CAMBRIDGE SYSTEMATICS

High-Speed Regional Transportation System Alternatives Analysis

Appendices

final

appendices

prepared for

Southern California Association of Governments

prepared by

Cambridge Systematics, Inc.

with

SYSTRA Consulting, Inc.
System Metrics Group

January 2009

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Table of Contents

1.0 Engineering – Details 1-1
1.1 I-10 Alignment 1-1
1.2 UPRR Alignment 1-1
1.3 Horizontal Curves 1-2

2.0 Operating Parameters – Details 2-1
2.1 Rolling Stock 2-1
2.2 Acceleration and Braking 2-1

3.0 HSRT Speed Profiles 3-1

4.0 Local Transit Route Adjustments 4-1
4.1 Adjustments to Local Transit – West Covina 4-1
4.2 Adjustments to Local Transit – City of Industry 4-44
4.3 Adjustments to Local Transit – Ontario Airport 4-66

5.0 Comparison With California Maglev Deployment Program Ridership Results 5-1
5.1 Differences in Assumptions 5-2
5.2 Comparing Ridership Results 5-3

6.0 Capital Cost – Details 6-1
6.1 Capital Costing Assumptions 6-1
6.2 Sources of Unit Price Information 6-2
6.3 Capital Costs in FTA SCC Format 6-4
6.4 Takeoff Details and Unit Costs 6-9

7.0 HSRT Speed Profiles – LAX Extension 7-1

8.0 Local Transit Route Adjustments – LAX Extension 8-1

9.0 Identification of Additional Stations 9-1
9.1 Step One – Identification of Relatively Denser Areas 9-1
9.2 Step Two – Detailed Analysis of Relatively Denser Areas 9-3

10.0 Benefit Assessment Districts and Tax Increment Financing 10-1

11.0 Potential for HSRT Goods Movement Revenue 11-1

11.1 United Parcel Service 11-1
11.2 Federal Express 11-2

List of Tables

Table 2.1 Steel-Wheel Acceleration *TPC Settings* 2-2
Table 2.2 Steel-Wheel Braking *TPC Settings* 2-3
Table 2.3 Steel-Wheel Braking *Brake Rate Computation* 2-3
Table 2.4 Maglev Performance Targets and Results 2-4
Table 2.5 Maglev Acceleration *TPC Settings* 2-5
Table 5.1 CMDP Station Locations by Alternative 5-2
Table 5.2 Key Differences Between HSRT AA and CMDP Ridership Analyses 5-3
Table 5.3 CMDP Alternative 5mc Ridership Result Adjusted to be More Consistent with HSRT AA 5-4
Table 6.1 Capital Cost Unit Costs and Sources 6-3
Table 10.1 Redevelopment Projects near Proposed IOS HSRT Stations 10-2

List of Figures

Figure 3.1 Speed Profile, Maglev on I-10 Alignment, Eastbound 3-2

Figure 3.2 Speed Profile, Steel-Wheel on I-10 Alignment, Eastbound 3-3

Figure 3.3 Speed Profile, Maglev on I-10 Alignment, Westbound 3-4

Figure 3.4 Speed Profile, Steel-Wheel on I-10 Alignment, Westbound.....3-5

Figure 3.5 Speed Profile, Maglev on UPRR Alignment from LA Union Station to Ontario Airport, Eastbound 3-6

Figure 3.6 Speed Profile, Steel-Wheel on UPRR Alignment from LA Union Station to Ontario Airport, Eastbound 3-7

Figure 3.7 Speed Profile, Maglev on UPRR Alignment from Ontario Airport to LA Union Station, Westbound.....3-8

Figure 3.8 Speed Profile, Steel-Wheel on UPRR Alignment from Ontario Airport to LA Union Station, Westbound.....3-9

Figure 4.1 Adjustment to Foothill Transit Route 281, Northbound 4-2

Figure 4.2 Adjustment to Foothill Transit Route 281, Southbound.....4-3

Figure 4.3 Adjustment to Metro Route 490, Eastbound 4-4

Figure 4.4 Adjustment to Metro Route 490, Westbound.....4-5

Figure 4.5 Adjustment to Foothill Transit Route 178, Eastbound.....4-6

Figure 4.6 Adjustment to Foothill Transit Route 178, Eastbound.....4-7

Figure 4.7 Adjustment to Foothill Transit Route 178, Westbound 4-8

Figure 4.8 Adjustment to Foothill Transit Route 178, Westbound 4-9

Figure 4.9 Adjustment to Foothill Transit Route 179, Eastbound.....4-10

Figure 4.10 Adjustment to Foothill Transit Route 179, Eastbound.....4-11

Figure 4.11 Adjustment to Foothill Transit Route 179, Eastbound.....4-12

Figure 4.12 Adjustment to Foothill Transit Route 179, Westbound 4-13

Figure 4.13 Adjustment to Foothill Transit Route 179, Westbound 4-14

Figure 4.14 Adjustment to Foothill Transit Route 185, Northbound 4-15

Figure 4.15 Adjustment to Foothill Transit Route 185, Southbound.....4-16

Figure 4.16 Adjustment to Foothill Transit Route 272, Northbound 4-17

Figure 4.17 Adjustment to Foothill Transit Route 272, Southbound.....4-18

Figure 4.18 Adjustment to Foothill Transit Route 274, Northbound 4-19
Figure 4.19 Adjustment to Foothill Transit Route 274, Northbound 4-20
Figure 4.20 Adjustment to Foothill Transit Route 274, Southbound.....4-21
Figure 4.21 Adjustment to Foothill Transit Route 274, Southbound.....4-22
Figure 4.22 Adjustment to Foothill Transit Route 276, Northbound 4-23
Figure 4.23 Adjustment to Foothill Transit Route 276, Northbound 4-24
Figure 4.24 Adjustment to Foothill Transit Route 276, Southbound.....4-25
Figure 4.25 Adjustment to Foothill Transit Route 280, Northbound 4-26
Figure 4.26 Adjustment to Foothill Transit Route 280, Southbound.....4-27
Figure 4.27 Adjustment to Foothill Transit Route 480, Westbound 4-28
Figure 4.28 Adjustment to Foothill Transit Route 480, Eastbound.....4-29
Figure 4.29 Adjustment to Foothill Transit Route 481, Westbound 4-30
Figure 4.30 Adjustment to Foothill Transit Route 481, Eastbound.....4-31
Figure 4.31 Adjustment to Foothill Transit Route 488, Eastbound.....4-32
Figure 4.32 Adjustment to Foothill Transit Route 488, Westbound 4-33
Figure 4.33 Adjustment to Foothill Transit Route 498, Eastbound.....4-34
Figure 4.34 Adjustment to Foothill Transit Route 498, Westbound 4-35
Figure 4.35 Adjustment to Foothill Transit Route 499, Westbound 4-36
Figure 4.36 Adjustment to Foothill Transit Route 499, Eastbound.....4-37
Figure 4.37 Adjustment to Foothill Transit Route 699, Westbound 4-38
Figure 4.38 Adjustment to Foothill Transit Route 699, Eastbound.....4-39
Figure 4.39 Adjustment to West Covina Transit Blue Line 4-40
Figure 4.40 Adjustment to West Covina Transit Red Line 4-41
Figure 4.41 Adjustment to West Covina Transit West Shuttle.....4-42
Figure 4.42 Adjustment to West Covina Transit West Shuttle.....4-43
Figure 4.43 Adjustment to Metro Route 484, Eastbound 4-45
Figure 4.44 Adjustment to Metro Route 484, Westbound.....4-46
Figure 4.45 Adjustment to Metro Route 484A, Eastbound 4-47
Figure 4.46 Adjustment to Foothill Transit Route 178, Eastbound.....4-48
Figure 4.47 Adjustment to Foothill Transit Route 178, Eastbound.....4-49

Figure 4.48 Adjustment to Foothill Transit Route 178, Westbound 4-50
Figure 4.49 Adjustment to Foothill Transit Route 178, Westbound 4-51
Figure 4.50 Adjustment to Foothill Transit Route 179, Eastbound.....4-52
Figure 4.51 Adjustment to Foothill Transit Route 179, Eastbound.....4-53
Figure 4.52 Adjustment to Foothill Transit Route 179, Eastbound.....4-54
Figure 4.53 Adjustment to Foothill Transit Route 179, Westbound 4-55
Figure 4.54 Adjustment to Foothill Transit Route 179, Westbound 4-56
Figure 4.55 Adjustment to Foothill Transit Route 179, Westbound 4-57
Figure 4.56 Adjustment to Foothill Transit Route 482, Westbound 4-58
Figure 4.57 Adjustment to Foothill Transit Route 482, Westbound 4-59
Figure 4.58 Adjustment to Foothill Transit Route 482, Eastbound.....4-60
Figure 4.59 Adjustment to Foothill Transit Route 482, Eastbound.....4-61
Figure 4.60 Adjustment to Foothill Transit Route 495, Eastbound.....4-62
Figure 4.61 Adjustment to Foothill Transit Route 495, Westbound 4-63
Figure 4.62 Adjustment to Foothill Transit Route 701, Westbound 4-64
Figure 4.63 Adjustment to Foothill Transit Route 701, Eastbound.....4-65
Figure 4.64 Adjustment to Riverside Transit Route 204, Northbound 4-67
Figure 4.65 Adjustment to Riverside Transit Route 204, Southbound.....4-68
Figure 4.66 Adjustment to Omnitrans Route 90, Westbound 4-69
Figure 4.67 Adjustment to Omnitrans Route 90, Eastbound.....4-70
Figure 4.68 Adjustment to Omnitrans Route 60, Northbound.....4-71
Figure 4.69 Adjustment to Omnitrans Route 60, Southbound.....4-72
Figure 4.70 Adjustment to Omnitrans Route 61, Eastbound.....4-73
Figure 4.71 Adjustment to Omnitrans Route 61, Westbound 4-74
Figure 4.72 Adjustment to Omnitrans Route 61, Eastbound.....4-75
Figure 4.73 Adjustment to Omnitrans Route 61, Westbound 4-76
Figure 4.74 Adjustment to Omnitrans Route 71, Eastbound.....4-77
Figure 4.75 Adjustment to Omnitrans Route 71, Westbound 4-78
Figure 7.1 LAX to West LA Speed Profile, Maglev, Eastbound.....7-2
Figure 7.2 LAX to West LA Speed Profile, Steel-Wheel, Eastbound 7-3

Figure 7.3 West LA to LAX Speed Profile, Maglev, Westbound 7-4
Figure 7.4 West LA to LAX Speed Profile, Steel-Wheel, Westbound.....7-5
Figure 8.1 Adjustment to Metro Route 439, Northbound.....8-2
Figure 8.2 Adjustment to Metro Route 439, Southbound 8-3
Figure 8.3 Adjustment to Metro Route 703, Northbound.....8-4
Figure 8.4 Adjustment to Metro Route 703, Southbound 8-5
Figure 8.5 Adjustment to Metro Route 706, Northbound.....8-6
Figure 8.6 Adjustment to Metro Route 706, Southbound 8-7
Figure 8.7 Adjustment to Metro Route 715, Eastbound 8-8
Figure 8.8 Adjustment to Metro Route 715, Westbound.....8-9
Figure 8.9 Adjustment to Metro Route 111, Westbound.....8-10
Figure 8.10 Adjustment to Metro Route 111, Eastbound 8-11
Figure 8.11 Adjustment to Metro Route 115, Eastbound 8-12
Figure 8.12 Adjustment to Metro Route 115, Eastbound 8-13
Figure 8.13 Adjustment to Metro Route 115, Eastbound 8-14
Figure 8.14 Adjustment to Metro Route 115, Westbound.....8-15
Figure 8.15 Adjustment to Metro Route 115, Westbound.....8-16
Figure 8.16 Adjustment to Metro Route 117, Eastbound 8-17
Figure 8.17 Adjustment to Metro Route 117, Westbound.....8-18
Figure 8.18 Adjustment to Metro Route 215, Northbound.....8-19
Figure 8.19 Adjustment to Metro Route 215, Southbound 8-20
Figure 8.20 Adjustment to Metro Route 311, Eastbound 8-21
Figure 8.21 Adjustment to Metro Route 311, Westbound.....8-22
Figure 8.22 Adjustment to Metro Route 315, Westbound.....8-23
Figure 8.23 Adjustment to Metro Route 315, Eastbound 8-24
Figure 8.24 Adjustment to Metro Route 315, Eastbound 8-25
Figure 8.25 Adjustment to Metro Route 315, Eastbound 8-26
Figure 8.26 Adjustment to Metro Route 40, Northbound Owl 8-27
Figure 8.27 Adjustment to Metro Route 40, Northbound Owl 8-28
Figure 8.28 Adjustment to Metro Route 40, Southbound Owl.....8-29

Figure 8.29 Adjustment to Metro Green Line Shuttle, Eastbound....8-30
Figure 8.30 Adjustment to Metro Green Line Shuttle, Westbound....8-31
Figure 8.31 Adjustment to Metro Route 3, Southbound....8-32
Figure 8.32 Adjustment to Metro Route 3, Southbound/1....8-33
Figure 8.33 Adjustment to Metro Route 3, Northbound/1....8-34
Figure 8.34 Adjustment to Metro Route 3, Northbound....8-35
Figure 9.1 Additional HSRT Stations....9-2
Figure 9.2 Relatively Denser Areas Along I-10 Alignment....9-3
Figure 9.3 Central Los Angeles, 2035 Population Density....9-5
Figure 9.4 Central Los Angeles, 2035 Employment Density....9-6
Figure 9.5 San Gabriel Valley, 2035 Population Density....9-7
Figure 9.6 San Gabriel Valley, 2035 Employment Density....9-8
Figure 9.7 Pomona-Ontario Area, 2035 Population Density....9-9
Figure 9.8 Pomona-Ontario Area, 2035 Employment Density....9-10
Figure 11.1 UPS Distribution Network....11-2
Figure 11.2 Federal Express Distribution Network....11-3

1.0 Engineering – Details

The High-Speed Regional Transportation (HSRT) Alternatives Analysis (AA) evaluates high-speed transportation technologies within the Initial Operating Segment (IOS) corridor from West Los Angeles to Ontario Airport. Four alternatives are evaluated in the study:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on Union Pacific Railroad (UPRR) alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. This appendix contains details related to the development of engineering information for the four alternatives.

1.1 I-10 ALIGNMENT

The I-10 alignment, with a general east-west orientation, was taken from a single set of drawings that use English units entitled, *Maglev Deployment Program, Phase II*, prepared for SCAG by the IBI Group and Maglev, Inc., as Work Element Number 05-240.SCGC1.2, and last dated July 28, 2006. Of specific importance are the Plan and Profile Sheets numbered 1-59.

Viewed west to east, the alignment begins at station 106+50, just west of the westerly platform limit of the proposed West Los Angeles station. It proceeds easterly past the proposed Los Angeles Union Station (LAUS) and West Covina stations to end at station 2956+61, just east of the easterly platform limit of the proposed Ontario Airport station.

The alignment drawings identify the limits and characteristics of the horizontal curves (circular and spiral) and vertical profile. Vertical curves are not parabolic but circular, with each Vertical Curve Radius (VCR) specified.

The typical cross section on the I-10 alignment is a two-track elevated structure, noted as urban aerial on the drawings.

1.2 UPRR ALIGNMENT

The UPRR alignment, also with a general east-west orientation, was taken from two sets of drawings that use metric units:

1. On the west end, a set of drawings entitled *Los Angeles – Riverside – San Diego, Union Station to Pomona Station via Union Pacific, Segment 1-B (joins Segment 1A*

at Pomona), taken from the California High-Speed Train Program Environmental Impact Report, prepared for the California High Speed Rail Authority (CHSRA), consisting of Sheets 1-4 of 4 plus an Index sheet, and dated August 14, 2002; and

2. On the east end, a set of drawings entitled *Los Angeles – Riverside – San Diego, Union Station to March ARB via SP Colton Line, Segment 1-A*, taken from the California High-Speed Train Program Environmental Impact Report, prepared for the CHSRA, consisting of Sheets 1-8 of 8 plus two Index sheets, and dated August 14, 2002.

Viewed west to east, the UPRR alignment begins at the west end of Segment 1-B at Station 1-B 2+100.00, at the westerly platform limit of the proposed HSRT station at Union Station. It proceeds easterly (with stationing increasing) along Segment 1-B past the proposed Union Station, South El Monte, and City of Industry Stations to meet Segment 1-A at station equation 1-B 53+691.96 = 1-A 51+678.41. It then continues easterly along Segment 1-A (with increasing stationing) past the proposed Pomona Station to end at the easterly platform limit of the proposed Ontario Airport Station, at Station 1-A 67+810.00. The HSRT system does not include stations at South El Monte and Pomona, so these were excluded in the analysis.

The typical cross section used on the CHSRA alignment is a two-track elevated structure, noted as urban aerial on drawings.

The above drawings include several at-grade segments. Most of these were modified to aerial due to numerous at-grade road crossings within these segments. At-grade road crossings are infeasible with the Maglev mode, and are not allowed at higher speeds with the steel-wheel mode.

1.3 HORIZONTAL CURVES

Using the given alignments, AREMA standards were used to calculate speeds that the current geometry could adequately handle, while still remaining within the 0.1 g lateral acceleration standard established for HSRT. This lateral acceleration equates to an unbalance of 5.99 inches.

$A_{lat} = 0.1 \times g(ft/s^2)$

$V = Velocity(ft/s)$

$E = Superelevation(in.)$

$R = Radius(ft)$

If $A_{lat} = V^2 / R$

And $V = 0.5\sqrt{E \times R}$

Then $E_{(Alat=.1g)} = 5.99\ inches$

However, it is insufficient to assume an unbalance of 5.99 inches at all curves. The lateral acceleration and jerk rate within the spiral must also be considered. From Chapter 11, Section 3.5.7.9 of AREMA, the equation is:

$$L_S \geq (A_{lat} / J) \times (E_U / E_{U\,max}) \times 1.46V$$
$$L_S = Sprial\ Length\,(ft)$$
$$A_{lat} = Lateral\ Acceleration\,(g)$$
$$J = Jerk\ Rate\,(ft / sec^3)$$
$$E_{U\,Max} = Maximum\,Unbalanced\,(inch)$$

Unbalance (Eu). Assuming a maximum lateral acceleration of 0.1 g, jerk rate of 0.03 g per second as recommended by AREMA and the maximum unbalanced of 5.99 inches gives $L_s \geq 0.811E_u \times V$.

Superelevation (Ea). Superelevation was assumed to be runoff at a maximum rate of one-half inch per 62 feet of spiral, which is consistent with Class 9 railroad traveling at 200 mph.

The UPRR alignment calculations were, therefore, performed to determine the maximum safe speeds, using $E_a = L_s / 124\ and\ E_u = L_s / 0.811V$ for the existing spiral lengths.

The spirals shown on the UPRR alignment did not maximize the unbalance and/ or superelevation. We recalculated spiral lengths so that higher speeds could be reached while maintaining radii. This is the only change made to the horizontal alignment, resulting in insignificant changes to stationing and keeping the alignment within the proposed right-of-way.

Spirals on the I-10 alignment were not adjusted, as they were designed for maximum speed for the lengths of the curves.

Curves were analyzed to determine which ones may be optimized in the following way:

- The maximum allowed superelevation for steel-wheel vehicles is 7 inches, which would require 868-foot spirals. The maximum allowed superelevation for Maglev vehicles is 12 degrees, which is equivalent to 12 inches, which would require 1,488-foot spirals. However, a minimum curve length of 3.66V (where $V = mph\ and\ L_C = ft)$ must be satisfied to meet the required minimum of 2.5 seconds of travel time on the curve. Where curves were sufficiently long, the maximum speed was calculated using 5.99 inches unbalanced and superelevations of 7 inches of for steel-wheel and 12 inches for Maglev.
- For curves where the spirals could be lengthened but not to a sufficient length to achieve the maximum allowable superelevation, an iterative process was used to calculate speed restrictions. Velocity is a function of superelevation, unbalance, and radius. Unbalance is a function of speed and length of spiral. Therefore, multiple iterations were performed to obtain the final speed, spiral length, and superelevation. A trial speed was chosen

which determined the minimum length of curve and maximum length of spiral for that speed: $L_{Sprial} New = L_{curve} + L_{spiral} - (3.66 \times V)$.

- An actual superelevation and unbalance were then calculated for that spiral length, which were then used to determine the speed. This process was repeated until the two speeds converged.

Maglev curve speed information was provided by TransRapid International (TRI) in the system planning document, *TransRapid Maglev System Concept Alignment Overview*, prepared by TRI/Thyssen Krupp, and dated February 5, 2003. Table 1, "Minimum and Standard Alignment Parameters for Creation of a Concept Alignment," lists horizontal and vertical curve criteria required for speed at 200, 250, 300, 400, and 500 kph (125, 155, 186, 249, and 311 mph). Speeds for the Maglev technology on both the I-10 and UPRR alignments were determined by using the methodology described above, and checked against the TRI data. The resulting curve speeds were similar to the TRI information, indicating that, while TRI did not provide a specific lateral jerk rate or superelevation runoff rate, the rates used for steel-wheel are similar to what was used to develop the TRI curve speed tables.

2.0 Operating Parameters – Details

The HSRT AA evaluates high-speed transportation technologies within the IOS corridor from West Los Angeles to Ontario Airport. Four alternatives are evaluated in the study:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on UPRR alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. This appendix contains details related to the development of operating parameter information for the four alternatives.

2.1 ROLLING STOCK

Both the steel-wheel and the Maglev-simulated rolling stock were based upon dimensions of the Siemens Velaro E, a high-speed train derived from the Siemens ICE® 3 of German Rail (DB AG). Dimensional specifications for the train were taken from literature provided by Siemens entitled, *High-Speed Train, Velaro E for the Spanish National Railways, Order No. A19100-V800-B720-X-7600*. It is an 8-car train set. It is 200 meters in length, has an empty weight of 425 metric tons, and carries 400 passengers. Specific operating parameters were changed for use of the rolling stock with each technology, as described below.

2.2 ACCELERATION AND BRAKING

Simulation of both acceleration and braking of the rolling stock for each of the two technologies were first performed on level tangent track in order to calibrate the equipment performance with the specifications that had been received (as cited below). When the performance for each rolling stock type had been brought into good agreement with the manufacturers' documented performance on level tangent track, then the train consist could be simulated on the actual project alignments with confidence, and projected travel times could be generated.

Steel-Wheel

Acceleration Performance

The above-cited technical specifications for the Siemens Velaro E listed traction power (at the wheel) of 8,800 kW and a time to accelerate from 0 to 320 kph of 380 seconds. Table 2.1 lists the critical Train Performance Calculator (TPC) settings for the acceleration performance calibration test.

Table 2.1 Steel-Wheel Acceleration
TPC Settings

Description	Value
Train name	SCAG Velaro E (5588) 8-car half-train
Resistance equation	TGV High-Speed Rail
System maximum speed	N/A
Velocity smoothing	None
Jerk limiting	Yes
Schedule margin calculation	None
Passenger load	Empty
Average passenger weight:	N/A
Continuous power per car	1,222 kW*
Propulsion system efficiency	90%
Percent of train mass in rotation	5%
Total axles/powered axles	32/16
Maximum adhesion	14%**

* Tractive power at wheel for an 8-car train of 8,800 kW (Siemens literature). Therefore, average tractive power at wheel per car of 1,100 kW. Propulsion System Efficiency of 90 percent (assumed). Assumed continuous power per car = 1,100 kW/0.90 = 1,222 kW.

** Four of the eight cars are powered. Powered cars each have assumed maximum adhesion of 28 percent. Maximum adhesion of train as a whole is 14 percent.

With these settings in place, the time to accelerate from 0 to 320 kilometers per hour in TPC simulation was 380.1 seconds, demonstrating excellent agreement with the 380-second acceleration performance cited by Siemens. The TPC run was based on the RAILSIM High-Speed Rail resistance equation, which has been used for SNCF Train a Grande Vitesse (TGV) rolling/aerodynamic resistance computations. Rolling/aerodynamic resistance of the ICE is similar to that of the TGV.

Braking Performance

Siemens' technical specifications cited above state that the braking distance required from 320 to 0 kilometers per hour is 3,900 meters. This is taken to represent full service – not emergency – braking. Table 2.2 lists the critical TPC settings for the braking performance calibration test.

Table 2.2 Steel-Wheel Braking
TPC Settings

Description	Value
Train name	SCAG Velaro E (5588) 8-car half train
Resistance equation	TGV High Speed Rail
System maximum speed	N/A
Velocity smoothing	None
Jerk limiting	Yes
Schedule margin calculation	None
Passenger load	Empty
Average passenger weight	N/A
Brakepipe propagation type	Electric
Comfort braking margin	0 percent
Enforced braking reaction time	0 seconds

A constant braking rate was assumed and computed as shown in Table 2.3.

Table 2.3 Steel-Wheel Braking
Brake Rate Computation

Average Speed through braking = 320 kph/2 = 160 kph = 44.44 m/s
Time to brake = 3,900 meters/44.44 m/s = 87.75 seconds
320 kph/87.75 seconds = 3.6467 kphps service brake rate = 1.0130 m/s^2

Iterative simulations refined the solution to arrive at a service brake rate of -1.003 m/s^2, resulting in a stopping distance of 3,900.41 meters.

Maglev

Acceleration and Braking Performance

For the Maglev rolling stock, the dimensional attributes were again taken from the Siemens Velaro E described above. However, the performance attributes were taken from a file named "System Characteristics TR Velaro Aug2007.pdf,"

received from TRI. The Maglev acceleration and braking performance therein are shown in Table 2.4 under the headings labeled "Required."

Table 2.4 Maglev Performance Targets and Results

Speed (kph)	Acceleration Time (in Second)		Deceleration Time (in Second)	
	Required	Simulated	Required	Simulated
0 <> 100	31	30.5	30	30.4
0 <> 200	61	60.7	59	59.9
0 <> 300	97	95.9	88	89.7
0 <> 400	148	145.2	117	119.8
0 <> 500	256	–	147	–

In order to attain the specified performance for the Maglev rolling stock, tractive force and braking force curves corresponding with the required performance were developed based upon the car dimensions and weight with no passengers. These curves were applied to the hypothetical Maglev train. With Flange Resistance and Mechanical Resistance both set to zero as shown (and as is appropriate for Maglev rolling stock), the only resistance component affecting the simulated train was Aerodynamic Resistance.

Table 2.5 Maglev Acceleration
TPC Settings

Description	Value
Train name	MagLev (dimensionally identical to SCAG Velaro E (5588) 8-car half-train)
Resistance equation	TGV High-Speed Rail, with both Flange Resistance and Mechanical Resistance set to zero
System maximum speed	500 km/hr (311 mph)
Velocity smoothing	None
Jerk limiting	None
Schedule margin calculation	None
Passenger load	0
Average passenger weight	N/A
Continuous power per car	Not computed
Propulsion system efficiency	n/a
Percent of train mass in rotation	0%
Total axles/powered axles	0
Maximum adhesion	n/a

The resulting times for simulated acceleration and braking are shown in Table 2.5 under the headings labeled "Simulated." As can be seen, simulated Maglev performance is virtually identical to the TRI documentation for both acceleration and braking.

3.0 HSRT Speed Profiles

The HSRT AA evaluates high-speed transportation technologies within the IOS corridor from West Los Angeles to Ontario Airport. This appendix shows the speed profiles for the four alternatives evaluated in the study. The four alternatives are:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on UPRR alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. Speed profiles for the UPRR alignment are shown between Los Angeles Union Station (LAUS) and Ontario Airport only. For the UPRR alignment, the speed profiles between West Los Angeles and LAUS are identical to those for the I-10 alignment. The speed profiles were developed using SYSTRA's RAILSIM® Train Performance Calculator.

Figure 3.1 Speed Profile, Maglev on I-10 Alignment, Eastbound

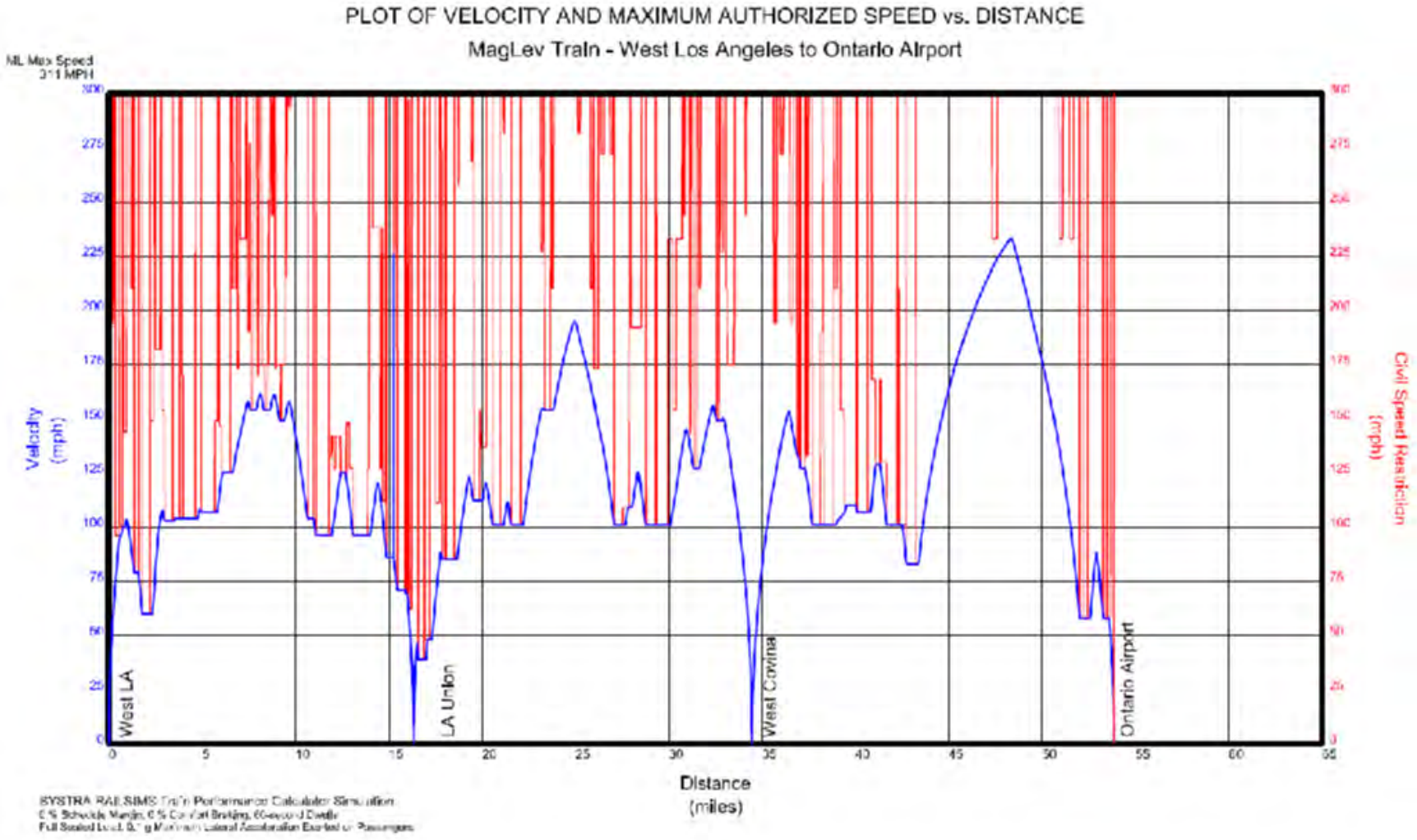


Figure 3.2 Speed Profile, Steel-Wheel on I-10 Alignment, Eastbound

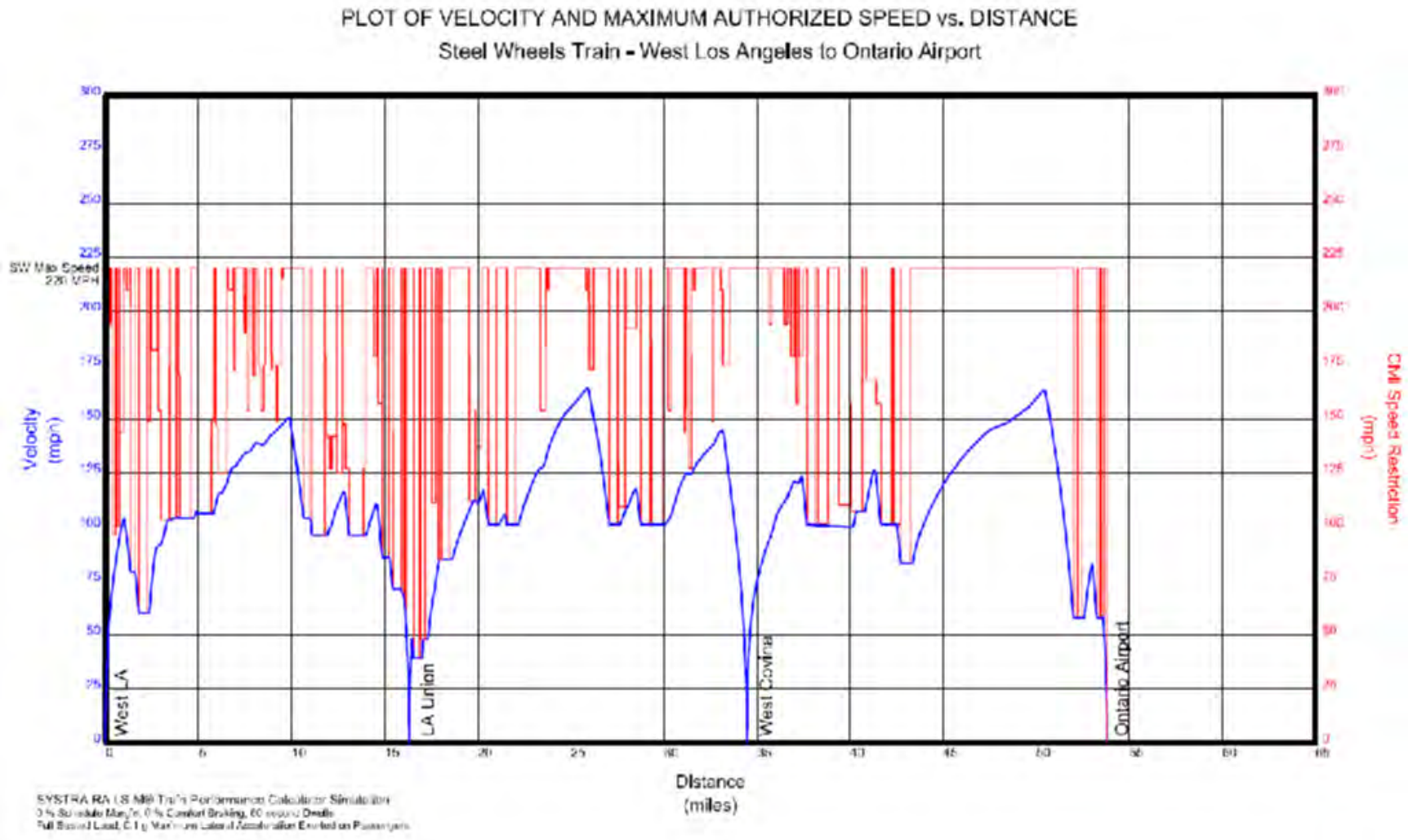


Figure 3.3 Speed Profile, Maglev on I-10 Alignment, Westbound

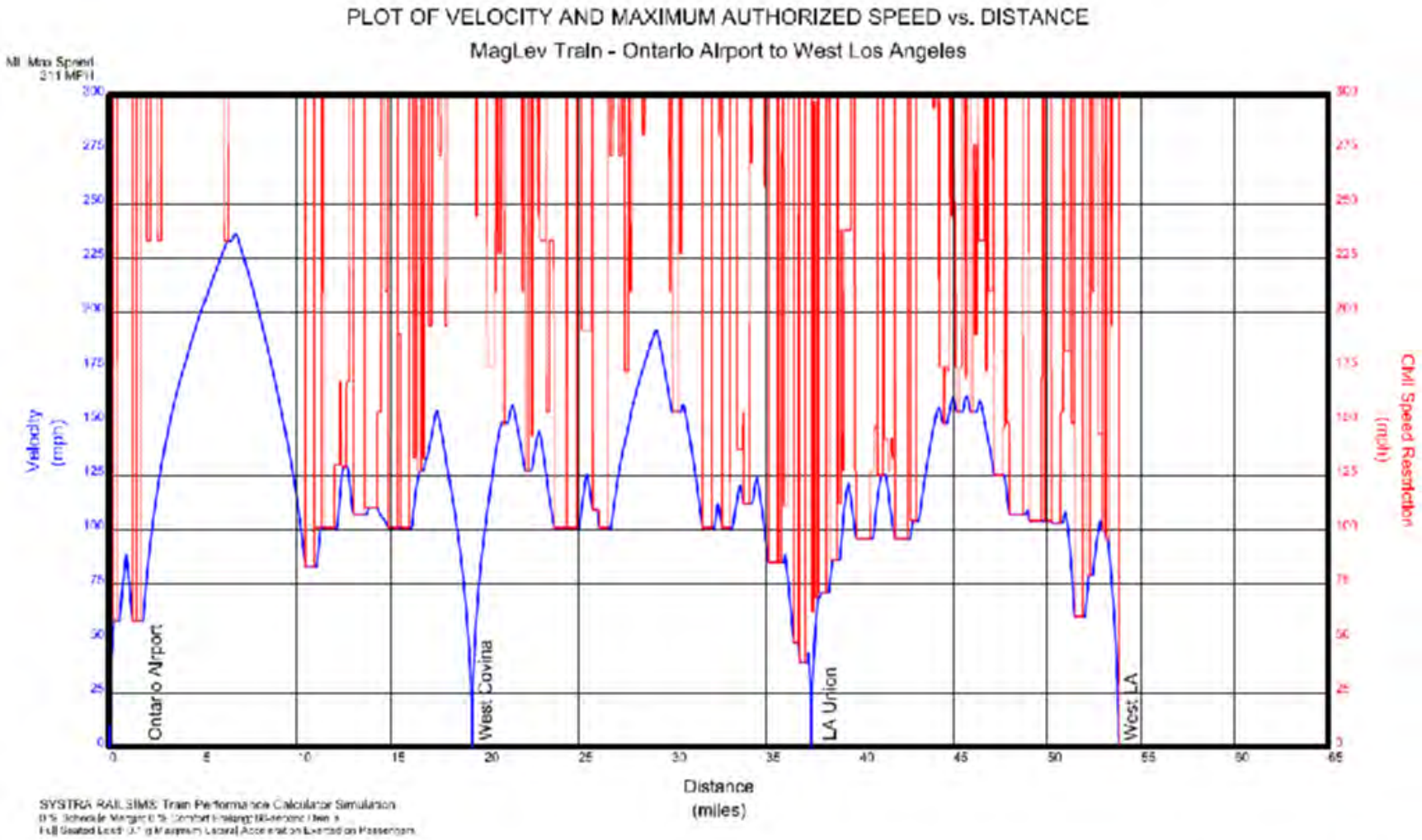


Figure 3.4 Speed Profile, Steel-Wheel on I-10 Alignment, Westbound

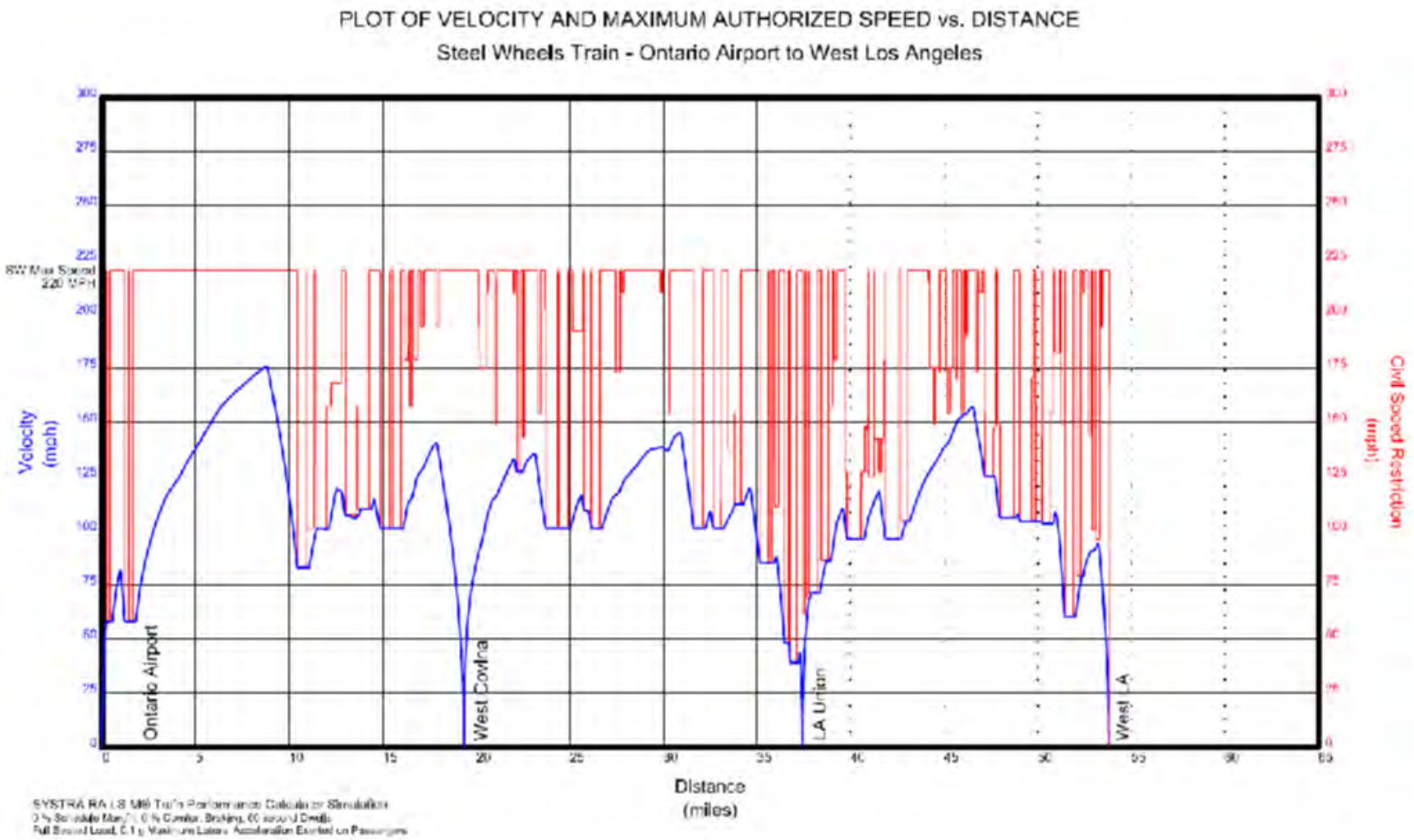


Figure 3.5 Speed Profile, Maglev on UPRR Alignment from LA Union Station to Ontario Airport, Eastbound

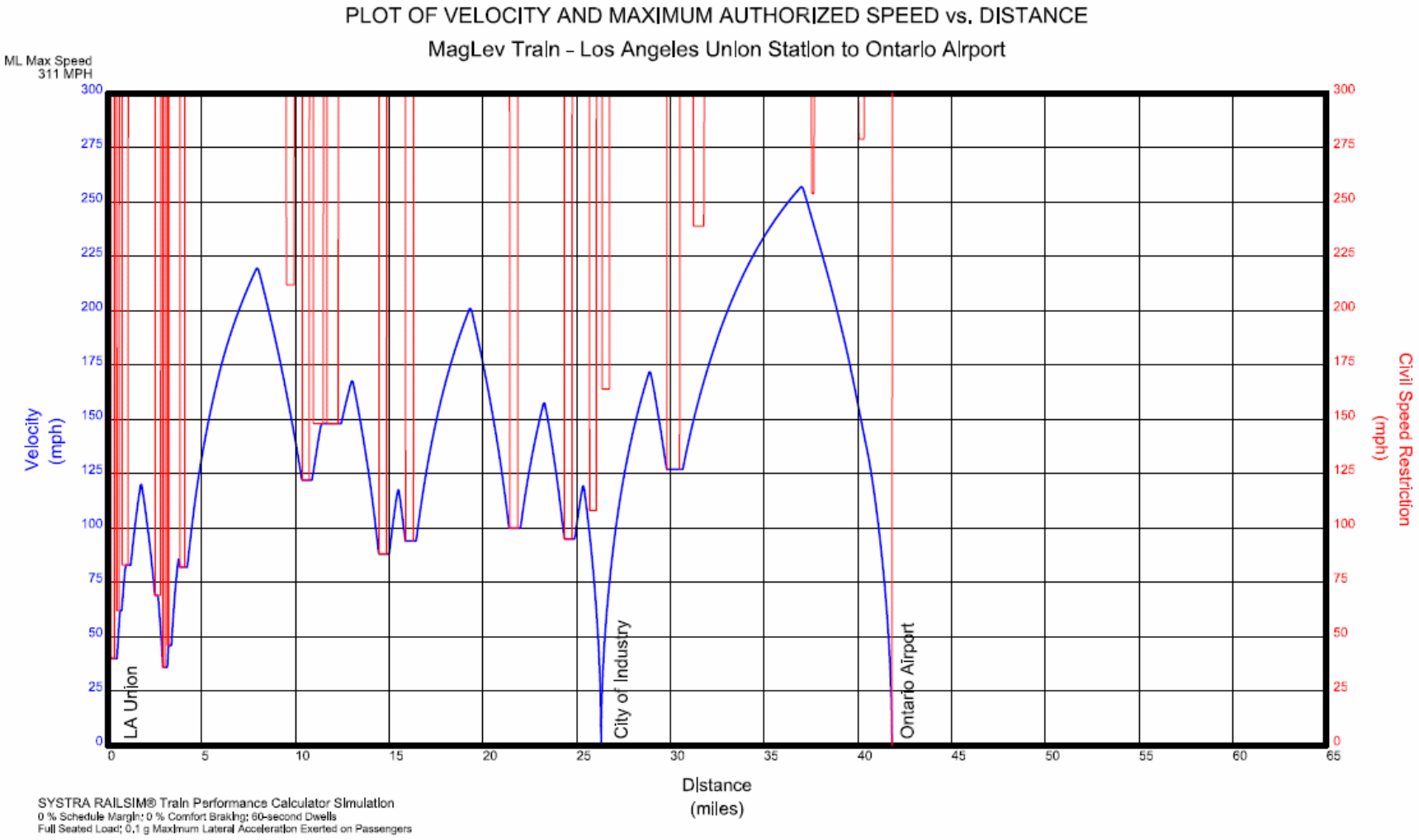


Figure 3.6 Speed Profile, Steel-Wheel on UPRR Alignment from LA Union Station to Ontario Airport, Eastbound

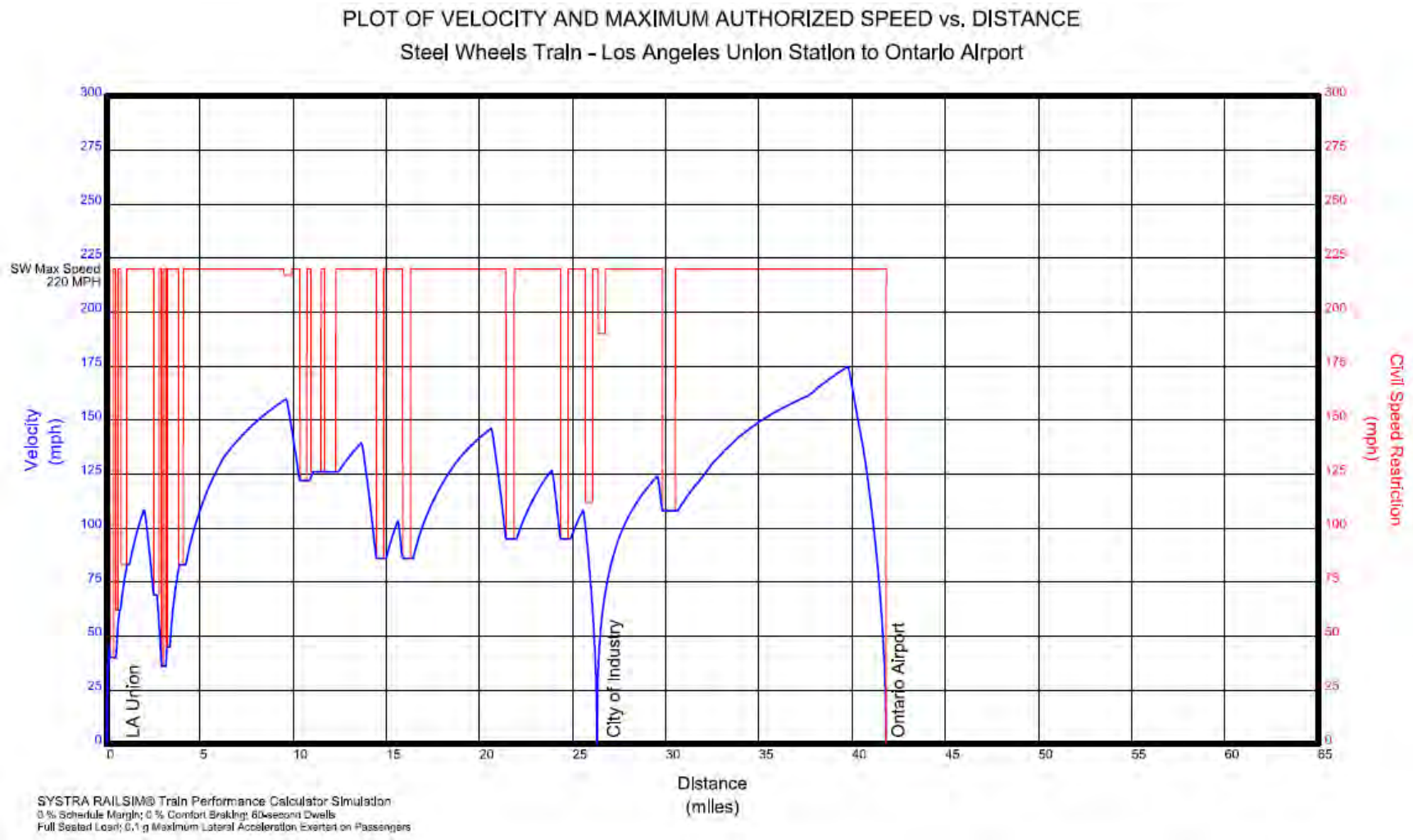


Figure 3.7 Speed Profile, Maglev on UPRR Alignment from Ontario Airport to LA Union Station, Westbound

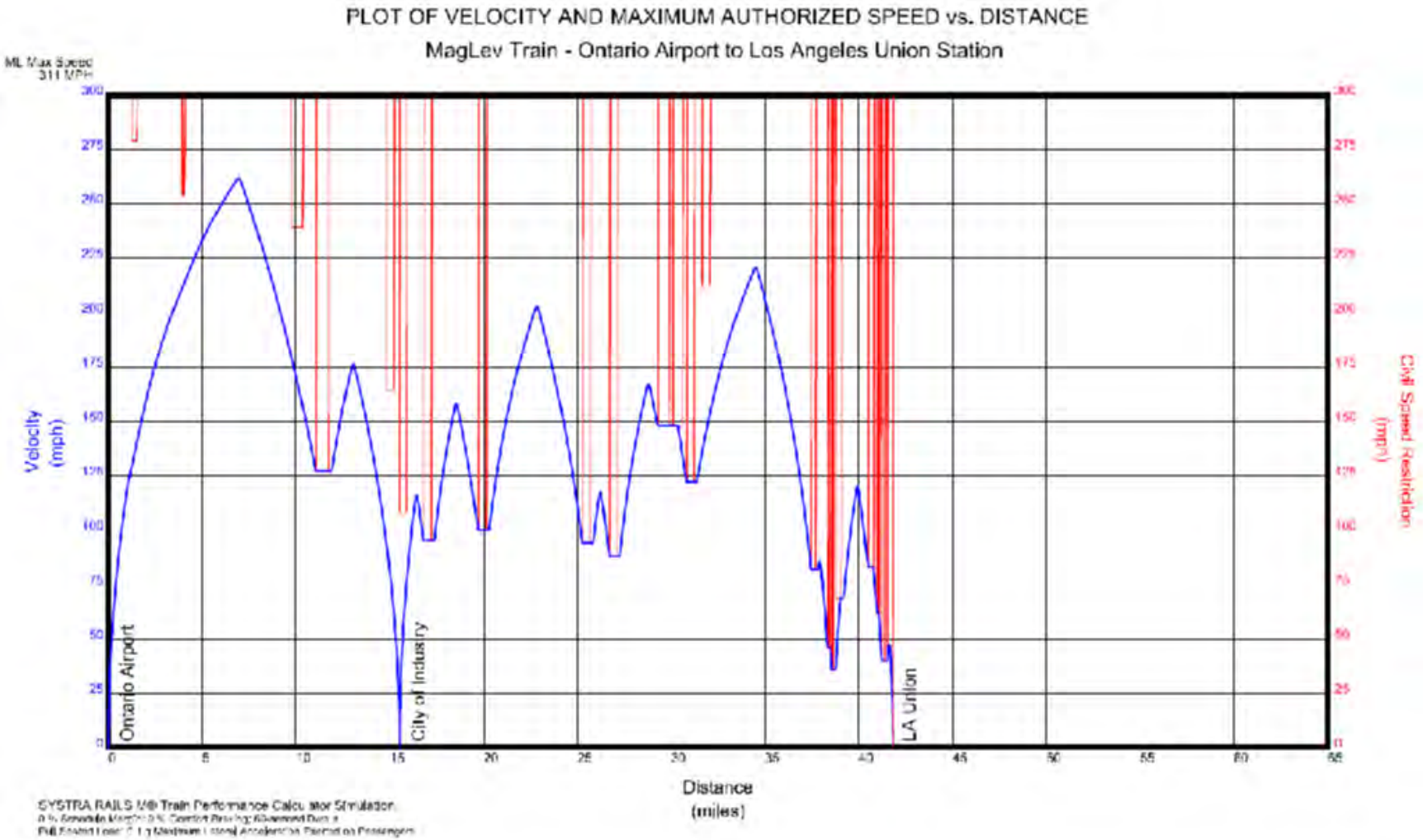
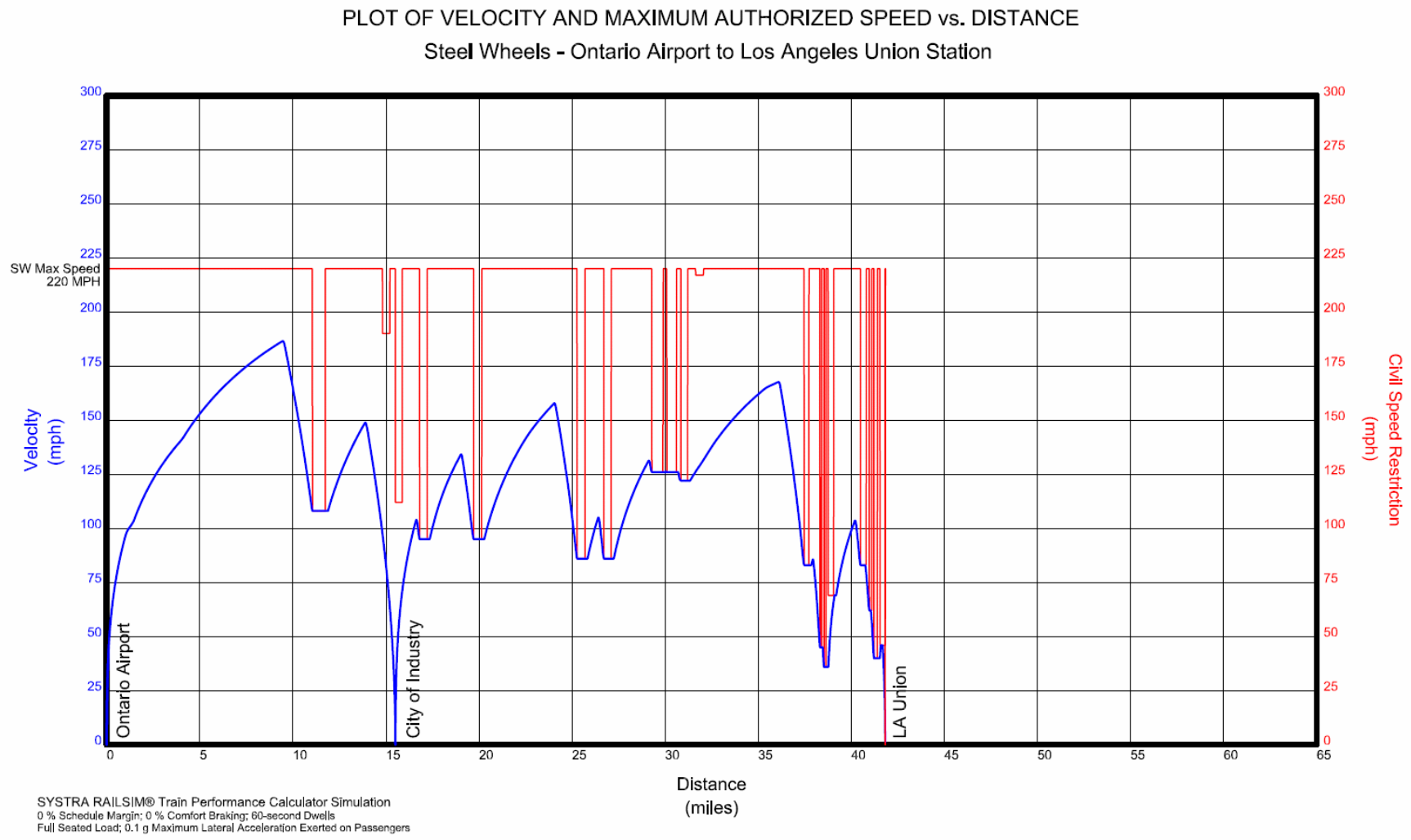


Figure 3.8 Speed Profile, Steel-Wheel on UPRR Alignment from Ontario Airport to LA Union Station, Westbound



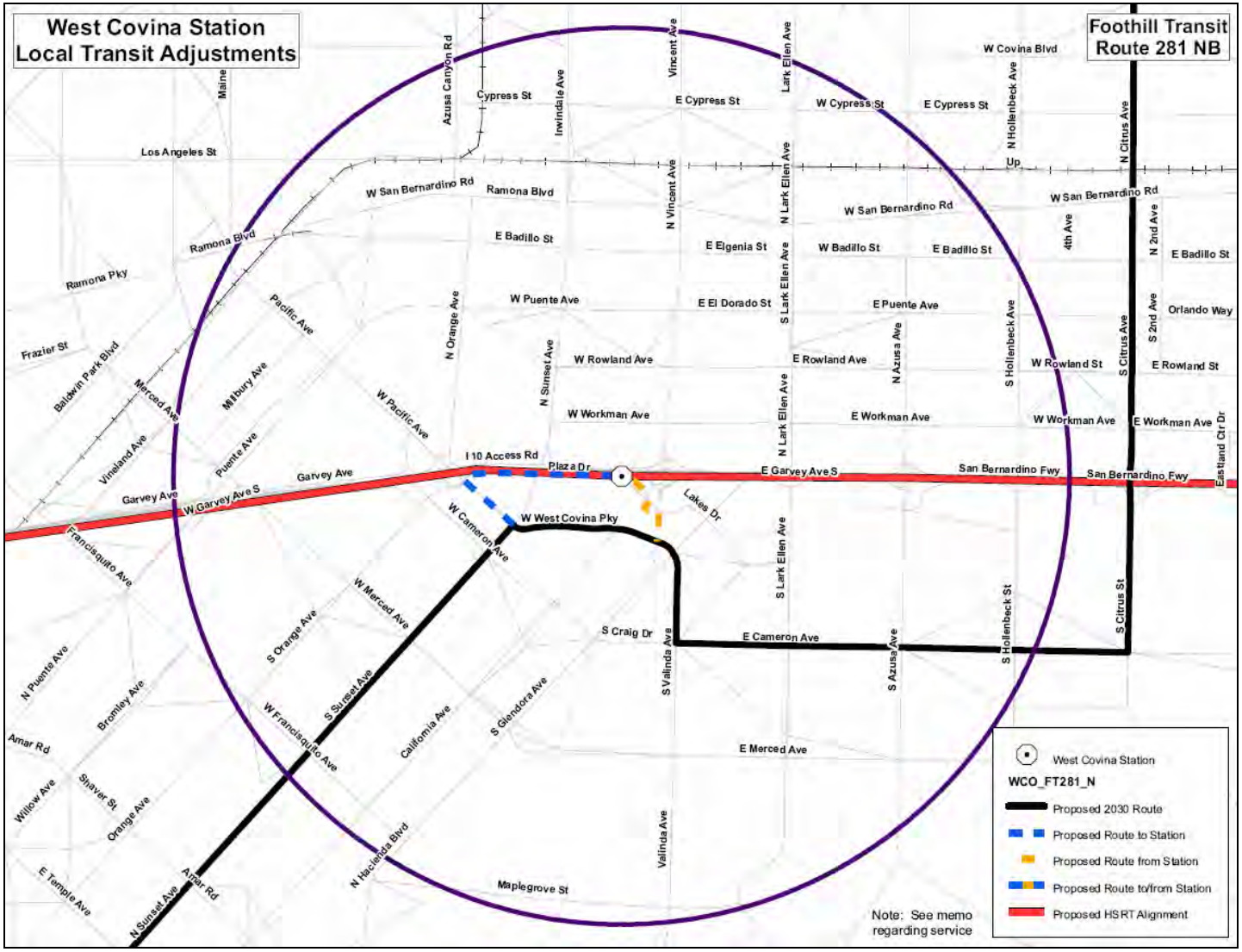
4.0 Local Transit Route Adjustments

This appendix shows the reroutings made to local transit services to serve the proposed West Covina, City of Industry, and Ontario Airport HSRT stations.

4.1 ADJUSTMENTS TO LOCAL TRANSIT – WEST COVINA

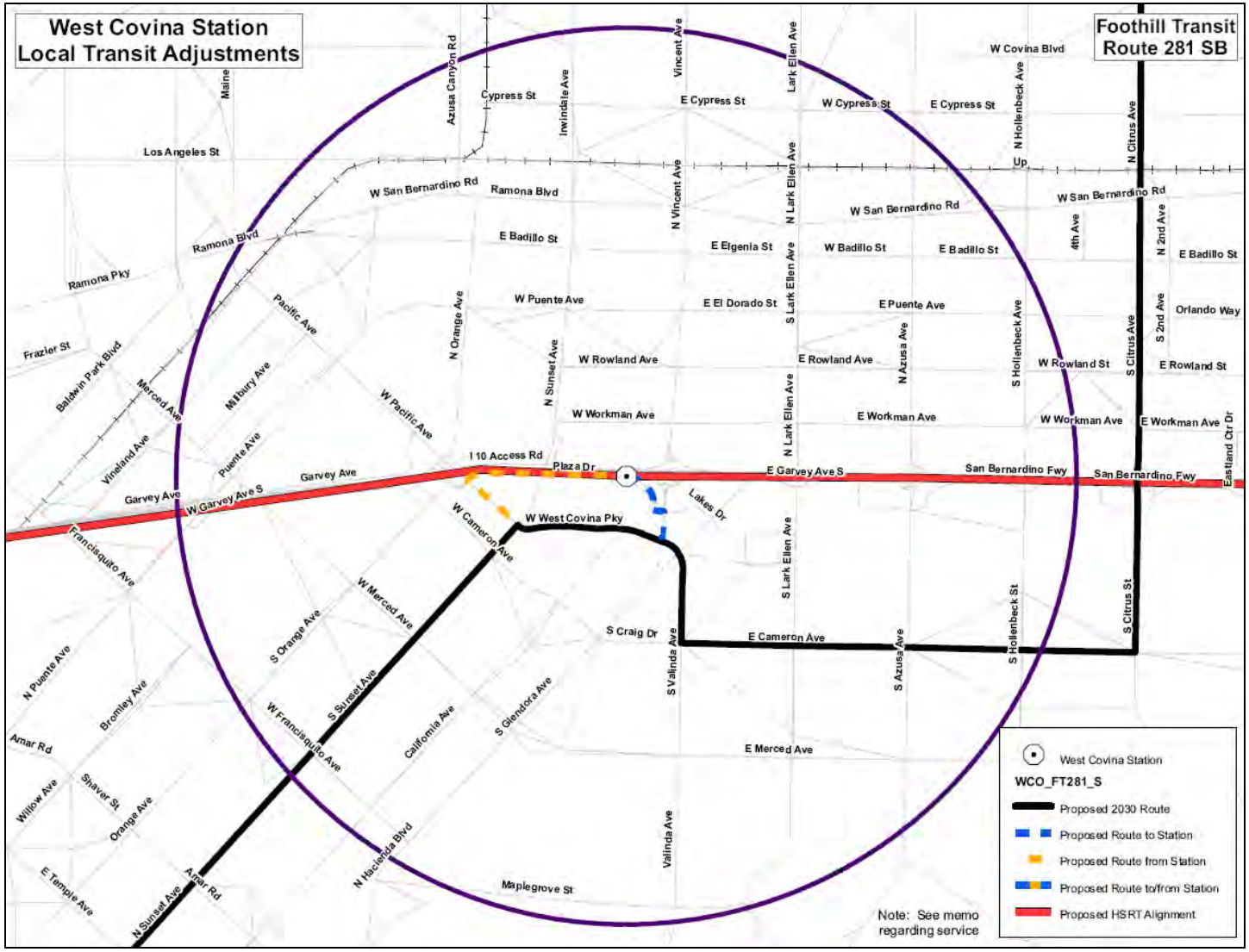
Year 2025 transit routes in the vicinity of the proposed West Covina HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 4.1 to Figure 4.42. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 4.1 Adjustment to Foothill Transit Route 281, Northbound



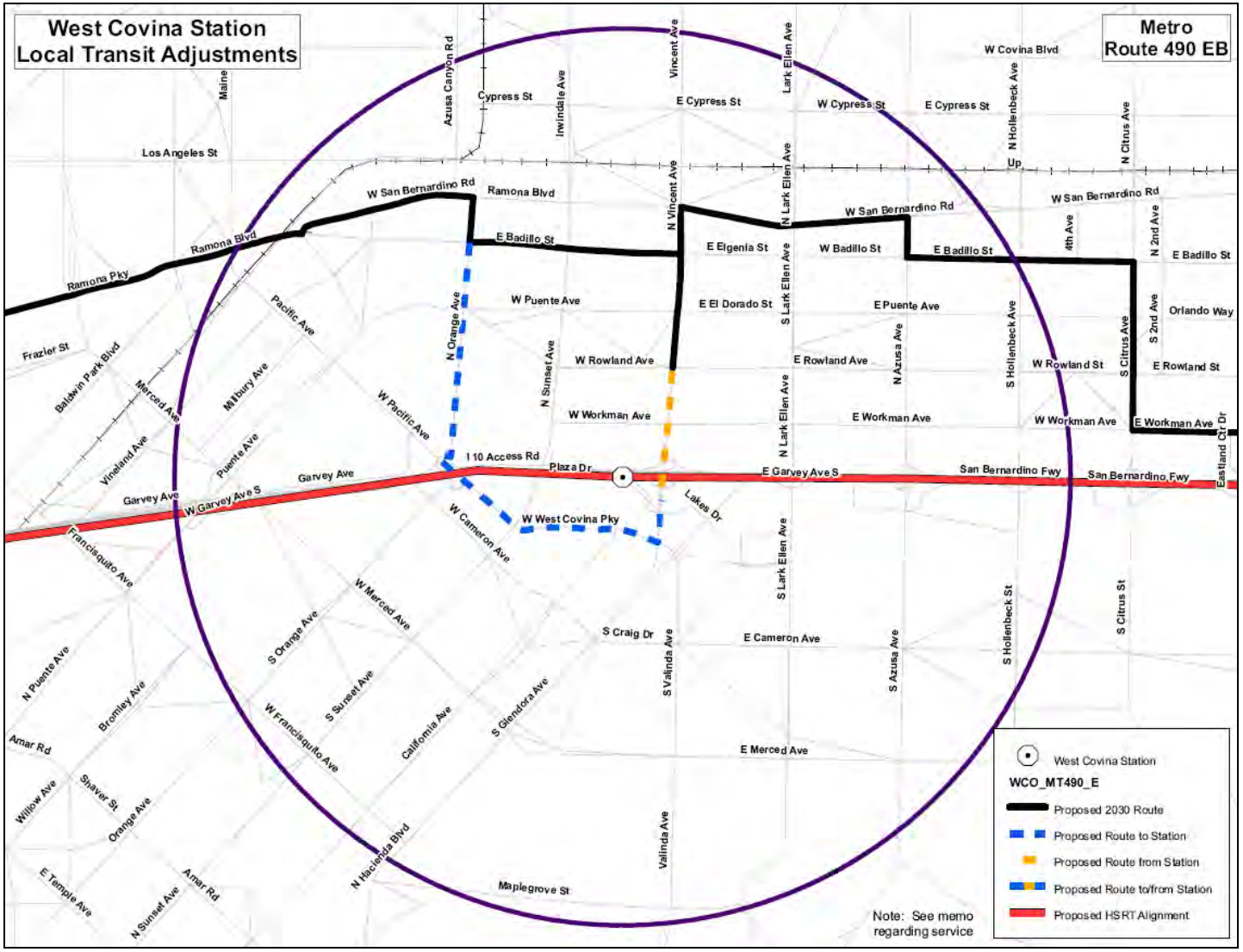
Source: SCAG Regional Travel Demand Model.

Figure 4.2 Adjustment to Foothill Transit Route 281, Southbound



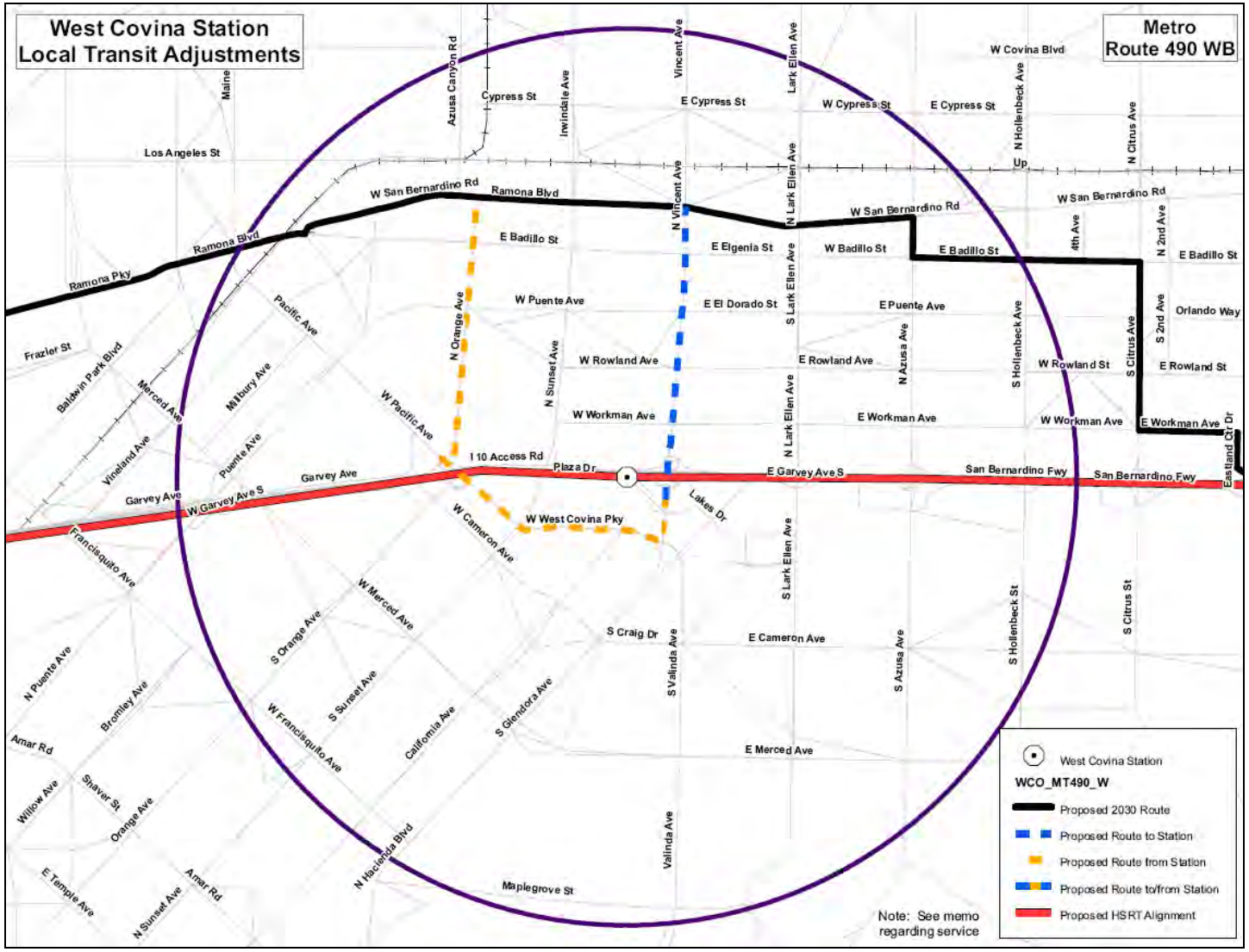
Source: SCAG Regional Travel Demand Model.

