FOR CORNER AND STOPPING SIGHT DISTANCE

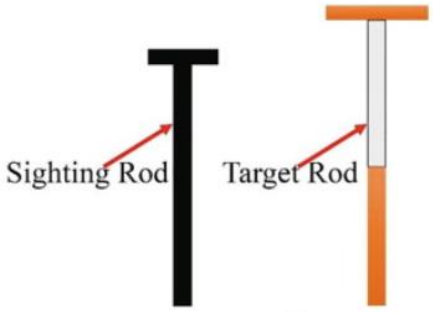
CHAPTER 3: EQUIPMENT REQUIREMENTS FOR CORNER AND STOPPING SIGHT DISTANCE

Stopping and corner sight distance can be done with surveying equipment such as total station. However, the section below provides recommendations on the minimum equipment needed to safely and successfully, conduct a sight distance analysis in the event surveying equipment is not available.

TABLE 2 RECOMMENDED EQUIPMENT TO CONDUCT SIGHT DISTANCE ANALYSIS

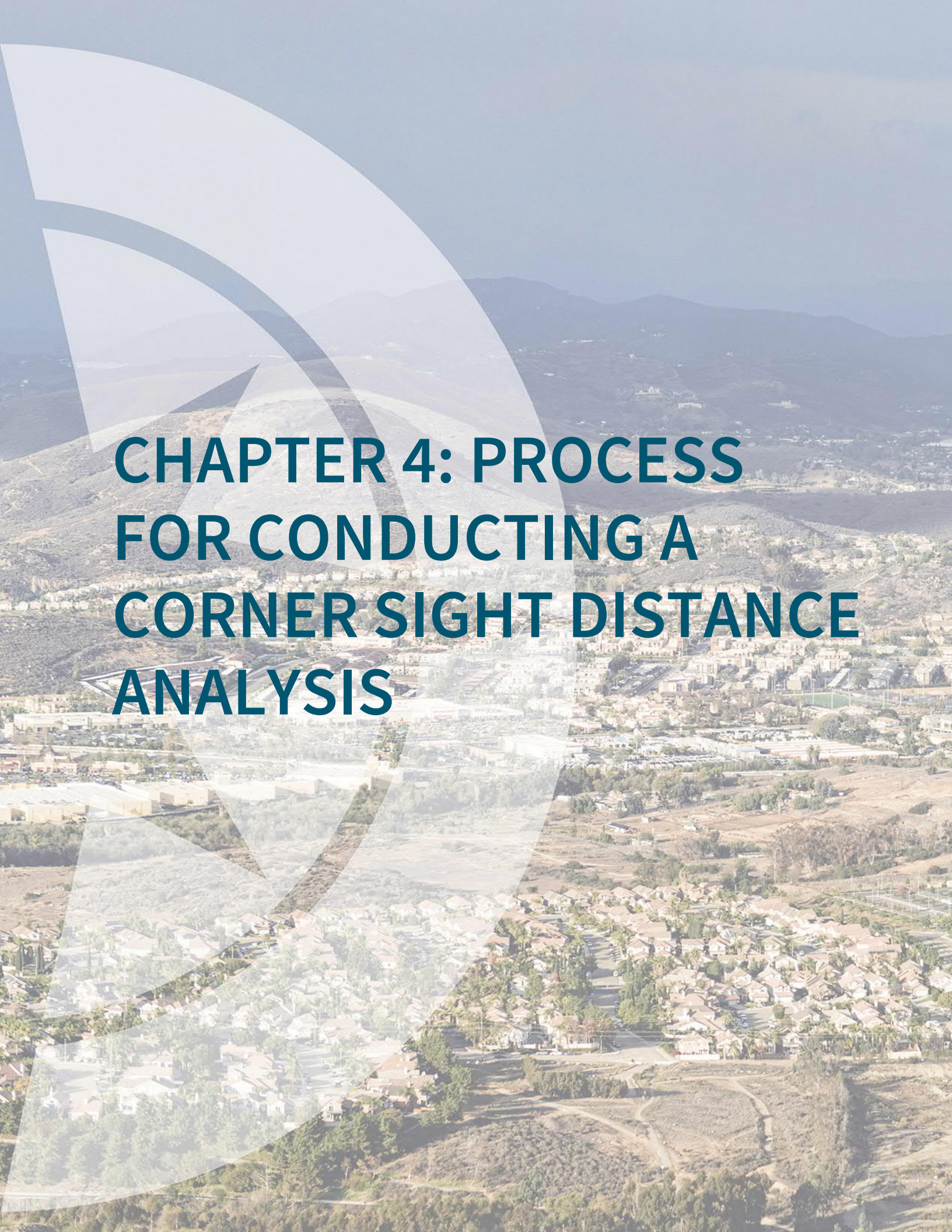
EQUIPMENT	CORNER SIGHT DISTANCE	STOPPING SIGHT DISTANCE
MEASURING WHEEL (A)	X	X
SIGHTING AND TARGET RODS (B)	3.5 ft (target rod) & 3.5 ft (sighting rod)	0.5 ft (target rod) & 3.5 ft (sighting rod)
GENERAL EQUIPMENT (C)	1. Two reflective Personal Protective Equipment (PPE) vests 2. A high-quality camera 3. A measuring wheel; and 4. In areas with no cellphone service, a pair of walkie talkies is recommended.	

(A) Measuring wheel



(B) Sighting and Target Rods

(C) PPE Vest



CHAPTER 4: PROCESS FOR CONDUCTING A CORNER SIGHT DISTANCE ANALYSIS

CHAPTER 4: PROCESS FOR CONDUCTING A CORNER SIGHT DISTANCE ANALYSIS

The following are the recommended steps to conduct a corner sight distance analysis. It is important to note that caution and safety measures shall always be practiced. In the event corner sight distance analysis are required at a heavily traveled roadway, coordination with City staff shall take place in case traffic control measures are needed.

Step 1 – Determine who will be the observer (representing vehicle at driveway) and who will be the assistant (representing vehicle on the roadway).

Step 2 – Measure 10 feet back from the edge of travel way plus the width of the shoulder or measure 15 feet back from the edge of travel way. It is important to note that the minimum distance the observer should be set back from the edge of travel way is 15 feet.

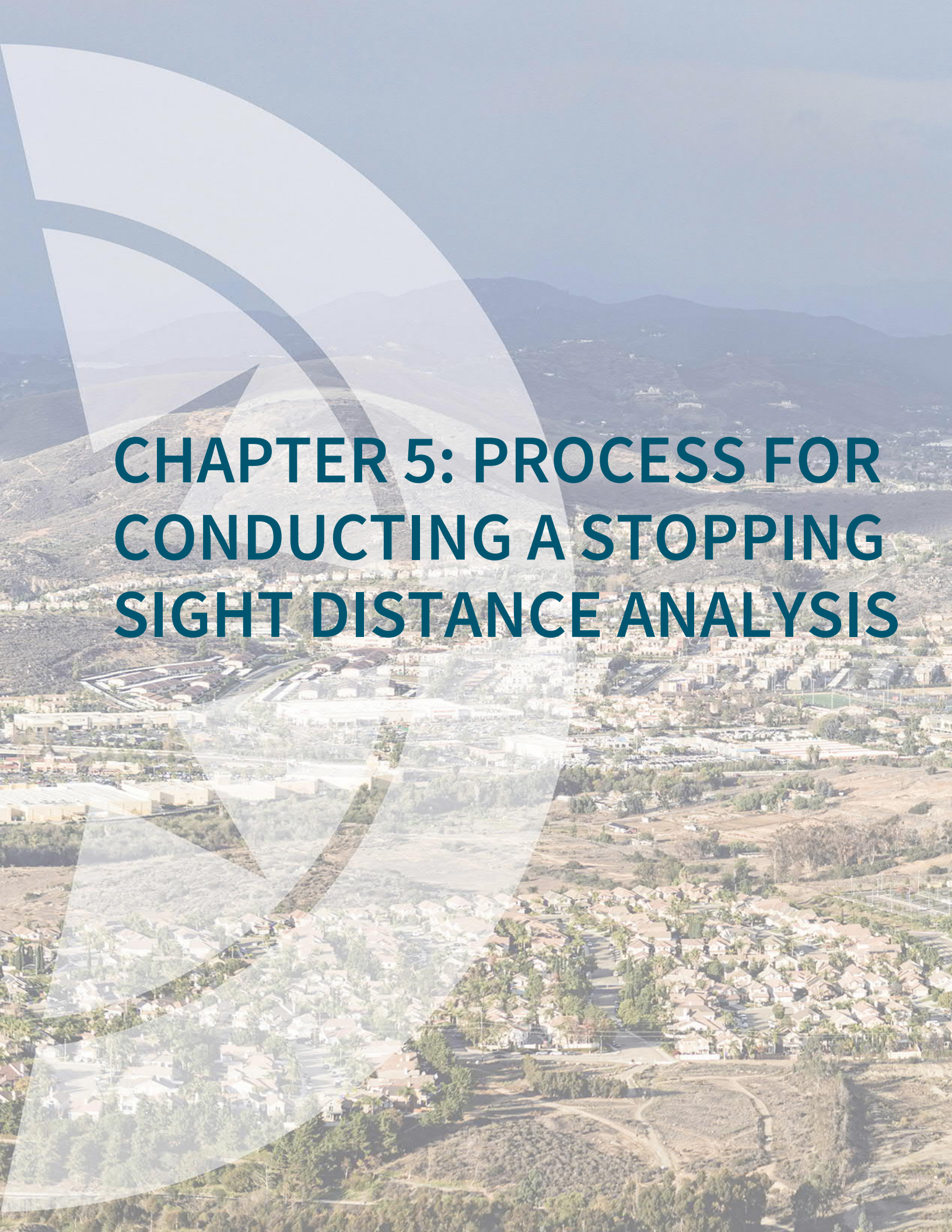
Step 3 – If you are the observer, position yourself in the middle of the approach lane at the driveway at a minimum of 15 feet setback. For example, in a two-way driveway with a width of 20 feet (10-foot lane for access / 10-foot lane for egress), you should position yourself at the middle of the 10-foot egress lane and be holding a 3.5-foot target rod.

