RICK

619-291-0707
rickengineering.com

5620 Friars Road
San Diego, CA 92110

September 4, 2024

Mr. Oscar Morales, PE
Supervisor, Property Management Group
Los Angeles County Sanitation Districts
1955 Workman Mill Road
Whittier, CA 90601

SUBJECT: E. SPRING STREET PUMPING PLANT FACILITY IMPROVEMENTS LINE OF SIGHT ANALYSIS (JOB NUMBER 19215-A)

Dear Mr. Morales:

RICK has reviewed the August 17, 2020 Line of Sight Analysis for the E. Spring Street Pumping Plant Facility Improvements (attached), to determine if the report is still valid based on current guidelines. The following summarizes our findings.

Circulation Element

The City of Signal Hill's General Plan Circulation Element, dated December 2009 is still listed at the City's current General Plan Circulation Element on the City's website. Therefore, the roadway classification for E. Spring Street remains the same as that contained within the previous analysis.

Highway Design Manual

The current version of the Caltrans Highway Design Manual is the 7th Edition, 2022, which has been updated since the previous analysis. Chapters 200 and 400 of the current version were reviewed, as they relate to corner sight distance and stopping sight distance of urban driveways. The review determined that the current standards remain the same as those within the previous version of the Highway Design Manual that was utilized for the 2020 line of sight analysis.

Conclusion

Our review concludes that the analysis contained within the August 17, 2020 Line of Sight Analysis for the E. Spring Street Pumping Plant Facility Improvements is still valid and meets current design requirements, therefore no updates to the analysis are required at this time.

Please feel free to or me at (619) 291-0707 or bstephenson@rickengineering.com should you have any questions.

Sincerely,

RICK

Brian R. Stephenson, PE, TE, PTOE
RCE No. 69471
Associate Principal

K:\Files\19215\text\19215-A.001.docx

Attachments

Attachment A

ATTACHMENT

E. Spring Street Pumping Plant Facility Improvements
Line of Sight Analysis

August 17, 2020

RICK
ENGINEERING COMPANY
Traffic Division

August 17, 2020

Mr. Stan Pegadiotes
Section Head Planning and Property Management Section
Los Angeles County Sanitation Districts
1955 Workman Mill Road
Whittier, CA 90601

SUBJECT: E. SPRING STREET PUMPING PLANT FACILITY IMPROVEMENTS LINE OF SIGHT ANALYSIS (JOB NUMBER 19215)

Dear Mr. Pegadiotes:

The following traffic assessment has been prepared to analyze the impact of the proposed pumping plant project on the horizontal sight distance for eastbound travel along E. Spring Street at the easterly driveway of the Chrysler-Dodge-Jeep-Ram car dealership in Signal Hill California. The project proposes to install a new above-ground electrical panel (7.5' tall by 6' wide by 3.5' long), a new above ground SCE transformer (5' tall by 5' long) and raise the existing dealership sign 5 feet above-ground.

Per the *City of Signal Hill Circulation Element* document updated December 2009, E. Spring Street traverses in the east-west direction and is classified as a Principal Arterial. Currently, it provides two (2) travel lanes in each direction with a two-way left turn lane along the frontage of the project. The posted speed limit is 40 MPH and parking is generally allowed. Additionally, the *City of Signal Hill Circulation Element* designates E. Spring Street as a truck route with a Class II Bike Lane (future). There is currently no bike lane signage or striping along the E. Spring Street project frontage (see **Attachment A**).

Based on Section 405.1(2)(d) of the Caltrans Highway Design Manual (HDM), corner sight distance does not apply to urban driveways unless they are signalized, therefore, stopping sight distance was analyzed for this analysis.

Stopping sight distance was measured June 18, 2020 for vehicles approaching the dealership driveway for the eastbound direction, assuming a driver's eye height of 3.5 feet, an object height of 0.5 feet, and compared to HDM requirements. Based on Table 201.1 *Sight Distance Standards* of Chapter 200 the required unobstructed stopping sight distance for the eastbound direction should be 300 feet based on 40 MPH design speed (see **Attachment B**). The available stopping sight distance was field measured to extend to the traffic signal at Cherry Avenue (approximately 800 feet), which is more than the required 300 feet, with a clear line of sight to the driveway. There are no vertical or horizontal curves that would obstruct visibility.

Exhibit 1 shows that the proposed location of the SCE transformer and the electrical panel. **Attachment C** contains photos of current conditions.

Conclusion

Installation of the new above-ground SCE transformer and electrical panel, and raising of the existing dealership sign by 5 feet have no impact on the stopping sight distance for eastbound vehicles on E. Spring Street approaching the dealership driveway (Jones Place), and the measured stopping sight distance for eastbound vehicles along E. Spring Street is greater than the minimum required by the HDM.