Figure 4.3 Adjustment to Metro Route 490, Eastbound



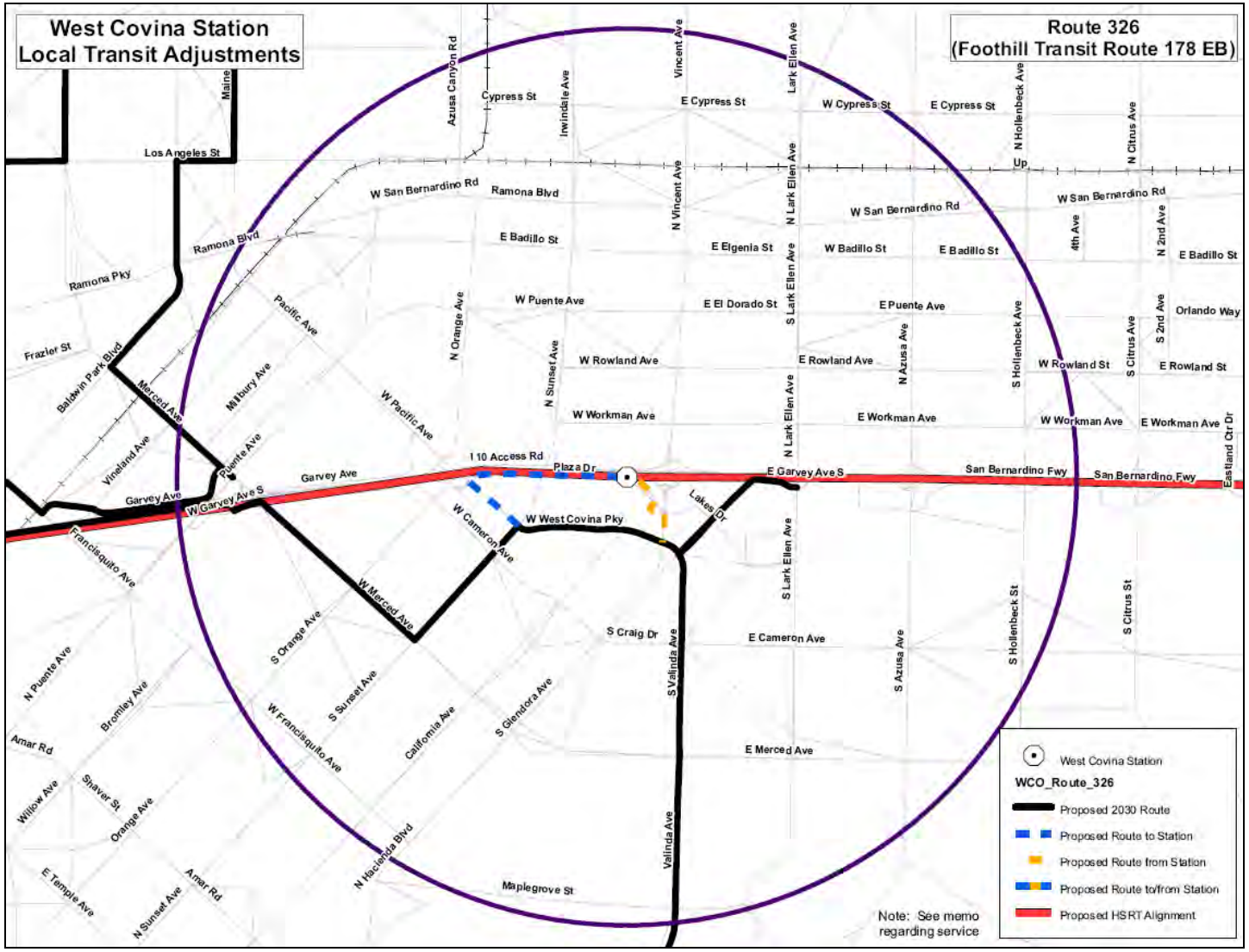
Source: SCAG Regional Travel Demand Model.

Figure 4.4 Adjustment to Metro Route 490, Westbound



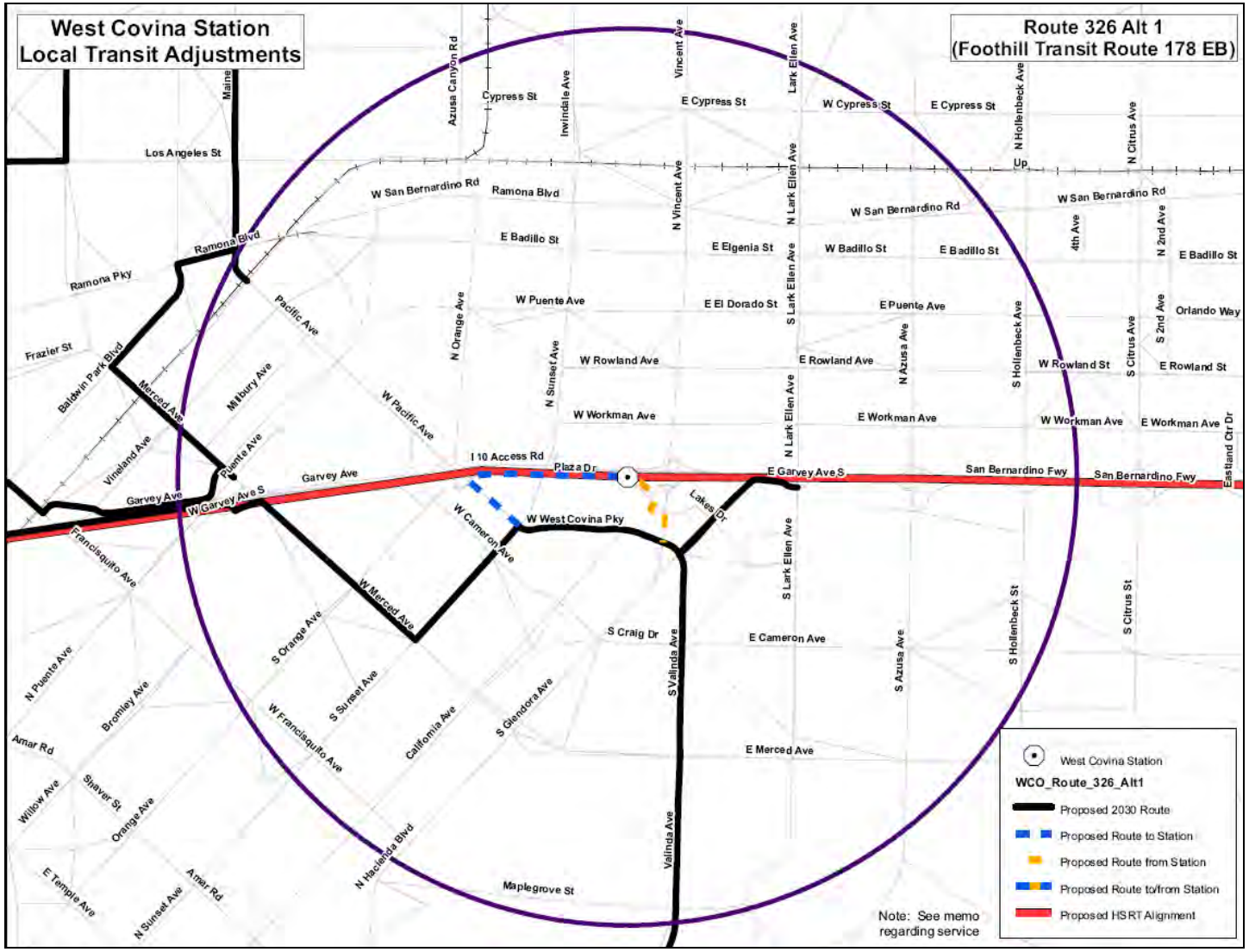
Source: SCAG Regional Travel Demand Model.

Figure 4.5 Adjustment to Foothill Transit Route 178, Eastbound



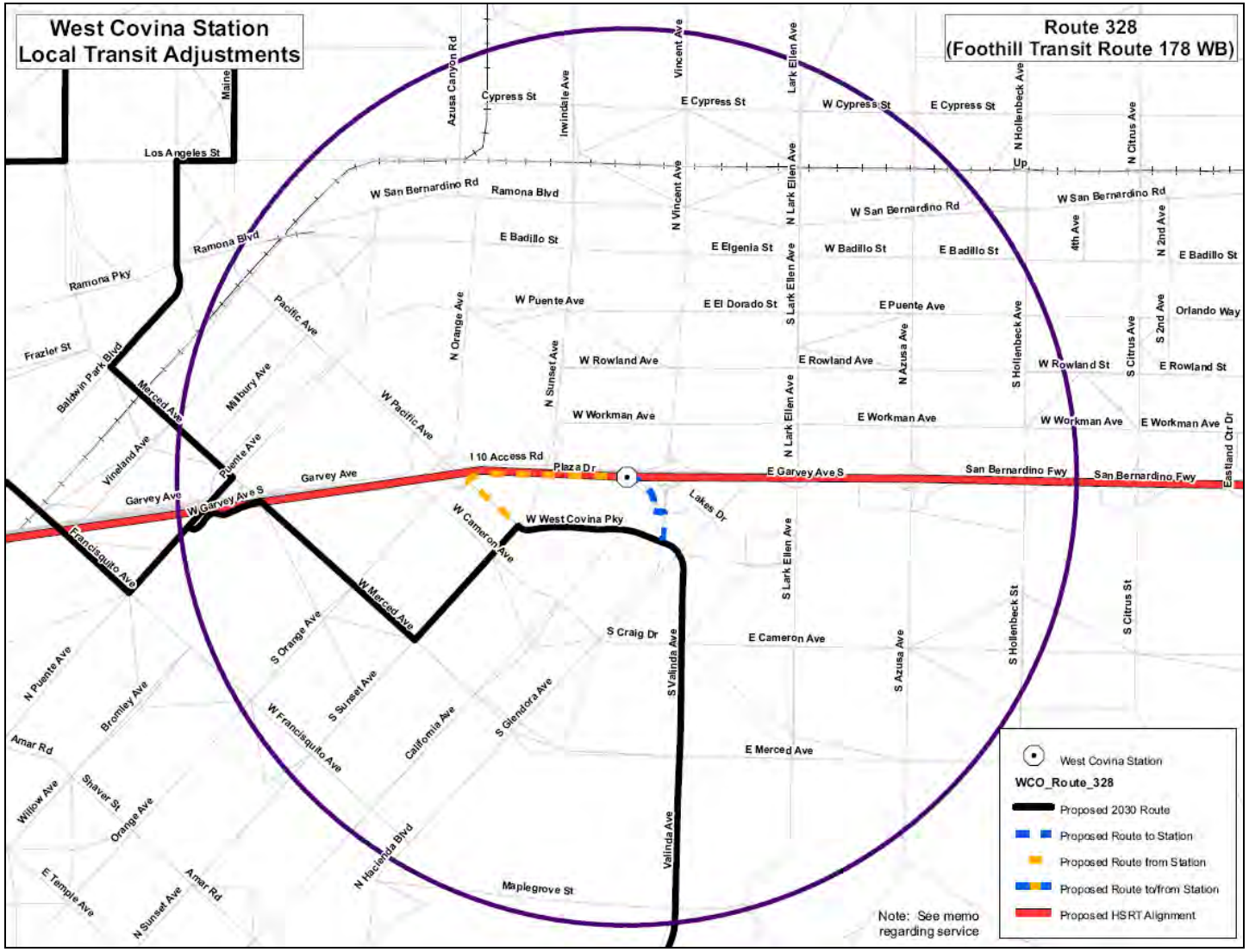
Source: SCAG Regional Travel Demand Model.

Figure 4.6 Adjustment to Foothill Transit Route 178, Eastbound



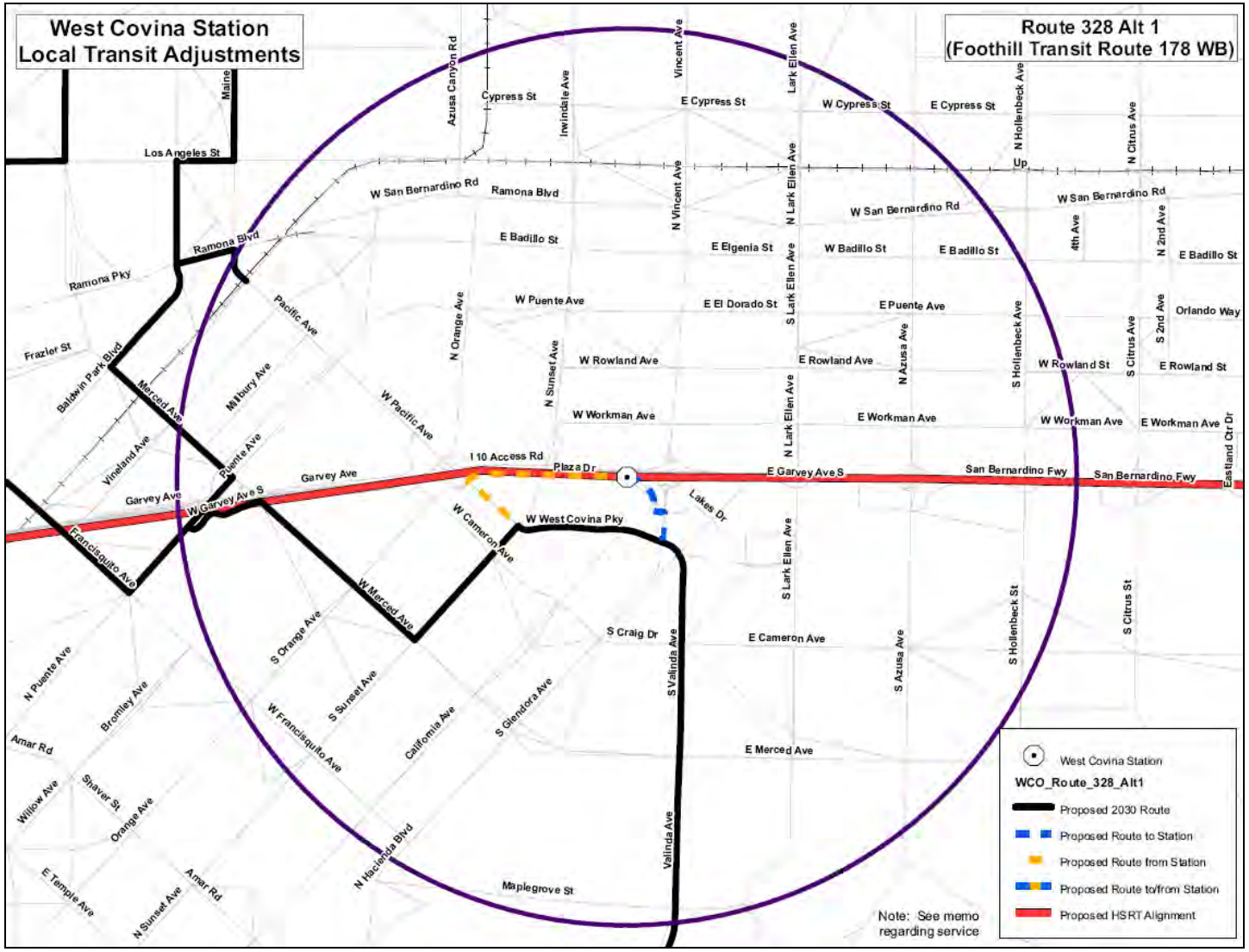
Source: SCAG Regional Travel Demand Model.

Figure 4.7 Adjustment to Foothill Transit Route 178, Westbound



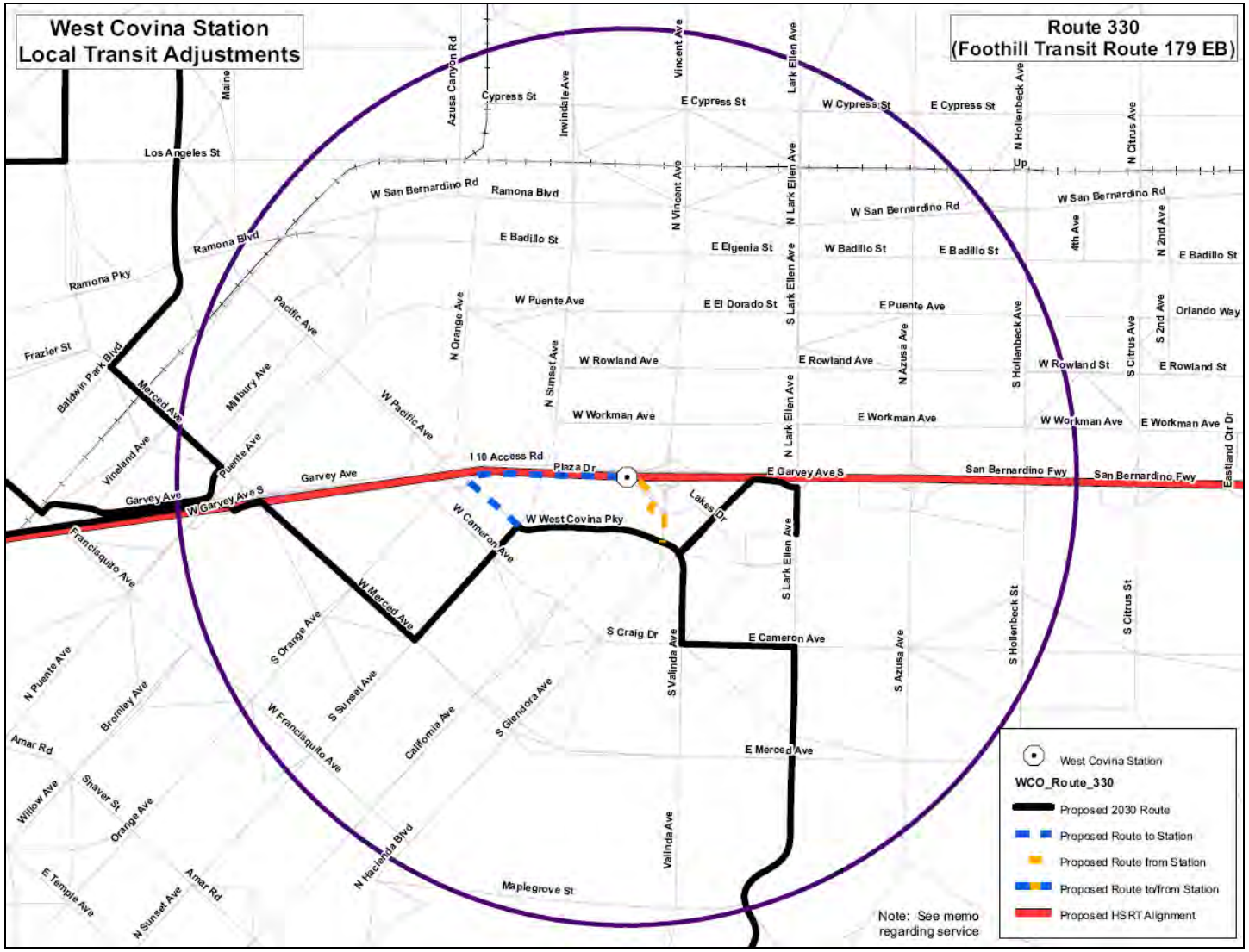
Source: SCAG Regional Travel Demand Model.

Figure 4.8 Adjustment to Foothill Transit Route 178, Westbound



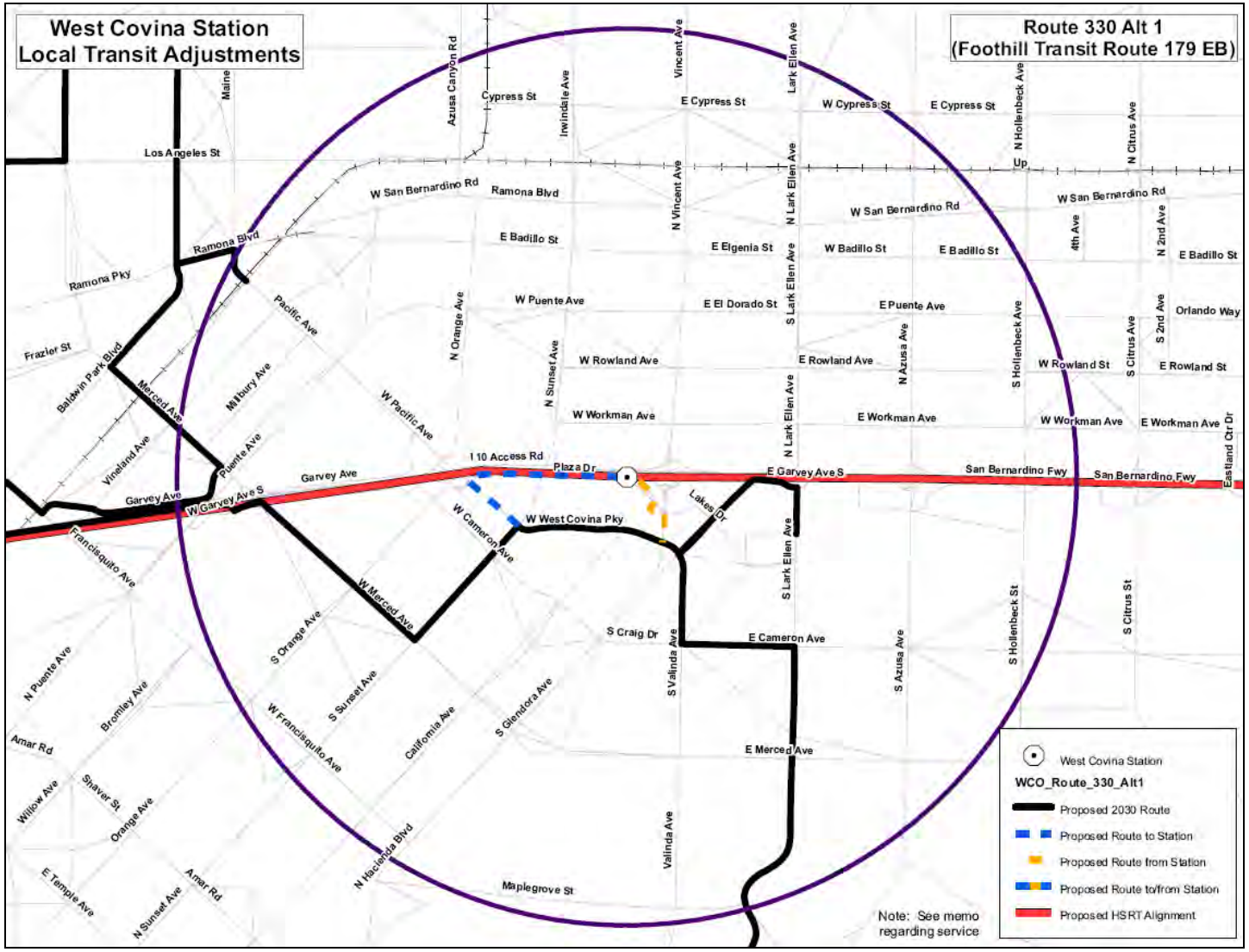
Source: SCAG Regional Travel Demand Model.

Figure 4.9 Adjustment to Foothill Transit Route 179, Eastbound



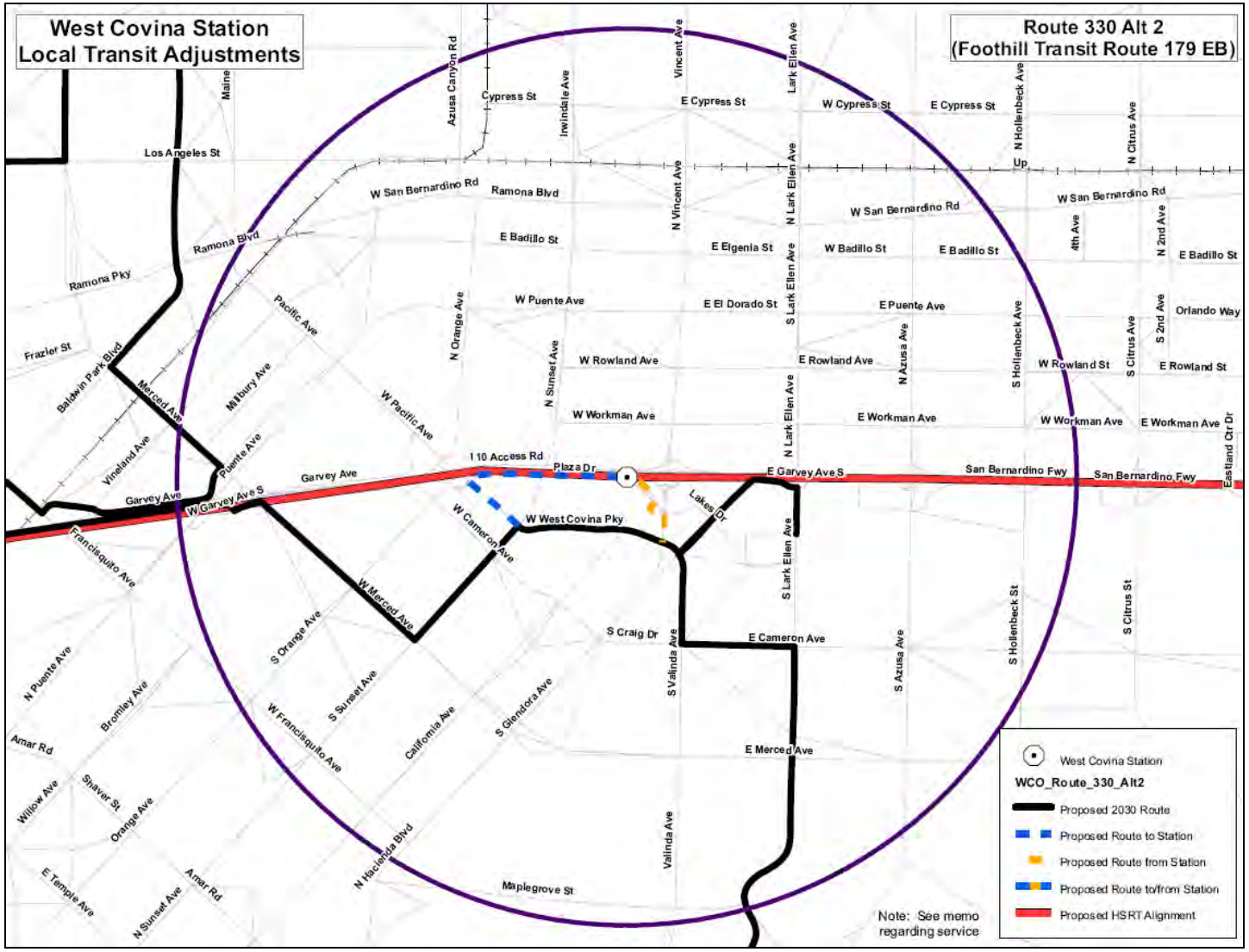
Source: SCAG Regional Travel Demand Model.

Figure 4.10 Adjustment to Foothill Transit Route 179, Eastbound



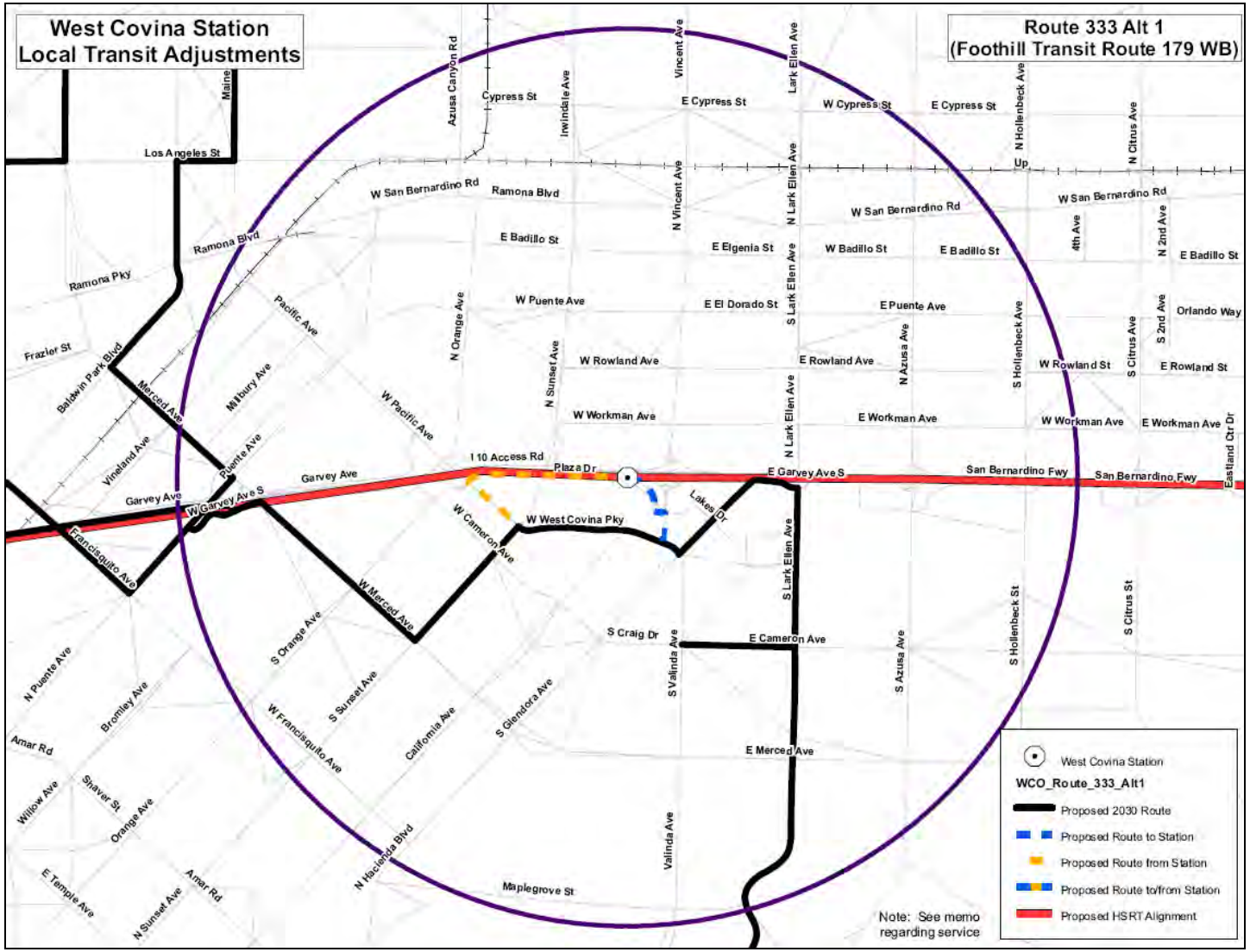
Source: SCAG Regional Travel Demand Model.

Figure 4.11 Adjustment to Foothill Transit Route 179, Eastbound



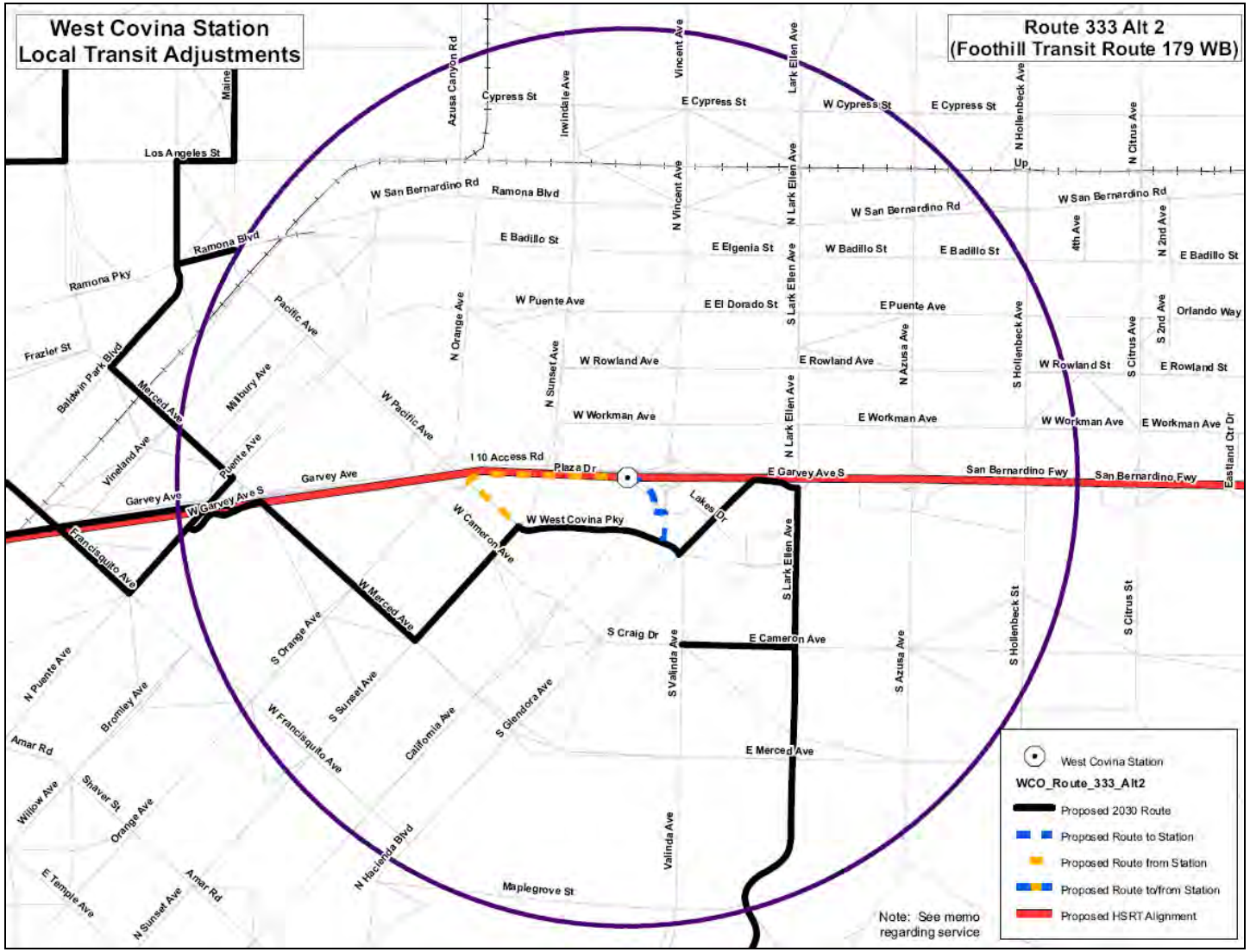
Source: SCAG Regional Travel Demand Model.

Figure 4.12 Adjustment to Foothill Transit Route 179, Westbound



Source: SCAG Regional Travel Demand Model.

Figure 4.13 Adjustment to Foothill Transit Route 179, Westbound



Source: SCAG Regional Travel Demand Model.

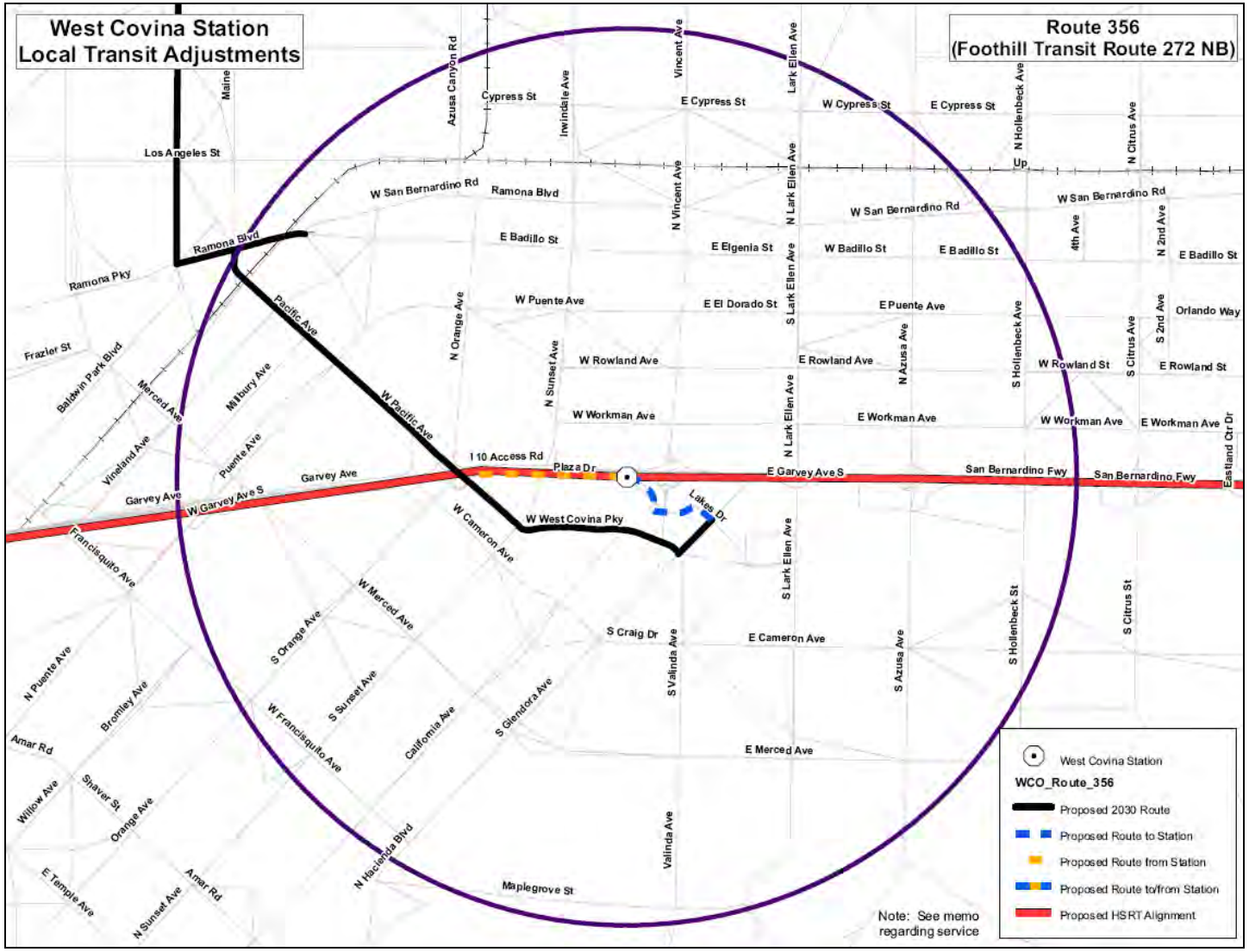
Figure 4.14 Adjustment to Foothill Transit Route 185, Northbound

Source: SCAG Regional Travel Demand Model.

Figure 4.15 Adjustment to Foothill Transit Route 185, Southbound

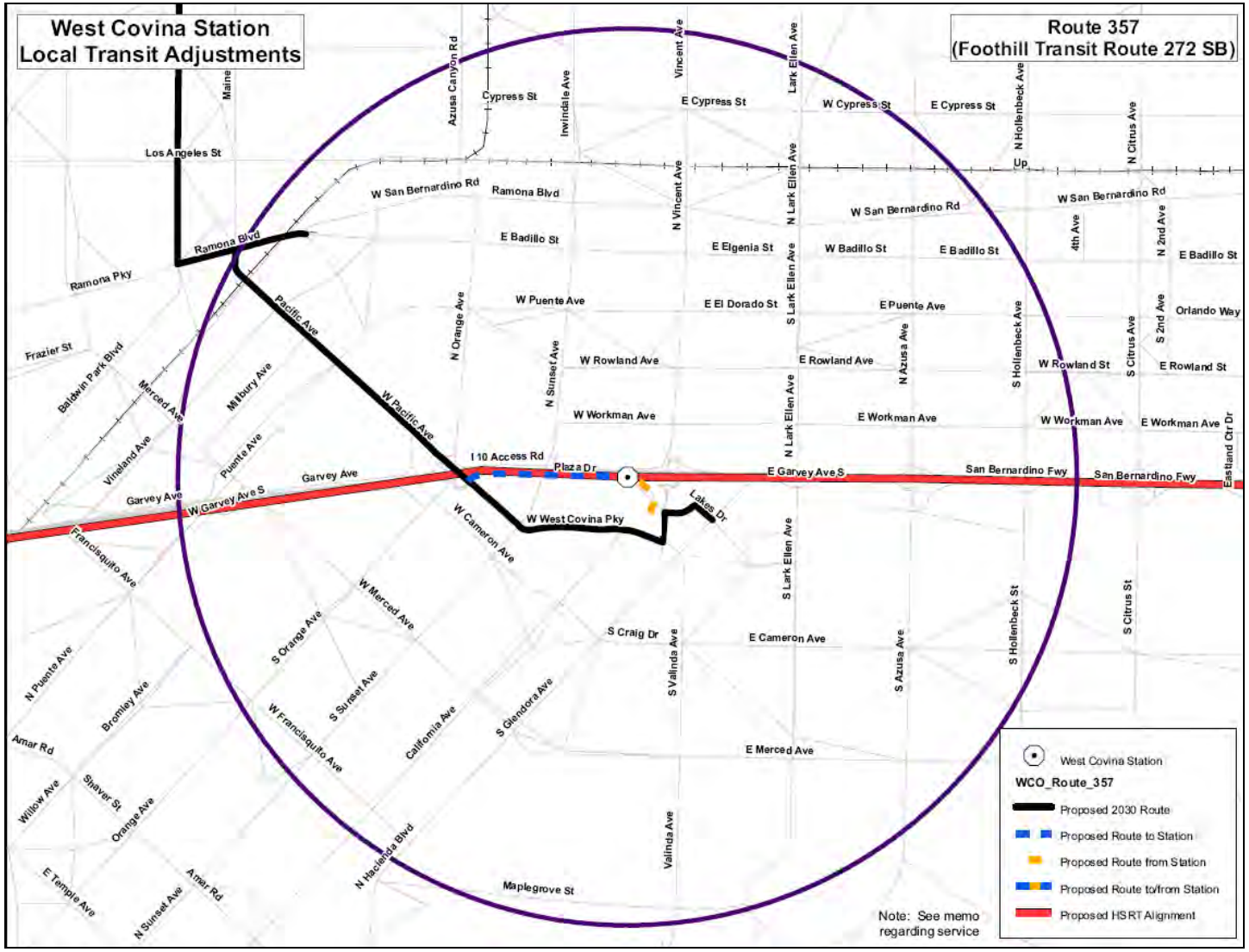
Source: SCAG Regional Travel Demand Model.

Figure 4.16 Adjustment to Foothill Transit Route 272, Northbound



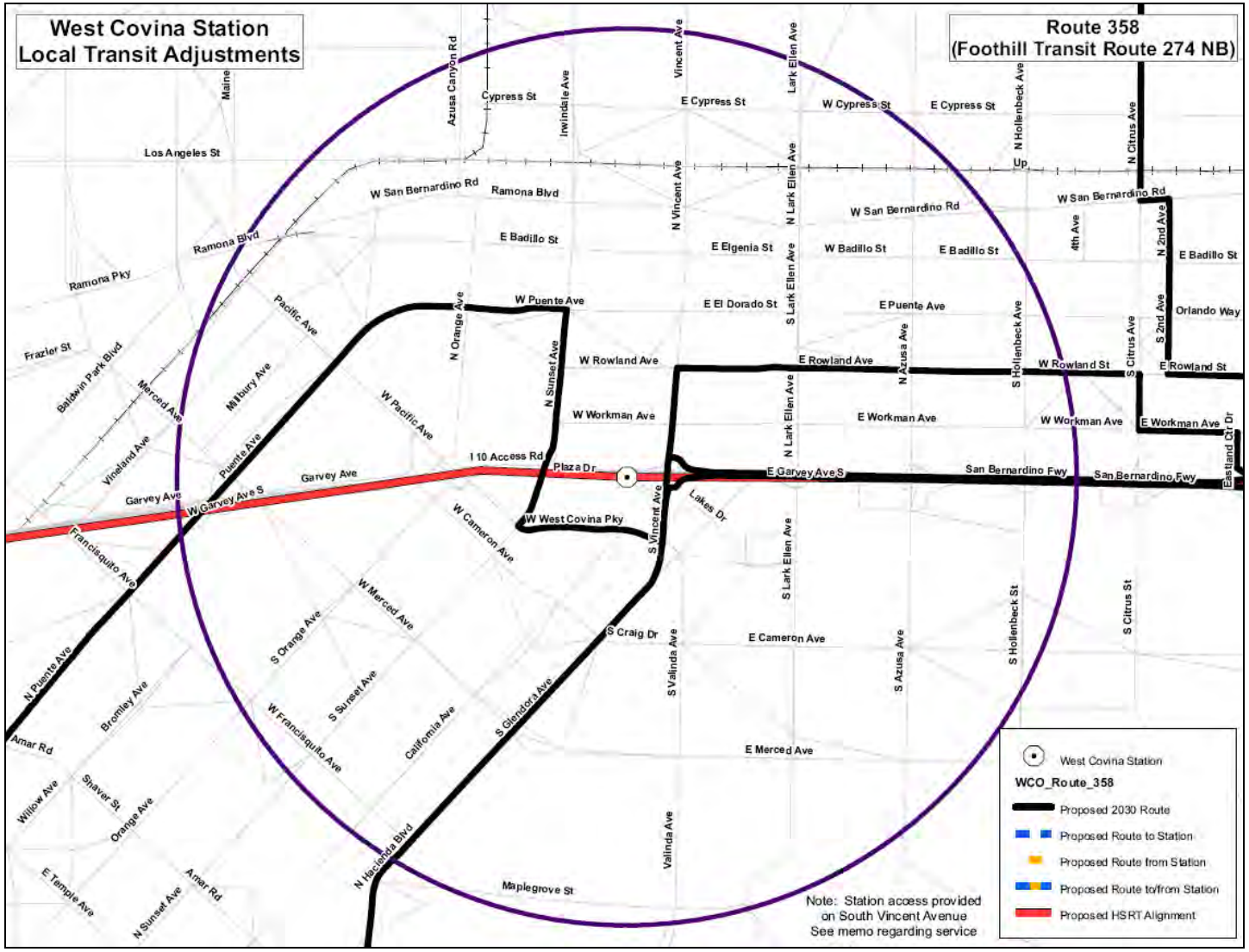
Source: SCAG Regional Travel Demand Model.

Figure 4.17 Adjustment to Foothill Transit Route 272, Southbound



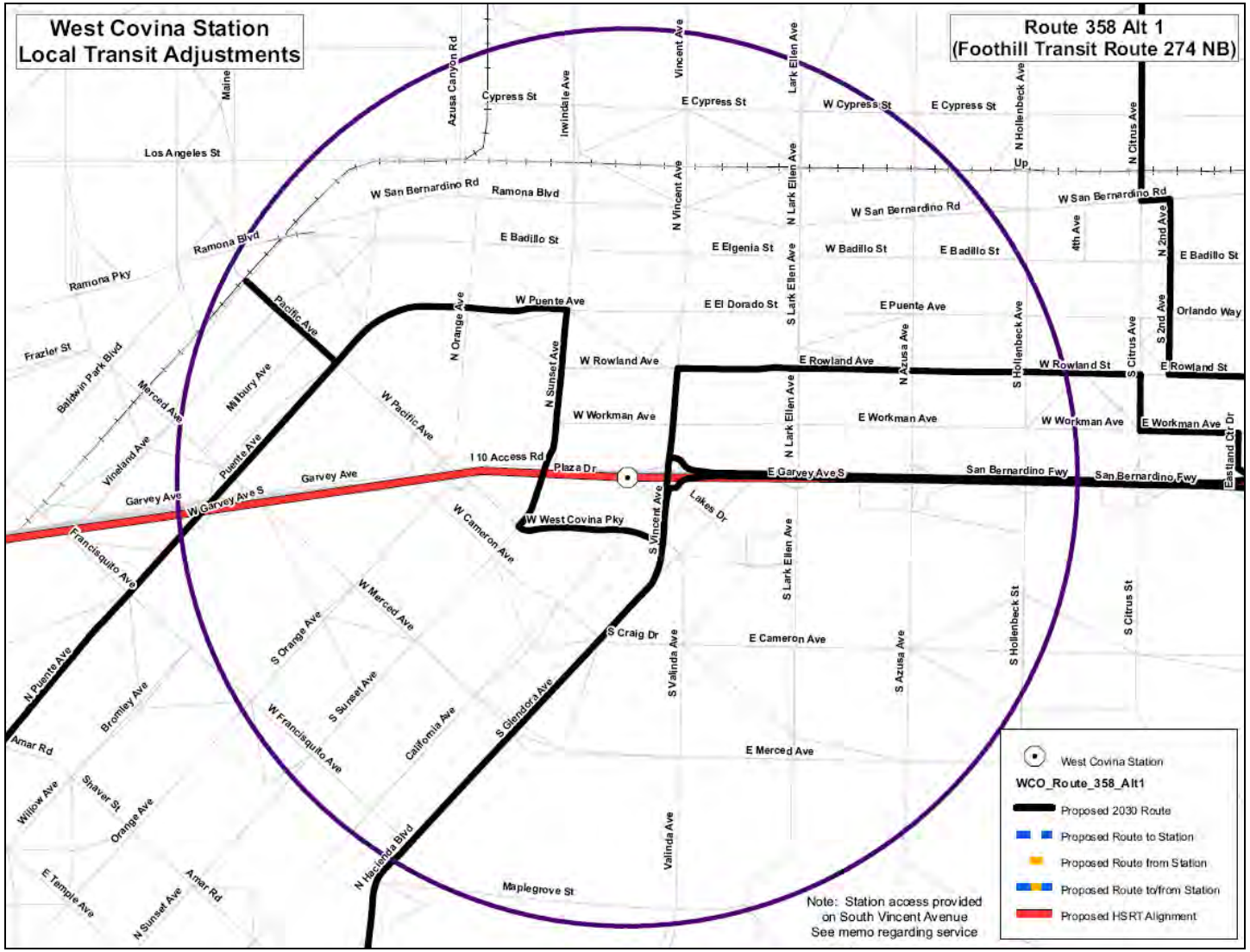
Source: SCAG Regional Travel Demand Model.

Figure 4.18 Adjustment to Foothill Transit Route 274, Northbound



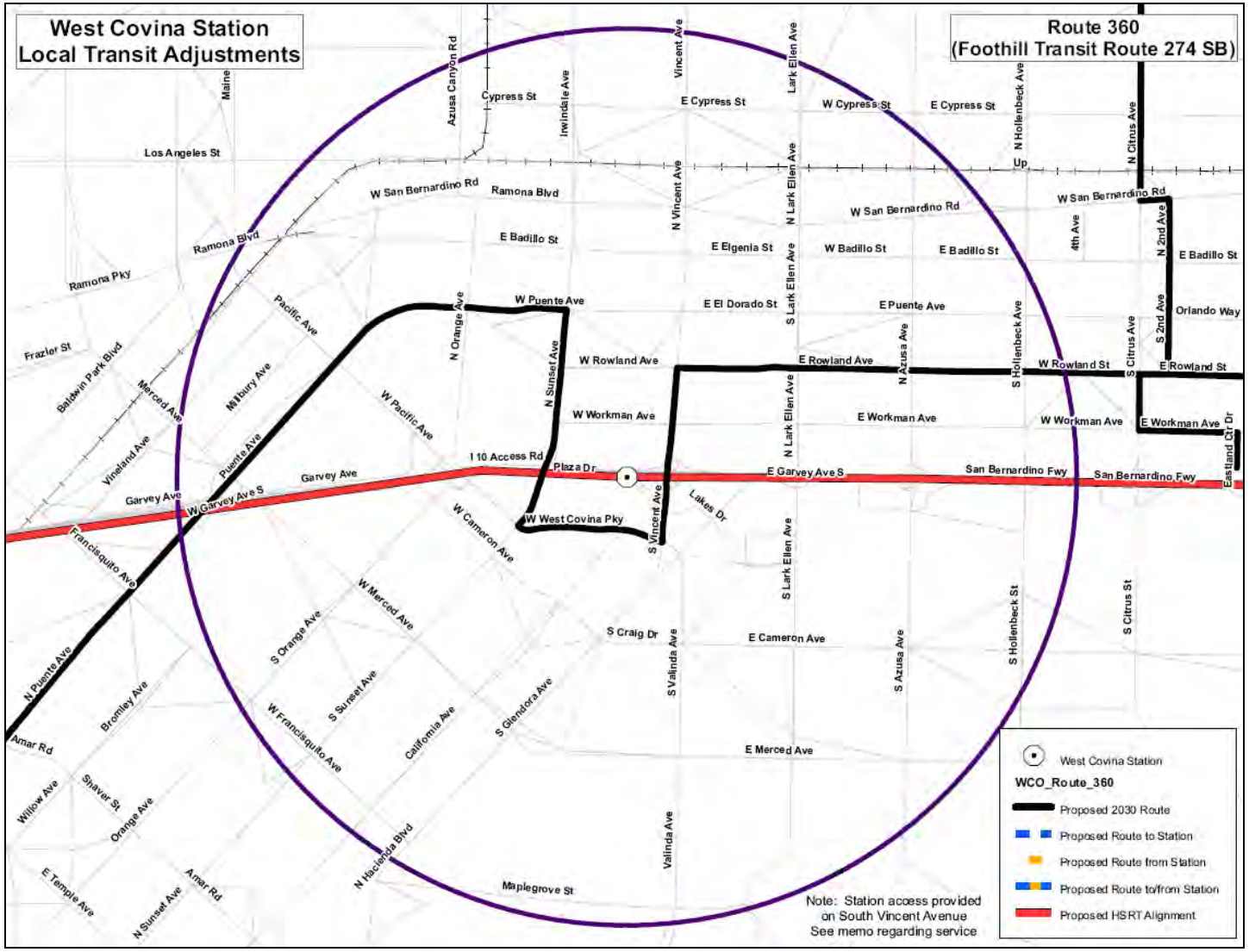
Source: SCAG Regional Travel Demand Model.

Figure 4.19 Adjustment to Foothill Transit Route 274, Northbound



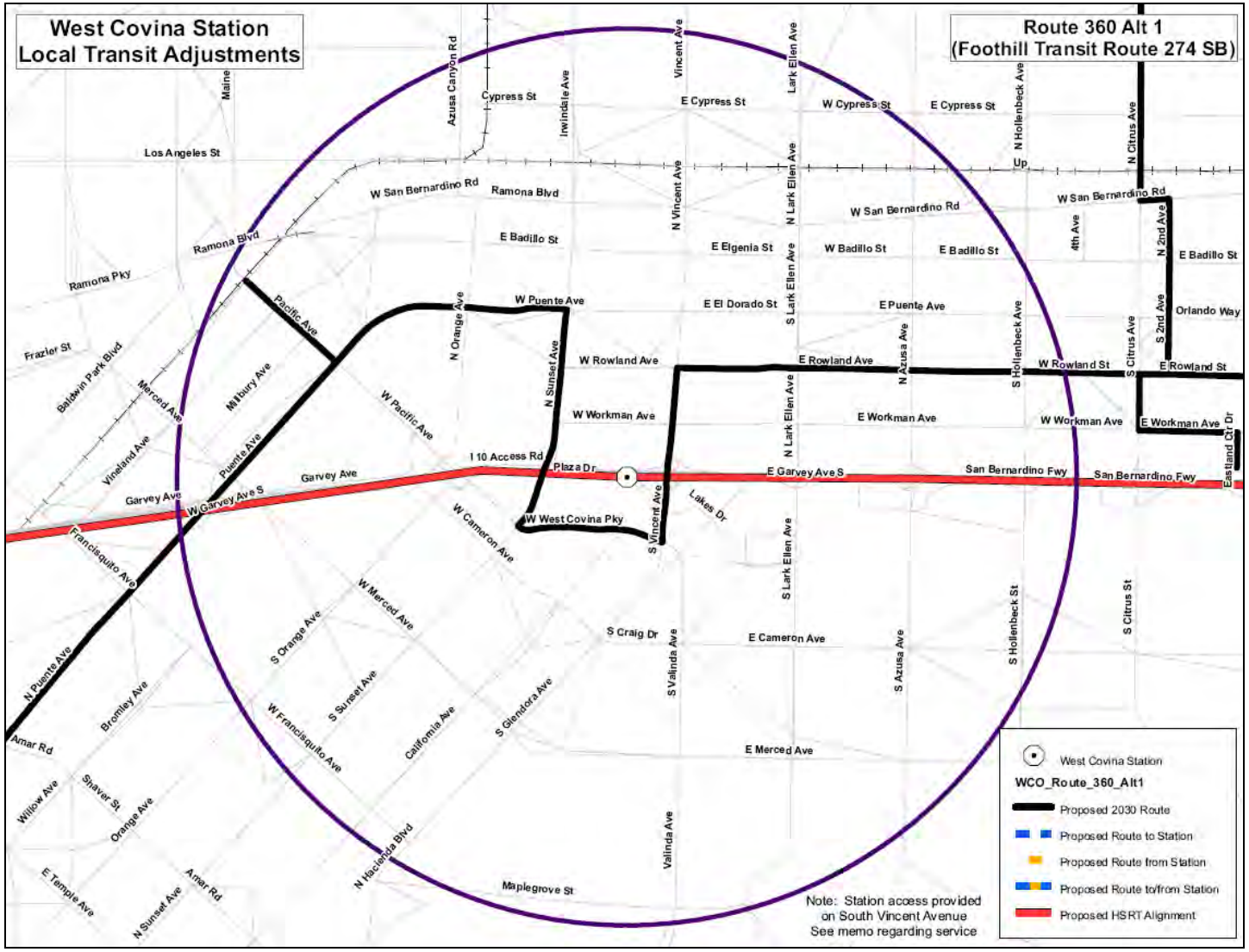
Source: SCAG Regional Travel Demand Model.

Figure 4.20 Adjustment to Foothill Transit Route 274, Southbound



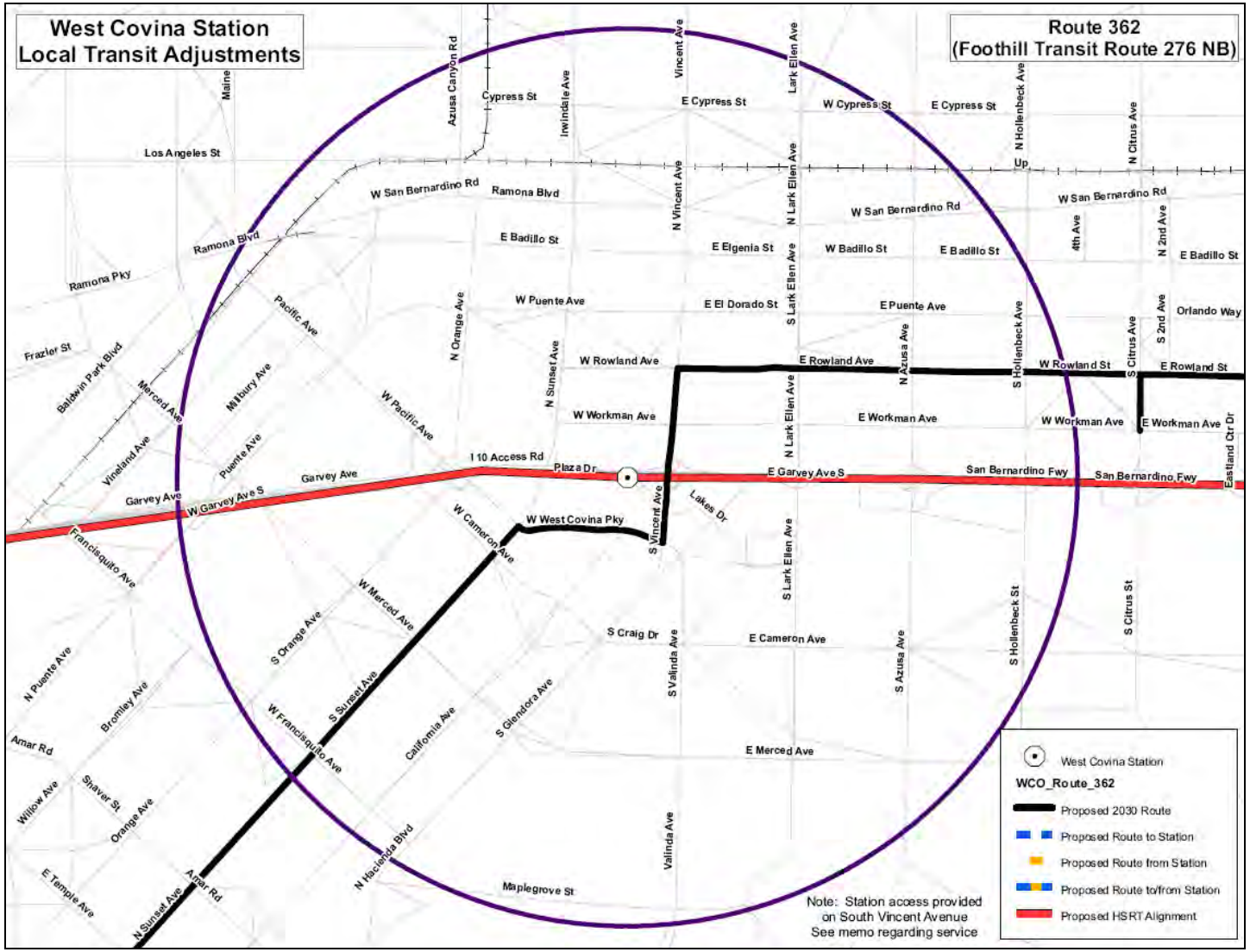
Source: SCAG Regional Travel Demand Model.

Figure 4.21 Adjustment to Foothill Transit Route 274, Southbound



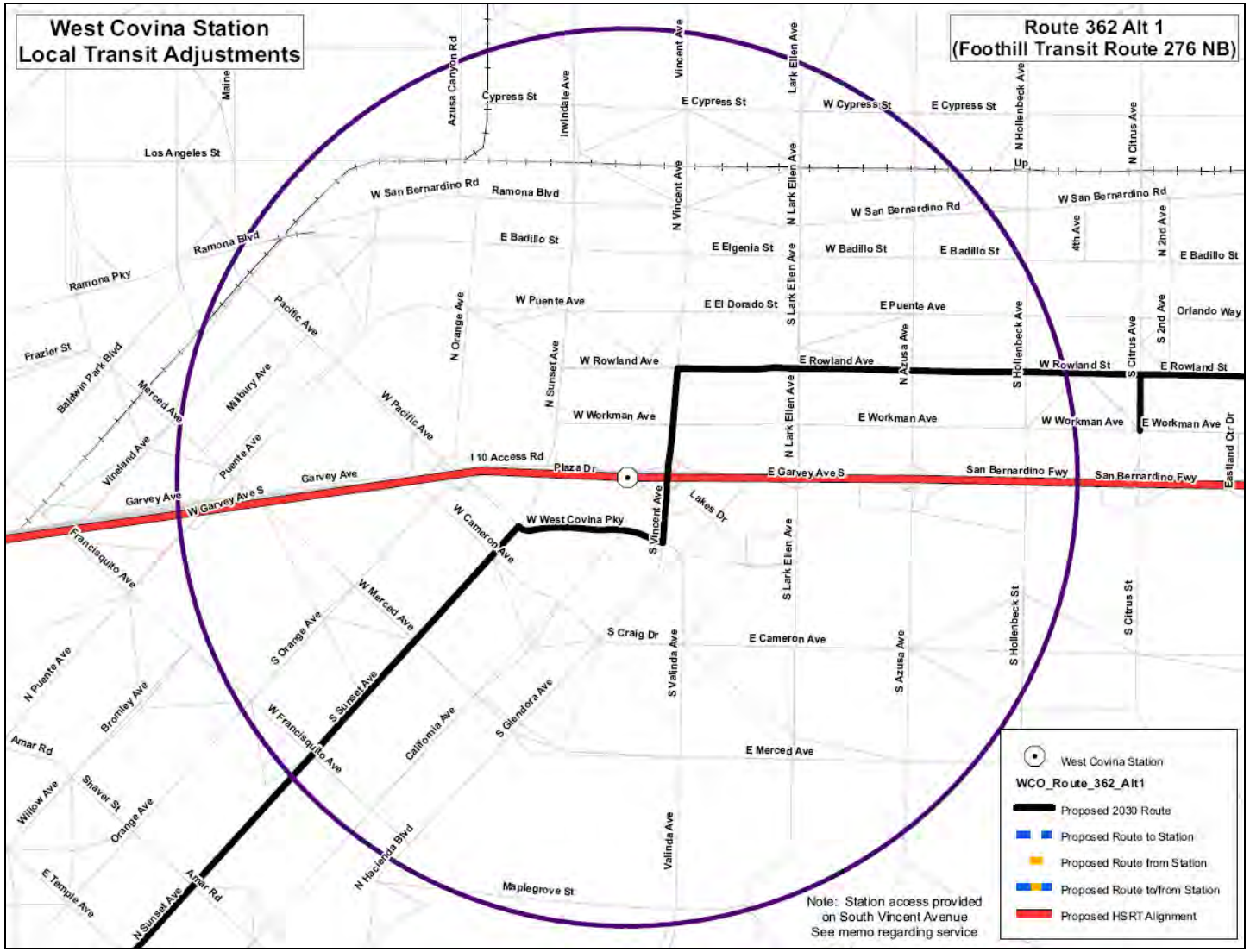
Source: SCAG Regional Travel Demand Model.

Figure 4.22 Adjustment to Foothill Transit Route 276, Northbound



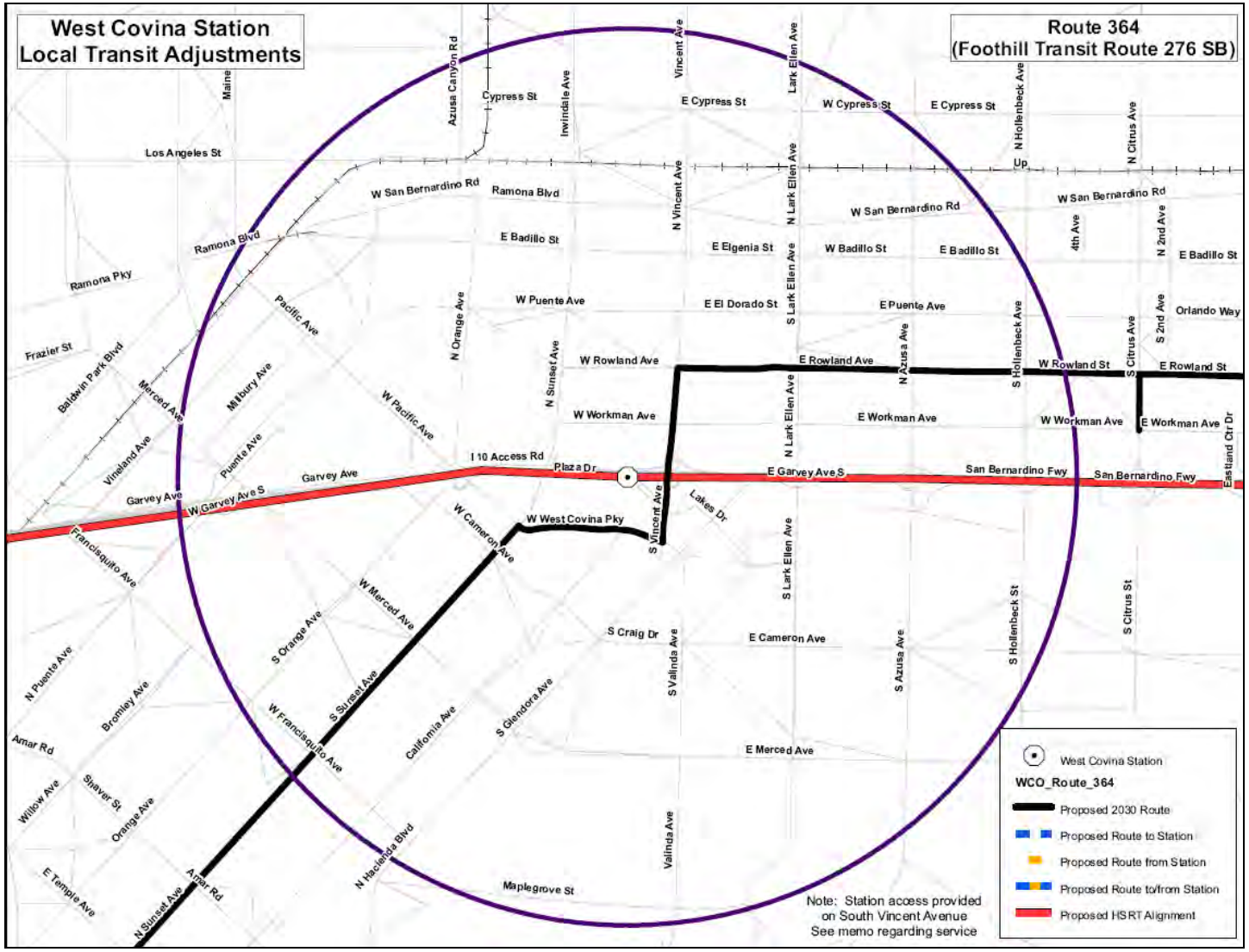
Source: SCAG Regional Travel Demand Model.

Figure 4.23 Adjustment to Foothill Transit Route 276, Northbound



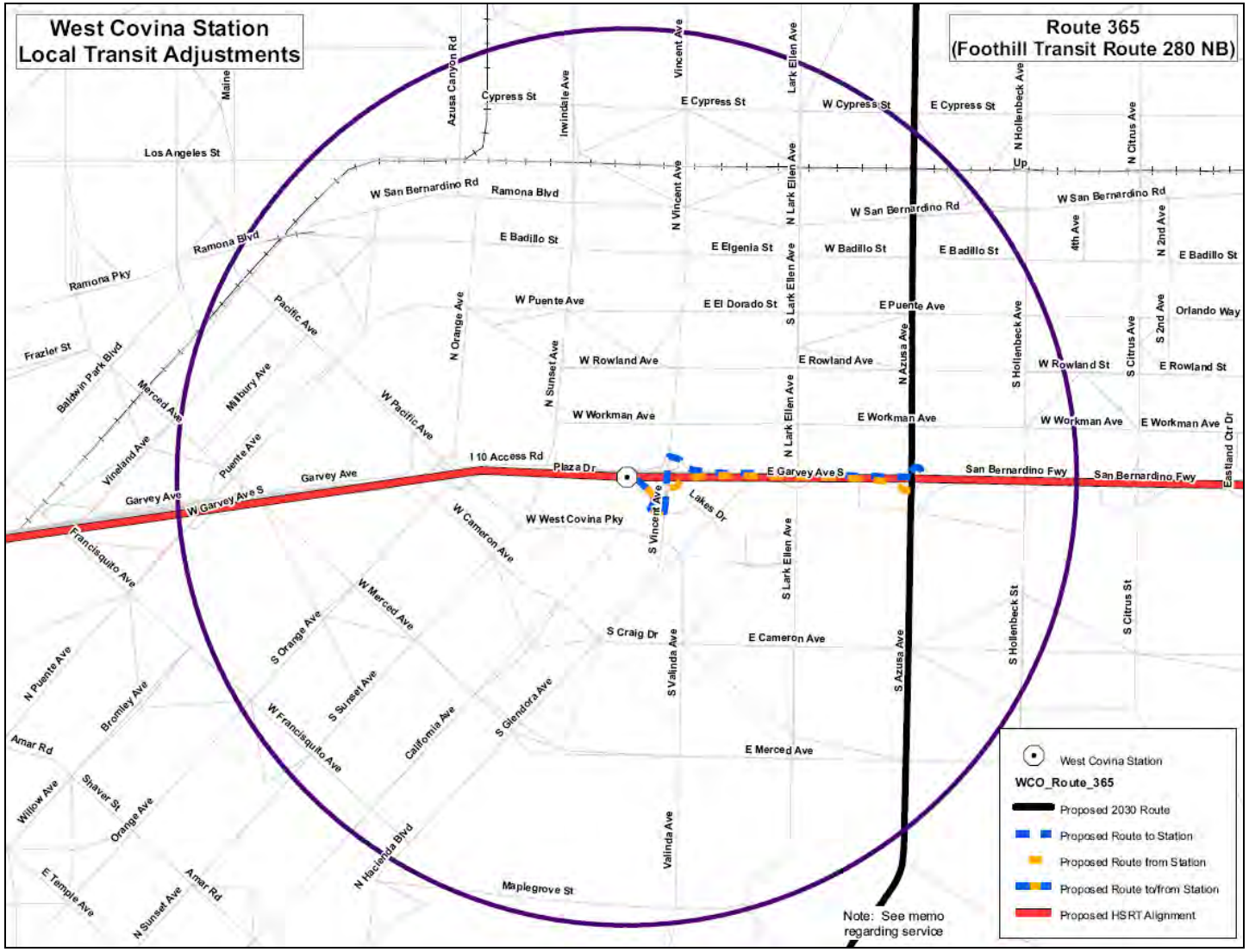
Source: SCAG Regional Travel Demand Model.