Step 4 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane closest to the driveway and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. ***It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.***

Step 5 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the left of the driveway. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the left of the driveway is done.

Step 6 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane on the opposite side of the driveway and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. ***It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.***

Step 7 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the right of the driveway. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the left of the driveway is done.



CHAPTER 5: PROCESS FOR CONDUCTING A STOPPING SIGHT DISTANCE ANALYSIS

CHAPTER 5: PROCESS FOR CONDUCTING A STOPPING SIGHT DISTANCE ANALYSIS

The following are the recommended steps to conduct a corner sight distance analysis. It is important to note that caution and safety measures shall always be practiced. In the event corner sight distance analysis are required at a heavily traveled roadway, coordination with City staff shall take place in case traffic control measures are needed.

Step 1 – Determine who will be the assistant (representing the point of conflict) and who will be the observer (representing vehicle on the roadway).

Step 2 – If you are the observer, position yourself in the middle of the travel lane closest to the driveway, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. ***It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.***

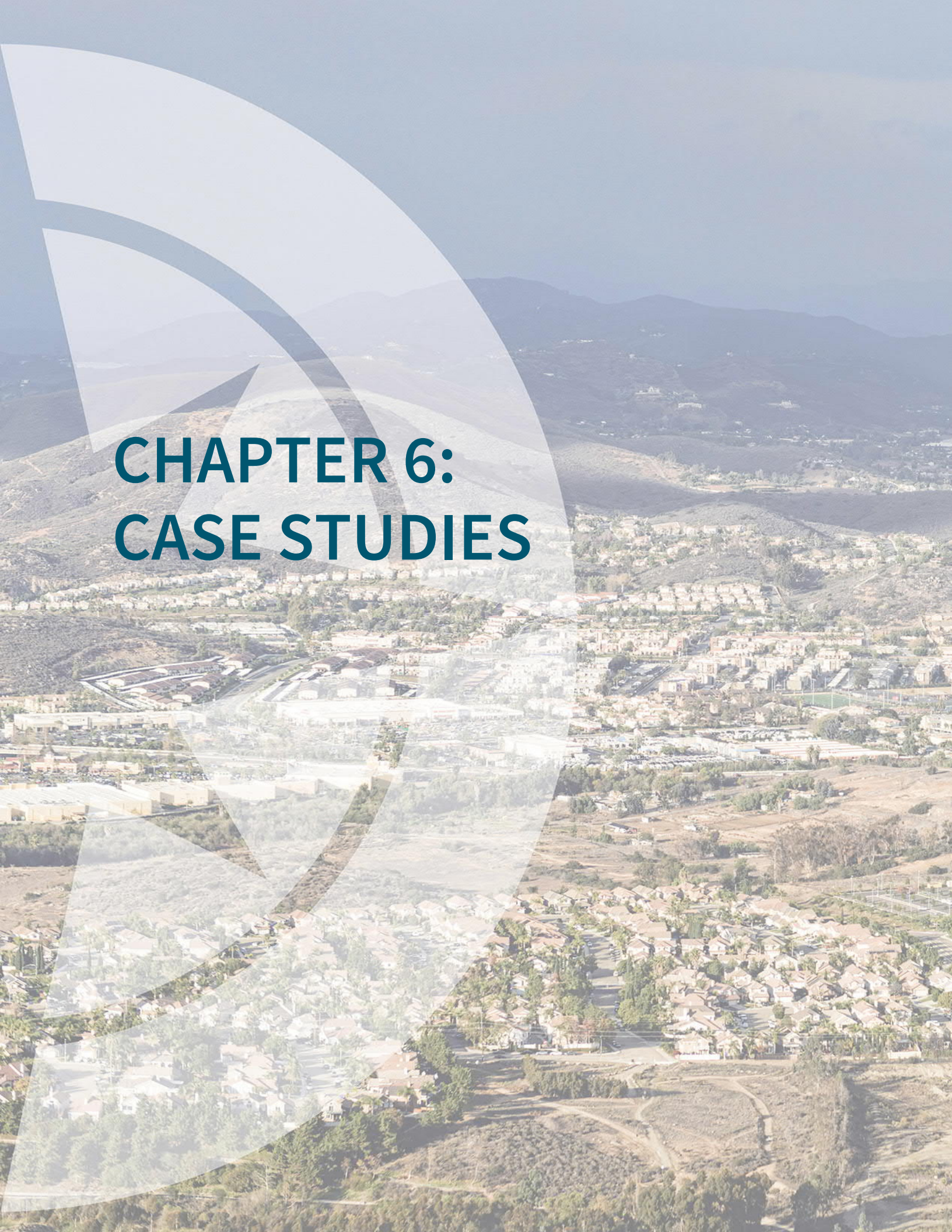
Step 3 – If you are the assistant, walk from the middle of the approach lane at the driveway (egress lane) to the middle of the closest travel lane to the driveway and hold a ½-foot target rod.

Step 4 – When the observer reaches a point where the assistant can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Stopping Sight Distance looking down at the driveway. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the driveway is done.

Step 5 – If you are the observer, position yourself in the middle of the travel lane on the opposite side of the driveway, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. ***It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.***

Step 6 – If you are the assistant, walk from the middle of the approach lane at the driveway (egress lane) to the middle of the travel lane on the opposite side of the driveway and hold a ½-foot target rod.

Step 7 – When the observer reaches a point where the assistant can no longer be seen, the observer should stop and document the measured distance. This measured distance is the Stopping Sight Distance looking up at the driveway. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the driveway is done.



CHAPTER 6: CASE STUDIES

CHAPTER 6: CASE STUDIES

The following three locations were identified to conduct both corner and stopping sight distance analyses:

1. Intersection – Vineyard Road and Shirley Drive (residential street / collector)
2. Driveway – Fry's Electronics (commercial driveway/collector street)
3. Intersection - Camino Del Sol and Las Posas Road (residential/major arterial with raised median)

Analysis details are found in **Attachment D.**

ATTACHMENTS

ATTACHMENT A – ADDITIONAL SIGHT DISTANCE INFORMATION

CHAPTER 200 – GEOMETRIC DESIGN AND STRUCTURE STANDARDS

Topic 201 – Sight Distance

Index 201.1 – General

Sight distance is the continuous length of highway ahead, visible to the highway user. Four types of sight distance are considered herein: passing, stopping, decision, and corner. Passing sight distance is used where use of an opposing lane can provide passing opportunities (see Index 201.2). Stopping sight distance is the minimum sight distance for a given design speed to be provided on multilane highways and on 2-lane roads when passing sight distance is not economically obtainable. Stopping sight distance also is to be provided for all users, including motorists and bicyclists, at all elements of interchanges and intersections at grade, including private road connections (see Topic 504, Index 405.1, & Figure 405.7). Decision sight distance is used at major decision points (see Indexes 201.7 and 504.2). Corner sight distance is used at intersections (see Index 405.1, Figure 405.7, and Figure 504.3I).