Please feel free to contact Carlo Perez, TE or me at (619) 291-0707 should you have any questions.

Sincerely,

RICK ENGINEERING COMPANY

Brian R. Stephenson, PE, TE, PTOE
RCE No. 69471
Associate Principal

K:\Files\19215\text\19215.003.docx

Attachments

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

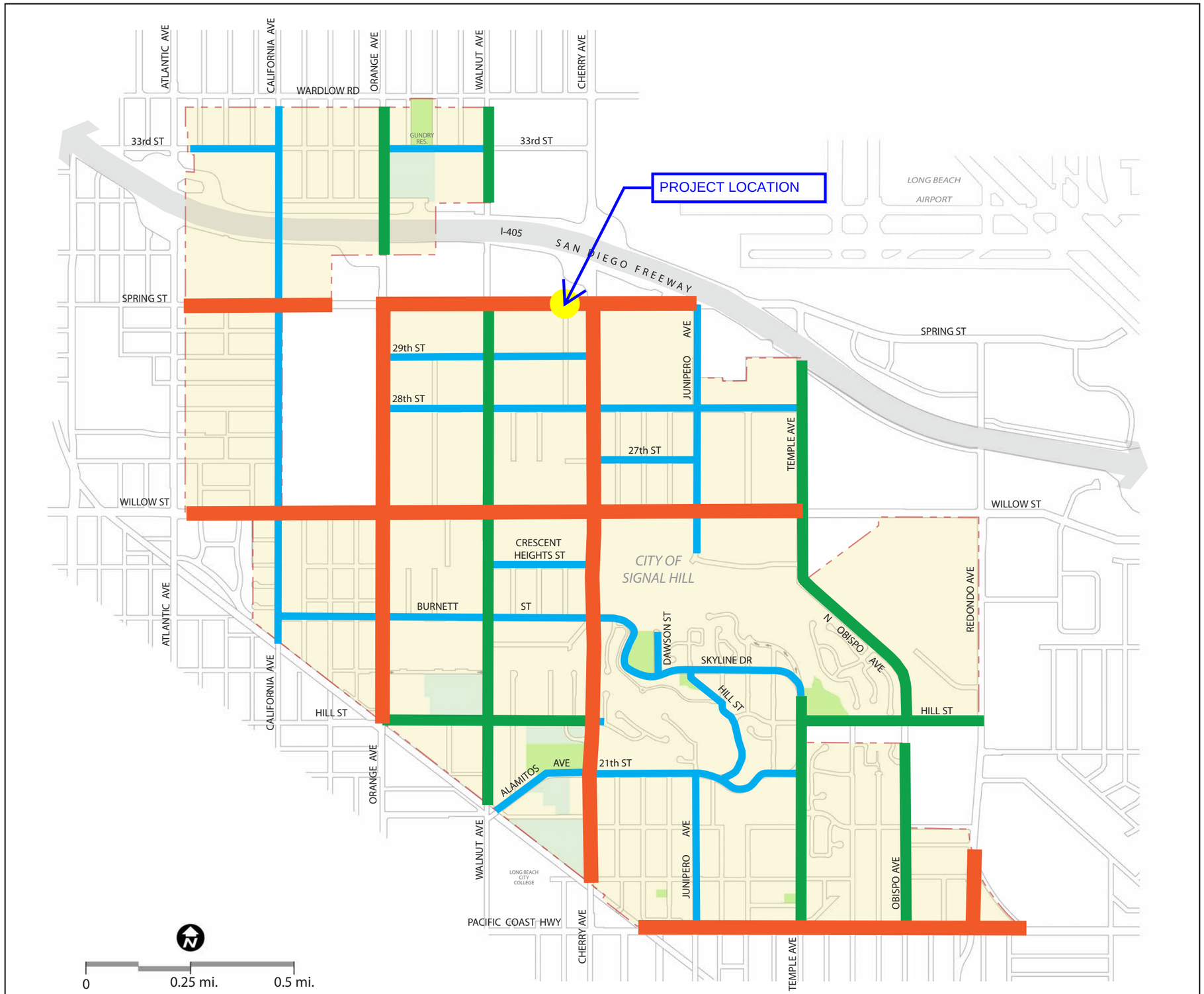
J 19215

EXHIBIT 1
LINE OF SIGHT DISTANCE ANALYSIS
E. SPRING STREET PUMPING PLANT FACILITY IMPROVEMENTS

LEGEND
- = FIELD MEASURED STOPPING SIGHT DISTANCE
- = REQUIRED STOPPING SIGHT DISTANCE (SSD)