Figure 4.24 Adjustment to Foothill Transit Route 276, Southbound



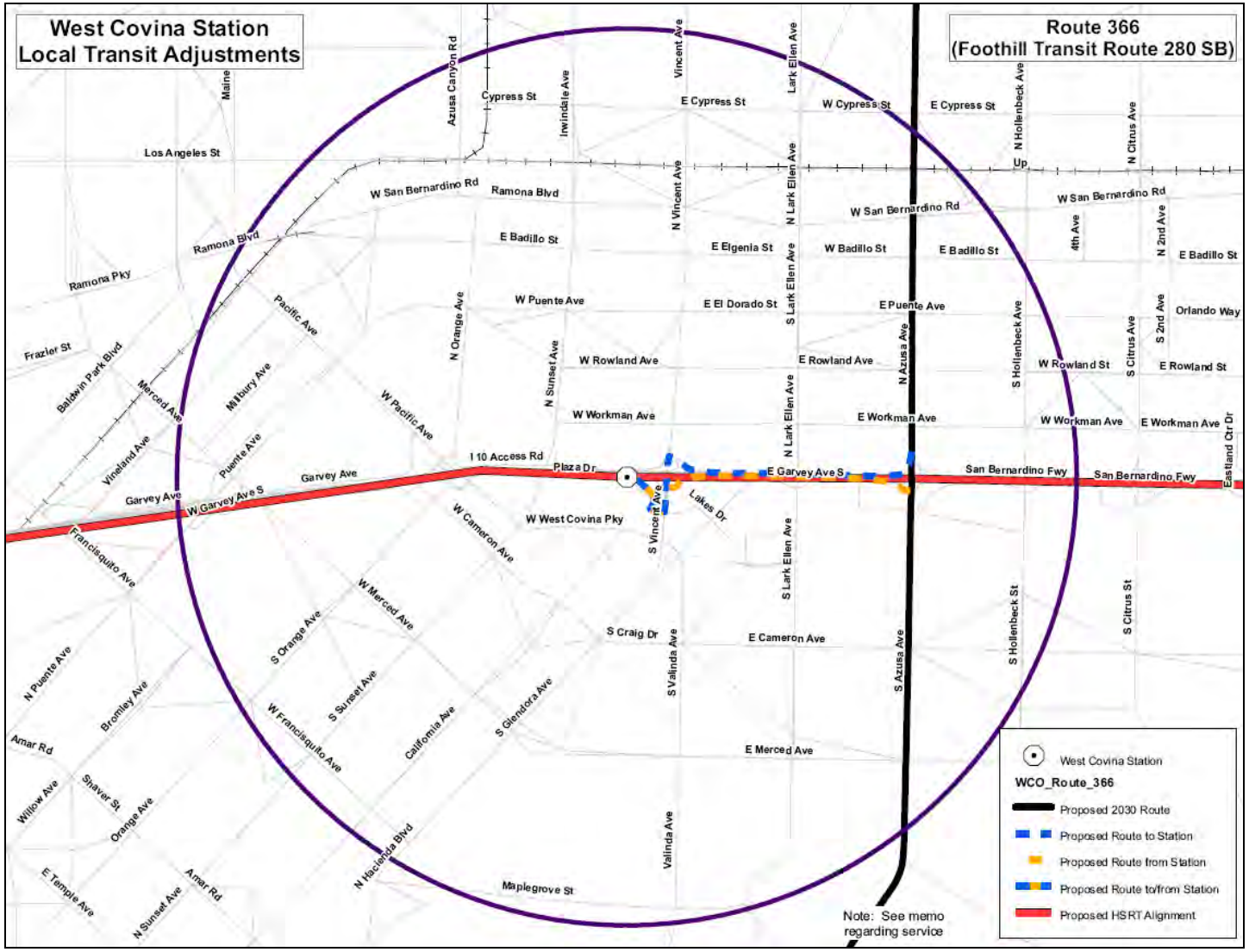
Source: SCAG Regional Travel Demand Model.

Figure 4.25 Adjustment to Foothill Transit Route 280, Northbound



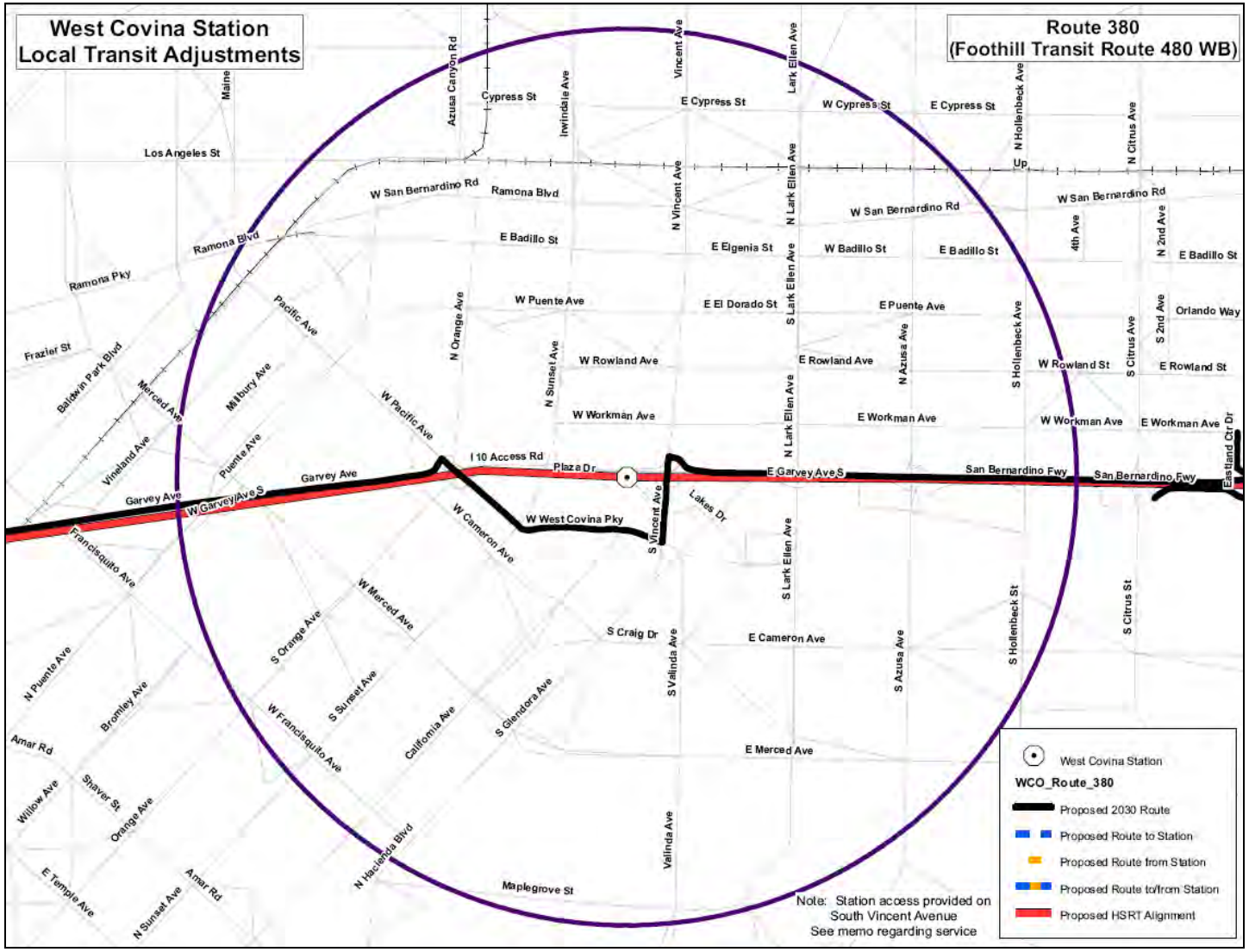
Source: SCAG Regional Travel Demand Model.

Figure 4.26 Adjustment to Foothill Transit Route 280, Southbound



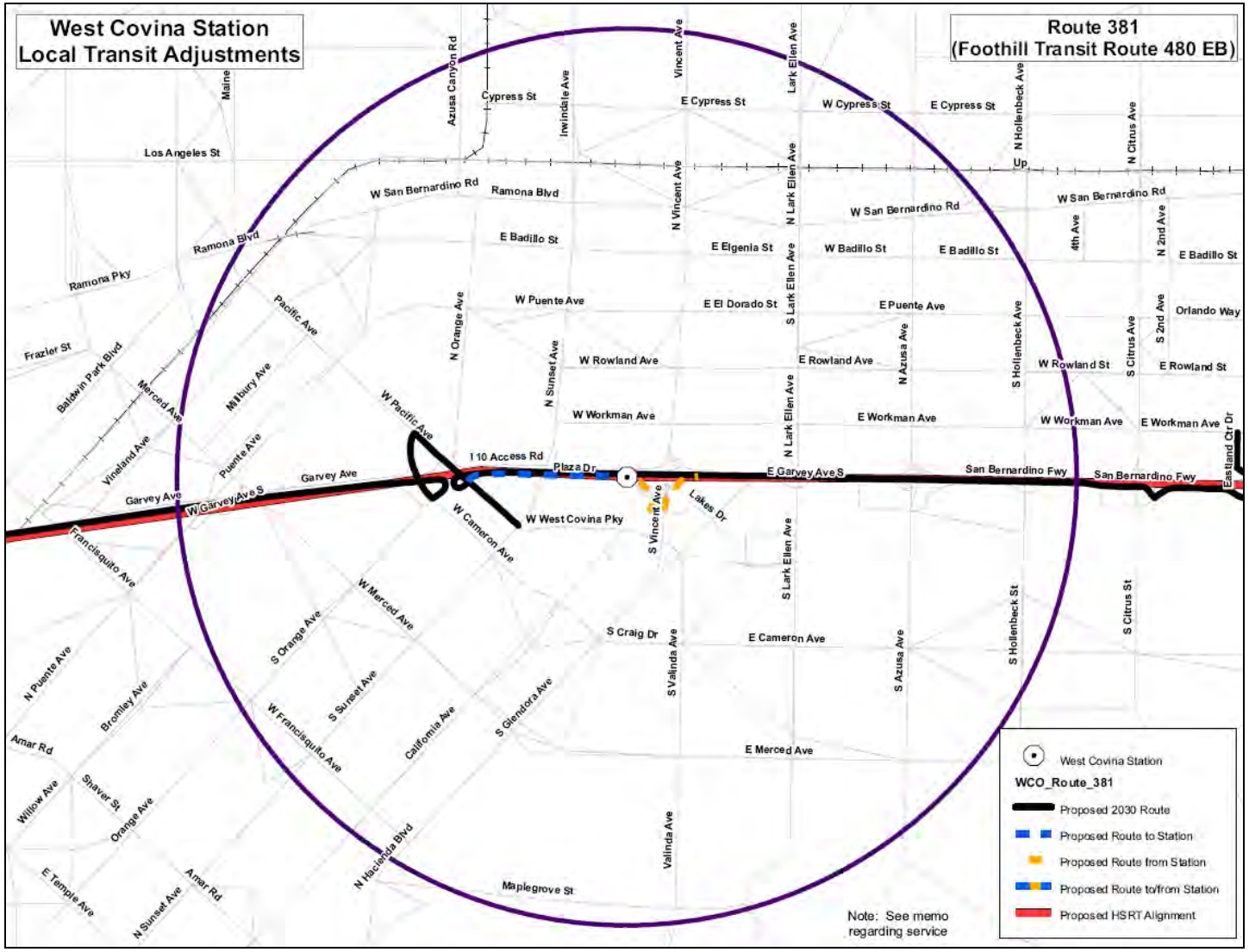
Source: SCAG Regional Travel Demand Model.

Figure 4.27 Adjustment to Foothill Transit Route 480, Westbound



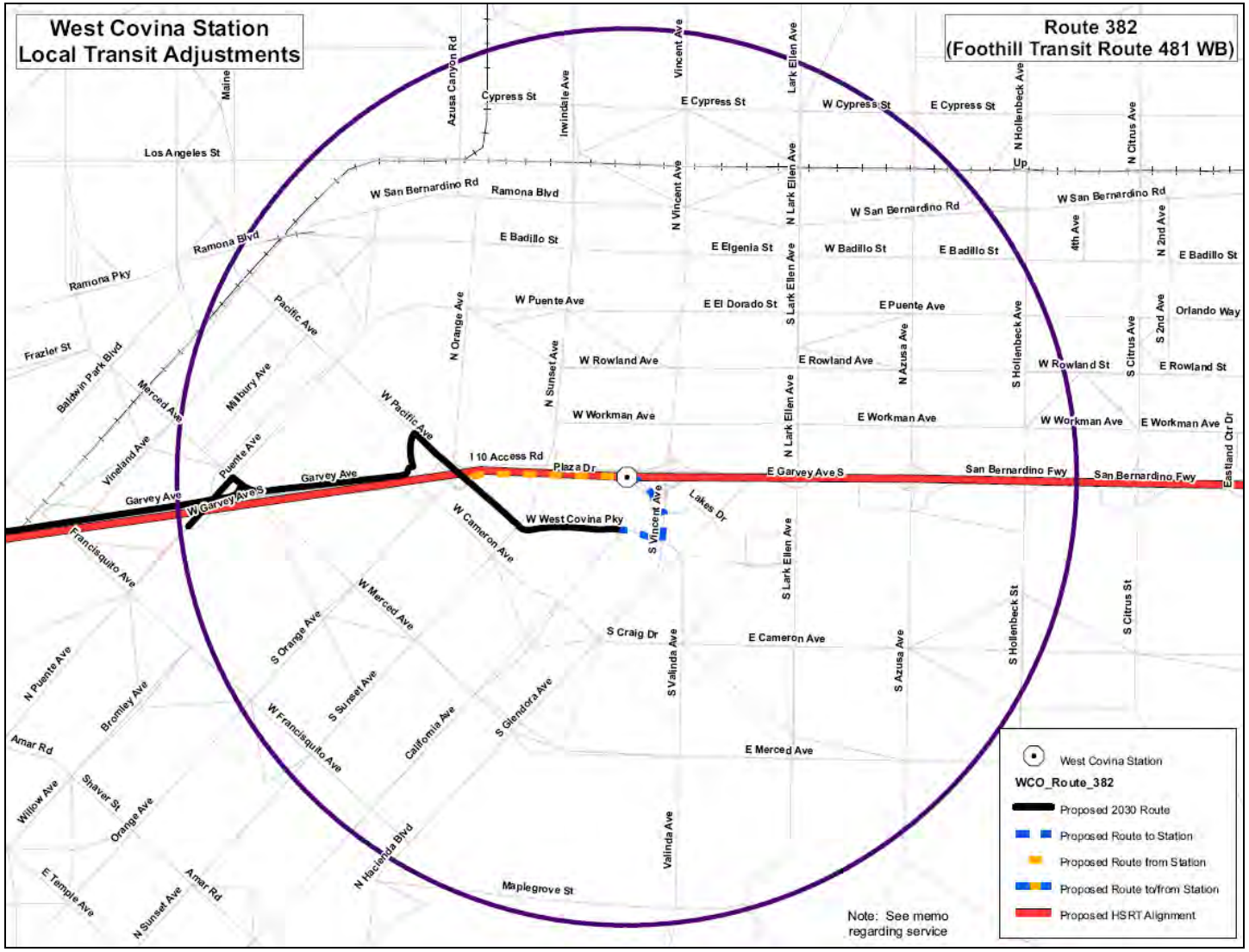
Source: SCAG Regional Travel Demand Model.

Figure 4.28 Adjustment to Foothill Transit Route 480, Eastbound



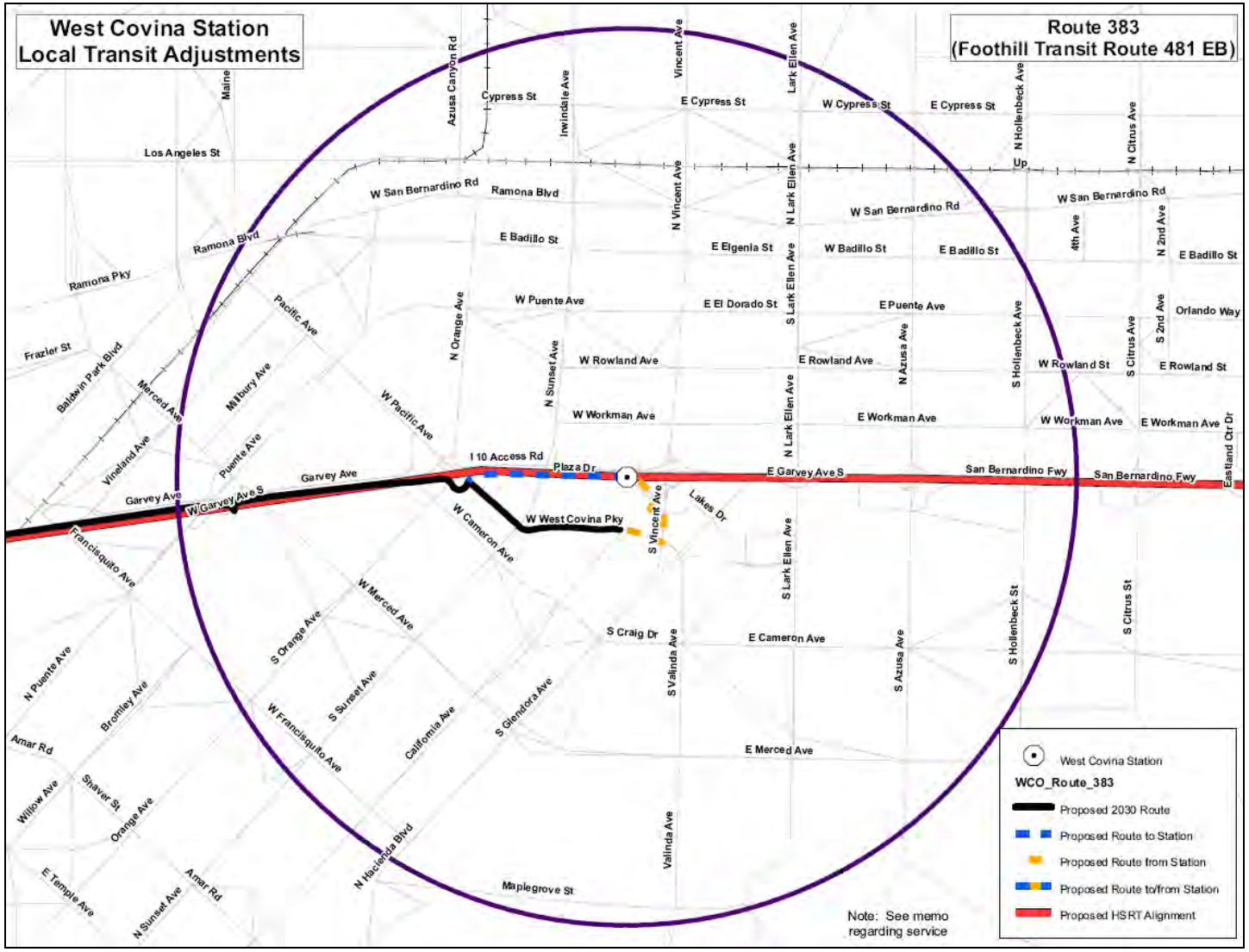
Source: SCAG Regional Travel Demand Model.

Figure 4.29 Adjustment to Foothill Transit Route 481, Westbound



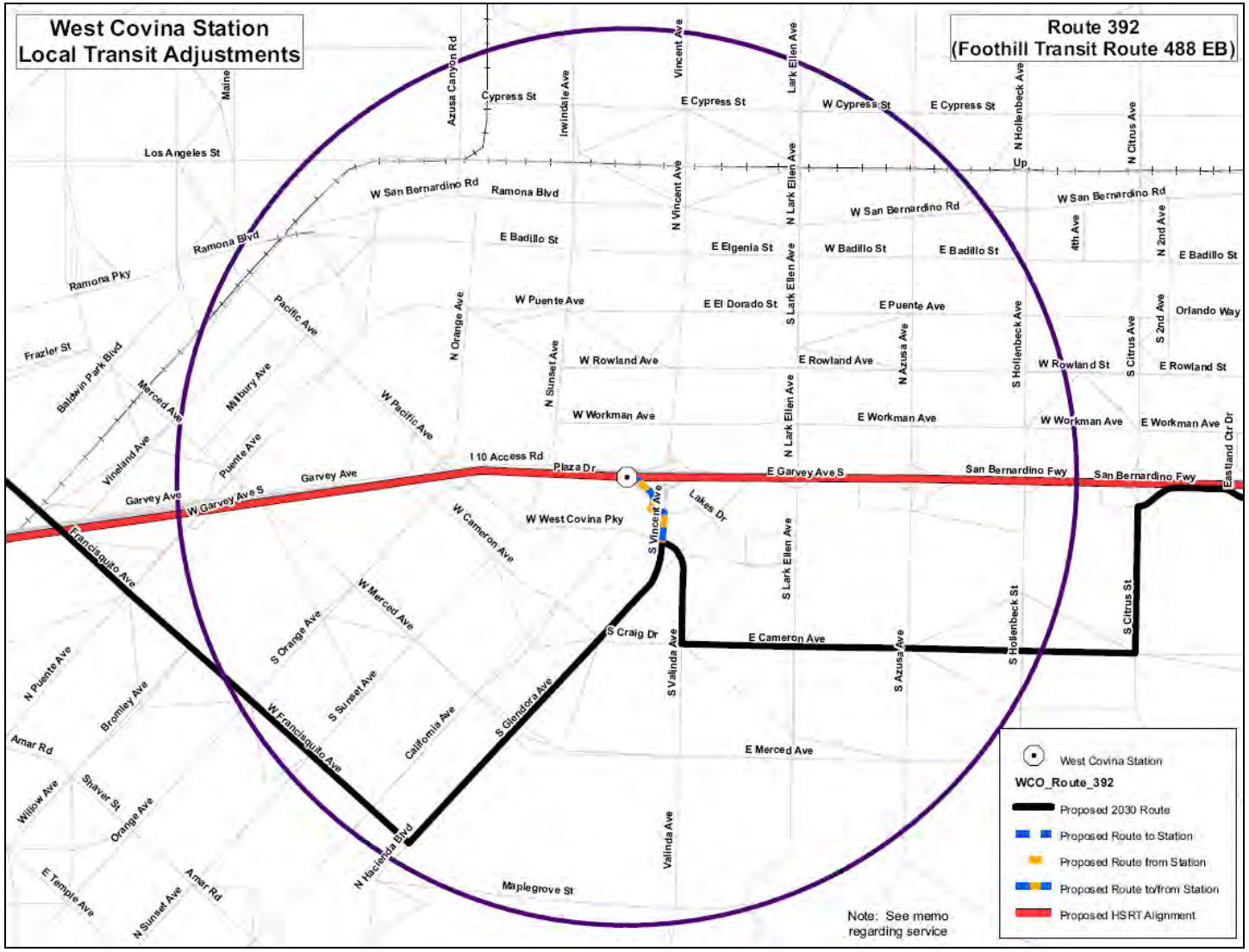
Source: SCAG Regional Travel Demand Model.

Figure 4.30 Adjustment to Foothill Transit Route 481, Eastbound



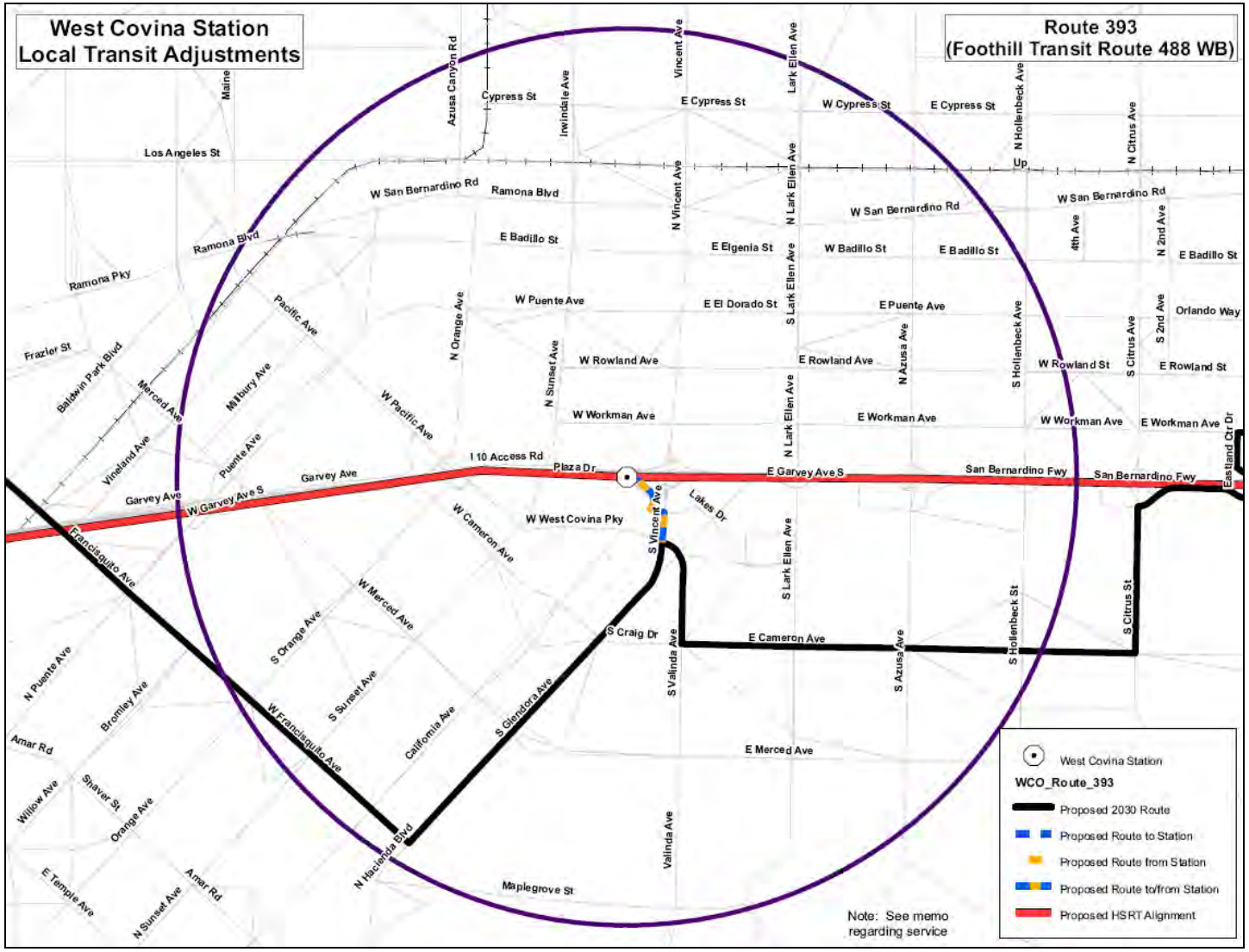
Source: SCAG Regional Travel Demand Model.

Figure 4.31 Adjustment to Foothill Transit Route 488, Eastbound



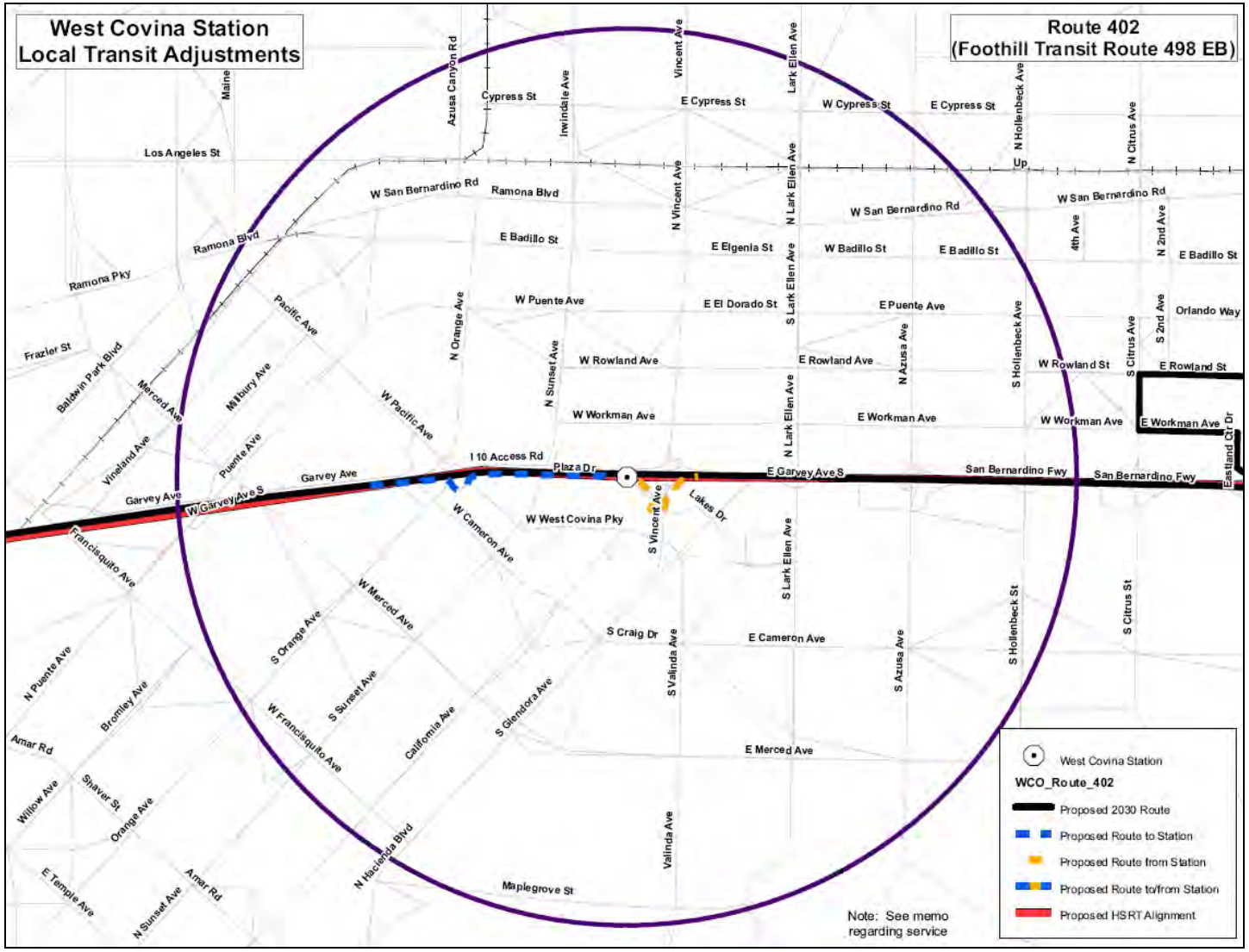
Source: SCAG Regional Travel Demand Model.

Figure 4.32 Adjustment to Foothill Transit Route 488, Westbound



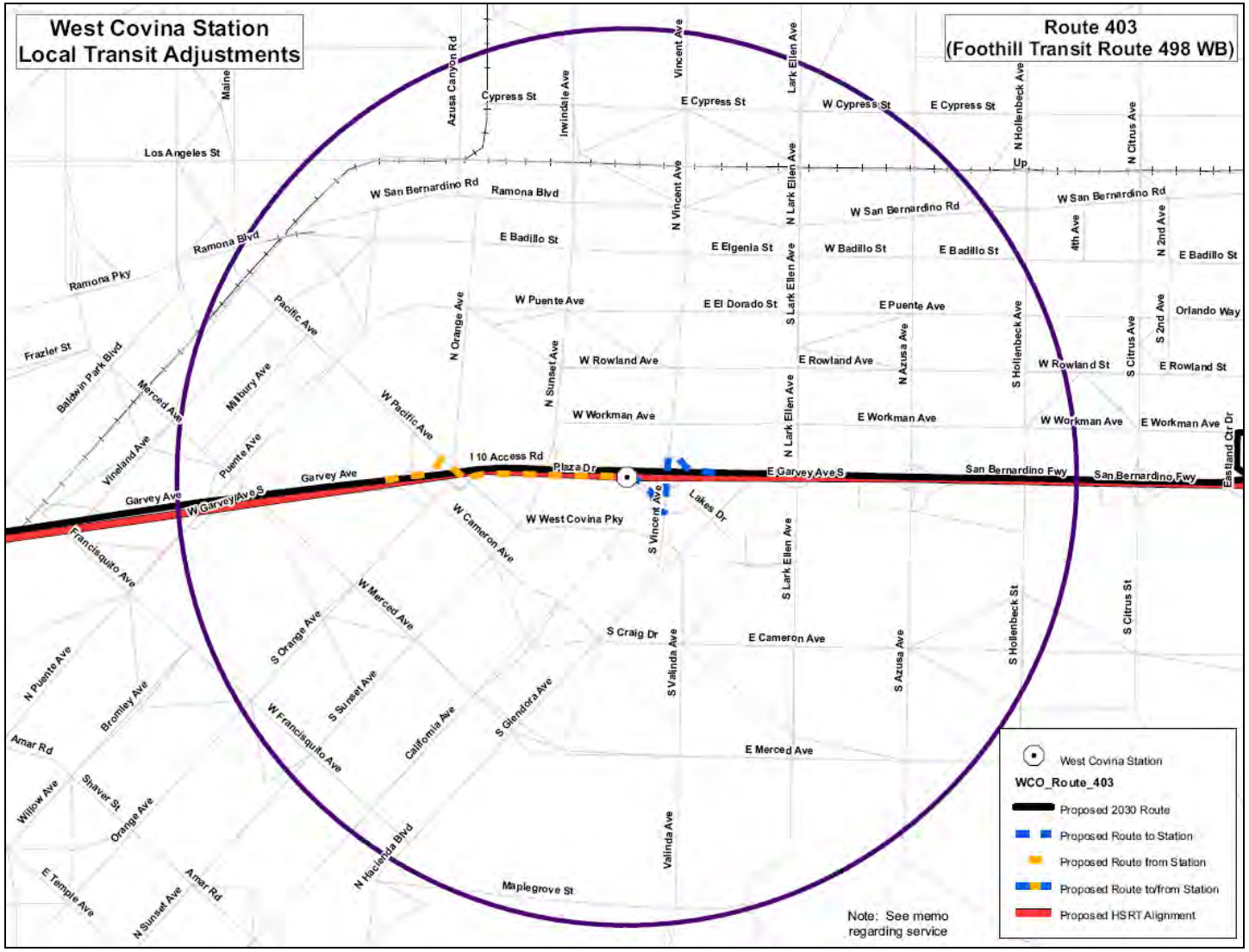
Source: SCAG Regional Travel Demand Model.

Figure 4.33 Adjustment to Foothill Transit Route 498, Eastbound



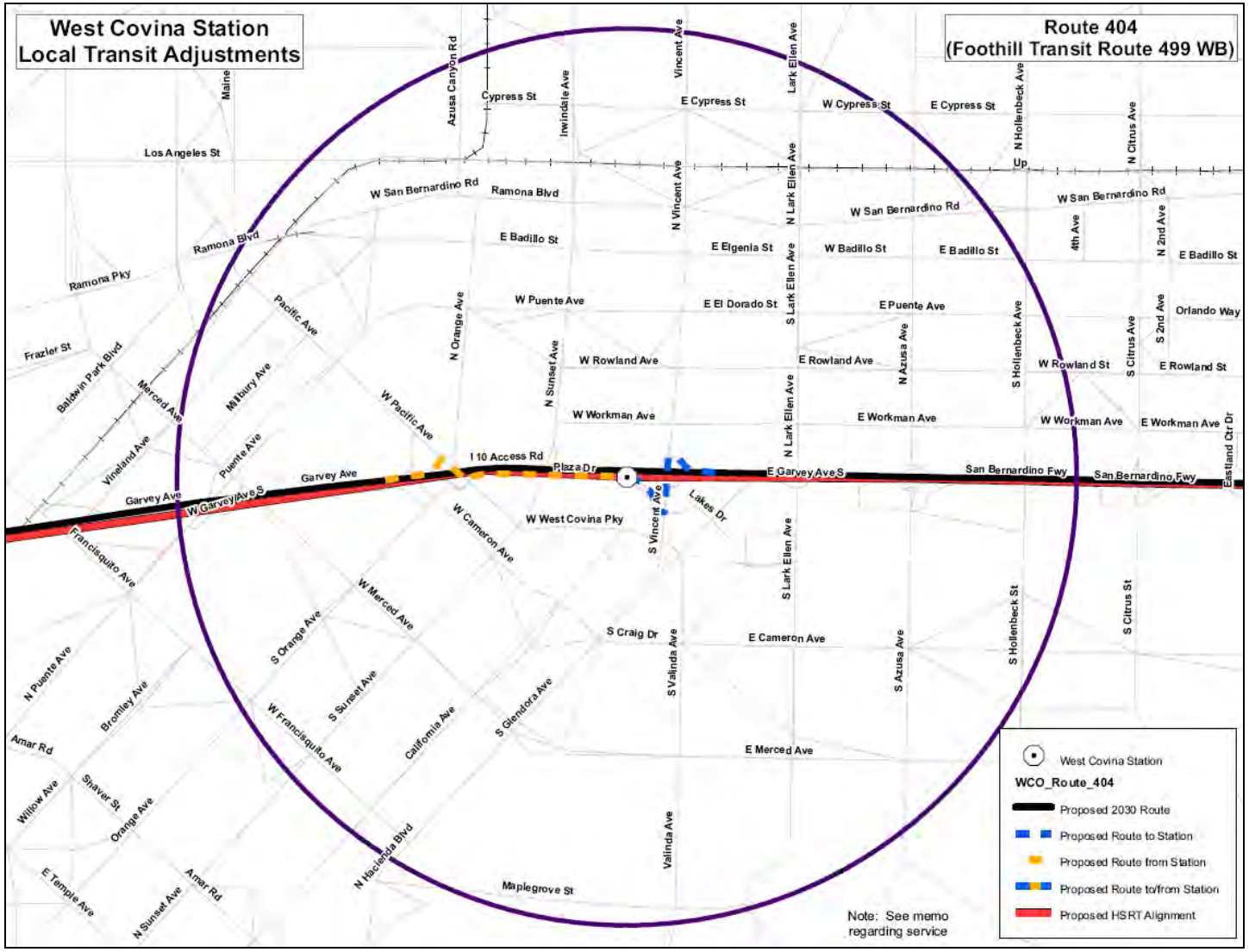
Source: SCAG Regional Travel Demand Model.

Figure 4.34 Adjustment to Foothill Transit Route 498, Westbound



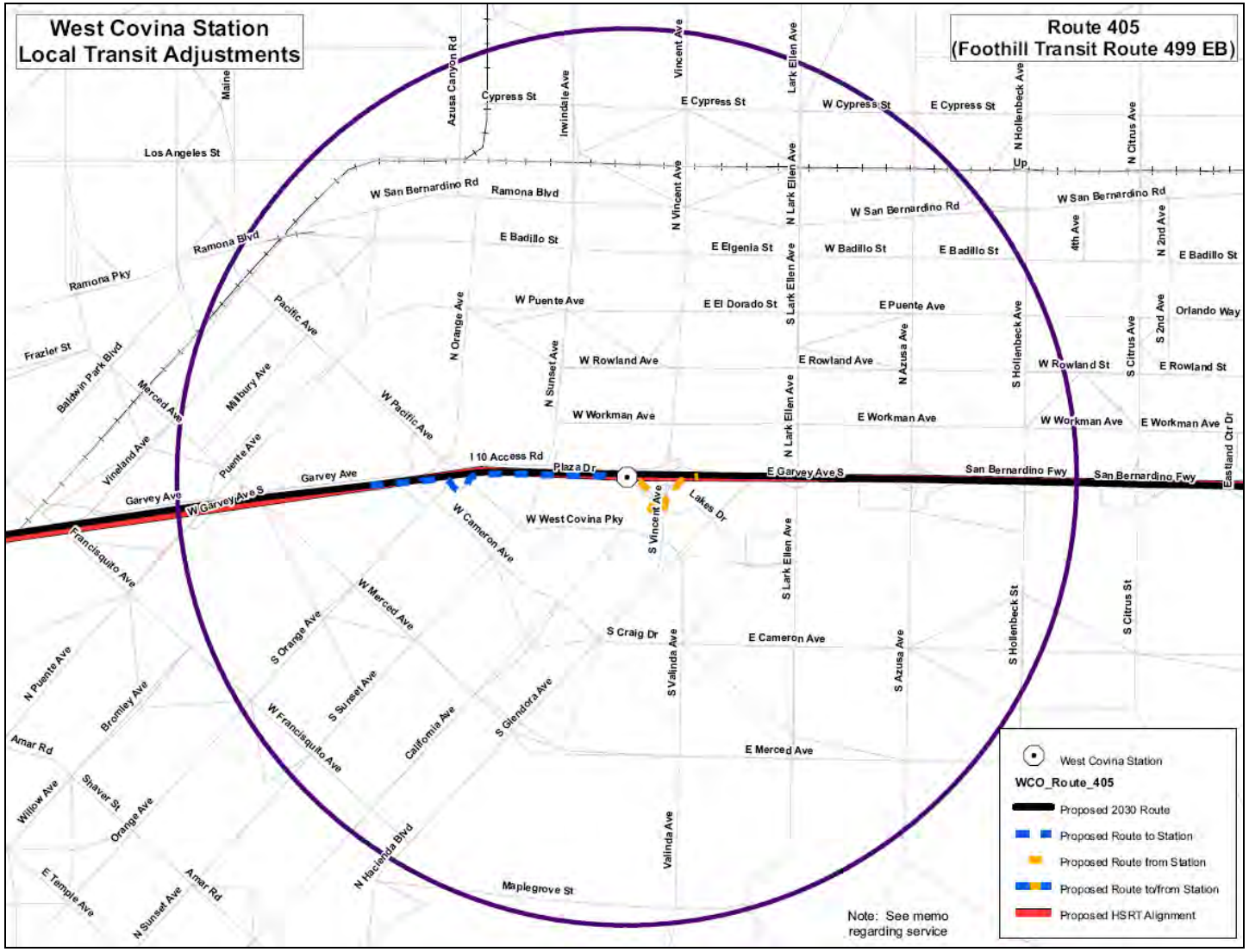
Source: SCAG Regional Travel Demand Model.

Figure 4.35 Adjustment to Foothill Transit Route 499, Westbound



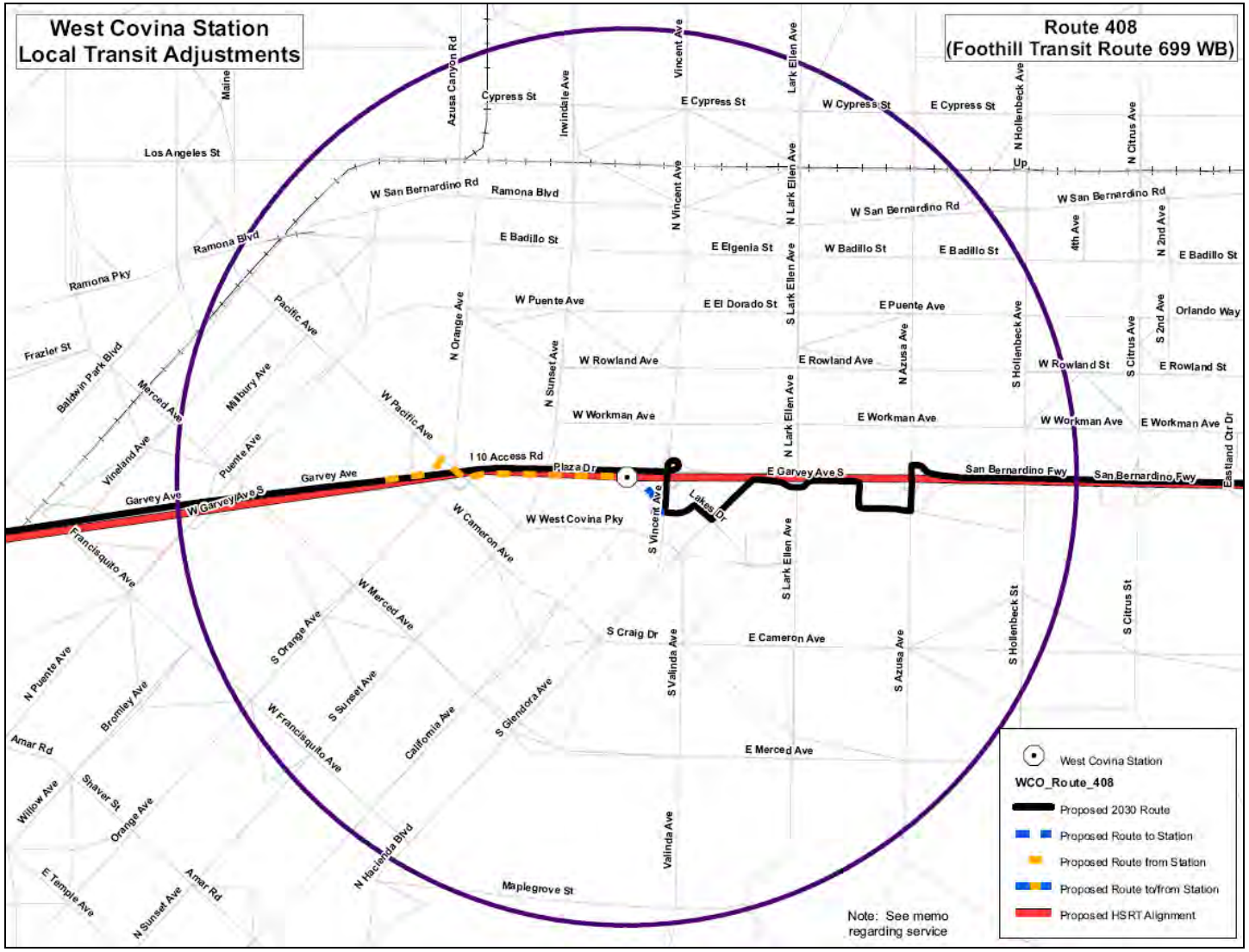
Source: SCAG Regional Travel Demand Model.

Figure 4.36 Adjustment to Foothill Transit Route 499, Eastbound



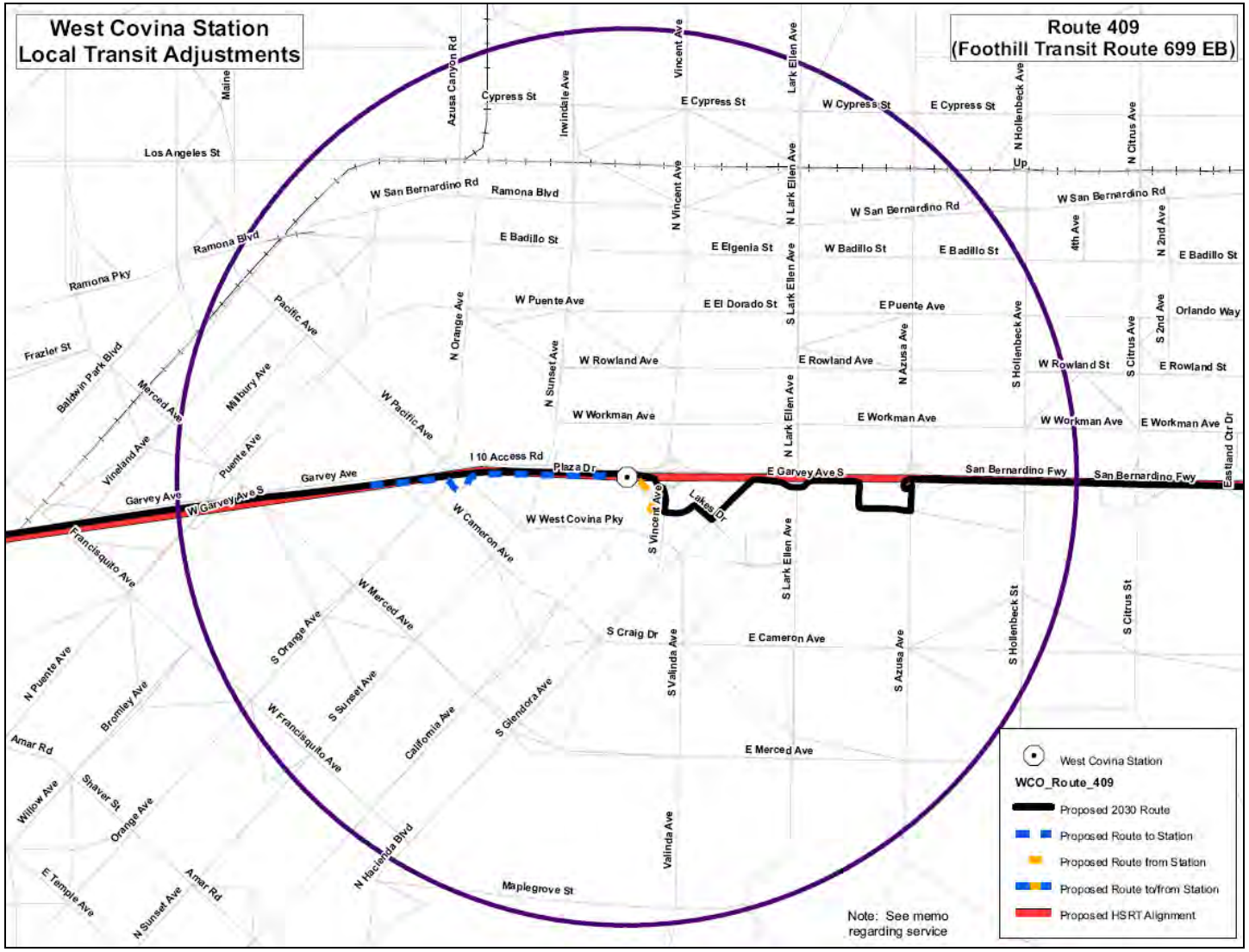
Source: SCAG Regional Travel Demand Model.

Figure 4.37 Adjustment to Foothill Transit Route 699, Westbound



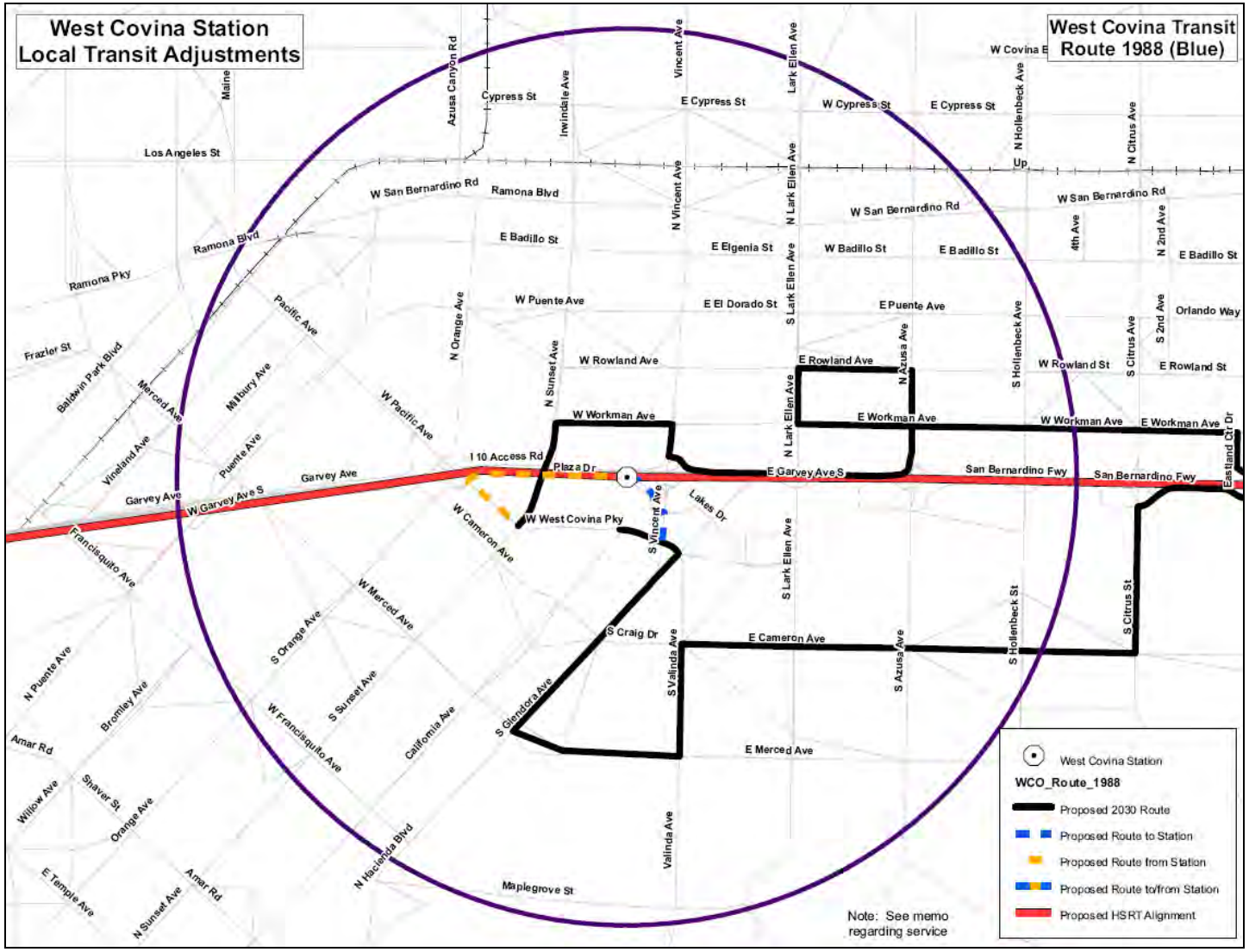
Source: SCAG Regional Travel Demand Model.

Figure 4.38 Adjustment to Foothill Transit Route 699, Eastbound



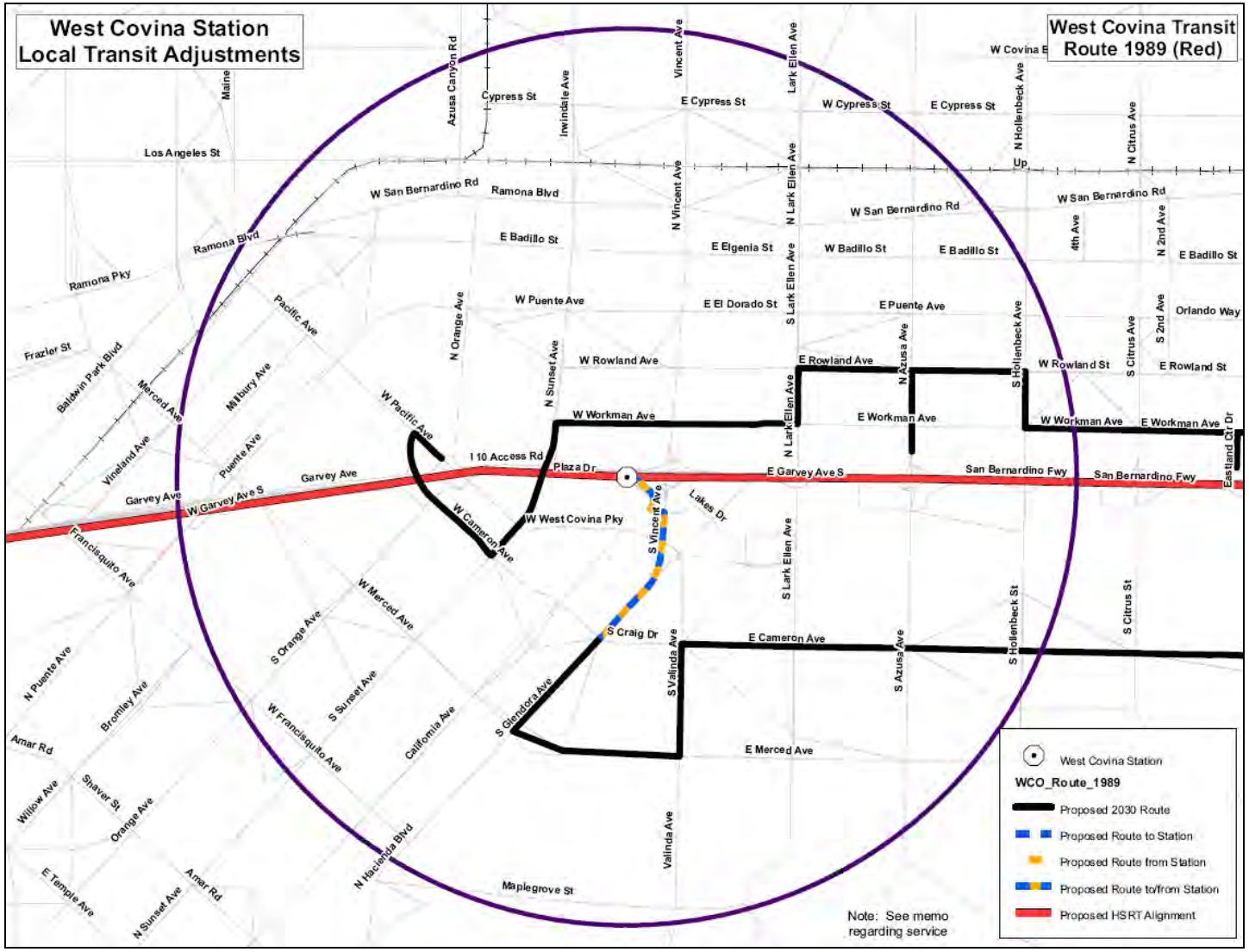
Source: SCAG Regional Travel Demand Model.

Figure 4.39 Adjustment to West Covina Transit Blue Line



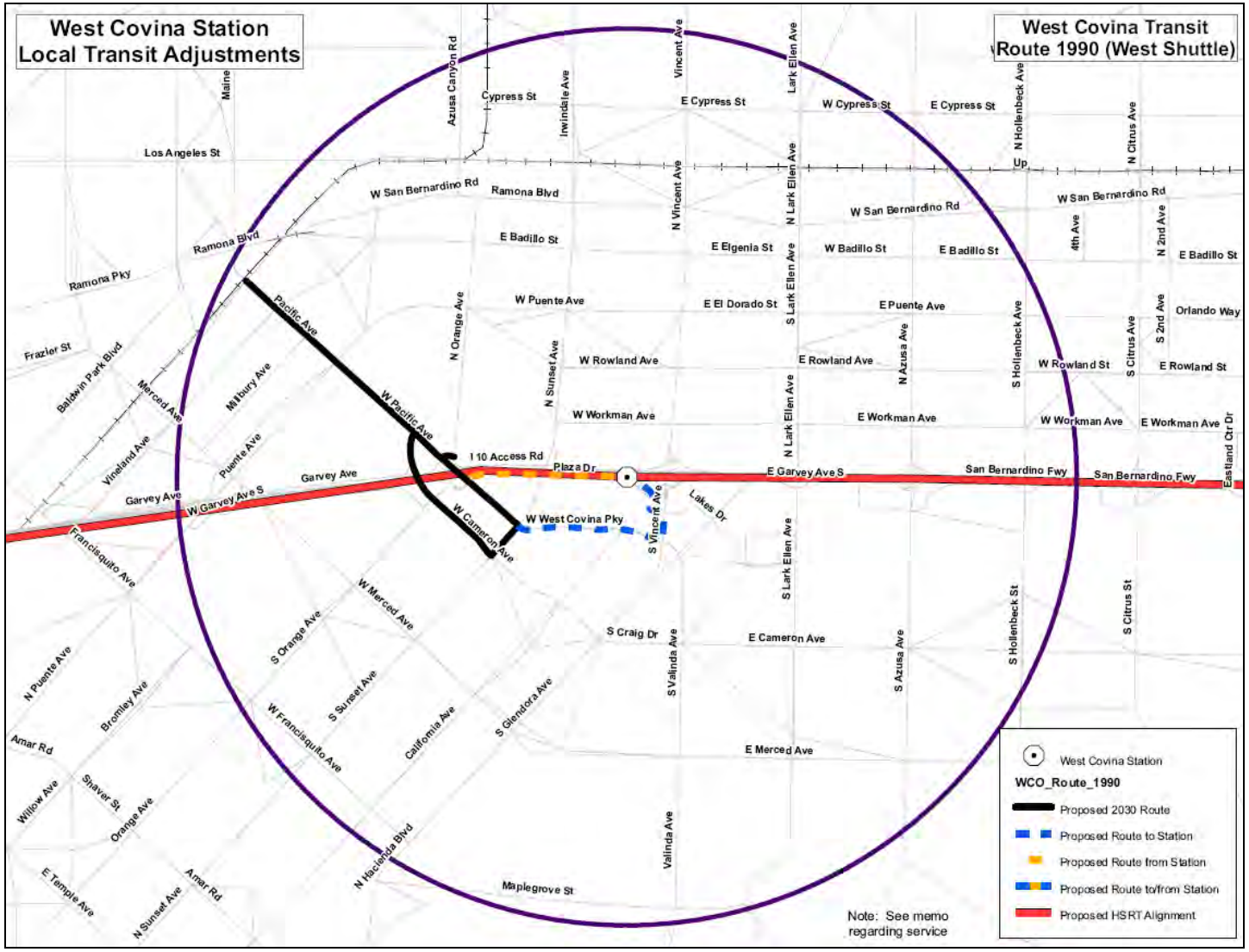
Source: SCAG Regional Travel Demand Model.

Figure 4.40 Adjustment to West Covina Transit Red Line



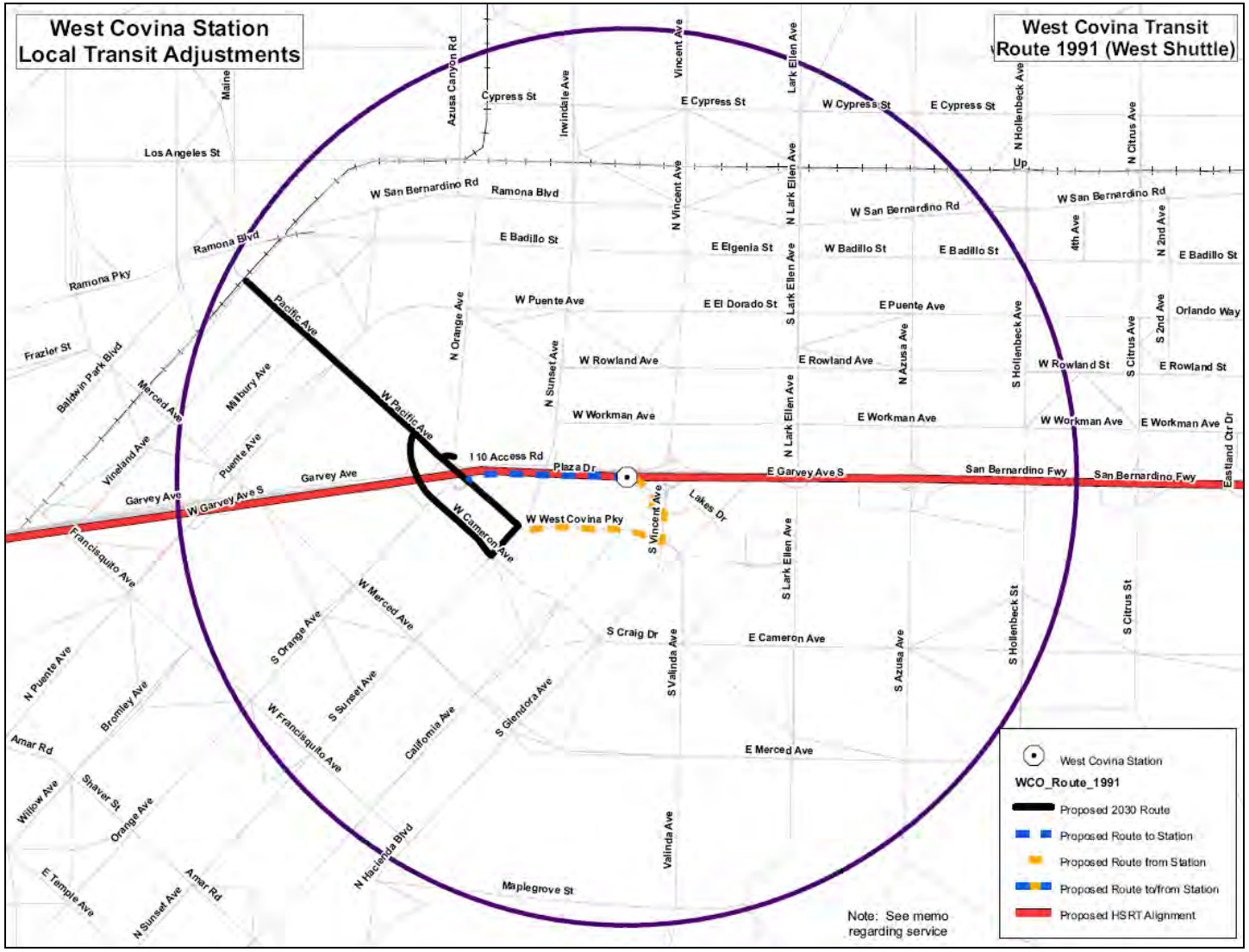
Source: SCAG Regional Travel Demand Model.

Figure 4.41 Adjustment to West Covina Transit West Shuttle



Source: SCAG Regional Travel Demand Model.

Figure 4.42 Adjustment to West Covina Transit West Shuttle

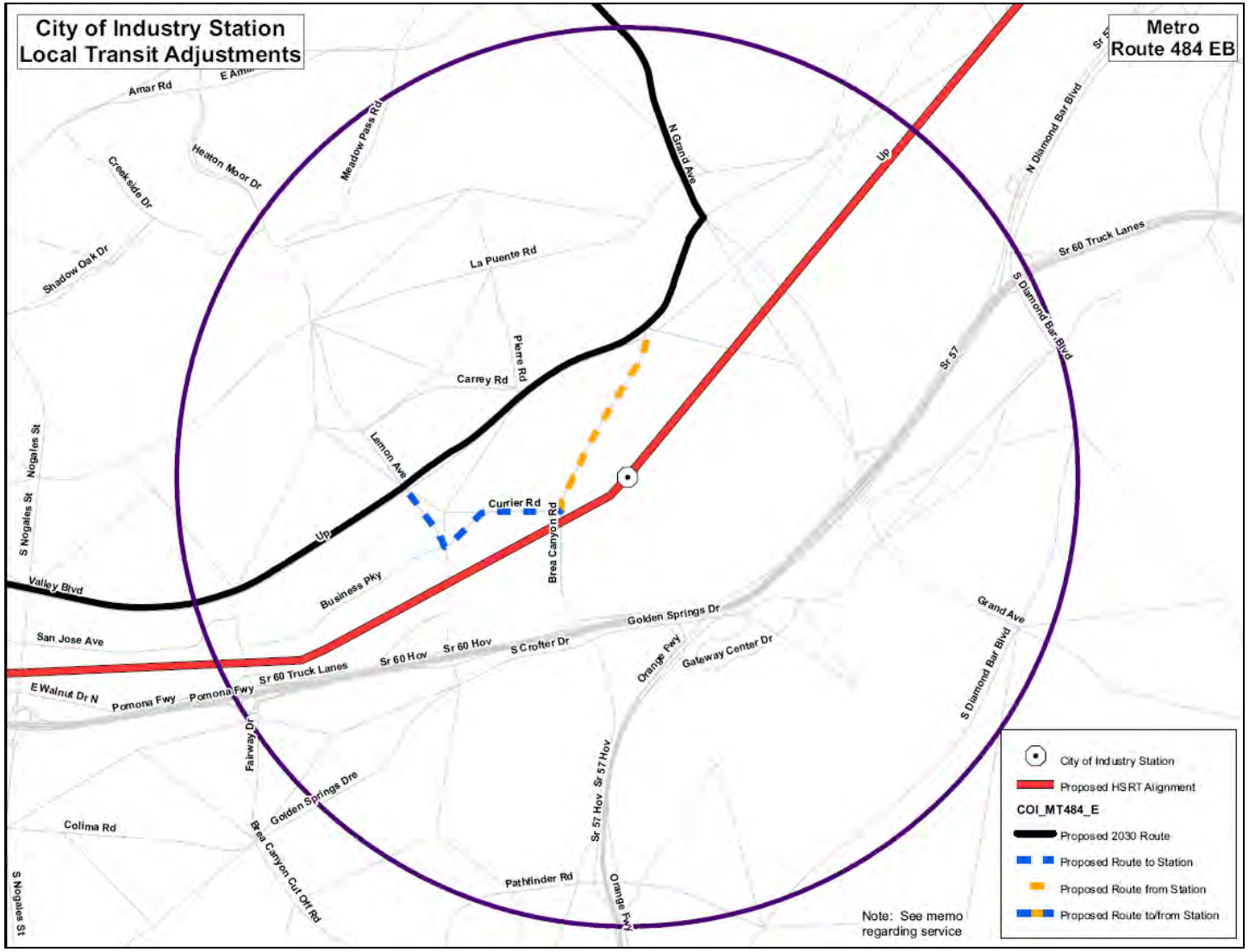


Source: SCAG Regional Travel Demand Model.