Table 201.1 shows the minimum standards for stopping sight distance related to design speed for motorists. Stopping sight distances given in the table are suitable for Class II and Class III bikeways. The stopping sight distances are also applicable to roundabout design on the approach roadway, within the circulatory roadway, and on the exits prior to the pedestrian crossings. Also shown in Table 201.1 are the values for use in providing passing sight distance.

See Chapter 1000 for Class I bikeway sight distance guidance.

Chapter 3 of "A Policy on Geometric Design of Highways and Streets," AASHTO, contains a thorough discussion of the derivation of stopping sight distance.

201.2 Passing Sight Distance

Passing sight distance is the minimum sight distance required for the driver of one vehicle to pass another vehicle safely and comfortably. Passing must be accomplished assuming an oncoming vehicle comes into view and maintains the design speed, without reduction, after the overtaking maneuver is started.

Table 201.1

Sight Distance Standards

Design Speed[1] (mph)	Stopping[2] (ft)	Passing (ft)
10	50	---
15	100	---
20	125	800
25	150	950
30	200	1,100
35	250	1,300
40	300	1,500
45	360	1,650
50	430	1,800
55	500	1,950
60	580	2,100
65	660	2,300
70	750	2,500
75	840	2,600
80	930	2,700

Notes:

[1]See Topic 101 for selection of design speed.

[2]For sustained downgrades, refer to underlined standard in Index 201.3

The sight distance available for passing at any place is the longest distance at which a driver whose eyes are 3 ½ feet above the pavement surface can see the top of an object 4 ¼ feet high on the road. See Table 201.1 for the calculated values that are associated with various design speeds.

In general, 2-lane highways should be designed to provide for passing where possible, especially those routes with high volumes of trucks or recreational vehicles. Passing should be done on tangent horizontal alignments with constant grades or a slight sag vertical curve. Not only are drivers reluctant to pass on a long crest vertical curve, but it is impracticable to design crest vertical curves to provide for passing sight distance because of high cost where crest cuts are involved. Passing sight distance for crest vertical curves is 7 to 17 times longer than the stopping sight distance.

Ordinarily, passing sight distance is provided at locations where combinations of alignment and profile do not require the use of crest vertical curves.

Passing sight distance is considered only on 2-lane roads. At critical locations, a stretch of 3- or 4-lane passing section with stopping sight distance is sometimes more economical than two lanes with passing sight distance.

Passing on sag vertical curves can be accomplished both day and night because headlights can be seen through the entire curve.

See Part 3 of the California Manual on Uniform Traffic Control Devices (California MUTCD) for criteria relating to the placement of barrier striping for no-passing zones. Note, that the passing sight distances shown in the California MUTCD are based on traffic operational criteria. Traffic operational criteria are different from the design characteristics used to develop the values provided in Table 201.1 and Chapter 3 of AASHTO, A Policy on Geometric Design of Highways and Streets. The aforementioned table and AASHTO reference are also used to design the vertical profile and horizontal alignment of the highway. Consult the District Traffic Engineer or designee when using the California MUTCD criteria for traffic operating-control needs.

Other means for providing passing opportunities, such as climbing lanes or turnouts, are discussed in Index 204.5. Chapter 3 of AASHTO, A Policy on Geometric Design of Highways and Streets, contains a thorough discussion of the derivation of passing sight distance.

201.3 Stopping Sight Distance

The minimum stopping sight distance is the distance required by the user, traveling at a given speed, to bring the vehicle or bicycle to a stop after an object ½-foot high on the road becomes visible. Stopping sight distance for motorists is measured from the driver's eyes, which are assumed to be 3 ½ feet above the pavement surface, to an object ½-foot high on the road. See Index 1003.1(10) for Class I bikeway stopping sight distance guidance.

The stopping sight distances in Table 201.1 should be increased by 20 percent on sustained downgrades steeper than 3 percent and longer than one mile.

201.4 Stopping Sight Distance at Grade Crests

Figure 201.4 shows graphically the relationships between length of highway crest vertical curve, design speed, and algebraic difference in grades. Any one factor can be determined when the other two are known.

201.5 Stopping Sight Distance at Grade Sags

From the curves in Figure 201.5, the minimum length of vertical curve which provides headlight sight distance in grade sags for a given design speed can be obtained.

If headlight sight distance is not obtainable at grade sags, lighting may be considered. The District approval authority or Project Delivery Coordinator, depending upon the current District Design Delegation Agreement, and the District Traffic Engineer or designee shall be contacted to review proposed grade sag lighting to determine if such use is appropriate.

201.6 Stopping Sight Distance on Horizontal Curves

Where an object off the pavement such as a bridge pier, building, cut slope, or natural growth restricts sight distance, the minimum radius of curvature is determined by the stopping sight distance.

Available stopping sight distance on horizontal curves is obtained from Figure 201.6. It is assumed that the driver's eye is 3 ½ feet above the center of the inside lane (inside with respect to curve) and the object is ½-foot high. The line of sight is assumed to intercept the view obstruction at the midpoint of the sight line and 2 feet above the center of the inside lane when the road profile is flat (i.e. no vertical curve). Crest vertical curves can cause additional reductions in sight distance. The clear distance (*m*) is measured from the center of the inside lane to the obstruction.

The design objective is to determine the required clear distance from centerline of inside lane to a retaining wall, bridge pier, abutment, cut slope, or other obstruction for a given design speed. Using radius of curvature and minimum sight distance for that design speed, Figure 201.6 gives the clear distance (*m*) from centerline of inside lane to the obstruction.

See Index 1003.1(13) for bikeway stopping sight distance on horizontal curve guidance.

When the radius of curvature and the clear distance to a fixed obstruction are known, Figure 201.6 also gives the sight distance for these conditions.

See Index 101.1 for technical reductions in design speed caused by partial or momentary horizontal sight distance restrictions. See Index 203.2 for additional comments on glare screens.

Cuts may be widened where vegetation restricting horizontal sight distance is expected to grow on finished slopes. Widening is an economic trade-off that must be evaluated along with other options. See Topic 902 for sight distance requirements on landscape projects.

201.7 Decision Sight Distance

At certain locations, sight distance greater than stopping sight distance is desirable to allow drivers time for decisions without making last minute erratic maneuvers (see Chapter III of AASHTO, A Policy on Geometric Design of Highways and Streets, for a thorough discussion of the derivation of decision sight distance.)

On freeways and expressways the decision sight distance values in Table 201.7 should be used at lane drops and at off-ramp noses to interchanges, branch connections, safety roadside rest areas, vista points, and inspection stations. When determining decision sight distance on horizontal and vertical curves, Figures 201.4, 201.5, and 201.6 can be used. Figure 201.7 is an expanded version of Figure 201.4 and gives the relationship among length of crest vertical curve, design speed, and algebraic difference in grades for much longer vertical curves than Figure 201.4.

Decision sight distance is measured using the 3 ½-foot eye height and ½-foot object height. See Index 504.2 for sight distance at secondary exits on a collector-distributor road.

Table 201.7

Decision Sight Distance

Design Speed(mph)	Decision Sight Distance(ft)
30	450
35	525
40	600
45	675
50	750
55	865
60	990
65	1,050
70	1,105
75	1,180
80	1,260

Topic 202 – Superelevation

202.1 Basic Criteria

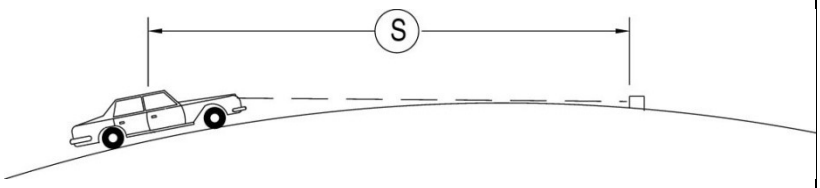
When a vehicle moves in a circular path, it undergoes a centripetal acceleration that acts toward the center of curvature. This force is countered by the perceived centrifugal force experienced by the motorist.

On a superelevated highway, this force is resisted by the vehicle weight component parallel to the superelevated surface and by the side friction developed between the tires and pavement. It is impractical to balance centrifugal force by superelevation alone, because for any given curve radius a certain superelevation rate is exactly correct for only one driving speed. At all other speeds there will be a side thrust either outward or inward, relative to the curve center, which must be offset by side friction.

If the vehicle is not skidding, these forces are in equilibrium as represented by the following simplified curve equation, which is used to design a curve for a comfortable operation at a particular speed:

Figure 201.4

Stopping Sight Distance on Crest Vertical Curves



Drivers eye height is 3 ½ feet.
Object height is ½-foot.

L = Curve Length (feet)

A = Algebraic Grade Difference (%)

S = Sight Distance (feet)

V = Design Speed for "S" in mph

K = Distance in feet required to achieve a 1% change in grade. K value as shown on graph is valid when S < L.