\\cp.rickeng.com\projects\C19000\19215_SignalHillSightDistEval\Traffic\Exhibits\19215_01.dgn
\\cp.rickeng.com\projects\C19000\19215_SignalHillSightDistEval\Traffic\Exhibits\SD CorpStds 2005.dscript
17-AUG-2020 11:16

ATTACHMENT "A"



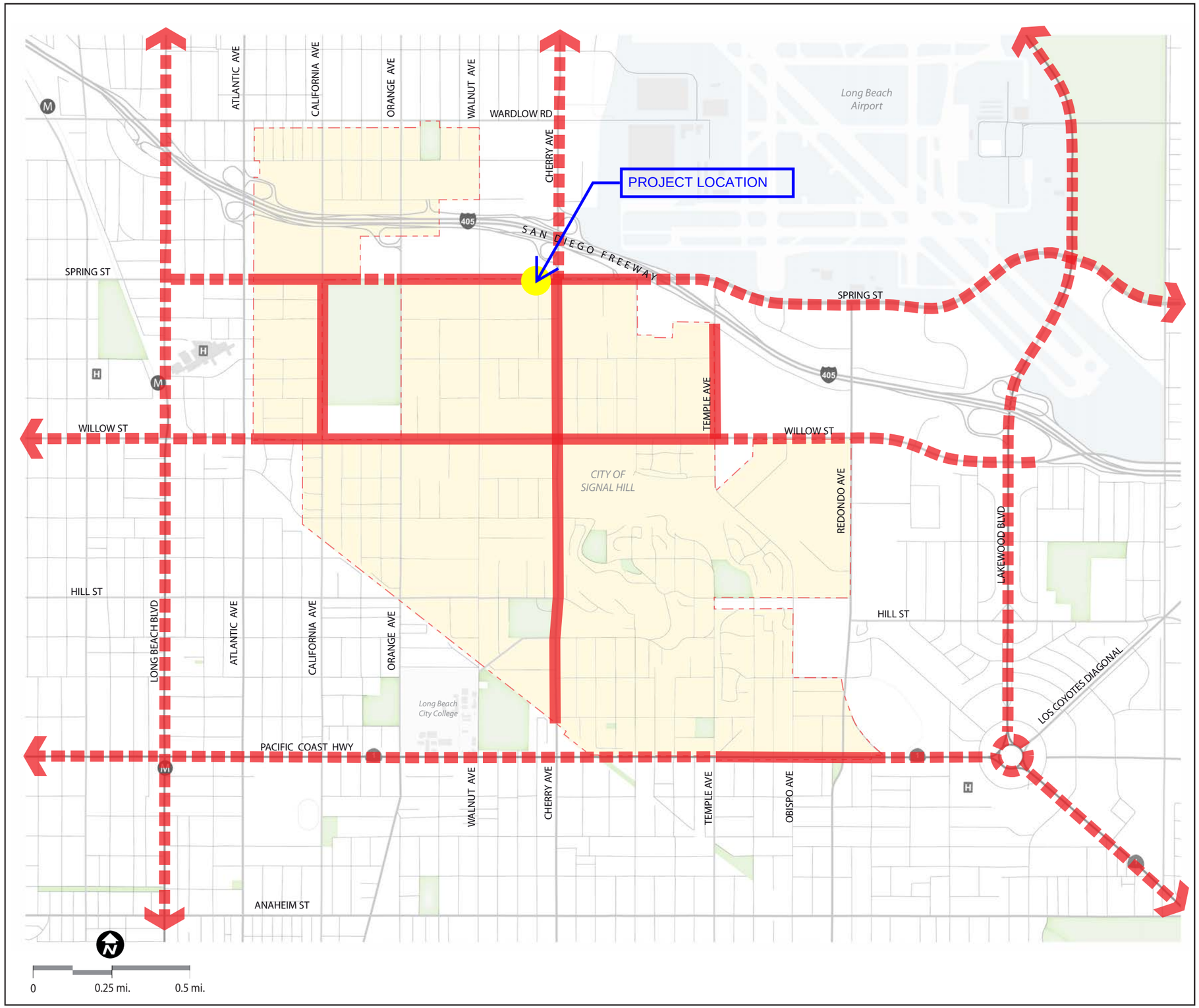
City of Signal Hill
GENERAL PLAN

Circulation Element
December 2009

- Freeway
- Principal Arterial
- Minor Arterial
- Collector
- City of Signal Hill Boundary

Figure 2
Roadway Classifications

ATTACHMENT "A"