4.2 ADJUSTMENTS TO LOCAL TRANSIT – CITY OF INDUSTRY

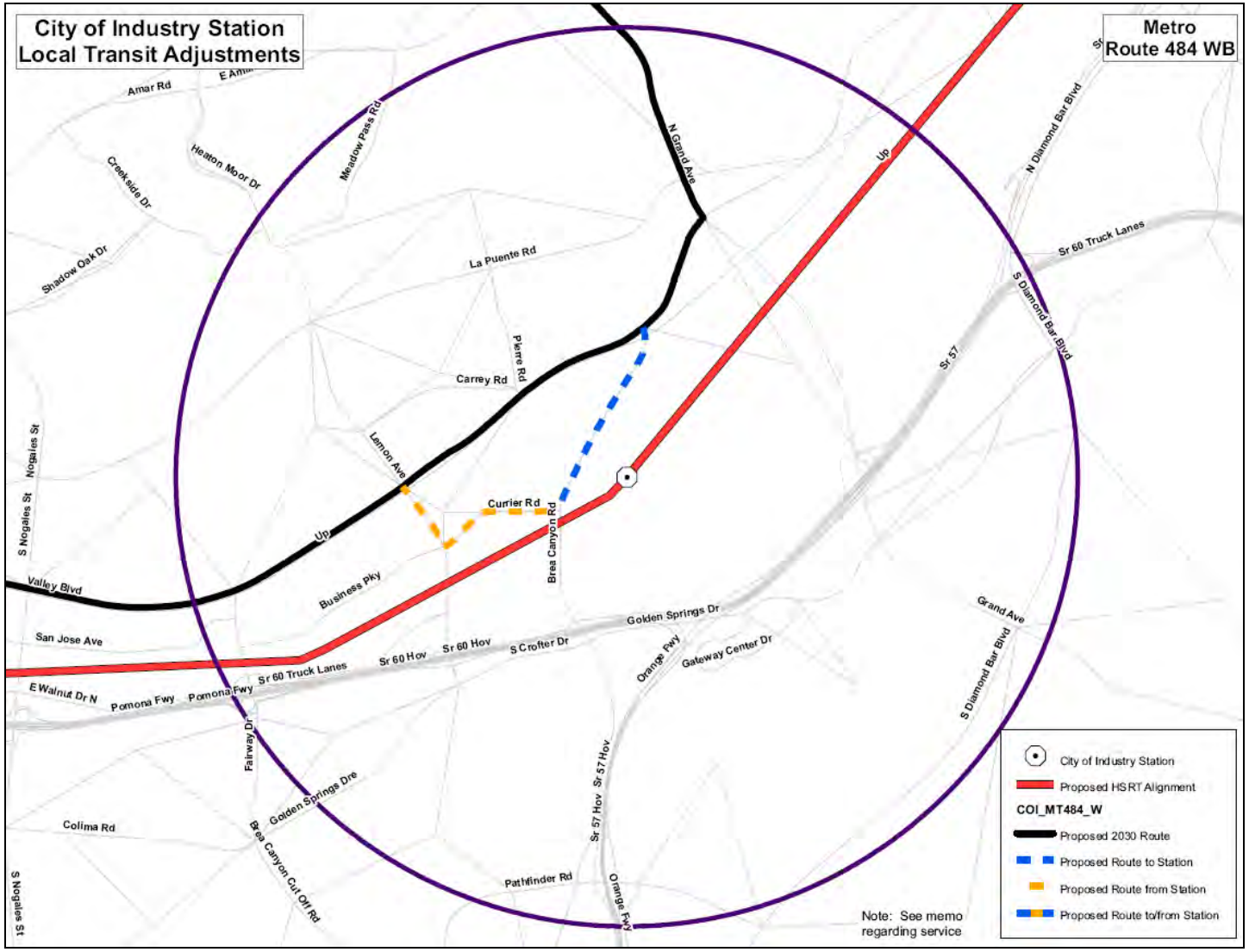
Year 2025 transit routes in the vicinity of the proposed City of Industry HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 4.43 to Figure 4.63. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 4.43 Adjustment to Metro Route 484, Eastbound



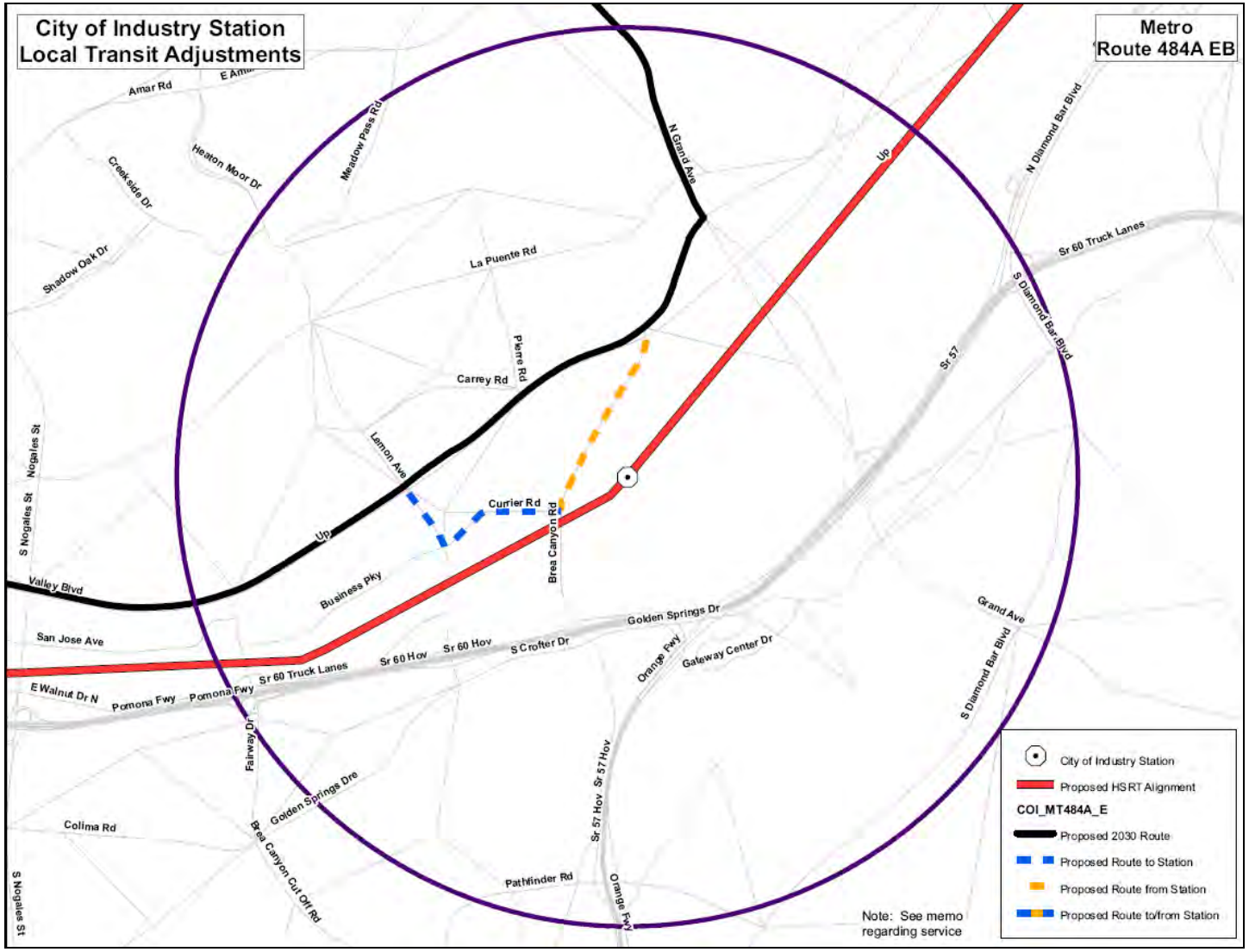
Source: SCAG Regional Travel Demand Model.

Figure 4.44 Adjustment to Metro Route 484, Westbound



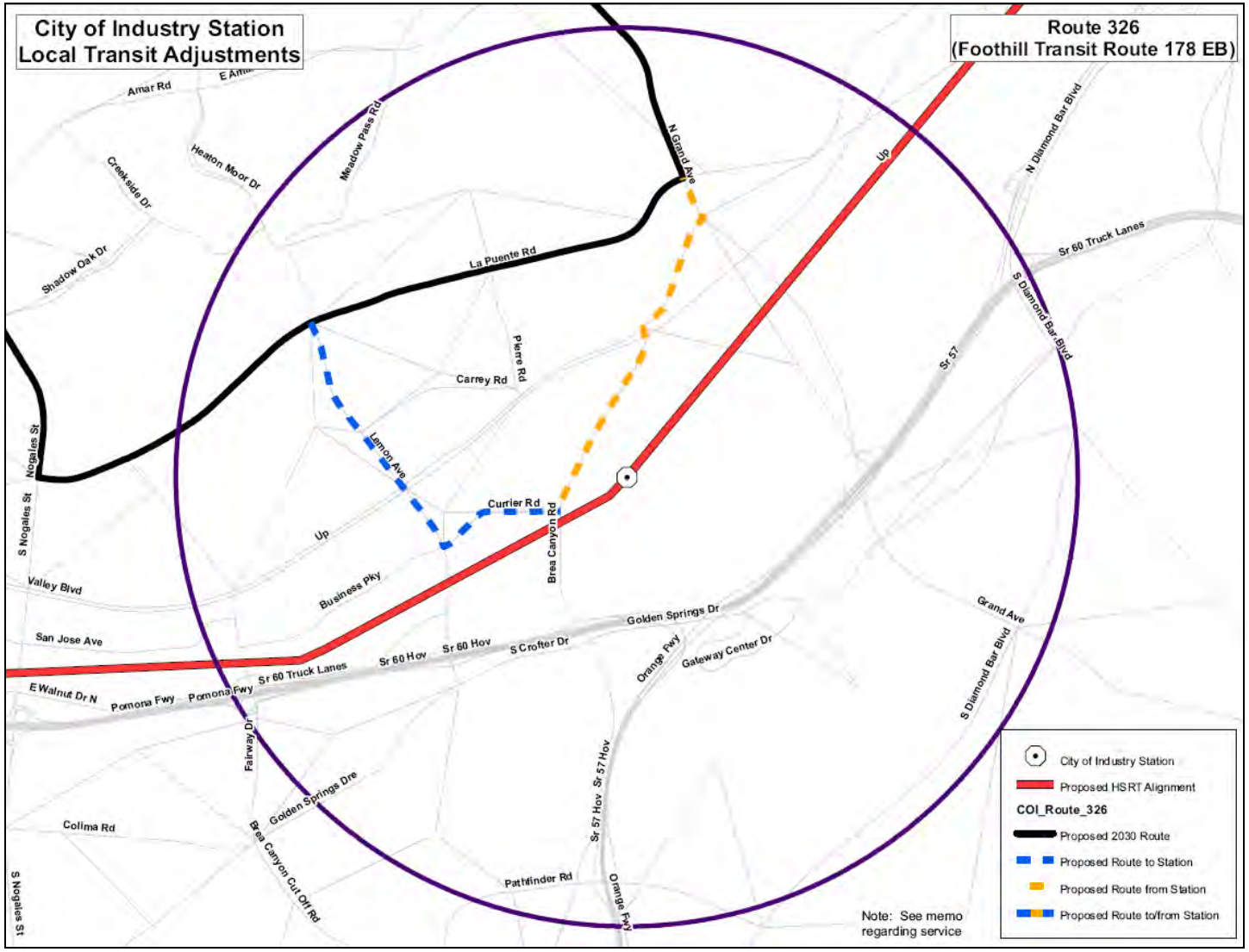
Source: SCAG Regional Travel Demand Model.

Figure 4.45 Adjustment to Metro Route 484A, Eastbound



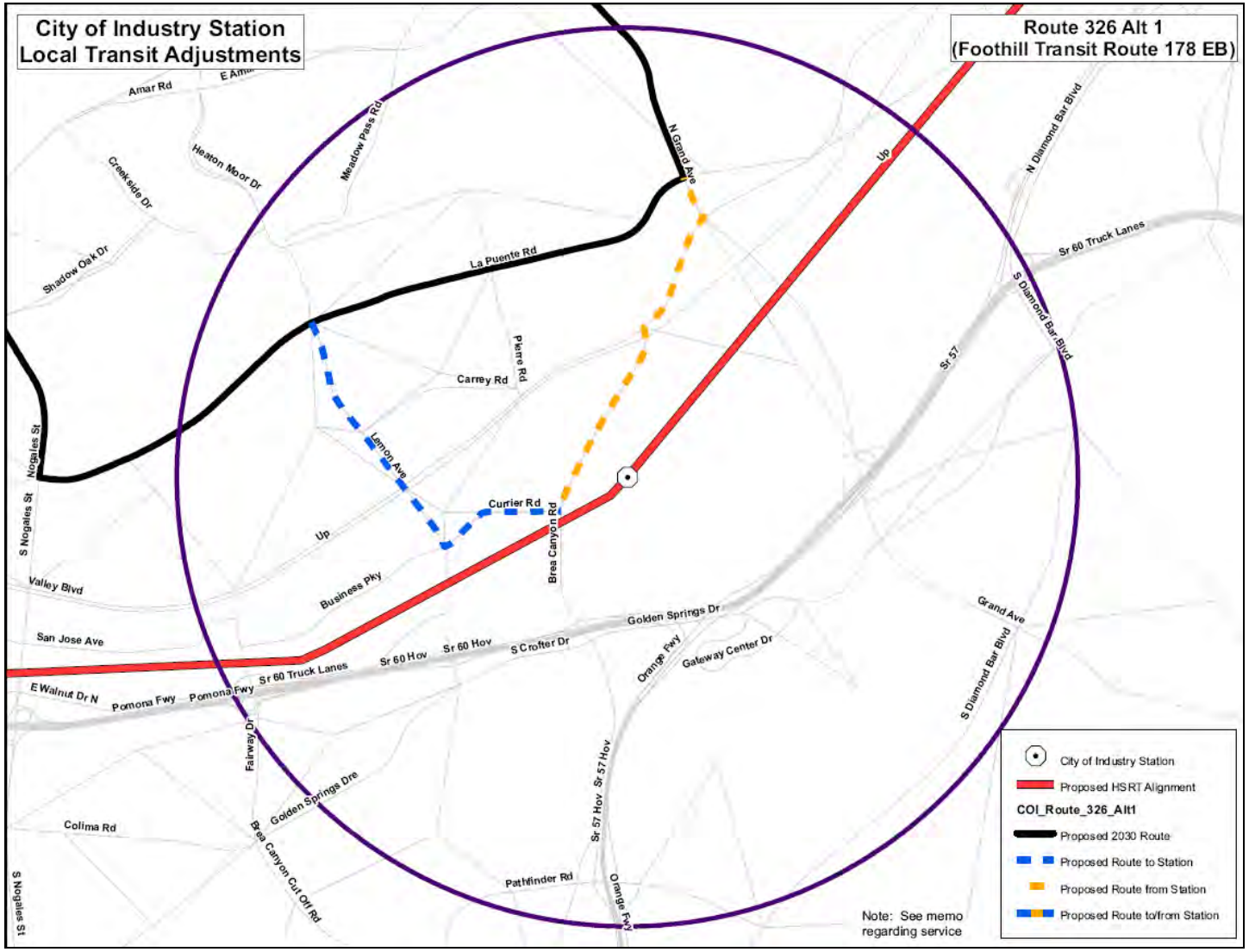
Source: SCAG Regional Travel Demand Model.

Figure 4.46 Adjustment to Foothill Transit Route 178, Eastbound



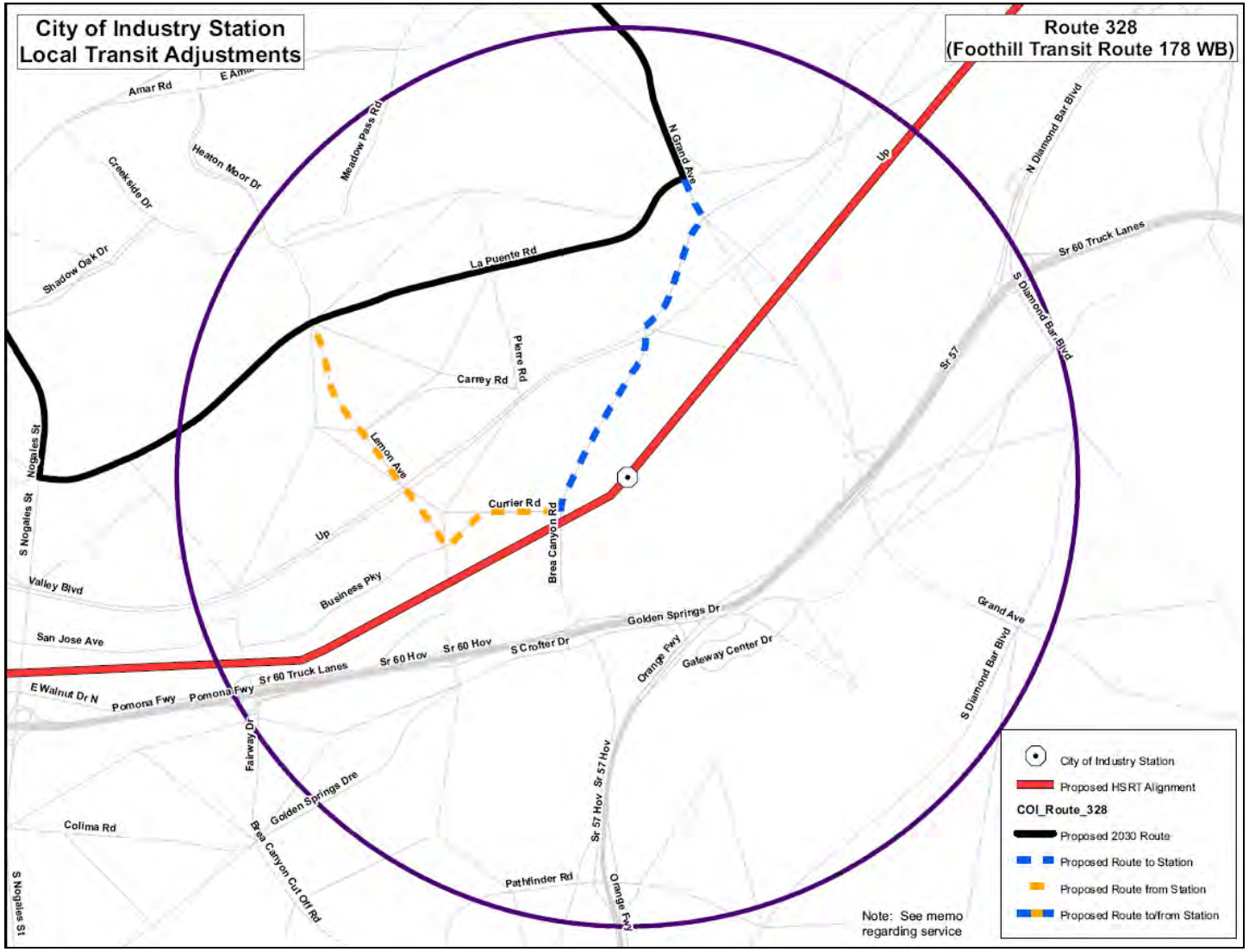
Source: SCAG Regional Travel Demand Model.

Figure 4.47 Adjustment to Foothill Transit Route 178, Eastbound



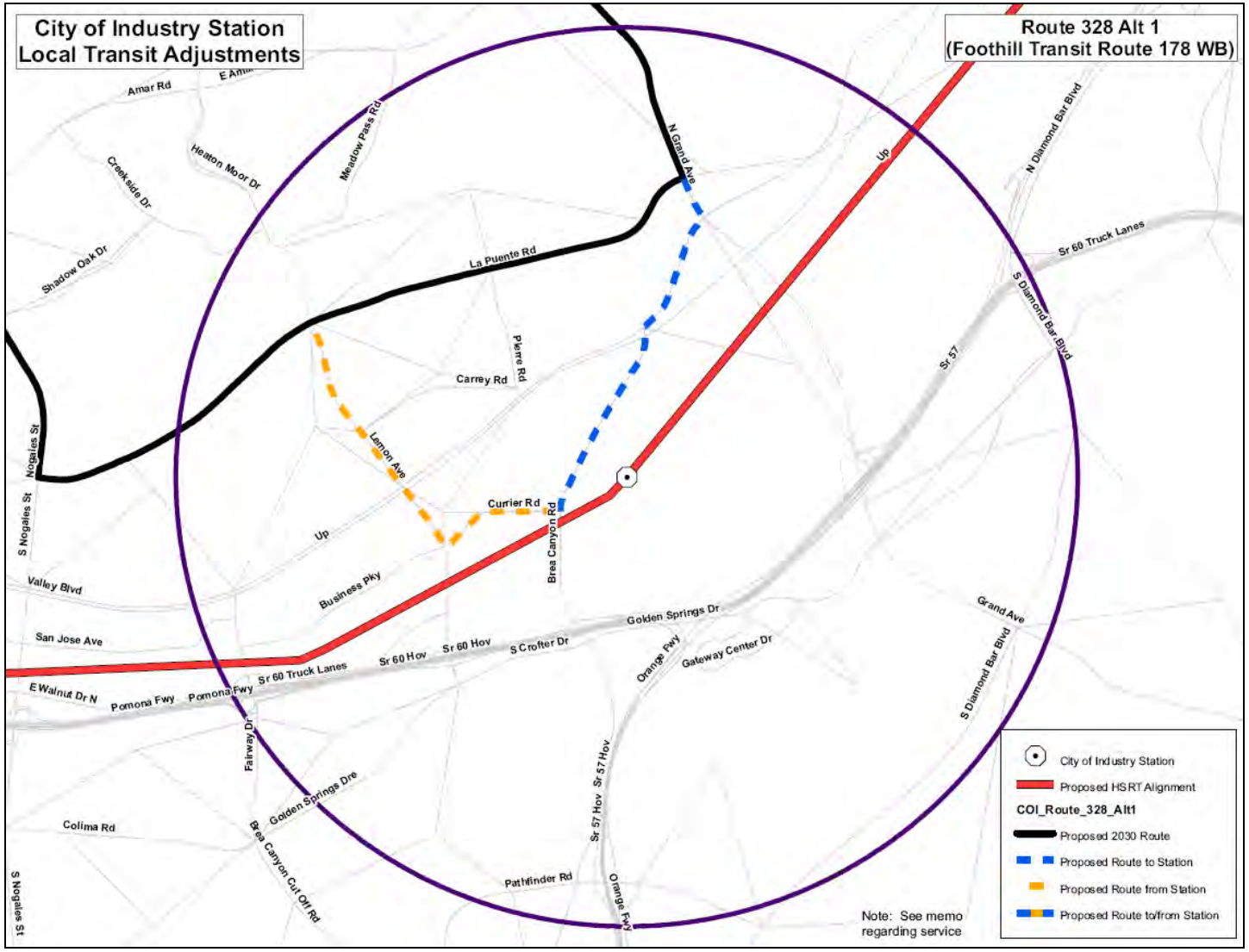
Source: SCAG Regional Travel Demand Model.

Figure 4.48 Adjustment to Foothill Transit Route 178, Westbound



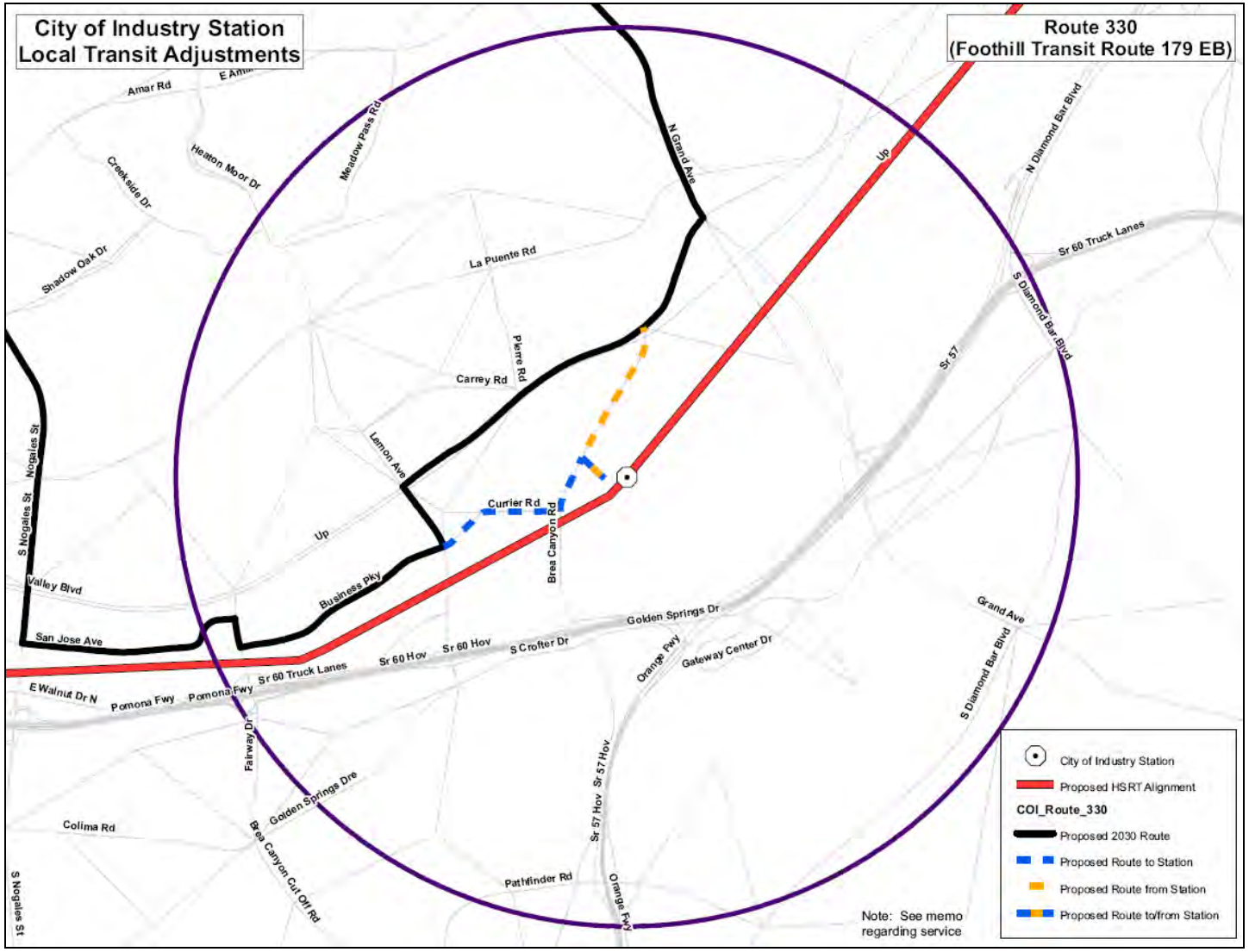
Source: SCAG Regional Travel Demand Model.

Figure 4.49 Adjustment to Foothill Transit Route 178, Westbound



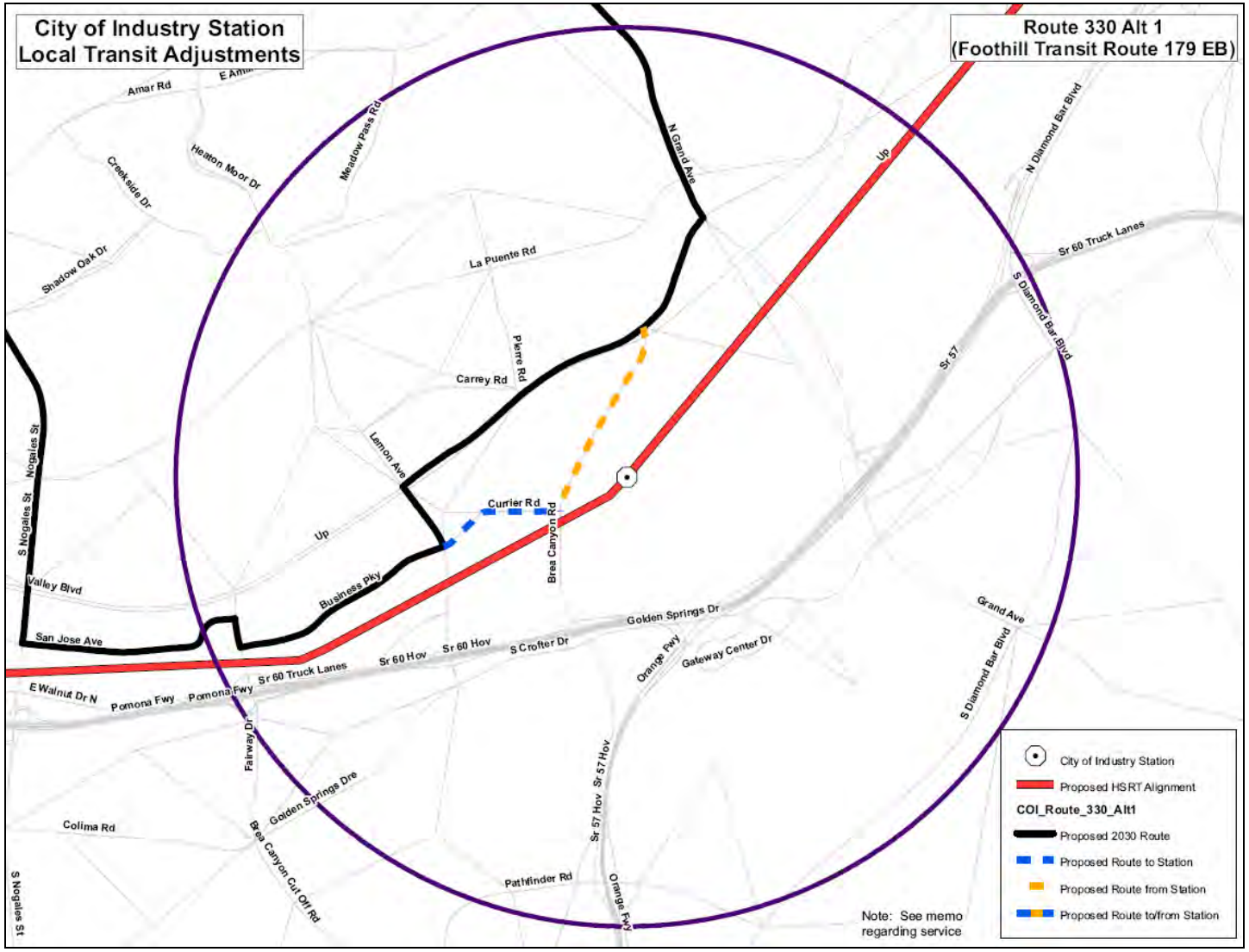
Source: SCAG Regional Travel Demand Model.

Figure 4.50 Adjustment to Foothill Transit Route 179, Eastbound



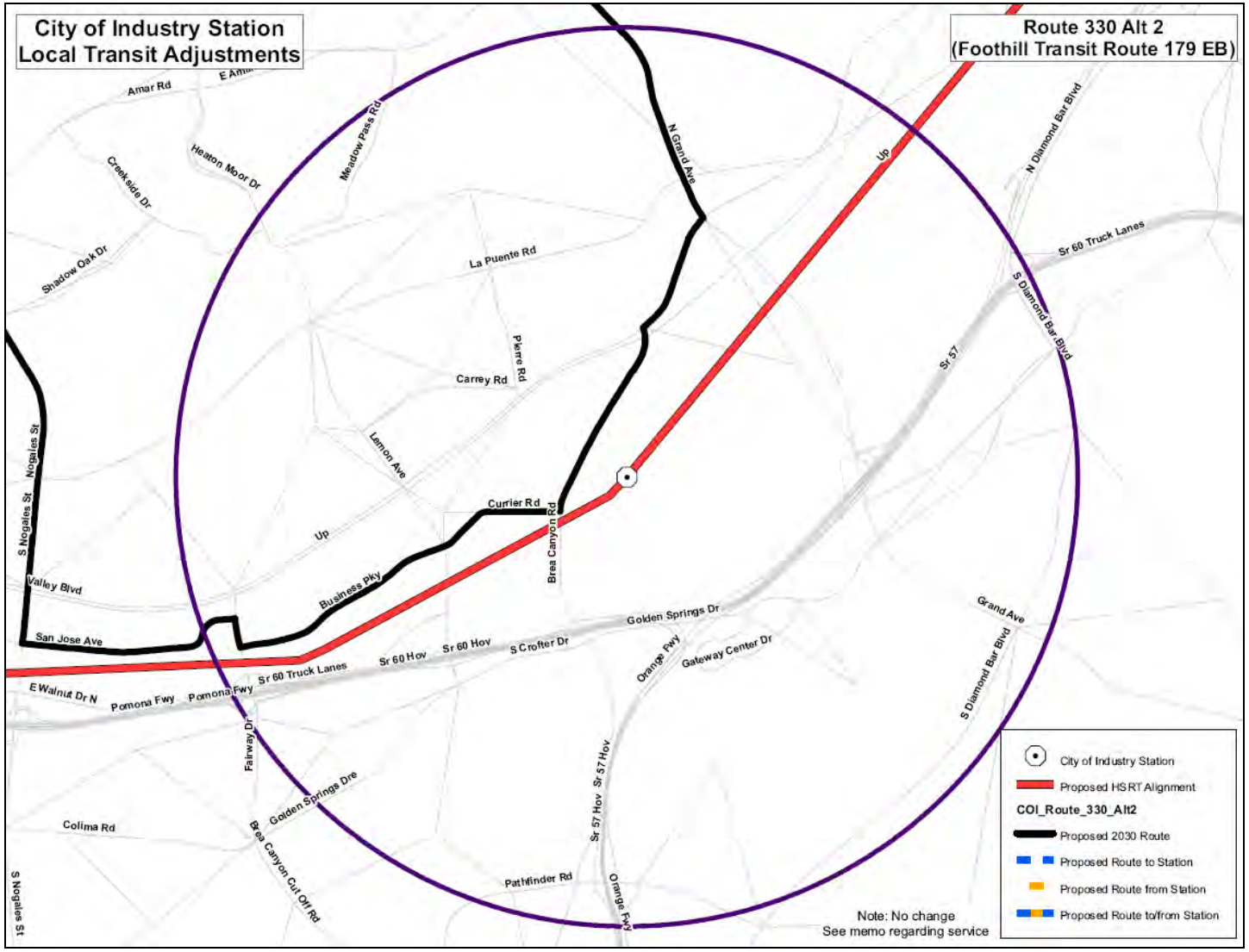
Source: SCAG Regional Travel Demand Model.

Figure 4.51 Adjustment to Foothill Transit Route 179, Eastbound



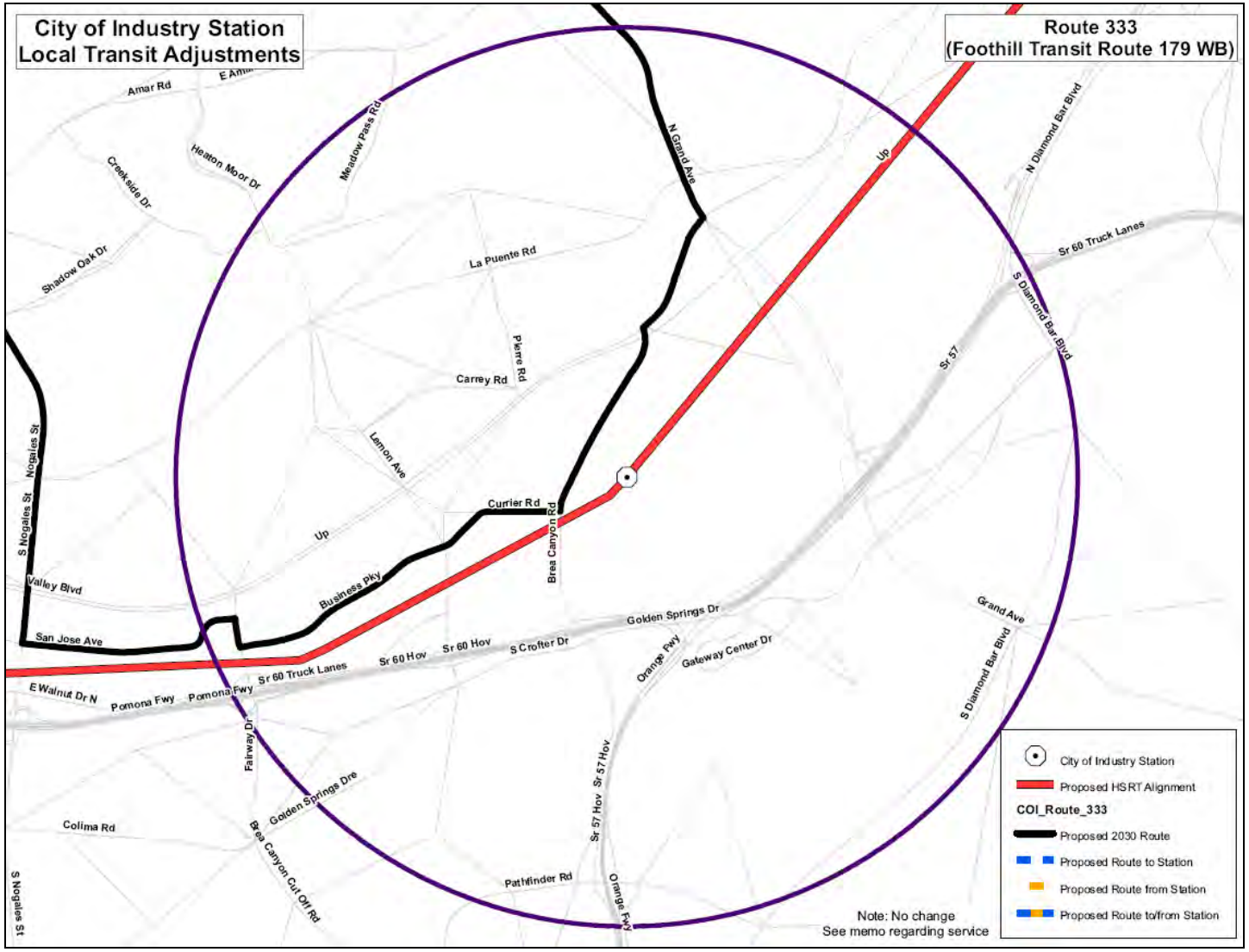
Source: SCAG Regional Travel Demand Model.

Figure 4.52 Adjustment to Foothill Transit Route 179, Eastbound



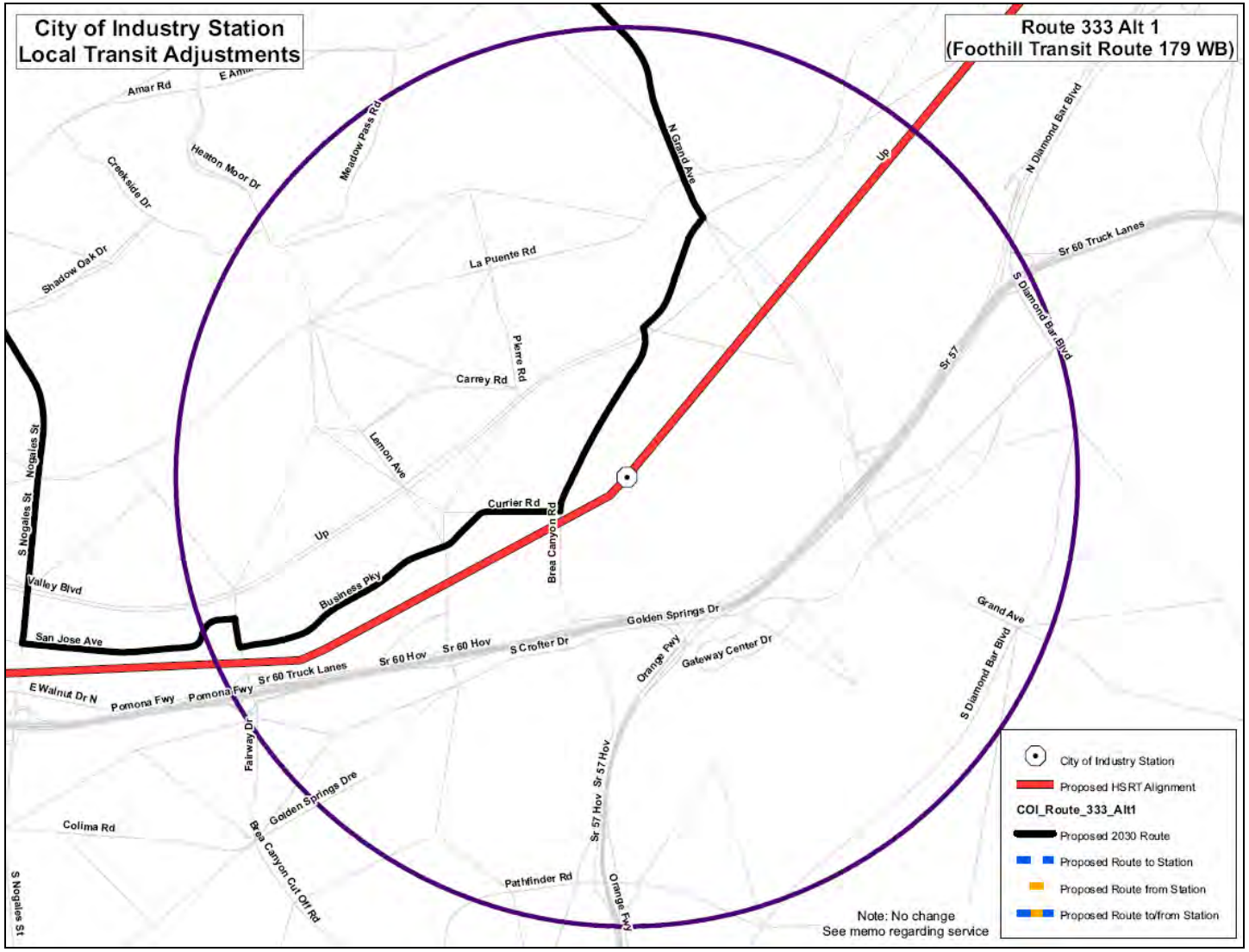
Source: SCAG Regional Travel Demand Model.

Figure 4.53 Adjustment to Foothill Transit Route 179, Westbound



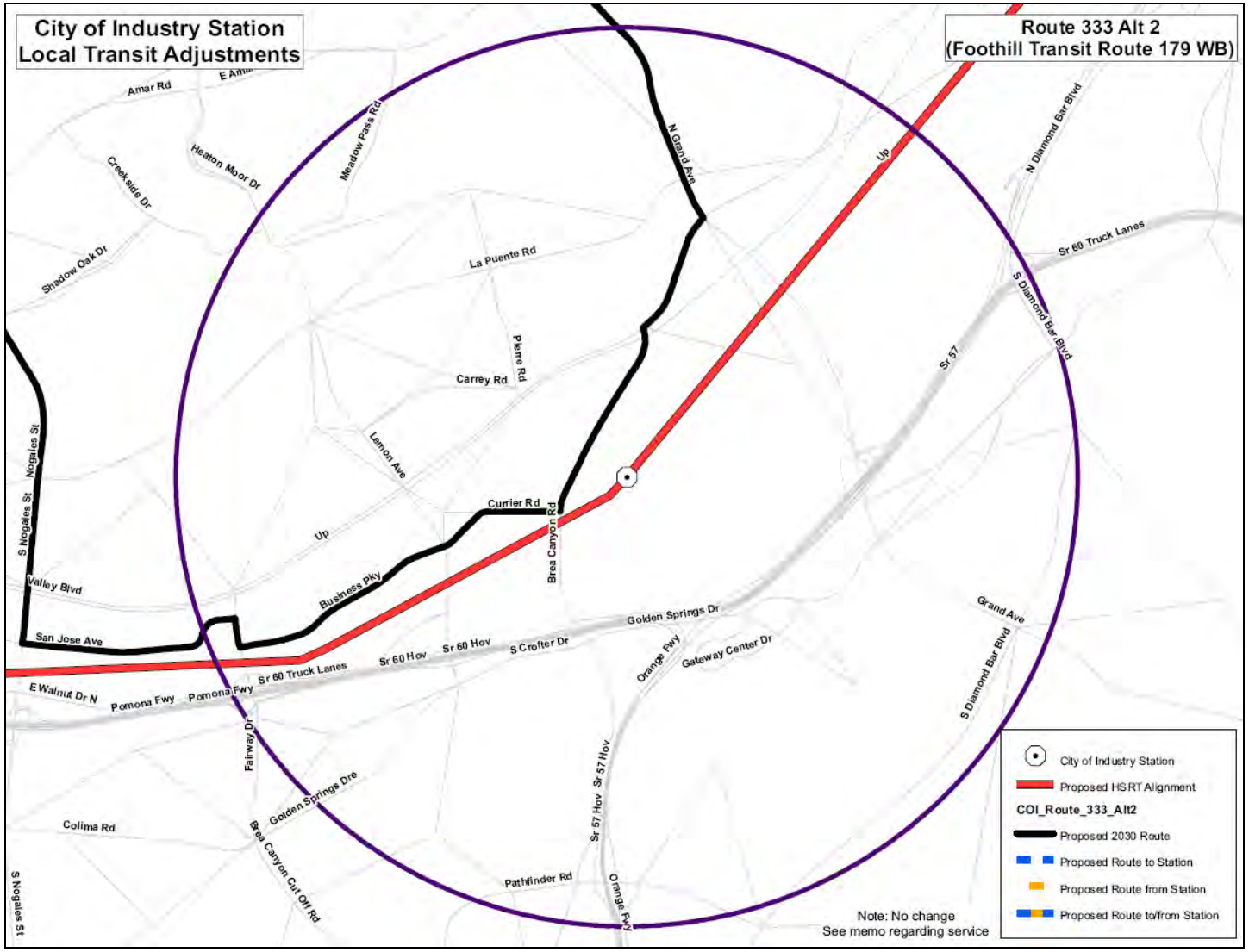
Source: SCAG Regional Travel Demand Model.

Figure 4.54 Adjustment to Foothill Transit Route 179, Westbound



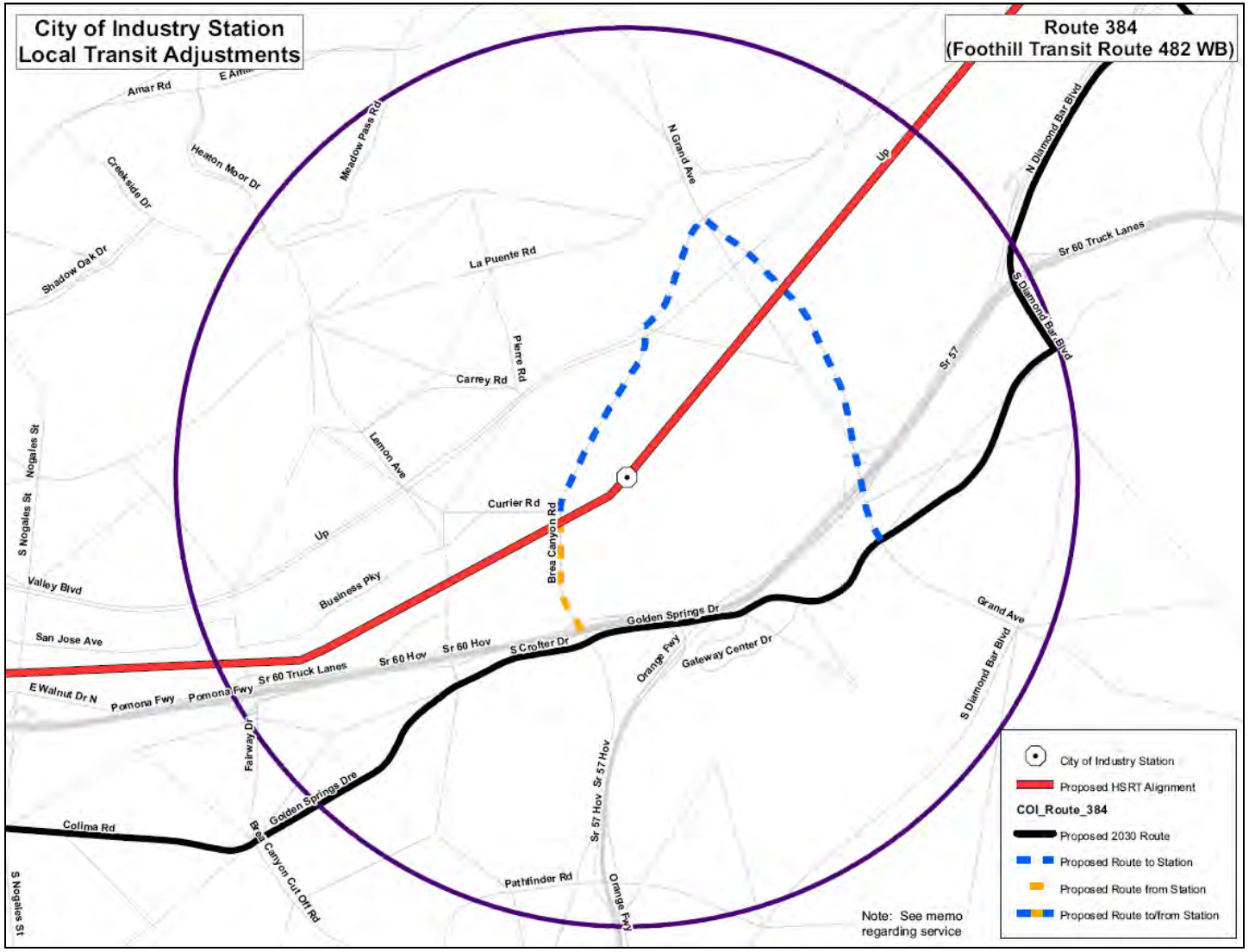
Source: SCAG Regional Travel Demand Model.

Figure 4.55 Adjustment to Foothill Transit Route 179, Westbound



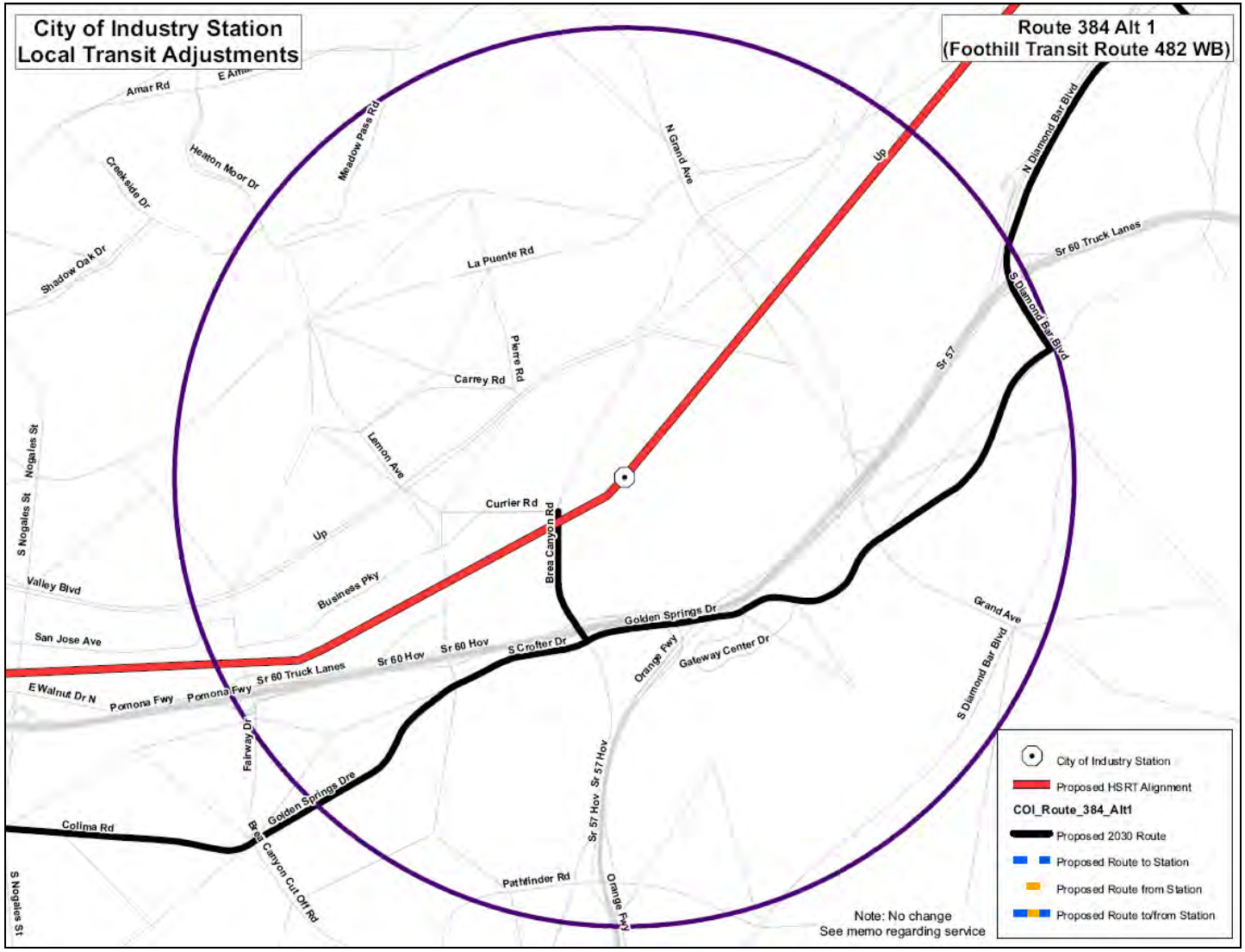
Source: SCAG Regional Travel Demand Model.

Figure 4.56 Adjustment to Foothill Transit Route 482, Westbound



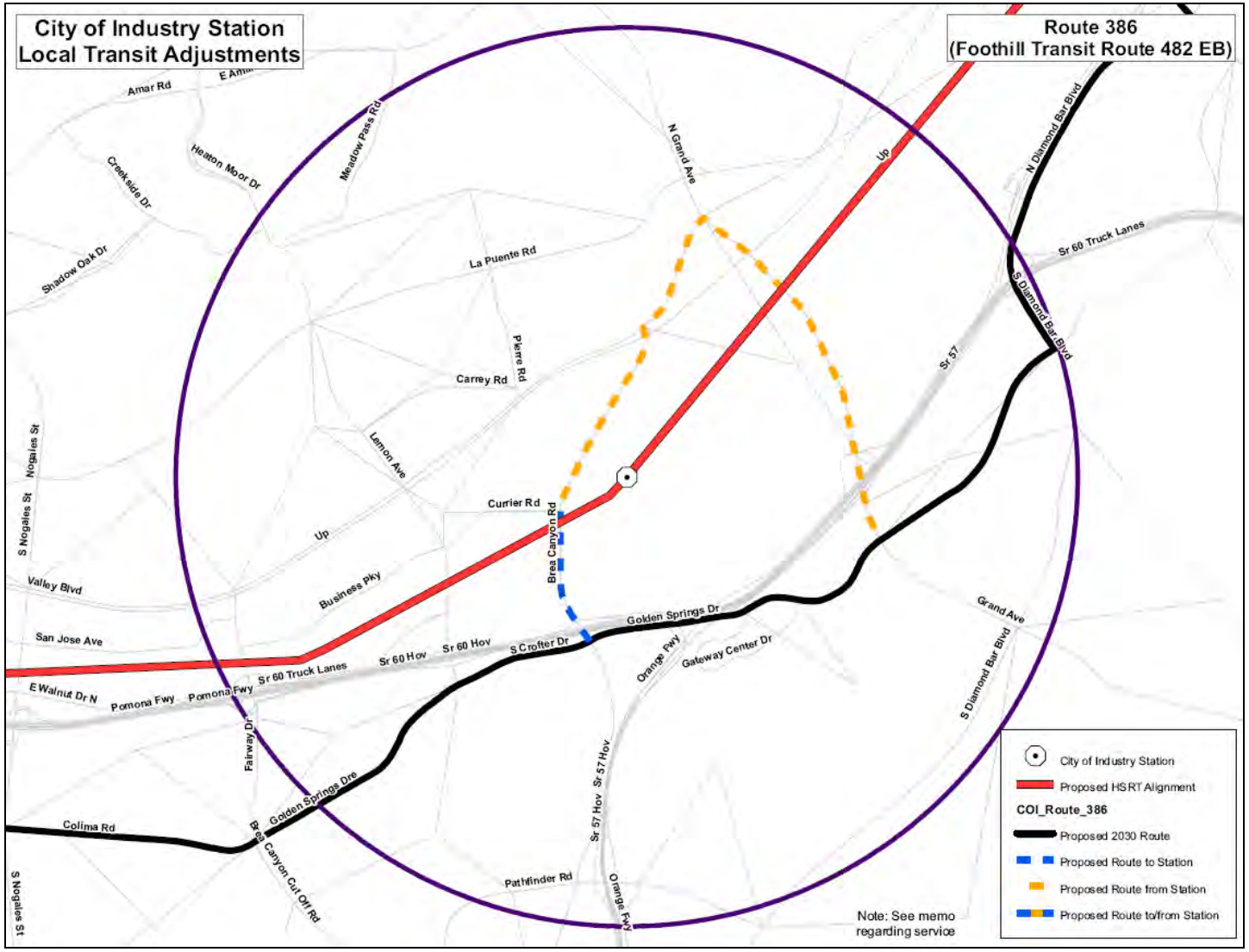
Source: SCAG Regional Travel Demand Model.

Figure 4.57 Adjustment to Foothill Transit Route 482, Westbound



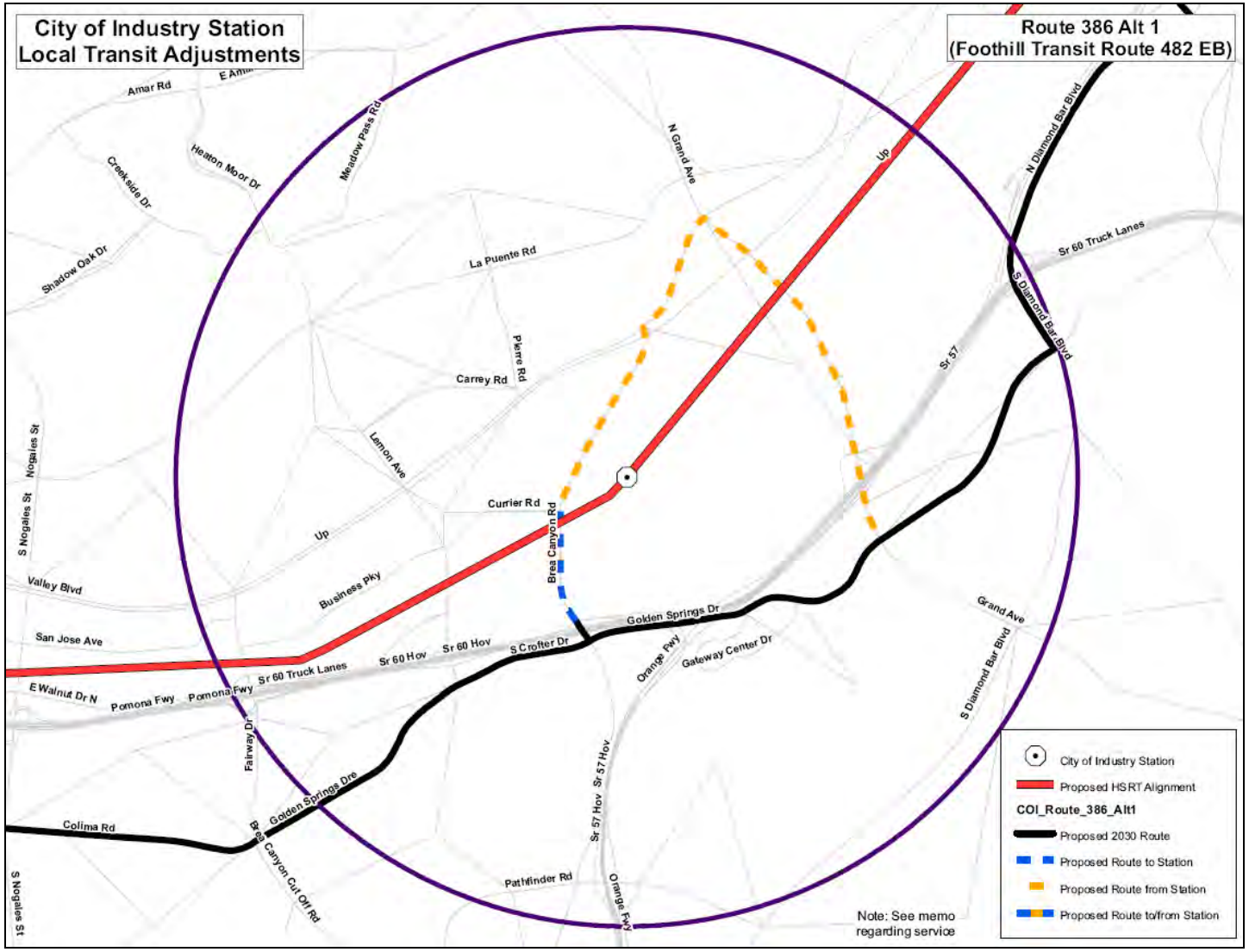
Source: SCAG Regional Travel Demand Model.

Figure 4.58 Adjustment to Foothill Transit Route 482, Eastbound



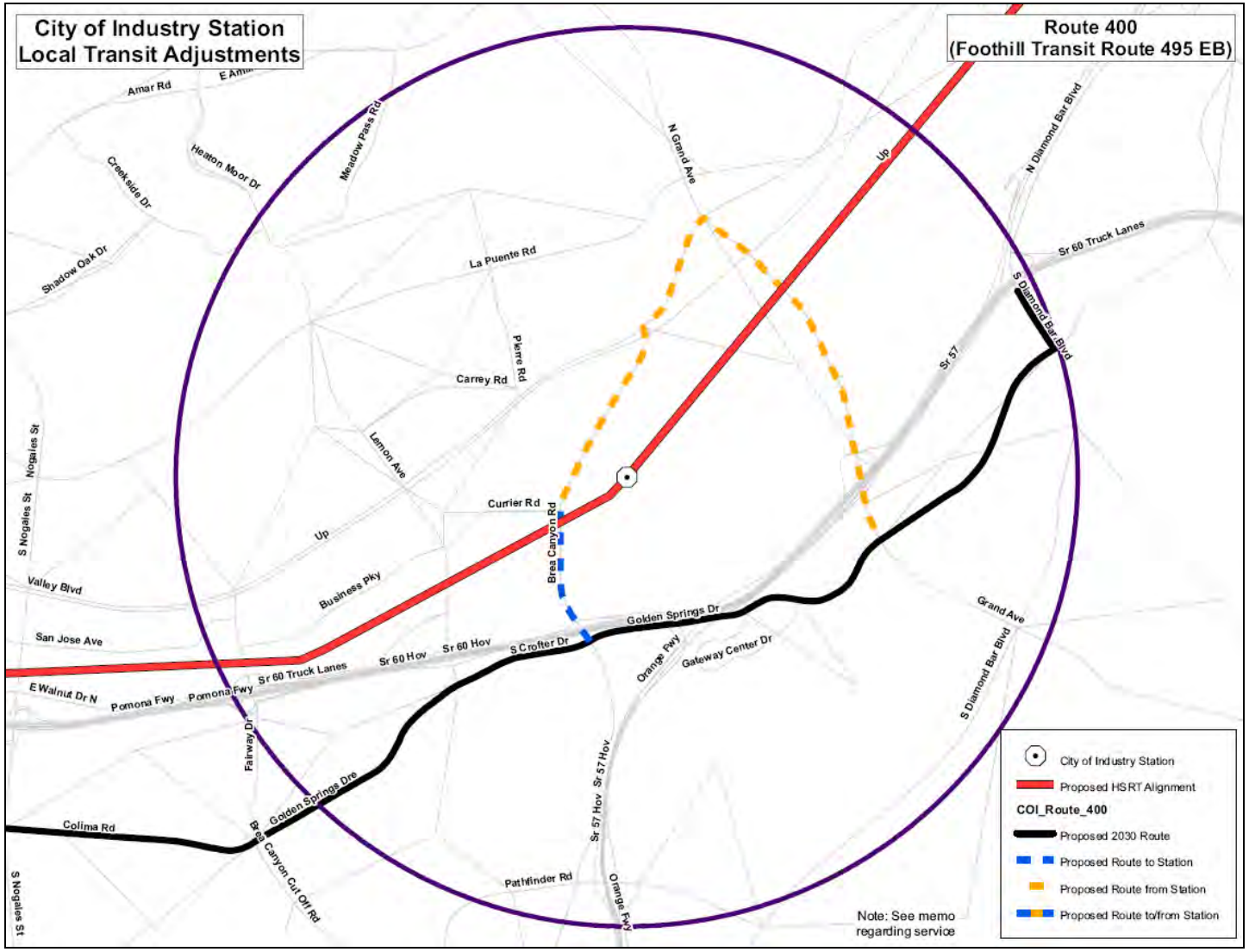
Source: SCAG Regional Travel Demand Model.

Figure 4.59 Adjustment to Foothill Transit Route 482, Eastbound



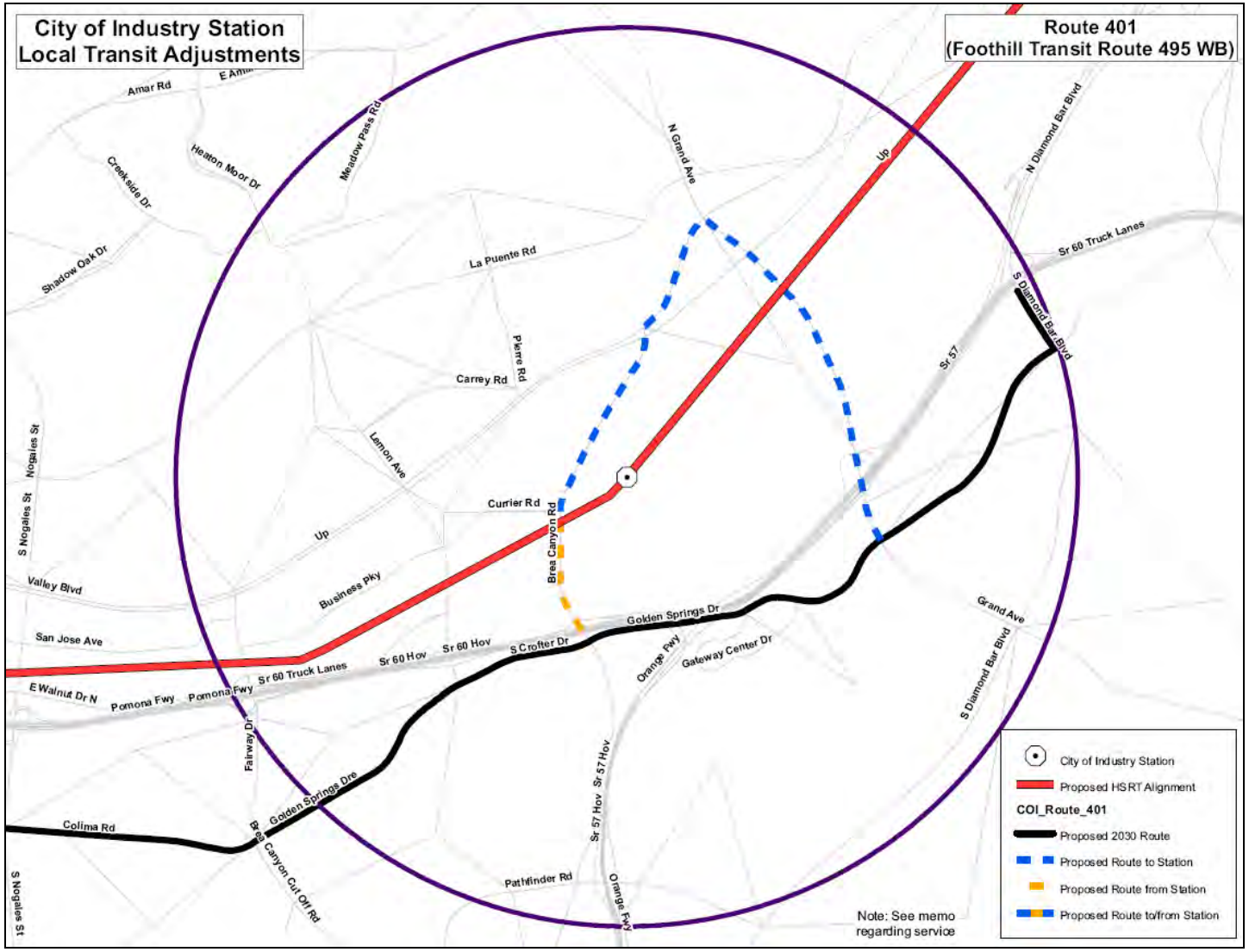
Source: SCAG Regional Travel Demand Model.

Figure 4.60 Adjustment to Foothill Transit Route 495, Eastbound



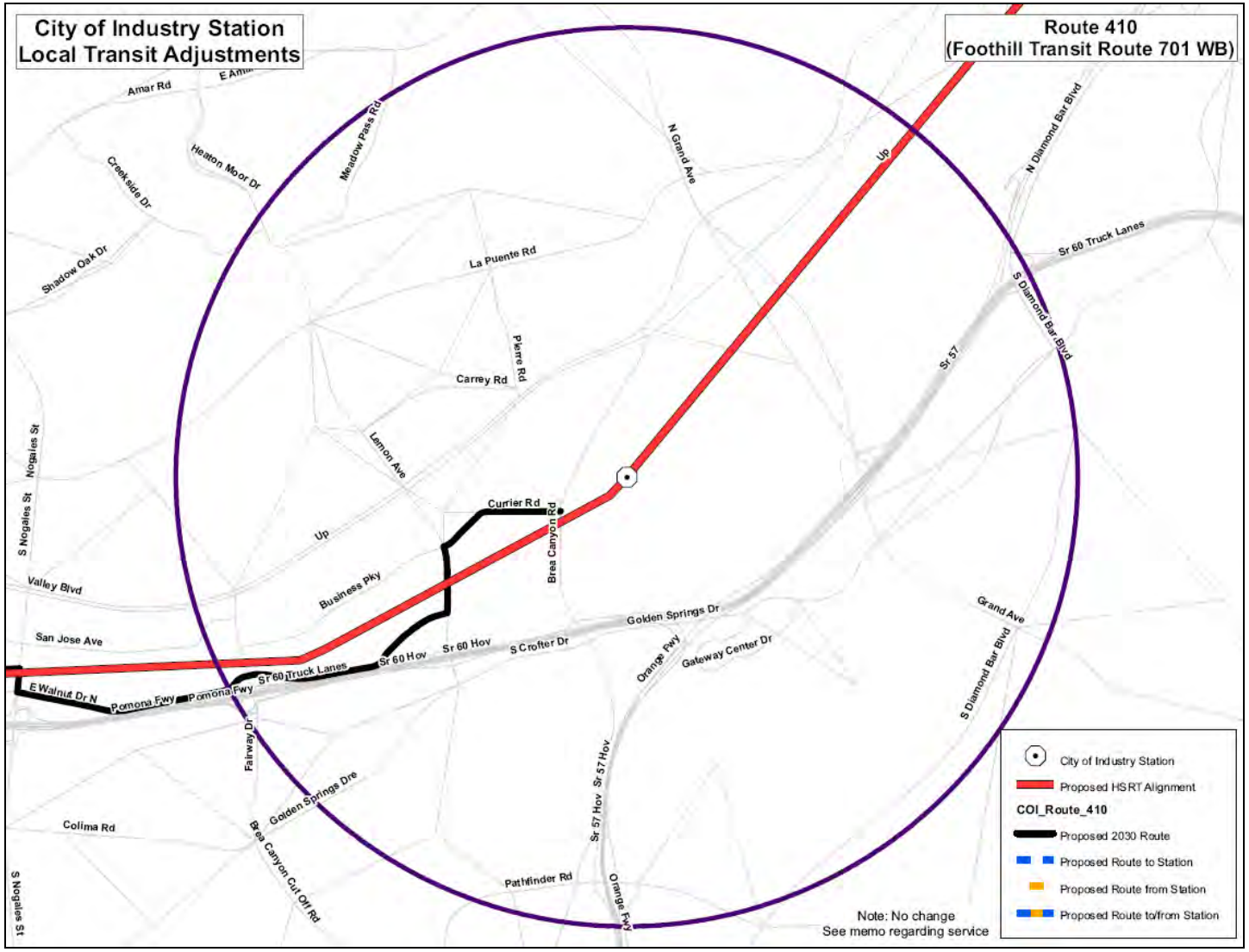
Source: SCAG Regional Travel Demand Model.

Figure 4.61 Adjustment to Foothill Transit Route 495, Westbound



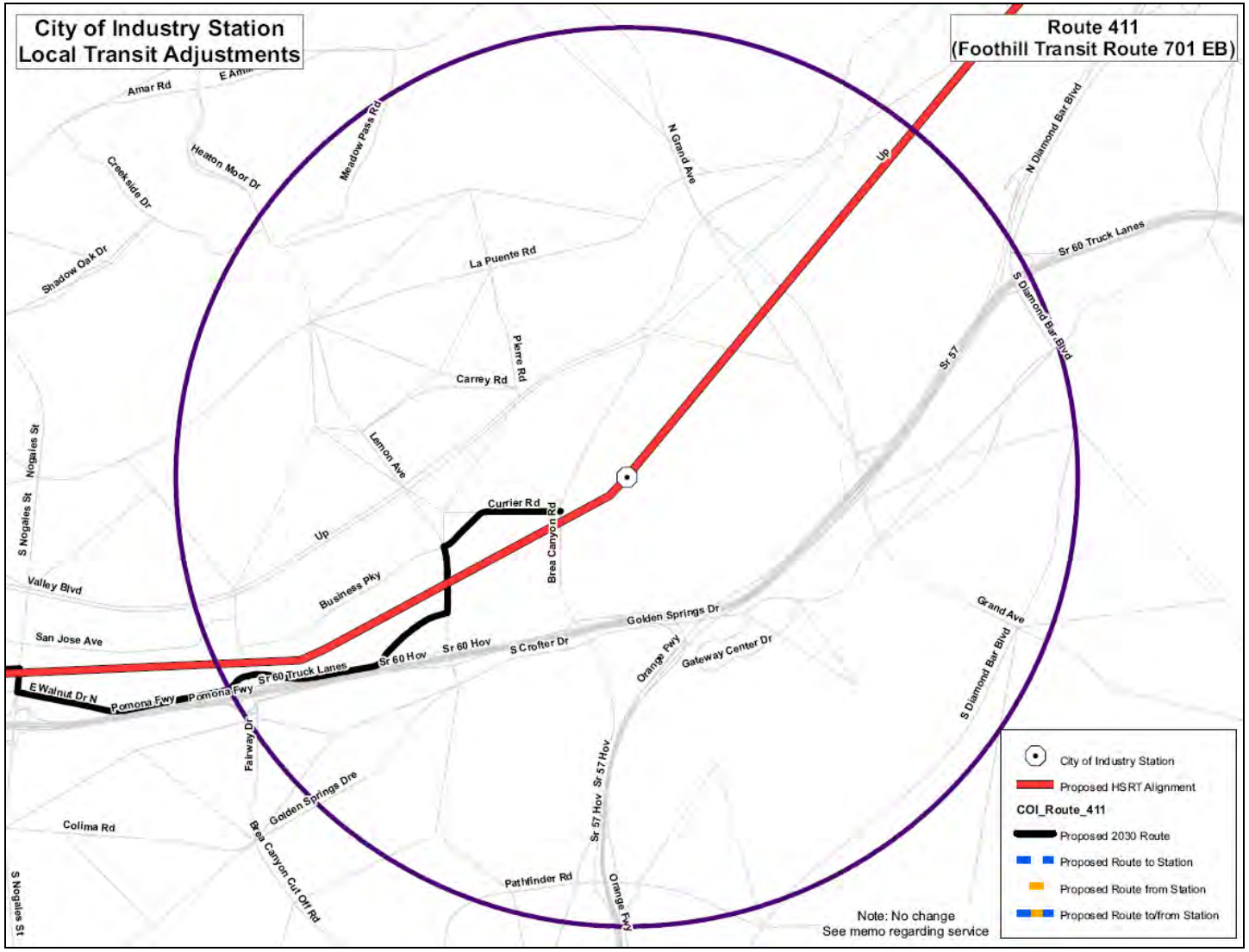
Source: SCAG Regional Travel Demand Model.