Notes:

- Before using this figure for intersections, branch connections and exits, see Indexes 201.7 and 405.1, and Topic 504.
- See Figure 204.4 for vertical curve formulas.
- See Index 204.4 for minimum length of vertical curve

When S > L	When S < L
$L = 2S - 1329/A$	$L = AS^2/1329$

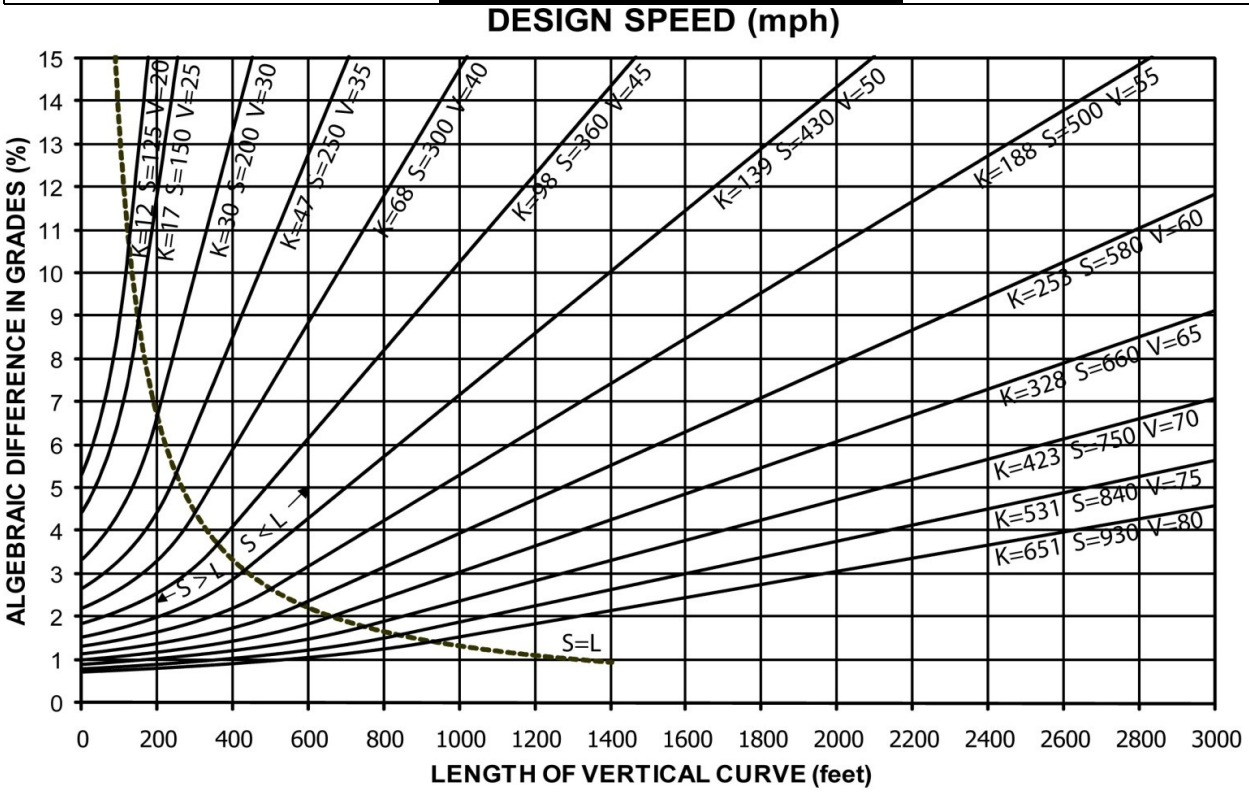
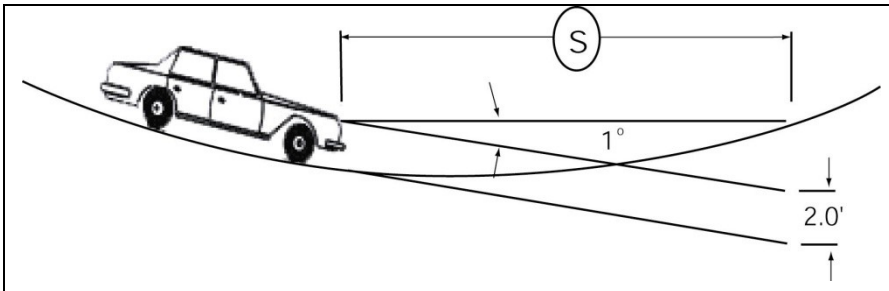


Figure 201.5

Stopping Sight Distance on Sag Vertical Curves



L = Curve Length (feet)
A = Algebraic Grade Difference (%)
S = Sight Distance (feet)
V = Design Speed for "S" in mph
K = Distance in feet required to achieve a 1% change in grade. K value as shown on graph is valid when S < L.

Notes:

- For sustained downgrades, see Index 201.3.
- Before using this figure for intersections, branch connections and exits, see Indexes 201.7 and 405.1, and Topic 504.
- See Figure 204.4 for vertical curve formulas.
- See Index 204.4 for minimum length of vertical curve.

When S > L	When S < L
$L = 2S - (400 + 3.5S)/A$	$L = AS^2/(400 + 3.5S)$

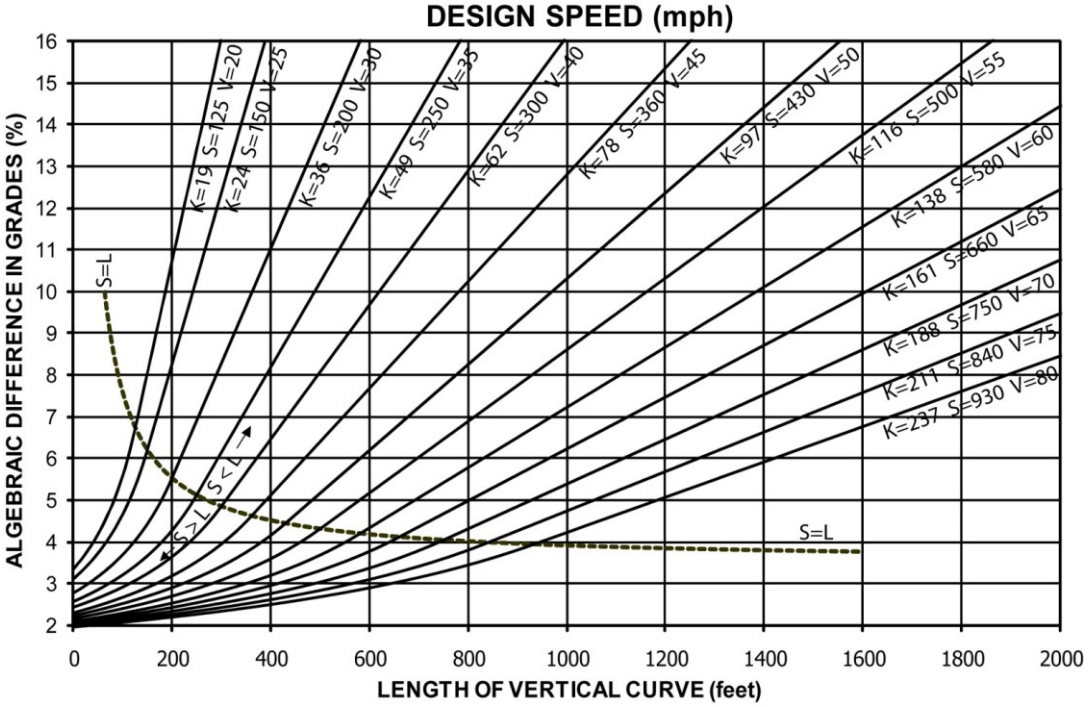
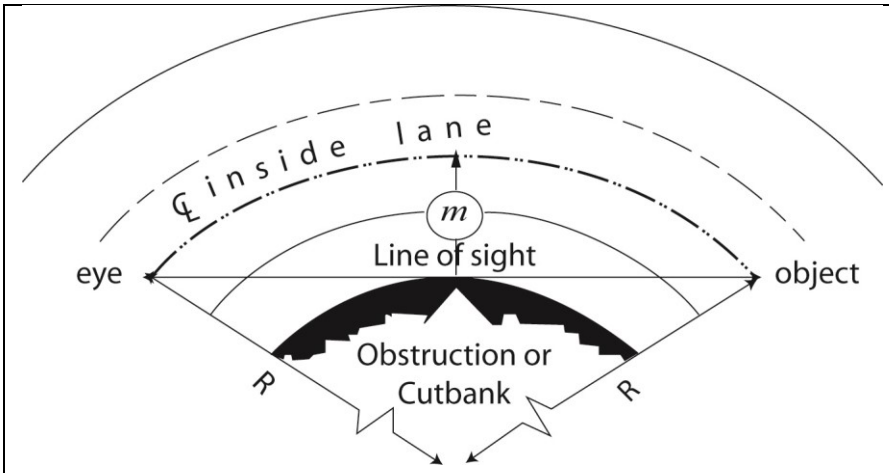


Figure 201.6

Stopping Sight Distance on Horizontal Curves



Line of sight is 2.0 feet above the centerline inside lane at point of obstruction.