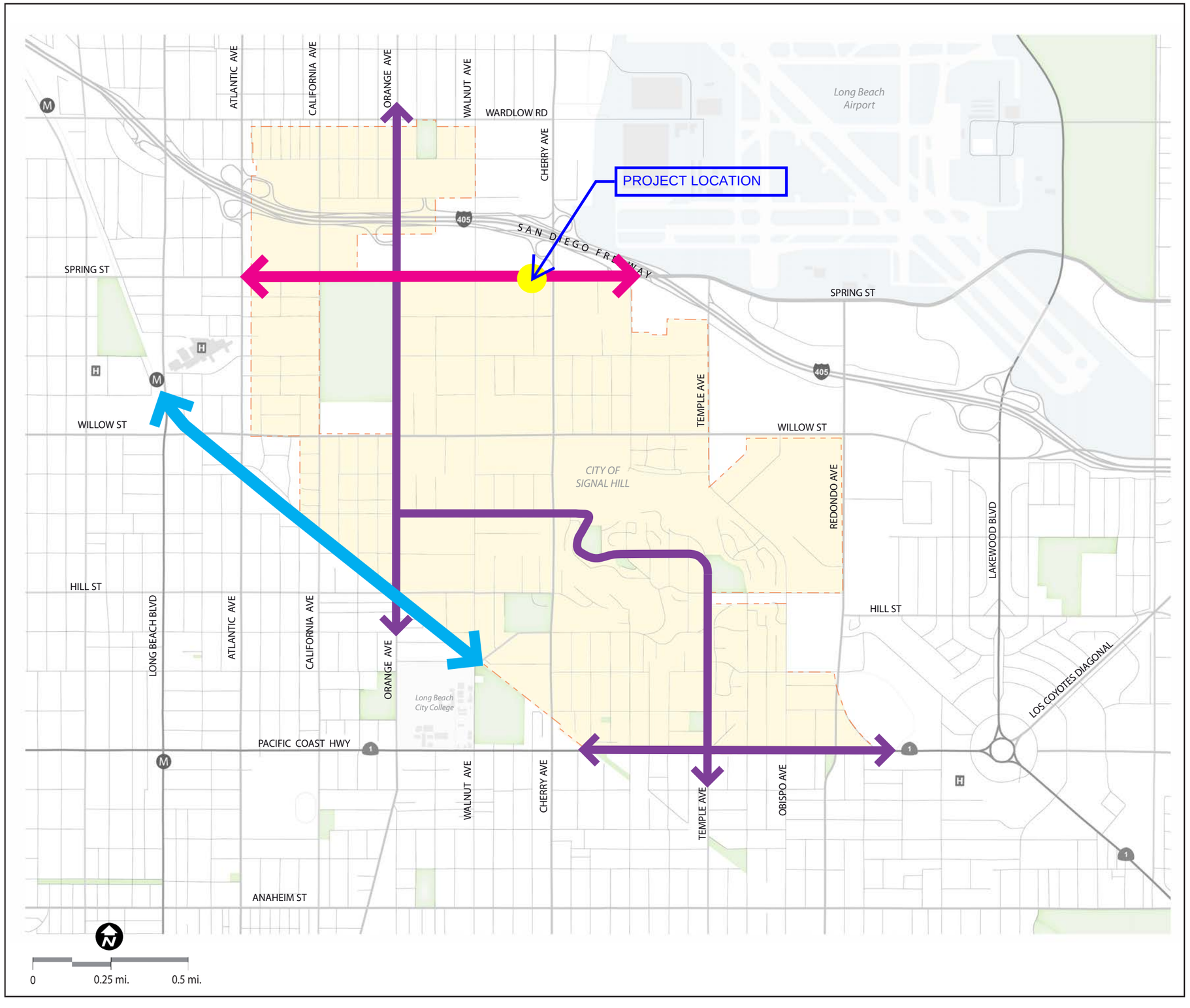
City of Signal Hill
GENERAL PLAN

Circulation Element
December 2009

- Signal Hill Truck Route
- Long Beach Truck Route
- City of Signal Hill Boundary
- Park/Open Space
- Metro Station
- Hospital

Figure 4
Truck Routes

ATTACHMENT "A"



City of Signal Hill
GENERAL PLAN

Circulation Element
December 2009

- Class I Bike Path
- Class II Bike Lane
- Class III Bike Route
- City of Signal Hill Boundary

Figure 6
Bicycle Master Plan

(5) Lock To Lock Time - The time in seconds that an average driver would take under normal driving conditions to turn the steering wheel of a vehicle from the lock position on one side to the lock position on the other side. The default in AutoTurn software is 6 seconds.