Figure 4.62 Adjustment to Foothill Transit Route 701, Westbound



Source: SCAG Regional Travel Demand Model.

Figure 4.63 Adjustment to Foothill Transit Route 701, Eastbound

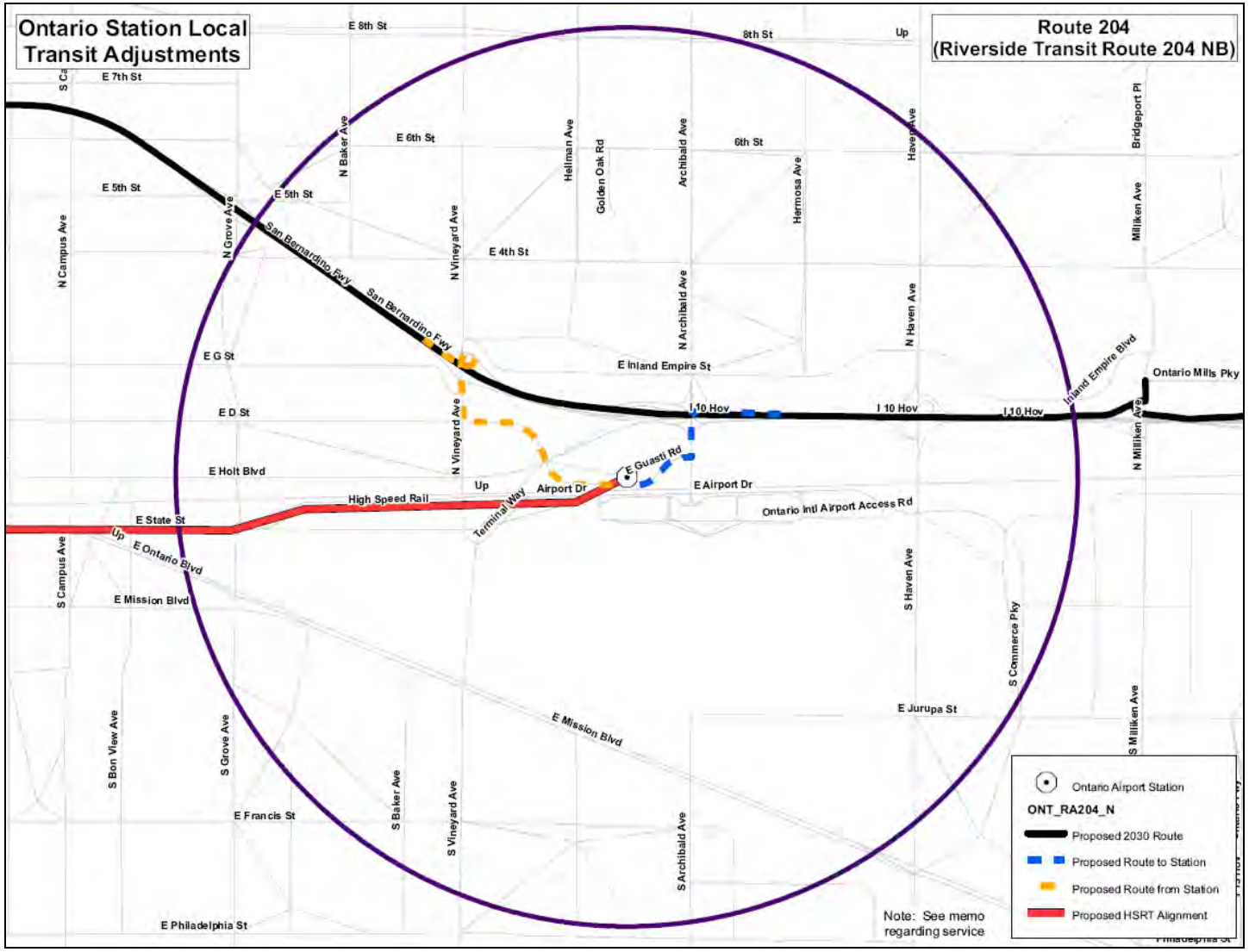


Source: SCAG Regional Travel Demand Model.

4.3 ADJUSTMENTS TO LOCAL TRANSIT – ONTARIO AIRPORT

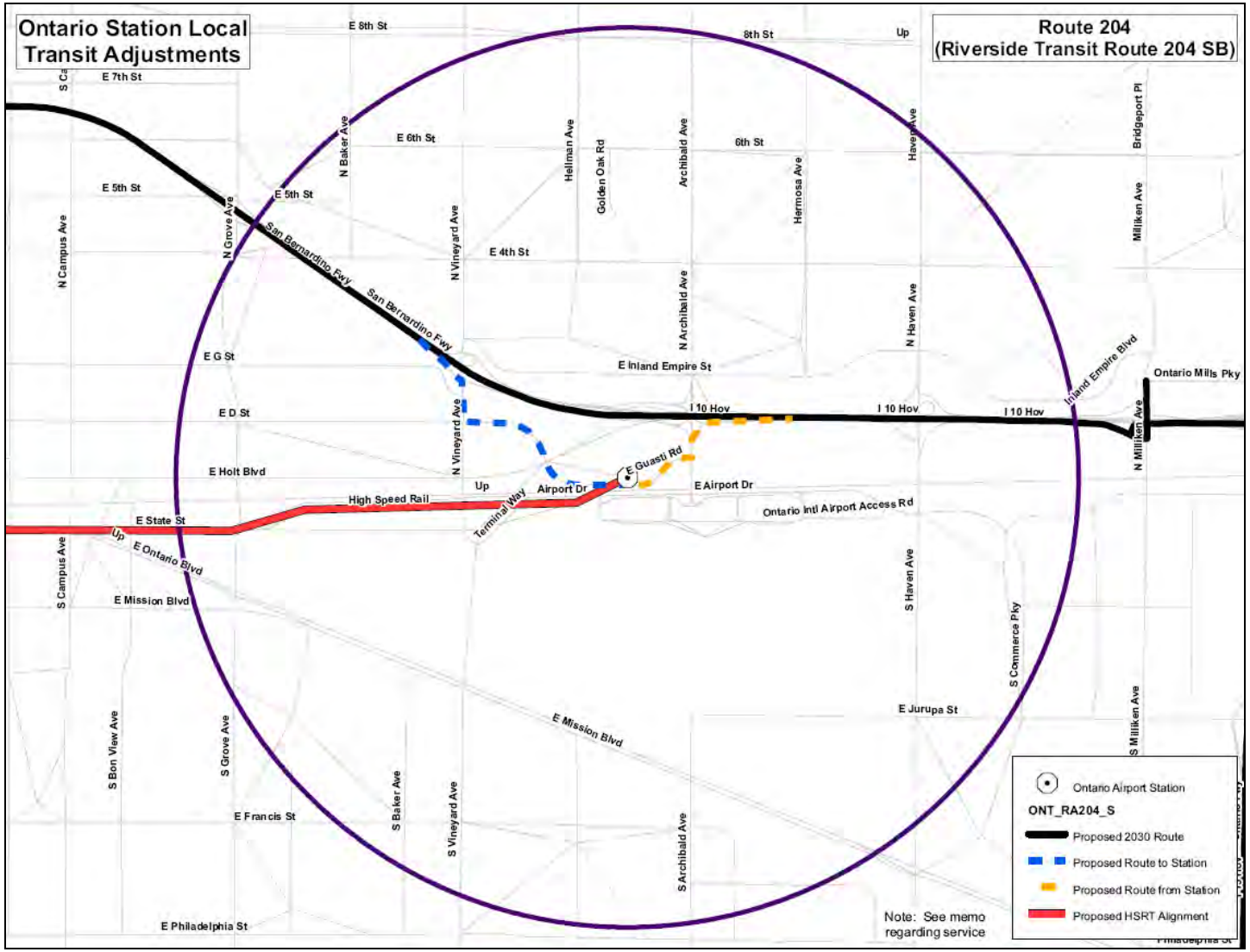
Year 2025 transit routes in the vicinity of the proposed Ontario Airport HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 4.64 to Figure 4.75. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 4.64 Adjustment to Riverside Transit Route 204, Northbound



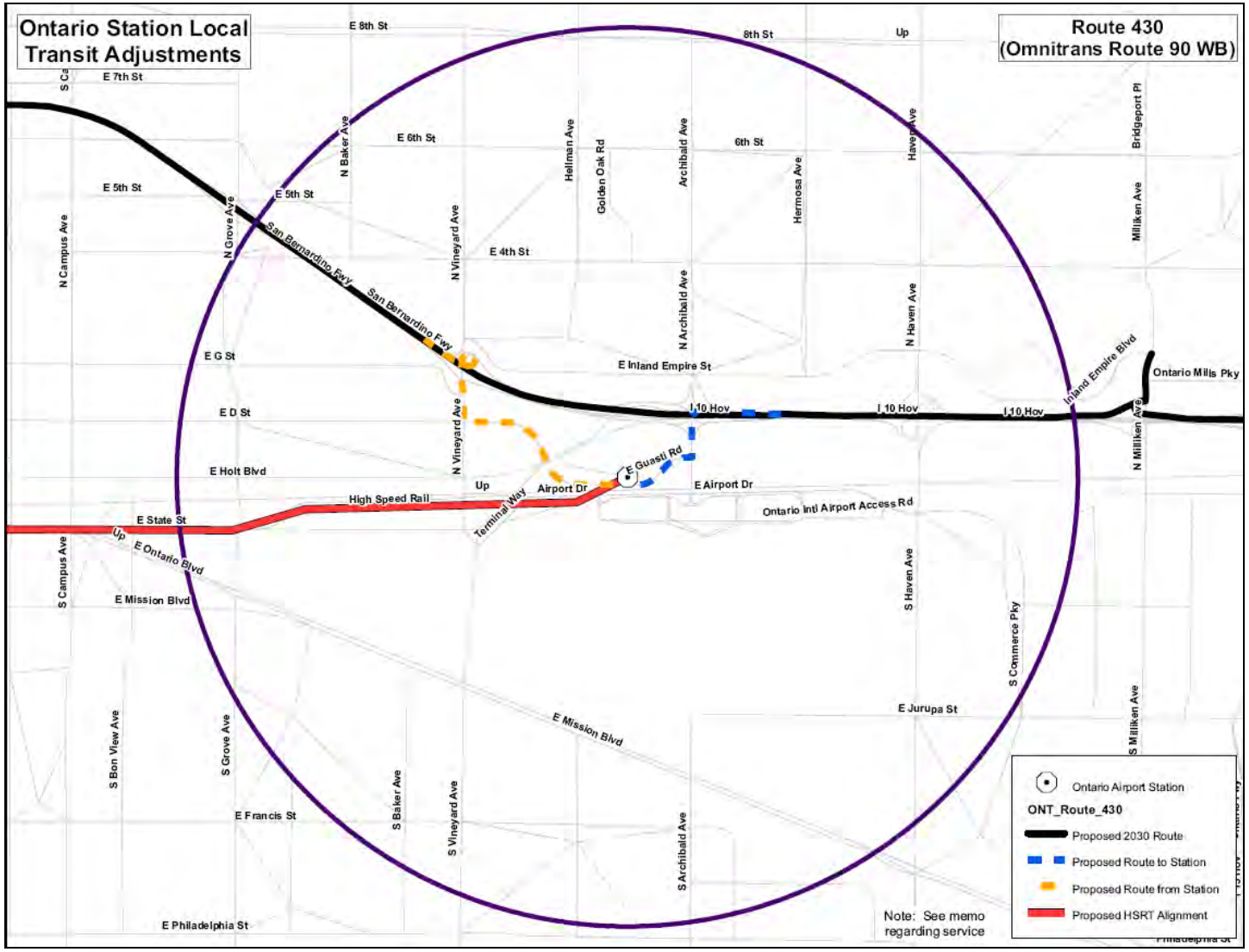
Source: SCAG Regional Travel Demand Model.

Figure 4.65 Adjustment to Riverside Transit Route 204, Southbound



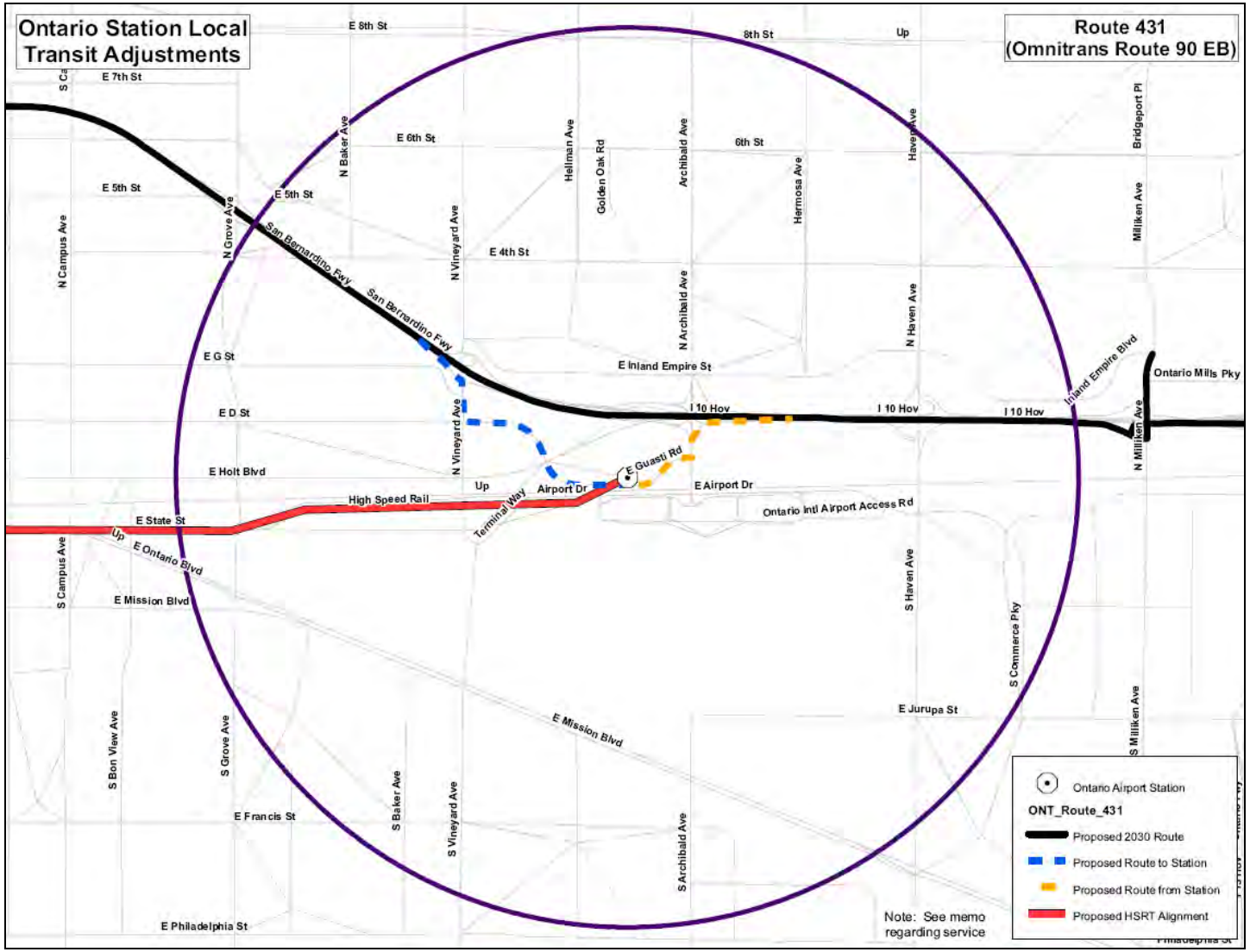
Source: SCAG Regional Travel Demand Model.

Figure 4.66 Adjustment to Omnitrans Route 90, Westbound



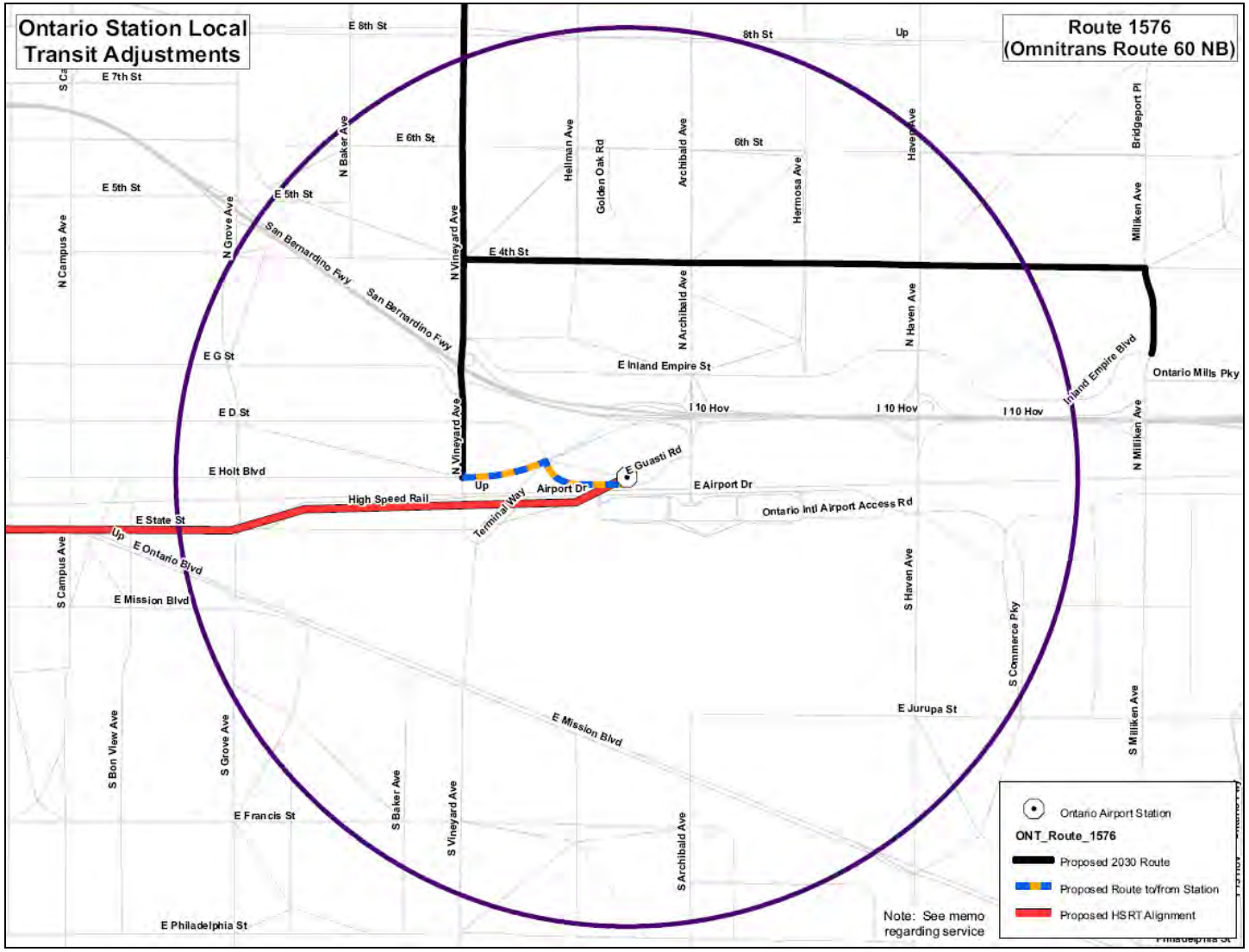
Source: SCAG Regional Travel Demand Model.

Figure 4.67 Adjustment to Omnitrans Route 90, Eastbound



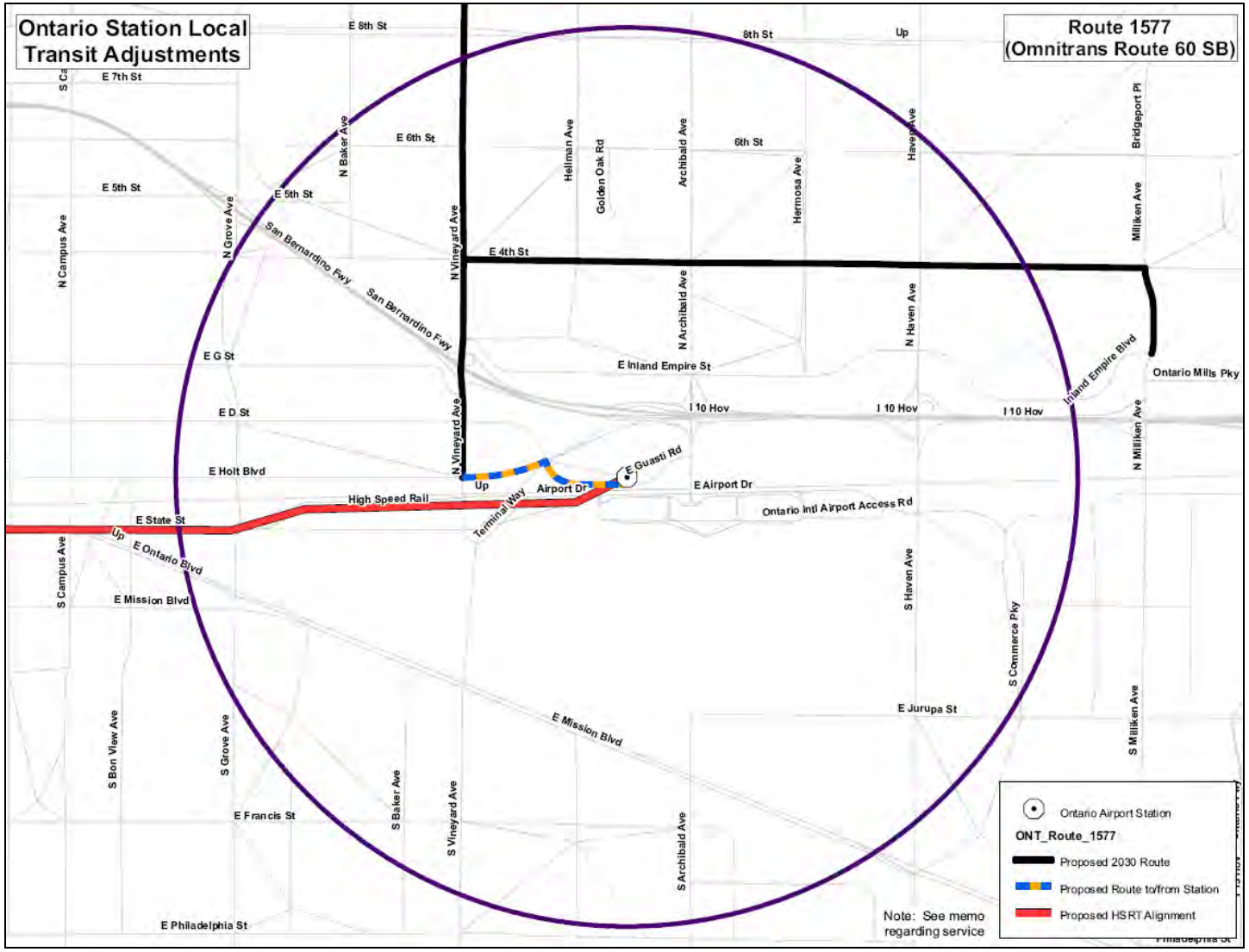
Source: SCAG Regional Travel Demand Model.

Figure 4.68 Adjustment to Omnitrans Route 60, Northbound



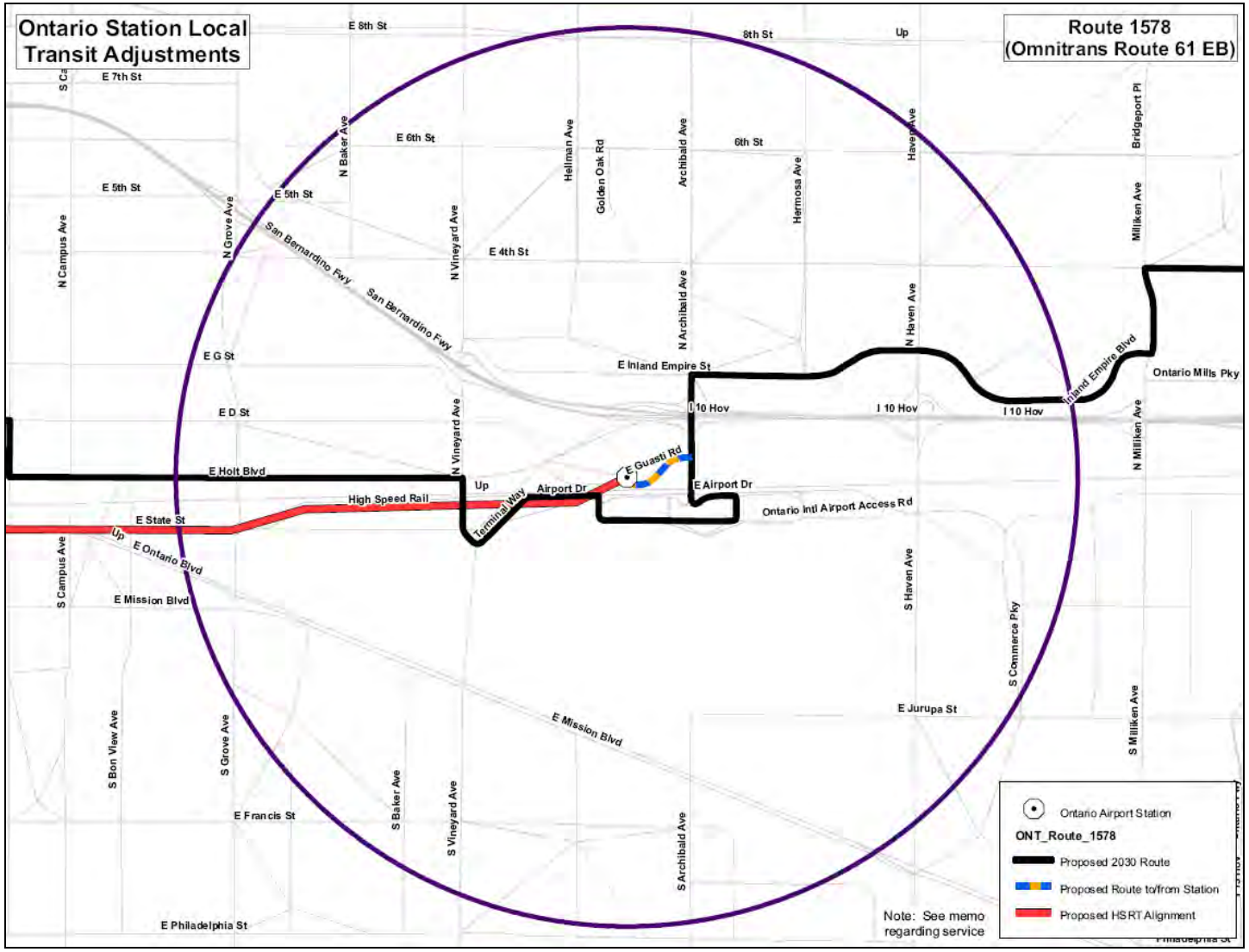
Source: SCAG Regional Travel Demand Model.

Figure 4.69 Adjustment to Omnitrans Route 60, Southbound



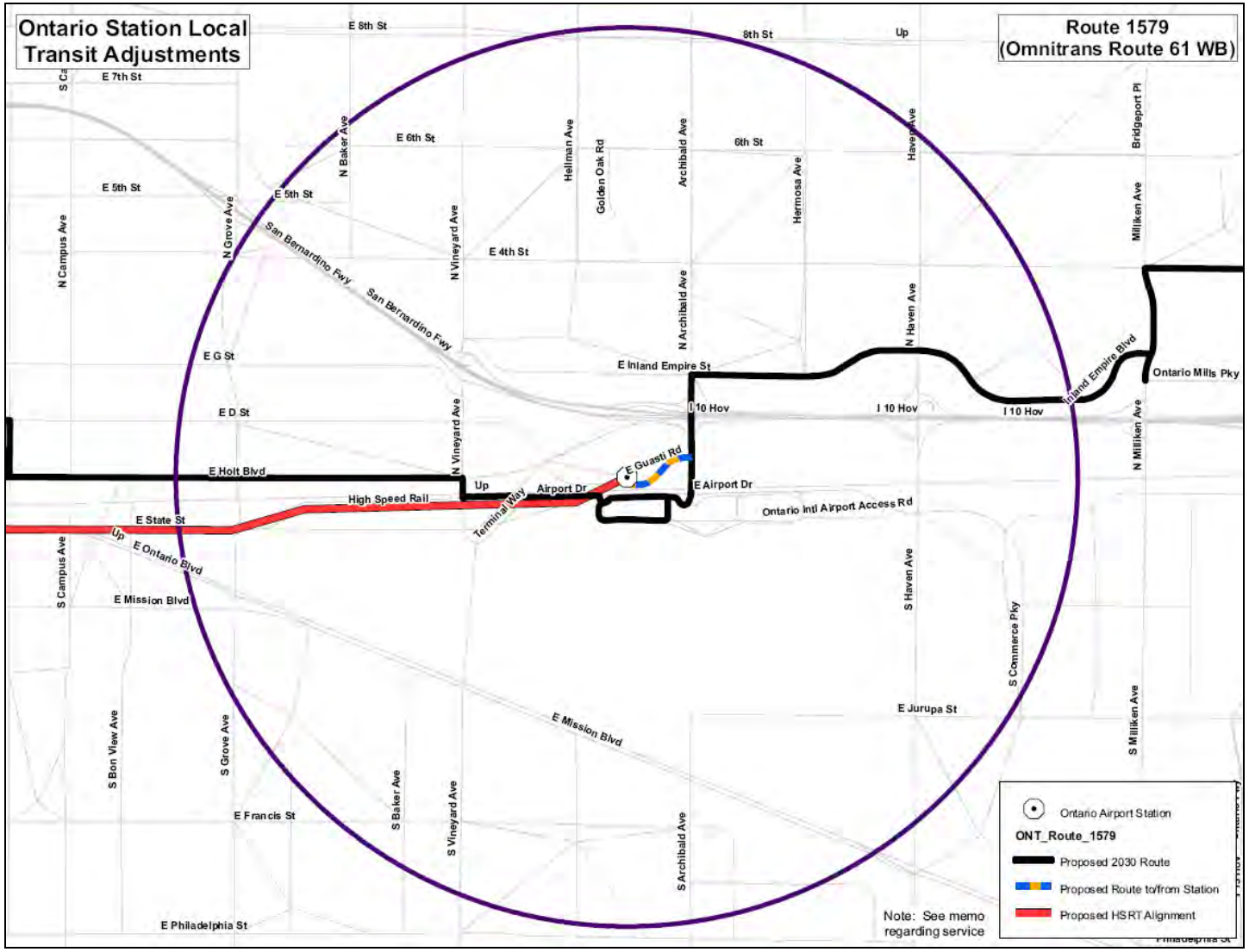
Source: SCAG Regional Travel Demand Model.

Figure 4.70 Adjustment to Omnitrans Route 61, Eastbound



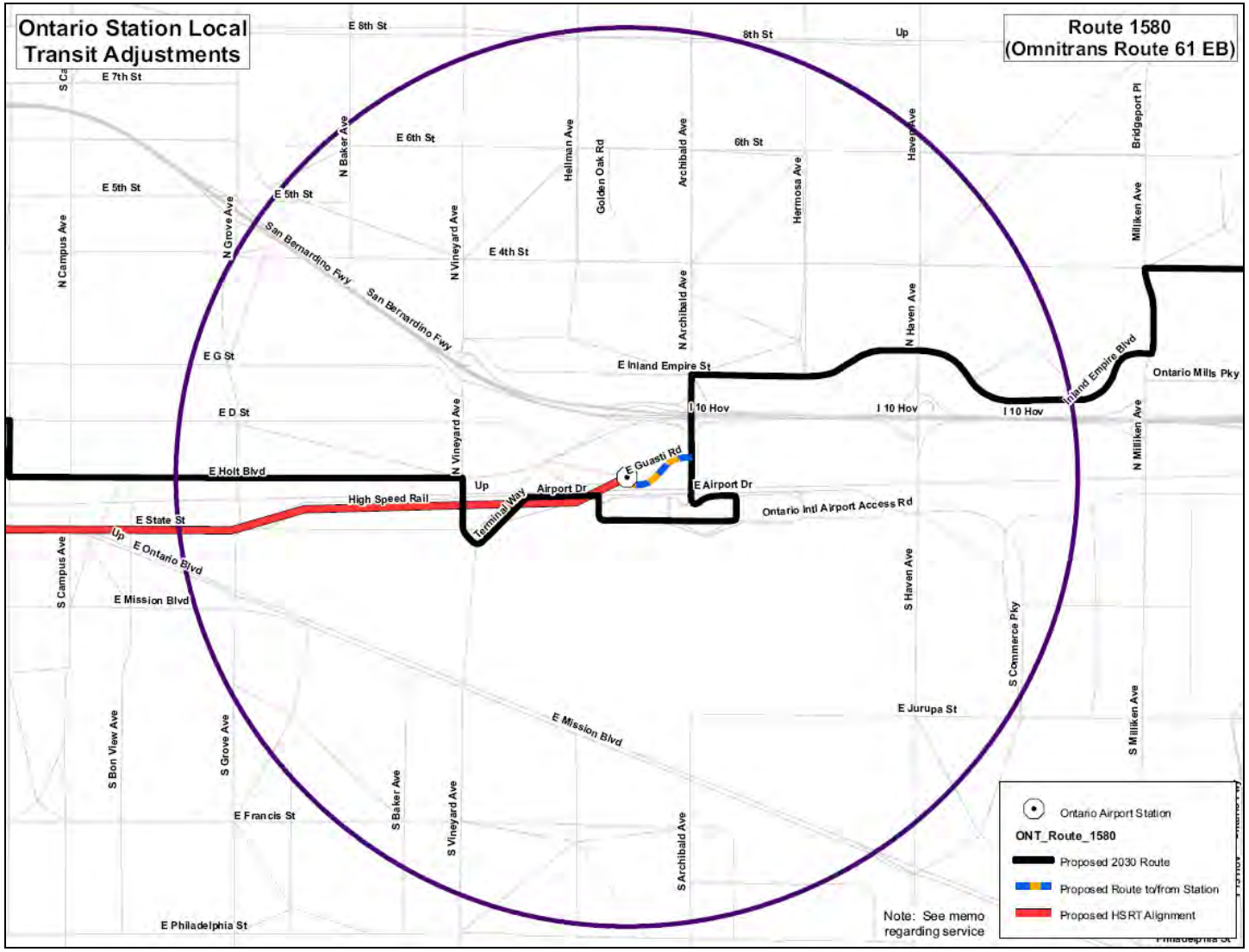
Source: SCAG Regional Travel Demand Model.

Figure 4.71 Adjustment to Omnitrans Route 61, Westbound



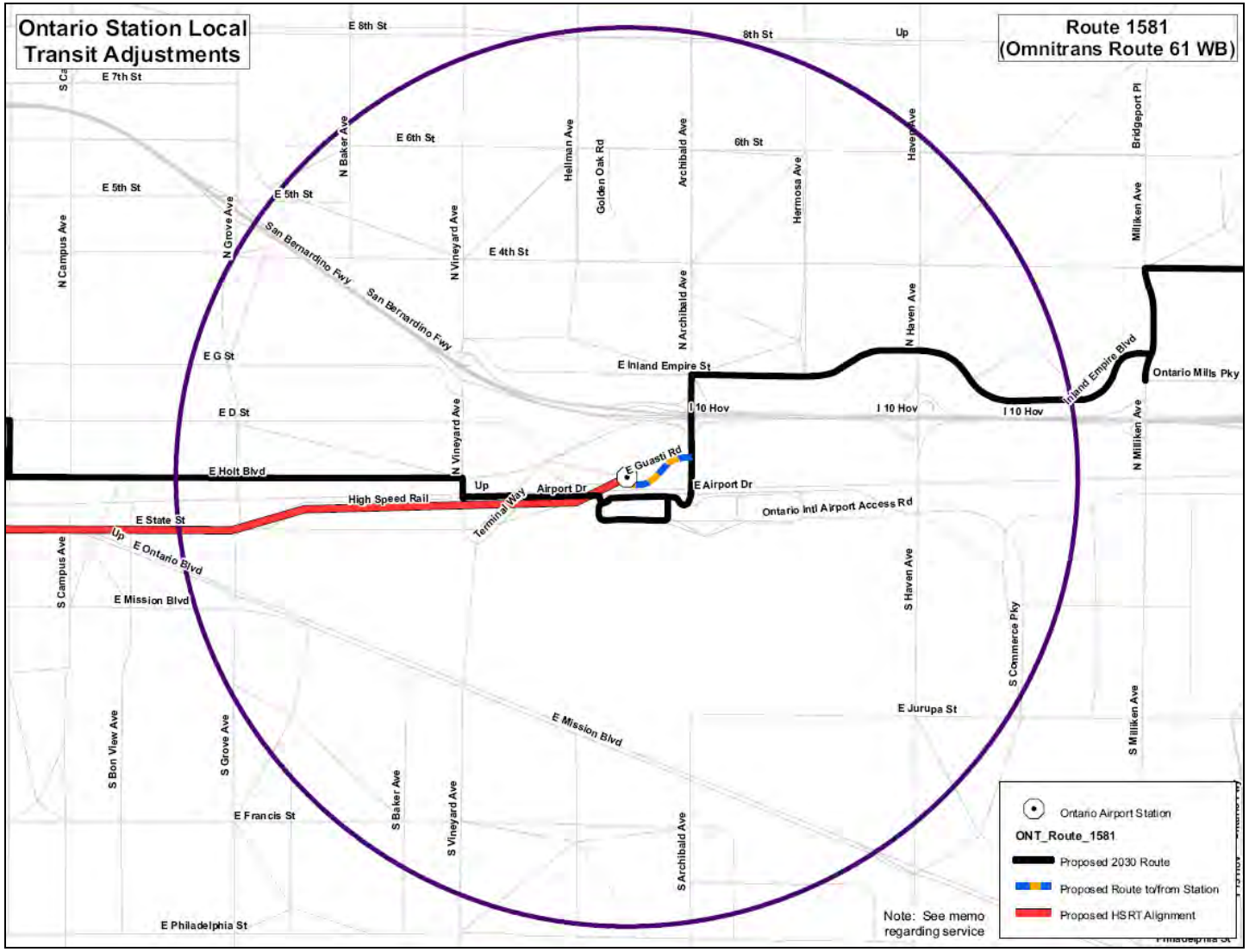
Source: SCAG Regional Travel Demand Model.

Figure 4.72 Adjustment to Omnitrans Route 61, Eastbound



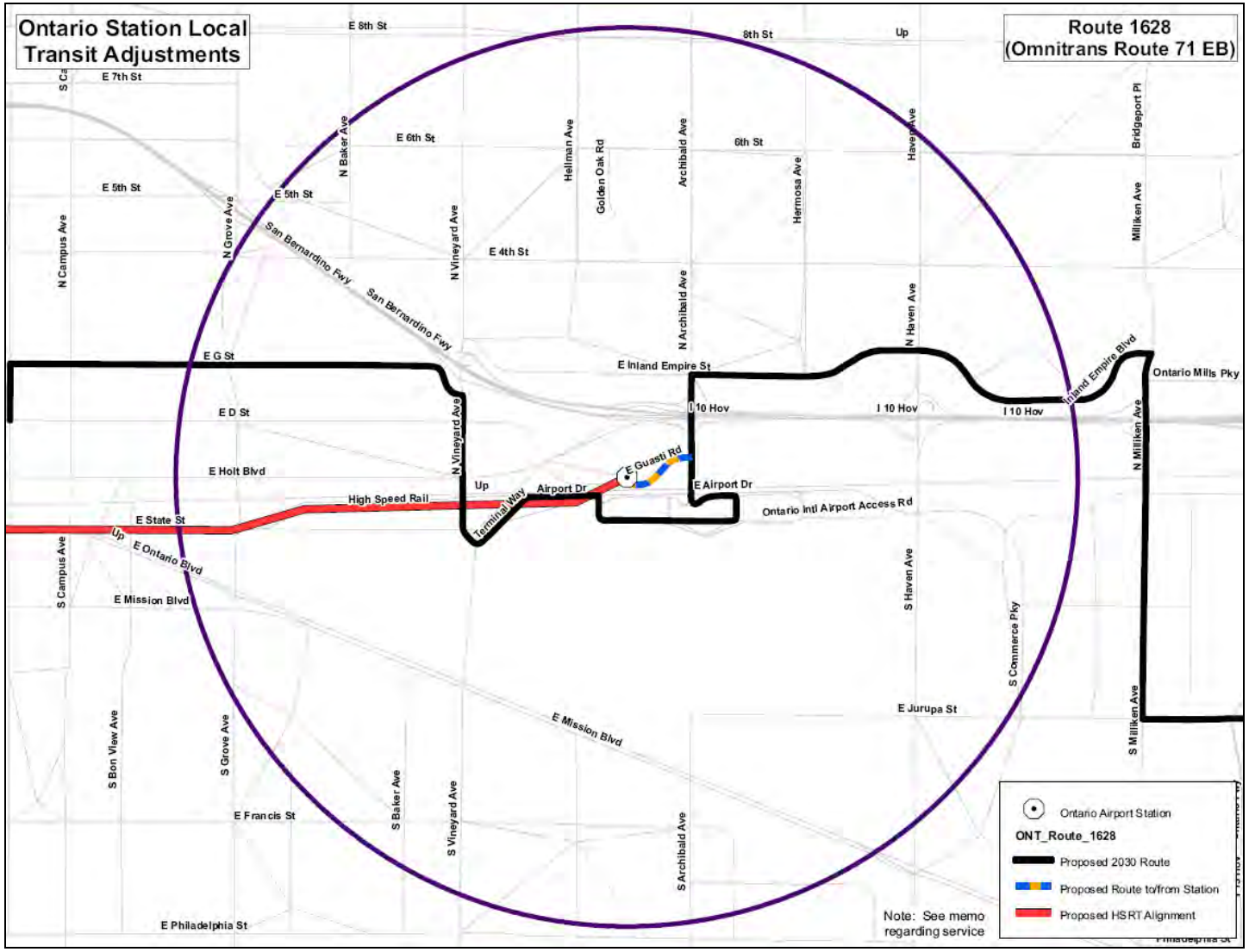
Source: SCAG Regional Travel Demand Model.

Figure 4.73 Adjustment to Omnitrans Route 61, Westbound



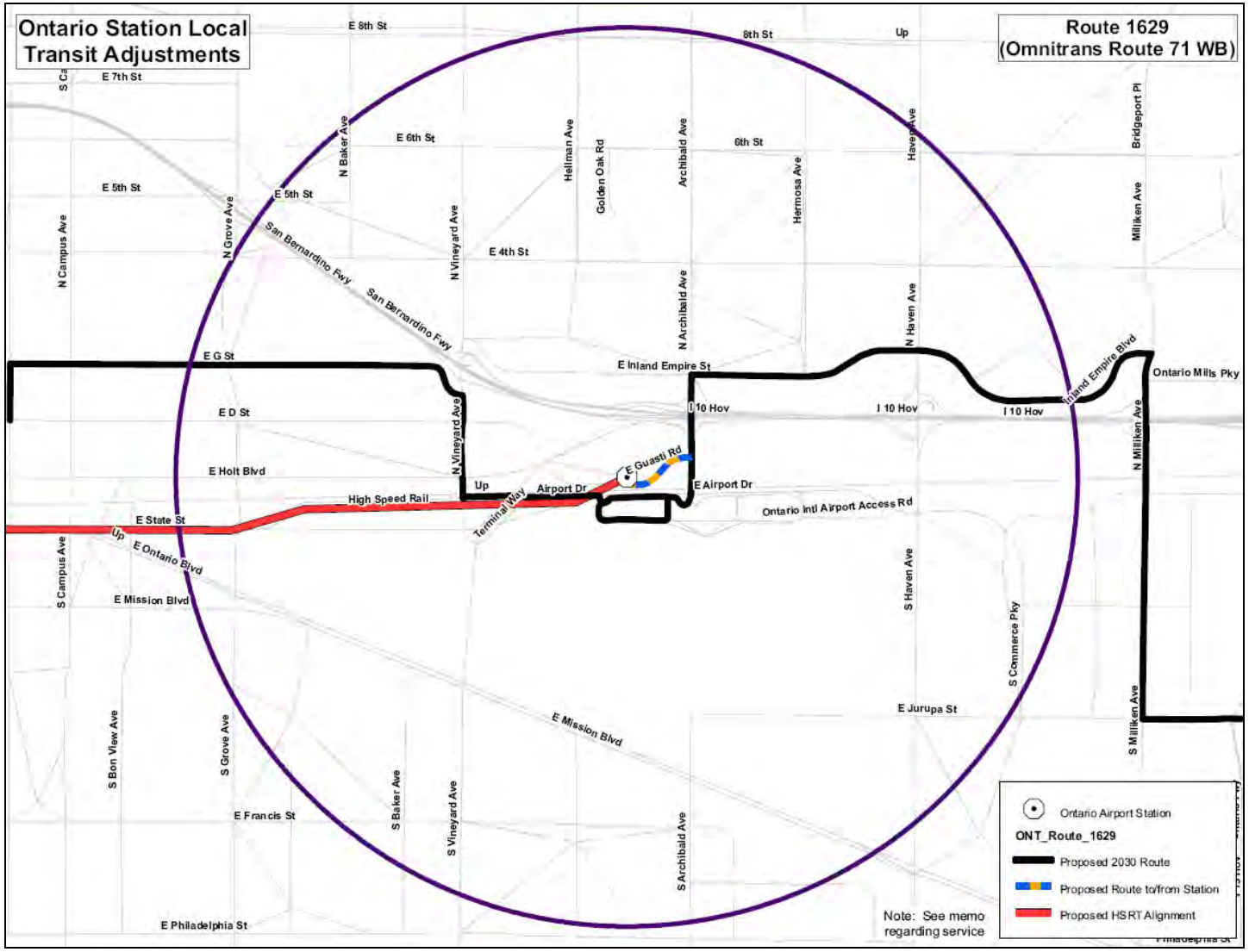
Source: SCAG Regional Travel Demand Model.

Figure 4.74 Adjustment to Omnitrans Route 71, Eastbound



Source: SCAG Regional Travel Demand Model.

Figure 4.75 Adjustment to Omnitrans Route 71, Westbound



Source: SCAG Regional Travel Demand Model.

5.0 Comparison With California Maglev Deployment Program Ridership Results

The last analysis of high-speed rail ridership in the IOS corridor was conducted as part of the California Maglev Deployment Program (CMDP). This study was developed by Parsons Transportation Group for the California Business, Transportation and Housing Agency; California High Speed Rail Authority (CHSRA), and the Southern California Association of Governments (SCAG). The CMDP results, shown in this appendix, come from *California Maglev Deployment Program, Preliminary Ridership and Revenue Forecasts, June 2000*.

Prior to the High-Speed Regional Transportation System Alternatives Analysis (HSRT AA), the CMDP ridership analysis had been regarded as the only official forecast for a high-speed rail system in the IOS corridor. Although the HSRT AA Detailed Workplan does not specify that results from the current study be compared or reconciled with the previous study, many stakeholders reviewing this current study (HSRT AA) are likely to make comparisons and have legitimate questions regarding significant differences between the results from the two studies, especially with regard to ridership. Anticipating these questions, this section summarizes the previous study's results and provides some reconciliation.

The CMDP estimated ridership in the year 2020 for a high-speed Maglev system operating from Los Angeles International Airport (LAX) to March Inland Port (formerly March Air Force Base). Five primary alternatives were considered (see Table 5.1). Of these, CMDP Alternative 5 closely matches the HSRT AA Maglev on UPRR Alternative between West Los Angeles (West LA) and Ontario, both having stations at West LA, Los Angeles Union Station (LAUS), City of Industry and Ontario Airport. The CMDP analyzed Alternative 5 under a variety of modeling assumptions. Of these, extensive ridership information was provided for Alternative 5mc. Comparisons of ridership from this point forward therefore compare CMDP Alternative 5mc with the HSRT AA Maglev on UPRR Alternative. It is worth noting that of the CMDP alternatives, Alternative 5mc has the highest ridership.

Table 5.1 CMDP Station Locations by Alternative

Stations	CMDP Alternative				
	1	2	3	4	5
LAX	No-Build	X	X	X	X
West LA					X
Union Station		X	X	X	X
West Covina				X	
City of Industry		X			X
Irwindale			X		
Ontario Airport		X	X	X	X
Downtown Riverside		X	X	X	X
March Inland Port		X	X	X	X

5.1 DIFFERENCES IN ASSUMPTIONS

The analytical methodology and implementation used by Parsons Transportation Group in its ridership forecast for the CMDP were rigorous and state-of-the-practice. However, several of the operating and modeling assumptions made in the CMDP differ from those in the HSRT AA. Most of the differences in the ridership results between the two studies can be explained with a careful comparison of the two set of assumptions. This section presents this comparison by systematically deconstructing the previous CMDP ridership forecast.

Table 5.2 summarizes the key differences in operating and modeling assumptions between the HSRT AA and the CMDP. See Section 6.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009* for a more complete discussion of the travel time assumptions used in the HSRT AA. See Section 8.2 regarding the assumptions for the other operating parameters. See Section 7.0 regarding Smart Shuttles. See Section 8.1, Travel Demand Models, regarding the high-speed rail modal constant.

Table 5.2 Key Differences Between HSRT AA and CMDP Ridership Analyses

	HSRT AA Maglev on UPRR	CMDP Alternative 5mc
Stations	West LA, LAUS, City of Industry, Ontario	LAX, West LA, LAUS, City of Industry, Ontario, Riverside, March
Travel Time (West LA to Ontario)	33 minutes	37 minutes*
Peak Fares (2007$)	$10.91-$13.36, average $11.90	$12.34-19.40, average $14.70
Off-peak Fares (2007$)	Same as above	$9.47-15.77, average $11.60
Peak Headway	15 min	5 min
Off-peak Headway	20 min	10 min
Parking Cost	$10.60 at LA Union Station,** $2.50 at other stations	Free
Time from Parked Car to Station Platform	4 min at LA Union Station,** 5 min at other stations	1 minute
Smart Shuttles	No	Yes
High-Speed Rail Modal Constant	Same as Commuter Rail	Higher than Commuter Rail

*From the Lockheed Martin – IBI Final Milestone 2 Report, July 2003.

**Value from SCAG Regional Travel Demand Model.

5.2 COMPARING RIDERSHIP RESULTS

For Alternative 5mc, the CMDP forecast 91,570 boardings per day in 2020. However, this figure includes stations at LAX, Downtown Riverside, and March Inland Port – stations which are not included in the HSRT AA Maglev on UPRR Alternative. Table 6-8, page 6-25 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000*, shows projected ridership by station-to-station pair. Using this table, we could remove the effects of LAX, Downtown Riverside, and March Inland Port. Doing so results in a forecast of 40,780 boardings per day in 2020.

The CMDP also tested the ridership impact of various sensitivities (see pages 6-8 to 6-10 and Table 6-4 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000):*

1. Using the same modal constant for high-speed rail as commuter rail rather than an improved one reduces daily ridership by 35 percent;
2. Adding a $5.00 parking cost (1989 dollars) at all stations reduces daily ridership by 31 percent;
3. Removing Smart Shuttles reduces daily ridership by nine percent;

4. Increasing the time to walk from a parked car to the station from 1 minute to 5 minutes reduces daily ridership by 18 percent; and
5. Decreasing train frequency to three per hour reduces daily ridership by 19 percent.

To estimate the ridership impact on CMDP results of imposing a $2.50 parking cost rather than $5.00, we reduced the parking reduction percent by 50 percent, to 16 percent.

Combining all of the above sensitivities together results in a set of operating and model assumptions that are much more similar to those made for the HSRT AA. The result of this exercise is shown in Table 5.3, and results in CMDP average daily ridership in 2020 for Alternative 5mc of 13,520, about 15 percent higher than the HSRT AA year 2035 forecast for the Maglev on UPRR Alternative. It is important to note that the CMDP did not conduct a sensitivity test with all of the above sensitivity scenarios combined. If they had done such a test, it may likely have resulted in ridership figures different from those shown in Table 5.3. However, the results in Table 5.3 provide a sense of how large the CMDP ridership might have been if it had included all the sensitivity scenarios and thus generated a result more consistent with the HSRT AA assumptions.

Table 5.3 CMDP Alternative 5mc Ridership Result Adjusted to be More Consistent with HSRT AA

Scenario	CMDP Estimated Ridership Reduction	Resulting Year 2020 Daily Ridership
CMDP Forecast for Alternative 5mc		91,570
Remove Riverside, March	-19%	74,490
Remove LAX	-45%	40,770
Reduce frequency to 3 per hour	-19%	32,940
Increase walk time from car to station to 5 minutes	-18%	27,080
Add $2.50 parking cost	-16%	22,850
Remove Smart Shuttle	-9%	20,790
High-speed rail has same modal constant as commuter rail	-35%	13,520
HSRT AA result for Maglev on UPRR Alternative (year 2035)		11,670

Source: Cambridge Systematics analysis using CMDP ridership reduction results for individual scenarios.

Based on this analysis, we conclude that the CMDP results for Alternative 5mc could be made consistent with the HSRT AA results for the Maglev on UPRR Alternative if similar operating and modeling assumptions are made. We note that the two largest impacts on ridership according to the CMDP are removing LAX and setting the high-speed rail modal constant equal to the commuter rail constant.

While the overall CMDP ridership results can be made consistent with the overall HSRT AA results, there are differences for individual ridership components. The HSRT AA ridership forecast is comprised of six potential sources of ridership:

1. Core daily ridership;
2. Air traveler trips;
3. Induced travel;
4. Special attractors;
5. Transfers to California – Nevada Maglev; and
6. Transfers to Intercity California High-Speed Rail System.

The below sections compare CMDP results for Items 2 to 6 above with HSRT AA results.

Air Traveler Trips

Air traveler trips are trips made by air travelers and their companions (i.e., drop-off and pick-up) to and from Ontario Airport. This category does not include trips made by employees working at Ontario Airport – these are covered by core daily ridership.

The CMDP estimates 27 percent of ridership for Alternative 5mc are air travelers (see Table 6-7 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000).* Applying this percentage to the estimated 13,520 total ridership (with operating and modeling assumptions made similar to HSRT AA) results in 3,710 air travelers in 2020. This is approximately 90 percent higher than the 1,890 figure forecast for year 2035 by the HSRT AA for the Maglev on UPRR Alternative. While this percentage difference is large, the magnitude of the difference is small relative to the total ridership forecast, and as a result, does not affect the overall results substantially.

Induced Travel

Induced travel are new trips that people decide to make because the HSRT system is available. For example, some people may decide to make a trip to a concert in Downtown Los Angeles they would not have otherwise.

The CMDP estimates four percent of ridership for Alternative 5mc are induced trips (see Table 6-7 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000).* Applying this percentage to the estimated 13,520 total ridership (with operating and modeling assumptions made similar to HSRT AA) results in 590 induced trips in 2020. This is similar to the HSRT AA result for the Maglev on AA Alternative for year 2035 of 530.

Special Attractors

These are trips to specific attractions that generate visitors episodically during the year (e.g., sporting events, amusement parks, museums, etc.).

The CMDP estimates seven percent of ridership for Alternative 5mc are to special attractors (see Table 6-7 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000).* Applying this percentage to the estimated 13,520 total ridership (with operating and modeling assumptions made similar to HSRT AA) results in 890 special attractor trips in 2020. This is approximately 15 times larger than the 60 figure forecast for year 2035 by the HSRT AA for the Maglev on UPRR Alternative. While this percentage difference is large, the magnitude of the difference is small relative to the total ridership forecast, and as a result, does not affect the overall results substantially. Furthermore, as explained in Section 8.3 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*, we believe an average daily forecast of HSRT trips to special attractors on the order of 100 is reasonable.

Transfers to California-Nevada Maglev

This category accounts for riders using the HSRT to access and transfer to a proposed Maglev system operating between Anaheim and Las Vegas.

The CMDP did not include the California-Nevada Maglev system, so no riders were included in its forecasts for this source of ridership.

Transfers to Intercity California High-Speed Rail

This category accounts for riders using the HSRT to access and transfer to the proposed Phase 1 California High-Speed Rail (CHSR) system operating between Anaheim and Northern California.

The CMDP did not include the California-Nevada Maglev system, so no riders were included in its forecasts for this source of ridership.

6.0 Capital Cost – Details

The High-Speed Regional Transportation (HSRT) Alternatives Analysis (AA) evaluates high-speed transportation technologies within the Initial Operating Segment (IOS) corridor from West Los Angeles to Ontario Airport. Four alternatives are evaluated in the study:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on Union Pacific Railroad (UPRR) alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. This appendix contains detailed information for the capital cost estimates for the four HSRT IOS alternatives.

Costs were developed using standard design criteria, cross sections and unit prices developed by the California High Speed Rail Authority (CHSRA) for the high-speed steel-wheel mode, and from previous reports prepared for SCAG for the Maglev mode, with reviews for reasonableness performed by SYSTRA. All costs are escalated as needed to year 2008 dollars, and are presented using the Federal Transit Administration's (FTA's) Standard Cost Category (SCC) format. Cost escalation is based on entering revenue service in 2012.

Estimates for hard costs were developed by taking off quantities from the alignment drawings for each of the four alternatives. Unit prices based on typical cross sections developed by previous reports were applied to these quantities. Hard cost items include all components of the system, including structures, track and guide beams, stations, parking, site and utility work, electric traction, signaling, communications and other systems, land, and vehicles. Contingencies were included for all hard cost items. Total capital cost was developed by adding soft costs (e.g., Preliminary Engineering, Final Design, project management, construction management, insurance, and start-up costs) to hard costs.

6.1 Capital Costing Assumptions

To calculate capital costs for each of the IOS alternatives, sketch methods appropriate to the sub-conceptual level of engineering were implemented:

- Infrastructure is priced on a per-foot and per-meter basis (for Maglev and steel-wheel, respectively) for each of several broadly defined typical sections (i.e., elevated, at-grade, retained cut, tunnel) that were prepared as part of previous studies. Infrastructure includes track, line structures, signals,

power, and communications. Maglev guideway costs were provided as a lump sum. Per linear foot (lf) costs were derived by dividing by alignment length.

- Stations are based on typical station designs, independent of analysis of individual sites. Both Maglev and steel-wheel technologies are assumed to have stations with 200 meter-long platforms that serve trainsets up to 200 meters in length, as documented in the operating cost estimates, with equivalent passenger amenities and circulation.
- Parking is allocated on a per-space basis systemwide rather than at each station. All parking facilities are assumed to be decked.
- Shop and yard costs are based on storage, inspection and scheduled repair programs prepared as part of previous studies. Both technologies are assumed to have similar storage, inspection and schedule repair functions.
- Land costs are based on per-acre costs of typical sections (i.e., urban, freeway, freight corridor) and sites (i.e., station or yard). Current CHSRA property costs are assumed for both technologies.
- Vehicle costs are based on trainsets needed to operate the proposed operating plan plus a 17 percent spare ratio.

All cost values are escalated to 2008 dollars using RS Means Historical Construction Cost Index (January 2008).

6.2 SOURCES OF UNIT PRICE INFORMATION

Cost information was drawn from the several sources:

- Refined Cost Estimates, 2006, SCAG Maglev Deployment Program (IBI Group) (SC-RCE);
- Conceptual Design of Stations and Maintenance Facility Technical Report 2006, SCAG Maglev Deployment Program (IBI Group) (SC-CDS);
- CHSRA High Speed Train Unit Costs, 2006 (CA-HUC) is the source of unit costs for high-speed rail specific infrastructure and vehicles;
- Conceptual Construction Cost Estimate, Storage Yard and Maintenance Facilities, California High Speed Train EIR/EIS 2003 (Parsons Brinckerhoff) (CA-EIR); and
- Heavy maintenance facility costs are based on an analysis of typical CHSRA facilities (in particular the California Central Valley) from CA-EIR.

Table 6.1 presents the unit costs for Maglev and steel-wheel technologies. Also listed are the specific sources for each unit cost.

Table 6.1 Capital Cost Unit Costs and Sources

FTA SCC Category	Item	Steel-Wheel	Maglev	Sources/Assumptions
10.04	Elevated Guideway	$4,500/lf	$4,500/lf	CA-HUC for steel-wheel, SC-RCE; SC-GCE, average cost of structural cross-sections for Maglev.
10.04	Elevated – additive for high structure	$900/lf	N/A	CA-HUC for steel-wheel; high structure cost not called out for Maglev.
10.04	Elevated – additive for long structure	$7,800/lf	$4,000/lf	CA-HUC for steel-wheel, SC-RCE; SC-GCE, includes cost of additional superstructure needed for Type 4/5 structures.
10.04	Elevated – additive for very high (>60') structure	$2,700/lf	N/A	SYSTRA estimate, applies to steel-wheel on I-10 alignment crossings only.
10.09	Track	$305/tf	$2,100/tf (Type 1); $1,300/tf (Type 3)	Steel-wheel – direct fixation on structure – CH-HUC; Maglev – Guideway Beams; and SC-RCE; SC-GCE.
20.02	Elevated Center	$47.2 million	$47.2 million	Based on center platform station design described in SC-CDS – both modes.
20.02	Elevated – Center/ Side with Mezz.	$85.8 million	$85.8 million	Based on center-side platform station design described in SC-CDS – both modes; price from SC-RCE includes walkway allowance.
20.06	Decked parking	$20,475/sp	$20,475/sp	SC-RCE; SC-CDS.
30.02	HSR Shop and Yard	$156.8 million	$204.4 million	CA-EIR.
40.02	Utility Relocation	$1,100/lf		SC-RCE.
40.04	Environmental Mitigation	3%	3%	SC-RCE, CA-HUC.
40.07	Roadway on ROW	$990/lf	$990	SC-RCE.
40.08	MPT	$228/lf	$228	SC-RCE.
50.01	Signaling	$293/lf	$293/lf	CA-HUC.
50.03	Traction Power Supply	$141/lf	$2,103/lf	CA-HUC and SC-RCE, respectively. Maglev cost includes supply and distribution.
50.04	Traction Power Distribution	$262/lf	See 50.03	CA-HUC.
50.05	Communications	$228/lf	$228/lf	Fiber backbone is included; CA-HUC – both modes.
60.01	Property for stations and yards	$20/sf	$20/sf	CA-HUC, used average cost for urban/ suburban location.
60.01	Property for ROW – Urban	$1,020/lf	$1,020/lf	CA-HUC was used for property costs and definitions of locations (Urban, Dense Urban, Freight and Freeway); based on 50' right-of-way for steel-wheel and 52' for Maglev.
60.01	Property for ROW – Dense Urban (2x Urban)	$2,040/lf	$2,122/lf	
60.01	Property for ROW – Freeway (0.5x Urban)	$510/lf	$530/lf	

FTA SCC Category	Item	Steel-Wheel	Maglev	Sources/Assumptions
60.01	Property for ROW – Freight (0.5x Urban)	$510/lf	$530/lf	
70.03	Trainsets	$30 million/6-car trainset	$$64.1 million/6-car trainset	CA-HUC and SC-RCE, respectively.
80.01-80.08	All categories	30%	30%	SC-RCE – both technologies
90.01	Unallocated	0		All contingencies are allocated. Allocated contingencies are 25% for all items, except vehicles and track/guide beams, which are 10%. This amounts to overall contingencies of 17.9% for steel-wheel and 19.7% for Maglev.

6.3 CAPITAL COSTS IN FTA SCC FORMAT

The following pages show the capital costs for each of the four HSRT IOS alternatives in FTA SCC format.