R = Radius of the centerline of the lane nearest the obstruction (feet).

S = Sight Distance (feet)

V = Design Speed for "S" in mph

m = Clear distance from centerline of the lane nearest the obstruction (feet).

Notes:

- For sustained downgrades, see Index 201.3.
- Formulas apply only when "S" is equal to or less than length of curve.
- Angles in formulas are expressed in degrees.

$$m = R\left[1 - \cos\left(\frac{28.65S}{R}\right)\right]$$

$$S = \frac{R}{28.65}\left[\cos^{-1}\left(\frac{R - m}{R}\right)\right]$$

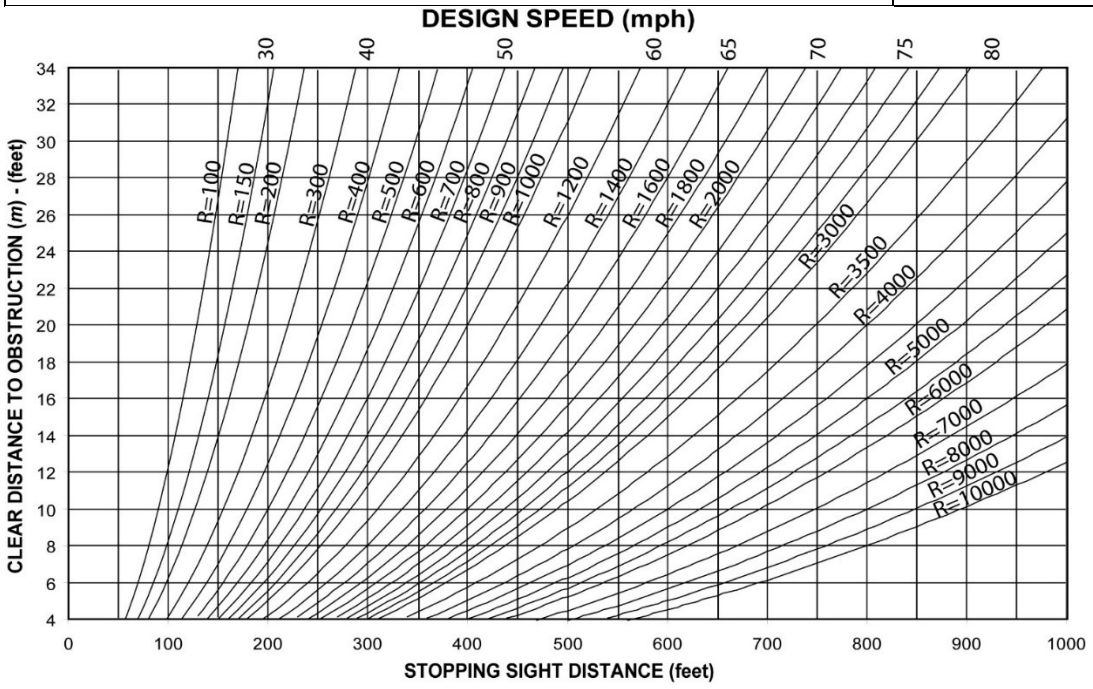
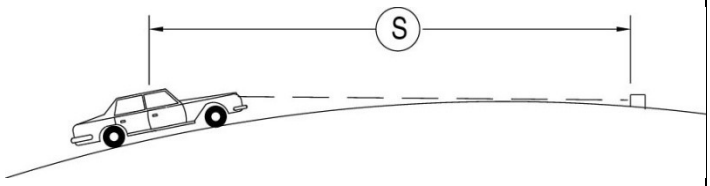


Figure 201.7

Decision Sight Distance on Crest Vertical Curves



Drivers eye height is 3½ feet.
Object height is ½-foot.

L = Curve Length (feet)

A = Algebraic Grade Difference (%)

S = Sight Distance (feet)

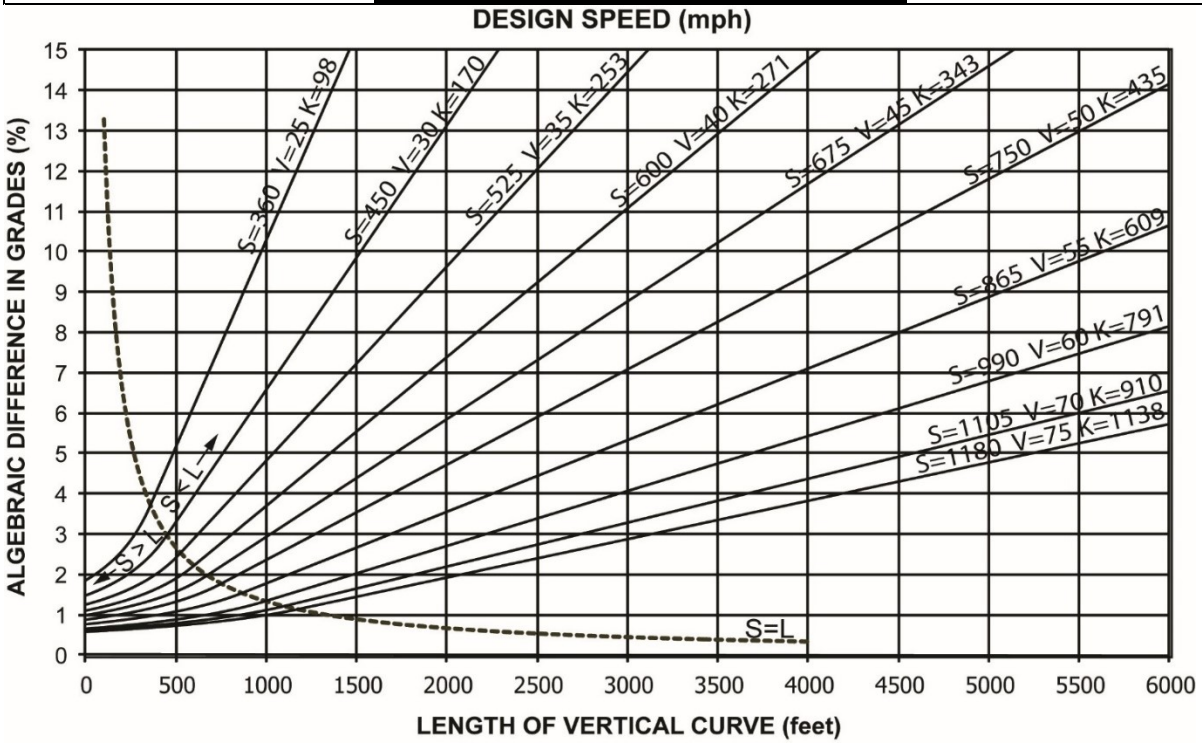
V = Design Speed for "S" in mph

K = Distance in feet required to achieve a 1% change in grade. K value as shown on graph is valid when S < L.

Notes:

- Before using this figure for intersections, branch connections and exits, see Indexes 201.7 and 405.1, and Topic 504.
- See Figure 204.4 for vertical curve formulas.
- See Index 204.4 for minimum length of vertical curve.

When S > L	When S < L
$L = 2S - 1329/A$	$L = AS^2/1329$



ATTACHMENT B – SIGHT DISTANCE EVALUATION FORM

CITY OF SAN MARCOS
INTERSECTION SIGHT DISTANCE EVALUATION

Project Name:				
Project Applicant				
Name:				
Address:				
Contact Information	Phone Number:		Email:	
Project Location and Context				
Project Location/Address				
Project Number (Assigned by City)				
Project Type				
Study Location				
Project Description				
Field Measurements (All backup data must be attached to this form)				
Roadway Segment/Intersection				
85th Percentile Speed (mph)	Northbound / Eastbound		Southbound / Westbound	
	Minimum (ft)	Field Measurement (ft)	Minimum (ft)	Field Measurement (ft)
Stopping Sight Distance				
Corner Sight Distance				
Recommended Mitigation (if sight distance is not met)				
Submittal				
Registered Traffic/Civil Engineer Name		Registered Traffic/Civil Engineer Stamp Here		
Company				
Date				
For City Staff Only				
Does project provide all necessary documentation?				
Is the intersection sight distance analysis adequate?				
Name and Signature of City of San Marcos Traffic Engineer		Date:		

Backup information such as field work photo, recommendations, 85th percentile speed measurement must be attached to this form.