(6) Steering Lock Angle - The maximum angle that the steering wheels can be turned. It is further defined as the average of the maximum angles made by the left and right steering wheels with the longitudinal axis of the vehicle.

(7) Articulating Angle - The maximum angle between the tractor and semitrailer.

Topic 405 – Intersection Design Standards

405.1 Sight Distance

(1) Stopping Sight Distance. See Index 201.1 for minimum stopping sight distance requirements.

(2) Corner Sight Distance.

(a) General. At unsignalized intersections a substantially clear line of sight should be maintained between the driver of a vehicle, bicyclist or pedestrian stopped on the minor road and the driver of an approaching vehicle on the major road that has no stop. Line of sight for all users should be included in right of way, in order to preserve sight lines.

See DIB 79 for 2R, 3R, certain storm damage, protective betterment, operational, and safety projects on two-lane and three-lane conventional highways.

Adequate time should be provided for the stopped vehicle on the minor road to either cross all lanes of through traffic, cross the near lanes and turn left, or turn right, without requiring through traffic to radically alter their speed. The visibility required for these maneuvers form a clear sight triangle with the corner sight distance b and the crossing distance a_1 or a_2 (see Figure 405.1 as an example of corner sight distance at a two-lane, two-way highway). Dimensions a_1 and a_2 are measured from the decision point to the center of the lane. The actual number of lanes will vary on the major and minor roads. There should be no sight obstruction within the clear sight triangle.

The methodology used for the driver on the minor road that is stopped to complete the necessary maneuver while the approaching vehicle travels at the design speed of the major road is based on gap-acceptance behavior. A 7-1/2 second criterion is applied to a passenger car (including pickup trucks) for a left turn from a stop on the minor road. However, this time gap does not account for a single-unit truck (no semitrailer), a combination truck (see Index 404.4 for truck tractor-semitrailer guidance), a right-turn from a stop, or for a crossing maneuver. See Table 405.1A for the time gap that addresses these situations for the assumed design vehicle making these maneuvers from the minor road.

In determining corner sight distance, a set back distance for the vehicle waiting on the minor road must be assumed as measured from the edge of traveled way of the major road. Set back for the driver of the vehicle on the minor road should be a minimum of 10 feet plus the shoulder width of the major road but not less than 15 feet. The location of the driver's eye for the set back is the decision point per Figure 405.1. Corner sight distance and the driver's eye set back are also illustrated in Figures 405.7 and 504.3I. Line of sight for corner sight distance for passenger cars is to be determined from a 3 and 1/2-foot height at the location of the driver of the vehicle in the center of the minor road lane to a 3 and 1/2-foot object height in the center of the approaching outside lane of the major road. This provides for reciprocal sight by both vehicles. The passenger

car driver's eye height should be applied to all minor roads. In addition, a truck driver's eye height of 7.6 feet should be applied to the minor road where applicable. Additionally, if the major road has a median barrier, a 2-foot object height should be used to determine the median barrier set back. A median that is wide enough to accommodate a stopped vehicle should also provide a clear sight triangle.

The minimum corner sight distance (feet) should be determined by the equation: $1.47V_mT_g$, where V_m is the design speed (mph) of the major road and T_g is the time gap (seconds) for the minor road vehicle to enter the major road. The values given in Table 405.1A should be used to determine T_g based on the design vehicle, the type of maneuver, and whether the stopped vehicle's rear wheels are on an upgrade exceeding 3 percent. The distance from the edge of traveled way to the rear wheels at the minor road stop location should be assumed as: 20 feet for a passenger car, 30 feet for a single-unit truck, and 72 feet for a combination truck.

(b) Public Road Intersections (Refer to Topic 205 and Index 405.7); corner sight distance applies, see Table 405.1A.

At signalized intersections the corner sight distances 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.

The minimum value for corner sight distance at signalized intersections should be equal to the stopping sight distance as given in Table 201.1, measured as previously described. This includes an urban driveway that forms a leg of the signalized intersection.

(c) Private Road Intersections (Refer to Index 205.2) and Rural Driveways (Refer to Index 205.4); corner sight distance applies, see Table 405.1A. If signalized, the minimum corner sight distance should 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 unless signalized. See Index 405.1(2)(b) underlined standard. If parking is allowed on the major road, parking should be prohibited on both sides of the driveway per the California MUTCD, 3B.19.

(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

ATTACHMENT "B"

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.

ATTACHMENT "C"

Along Spring Street looking westbound

At driveway looking westbound along Spring Street

Along Spring Street looking eastbound towards the driveway