MAIN WORKSHEET-BUILD ALTERNATIVE

(Rev.11a, June 4, 2008)

SCAG High Speed Regional Transportation System Alternatives Analysis

Alternative: MAGLEV on I-10

Today's Date	**11/10/08**
Yr of Base Year $	2008
Yr of Revenue Ops	2012

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost
10 GUIDEWAY & TRACK ELEMENTS (route miles)	**54.50**	2,552,105	461,991	**3,014,096**	**$ 55,305**	**59%**	**43%**
10.01 Guideway: At-grade exclusive right-of-way				0			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)				0			
10.03 Guideway: At-grade in mixed traffic				0			
10.04 Guideway: Aerial structure	54.50	1,357,858	339,465	1,697,323	$ 31,144		
10.05 Guideway: Built-up fill				0			
10.06 Guideway: Underground cut & cover				0			
10.07 Guideway: Underground tunnel				0			
10.08 Guideway: Retained cut or fill		20,680	5,170	25,850			
10.09 Track: Direct fixation		1,173,567	117,357	1,290,923			
10.10 Track: Embedded				0			
10.11 Track: Ballasted				0			
10.12 Track: Special (switches, turnouts)				0			
10.13 Track: Vibration and noise dampening				0			
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	**4**	368,375	92,094	**460,469**	**$ 115,117**	**9%**	**7%**
20.01 At-grade station, stop, shelter, mall, terminal, platform				0			
20.02 Aerial station, stop, shelter, mall, terminal, platform	4	266,000	66,500	332,500	$ 83,125		
20.03 Underground station, stop, shelter, mall, terminal, platform				0			
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.				0			
20.05 Joint development				0			
20.06 Automobile parking multi-story structure		102,375	25,594	127,969			
20.07 Elevators, escalators				0			
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	54.50	204,400	51,100	**255,500**	**$ 4,688**	**5%**	**4%**
30.01 Administration Building: Office, sales, storage, revenue counting				0			
30.02 Light Maintenance Facility		204,400	51,100	255,500			
30.03 Heavy Maintenance Facility				0			
30.04 Storage or Maintenance of Way Building				0			
30.05 Yard and Yard Track				0			
40 SITEWORK & SPECIAL CONDITIONS	54.50	229,670	26,463	**256,134**	**$ 4,700**	**5%**	**4%**
40.01 Demolition, Clearing, Earthwork				0			
40.02 Site Utilities, Utility Relocation		50,229	12,557	62,786			
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments				0			
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		123,817		123,817			
40.05 Site structures including retaining walls, sound walls				0			
40.06 Pedestrian / bike access and accommodation, landscaping				0			
40.07 Automobile, bus, van accessways including roads, parking lots		45,214	11,303	56,517			
40.08 Temporary Facilities and other indirect costs during construction		10,411	2,603	13,013			
50 SYSTEMS	54.50	906,905	226,726	**1,133,631**	**$ 20,801**	**22%**	**16%**
50.01 Train control and signals		302,397	75,599	377,997			
50.02 Traffic signals and crossing protection				0			
50.03 Traction power supply: substations		604,507	151,127	755,634			
50.04 Traction power distribution: catenary and third rail				0			
50.05 Communications				0			
50.06 Fare collection system and equipment				0			
50.07 Central Control				0			
Construction Subtotal (10 - 50)	54.50	4,261,455	858,375	**5,119,830**	**$ 93,942**	**100%**	**73%**
60 ROW, LAND, EXISTING IMPROVEMENTS	54.50	120,692	30,173	**150,865**	**$ 2,768**		**2%**
60.01 Purchase or lease of real estate		120,692	30,173	150,865			
60.02 Relocation of existing households and businesses				0			
70 VEHICLES (number)	**42**	471,319	44,888	**516,206**	**$ 12,291**		**7%**
70.01 Light Rail				0			
70.02 Heavy Rail				0			
70.03 Commuter Rail	42	471,319	44,888	516,206	$ 12,291		
70.04 Bus				0			
70.05 Other				0			
70.06 Non-revenue vehicles				0			
70.07 Spare parts				0			
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	54.50	1,238,168	0	**1,238,168**	**$ 22,719**	**24%**	**18%**
80.01 Preliminary Engineering		123,817	0	123,817			
80.02 Final Design		288,906	0	288,906			
80.03 Project Management for Design and Construction		330,178	0	330,178			
80.04 Construction Administration & Management		206,361	0	206,361			
80.05 Professional Liability and other Non-Construction Insurance		206,361	0	206,361			
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.				0			
80.07 Surveys, Testing, Investigation, Inspection				0			
80.08 Start up		82,544.55	0	82,545			
Subtotal (10 - 80)	54.50	6,091,634	933,435	**7,025,069**	**$ 128,900**		**100%**
90 UNALLOCATED CONTINGENCY				**0**			**0%**
Subtotal (10 - 90)	54.50			**7,025,069**	**$ 128,900**		**100%**
100 FINANCE CHARGES				**0**			**0%**
Total Project Cost (10 - 100)	54.50			**7,025,069**	**$ 128,900**		**100%**
Allocated Contingency as % of Base Yr Dollars w/o Contingency				15.32%			
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				0.00%			
Total Contingency as % of Base Yr Dollars w/o Contingency				15.32%			
Unallocated Contingency as % of Subtotal (10 - 80)				0.00%			

MAIN WORKSHEET-BUILD ALTERNATIVE

(Rev.11a, June 4, 2008)

SCAG High Speed Regional Transportation System Alternatives Analysis

Alternative: SWT on I-10

Today's Date	**11/10/08**
Yr of Base Year $	2008
Yr of Revenue Ops	2012

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost
10 GUIDEWAY & TRACK ELEMENTS (route miles)	**54.50**	1,677,511	392,856	**2,070,367**	**$ 37,988**	**63%**	**47%**
10.01 Guideway: At-grade exclusive right-of-way				0			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)				0			
10.03 Guideway: At-grade in mixed traffic				0			
10.04 Guideway: Aerial structure	54.50	1,478,712	369,678	1,848,390	$ 33,915		
10.05 Guideway: Built-up fill				0			
10.06 Guideway: Underground cut & cover				0			
10.07 Guideway: Underground tunnel				0			
10.08 Guideway: Retained cut or fill		21,990	5,498	27,488			
10.09 Track: Direct fixation		176,809	17,681	194,489			
10.10 Track: Embedded				0			
10.11 Track: Ballasted				0			
10.12 Track: Special (switches, turnouts)				0			
10.13 Track: Vibration and noise dampening				0			
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	**4**	368,375	92,094	**460,469**	**$ 115,117**	**14%**	**10%**
20.01 At-grade station, stop, shelter, mall, terminal, platform				0			
20.02 Aerial station, stop, shelter, mall, terminal, platform	4	266,000	66,500	332,500	$ 83,125		
20.03 Underground station, stop, shelter, mall, terminal, platform				0			
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.				0			
20.05 Joint development				0			
20.06 Automobile parking multi-story structure		102,375	25,594	127,969			
20.07 Elevators, escalators				0			
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	54.50	156,822	39,206	**196,028**	**$ 3,597**	**6%**	**4%**
30.01 Administration Building: Office, sales, storage, revenue counting				0			
30.02 Light Maintenance Facility		140,022	35,006	175,028			
30.03 Heavy Maintenance Facility				0			
30.04 Storage or Maintenance of Way Building				0			
30.05 Yard and Yard Track		16,800	4,200	21,000			
40 SITEWORK & SPECIAL CONDITIONS	54.50	178,679	25,444	**204,123**	**$ 3,745**	**6%**	**5%**
40.01 Demolition, Clearing, Earthwork				0			
40.02 Site Utilities, Utility Relocation		48,297	12,074	60,371			
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments				0			
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		76,904		76,904			
40.05 Site structures including retaining walls, sound walls				0			
40.06 Pedestrian / bike access and accommodation, landscaping				0			
40.07 Automobile, bus, van accessways including roads, parking lots		43,467	10,867	54,334			
40.08 Temporary Facilities and other indirect costs during construction		10,011	2,503	12,513			
50 SYSTEMS	54.50	268,981	67,245	**336,226**	**$ 6,169**	**10%**	**8%**
50.01 Train control and signals		86,085	21,521	107,607			
50.02 Traffic signals and crossing protection				0			
50.03 Traction power supply: substations		40,869	10,217	51,086			
50.04 Traction power distribution: catenary and third rail		75,941	18,985	94,926			
50.05 Communications		66,086	16,521	82,607			
50.06 Fare collection system and equipment				0			
50.07 Central Control				0			
Construction Subtotal (10 - 50)	54.50	2,650,367	616,845	**3,267,213**	**$ 59,949**	**100%**	**74%**
60 ROW, LAND, EXISTING IMPROVEMENTS	54.50	117,541	29,385	**146,927**	**$ 2,696**		**3%**
60.01 Purchase or lease of real estate		117,541	29,385	146,927			
60.02 Relocation of existing households and businesses				0			
70 VEHICLES (number)	**42**	210,000	21,000	**231,000**	**$ 5,500**		**5%**
70.01 Light Rail				0			
70.02 Heavy Rail				0			
70.03 Commuter Rail	42	210,000	21,000	231,000	$ 5,500		
70.04 Bus				0			
70.05 Other				0			
70.06 Non-revenue vehicles				0			
70.07 Spare parts				0			
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	54.50	769,036	0	**769,036**	**$ 14,111**	**24%**	**17%**
80.01 Preliminary Engineering		76,904	0	76,904			
80.02 Final Design		179,442	0	179,442			
80.03 Project Management for Design and Construction		205,076	0	205,076			
80.04 Construction Administration & Management		128,173	0	128,173			
80.05 Professional Liability and other Non-Construction Insurance		128,173	0	128,173			
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.				0			
80.07 Surveys, Testing, Investigation, Inspection				0			
80.08 Start up		51,269	0	51,269			
Subtotal (10 - 80)	54.50	3,746,945	667,231	**4,414,175**	**$ 80,994**		**100%**
90 UNALLOCATED CONTINGENCY				**0**			**0%**
Subtotal (10 - 90)	54.50			**4,414,175**	**$ 80,994**		**100%**
100 FINANCE CHARGES				**0**			**0%**
Total Project Cost (10 - 100)	54.50			**4,414,175**	**$ 80,994**		**100%**
Allocated Contingency as % of Base Yr Dollars w/o Contingency				17.81%			
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				0.00%			
Total Contingency as % of Base Yr Dollars w/o Contingency				17.81%			
Unallocated Contingency as % of Subtotal (10 - 80)				0.00%			

MAIN WORKSHEET-BUILD ALTERNATIVE

(Rev.11a, June 4, 2008)

SCAG High Speed Regional Transportation System Alternatives Analysis

Alternative: MAGLEV on UPRR

Today's Date	**11/10/08**
Yr of Base Year $	2008
Yr of Revenue Ops	2012

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost
10 GUIDEWAY & TRACK ELEMENTS (route miles)	**58.70**	2,965,343	542,501	**3,507,844**	**$ 59,759**	**61%**	**45%**
10.01 Guideway: At-grade exclusive right-of-way				0			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)				0			
10.03 Guideway: At-grade in mixed traffic				0			
10.04 Guideway: Aerial structure	58.70	1,639,779	409,945	2,049,724	$ 34,919		
10.05 Guideway: Built-up fill				0			
10.06 Guideway: Underground cut & cover				0			
10.07 Guideway: Underground tunnel				0			
10.08 Guideway: Retained cut or fill				0			
10.09 Track: Direct fixation		1,325,564	132,556	1,458,120			
10.10 Track: Embedded				0			
10.11 Track: Ballasted				0			
10.12 Track: Special (switches, turnouts)				0			
10.13 Track: Vibration and noise dampening				0			
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	**4**	368,375	92,094	**460,469**	**$ 115,117**	**8%**	**6%**
20.01 At-grade station, stop, shelter, mall, terminal, platform				0			
20.02 Aerial station, stop, shelter, mall, terminal, platform	4	266,000	66,500	332,500	$ 83,125		
20.03 Underground station, stop, shelter, mall, terminal, platform				0			
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.				0			
20.05 Joint development				0			
20.06 Automobile parking multi-story structure		102,375	25,594	127,969			
20.07 Elevators, escalators				0			
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	58.70	204,400	51,100	**255,500**	**$ 4,353**	**4%**	**3%**
30.01 Administration Building: Office, sales, storage, revenue counting				0			
30.02 Light Maintenance Facility		204,400	51,100	255,500			
30.03 Heavy Maintenance Facility				0			
30.04 Storage or Maintenance of Way Building				0			
30.05 Yard and Yard Track				0			
40 SITEWORK & SPECIAL CONDITIONS	58.70	174,179	8,952	**183,131**	**$ 3,120**	**3%**	**2%**
40.01 Demolition, Clearing, Earthwork				0			
40.02 Site Utilities, Utility Relocation		16,994	4,248	21,242			
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments				0			
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		138,370		138,370			
40.05 Site structures including retaining walls, sound walls				0			
40.06 Pedestrian / bike access and accommodation, landscaping				0			
40.07 Automobile, bus, van accessways including roads, parking lots		15,290	3,823	19,113			
40.08 Temporary Facilities and other indirect costs during construction		3,525	881	4,407			
50 SYSTEMS	58.70	1,041,926	260,482	**1,302,408**	**$ 22,188**	**23%**	**17%**
50.01 Train control and signals		347,419	86,855	434,273			
50.02 Traffic signals and crossing protection				0			
50.03 Traction power supply: substations		694,507	173,627	868,134			
50.04 Traction power distribution: catenary and third rail				0			
50.05 Communications				0			
50.06 Fare collection system and equipment				0			
50.07 Central Control				0			
Construction Subtotal (10 - 50)	58.70	4,754,223	955,129	**5,709,352**	**$ 97,263**	**100%**	**73%**
60 ROW, LAND, EXISTING IMPROVEMENTS	58.70	168,592	42,148	**210,740**	**$ 3,590**		**3%**
60.01 Purchase or lease of real estate		168,592	42,148	210,740			
60.02 Relocation of existing households and businesses				0			
70 VEHICLES (number)	**48**	471,319	44,888	**516,206**	**$ 10,754**		**7%**
70.01 Light Rail				0			
70.02 Heavy Rail				0			
70.03 Commuter Rail	48	471,319	44,888	516,206	$ 10,754		
70.04 Bus				0			
70.05 Other				0			
70.06 Non-revenue vehicles				0			
70.07 Spare parts				0			
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	58.70	1,383,698	0	**1,383,698**	**$ 23,572**	**24%**	**18%**
80.01 Preliminary Engineering		138,370	0	138,370			
80.02 Final Design		322,863	0	322,863			
80.03 Project Management for Design and Construction		368,986	0	368,986			
80.04 Construction Administration & Management		230,616	0	230,616			
80.05 Professional Liability and other Non-Construction Insurance		230,616	0	230,616			
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.				0			
80.07 Surveys, Testing, Investigation, Inspection				0			
80.08 Start up		92,247	0	92,247			
Subtotal (10 - 80)	58.70	6,777,833	1,042,164	**7,819,997**	**$ 133,220**		**100%**
90 UNALLOCATED CONTINGENCY							**0%**
Subtotal (10 - 90)	58.70			**7,819,997**	**$ 133,220**		**100%**
100 FINANCE CHARGES				**0**			**0%**
Total Project Cost (10 - 100)	58.70			**7,819,997**	**$ 133,220**		**100%**
Allocated Contingency as % of Base Yr Dollars w/o Contingency				15.38%			
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				0.00%			
Total Contingency as % of Base Yr Dollars w/o Contingency				15.38%			
Unallocated Contingency as % of Subtotal (10 - 80)				0.00%			

MAIN WORKSHEET-BUILD ALTERNATIVE

(Rev.11a, June 4, 2008)

SCAG High Speed Regional Transportation System Alternatives Analysis

Alternative: SWT on UPRR

Today's Date	**11/10/08**
Yr of Base Year $	2008
Yr of Revenue Ops	2012

	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost
10 GUIDEWAY & TRACK ELEMENTS (route miles)	**58.70**	1,804,086	420,584	**2,224,671**	**$ 37,899**	**66%**	**48%**
10.01 Guideway: At-grade exclusive right-of-way				0			
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)				0			
10.03 Guideway: At-grade in mixed traffic				0			
10.04 Guideway: Aerial structure	58.70	1,601,172	400,293	2,001,465	$ 34,097		
10.05 Guideway: Built-up fill				0			
10.06 Guideway: Underground cut & cover				0			
10.07 Guideway: Underground tunnel				0			
10.08 Guideway: Retained cut or fill				0			
10.09 Track: Direct fixation		202,914	20,291	223,205			
10.10 Track: Embedded				0			
10.11 Track: Ballasted				0			
10.12 Track: Special (switches, turnouts)				0			
10.13 Track: Vibration and noise dampening				0			
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	**4**	368,375	92,094	**460,469**	**$ 115,117**	**14%**	**10%**
20.01 At-grade station, stop, shelter, mall, terminal, platform				0			
20.02 Aerial station, stop, shelter, mall, terminal, platform	4	266,000	66,500	332,500	$ 83,125		
20.03 Underground station, stop, shelter, mall, terminal, platform				0			
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.				0			
20.05 Joint development				0			
20.06 Automobile parking multi-story structure		102,375	25,594	127,969			
20.07 Elevators, escalators				0			
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	58.70	156,822	39,206	**196,028**	**$ 3,339**	**6%**	**4%**
30.01 Administration Building: Office, sales, storage, revenue counting				0			
30.02 Light Maintenance Facility		140,022	35,006	175,028			
30.03 Heavy Maintenance Facility				0			
30.04 Storage or Maintenance of Way Building				0			
30.05 Yard and Yard Track		16,800	4,200	21,000			
40 SITEWORK & SPECIAL CONDITIONS	58.70	114,503	8,608	**123,112**	**$ 2,097**	**4%**	**3%**
40.01 Demolition, Clearing, Earthwork				0			
40.02 Site Utilities, Utility Relocation		16,340	4,085	20,425			
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments				0			
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		80,071		80,071			
40.05 Site structures including retaining walls, sound walls				0			
40.06 Pedestrian / bike access and accommodation, landscaping				0			
40.07 Automobile, bus, van accessways including roads, parking lots		14,706	3,676	18,382			
40.08 Temporary Facilities and other indirect costs during construction		3,387	847	4,234			
50 SYSTEMS	58.70	308,695	77,174	**385,869**	**$ 6,574**	**11%**	**8%**
50.01 Train control and signals		98,796	24,699	123,495			
50.02 Traffic signals and crossing protection				0			
50.03 Traction power supply: substations		46,903	11,726	58,629			
50.04 Traction power distribution: catenary and third rail		87,153	21,788	108,942			
50.05 Communications		75,843	18,961	94,804			
50.06 Fare collection system and equipment				0			
50.07 Central Control				0			
Construction Subtotal (10 - 50)	58.70	2,752,483	637,666	**3,390,149**	**$ 57,754**	**100%**	**73%**
60 ROW, LAND, EXISTING IMPROVEMENTS	58.70	163,662	40,916	**204,578**	**$ 3,485**		**4%**
60.01 Purchase or lease of real estate		163,662	40,916	204,578			
60.02 Relocation of existing households and businesses				0			
70 VEHICLES (number)	**42**	210,000	21,000	**231,000**	**$ 5,500**		**5%**
70.01 Light Rail				0			
70.02 Heavy Rail				0			
70.03 Commuter Rail	42	210,000	21,000	231,000	$ 5,500		
70.04 Bus				0			
70.05 Other				0			
70.06 Non-revenue vehicles				0			
70.07 Spare parts				0			
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	58.70	800,708	0	**800,708**	**$ 13,641**	**24%**	**17%**
80.01 Preliminary Engineering		80,071	0	80,071			
80.02 Final Design		186,832	0	186,832			
80.03 Project Management for Design and Construction		213,522	0	213,522			
80.04 Construction Administration & Management		133,451	0	133,451			
80.05 Professional Liability and other Non-Construction Insurance		133,451	0	133,451			
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.				0			
80.07 Surveys, Testing, Investigation, Inspection				0			
80.08 Start up		53,381	0	53,381			
Subtotal (10 - 80)	58.70	3,926,852	699,581	**4,626,434**	**$ 78,815**		**100%**
90 UNALLOCATED CONTINGENCY				**0**			**0%**
Subtotal (10 - 90)	58.70			**4,626,434**	**$ 78,815**		**100%**
100 FINANCE CHARGES				**0**			**0%**
Total Project Cost (10 - 100)	58.70			**4,626,434**	**$ 78,815**		**100%**
Allocated Contingency as % of Base Yr Dollars w/o Contingency				17.82%			
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				0.00%			
Total Contingency as % of Base Yr Dollars w/o Contingency				17.82%			
Unallocated Contingency as % of Subtotal (10 - 80)				0.00%			

6.4 TAKEOFF DETAILS AND UNIT COSTS

The following pages show detailed takeoff and unit cost information.

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**106+50**	**Maglev - Elevated Section - 2 Tracks**			**86,250**		**$1,022,493,750**		
	969+00	Two-Track Elevated Guideway							
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	86,250	$4,500	$388,125,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	172,500	$2,100	$362,250,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	86,250	$1,052	$90,735,000	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	86,250	$2,103	$181,383,750	CONSTR	25.0%
I10	**123+80**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**330**		**$792,000**		
	127+10	Type 4 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	330	$4,000	$1,320,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-660	$2,100	($1,386,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	660	$1,300	$858,000	G_MAG	10.0%
I10	**153+80**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**380**		**$912,000**		
	157+60	Type 4 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	380	$4,000	$1,520,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	760	$1,300	$988,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-760	$2,100	($1,596,000)	G_MAG	10.0%
I10	**189+55**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**365**		**$876,000**		
	193+20	Type 4 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	365	$4,000	$1,460,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-730	$2,100	($1,533,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	730	$1,300	$949,000	G_MAG	10.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	235+10	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**355**		**$852,000**		
	238+65	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	355	$4,000	$1,420,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-710	$2,100	($1,491,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	710	$1,300	$923,000	G_MAG	10.0%
I10	268+40	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**680**		**$1,632,000**		
	275+20	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	680	$4,000	$2,720,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,360	$1,300	$1,768,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,360	$2,100	($2,856,000)	G_MAG	10.0%
I10	334+90	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**410**		**$984,000**		
	339+00	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	410	$4,000	$1,640,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	820	$1,300	$1,066,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-820	$2,100	($1,722,000)	G_MAG	10.0%
I10	354+80	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**405**		**$972,000**		
	358+85	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	405	$4,000	$1,620,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	810	$1,300	$1,053,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-810	$2,100	($1,701,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**400+95**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**345**		**$828,000**		
	404+40	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	345	$4,000	$1,380,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	690	$1,300	$897,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-690	$2,100	($1,449,000)	G_MAG	10.0%
I10	**516+50**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**330**		**$792,000**		
	519+80	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	330	$4,000	$1,320,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-660	$2,100	($1,386,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	660	$1,300	$858,000	G_MAG	10.0%
I10	**535+45**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**340**		**$816,000**		
	538+85	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	340	$4,000	$1,360,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-680	$2,100	($1,428,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	680	$1,300	$884,000	G_MAG	10.0%
I10	**713+20**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**680**		**$1,632,000**		
	720+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	680	$4,000	$2,720,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,360	$2,100	($2,856,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,360	$1,300	$1,768,000	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**720+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**418**		**$1,003,200**		
	724+18	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	418	$4,000	$1,672,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-836	$2,100	($1,755,600)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	836	$1,300	$1,086,800	G_MAG	10.0%
I10	**724+18**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**500**		**$1,200,000**		
	729+18	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	500	$4,000	$2,000,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,000	$1,300	$1,300,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,000	$2,100	($2,100,000)	G_MAG	10.0%
I10	**756+40**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**235**		**$564,000**		
	758+75	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	235	$4,000	$940,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-470	$2,100	($987,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	470	$1,300	$611,000	G_MAG	10.0%
I10	**839+80**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**360**		**$864,000**		
	843+40	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	360	$4,000	$1,440,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	720	$1,300	$936,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-720	$2,100	($1,512,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**868+18**	**Right of Way - Dense Urban Corridor**				**2,753**		**$15,795,833**		
	895+71	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		2,753	$1,716	$4,724,148	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		2,753	$1,544	$4,251,733	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		2,753	$356	$979,187	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		2,753	$2,122	$5,840,765	LAND	25.0%
I10	**869+35**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**310**		**$744,000**		
	872+45	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		310	$4,000	$1,240,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-620	$2,100	($1,302,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		620	$1,300	$806,000	G_MAG	10.0%
I10	**895+71**	**Right of Way - Dense Urban Corridor**				**3,229**		**$18,526,969**		
	928+00	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		3,229	$1,716	$5,540,964	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,229	$1,544	$4,986,868	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,229	$356	$1,148,491	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,229	$2,122	$6,850,646	LAND	25.0%
I10	**917+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**400**		**$960,000**		
	921+00	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		400	$4,000	$1,600,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-800	$2,100	($1,680,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		800	$1,300	$1,040,000	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**928+00**	**Right of Way - Dense Urban Corridor**				**3,921**		**$22,497,443**		
	967+21	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		3,921	$1,716	$6,728,436	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,921	$1,544	$6,055,592	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,921	$356	$1,394,621	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,921	$2,122	$8,318,794	LAND	25.0%
I10	**966+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**400**		**$960,000**		
	970+00	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		400	$4,000	$1,600,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-800	$2,100	($1,680,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		800	$1,300	$1,040,000	G_MAG	10.0%
							Subtotal Part 3: West Los Angeles to LA Union Station:	**$1,096,697,195**		

Part 2: Interstate 10 Freeway

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	969+00	**Maglev - Elevated Section - 2 Tracks**			**94,600**		**$1,121,483,000**		
	1915+00	Two-Track Elevated Guideway							
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	94,600	$4,500	$425,700,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	189,200	$2,100	$397,320,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	94,600	$1,052	$99,519,200	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	94,600	$2,103	$198,943,800	CONSTR	25.0%
I10	998+00	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**500**		**$1,200,000**		
	1003+00	Type 5 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	500	$4,000	$2,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-1,000	$2,100	($2,100,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	1,000	$1,300	$1,300,000	G_MAG	10.0%
I10	1003+56	**Right of Way - Freight Corridor**			**13,869**		**$7,356,118**		
	1142+25	Right of Way Acquisition (Freight)							
		40.02 Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF	13,869	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	13,869	$530	$7,356,118	LAND	25.0%
I10	1019+00	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**300**		**$720,000**		
	1022+00	Type 4 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	300	$4,000	$1,200,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-600	$2,100	($1,260,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	600	$1,300	$780,000	G_MAG	10.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**1044+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**200**		**$480,000**		
	1046+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	200	$4,000	$800,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-400	$2,100	($840,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	400	$1,300	$520,000	G_MAG	10.0%
I10	**1067+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**500**		**$1,200,000**		
	1072+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	500	$4,000	$2,000,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,000	$1,300	$1,300,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,000	$2,100	($2,100,000)	G_MAG	10.0%
I10	**1142+25**	**Right of Way - Urban Corridor**				**3,775**		**$13,104,988**		
	1180+00	Right of Way Acquisition								
		40.02	Utility Relocation along Right of Way	URU	LF	3,775	$1,144	$4,318,600	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	3,775	$1,030	$3,886,740	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	3,775	$237	$895,128	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	3,775	$1,061	$4,004,520	LAND	25.0%
I10	**1159+40**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**385**		**$924,000**		
	1163+25	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	385	$4,000	$1,540,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	770	$1,300	$1,001,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-770	$2,100	($1,617,000)	G_MAG	10.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**1167+15**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**130**		**$312,000**		
	1168+45	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	130	$4,000	$520,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	260	$1,300	$338,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-260	$2,100	($546,000)	G_MAG	10.0%
I10	**1182+15**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**240**		**$576,000**		
	1184+55	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	240	$4,000	$960,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	480	$1,300	$624,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-480	$2,100	($1,008,000)	G_MAG	10.0%
I10	**1186+55**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**680**		**$1,632,000**		
	1193+35	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	680	$4,000	$2,720,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,360	$1,300	$1,768,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,360	$2,100	($2,856,000)	G_MAG	10.0%
I10	**1197+40**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**100**		**$240,000**		
	1198+40	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	100	$4,000	$400,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-200	$2,100	($420,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	200	$1,300	$260,000	G_MAG	10.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**1200+40**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**270**		**$648,000**		
	1203+10	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	270	$4,000	$1,080,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	540	$1,300	$702,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-540	$2,100	($1,134,000)	G_MAG	10.0%
I10	**1210+10**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**360**		**$864,000**		
	1213+70	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	360	$4,000	$1,440,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	720	$1,300	$936,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-720	$2,100	($1,512,000)	G_MAG	10.0%
I10	**1268+55**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**205**		**$492,000**		
	1270+60	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	205	$4,000	$820,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	410	$1,300	$533,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-410	$2,100	($861,000)	G_MAG	10.0%
I10	**1559+10**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**340**		**$816,000**		
	1562+50	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	340	$4,000	$1,360,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	680	$1,300	$884,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-680	$2,100	($1,428,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	1561+50	**Right of Way - Urban Corridor**				**1,695**		**$5,884,226**		
	1578+45	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		1,695	$1,144	$1,939,080	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		1,695	$1,030	$1,745,172	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		1,695	$237	$401,918	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		1,695	$1,061	$1,798,056	LAND	25.0%
I10	1583+05	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**135**		**$324,000**		
	1584+40	Type 5 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		135	$4,000	$540,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		270	$1,300	$351,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-270	$2,100	($567,000)	G_MAG	10.0%
I10	1601+00	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**325**		**$780,000**		
	1604+25	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		325	$4,000	$1,300,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		650	$1,300	$845,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-650	$2,100	($1,365,000)	G_MAG	10.0%
I10	1678+10	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**480**		**$1,152,000**		
	1682+90	Type 5 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		480	$4,000	$1,920,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		960	$1,300	$1,248,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-960	$2,100	($2,016,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	1692+00	**Right of Way - Urban Corridor**				**1,676**		**$5,818,268**		
	1708+76	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		1,676	$1,144	$1,917,344	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		1,676	$1,030	$1,725,610	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		1,676	$237	$397,413	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		1,676	$1,061	$1,777,901	LAND	25.0%
I10	1697+80	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**775**		**$1,860,000**		
	1705+55	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		775	$4,000	$3,100,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		1,550	$1,300	$2,015,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-1,550	$2,100	($3,255,000)	G_MAG	10.0%
I10	1713+65	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**325**		**$780,000**		
	1716+90	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		325	$4,000	$1,300,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		650	$1,300	$845,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-650	$2,100	($1,365,000)	G_MAG	10.0%
I10	1724+80	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**330**		**$792,000**		
	1728+10	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		330	$4,000	$1,320,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-660	$2,100	($1,386,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		660	$1,300	$858,000	G_MAG	10.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**1770+70**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**310**		**$744,000**		
	1773+80	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	310	$4,000	$1,240,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	620	$1,300	$806,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-620	$2,100	($1,302,000)	G_MAG	10.0%
I10	**1792+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**300**		**$720,000**		
	1795+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	300	$4,000	$1,200,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	600	$1,300	$780,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-600	$2,100	($1,260,000)	G_MAG	10.0%
I10	**1802+75**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**365**		**$876,000**		
	1806+40	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	365	$4,000	$1,460,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	730	$1,300	$949,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-730	$2,100	($1,533,000)	G_MAG	10.0%
I10	**1808+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**400**		**$960,000**		
	1812+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	400	$4,000	$1,600,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	800	$1,300	$1,040,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-800	$2,100	($1,680,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**1830+80**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**320**		**$768,000**		
	1834+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	320	$4,000	$1,280,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	640	$1,300	$832,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-640	$2,100	($1,344,000)	G_MAG	10.0%
I10	**1892+00**	**Right of Way - Urban Corridor**				**2,300**		**$7,984,496**		
	1915+00	Right of Way Acquisition								
		40.02	Utility Relocation along Right of Way	URU	LF	2,300	$1,144	$2,631,200	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	2,300	$1,030	$2,368,080	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	2,300	$237	$545,376	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	2,300	$1,061	$2,439,840	LAND	25.0%
							Subtotal Part 2: Interstate 10 Freeway:	**$1,181,491,096**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	1915+00	**Maglev - Elevated Section - 2 Tracks**				**0**		**$0**		
	1933+36	Two-Track Elevated Guideway								
		10.04	Elevated Maglev Guideway (2 Tracks)	GME	LF	0	$0	$0	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	0	$0	$0	G_MAG	10.0%
		50.01	Maglev Signals and Communications	YMM	LF	0	$0	$0	CONSTR	25.0%
		50.03	Maglev Traction Power (Supply and Distribution)	PMM	LF	0	$0	$0	CONSTR	25.0%
I10	1915+00	**Maglev - Elevated Section - 2 Tracks**				**25,100**		**$297,560,500**		
	2166+00	Two-Track Elevated Guideway								
		10.04	Elevated Maglev Guideway (2 Tracks)	GME	LF	25,100	$4,500	$112,950,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	50,200	$2,100	$105,420,000	G_MAG	10.0%
		50.01	Maglev Signals and Communications	YMM	LF	25,100	$1,052	$26,405,200	CONSTR	25.0%
		50.03	Maglev Traction Power (Supply and Distribution)	PMM	LF	25,100	$2,103	$52,785,300	CONSTR	25.0%
I10	1944+00	**Right of Way - Urban Corridor**				**1,961**		**$6,807,651**		
	1963+61	Right of Way Acquisition								
		40.02	Utility Relocation along Right of Way	URU	LF	1,961	$1,144	$2,243,384	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	1,961	$1,030	$2,019,046	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	1,961	$237	$464,992	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	1,961	$1,061	$2,080,229	LAND	25.0%
I10	2076+00	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**235**		**$564,000**		
	2078+35	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	235	$4,000	$940,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	470	$1,300	$611,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-470	$2,100	($987,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	2125+65	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**335**		**$804,000**		
	2129+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	335	$4,000	$1,340,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	670	$1,300	$871,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-670	$2,100	($1,407,000)	G_MAG	10.0%
I10	2159+50	**Right of Way - Urban Corridor**				**921**		**$3,197,271**		
	2168+71	Right of Way Acquisition								
		40.02	Utility Relocation along Right of Way	URU	LF	921	$1,144	$1,053,624	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	921	$1,030	$948,262	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	921	$237	$218,388	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	921	$1,061	$976,997	LAND	25.0%
I10	2166+00	**Maglev - Retained Cut Section - 2 Tracks**				**200**		**$2,911,000**		
	2168+00	Type 6 Structure (Retained Cut)								
		10.08	Retained Maglev Section (One Side)	GMR	LF	200	$8,800	$1,760,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	400	$1,300	$520,000	G_MAG	10.0%
		50.01	Maglev Signals and Communications	YMM	LF	200	$1,052	$210,400	CONSTR	25.0%
		50.03	Maglev Traction Power (Supply and Distribution)	PMM	LF	200	$2,103	$420,600	CONSTR	25.0%
I10	2168+00	**Maglev - Elevated Section - 2 Tracks**				**1,750**		**$20,746,250**		
	2185+50	Two-Track Elevated Guideway								
		10.04	Elevated Maglev Guideway (2 Tracks)	GME	LF	1,750	$4,500	$7,875,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	3,500	$2,100	$7,350,000	G_MAG	10.0%
		50.01	Maglev Signals and Communications	YMM	LF	1,750	$1,052	$1,841,000	CONSTR	25.0%
		50.03	Maglev Traction Power (Supply and Distribution)	PMM	LF	1,750	$2,103	$3,680,250	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	2180+00	**Right of Way - Urban Corridor**				**500**		**$1,735,760**		
	2185+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		500	$1,144	$572,000	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		500	$1,030	$514,800	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		500	$237	$118,560	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		500	$1,061	$530,400	LAND	25.0%
I10	2185+50	**Maglev - Retained Cut Section - 2 Tracks**				**550**		**$8,005,250**		
	2191+00	Type 6 Structure (Retained Cut)								
		10.08 Retained Maglev Section (One Side)	GMR	LF		550	$8,800	$4,840,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		1,100	$1,300	$1,430,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		550	$1,052	$578,600	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		550	$2,103	$1,156,650	CONSTR	25.0%
I10	2191+00	**Maglev - Elevated Section - 2 Tracks**				**4,000**		**$47,420,000**		
	2231+00	Two-Track Elevated Guideway								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		4,000	$4,500	$18,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		8,000	$2,100	$16,800,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		4,000	$1,052	$4,208,000	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		4,000	$2,103	$8,412,000	CONSTR	25.0%
I10	2212+00	**Right of Way - Urban Corridor**				**800**		**$2,777,216**		
	2220+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		800	$1,144	$915,200	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		800	$1,030	$823,680	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		800	$237	$189,696	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		800	$1,061	$848,640	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2225+00**	**Right of Way - Urban Corridor**				**100**		**$347,152**		
	2226+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		100	$1,144	$114,400	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		100	$1,030	$102,960	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		100	$237	$23,712	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		100	$1,061	$106,080	LAND	25.0%
I10	**2231+00**	**Maglev - Retained Cut Section - 2 Tracks**				**1,600**		**$23,288,000**		
	2247+00	Type 6 Structure (Retained Cut)								
		10.08 Retained Maglev Section (One Side)	GMR	LF		1,600	$8,800	$14,080,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		3,200	$1,300	$4,160,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		1,600	$1,052	$1,683,200	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		1,600	$2,103	$3,364,800	CONSTR	25.0%
I10	**2247+00**	**Maglev - Elevated Section - 2 Tracks**				**73,400**		**$870,157,000**		
	2981+00	Two-Track Elevated Guideway								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		73,400	$4,500	$330,300,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		146,800	$2,100	$308,280,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		73,400	$1,052	$77,216,800	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		73,400	$2,103	$154,360,200	CONSTR	25.0%
I10	**2265+00**	**Right of Way - Urban Corridor**				**3,300**		**$11,456,016**		
	2298+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		3,300	$1,144	$3,775,200	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,300	$1,030	$3,397,680	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,300	$237	$782,496	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,300	$1,061	$3,500,640	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2309+15**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**610**		**$1,464,000**		
	2315+25	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	610	$4,000	$2,440,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,220	$1,300	$1,586,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,220	$2,100	($2,562,000)	G_MAG	10.0%
I10	**2337+55**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**675**		**$1,620,000**		
	2344+30	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	675	$4,000	$2,700,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,350	$1,300	$1,755,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,350	$2,100	($2,835,000)	G_MAG	10.0%
I10	**2381+76**	**Right of Way - Urban Corridor**				**324**		**$1,124,772**		
	2385+00	Right of Way Acquisition								
		40.02	Utility Relocation along Right of Way	URU	LF	324	$1,144	$370,656	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	324	$1,030	$333,590	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	324	$237	$76,827	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	324	$1,061	$343,699	LAND	25.0%
I10	**2385+00**	**Right of Way - Freight Corridor**				**43,500**		**$23,072,400**		
	2820+00	Right of Way Acquisition (Freight)								
		40.02	Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08	Flagging in Freight Corridor	CFL	LF	43,500	$0	$0	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	43,500	$530	$23,072,400	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2540+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**400**		**$960,000**		
	2544+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	400	$4,000	$1,600,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	800	$1,300	$1,040,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-800	$2,100	($1,680,000)	G_MAG	10.0%
I10	**2857+19**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**326**		**$782,400**		
	2860+45	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	326	$4,000	$1,304,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	652	$1,300	$847,600	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-652	$2,100	($1,369,200)	G_MAG	10.0%
I10	**2864+00**	**Right of Way - Urban Corridor**				**8,351**		**$28,990,664**		
	2947+51	Right of Way Acquisition (Airport Property)								
		40.02	Utility Relocation along Right of Way	URU	LF	8,351	$1,144	$9,553,544	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	8,351	$1,030	$8,598,190	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	8,351	$237	$1,980,189	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	8,351	$1,061	$8,858,741	LAND	25.0%
I10	**2892+03**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**315**		**$756,000**		
	2895+18	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	315	$4,000	$1,260,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	630	$1,300	$819,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-630	$2,100	($1,323,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2937+58**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**312**		**$748,800**		
	2940+70	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	312	$4,000	$1,248,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	624	$1,300	$811,200	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-624	$2,100	($1,310,400)	G_MAG	10.0%
I10	**2947+51**	**Right of Way - Urban Corridor**				**3,349**		**$11,626,120**		
	2981+00	Right of Way Acquisition (Airport Property)								
		40.02	Utility Relocation along Right of Way	URU	LF	3,349	$1,144	$3,831,256	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	3,349	$1,030	$3,448,130	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	3,349	$237	$794,115	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	3,349	$1,061	$3,552,619	LAND	25.0%
I10	**2956+11**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**1**		**$2,400**		
	2981+00	Segment at Ontario Airport								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1	$4,000	$4,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	2	$1,300	$2,600	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-2	$2,100	($4,200)	G_MAG	10.0%
							Subtotal Part 1: I10 to Ontario Airport:	**$1,368,924,622**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Ontario Airport Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2947+51**	**Elevated Station (Center-Side Platform)**				**1**		**$94,138,000**		
	2956+11	Ontario Airport Station								
		20.02	Elevated Station - Center-Side Platform with Mezzanine	SCM	EA	1	$85,800,000	$85,800,000	CONSTR	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	94,000	$20	$1,880,000	LAND	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	322,900	$20	$6,458,000	LAND	25.0%
I10	**2947+51**	**Parking Deck Spaces**				**2,000**		**$44,710,000**		
	2956+11	Parking at Ontario Airport								
		20.06	Parking Space - Deck	PKD	SP	2,000	$20,475	$40,950,000	CONSTR	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	188,000	$20	$3,760,000	LAND	25.0%
							Subtotal Ontario Airport Station:	**$138,848,000**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Stations - Maglev Alignment

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**107+06**	**Elevated Station (Center Platform)**				**1**		**$53,386,000**		
	113+86	West Los Angeles Station								
		20.02 Elevated Station - Center Platform	SCP	EA	1		$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	215,300		$20	$4,306,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000		$20	$1,880,000	LAND	25.0%
I10	**107+06**	**Parking Deck Spaces**				**1,000**		**$22,355,000**		
	113+86	Parking at West Los Angeles Station								
		20.06 Parking Space - Deck	PKD	SP	1,000		$20,475	$20,475,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000		$20	$1,880,000	LAND	25.0%
I10	**1926+56**	**Elevated Station (Center Platform)**				**1**		**$53,386,000**		
	1933+36	West Covina Station								
		20.02 Elevated Station - Center Platform	SCP	EA	1		$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	215,300		$20	$4,306,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000		$20	$1,880,000	LAND	25.0%
I10	**1926+56**	**Parking Deck Spaces**				**2,000**		**$44,710,000**		
	1933+36	Parking at West Covina Station								
		20.06 Parking Space - Deck	PKD	SP	2,000		$20,475	$40,950,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	188,000		$20	$3,760,000	LAND	25.0%
UP1B	**21+00**	**Elevated Station (Center-Side Platform)**				**1**		**$94,138,000**		
	21+00	LA Union Station								
		20.02 Elevated Station - Center-Side Platform with Mezzanine	SCM	EA	1		$85,800,000	$85,800,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	322,900		$20	$6,458,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000		$20	$1,880,000	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Stations - Maglev Alignment

Station From/To	*Cost Item*	*Qty*	*Unit Cost*	*Cost*	*Contingency*
		Subtotal Stations - Maglev Alignment:		**$267,975,000**	

Ontario Maintenance Facility

Station From/To	Cost Item			Qty	Unit Cost	Cost	Contingency	
	Maglev - Central Maintenance Facility Central Maintenance Facility - Maglev			**1**		**$175,200,000**		
30.02	Maglev Vehicle Equipment	MEH	EA	1	$70,000,000	$70,000,000	CONSTR	25.0%
30.02	Maglev Centralized Maintenance Facility	MHF	EA	1	$97,700,000	$97,700,000	CONSTR	25.0%
30.02	Maglev Train Wash Facility	MWF	EA	1	$7,500,000	$7,500,000	CONSTR	25.0%
					Subtotal Ontario Maintenance Facility:	**$175,200,000**		

West Los Angeles Yard

Station From/To	*Cost Item*			*Qty*	*Unit Cost*	*Cost*	*Contingency*	
	Maglev - Decentralized Maintenance Facility Decentral Maintenance Facility - Maglev			**1**		**$29,200,000**		
30.02	Maglev Decentral Maintenance Facility	MIF	EA	1	$29,200,000	$29,200,000	CONSTR	25.0%
			Subtotal West Los Angeles Yard:			**$29,200,000**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on I-10 Alignment

Revenue Fleet

Station From/To	*Cost Item*			*Qty*	*Unit Cost*	*Cost*	*Contingency*	
	Maglev Trainsets Maglev Trainsets			**7**		**$448,875,000**		
	70.03 Maglev Train Sets	VTM	EA	7	$64,125,000	$448,875,000	VEH_MAG	10.0%
				Subtotal Revenue Fleet:		**$448,875,000**		

Total Maglev on I-10 Alignment: $4,707,210,913

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	82+50	**HSR - Drill Track - West Los Angeles**				**1**		**$14,491,200**		
	106+50	Drill track beyond WLA station								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		2,400	$4,500	$10,800,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		4,800	$305	$1,464,000	LOW	10.0%
		50.01 HSR Signaling (ATC)	YRA	LF		2,400	$275	$660,000	CONSTR	25.0%
		50.01 HSR Wayside Protection System	YRW	LF		2,400	$22	$52,800	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		2,400	$141	$338,400	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		2,400	$262	$628,800	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		2,400	$228	$547,200	CONSTR	25.0%
I10	106+50	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**86,250**		**$520,777,500**		
	969+00	Urban Aerial Adjacent to Highway Corridor								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		86,250	$4,500	$388,125,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		172,500	$305	$52,612,500	LOW	10.0%
		50.01 HSR Wayside Protection System	YRW	LF		86,250	$22	$1,897,500	CONSTR	25.0%
		50.01 HSR Signaling (ATC)	YRA	LF		86,250	$275	$23,718,750	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		86,250	$141	$12,161,250	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		86,250	$262	$22,597,500	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		86,250	$228	$19,665,000	CONSTR	25.0%
I10	123+80	**Additional for Long Crossing**				**330**		**$2,574,000**		
	127+10	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		330	$7,800	$2,574,000	CONSTR	25.0%
I10	148+08	**Additional for High Elevated Structure**				**1,492**		**$1,342,800**		
	163+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,492	$900	$1,342,800	CONSTR	25.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**153+80**	**Additional for Long Crossing**			**380**		**$2,964,000**		
	157+60	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	380	$7,800	$2,964,000	CONSTR	25.0%
I10	**189+55**	**Additional for Long Crossing**			**365**		**$2,847,000**		
	193+20	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	365	$7,800	$2,847,000	CONSTR	25.0%
I10	**235+10**	**Additional for Long Crossing**			**355**		**$2,769,000**		
	238+65	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	355	$7,800	$2,769,000	CONSTR	25.0%
I10	**268+40**	**Additional for Long Crossing**			**680**		**$5,304,000**		
	275+20	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	680	$7,800	$5,304,000	CONSTR	25.0%
I10	**334+90**	**Additional for Long Crossing**			**410**		**$3,198,000**		
	339+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	410	$7,800	$3,198,000	CONSTR	25.0%
I10	**354+80**	**Additional for Long Crossing**			**405**		**$3,159,000**		
	358+85	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	405	$7,800	$3,159,000	CONSTR	25.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	400+95	**Additional for Long Crossing**			**345**		**$2,691,000**		
	404+40	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	345	$7,800	$2,691,000	CONSTR	25.0%
I10	516+50	**Additional for Long Crossing**			**330**		**$2,574,000**		
	519+80	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	330	$7,800	$2,574,000	CONSTR	25.0%
I10	535+45	**Additional for Long Crossing**			**340**		**$2,652,000**		
	538+85	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	340	$7,800	$2,652,000	CONSTR	25.0%
I10	713+20	**Additional for Long Crossing**			**680**		**$5,304,000**		
	720+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	680	$7,800	$5,304,000	CONSTR	25.0%
I10	720+00	**Additional for Long Crossing**			**418**		**$3,260,400**		
	724+18	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	418	$7,800	$3,260,400	CONSTR	25.0%
I10	722+50	**Additional for High Elevated Structure**			**1,950**		**$1,755,000**		
	742+00	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,950	$900	$1,755,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**724+18**	**Additional for Long Crossing**			**500**		**$3,900,000**		
	729+18	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	500	$7,800	$3,900,000	CONSTR	25.0%
I10	**756+40**	**Additional for Long Crossing**			**235**		**$1,833,000**		
	758+75	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	235	$7,800	$1,833,000	CONSTR	25.0%
I10	**839+80**	**Additional for Long Crossing**			**360**		**$2,808,000**		
	843+40	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	360	$7,800	$2,808,000	CONSTR	25.0%
I10	**868+18**	**Right of Way - Dense Urban Corridor**			**2,753**		**$15,188,301**		
	895+71	Right of Way Acquisition (Dense Urban)							
		40.02 Utility Relocation along Right of Way	URU	LF	2,753	$1,650	$4,542,450	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	2,753	$1,485	$4,088,205	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	2,753	$342	$941,526	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	2,753	$2,040	$5,616,120	LAND	25.0%
I10	**869+35**	**Additional for Long Crossing**			**310**		**$2,418,000**		
	872+45	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	310	$7,800	$2,418,000	CONSTR	25.0%
I10	**879+00**	**Additional for High Elevated Structure**			**1,318**		**$1,186,200**		
	892+18	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,318	$900	$1,186,200	CONSTR	25.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	895+71	**Right of Way - Dense Urban Corridor**				**3,229**		**$17,814,393**		
	928+00	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		3,229	$1,650	$5,327,850	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,229	$1,485	$4,795,065	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,229	$342	$1,104,318	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,229	$2,040	$6,587,160	LAND	25.0%
I10	917+00	**Additional for Long Crossing**				**400**		**$3,120,000**		
	921+00	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		400	$7,800	$3,120,000	CONSTR	25.0%
I10	928+00	**Right of Way - Dense Urban Corridor**				**3,921**		**$21,632,157**		
	967+21	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		3,921	$1,650	$6,469,650	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,921	$1,485	$5,822,685	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,921	$342	$1,340,982	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,921	$2,040	$7,998,840	LAND	25.0%
I10	966+00	**Additional for Long Crossing**				**400**		**$3,120,000**		
	970+00	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		400	$7,800	$3,120,000	CONSTR	25.0%
							Subtotal Part 3: West Los Angeles to LA Union Station:	**$650,682,951**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 2: Interstate 10 Freeway

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**969+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**			**94,600**		**$571,194,800**		
	1915+00	Urban Aerial							
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF	94,600	$4,500	$425,700,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF	189,200	$305	$57,706,000	LOW	10.0%
		50.01 HSR Signaling (ATC)	YRA	LF	94,600	$275	$26,015,000	CONSTR	25.0%
		50.01 HSR Wayside Protection System	YRW	LF	94,600	$22	$2,081,200	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF	94,600	$141	$13,338,600	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF	94,600	$262	$24,785,200	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF	94,600	$228	$21,568,800	CONSTR	25.0%
I10	**998+00**	**Additional for Long Crossing**			**500**		**$3,900,000**		
	1003+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	500	$7,800	$3,900,000	CONSTR	25.0%
I10	**1003+56**	**Right of Way - Freight Corridor**			**13,869**		**$7,073,190**		
	1142+25	Right of Way Acquisition (Freight)							
		40.02 Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF	13,869	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	13,869	$510	$7,073,190	LAND	25.0%
I10	**1019+00**	**Additional for Long Crossing**			**300**		**$2,340,000**		
	1022+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	300	$7,800	$2,340,000	CONSTR	25.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**1044+00**	**Additional for Long Crossing**			**200**		**$1,560,000**		
	1046+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	200	$7,800	$1,560,000	CONSTR	25.0%
I10	**1067+00**	**Additional for Long Crossing**			**500**		**$3,900,000**		
	1072+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	500	$7,800	$3,900,000	CONSTR	25.0%
I10	**1142+25**	**Right of Way - Urban Corridor**			**3,775**		**$12,600,950**		
	1180+00	Right of Way Acquisition							
		40.02 Utility Relocation along Right of Way	URU	LF	3,775	$1,100	$4,152,500	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	3,775	$990	$3,737,250	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	3,775	$228	$860,700	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	3,775	$1,020	$3,850,500	LAND	25.0%
I10	**1159+40**	**Additional for Long Crossing**			**385**		**$3,003,000**		
	1163+25	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	385	$7,800	$3,003,000	CONSTR	25.0%
I10	**1167+15**	**Additional for Long Crossing**			**130**		**$1,014,000**		
	1168+45	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	130	$7,800	$1,014,000	CONSTR	25.0%
I10	**1182+15**	**Additional for Long Crossing**			**240**		**$1,872,000**		
	1184+55	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	240	$7,800	$1,872,000	CONSTR	25.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**1186+55**	**Additional for Long Crossing**			**680**		**$5,304,000**		
	1193+35	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	680	$7,800	$5,304,000	CONSTR	25.0%
I10	**1197+40**	**Additional for Long Crossing**			**100**		**$780,000**		
	1198+40	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	100	$7,800	$780,000	CONSTR	25.0%
I10	**1200+40**	**Additional for Long Crossing**			**270**		**$2,106,000**		
	1203+10	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	270	$7,800	$2,106,000	CONSTR	25.0%
I10	**1210+10**	**Additional for Long Crossing**			**360**		**$2,808,000**		
	1213+70	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	360	$7,800	$2,808,000	CONSTR	25.0%
I10	**1268+55**	**Additional for Long Crossing**			**205**		**$1,599,000**		
	1270+60	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	205	$7,800	$1,599,000	CONSTR	25.0%
I10	**1559+10**	**Additional for Long Crossing**			**340**		**$2,652,000**		
	1562+50	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	340	$7,800	$2,652,000	CONSTR	25.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	1561+50	**Right of Way - Urban Corridor**			**1,695**		**$5,657,910**		
	1578+45	Right of Way Acquisition							
		40.02 Utility Relocation along Right of Way	URU	LF	1,695	$1,100	$1,864,500	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	1,695	$990	$1,678,050	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	1,695	$228	$386,460	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	1,695	$1,020	$1,728,900	LAND	25.0%
I10	1583+05	**Additional for Long Crossing**			**135**		**$1,053,000**		
	1584+40	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	135	$7,800	$1,053,000	CONSTR	25.0%
I10	1601+00	**Additional for Long Crossing**			**325**		**$2,535,000**		
	1604+25	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	325	$7,800	$2,535,000	CONSTR	25.0%
I10	1678+10	**Additional for Long Crossing**			**480**		**$3,744,000**		
	1682+90	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	480	$7,800	$3,744,000	CONSTR	25.0%
I10	1692+00	**Right of Way - Urban Corridor**			**1,676**		**$5,594,488**		
	1708+76	Right of Way Acquisition							
		40.02 Utility Relocation along Right of Way	URU	LF	1,676	$1,100	$1,843,600	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	1,676	$990	$1,659,240	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	1,676	$228	$382,128	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	1,676	$1,020	$1,709,520	LAND	25.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**1697+80**	**Additional for Long Crossing**			**775**		**$6,045,000**		
	1705+55	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	775	$7,800	$6,045,000	CONSTR	25.0%
I10	**1713+65**	**Additional for Long Crossing**			**325**		**$2,535,000**		
	1716+90	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	325	$7,800	$2,535,000	CONSTR	25.0%
I10	**1724+80**	**Additional for Long Crossing**			**330**		**$2,574,000**		
	1728+10	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	330	$7,800	$2,574,000	CONSTR	25.0%
I10	**1770+70**	**Additional for Long Crossing**			**310**		**$2,418,000**		
	1773+80	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	310	$7,800	$2,418,000	CONSTR	25.0%
I10	**1792+00**	**Additional for Long Crossing**			**300**		**$2,340,000**		
	1795+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	300	$7,800	$2,340,000	CONSTR	25.0%
I10	**1802+75**	**Additional for Long Crossing**			**365**		**$2,847,000**		
	1806+40	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	365	$7,800	$2,847,000	CONSTR	25.0%

Part 2: Interstate 10 Freeway

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	1808+00	**Additional for Long Crossing**				**400**		**$3,120,000**		
	1812+00	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		400	$7,800	$3,120,000	CONSTR	25.0%
I10	1830+80	**Additional for Long Crossing**				**320**		**$2,496,000**		
	1834+00	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		320	$7,800	$2,496,000	CONSTR	25.0%
I10	1892+00	**Right of Way - Urban Corridor**				**2,300**		**$7,677,400**		
	1915+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		2,300	$1,100	$2,530,000	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		2,300	$990	$2,277,000	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		2,300	$228	$524,400	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		2,300	$1,020	$2,346,000	LAND	25.0%
							Subtotal Part 2: Interstate 10 Freeway:	**$674,343,738**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**1915+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**106,600**		**$643,650,800**		
	2981+00	Urban Aerial								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF	106,600		$4,500	$479,700,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF	213,200		$305	$65,026,000	LOW	10.0%
		50.01 HSR Signaling (ATC)	YRA	LF	106,600		$275	$29,315,000	CONSTR	25.0%
		50.01 HSR Wayside Protection System	YRW	LF	106,600		$22	$2,345,200	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF	106,600		$141	$15,030,600	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF	106,600		$262	$27,929,200	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF	106,600		$228	$24,304,800	CONSTR	25.0%
I10	**1944+00**	**Right of Way - Urban Corridor**				**1,961**		**$6,545,818**		
	1963+61	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF	1,961		$1,100	$2,157,100	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	1,961		$990	$1,941,390	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	1,961		$228	$447,108	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	1,961		$1,020	$2,000,220	LAND	25.0%
I10	**2062+70**	**Additional for High Elevated Structure**				**1,364**		**$1,227,600**		
	2076+34	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,364		$900	$1,227,600	CONSTR	25.0%
I10	**2076+00**	**Additional for Long Crossing**				**34**		**$265,200**		
	2076+34	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	34		$7,800	$265,200	CONSTR	25.0%
I10	**2076+34**	**Additional for Super High (>60') Elevated Structure**				**290**		**$783,000**		
	2079+24	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF	290		$2,700	$783,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**2087+36**	**Additional for High Elevated Structure**			**1,564**		**$1,407,600**		
	2103+00	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,564	$900	$1,407,600	CONSTR	25.0%
I10	**2103+00**	**Additional for Super High (>60') Elevated Structure**			**100**		**$270,000**		
	2104+00	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF	100	$2,700	$270,000	CONSTR	25.0%
I10	**2104+00**	**Additional for High Elevated Structure**			**1,359**		**$1,223,100**		
	2117+59	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,359	$900	$1,223,100	CONSTR	25.0%
I10	**2117+59**	**Additional for Super High (>60') Elevated Structure**			**4,591**		**$12,395,700**		
	2163+50	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF	4,591	$2,700	$12,395,700	CONSTR	25.0%
I10	**2125+65**	**Additional for Long Crossing**			**335**		**$2,613,000**		
	2129+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	335	$7,800	$2,613,000	CONSTR	25.0%
I10	**2159+50**	**Right of Way - Urban Corridor**			**921**		**$3,074,298**		
	2168+71	Right of Way Acquisition							
		40.02 Utility Relocation along Right of Way	URU	LF	921	$1,100	$1,013,100	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	921	$990	$911,790	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	921	$228	$209,988	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	921	$1,020	$939,420	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2163+50**	**Additional for High Elevated Structure**				**961**		**$864,900**		
	2173+11	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		961	$900	$864,900	CONSTR	25.0%
I10	**2180+00**	**Right of Way - Urban Corridor**				**500**		**$1,669,000**		
	2185+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		500	$1,100	$550,000	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		500	$990	$495,000	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		500	$228	$114,000	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		500	$1,020	$510,000	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2182+64**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**-1,536**		**($9,274,368)**		
	2198+00	Two-Track Elevated Guideway - Offset								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	-1,536	$4,500	($6,912,000)	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	-3,072	$305	($936,960)	LOW	10.0%
		50.01	HSR Wayside Protection System	YRW	LF	-1,536	$22	($33,792)	CONSTR	25.0%
		50.01	HSR Signaling (ATC)	YRA	LF	-1,536	$275	($422,400)	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	-1,536	$141	($216,576)	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	-1,536	$262	($402,432)	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	-1,536	$228	($350,208)	CONSTR	25.0%
I10	**2182+64**	**HSR Retained Cut Section**				**1,536**		**$12,192,768**		
	2198+00	Retained Cut Section								
		10.08	Retained HSR Section (Trench)	GR6	LF	1,536	$6,400	$9,830,400	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	3,072	$305	$936,960	LOW	10.0%
		50.01	HSR Signaling (ATC)	YRA	LF	1,536	$275	$422,400	CONSTR	25.0%
		50.01	HSR Wayside Protection System	YRW	LF	1,536	$22	$33,792	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	1,536	$141	$216,576	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	1,536	$262	$402,432	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	1,536	$228	$350,208	CONSTR	25.0%
I10	**2209+50**	**Additional for Super High (>60') Elevated Structure**				**450**		**$1,215,000**		
	2214+00	High Structure								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF	450	$2,700	$1,215,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2212+00**	**Right of Way - Urban Corridor**				**800**		**$2,670,400**		
	2220+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		800	$1,100	$880,000	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		800	$990	$792,000	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		800	$228	$182,400	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		800	$1,020	$816,000	LAND	25.0%
I10	**2220+36**	**Additional for Super High (>60') Elevated Structure**				**164**		**$442,800**		
	2222+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF		164	$2,700	$442,800	CONSTR	25.0%
I10	**2222+00**	**Additional for High Elevated Structure**				**900**		**$810,000**		
	2231+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		900	$900	$810,000	CONSTR	25.0%
I10	**2224+00**	**Additional for High Elevated Structure**				**700**		**$630,000**		
	2231+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		700	$900	$630,000	CONSTR	25.0%
I10	**2225+00**	**Right of Way - Urban Corridor**				**100**		**$333,800**		
	2226+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		100	$1,100	$110,000	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		100	$990	$99,000	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		100	$228	$22,800	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		100	$1,020	$102,000	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2231+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**-1,900**		**($11,472,200)**		
	2250+00	Two-Track Elevated Guideway - Offset								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	-1,900	$4,500	($8,550,000)	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	-3,800	$305	($1,159,000)	LOW	10.0%
		50.01	HSR Signaling (ATC)	YRA	LF	-1,900	$275	($522,500)	CONSTR	25.0%
		50.01	HSR Wayside Protection System	YRW	LF	-1,900	$22	($41,800)	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	-1,900	$141	($267,900)	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	-1,900	$262	($497,800)	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	-1,900	$228	($433,200)	CONSTR	25.0%
I10	**2231+00**	**HSR Retained Cut Section**				**1,900**		**$15,082,200**		
	2250+00	Retained Cut Section - Extended								
		10.08	Retained HSR Section (Trench)	GR6	LF	1,900	$6,400	$12,160,000	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	3,800	$305	$1,159,000	LOW	10.0%
		50.01	HSR Wayside Protection System	YRW	LF	1,900	$22	$41,800	CONSTR	25.0%
		50.01	HSR Signaling (ATC)	YRA	LF	1,900	$275	$522,500	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	1,900	$141	$267,900	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	1,900	$262	$497,800	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	1,900	$228	$433,200	CONSTR	25.0%
I10	**2255+00**	**Additional for Super High (>60') Elevated Structure**				**1,100**		**$2,970,000**		
	2266+00	High Structure								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF	1,100	$2,700	$2,970,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	2265+00	**Right of Way - Urban Corridor**				**3,300**		**$11,015,400**		
	2298+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		3,300	$1,100	$3,630,000	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,300	$990	$3,267,000	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,300	$228	$752,400	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,300	$1,020	$3,366,000	LAND	25.0%
I10	2266+00	**Additional for High Elevated Structure**				**800**		**$720,000**		
	2274+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		800	$900	$720,000	CONSTR	25.0%
I10	2274+00	**Additional for Super High (>60') Elevated Structure**				**3,750**		**$10,125,000**		
	2311+50	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF		3,750	$2,700	$10,125,000	CONSTR	25.0%
I10	2300+66	**Additional for High Elevated Structure**				**150**		**$135,000**		
	2313+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		150	$900	$135,000	CONSTR	25.0%
I10	2309+15	**Additional for Long Crossing**				**610**		**$4,758,000**		
	2315+25	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		610	$7,800	$4,758,000	CONSTR	25.0%
I10	2313+00	**Additional for Super High (>60') Elevated Structure**				**1,900**		**$5,130,000**		
	2332+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'	GRS	LF		1,900	$2,700	$5,130,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2332+00**	**Additional for High Elevated Structure**				**800**		**$720,000**		
	2340+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		800	$900	$720,000	CONSTR	25.0%
I10	**2337+55**	**Additional for Long Crossing**				**675**		**$5,265,000**		
	2344+30	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		675	$7,800	$5,265,000	CONSTR	25.0%
I10	**2381+76**	**Right of Way - Urban Corridor**				**324**		**$1,081,512**		
	2385+00	Right of Way Acquisition								
		40.02 Utility Relocation along Right of Way	URU	LF		324	$1,100	$356,400	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		324	$990	$320,760	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		324	$228	$73,872	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		324	$1,020	$330,480	LAND	25.0%
I10	**2385+00**	**Right of Way - Freight Corridor**				**43,500**		**$22,185,000**		
	2820+00	Right of Way Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		43,500	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		43,500	$510	$22,185,000	LAND	25.0%
I10	**2540+00**	**Additional for Long Crossing**				**400**		**$3,120,000**		
	2544+00	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		400	$7,800	$3,120,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**2857+19**	**Additional for Long Crossing**			**326**		**$2,542,800**		
	2860+45	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	326	$7,800	$2,542,800	CONSTR	25.0%
I10	**2864+00**	**Right of Way - Urban Corridor**			**8,351**		**$27,875,638**		
	2947+51	Right of Way Acquisition (Airport Property)							
		40.02 Utility Relocation along Right of Way	URU	LF	8,351	$1,100	$9,186,100	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	8,351	$990	$8,267,490	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	8,351	$228	$1,904,028	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	8,351	$1,020	$8,518,020	LAND	25.0%
I10	**2892+03**	**Additional for Long Crossing**			**315**		**$2,457,000**		
	2895+18	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	315	$7,800	$2,457,000	CONSTR	25.0%
I10	**2937+58**	**Additional for Long Crossing**			**312**		**$2,433,600**		
	2940+70	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	312	$7,800	$2,433,600	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Part 1: I10 to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2947+51**	**Right of Way - Urban Corridor**				**0**		**$0**		
	2956+11	Right of Way Acquisition (Airport Property)								
		40.02	Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	0	$0	$0	LAND	25.0%
I10	**2947+51**	**Right of Way - Urban Corridor**				**3,349**		**$11,178,962**		
	2981+00	Right of Way Acquisition (Airport Property)								
		40.02	Utility Relocation along Right of Way	URU	LF	3,349	$1,100	$3,683,900	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	3,349	$990	$3,315,510	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	3,349	$228	$763,572	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	3,349	$1,020	$3,415,980	LAND	25.0%
							Subtotal Part 1: I10 to Ontario Airport:	**$802,333,328**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Ontario Airport Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2947+51**	**Elevated Station (Center-Side Platform)**				**1**		**$94,138,000**		
	2956+11	Ontario Airport Station								
		20.02	Elevated Station - Center-Side Platform with Mezzanine	SCM	EA	1	$85,800,000	$85,800,000	CONSTR	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	322,900	$20	$6,458,000	LAND	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	94,000	$20	$1,880,000	LAND	25.0%
I10	**2947+51**	**Parking Deck Spaces**				**2,000**		**$44,710,000**		
	2956+11	Parking at Ontario Airport								
		20.06	Parking Space - Deck	PKD	SP	2,000	$20,475	$40,950,000	CONSTR	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	188,000	$20	$3,760,000	LAND	25.0%
							Subtotal Ontario Airport Station:	**$138,848,000**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Stations - Maglev Alignment

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**107+06**	**Elevated Station (Center Platform)**			**1**		**$53,386,000**		
	113+86	West Los Angeles Station							
		20.02 Elevated Station - Center Platform	SCP	EA	1	$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	215,300	$20	$4,306,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000	$20	$1,880,000	LAND	25.0%
I10	**107+06**	**Parking Deck Spaces**			**1,000**		**$22,355,000**		
	113+86	Parking at West Los Angeles Station							
		20.06 Parking Space - Deck	PKD	SP	1,000	$20,475	$20,475,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000	$20	$1,880,000	LAND	25.0%
I10	**1926+56**	**Elevated Station (Center Platform)**			**1**		**$53,386,000**		
	1933+36	West Covina Station							
		20.02 Elevated Station - Center Platform	SCP	EA	1	$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000	$20	$1,880,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	215,300	$20	$4,306,000	LAND	25.0%
I10	**1926+56**	**Parking Deck Spaces**			**2,000**		**$44,710,000**		
	1933+36	Parking at West Covina Station							
		20.06 Parking Space - Deck	PKD	SP	2,000	$20,475	$40,950,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	188,000	$20	$3,760,000	LAND	25.0%
UP1B	**21+00**	**Elevated Station (Center-Side Platform)**			**1**		**$94,138,000**		
	21+00	LA Union Station							
		20.02 Elevated Station - Center-Side Platform with Mezzanine	SCM	EA	1	$85,800,000	$85,800,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	94,000	$20	$1,880,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF	322,900	$20	$6,458,000	LAND	25.0%

Stations - Maglev Alignment

Station From/To	*Cost Item*	*Qty*	*Unit Cost*	*Cost*	*Contingency*
		Subtotal Stations - Maglev Alignment:		**$267,975,000**	

Ontario Maintenance Facility

Station From/To	Cost Item			Qty	Unit Cost	Cost	Contingency	
	HSR - Central Maintenance Facility Central Maintenance Facility - HSR			**1**		**$156,822,400**		
30.02	HSR S&I Shop Equipment	HES	EA	1	$2,300,000	$2,300,000	CONSTR	25.0%
30.02	HSR Heavy Maintenance Equipment	HEH	EA	1	$5,300,000	$5,300,000	CONSTR	25.0%
30.02	HSR Car Wash Facility	HWF	EA	1	$2,500,000	$2,500,000	CONSTR	25.0%
30.02	HSR Heavy Maintenance Facility	HMF	SF	306,800	$343	$105,232,400	CONSTR	25.0%
30.02	HSR Service and Inspection Facility	HIF	SF	36,600	$343	$12,553,800	CONSTR	25.0%
30.02	HSR Material Storage Facility	HMS	SF	67,800	$179	$12,136,200	CONSTR	25.0%
30.05	HSR Yard Tracks	HYD	EA	8	$2,100,000	$16,800,000	CONSTR	25.0%
				Subtotal Ontario Maintenance Facility:		**$156,822,400**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on I-10 Alignment

Revenue Fleet

Station From/To	*Cost Item*			*Qty*	*Unit Cost*	*Cost*	*Contingency*	
	High Speed Trainsets High Speed Trainsets			**7**		**$210,000,000**		
	70.03 High Speed Trainsets	VTH	EA	7	$30,000,000	$210,000,000	VEH_SWT	10.0%
				Subtotal Revenue Fleet:		**$210,000,000**		

Total SWT on I-10 Alignment: $2,901,005,417

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	106+50	**Maglev - Elevated Section - 2 Tracks**				**86,250**		**$1,022,493,750**		
	969+00	Two-Track Elevated Guideway								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		86,250	$4,500	$388,125,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		172,500	$2,100	$362,250,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		86,250	$1,052	$90,735,000	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		86,250	$2,103	$181,383,750	CONSTR	25.0%
I10	123+80	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**330**		**$792,000**		
	127+10	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		330	$4,000	$1,320,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		660	$1,300	$858,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-660	$2,100	($1,386,000)	G_MAG	10.0%
I10	153+80	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**380**		**$912,000**		
	157+60	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		380	$4,000	$1,520,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-760	$2,100	($1,596,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		760	$1,300	$988,000	G_MAG	10.0%
I10	189+55	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**365**		**$876,000**		
	193+20	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		365	$4,000	$1,460,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-730	$2,100	($1,533,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		730	$1,300	$949,000	G_MAG	10.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**235+10**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**355**		**$852,000**		
	238+65	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	355	$4,000	$1,420,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-710	$2,100	($1,491,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	710	$1,300	$923,000	G_MAG	10.0%
I10	**268+40**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**680**		**$1,632,000**		
	275+20	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	680	$4,000	$2,720,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,360	$2,100	($2,856,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,360	$1,300	$1,768,000	G_MAG	10.0%
I10	**334+90**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**410**		**$984,000**		
	339+00	Type 5 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	410	$4,000	$1,640,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-820	$2,100	($1,722,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	820	$1,300	$1,066,000	G_MAG	10.0%
I10	**354+80**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**405**		**$972,000**		
	358+85	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	405	$4,000	$1,620,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-810	$2,100	($1,701,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	810	$1,300	$1,053,000	G_MAG	10.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	400+95	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**345**		**$828,000**		
	404+40	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	345	$4,000	$1,380,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-690	$2,100	($1,449,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	690	$1,300	$897,000	G_MAG	10.0%
I10	516+50	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**330**		**$792,000**		
	519+80	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	330	$4,000	$1,320,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-660	$2,100	($1,386,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	660	$1,300	$858,000	G_MAG	10.0%
I10	535+45	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**340**		**$816,000**		
	538+85	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	340	$4,000	$1,360,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	680	$1,300	$884,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-680	$2,100	($1,428,000)	G_MAG	10.0%
I10	713+20	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**680**		**$1,632,000**		
	720+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	680	$4,000	$2,720,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	1,360	$1,300	$1,768,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-1,360	$2,100	($2,856,000)	G_MAG	10.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	**720+00**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**418**		**$1,003,200**		
	724+18	Type 5 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	418	$4,000	$1,672,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-836	$2,100	($1,755,600)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	836	$1,300	$1,086,800	G_MAG	10.0%
I10	**724+18**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**500**		**$1,200,000**		
	729+18	Type 4 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	500	$4,000	$2,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-1,000	$2,100	($2,100,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	1,000	$1,300	$1,300,000	G_MAG	10.0%
I10	**756+40**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**235**		**$564,000**		
	758+75	Type 4 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	235	$4,000	$940,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	470	$1,300	$611,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-470	$2,100	($987,000)	G_MAG	10.0%
I10	**839+80**	**Maglev - Additional Superstructure for 2-Track Elevated Sections**			**360**		**$864,000**		
	843+40	Type 4 Structure							
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	360	$4,000	$1,440,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	720	$1,300	$936,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-720	$2,100	($1,512,000)	G_MAG	10.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	868+18	**Right of Way - Dense Urban Corridor**				**2,753**		**$15,795,833**		
	895+71	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		2,753	$1,716	$4,724,148	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		2,753	$1,544	$4,251,733	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		2,753	$356	$979,187	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		2,753	$2,122	$5,840,765	LAND	25.0%
I10	869+35	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**310**		**$744,000**		
	872+45	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		310	$4,000	$1,240,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		620	$1,300	$806,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-620	$2,100	($1,302,000)	G_MAG	10.0%
I10	895+71	**Right of Way - Dense Urban Corridor**				**3,229**		**$18,526,969**		
	928+00	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		3,229	$1,716	$5,540,964	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,229	$1,544	$4,986,868	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,229	$356	$1,148,491	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,229	$2,122	$6,850,646	LAND	25.0%
I10	917+00	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**400**		**$960,000**		
	921+00	Type 4 Structure								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		400	$4,000	$1,600,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		800	$1,300	$1,040,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-800	$2,100	($1,680,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	928+00	**Right of Way - Dense Urban Corridor**				**3,921**		**$22,497,443**		
	967+21	Right of Way Acquisition (Dense Urban)								
		40.02	Utility Relocation along Right of Way	URU	LF	3,921	$1,716	$6,728,436	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	3,921	$1,544	$6,055,592	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	3,921	$356	$1,394,621	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	3,921	$2,122	$8,318,794	LAND	25.0%
I10	966+00	**Maglev - Additional Superstructure for 2-Track Elevated Sections**				**400**		**$960,000**		
	970+00	Type 4 Structure								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	400	$4,000	$1,600,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	800	$1,300	$1,040,000	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-800	$2,100	($1,680,000)	G_MAG	10.0%
							Subtotal Part 3: West Los Angeles to LA Union Station:	**$1,096,697,195**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**21+00**	**Maglev - Elevated Section - 2 Tracks**				**35,761**		**$423,946,655**		
	130+00	Urban Aerial over Freight Corridor								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		35,761	$4,500	$160,924,500	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		71,522	$2,100	$150,196,200	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		35,761	$1,052	$37,620,572	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		35,761	$2,103	$75,205,383	CONSTR	25.0%
UP1B	**21+00**	**Right of Way - Freight Corridor**				**35,761**		**$18,967,634**		
	130+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		35,761	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		35,761	$530	$18,967,634	LAND	25.0%
UP1B	**33+00**	**Maglev Freeway Crossing**				**1**		**$4,080,000**		
	33+00	Freeway Crossing - 101 Freeway								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		1,700	$4,000	$6,800,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-3,400	$2,100	($7,140,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		3,400	$1,300	$4,420,000	G_MAG	10.0%
UP1B	**45+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	45+00	Street Crossing - 4th Street								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		1,500	$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		3,000	$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-3,000	$2,100	($6,300,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**49+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	49+00	Street Crossing - 6th Street								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%
UP1B	**54+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	54+00	Street Crossing - 7th Street								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%
UP1B	**60+00**	**Maglev Freeway Crossing**				**1**		**$4,080,000**		
	60+00	Freeway Crossing - Santa Monica Freeway								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,700		$4,000	$6,800,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,400		$1,300	$4,420,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,400		$2,100	($7,140,000)	G_MAG	10.0%
UP1B	**64+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	64+00	Olympic Boulevard								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**118+00**	**Maglev Freeway Crossing**				**1**		**$4,080,000**		
	118+00	Long Beach Freeway								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,700		$4,000	$6,800,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,400		$1,300	$4,420,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,400		$2,100	($7,140,000)	G_MAG	10.0%
UP1B	**130+00**	**Maglev - Elevated Section - 2 Tracks**				**22,966**		**$272,261,930**		
	200+00	Urban Aerial over Freight Corridor								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	22,966		$4,500	$103,347,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	45,932		$2,100	$96,457,200	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	22,966		$1,052	$24,160,232	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	22,966		$2,103	$48,297,498	CONSTR	25.0%
UP1B	**130+00**	**Right of Way - Freight Corridor**				**22,966**		**$12,181,166**		
	200+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF	0		$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	0		$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF	22,966		$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	0		$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	22,966		$530	$12,181,166	LAND	25.0%
UP1B	**184+50**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	184+50	Bluff Rd								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**200+00**	**Maglev - Elevated Section - 2 Tracks**				**3,281**		**$38,896,255**		
	210+00	Elevated								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		3,281	$4,500	$14,764,500	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		6,562	$2,100	$13,780,200	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		3,281	$1,052	$3,451,612	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		3,281	$2,103	$6,899,943	CONSTR	25.0%
UP1B	**200+00**	**Right of Way - Freight Corridor**				**3,281**		**$1,740,242**		
	210+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		3,281	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,281	$530	$1,740,242	LAND	25.0%
UP1B	**210+00**	**Maglev - Elevated Section - 2 Tracks**				**19,685**		**$233,365,675**		
	270+00	Urban At-Grade within Freight Corridor (to Be Elevated)								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		19,685	$4,500	$88,582,500	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		39,370	$2,100	$82,677,000	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		19,685	$1,052	$20,708,620	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		19,685	$2,103	$41,397,555	CONSTR	25.0%
UP1B	**210+00**	**Right of Way - Freight Corridor**				**19,685**		**$10,440,924**		
	270+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		19,685	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		19,685	$530	$10,440,924	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**227+00**	**Maglev Freeway Crossing**				**1**		**$5,100,000**		
	227+00	San Gabriel River Freeway								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,700		$5,000	$8,500,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,400		$1,625	$5,525,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,400		$2,625	($8,925,000)	G_MAG	10.0%
UP1B	**270+00**	**Maglev - Elevated Section - 2 Tracks**				**45,932**		**$544,523,860**		
	410+00	Urban At-Grade within Freight Corridor (to be Elevated)								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	45,932		$4,500	$206,694,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	91,864		$2,100	$192,914,400	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	45,932		$1,052	$48,320,464	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	45,932		$2,103	$96,594,996	CONSTR	25.0%
UP1B	**270+00**	**Right of Way - Freight Corridor**				**45,932**		**$24,362,333**		
	410+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF	0		$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	0		$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF	45,932		$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	0		$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	45,932		$530	$24,362,333	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**410+00**	**Maglev - Elevated Section - 2 Tracks**				**38,386**		**$455,066,030**		
	527+00	Elevated in Freight Corridor								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		38,386	$4,500	$172,737,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		76,772	$2,100	$161,221,200	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		38,386	$1,052	$40,382,072	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		38,386	$2,103	$80,725,758	CONSTR	25.0%
UP1B	**410+00**	**Right of Way - Freight Corridor**				**38,386**		**$20,359,934**		
	527+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		38,386	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		38,386	$530	$20,359,934	LAND	25.0%
UP1B	**464+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	464+00	Grand Avenue								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		1,500	$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		3,000	$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-3,000	$2,100	($6,300,000)	G_MAG	10.0%
UP1B	**504+00**	**Maglev Freeway Crossing**				**1**		**$5,100,000**		
	504+00	Orange Freeway								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		1,700	$5,000	$8,500,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		3,400	$1,625	$5,525,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-3,400	$2,625	($8,925,000)	G_MAG	10.0%