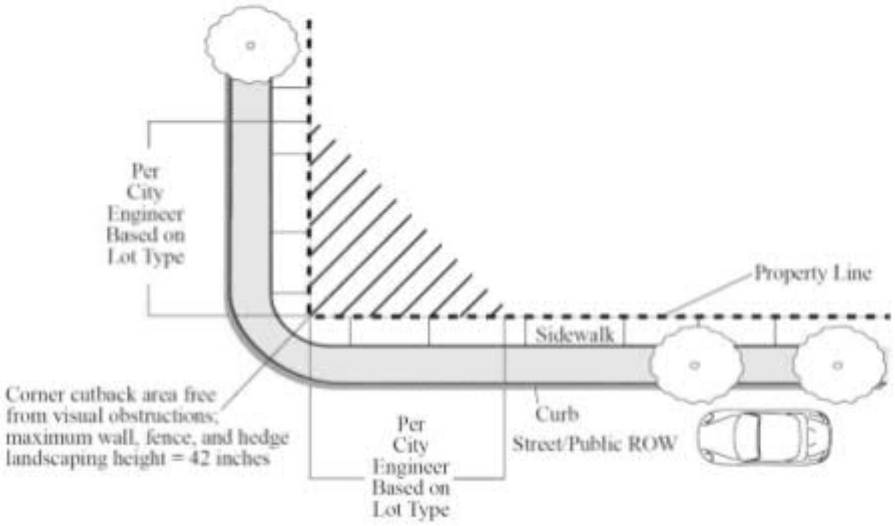
ATTACHMENT C – NEW DEVELOPMENT PROJECTS REQUIREMENTS

City of San Marcos Development Code - Section 20.300.070 - Performance Standards

Line of Sight - Development and structures in all Zones shall maintain the *line-of-sight* triangle as established by the City Engineer. *Line-of-sight* geometry shall be shown on applicable plans during permit and review and shall comply with the Sight Distance Minimum Standards, established by the Engineering Division (see Figure 20.300-4).

Figure 20.300-4

Line of Sight per the City Engineer



Persons holding signs may not block the view or *line of sight* within a "visibility triangle." "Visibility triangle" shall be defined as the area within the vertices of three (3) points, measured from the corner of any vehicular intersection to two (2) points located on the curbline forty-five (45) feet from said corner.

ATTACHMENT D – CASE STUDIES

CITY OF SAN MARCOS
INTERSECTION SIGHT DISTANCE GUIDELINES

Case Study 1 - Intersection of Vineyard Road and Shirley Drive

A sight distance study was conducted at the intersection of Vineyard Road and Shirley Drive on July 27th, 2020. The weather was clear with low traffic volumes in the study area. The following demonstrates the steps taken by staff to conduct the sight distance study.

Process for Conducting a Corner Sight Distance Analysis:

Step 1 – Determine who will be the observer (representing vehicle at the minor street) and who will be the assistant (representing vehicle on the roadway).

Observer: representing vehicle at the minor street

Assistant: representing vehicle on the roadway

Step 2 – Measure 10 feet back from the edge of travel way plus the width of the shoulder or measure 15 feet back from the edge of travel way. It is important to note that the minimum distance the observer should be set back from the edge of travel way is 15 feet. Note: the travel way is defined as the lane in which vehicles travel, shoulders, on-street parking, bike lanes, parkways, etc. are not considered part of the travel way.

Observer positioned at least 15 feet away from the edge of travel way

Step 3 – If you are the observer, position yourself in the middle of the approach lane at the minor street at a minimum of 15 feet setback. For example, in a two-way minor street with a width of 20 feet (10-foot lane approach / 10-foot lane for departure), you should position yourself at the middle of the 10-foot approach lane and be holding a 3.5-foot target rod.

Observer positioned in the middle of the approach lane

Step 4 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane closest to the minor street and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Assistant standing in the middle of travel way holding a target rod

Note: Due to minimal traffic, the assistant was able to measure the distance by walking on the middle of the travel way. Otherwise, the assistant would have to measure the distance by walking along the shoulder as recommended above.

Step 5 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the left of the minor street. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the left of the minor street is done.

Measured Distance at the point where observer can no longer be seen by the assistant: 160 ft.

Step 6 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane on the opposite side of the minor street and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Assistant standing in the middle of travel way holding a target rod

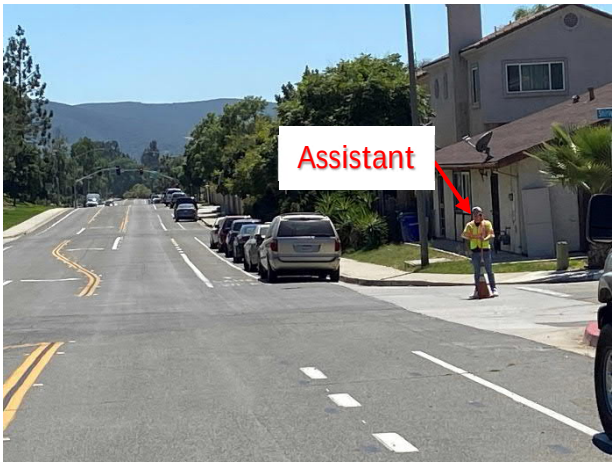
Note: Due to minimal traffic, the assistant was able to measure the distance by walking through the middle of the travel way. Otherwise the assistant would have to measure the distance by walking along the shoulder as recommended above.

Step 7 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the right of the minor street. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the right of the minor street is done.

Measured Distance at the point where observer can no longer be seen by the assistant: 177 ft.

Process for Conducting a Stopping Sight Distance Analysis:

Step 1 – Determine who will be the assistant (representing the point of conflict) and who will be the observer (representing vehicle on the roadway).



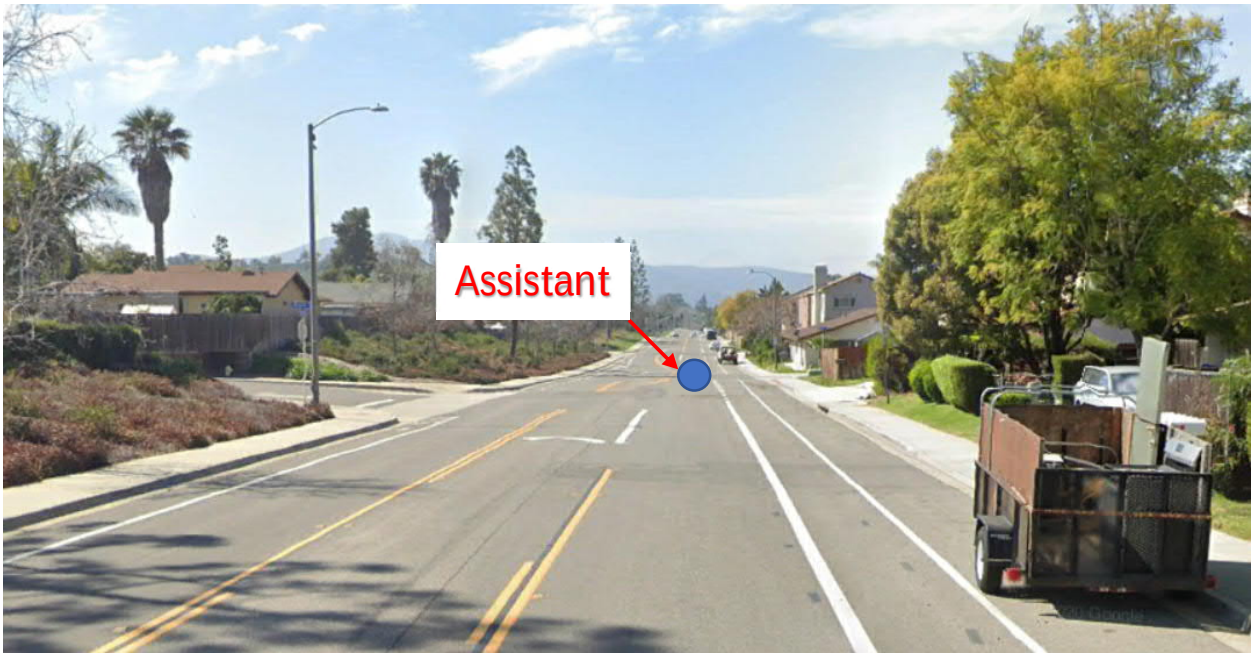
Assistant: representing the point of conflict

Observer: representing vehicle on the roadway

Step 2 – If you are the observer, position yourself in the middle of the travel lane closest to the minor street, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Step 3 – If you are the assistant, walk from the middle of the approach lane at the minor street to the middle of the closest travel lane to the minor street and hold a ½-foot target rod.

Step 4 – When the observer reaches a point where the assistant can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Stopping Sight Distance looking down at the minor street. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the minor street is done.



Measured Distance at the point where assistant can no longer be seen by the observer: at least 360 ft.

Step 5 – If you are the observer, position yourself in the middle of the travel lane on the opposite side of the minor street, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Step 6 – If you are the assistant, walk from the middle of the approach lane at the minor street to the middle of the travel lane on the opposite side of the minor street and hold a ½-foot target rod.

Step 7 – When the observer reaches a point where the assistant can no longer be seen, the observer should stop and document the measured distance. This measured distance is the Stopping Sight Distance looking up at the minor street. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the minor street is done.

Measured Distance at the point where assistant can no longer be seen by the observer: at least 360 ft.

The analysis of intersection sight distance consists of comparing the minimum required sight distance, as seen in Table 1, to the measured sight distance. The measured sight distance should be equal to or greater than the recommended corner sight distance or stopping sight distance. If the measured sight distance is less than the recommended sight distance, mitigation measures may be required. When the criteria for sight distances cannot be met, the City will prohibit turns by existing vehicles when appropriate or require additional speed change lane length.

Table 1 - Minimum Sight Distance Requirements

Design Speed	Intersection Sight Distance (Left)	Intersection Sight Distance (Right)	Stopping Sight Distance (ft)	Downgrades Steeper than 3%
20	220	190	125	150
25	275	240	150	180
30	330	285	200	240
35	385	335	250	300
40	440	380	300	360
45	495	430	360	430
50	550	480	430	520

For speeds not identified in the table, refer to Section 405.1 of the Highway Design Manual

The speed data (85th percentile) at the major roadway was collected to get an accurate depiction of the current conditions of the speed in which the cars are travelling in. The posted speed limit for the evaluated segment is 40 miles per hour; however, based on the collected speed data (85th percentile), traffic was observed to be traveling at 45 miles per hour, thus the minimum sight distance was calculated based on 45 miles per hour.

Table 2 displays the measured intersection sight distance, the design speed, as well as the respective minimum corner and stopping sight distance requirements.

Table 2 Intersection Sight Distance Analysis Results

		Corner Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive	45	160 / 177	495 /430	No / No
		Stopping Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive	45	360 / 360	360 / 360	Yes / Yes

Notes:
[1] XX / XX = Looking North / Looking South

As shown in the table above, the intersection does not currently meet the minimum corner sight distance requirements. The intersection needs the following distances to meet the requirement.

- Corner Sight Distance – The study intersection needs an additional 335 feet of clear corner sight distance line of sight looking north from the minor street and an additional 253 feet of corner sight distance line of sight looking south from the minor street.

Recommended mitigation measures to increase corner sight distance would be to remove on-street parking along the west side (southbound) of the roadway near the intersection to increase the line of sight.

CITY OF SAN MARCOS
INTERSECTION SIGHT DISTANCE GUIDELINES

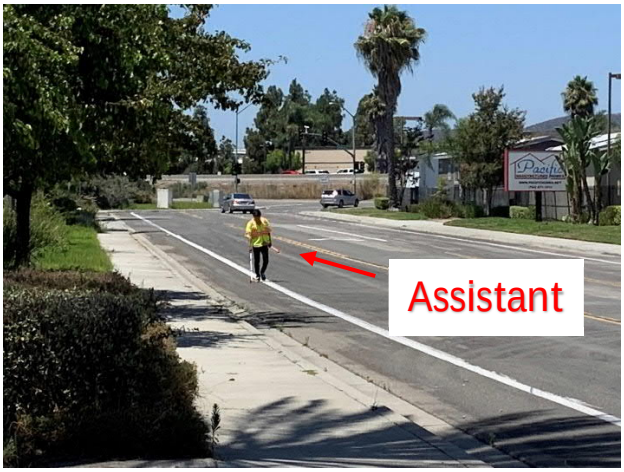
Case Study 2 - Intersection of Bent Avenue & Fry's Electronics Driveway

A sight distance study was conducted at the intersection of Bent Avenue and the south Fry's Electronics Driveway on July 27th, 2020. The weather was clear with low traffic volumes in the study area. The following demonstrates the steps taken by staff to conduct the sight distance study.

Process for Conducting a Corner Sight Distance Analysis:

Step 1 – Determine who will be the observer (representing vehicle at the minor street) and who will be the assistant (representing vehicle on the roadway).

Observer: representing vehicle at the minor street



Assistant: representing vehicle on the roadway

Step 2 – Measure 10 feet back from the edge of travel way plus the width of the shoulder or measure 15 feet back from the edge of travel way. It is important to note that the minimum distance the observer should be set back from the edge of travel way is 15 feet. Note: the travel way is defined as the lane in which vehicles travel, shoulders, on-street parking, bike lanes, parkways, etc. are not considered part of the travel way.

Observer positioned at least 15 feet away from the edge of travel way

Step 3 – If you are the observer, position yourself in the middle of the approach lane at the minor street at a minimum of 15 feet setback. For example, in a two-way minor street with a width of 20 feet (10-foot lane approach / 10-foot lane for departure), you should position yourself at the middle of the 10-foot approach lane and be holding a 3.5-foot target rod.

Observer positioned in the middle of the approach lane

Step 4 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane closest to the minor street and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Assistant standing along the shoulder of the driveway holding a travel wheel

Step 5 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the left of the minor street. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the left of the minor street is done.

Measured Distance between the observer and the assistant: 673 ft.

Note: Since the assistant can still be seen by the observer until the assistant reaches the intersection, the measured distance would be the distance between the observer and the assistant at the intersection. Otherwise, the measured distance would be until the assistant can no longer be seen by the observer as mentioned above.

Step 6 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane on the opposite side of the minor street and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Assistant standing in the middle of travel way holding a travel wheel

Note: Due to minimal traffic, the assistant was able to measure the distance by walking through the middle of the travel way. Otherwise the assistant would have to measure the distance by walking along the shoulder as recommended above.

Step 7 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the right of the minor street. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the right of the minor street is done.

Measured Distance at the point where observer can no longer be seen by the assistant: 521 ft.

Process for Conducting a Stopping Sight Distance Analysis:

Step 1 – Determine who will be the assistant (representing the point of conflict) and who will be the observer (representing vehicle on the roadway).

Observer: representing vehicle at the minor street

Assistant: representing vehicle on the roadway

Step 2 – If you are the observer, position yourself in the middle of the travel lane closest to the minor street, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Step 3 – If you are the assistant, walk from the middle of the approach lane at the minor street (egress lane) to the middle of the closest travel lane to the minor street and hold a ½-foot target rod.

Step 4 – When the observer reaches a point where the assistant can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Stopping Sight Distance looking down at the minor street. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the minor street is done.

Measured Distance between the observer and the assistant: 673 ft.

Note: Since the assistant can still be seen by the observer at the intersection, the measured distance would be the distance between the observer at the intersection and the assistant. Otherwise, the measured distance would be until the assistant can no longer be seen by the observer as mentioned above.

Step 5 – If you are the observer, position yourself in the middle of the travel lane on the opposite side of the minor street, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Step 6 – If you are the assistant, walk from the middle of the approach lane at the minor street to the middle of the travel lane on the opposite side of the minor street and hold a ½-foot target rod.

Step 7 – When the observer reaches a point where the assistant can no longer be seen, the observer should stop and document the measured distance. This measured distance is the Stopping Sight Distance looking up at the minor street. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the minor street is done.

Measured Distance at the point where assistant can no longer be seen by the observer: at least 420 ft.

The analysis of intersection sight distance consists of comparing the minimum required sight distance, as seen in Table 1, to the measured sight distance. The measured sight distance should be equal to or greater than the recommended stopping sight distance or corner sight distance. If the measured sight distance is less than the recommended sight distance, mitigation measures may be required. When the criteria for sight distances cannot be met, the City will prohibit turns by existing vehicles when appropriate or require additional speed change lane length.