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**523+00**	**Maglev Freeway Crossing**				**1**		**$5,100,000**		
	523+00	Chino Valley Freeway								
		10.04	Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,700	$5,000	$8,500,000	CONSTR	25.0%
		10.09	Guideway Beams (Track) Type I	TM1	TF	-3,400	$2,625	($8,925,000)	G_MAG	10.0%
		10.09	Guideway Beams (Track) Type III	TM3	TF	3,400	$1,625	$5,525,000	G_MAG	10.0%
							Subtotal Part B: CHSRA Union Station to Pomona:	**$2,105,252,638**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**220+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	220+00	Beverly Avenue								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%
UP1A	**270+00**	**Maglev Freeway Crossing**				**1**		**$4,080,000**		
	270+00	Pomona Freeway								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,700		$4,000	$6,800,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,400		$2,100	($7,140,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,400		$1,300	$4,420,000	G_MAG	10.0%
UP1A	**328+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	328+00	Hacienda Blvd								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%
UP1A	**497+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	497+00	Humane Way								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**498+50**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	498+50	W Temple Avenue								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500		$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000		$2,100	($6,300,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000		$1,300	$3,900,000	G_MAG	10.0%
UP1A	**502+00**	**Maglev - Elevated Section - 2 Tracks**				**3,281**		**$38,896,255**		
	512+00	Elevated in Freight Corridor								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	3,281		$4,500	$14,764,500	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	6,562		$2,100	$13,780,200	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	3,281		$1,052	$3,451,612	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	3,281		$2,103	$6,899,943	CONSTR	25.0%
UP1A	**512+00**	**Maglev - Elevated Section - 2 Tracks**				**28,871**		**$342,265,705**		
	600+00	Elevated in Freight Corridor								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	28,871		$4,500	$129,919,500	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	57,742		$2,100	$121,258,200	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	28,871		$1,052	$30,372,292	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	28,871		$2,103	$60,715,713	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**538+40**	**Right of Way - Freight Corridor**				**20,210**		**$10,719,384**		
	600+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		20,210	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		20,210	$530	$10,719,384	LAND	25.0%
UP1A	**538+40**	**Maglev - Elevated Section - 2 Tracks**				**36,614**		**$434,058,970**		
	650+00	Elevated in Freight Corridor								
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF		36,614	$4,500	$164,763,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		73,228	$2,100	$153,778,800	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF		36,614	$1,052	$38,517,928	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF		36,614	$2,103	$76,999,242	CONSTR	25.0%
UP1A	**591+50**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	591+50	Central Avenue Overpass								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF		1,500	$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF		3,000	$1,300	$3,900,000	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF		-3,000	$2,100	($6,300,000)	G_MAG	10.0%
UP1A	**600+00**	**Right of Way - Freight Corridor**				**16,404**		**$8,700,682**		
	650+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		16,404	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		16,404	$530	$8,700,682	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**608+00**	**Maglev Street Crossing**				**1**		**$3,600,000**		
	608+00	Mountain Avenue Overpass								
		10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure	GMS	LF	1,500	$4,000	$6,000,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	-3,000	$2,100	($6,300,000)	G_MAG	10.0%
		10.09 Guideway Beams (Track) Type III	TM3	TF	3,000	$1,300	$3,900,000	G_MAG	10.0%
UP1A	**650+00**	**Maglev - Elevated Section - 2 Tracks**			**3,281**		**$38,896,255**		
	660+00	Elevated in Freight Corridor							
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	3,281	$4,500	$14,764,500	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	6,562	$2,100	$13,780,200	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	3,281	$1,052	$3,451,612	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	3,281	$2,103	$6,899,943	CONSTR	25.0%
UP1A	**650+00**	**Right of Way - Freight Corridor**			**3,281**		**$1,740,242**		
	660+00	Property Acquisition (Freight)							
		40.02 Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF	3,281	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	3,281	$530	$1,740,242	LAND	25.0%
UP1A	**660+00**	**Maglev - Elevated Section - 2 Tracks**			**5,938**		**$70,394,990**		
	678+10	Elevated in Freight Corridor							
		10.04 Elevated Maglev Guideway (2 Tracks)	GME	LF	5,938	$4,500	$26,721,000	CONSTR	25.0%
		10.09 Guideway Beams (Track) Type I	TM1	TF	11,876	$2,100	$24,939,600	G_MAG	10.0%
		50.01 Maglev Signals and Communications	YMM	LF	5,938	$1,052	$6,246,776	CONSTR	25.0%
		50.03 Maglev Traction Power (Supply and Distribution)	PMM	LF	5,938	$2,103	$12,487,614	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To	*Cost Item*	*Qty*	*Unit Cost*	*Cost*	*Contingency*
	Subtotal Part A: CHSRA - Pomona to Ontario Airport:			**$971,352,483**	

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Ontario Airport Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2947+51**	**Elevated Station (Center-Side Platform)**				**1**		**$94,138,000**		
	2956+11	Ontario Airport Station								
		20.02	Elevated Station - Center-Side Platform with Mezzanine	SCM	EA	1	$85,800,000	$85,800,000	CONSTR	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	94,000	$20	$1,880,000	LAND	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	322,900	$20	$6,458,000	LAND	25.0%
I10	**2947+51**	**Parking Deck Spaces**				**2,000**		**$44,710,000**		
	2956+11	Parking at Ontario Airport								
		20.06	Parking Space - Deck	PKD	SP	2,000	$20,475	$40,950,000	CONSTR	25.0%
		60.01	Land Acquisition for Yards and Stations	LSU	SF	188,000	$20	$3,760,000	LAND	25.0%
							Subtotal Ontario Airport Station:	**$138,848,000**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Stations - CAHSRA Alignment

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**107+06**	**Elevated Station (Center Platform)**				**1**		**$53,386,000**		
	113+86	West Los Angeles Station								
		20.02 Elevated Station - Center Platform	SCP	EA		1	$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		215,300	$20	$4,306,000	LAND	25.0%
I10	**107+06**	**Parking Deck Spaces**				**1,000**		**$22,355,000**		
	113+86	Parking at West Los Angeles Station								
		20.06 Parking Space - Deck	PKD	SP		1,000	$20,475	$20,475,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
UP1B	**21+00**	**Elevated Station (Center-Side Platform)**				**1**		**$94,138,000**		
	21+00	LA Union Station								
		20.02 Elevated Station - Center-Side Platform with Mezzanine	SCM	EA		1	$85,800,000	$85,800,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		322,900	$20	$6,458,000	LAND	25.0%
UP1B	**444+55**	**Elevated Station (Center Platform)**				**1**		**$53,386,000**		
	448+55	City of Industry Station								
		20.02 Elevated Station - Center Platform	SCP	EA		1	$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		215,300	$20	$4,306,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
UP1B	**444+55**	**Parking Deck Spaces**				**2,000**		**$44,710,000**		
	448+55	Parking at City of Industry Station								
		20.06 Parking Space - Deck	PKD	SP		2,000	$20,475	$40,950,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		188,000	$20	$3,760,000	LAND	25.0%

Stations - CAHSRA Alignment

Station From/To	Cost Item	Qty	Unit Cost	Cost	Contingency
			Subtotal Stations - CAHSRA Alignment:	**$267,975,000**	

Ontario Maintenance Facility

Station From/To	Cost Item			Qty	Unit Cost	Cost	Contingency	
	Maglev - Central Maintenance Facility Central Maintenance Facility - Maglev			**1**		**$175,200,000**		
30.02	Maglev Centralized Maintenance Facility	MHF	EA	1	$97,700,000	$97,700,000	CONSTR	25.0%
30.02	Maglev Train Wash Facility	MWF	EA	1	$7,500,000	$7,500,000	CONSTR	25.0%
30.02	Maglev Vehicle Equipment	MEH	EA	1	$70,000,000	$70,000,000	CONSTR	25.0%
					Subtotal Ontario Maintenance Facility:	**$175,200,000**		

West Los Angeles Yard

Station From/To	*Cost Item*			*Qty*	*Unit Cost*	*Cost*	*Contingency*	
	Maglev - Decentralized Maintenance Facility Decentral Maintenance Facility - Maglev			**1**		**$29,200,000**		
30.02	Maglev Decentral Maintenance Facility	MIF	EA	1	$29,200,000	$29,200,000	CONSTR	25.0%
			Subtotal West Los Angeles Yard:			**$29,200,000**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

Maglev on UPRR Alignment

Revenue Fleet

Station From/To	*Cost Item*			*Qty*	*Unit Cost*	*Cost*	*Contingency*	
	Maglev Trainsets Maglev Trainsets			**7**		**$448,875,000**		
	70.03 Maglev Train Sets	VTM	EA	7	$64,125,000	$448,875,000	VEH_MAG	10.0%
				Subtotal Revenue Fleet:		**$448,875,000**		

Total Maglev on UPRR Alignment: $5,233,400,316

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	82+50	**HSR - Drill Track - West Los Angeles**				**1**		**$14,491,200**		
	106+50	Drill track beyond WLA station								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		2,400	$4,500	$10,800,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		4,800	$305	$1,464,000	LOW	10.0%
		50.01 HSR Signaling (ATC)	YRA	LF		2,400	$275	$660,000	CONSTR	25.0%
		50.01 HSR Wayside Protection System	YRW	LF		2,400	$22	$52,800	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		2,400	$141	$338,400	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		2,400	$262	$628,800	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		2,400	$228	$547,200	CONSTR	25.0%
I10	106+50	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**86,250**		**$520,777,500**		
	969+00	Urban Aerial Adjacent to Highway Corridor								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		86,250	$4,500	$388,125,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		172,500	$305	$52,612,500	LOW	10.0%
		50.01 HSR Signaling (ATC)	YRA	LF		86,250	$275	$23,718,750	CONSTR	25.0%
		50.01 HSR Wayside Protection System	YRW	LF		86,250	$22	$1,897,500	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		86,250	$141	$12,161,250	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		86,250	$262	$22,597,500	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		86,250	$228	$19,665,000	CONSTR	25.0%
I10	123+80	**Additional for Long Crossing**				**330**		**$2,574,000**		
	127+10	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		330	$7,800	$2,574,000	CONSTR	25.0%
I10	148+08	**Additional for High Elevated Structure**				**1,492**		**$1,342,800**		
	163+00	High Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,492	$900	$1,342,800	CONSTR	25.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	153+80	**Additional for Long Crossing**			**380**		**$2,964,000**		
	157+60	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	380	$7,800	$2,964,000	CONSTR	25.0%
I10	189+55	**Additional for Long Crossing**			**365**		**$2,847,000**		
	193+20	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	365	$7,800	$2,847,000	CONSTR	25.0%
I10	235+10	**Additional for Long Crossing**			**355**		**$2,769,000**		
	238+65	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	355	$7,800	$2,769,000	CONSTR	25.0%
I10	268+40	**Additional for Long Crossing**			**680**		**$5,304,000**		
	275+20	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	680	$7,800	$5,304,000	CONSTR	25.0%
I10	334+90	**Additional for Long Crossing**			**410**		**$3,198,000**		
	339+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	410	$7,800	$3,198,000	CONSTR	25.0%
I10	354+80	**Additional for Long Crossing**			**405**		**$3,159,000**		
	358+85	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	405	$7,800	$3,159,000	CONSTR	25.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	400+95	**Additional for Long Crossing**			**345**		**$2,691,000**		
	404+40	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	345	$7,800	$2,691,000	CONSTR	25.0%
I10	516+50	**Additional for Long Crossing**			**330**		**$2,574,000**		
	519+80	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	330	$7,800	$2,574,000	CONSTR	25.0%
I10	535+45	**Additional for Long Crossing**			**340**		**$2,652,000**		
	538+85	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	340	$7,800	$2,652,000	CONSTR	25.0%
I10	713+20	**Additional for Long Crossing**			**680**		**$5,304,000**		
	720+00	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	680	$7,800	$5,304,000	CONSTR	25.0%
I10	720+00	**Additional for Long Crossing**			**418**		**$3,260,400**		
	724+18	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	418	$7,800	$3,260,400	CONSTR	25.0%
I10	722+50	**Additional for High Elevated Structure**			**1,950**		**$1,755,000**		
	742+00	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,950	$900	$1,755,000	CONSTR	25.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item			Qty	Unit Cost	Cost	Contingency	
I10	724+18	**Additional for Long Crossing**			**500**		**$3,900,000**		
	729+18	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	500	$7,800	$3,900,000	CONSTR	25.0%
I10	756+40	**Additional for Long Crossing**			**235**		**$1,833,000**		
	758+75	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	235	$7,800	$1,833,000	CONSTR	25.0%
I10	839+80	**Additional for Long Crossing**			**360**		**$2,808,000**		
	843+40	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	360	$7,800	$2,808,000	CONSTR	25.0%
I10	868+18	**Right of Way - Dense Urban Corridor**			**2,753**		**$15,188,301**		
	895+71	Right of Way Acquisition (Dense Urban)							
		40.02 Utility Relocation along Right of Way	URU	LF	2,753	$1,650	$4,542,450	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF	2,753	$1,485	$4,088,205	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF	2,753	$342	$941,526	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF	2,753	$2,040	$5,616,120	LAND	25.0%
I10	869+35	**Additional for Long Crossing**			**310**		**$2,418,000**		
	872+45	Long Span Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	310	$7,800	$2,418,000	CONSTR	25.0%
I10	879+00	**Additional for High Elevated Structure**			**1,318**		**$1,186,200**		
	892+18	High Structure							
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,318	$900	$1,186,200	CONSTR	25.0%

Part 3: West Los Angeles to LA Union Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	895+71	**Right of Way - Dense Urban Corridor**				**3,229**		**$17,814,393**		
	928+00	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		3,229	$1,650	$5,327,850	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,229	$1,485	$4,795,065	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,229	$342	$1,104,318	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,229	$2,040	$6,587,160	LAND	25.0%
I10	917+00	**Additional for Long Crossing**				**400**		**$3,120,000**		
	921+00	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		400	$7,800	$3,120,000	CONSTR	25.0%
I10	928+00	**Right of Way - Dense Urban Corridor**				**3,921**		**$21,632,157**		
	967+21	Right of Way Acquisition (Dense Urban)								
		40.02 Utility Relocation along Right of Way	URU	LF		3,921	$1,650	$6,469,650	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		3,921	$1,485	$5,822,685	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		3,921	$342	$1,340,982	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,921	$2,040	$7,998,840	LAND	25.0%
I10	966+00	**Additional for Long Crossing**				**400**		**$3,120,000**		
	970+00	Long Span Structure								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		400	$7,800	$3,120,000	CONSTR	25.0%
							Subtotal Part 3: West Los Angeles to LA Union Station:	**$650,682,951**		

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**21+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**35,761**		**$215,924,918**		
	130+00	Urban Aerial over Freight Corridor								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	35,761	$4,500	$160,924,500	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	71,522	$305	$21,814,210	LOW	10.0%
		50.01	HSR Signaling (ATC)	YRA	LF	35,761	$275	$9,834,275	CONSTR	25.0%
		50.01	HSR Wayside Protection System	YRW	LF	35,761	$22	$786,742	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	35,761	$141	$5,042,301	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	35,761	$262	$9,369,382	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	35,761	$228	$8,153,508	CONSTR	25.0%
UP1B	**21+00**	**Right of Way - Freight Corridor**				**35,761**		**$18,238,110**		
	130+00	Property Acquisition (Freight)								
		40.02	Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08	Flagging in Freight Corridor	CFL	LF	35,761	$0	$0	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	35,761	$510	$18,238,110	LAND	25.0%
UP1B	**33+00**	**Additional for Freeway Crossing (ea)**				**1**		**$3,090,000**		
	33+00	Freeway Crossing - 101 Freeway								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	200	$7,800	$1,560,000	CONSTR	25.0%
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,700	$900	$1,530,000	CONSTR	25.0%
UP1B	**45+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	45+00	Street Crossing - 4th Street								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	0	$0	$0	CONSTR	25.0%
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,500	$900	$1,350,000	CONSTR	25.0%

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**49+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	49+00	Street Crossing - 6th Street								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
UP1B	**54+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	54+00	Street Crossing - 7th Street								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%
UP1B	**60+00**	**Additional for Freeway Crossing (ea)**				**1**		**$3,090,000**		
	60+00	Freeway Crossing - Santa Monica Freeway								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		200	$7,800	$1,560,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,700	$900	$1,530,000	CONSTR	25.0%
UP1B	**64+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	64+00	Olympic Boulevard								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
UP1B	**118+00**	**Additional for Freeway Crossing (ea)**				**1**		**$3,090,000**		
	118+00	Long Beach Freeway								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		200	$7,800	$1,560,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,700	$900	$1,530,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**130+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**22,966**		**$138,668,708**		
	200+00	Urban Aerial over Freight Corridor								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	22,966	$4,500	$103,347,000	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	45,932	$305	$14,009,260	LOW	10.0%
		50.01	HSR Wayside Protection System	YRW	LF	22,966	$22	$505,252	CONSTR	25.0%
		50.01	HSR Signaling (ATC)	YRA	LF	22,966	$275	$6,315,650	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	22,966	$141	$3,238,206	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	22,966	$262	$6,017,092	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	22,966	$228	$5,236,248	CONSTR	25.0%
UP1B	**130+00**	**Right of Way - Freight Corridor**				**22,966**		**$11,712,660**		
	200+00	Property Acquisition (Freight)								
		40.02	Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08	Flagging in Freight Corridor	CFL	LF	22,966	$0	$0	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	22,966	$510	$11,712,660	LAND	25.0%
UP1B	**184+50**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	184+50	Bluff Rd								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,500	$900	$1,350,000	CONSTR	25.0%
		10.04	Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	0	$0	$0	CONSTR	25.0%

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**200+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**3,281**		**$19,810,678**		
	210+00	Transition Aerial to At-Grade (to be Elevated)								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	3,281	$4,500	$14,764,500	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	6,562	$305	$2,001,410	LOW	10.0%
		50.01	HSR Wayside Protection System	YRW	LF	3,281	$22	$72,182	CONSTR	25.0%
		50.01	HSR Signaling (ATC)	YRA	LF	3,281	$275	$902,275	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	3,281	$141	$462,621	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	3,281	$262	$859,622	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	3,281	$228	$748,068	CONSTR	25.0%
UP1B	**200+00**	**Right of Way - Freight Corridor**				**3,281**		**$1,673,310**		
	210+00	Property Acquisition (Freight)								
		40.02	Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08	Flagging in Freight Corridor	CFL	LF	3,281	$0	$0	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	3,281	$510	$1,673,310	LAND	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**210+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**19,685**		**$118,858,030**		
	270+00	Urban At-Grade within Freight Corridor (to be Elevated)								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		19,685	$4,500	$88,582,500	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		39,370	$305	$12,007,850	LOW	10.0%
		50.01 HSR Signaling (ATC)	YRA	LF		19,685	$275	$5,413,375	CONSTR	25.0%
		50.01 HSR Wayside Protection System	YRW	LF		19,685	$22	$433,070	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		19,685	$141	$2,775,585	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		19,685	$262	$5,157,470	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		19,685	$228	$4,488,180	CONSTR	25.0%
UP1B	**210+00**	**Right of Way - Freight Corridor**				**19,685**		**$10,039,350**		
	270+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		19,685	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		19,685	$510	$10,039,350	LAND	25.0%
UP1B	**214+00**	**Additional for Long Crossing**				**328**		**$2,558,400**		
	215+00	San Gabriel River (Waterway)								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		328	$7,800	$2,558,400	CONSTR	25.0%
UP1B	**227+00**	**Additional for Freeway Crossing (ea)**				**1**		**$3,862,500**		
	227+00	San Gabriel River Freeway								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,700	$1,125	$1,912,500	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		200	$9,750	$1,950,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**270+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**45,932**		**$277,337,416**		
	410+00	Urban At-Grade within Freight Corridor (to be Elevated)								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	45,932	$4,500	$206,694,000	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	91,864	$305	$28,018,520	LOW	10.0%
		50.01	HSR Signaling (ATC)	YRA	LF	45,932	$275	$12,631,300	CONSTR	25.0%
		50.01	HSR Wayside Protection System	YRW	LF	45,932	$22	$1,010,504	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	45,932	$141	$6,476,412	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	45,932	$262	$12,034,184	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	45,932	$228	$10,472,496	CONSTR	25.0%
UP1B	**270+00**	**Right of Way - Freight Corridor**				**45,932**		**$23,425,320**		
	410+00	Property Acquisition (Freight)								
		40.02	Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		40.08	Flagging in Freight Corridor	CFL	LF	45,932	$0	$0	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	45,932	$510	$23,425,320	LAND	25.0%

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**410+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**38,386**		**$231,774,668**		
	527+00	Urban At-Grade within Freight Corridor (To be Elevated)								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	38,386	$4,500	$172,737,000	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	76,772	$305	$23,415,460	LOW	10.0%
		50.01	HSR Signaling (ATC)	YRA	LF	38,386	$275	$10,556,150	CONSTR	25.0%
		50.01	HSR Wayside Protection System	YRW	LF	38,386	$22	$844,492	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	38,386	$141	$5,412,426	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	38,386	$262	$10,057,132	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	38,386	$228	$8,752,008	CONSTR	25.0%
UP1B	**410+00**	**Right of Way - Freight Corridor**				**38,386**		**$19,576,860**		
	527+00	Property Acquisition (Freight)								
		40.02	Utility Relocation along Right of Way	URU	LF	0	$0	$0	CONSTR	25.0%
		40.07	Roadway Improvements on Right of Way	RDW	LF	0	$0	$0	CONSTR	25.0%
		40.08	Flagging in Freight Corridor	CFL	LF	38,386	$0	$0	CONSTR	25.0%
		40.08	Traffic Protection and Control During Construction	CMP	LF	0	$0	$0	CONSTR	25.0%
		60.01	Right of Way Acquisition	LWU	LF	38,386	$510	$19,576,860	LAND	25.0%
UP1B	**464+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	464+00	Grand Avenue								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	0	$0	$0	CONSTR	25.0%
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,500	$900	$1,350,000	CONSTR	25.0%
UP1B	**504+00**	**Additional for Freeway Crossing (ea)**				**1**		**$3,862,500**		
	504+00	Orange Freeway								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,700	$1,125	$1,912,500	CONSTR	25.0%
		10.04	Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	200	$9,750	$1,950,000	CONSTR	25.0%

Part B: CHSRA Union Station to Pomona

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**523+00**	**Additional for Freeway Crossing (ea)**				**1**		**$3,862,500**		
	523+00	Chino Valley Freeway								
		10.04	Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF	1,700	$1,125	$1,912,500	CONSTR	25.0%
		10.04	Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF	200	$9,750	$1,950,000	CONSTR	25.0%
							Subtotal Part B: CHSRA Union Station to Pomona:	**$1,118,555,928**		

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**220+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	220+00	Beverly Avenue								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%
UP1A	**270+00**	**Additional for Freeway Crossing (ea)**				**1**		**$3,090,000**		
	270+00	Pomona Freeway								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,700	$900	$1,530,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		200	$7,800	$1,560,000	CONSTR	25.0%
UP1A	**328+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	328+00	Hacienda Blvd								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%
UP1A	**497+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	497+00	Humane Way								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
UP1A	**498+50**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	498+50	W Temple Avenue								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**502+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**3,281**		**$19,810,678**		
	512+00	Transition At Grade to Aerial								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	3,281	$4,500	$14,764,500	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	6,562	$305	$2,001,410	LOW	10.0%
		50.01	HSR Signaling (ATC)	YRA	LF	3,281	$275	$902,275	CONSTR	25.0%
		50.01	HSR Wayside Protection System	YRW	LF	3,281	$22	$72,182	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	3,281	$141	$462,621	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	3,281	$262	$859,622	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	3,281	$228	$748,068	CONSTR	25.0%
UP1A	**512+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**28,871**		**$174,323,098**		
	600+00	Urban Aerial over Freight Corridor								
		10.04	Elevated HSR Guideway (2 Tracks)	GRE	LF	28,871	$4,500	$129,919,500	CONSTR	25.0%
		10.09	HSR Track on Structure (2 Tracks)	TRD	TF	57,742	$305	$17,611,310	LOW	10.0%
		50.01	HSR Signaling (ATC)	YRA	LF	28,871	$275	$7,939,525	CONSTR	25.0%
		50.01	HSR Wayside Protection System	YRW	LF	28,871	$22	$635,162	CONSTR	25.0%
		50.03	HSR Traction Power Supply	PRS	LF	28,871	$141	$4,070,811	CONSTR	25.0%
		50.04	HSR Traction Power Distribution	PRD	LF	28,871	$262	$7,564,202	CONSTR	25.0%
		50.05	HSR Communications (w/Fiber Optic Backbone)	CR1	LF	28,871	$228	$6,582,588	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**538+40**	**Right of Way - Freight Corridor**				**20,210**		**$10,307,100**		
	600+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		20,210	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		20,210	$510	$10,307,100	LAND	25.0%
UP1A	**538+40**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**36,614**		**$221,075,332**		
	650+00	Urban Aerial over Freight Corridor								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		36,614	$4,500	$164,763,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		73,228	$305	$22,334,540	LOW	10.0%
		50.01 HSR Wayside Protection System	YRW	LF		36,614	$22	$805,508	CONSTR	25.0%
		50.01 HSR Signaling (ATC)	YRA	LF		36,614	$275	$10,068,850	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		36,614	$141	$5,162,574	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		36,614	$262	$9,592,868	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		36,614	$228	$8,347,992	CONSTR	25.0%
UP1A	**591+50**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	591+50	Central Avenue Overpass								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**600+00**	**Right of Way - Freight Corridor**				**16,404**		**$8,366,040**		
	650+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		16,404	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		16,404	$510	$8,366,040	LAND	25.0%
UP1A	**608+00**	**Additional for Street Crossing**				**1**		**$1,350,000**		
	608+00	Mountain Avenue Overpass								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		0	$0	$0	CONSTR	25.0%
		10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure	GRH	LF		1,500	$900	$1,350,000	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1A	**650+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**3,281**		**$19,810,678**		
	660+00	Transition Aerial to At-Grade								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		3,281	$4,500	$14,764,500	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		6,562	$305	$2,001,410	LOW	10.0%
		50.01 HSR Wayside Protection System	YRW	LF		3,281	$22	$72,182	CONSTR	25.0%
		50.01 HSR Signaling (ATC)	YRA	LF		3,281	$275	$902,275	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		3,281	$141	$462,621	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		3,281	$262	$859,622	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		3,281	$228	$748,068	CONSTR	25.0%
UP1A	**650+00**	**Right of Way - Freight Corridor**				**3,281**		**$1,673,310**		
	660+00	Property Acquisition (Freight)								
		40.02 Utility Relocation along Right of Way	URU	LF		0	$0	$0	CONSTR	25.0%
		40.07 Roadway Improvements on Right of Way	RDW	LF		0	$0	$0	CONSTR	25.0%
		40.08 Traffic Protection and Control During Construction	CMP	LF		0	$0	$0	CONSTR	25.0%
		40.08 Flagging in Freight Corridor	CFL	LF		3,281	$0	$0	CONSTR	25.0%
		60.01 Right of Way Acquisition	LWU	LF		3,281	$510	$1,673,310	LAND	25.0%
UP1A	**660+00**	**HSR Elevated Section (Urban Aerial) - 2 Tracks**				**5,938**		**$35,853,644**		
	678+10	Urban At-Grade within Freight Corridor								
		10.04 Elevated HSR Guideway (2 Tracks)	GRE	LF		5,938	$4,500	$26,721,000	CONSTR	25.0%
		10.09 HSR Track on Structure (2 Tracks)	TRD	TF		11,876	$305	$3,622,180	LOW	10.0%
		50.01 HSR Signaling (ATC)	YRA	LF		5,938	$275	$1,632,950	CONSTR	25.0%
		50.01 HSR Wayside Protection System	YRW	LF		5,938	$22	$130,636	CONSTR	25.0%
		50.03 HSR Traction Power Supply	PRS	LF		5,938	$141	$837,258	CONSTR	25.0%
		50.04 HSR Traction Power Distribution	PRD	LF		5,938	$262	$1,555,756	CONSTR	25.0%
		50.05 HSR Communications (w/Fiber Optic Backbone)	CR1	LF		5,938	$228	$1,353,864	CONSTR	25.0%

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Part A: CHSRA - Pomona to Ontario Airport

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
UP1B	**270+00**	**Additional for Long Crossing**				**100**		**$780,000**		
	271+00	Pomona Freeway								
		10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure	GRL	LF		100	$7,800	$780,000	CONSTR	25.0%
					Subtotal Part A: CHSRA - Pomona to Ontario Airport:			**$503,189,880**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Ontario Airport Station

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**2947+51**	**Elevated Station (Center-Side Platform)**				**1**		**$94,138,000**		
	2956+11	Ontario Airport Station								
		20.02 Elevated Station - Center-Side Platform with Mezzanine	SCM	EA		1	$85,800,000	$85,800,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		322,900	$20	$6,458,000	LAND	25.0%
I10	**2947+51**	**Parking Deck Spaces**				**2,000**		**$44,710,000**		
	2956+11	Parking at Ontario Airport								
		20.06 Parking Space - Deck	PKD	SP		2,000	$20,475	$40,950,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		188,000	$20	$3,760,000	LAND	25.0%
							Subtotal Ontario Airport Station:	**$138,848,000**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Stations - CAHSRA Alignment

Station From/To		Cost Item				Qty	Unit Cost	Cost	Contingency	
I10	**107+06**	**Elevated Station (Center Platform)**				**1**		**$53,386,000**		
	113+86	West Los Angeles Station								
		20.02 Elevated Station - Center Platform	SCP	EA		1	$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		215,300	$20	$4,306,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
I10	**107+06**	**Parking Deck Spaces**				**1,000**		**$22,355,000**		
	113+86	Parking at West Los Angeles Station								
		20.06 Parking Space - Deck	PKD	SP		1,000	$20,475	$20,475,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
UP1B	**21+00**	**Elevated Station (Center-Side Platform)**				**1**		**$94,138,000**		
	21+00	LA Union Station								
		20.02 Elevated Station - Center-Side Platform with Mezzanine	SCM	EA		1	$85,800,000	$85,800,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		322,900	$20	$6,458,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
UP1B	**444+55**	**Elevated Station (Center Platform)**				**1**		**$53,386,000**		
	448+55	City of Industry Station								
		20.02 Elevated Station - Center Platform	SCP	EA		1	$47,200,000	$47,200,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		94,000	$20	$1,880,000	LAND	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		215,300	$20	$4,306,000	LAND	25.0%
UP1B	**444+55**	**Parking Deck Spaces**				**2,000**		**$44,710,000**		
	448+55	Parking at City of Industry Station								
		20.06 Parking Space - Deck	PKD	SP		2,000	$20,475	$40,950,000	CONSTR	25.0%
		60.01 Land Acquisition for Yards and Stations	LSU	SF		188,000	$20	$3,760,000	LAND	25.0%

Stations - CAHSRA Alignment

Station From/To	Cost Item	Qty	Unit Cost	Cost	Contingency
			Subtotal Stations - CAHSRA Alignment:	**$267,975,000**	

Ontario Maintenance Facility

Station From/To	Cost Item			Qty	Unit Cost	Cost	Contingency	
	HSR - Central Maintenance Facility Central Maintenance Facility - HSR			**1**		**$156,822,400**		
30.02	HSR Heavy Maintenance Facility	HMF	SF	306,800	$343	$105,232,400	CONSTR	25.0%
30.02	HSR Heavy Maintenance Equipment	HEH	EA	1	$5,300,000	$5,300,000	CONSTR	25.0%
30.02	HSR Material Storage Facility	HMS	SF	67,800	$179	$12,136,200	CONSTR	25.0%
30.02	HSR S&I Shop Equipment	HES	EA	1	$2,300,000	$2,300,000	CONSTR	25.0%
30.02	HSR Service and Inspection Facility	HIF	SF	36,600	$343	$12,553,800	CONSTR	25.0%
30.02	HSR Car Wash Facility	HWF	EA	1	$2,500,000	$2,500,000	CONSTR	25.0%
30.05	HSR Yard Tracks	HYD	EA	8	$2,100,000	$16,800,000	CONSTR	25.0%
		Subtotal Ontario Maintenance Facility:				**$156,822,400**		

SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

Takeoff Details with Unit Costs

SWT on UPRR Alignment

Revenue Fleet

Station From/To	*Cost Item*				*Qty*	*Unit Cost*	*Cost*	*Contingency*	
	High Speed Trainsets High Speed Trainsets				**7**		**$210,000,000**		
	70.03 High Speed Trainsets	VTH	EA		7	$30,000,000	$210,000,000	VEH_SWT	10.0%
					Subtotal Revenue Fleet:		**$210,000,000**		

Total SWT on UPRR Alignment: $3,046,074,159

7.0 HSRT Speed Profiles – LAX Extension

The HSRT AA evaluated extending the HSRT system from West Los Angeles to Los Angeles International Airport (LAX). This appendix shows the speed profiles for this extension using both Maglev and high-speed steel-wheel technologies. Further information on the LAX extension may be found in Section 12.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. The speed profiles were developed using SYSTRA's RAILSIM® Train Performance Calculator.

Figure 7.1 LAX to West LA Speed Profile, Maglev, Eastbound

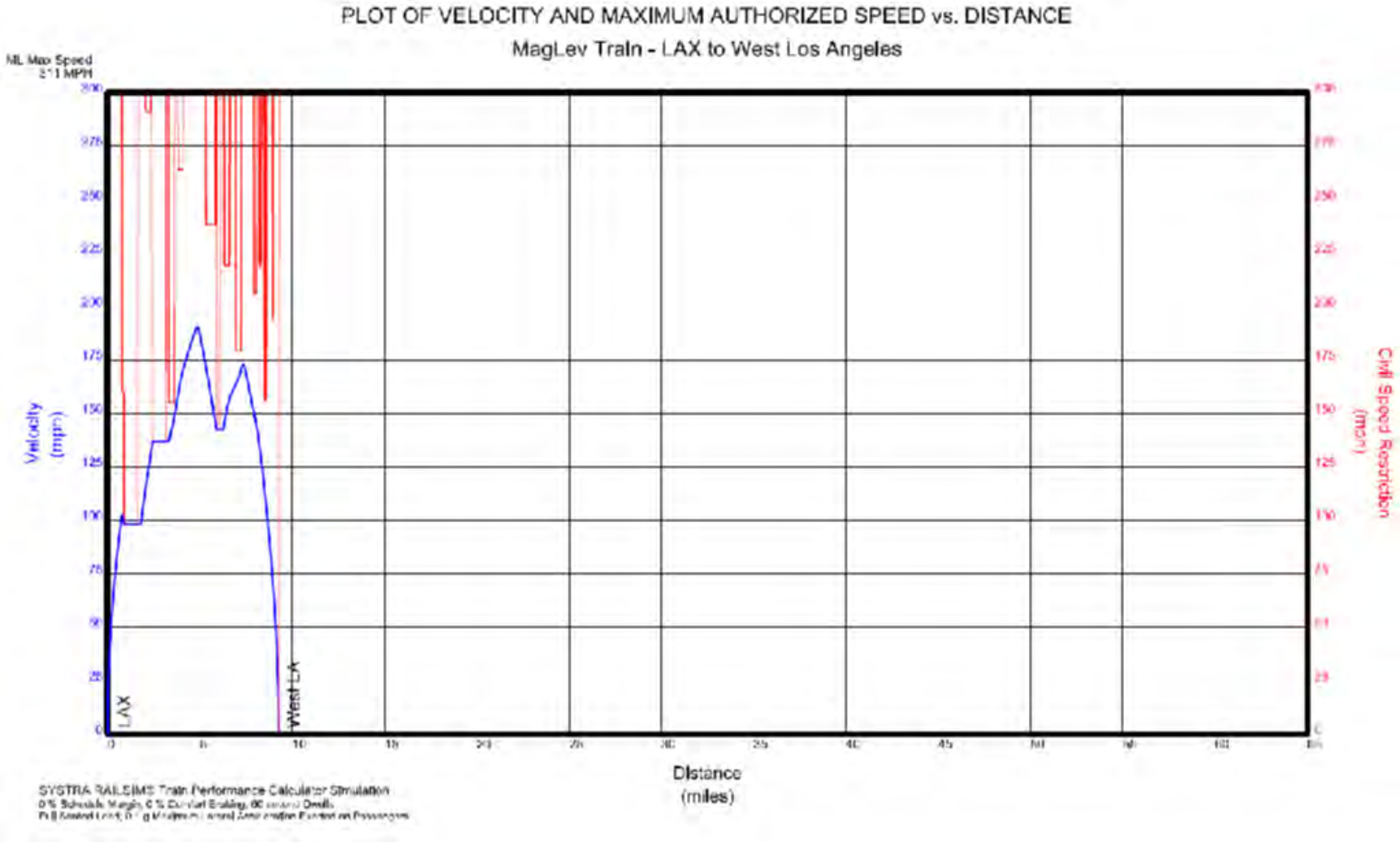


Figure 7.2 LAX to West LA Speed Profile, Steel-Wheel, Eastbound

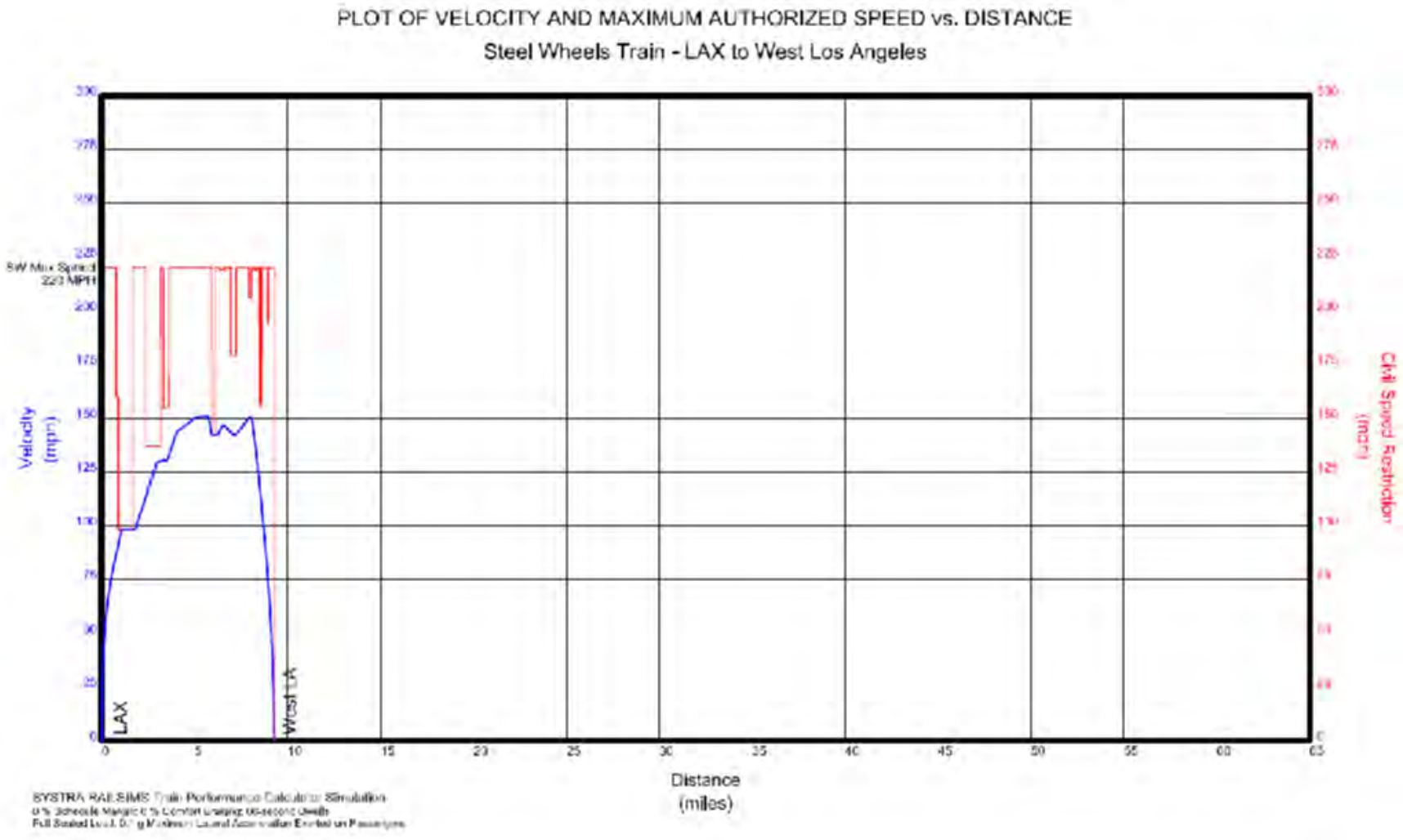


Figure 7.3 West LA to LAX Speed Profile, Maglev, Westbound

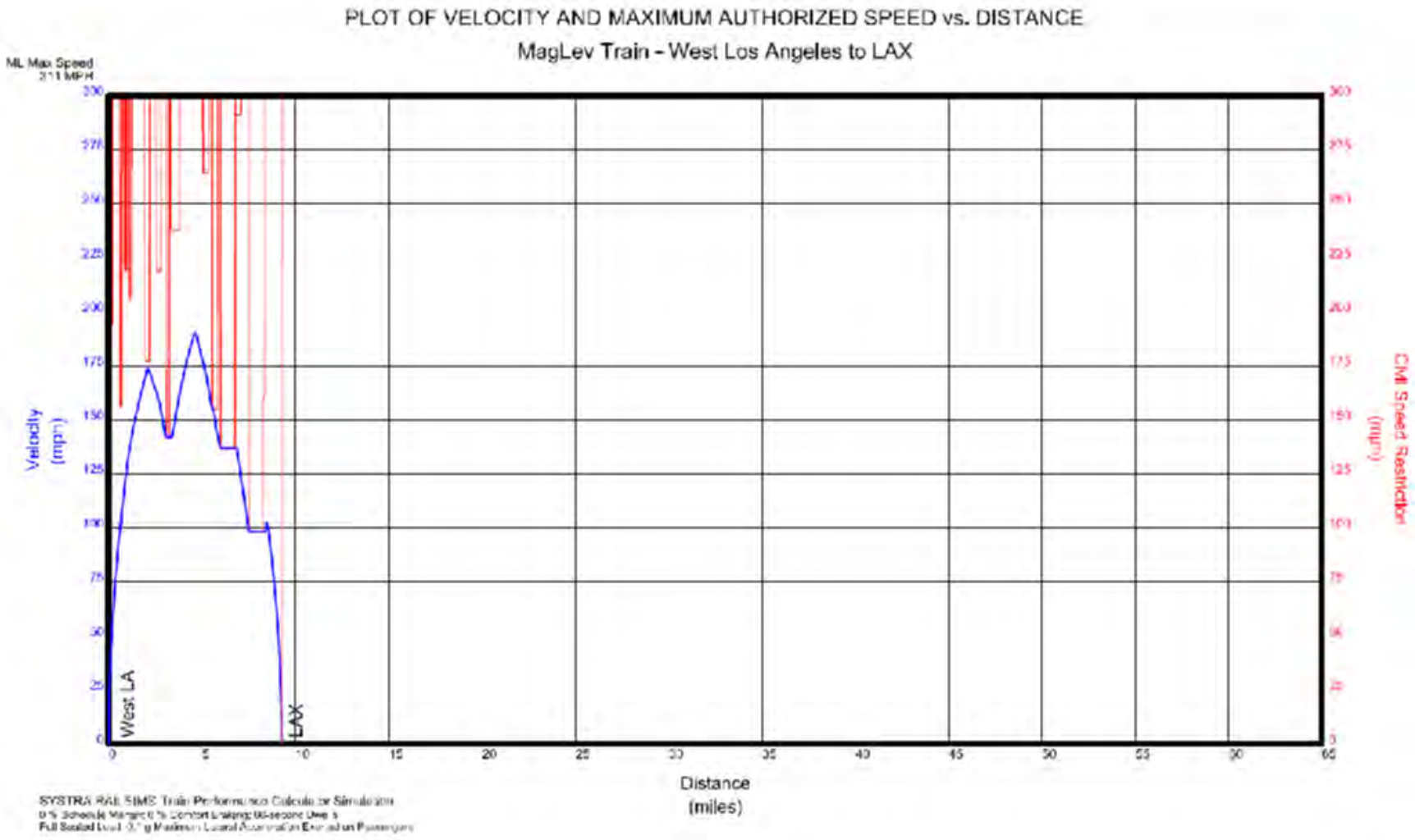
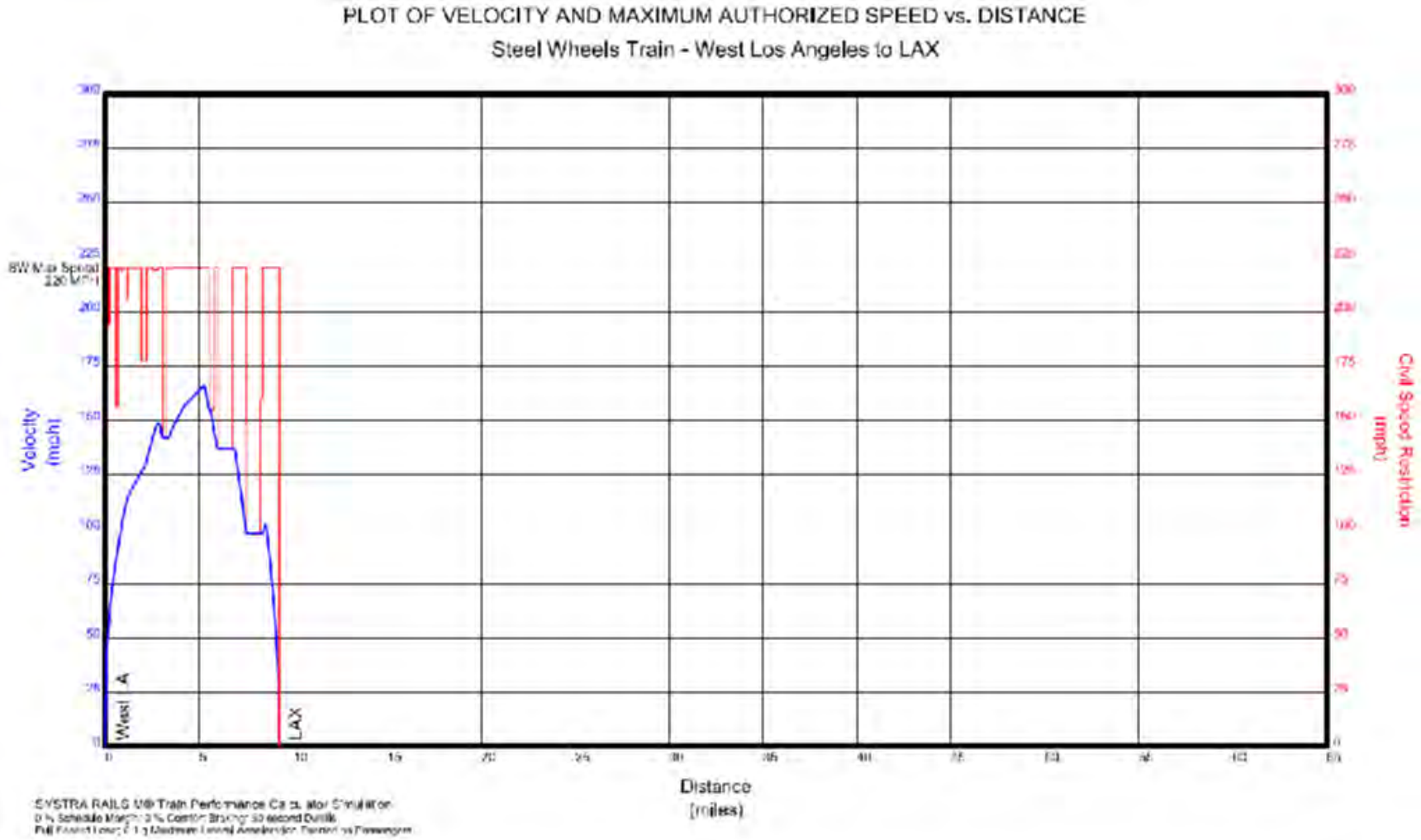


Figure 7.4 West LA to LAX Speed Profile, Steel-Wheel, Westbound



8.0 Local Transit Route Adjustments – LAX Extension

This appendix shows the reroutings made to local transit services to serve a possible LAX HSRT station. Year 2025 transit routes in the vicinity of the proposed LAX HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 8.1 to Figure 8.34. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 8.1 Adjustment to Metro Route 439, Northbound