Table 1 - Minimum Sight Distance Requirements

Design Speed	Intersection Sight Distance (Left)	Intersection Sight Distance (Right)	Stopping Sight Distance (ft)	Downgrades Steeper than 3%
20	220	190	125	150
25	275	240	150	180
30	330	285	200	240
35	385	335	250	300
40	440	380	300	360
45	495	430	360	430
50	550	480	430	520

For speeds not identified in the table, refer to Section 405.1 of the Highway Design Manual

Chen Ryan requested to collect speed data (85th percentile) at the major roadway to get an accurate depiction of the current conditions of the speed in which the cars are traveling in. The posted speed limit is 35 miles per hour, however based on the collected speed data (85th percentile), traffic was observed to be traveling at 40 miles per hour, thus the minimum sight distance was calculated based on 40 miles per hour.

Table 2 displays the measured intersection sight distance, the design speed, as well as the respective minimum corner and stopping sight distance requirements.

Table 2 Intersection Sight Distance Analysis Results

		Corner Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive	40	673 / 521	440 / 380	Yes / Yes
		Stopping Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive	40	420 / 673	300 / 300	Yes / Yes

Notes:
[1] XX / XX = Looking North / Looking South

Both corner sight distance and stopping sight distance requirements were met at the intersection. Therefore, no changes to the intersection configuration or additional measures are recommended.

CITY OF SAN MARCOS
INTERSECTION SIGHT DISTANCE GUIDELINES
Case Study 3 – Intersection at Las Posas Road and Camino del Sol

Two sight distance studies were conducted at the intersection of Las Posas Road and Camino del Sol on August 24th, 2020. The weather was clear with low traffic volumes in the study area. The following demonstrates the steps taken by staff to conduct the sight distance study. It is important to note that intersection sight distance measurements were performed at both the west leg and east leg of the intersection.

Process for Conducting a Corner Sight Distance Analysis:

Step 1 – Determine who will be the observer (representing vehicle at the minor street) and who will be the assistant (representing vehicle on the roadway).

Observer: representing vehicle at the minor street (West Leg)

Assistant: representing vehicle on the roadway

Observer: representing vehicle at the minor street (East Leg)

Assistant: representing vehicle on the roadway

Step 2 – Measure 10 feet back from the edge of travel way plus the width of the shoulder or measure 15 feet back from the edge of travel way. It is important to note that the minimum distance the observer should be set back from the edge of travel way is 15 feet. Note: the travel way is defined as the lane in which vehicles travel, shoulders, on-street parking, bike lanes, parkways, etc. are not considered part of the travel way.

Observer's positioned at least 15 feet away from the edge of travel way (West Leg & East Leg, respectively)

Step 3 – If you are the observer, position yourself in the middle of the approach lane at the minor street at a minimum of 15 feet setback. For example, in a two-way minor street with a width of 20 feet (10-foot lane approach / 10-foot lane for departure), you should position yourself at the middle of the 10-foot approach lane and be holding a 3.5-foot target rod.

Observer's positioned in the middle of the approach lane (West Leg & East Leg, respectively)

Step 4 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane closest to the minor street and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk. It is also important to note that if there are multiple lanes on the opposite side of the minor street, the most outer lane would be the location at which the assistant will be standing in the middle of.

Assistant's standing in the middle of outer travel way holding a target rod (West Leg & East Leg, respectively)

Note: Due to minimal traffic, the assistant was able to measure the distance by walking on the middle of the travel way. Otherwise, the assistant would have to measure the distance by walking along the shoulder as recommended above.

Step 5 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the left of the minor street. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the left of the minor street is done.

Measured Distance at the point where observer can no longer be seen by the assistant: 224 ft (West leg).

Measured Distance at the point where observer can no longer be seen by the assistant: 185 ft (East leg).

Step 6 – If you are the assistant, walk from the location the observer is standing to the middle of the travel lane on the opposite side of the minor street and start walking away from the observer in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to

note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk. It is also important to note that if there are multiple lanes on the opposite side of the minor street, the most outer lane would be the location at which the assistant will be standing in the middle of.

Assistant standing in the middle of outer travel way holding a target rod (East leg)

Note: Due to minimal traffic, the assistant was able to measure the distance by walking through the middle of the travel way. Otherwise the assistant would have to measure the distance by walking along the shoulder as recommended above.

Step 7 – When the assistant reaches a point where the observer can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Corner Sight Distance looking to the right of the minor street. The observer should take pictures of the assistant at the measured corner sight distance. At this point, corner sight distance looking to the right of the minor street is done.

Measured Distance at the point where observer can no longer be seen by the assistant: 530 ft (East leg).

Process for Conducting a Stopping Sight Distance Analysis:

Step 1 – Determine who will be the assistant (representing the point of conflict) and who will be the observer (representing vehicle on the roadway).

Assistant: representing the point of conflict (East leg)

Observer: representing vehicle on the roadway (West leg)

Assistant: representing vehicle at the minor street (West leg)

Observer: representing vehicle on the roadway (East leg)

Step 2 – If you are the observer, position yourself in the middle of the travel lane closest to the minor street, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Step 3 – If you are the assistant, walk from the middle of the approach lane at the minor street to the middle of the closest travel lane to the minor street and hold a ½-foot target rod.

Step 4 – When the observer reaches a point where the assistant can no longer be seen, the assistant should stop and document the measured distance. This measured distance is the Stopping Sight

Distance looking down at the minor street. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the minor street is done.

Measured Distance at the point where assistant can no longer be seen by the observer: at least 430 ft (West leg).

Measured Distance at the point where assistant can no longer be seen by the observer: at least 430 ft (West leg).

Step 5 – If you are the observer, position yourself in the middle of the travel lane on the opposite side of the minor street, hold a 3.5-foot target rod, and start walking away in the opposite direction of the traffic flow and utilize the measuring wheel to measure the distance. It is important to note that in the event traffic flow does not have any gaps and flows without interruptions, it is recommended that the measuring is done along the shoulder of the roadway or along the sidewalk.

Step 6 – If you are the assistant, walk from the middle of the approach lane at the minor street to the middle of the travel lane on the opposite side of the minor street and hold a ½-foot target rod.

Step 7 – When the observer reaches a point where the assistant can no longer be seen, the observer should stop and document the measured distance. This measured distance is the Stopping Sight Distance looking up at the minor street. The observer should take pictures of the assistant from the measured stopping sight distance. At this point, stopping sight distance looking to the down at the minor street is done.

Measured Distance at the point where assistant can no longer be seen by the observer: at least 430 ft (East leg).

The analysis of intersection sight distance consists of comparing the minimum required sight distance, as seen in Table 1, to the measured sight distance. The measured sight distance should be equal to or greater than the recommended corner sight distance or stopping sight distance. If the measured sight distance is less than the recommended sight distance, mitigation measures may be required. When the criteria for sight distances cannot be met, the City will prohibit turns by existing vehicles when appropriate or require additional speed change lane length.

Table 1 - Minimum Sight Distance Requirements

Design Speed	Intersection Sight Distance (Left)	Intersection Sight Distance (Right)	Stopping Sight Distance (ft)	Downgrades Steeper than 3%
20	220	190	125	150
25	275	240	150	180
30	330	285	200	240
35	385	335	250	300
40	440	380	300	360
45	495	430	360	430
50	550	480	430	520

For speeds not identified in the table, refer to Section 405.1 of the Highway Design Manual

The posted speed limit for the evaluated segment is 45 miles per hour; however, as a conservative approach, the minimum sight distance was calculated based on 50 miles per hour.

Table 2 displays the measured intersection sight distance, the design speed, as well as the respective minimum corner and stopping sight distance requirements.

Table 2 Intersection Sight Distance Analysis Results

		Corner Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive (West Leg)	50	224 / N/A[2]	550 / N/A[2]	No / N/A[2]
		Stopping Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive (West Leg)	50	N/A[2] / 430	430	N/A[2] / Yes
		Corner Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive (East Leg)	50	530 / 185	550 / 480	No / No
		Stopping Sight Distance		
Location	Design Speed	Measure (ft)[1]	Required (ft)	Adequate?
Vineyard Road and Shirley Drive (East Leg)	50	430 / 430	430 / 430	Yes / Yes

Notes:

[1] XX / XX = Looking North / Looking South

[2] Left turns are prohibited at the west leg of the intersection. Therefore, there are no conflicts with vehicles traveling northbound on the major roadway.

As shown in the table above, both sides of the intersection do not currently meet the corner sight distance that is required. Both sides of the intersection need the following distances to meet the requirement.

- Corner Sight Distance – The west study intersection needs an additional 276 feet of clear corner sight distance line of sight looking south from the minor street.
- Corner Sight Distance – The east study intersection needs an additional 20 feet of clear corner sight distance line of sight looking south from the minor street.
- Corner Sight Distance – The east study intersection needs an additional 295 feet of clear corner sight distance line of sight looking south from the minor street.

Recommended mitigation measures to increase corner sight distance would be the trimming or removal of vegetation at the median and parkway areas.