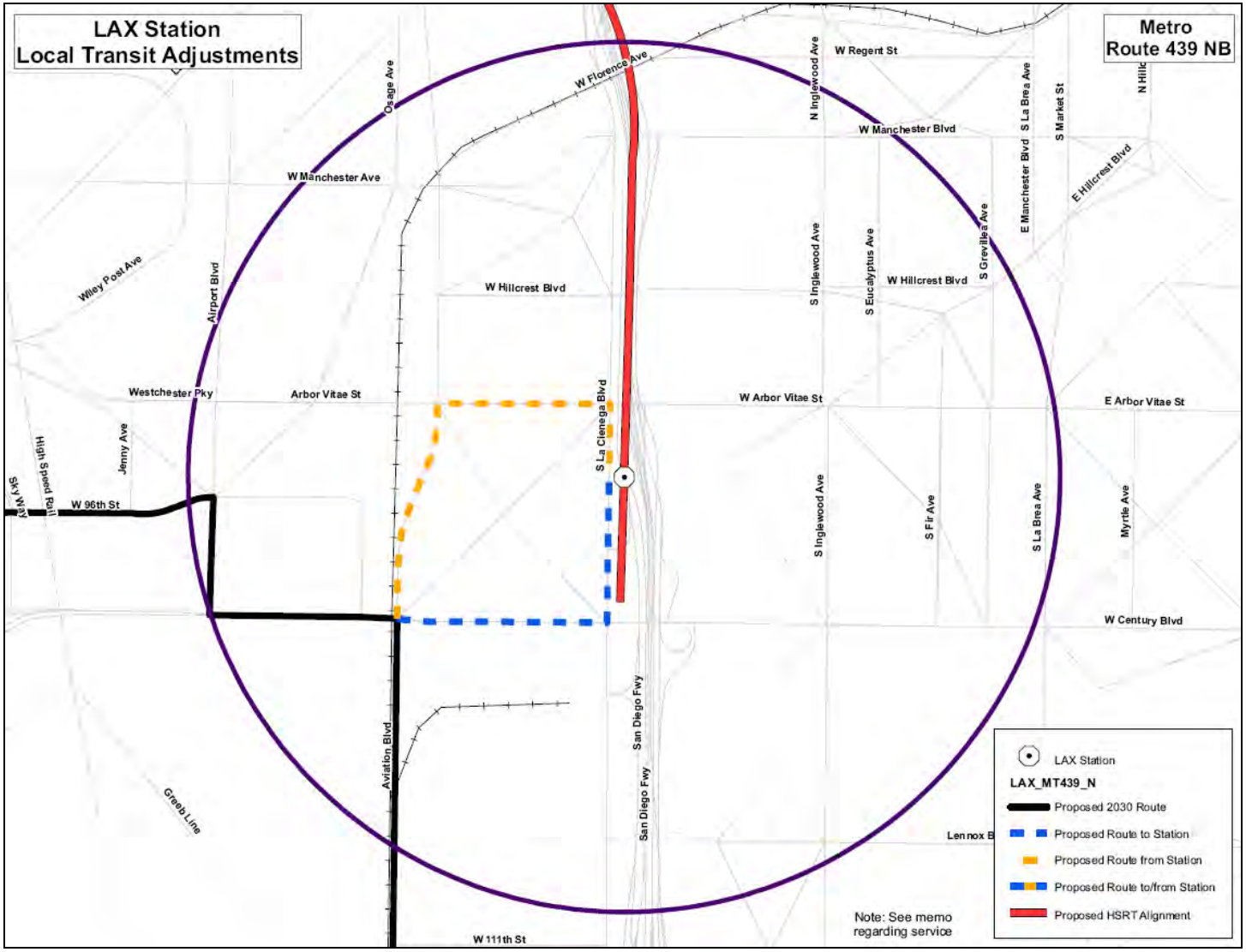


Figure 8.2 Adjustment to Metro Route 439, Southbound

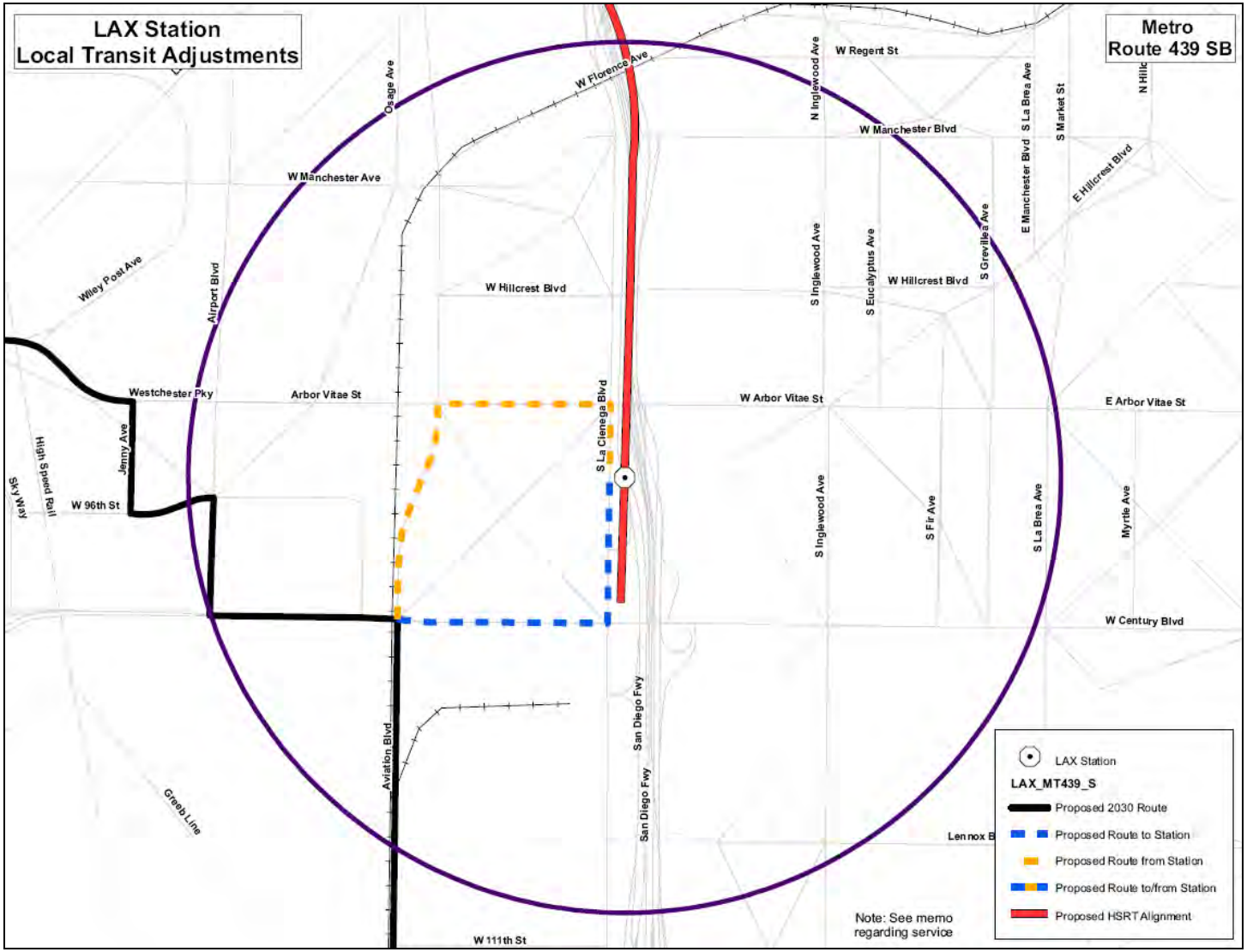


Figure 8.3 Adjustment to Metro Route 703, Northbound

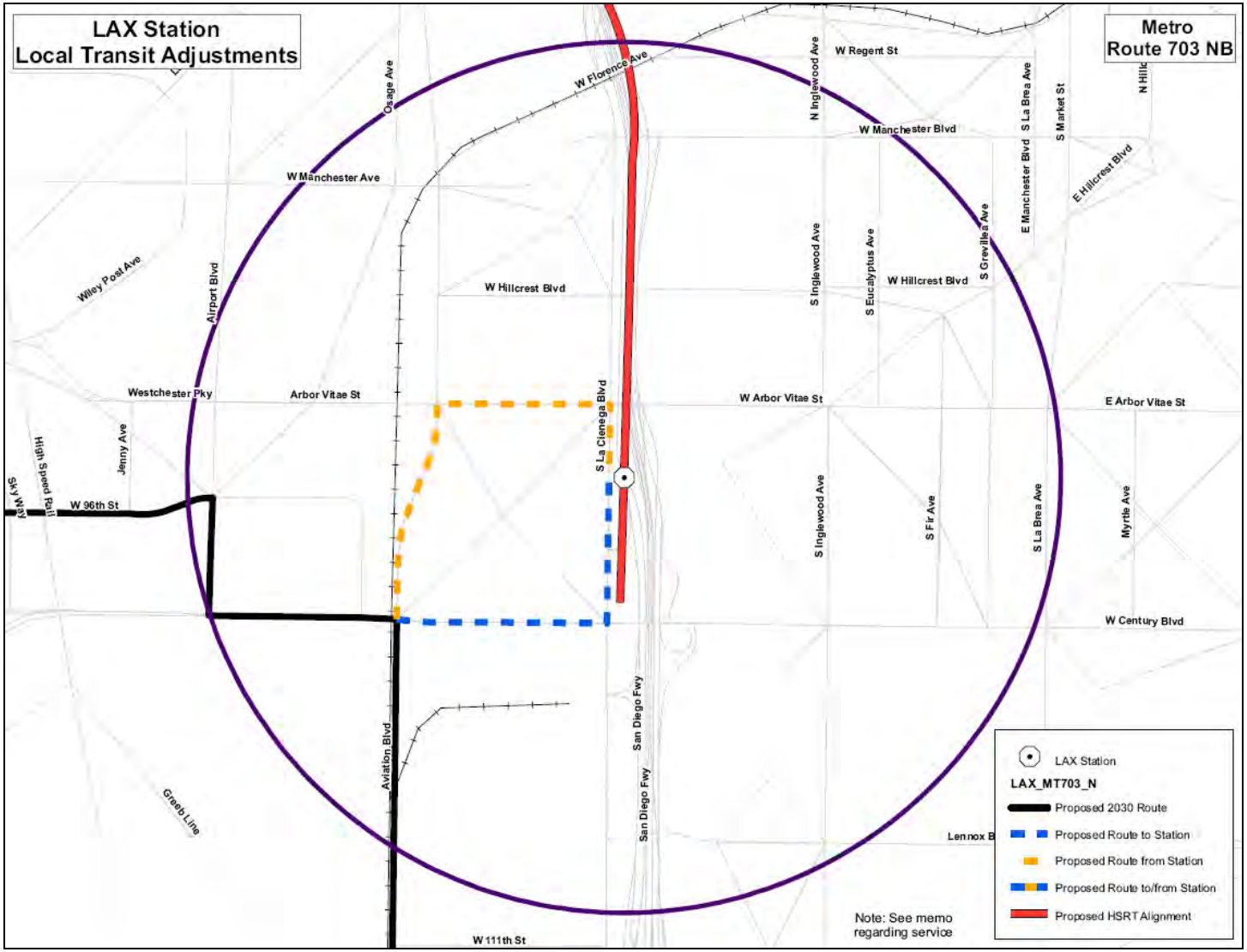


Figure 8.4 Adjustment to Metro Route 703, Southbound

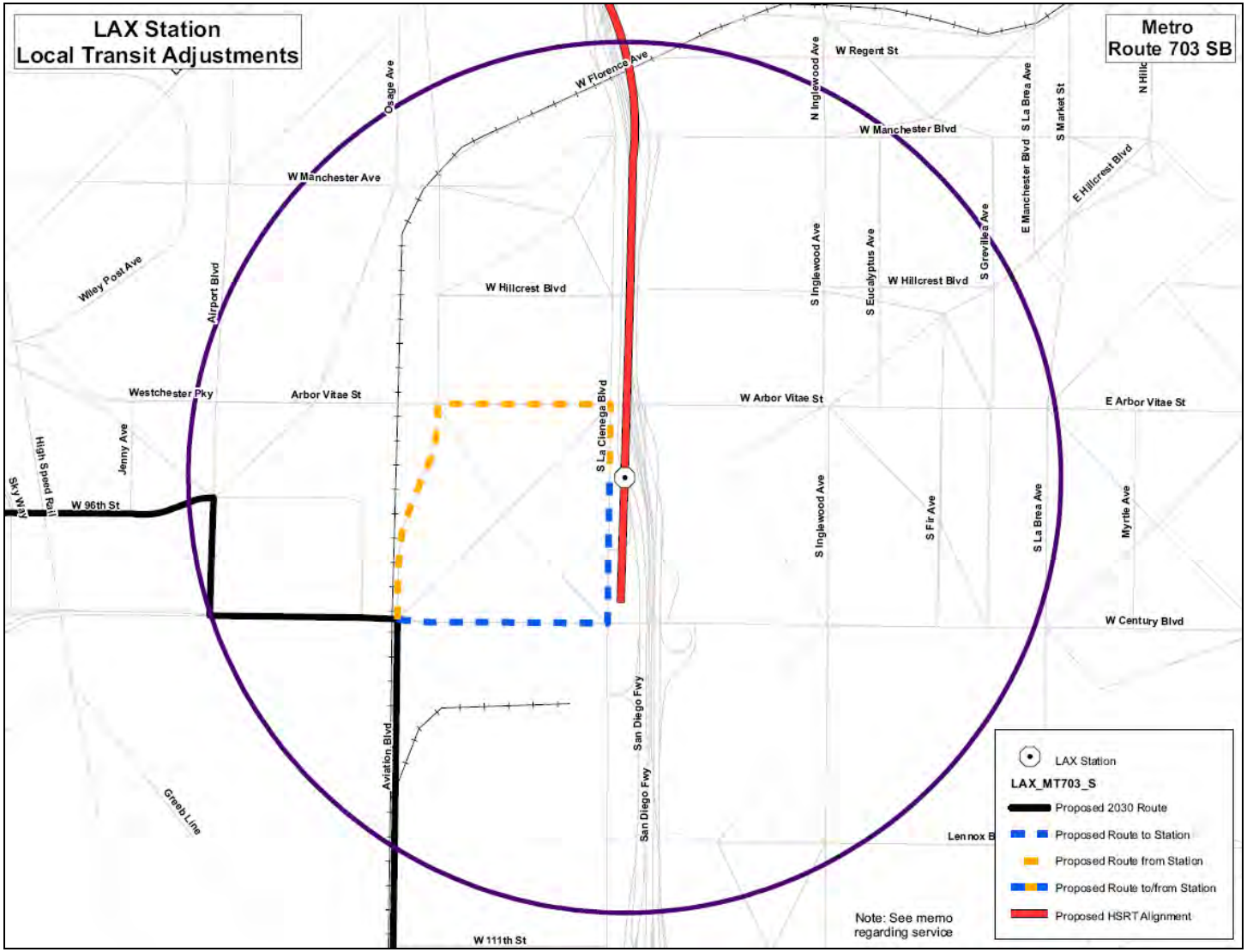


Figure 8.5 Adjustment to Metro Route 706, Northbound

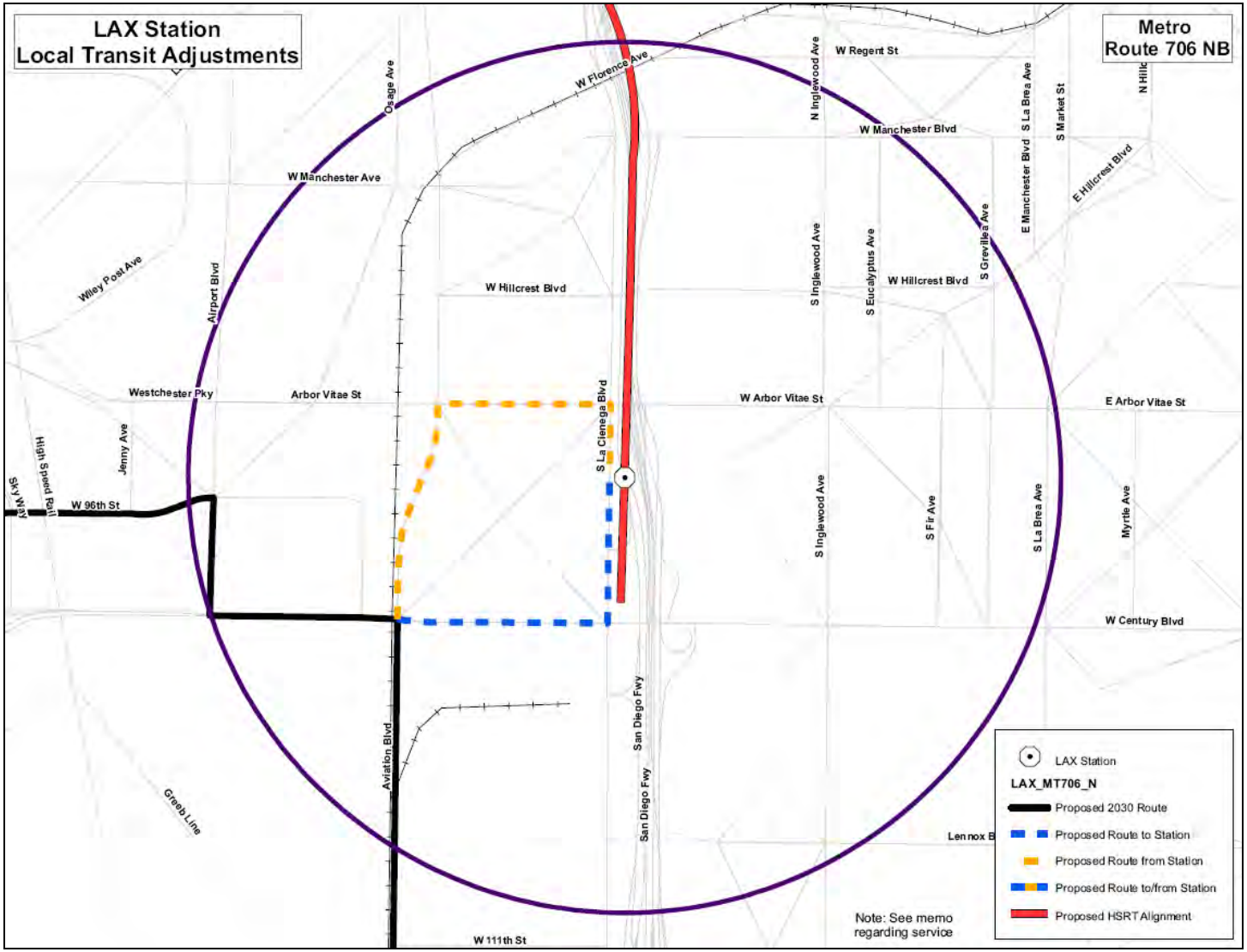


Figure 8.6 Adjustment to Metro Route 706, Southbound

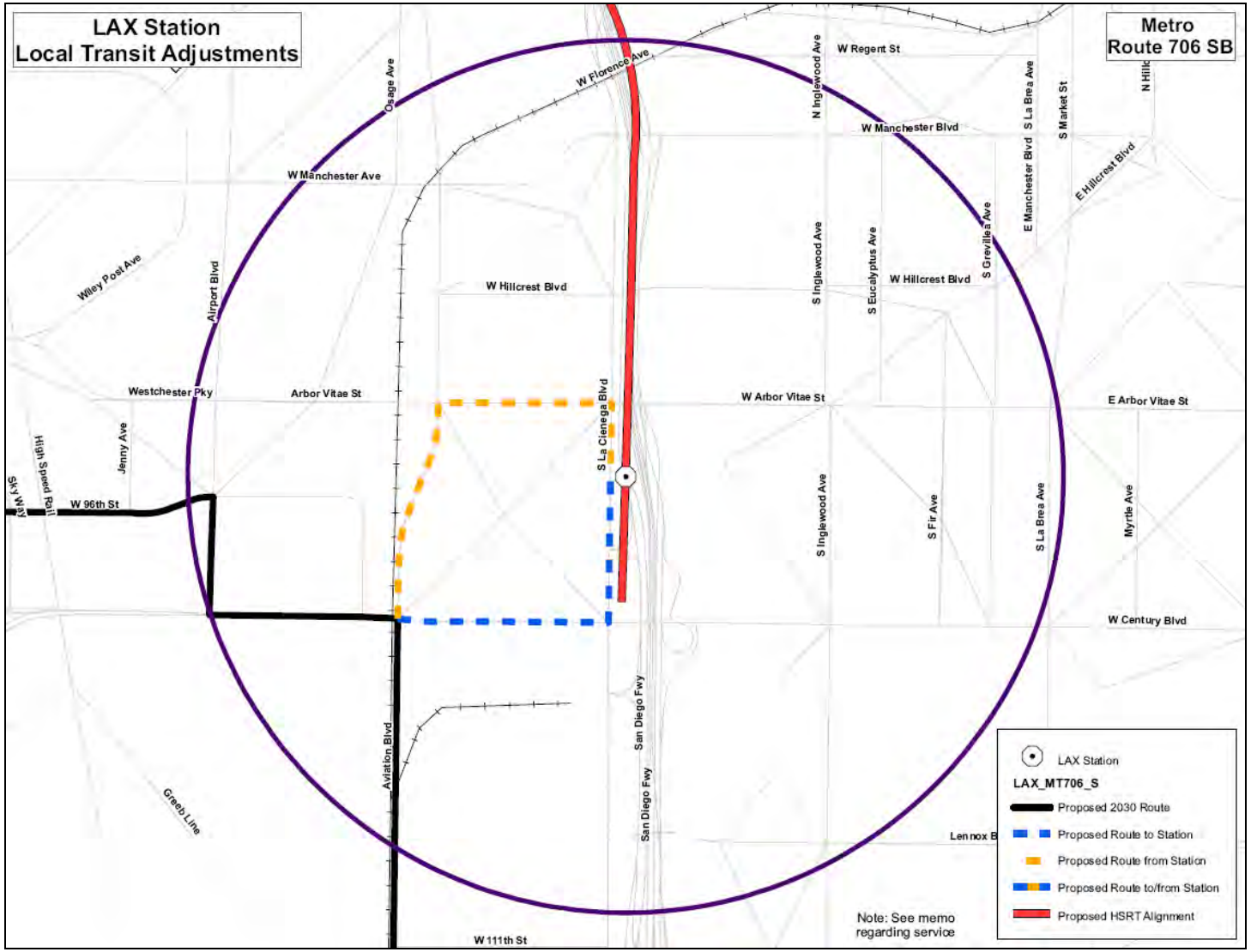


Figure 8.7 Adjustment to Metro Route 715, Eastbound

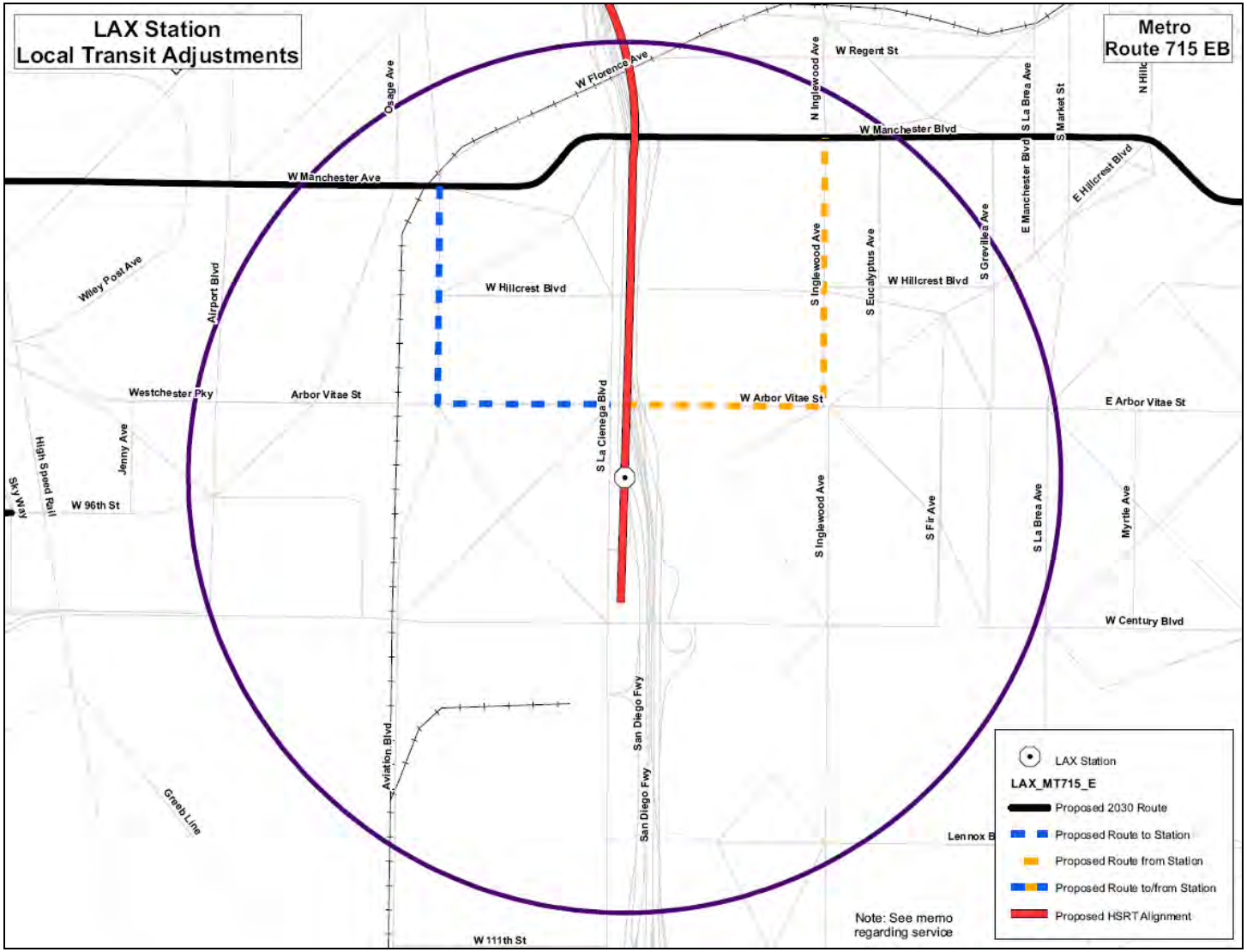


Figure 8.8 Adjustment to Metro Route 715, Westbound

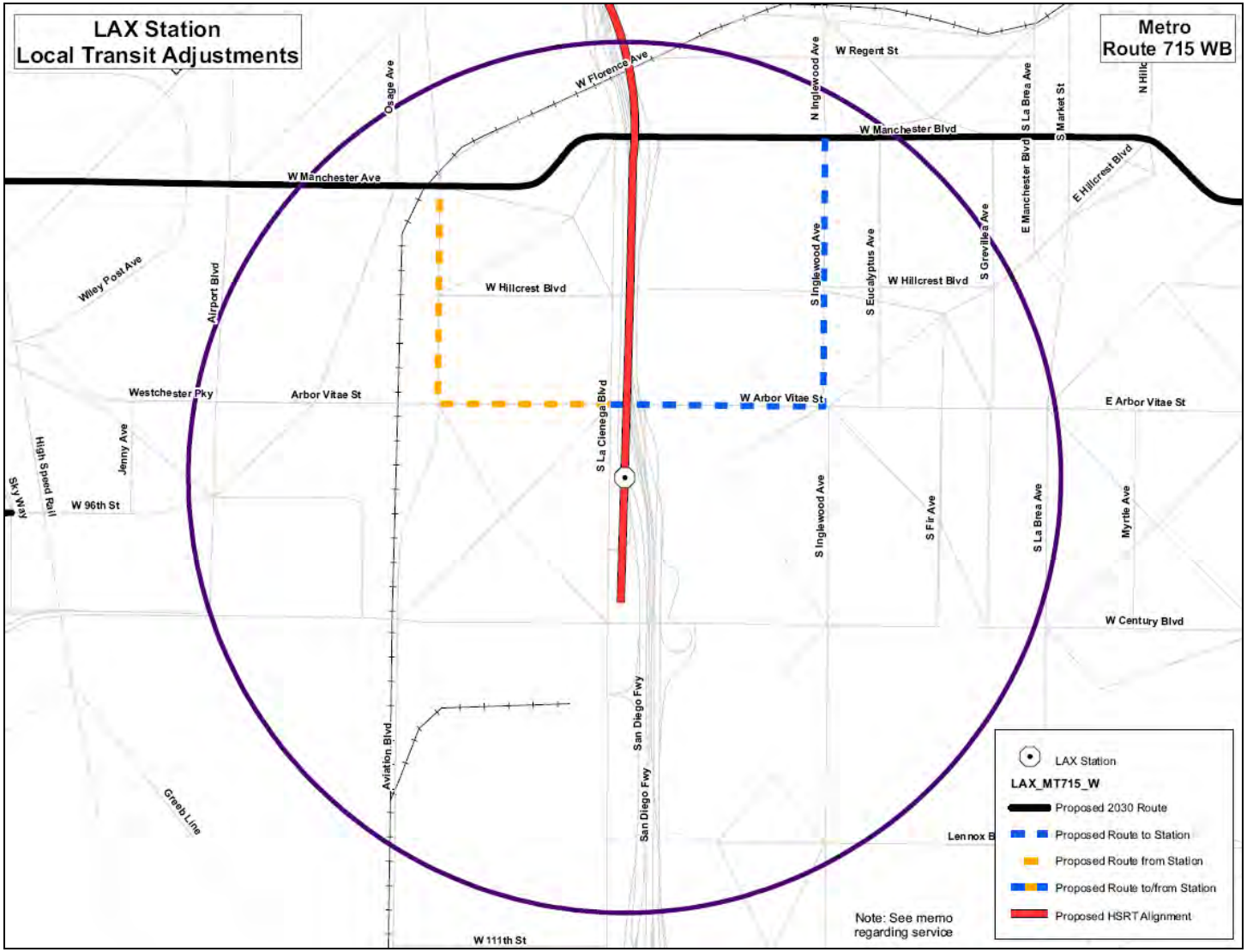


Figure 8.9 Adjustment to Metro Route 111, Westbound

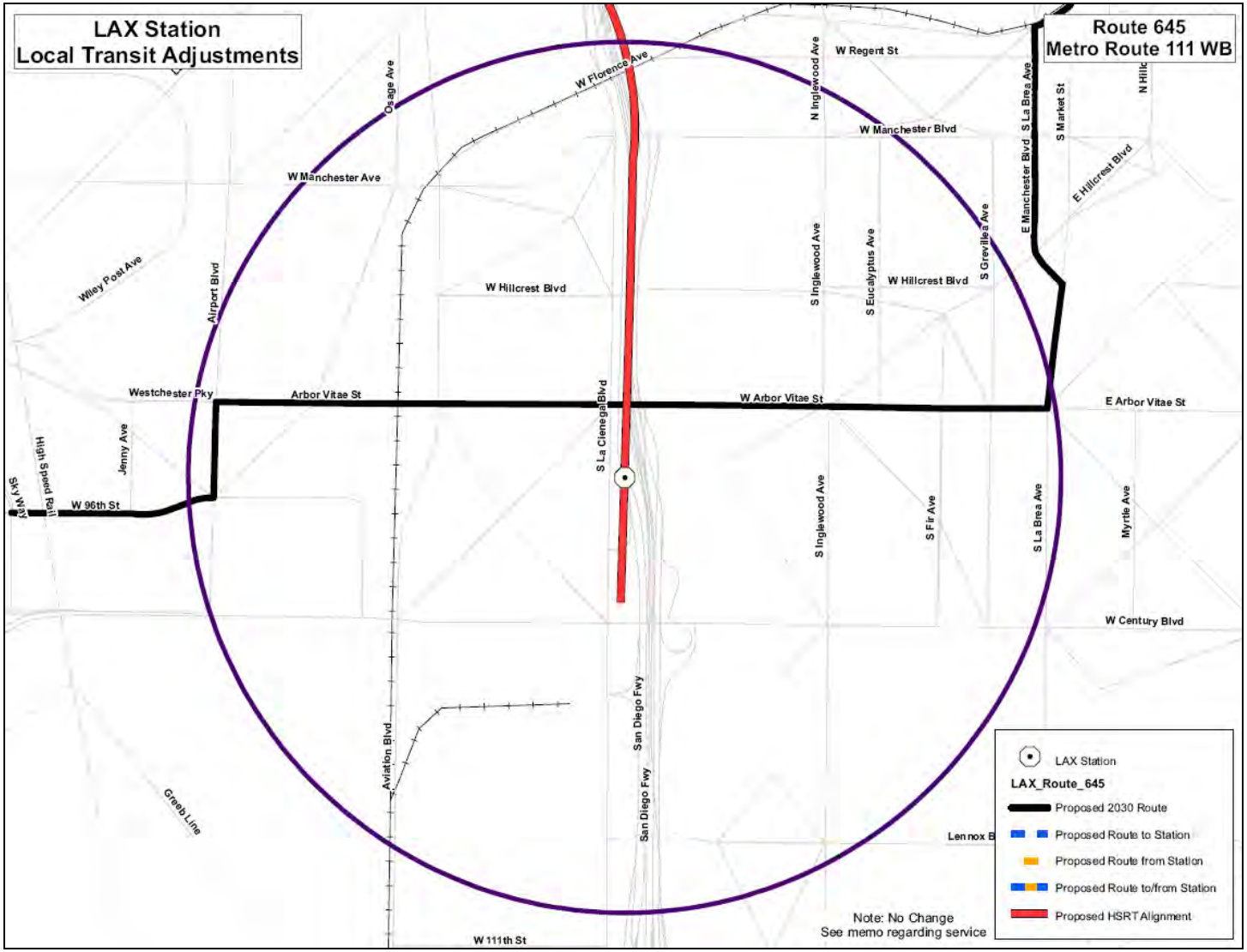


Figure 8.10 Adjustment to Metro Route 111, Eastbound

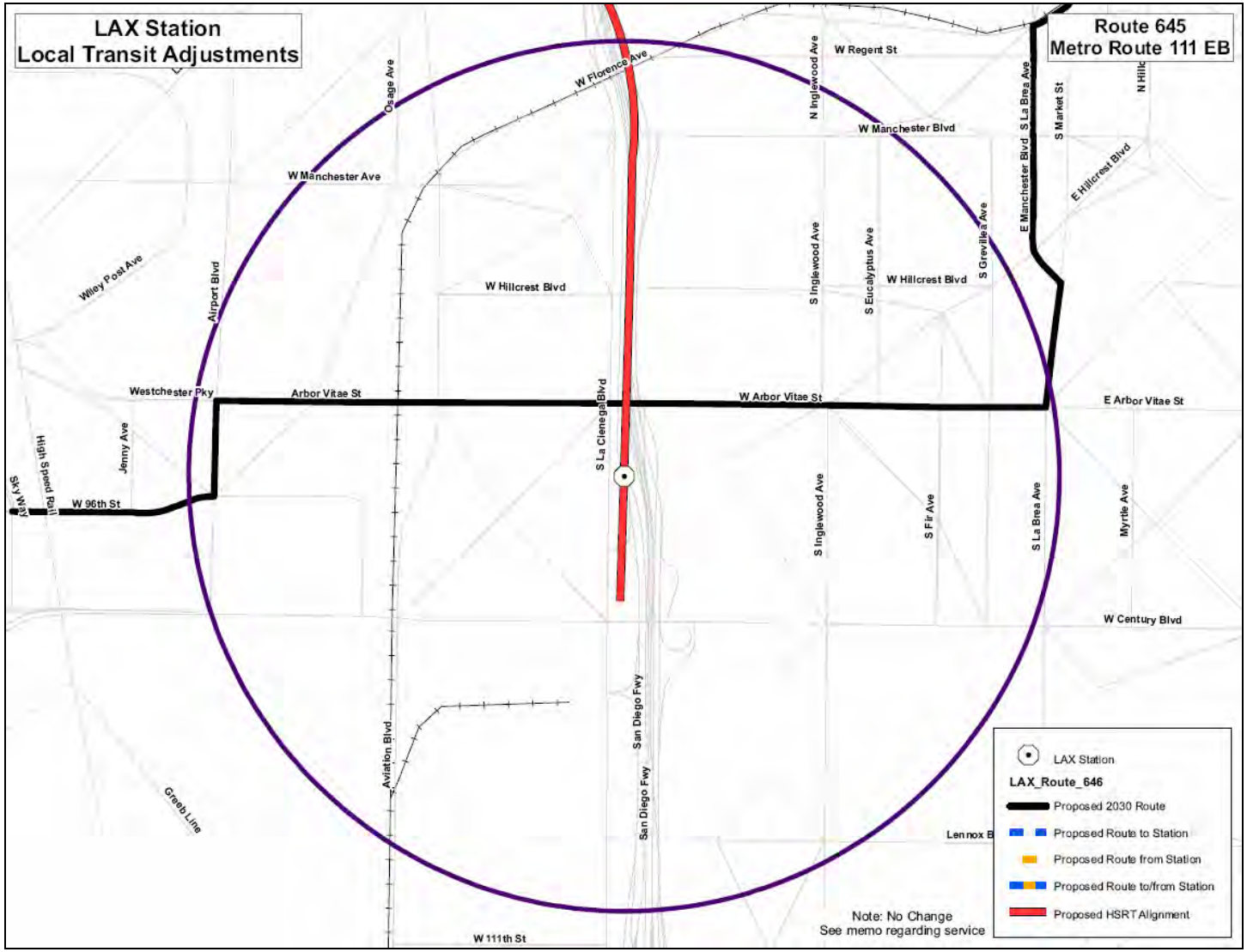


Figure 8.11 Adjustment to Metro Route 115, Eastbound

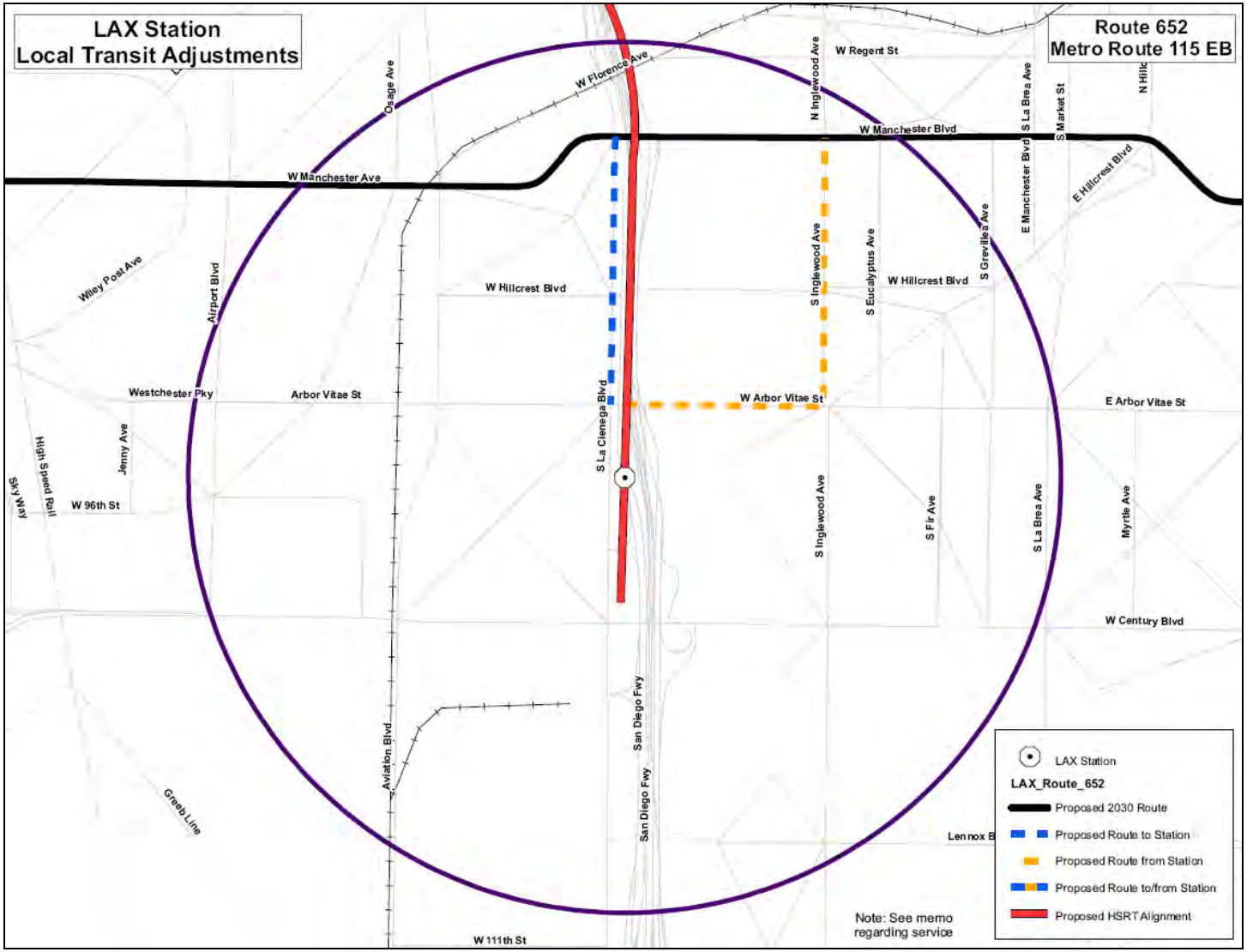


Figure 8.12 Adjustment to Metro Route 115, Eastbound

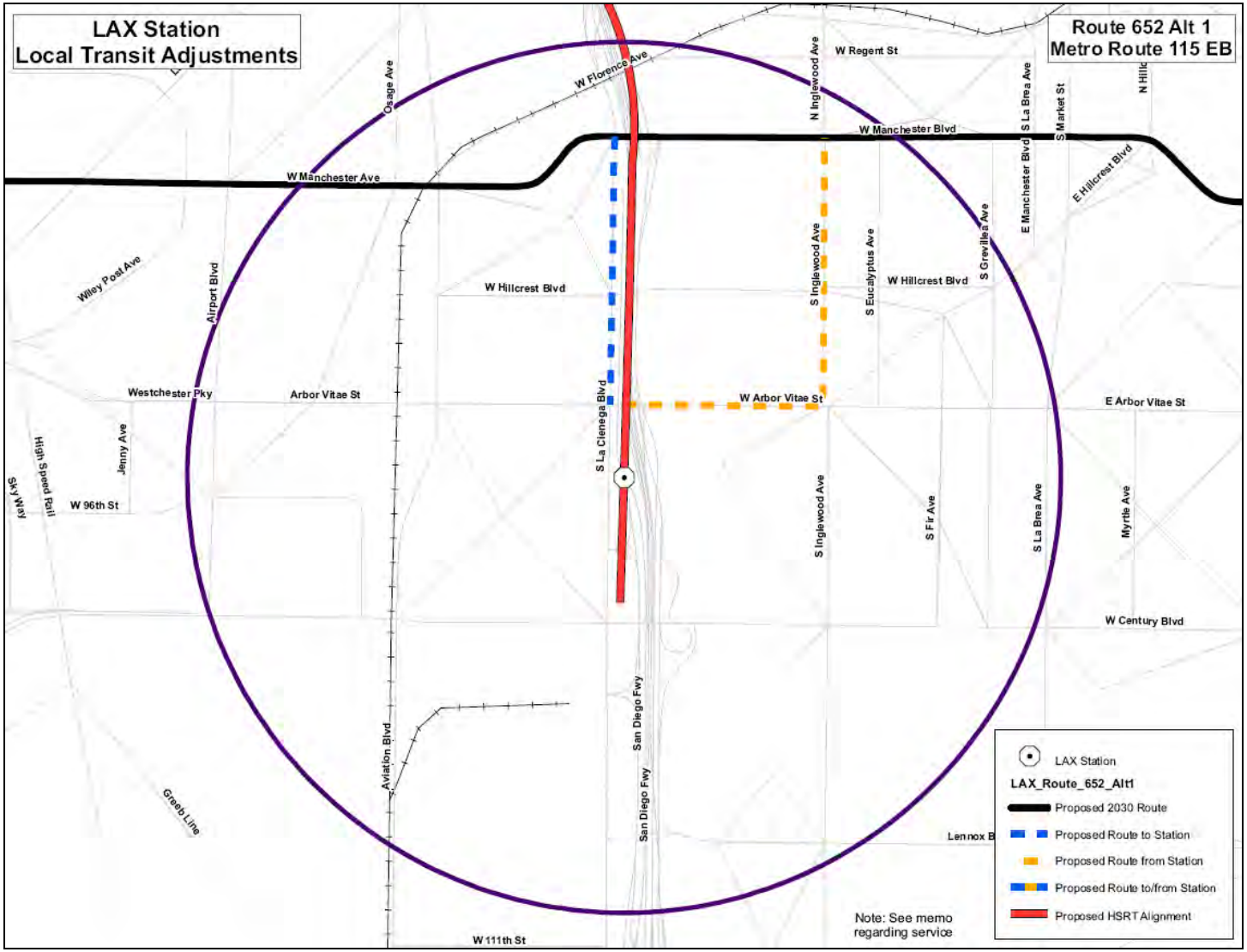


Figure 8.13 Adjustment to Metro Route 115, Eastbound

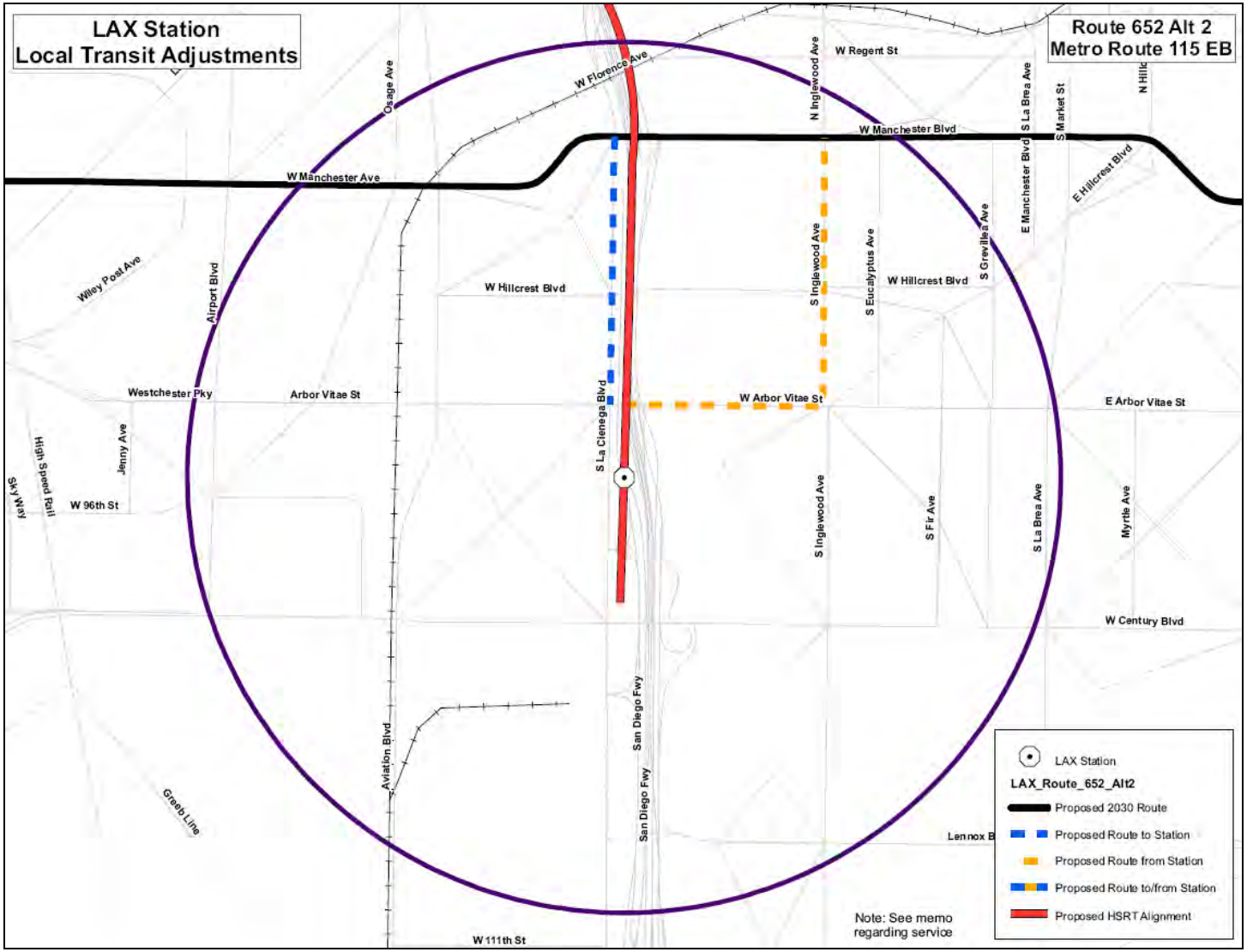


Figure 8.14 Adjustment to Metro Route 115, Westbound

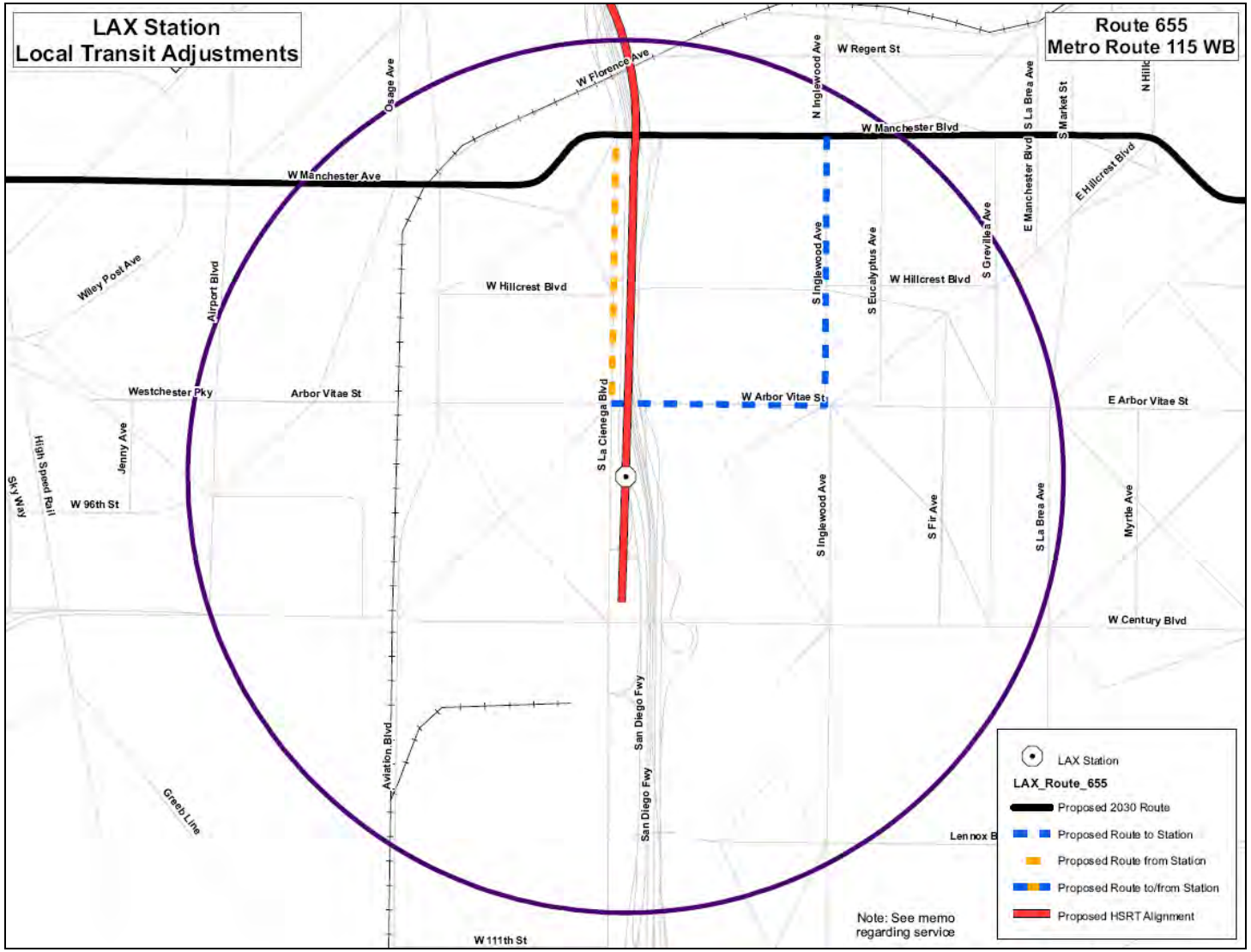


Figure 8.15 Adjustment to Metro Route 115, Westbound

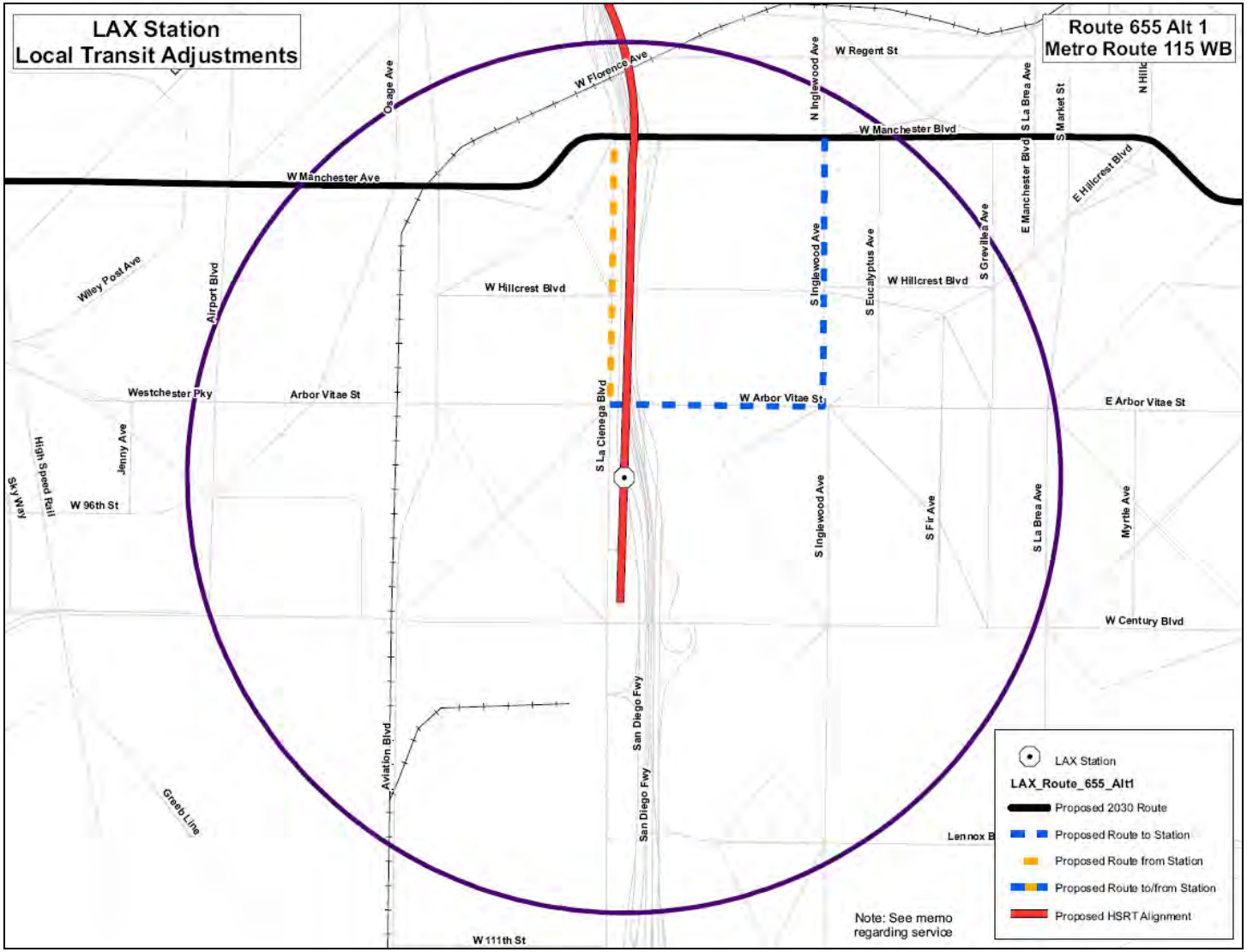


Figure 8.16 Adjustment to Metro Route 117, Eastbound

Figure 8.17 Adjustment to Metro Route 117, Westbound

Figure 8.18 Adjustment to Metro Route 215, Northbound

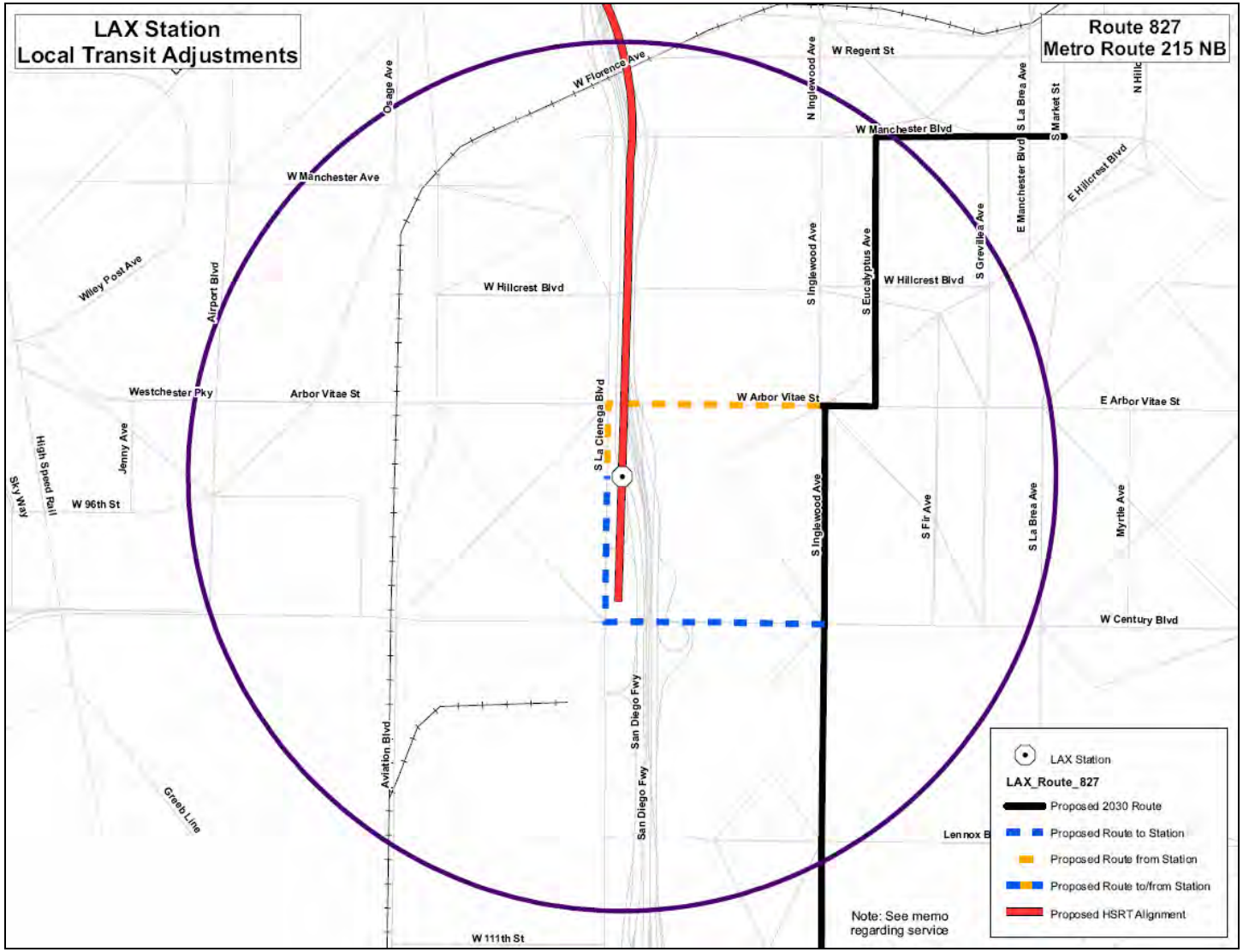


Figure 8.19 Adjustment to Metro Route 215, Southbound

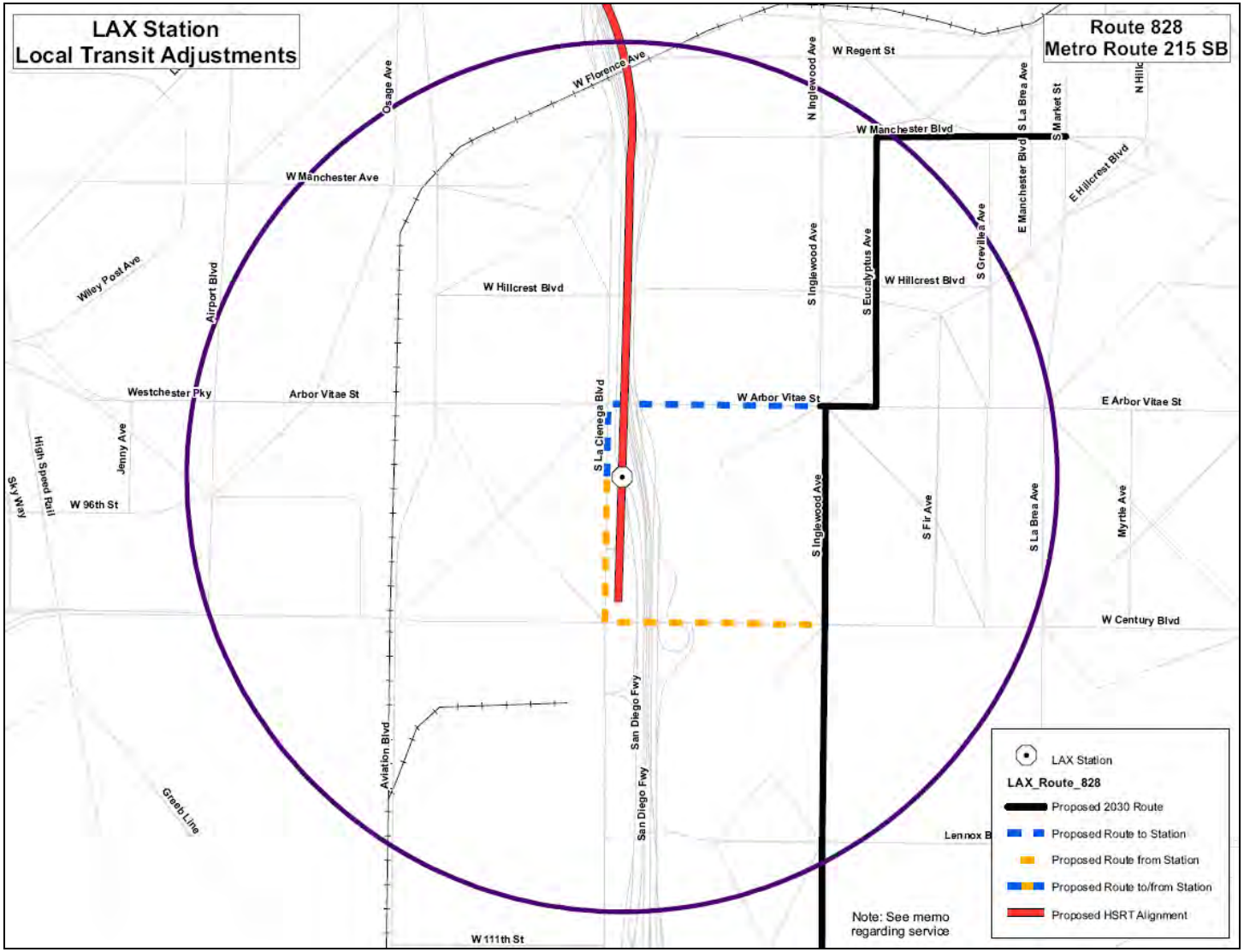


Figure 8.20 Adjustment to Metro Route 311, Eastbound

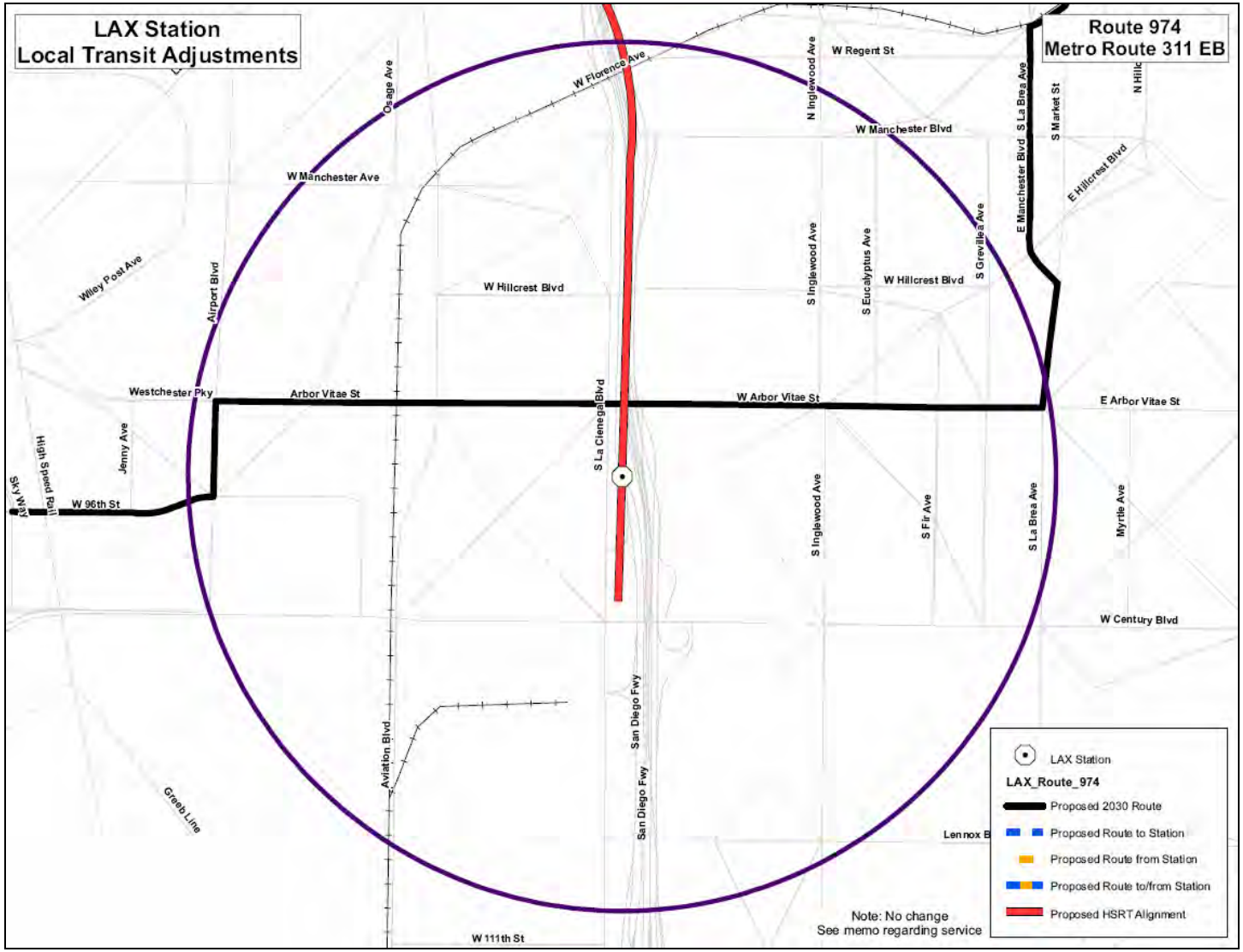


Figure 8.21 Adjustment to Metro Route 311, Westbound

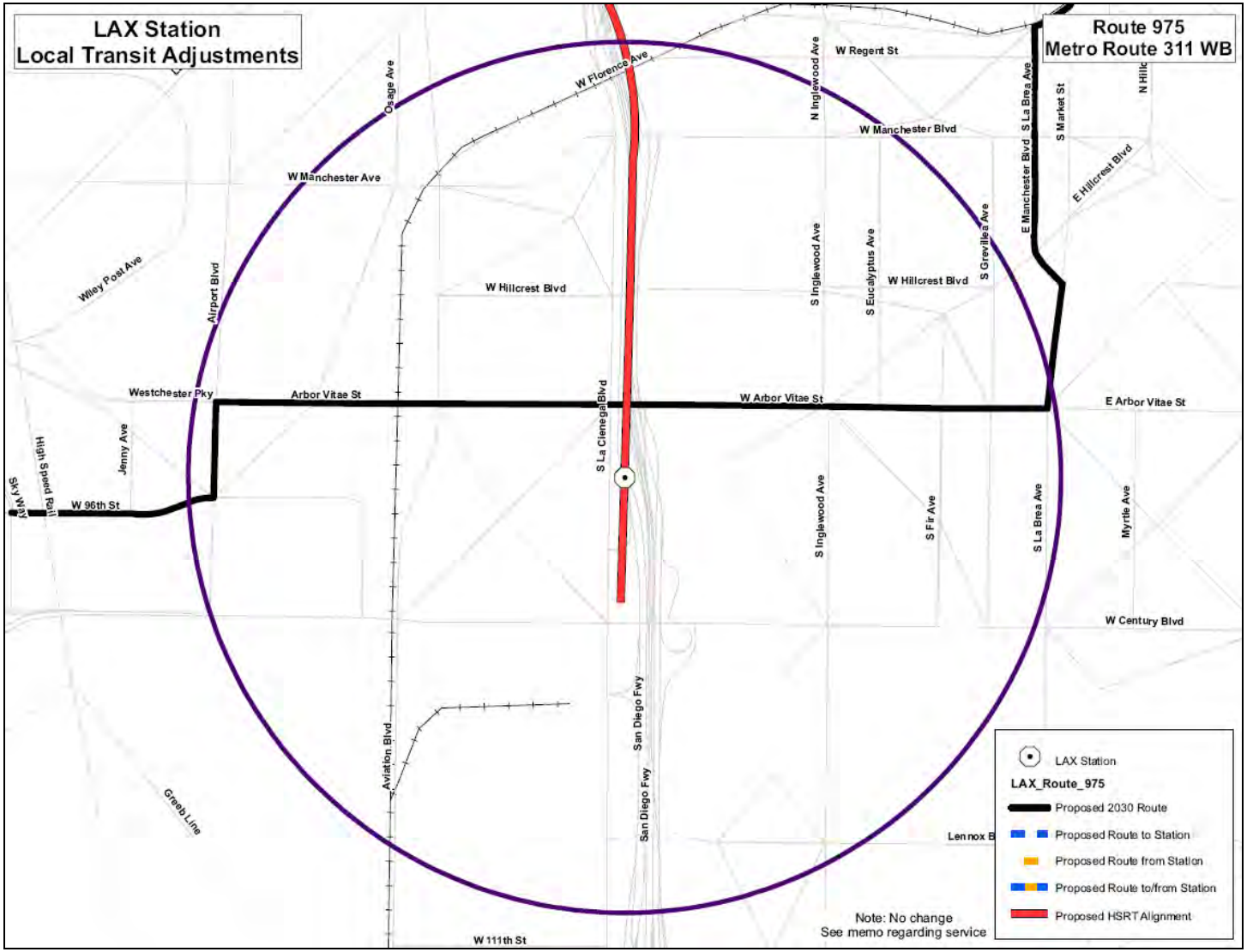


Figure 8.22 Adjustment to Metro Route 315, Westbound

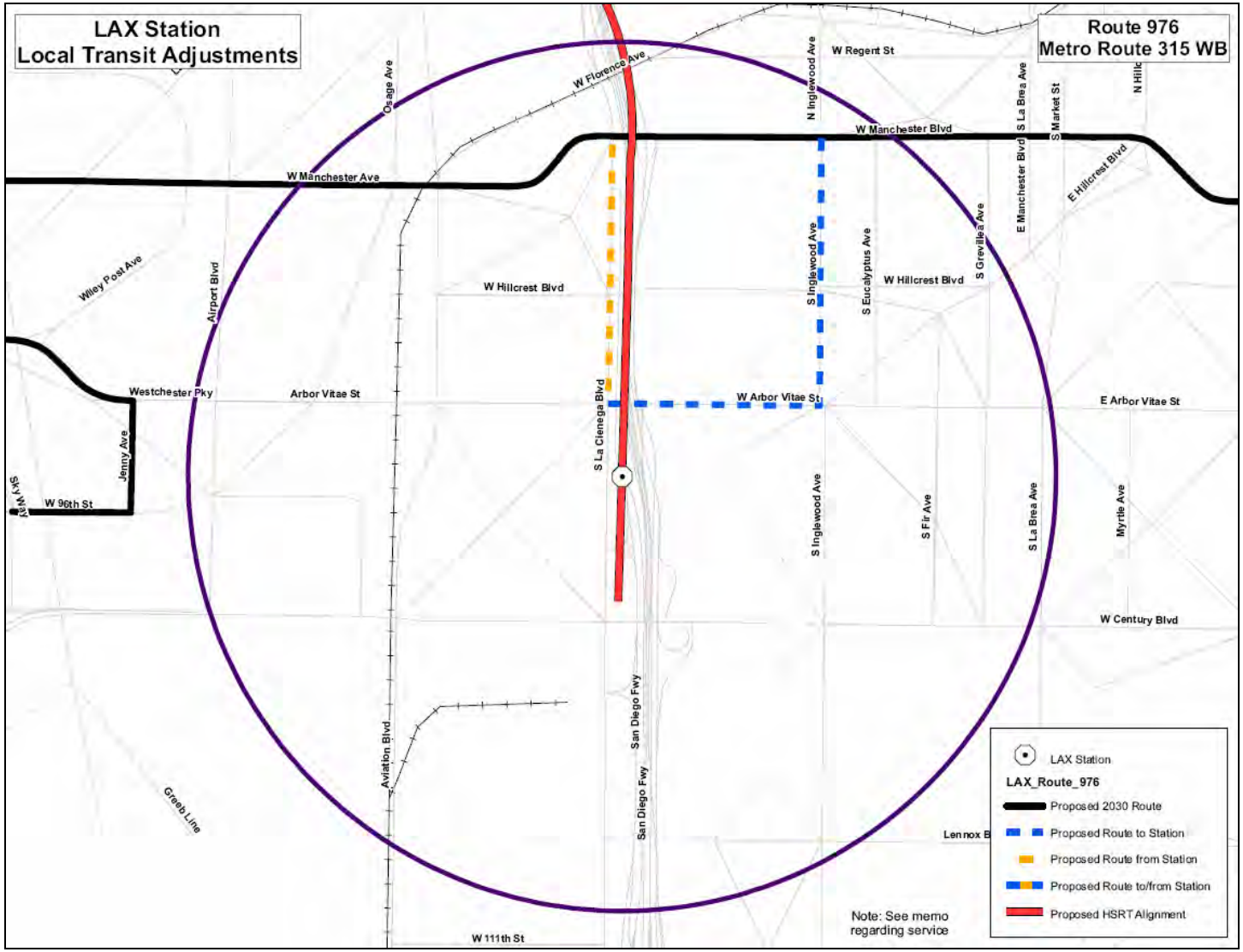


Figure 8.23 Adjustment to Metro Route 315, Eastbound

Figure 8.24 Adjustment to Metro Route 315, Eastbound

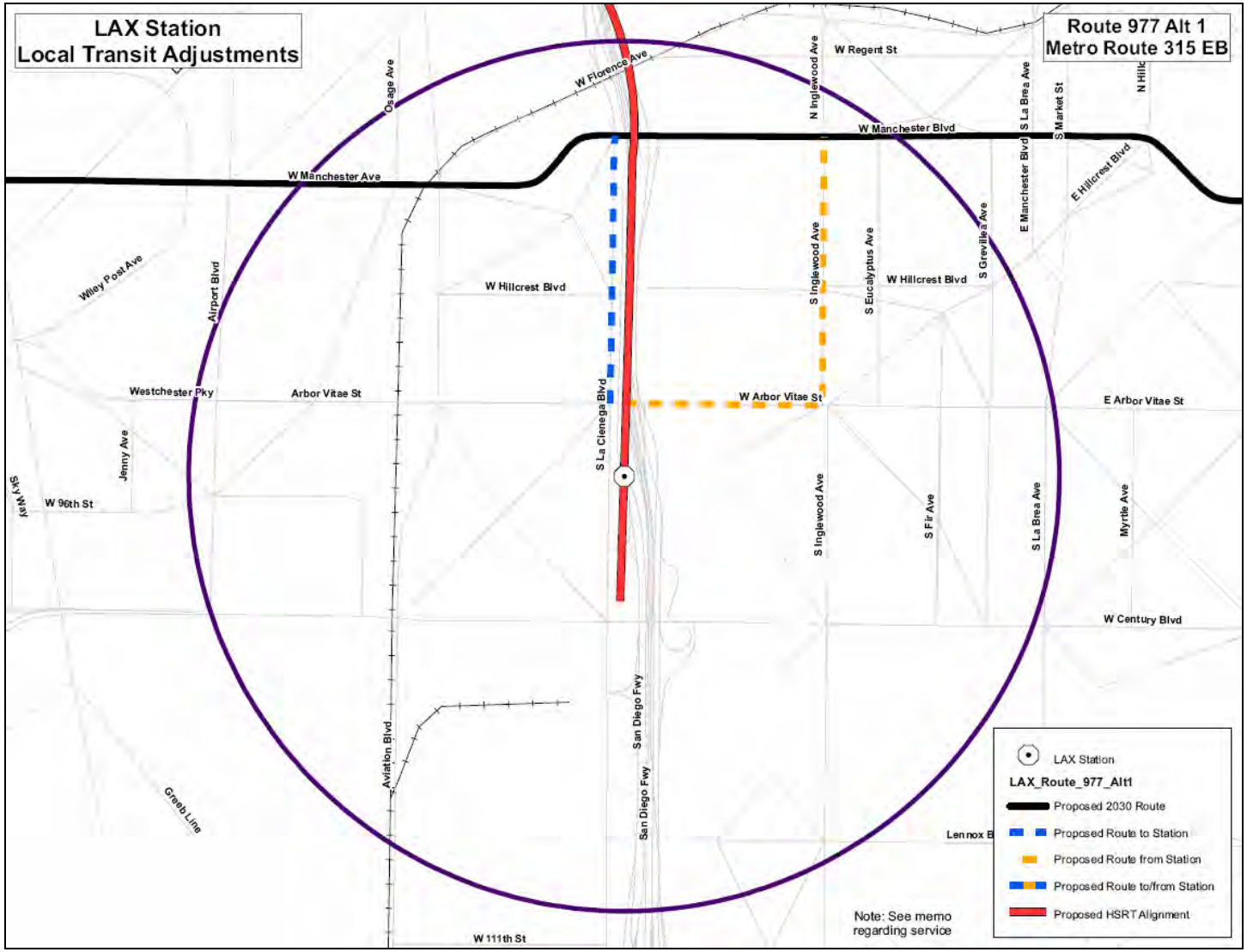


Figure 8.25 Adjustment to Metro Route 315, Eastbound

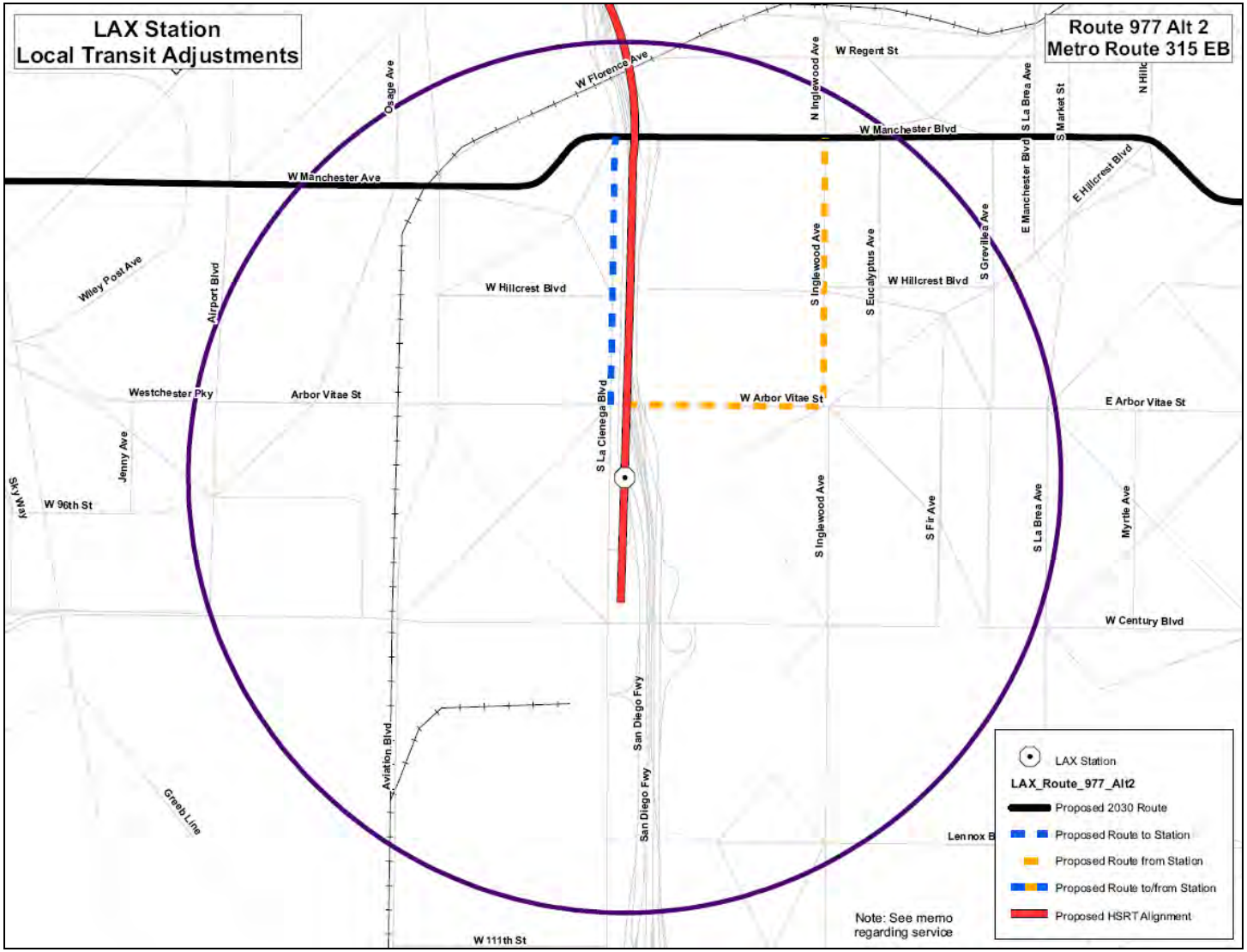


Figure 8.26 Adjustment to Metro Route 40, Northbound Owl

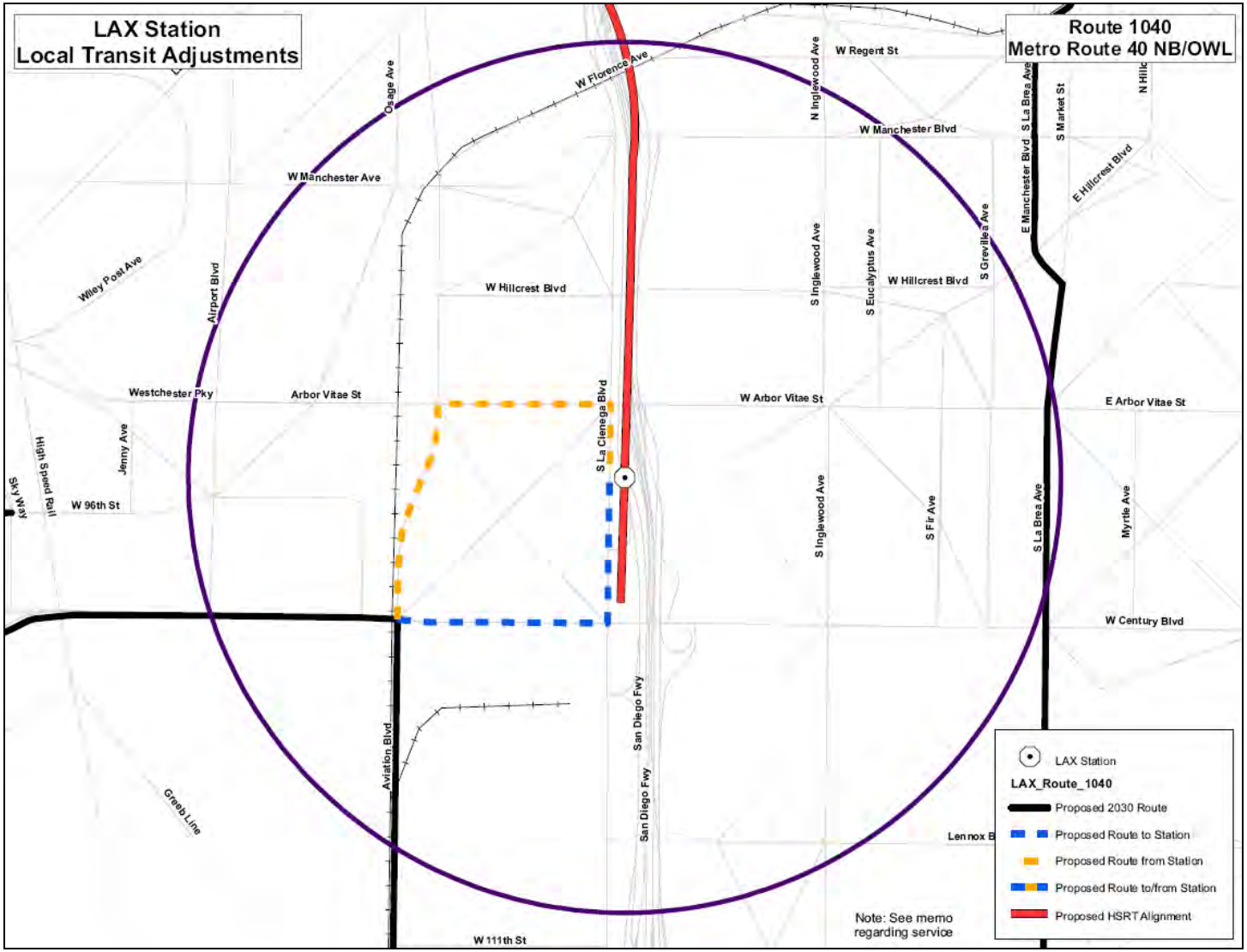


Figure 8.27 Adjustment to Metro Route 40, Northbound Owl

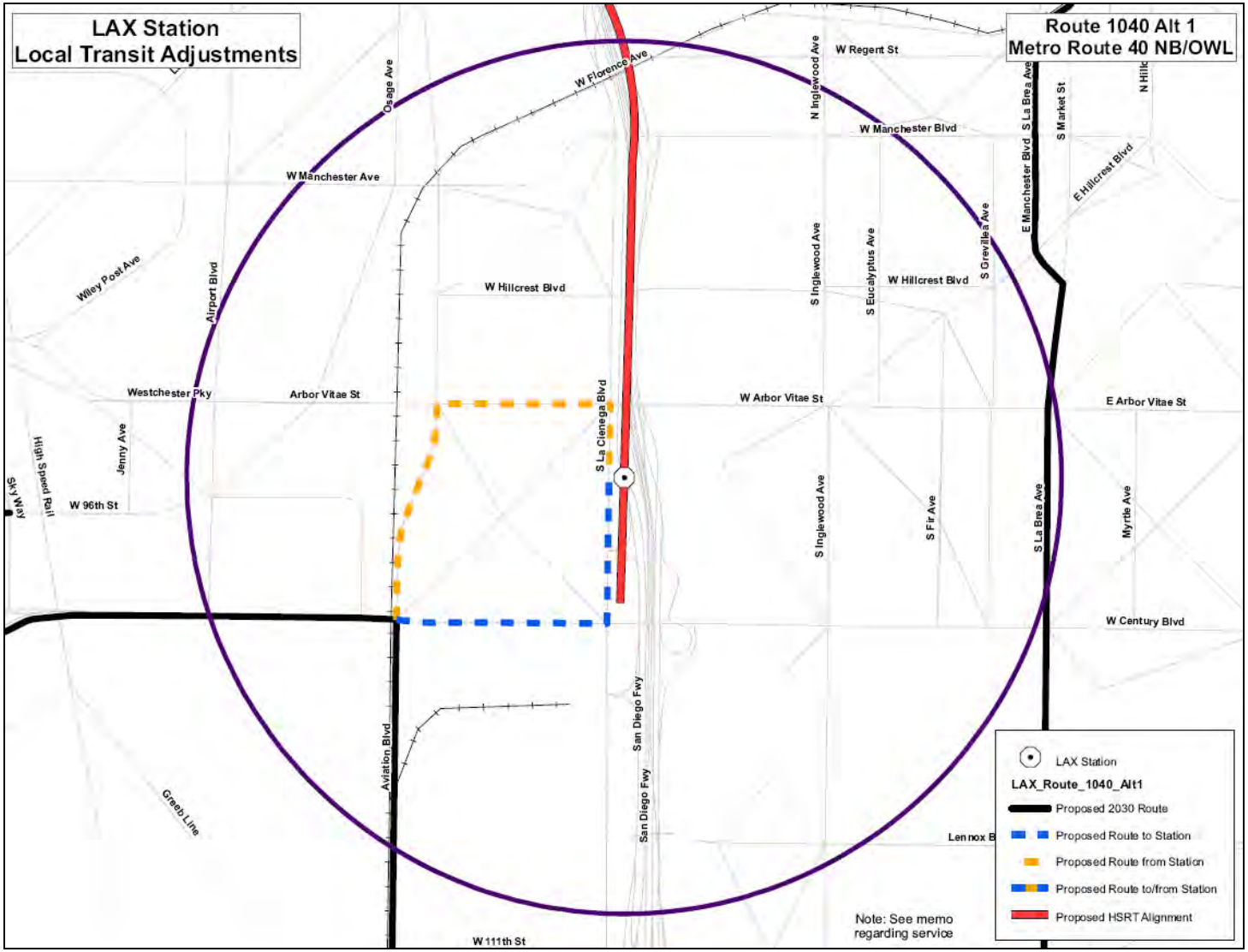


Figure 8.28 Adjustment to Metro Route 40, Southbound Owl

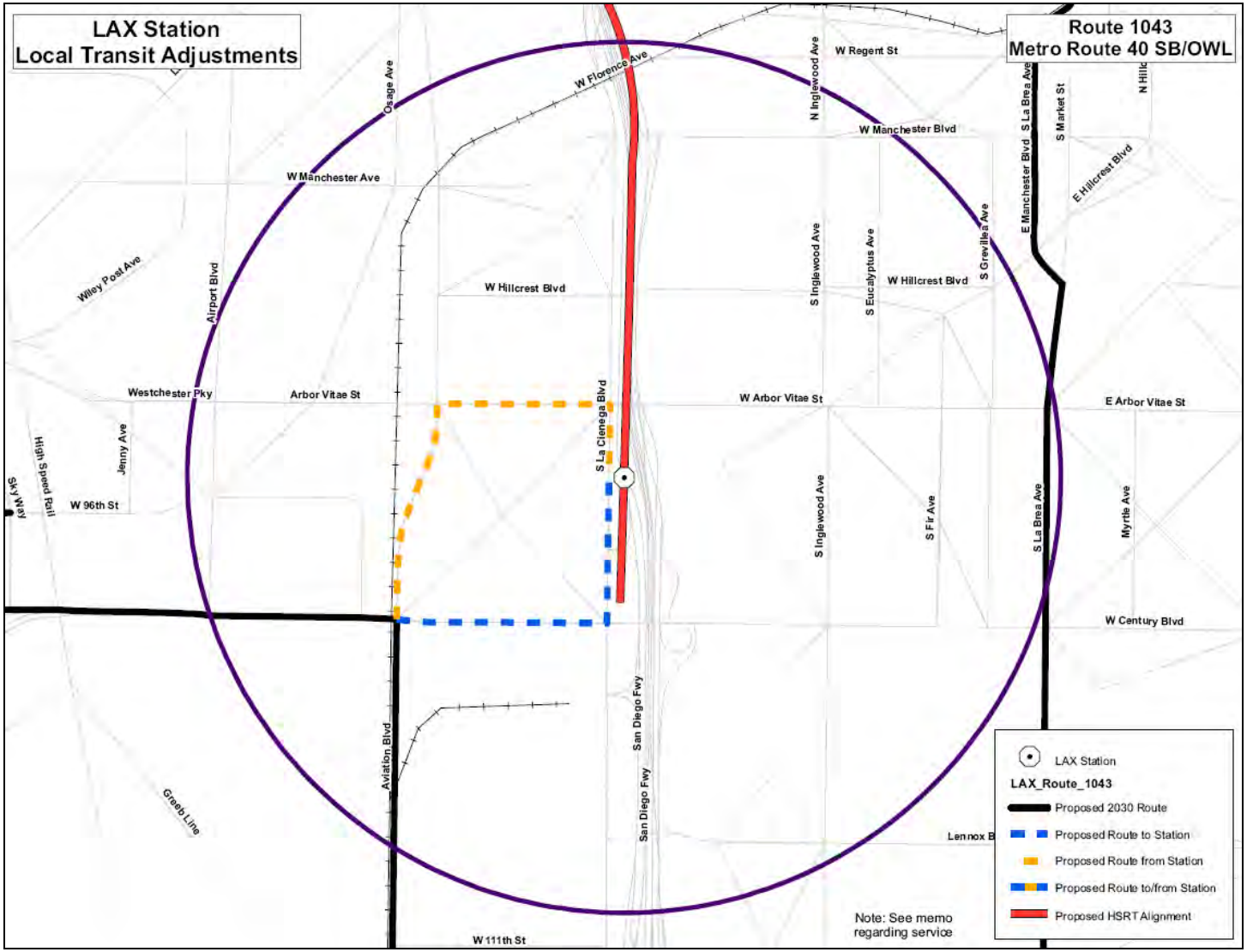


Figure 8.29 Adjustment to Metro Green Line Shuttle, Eastbound

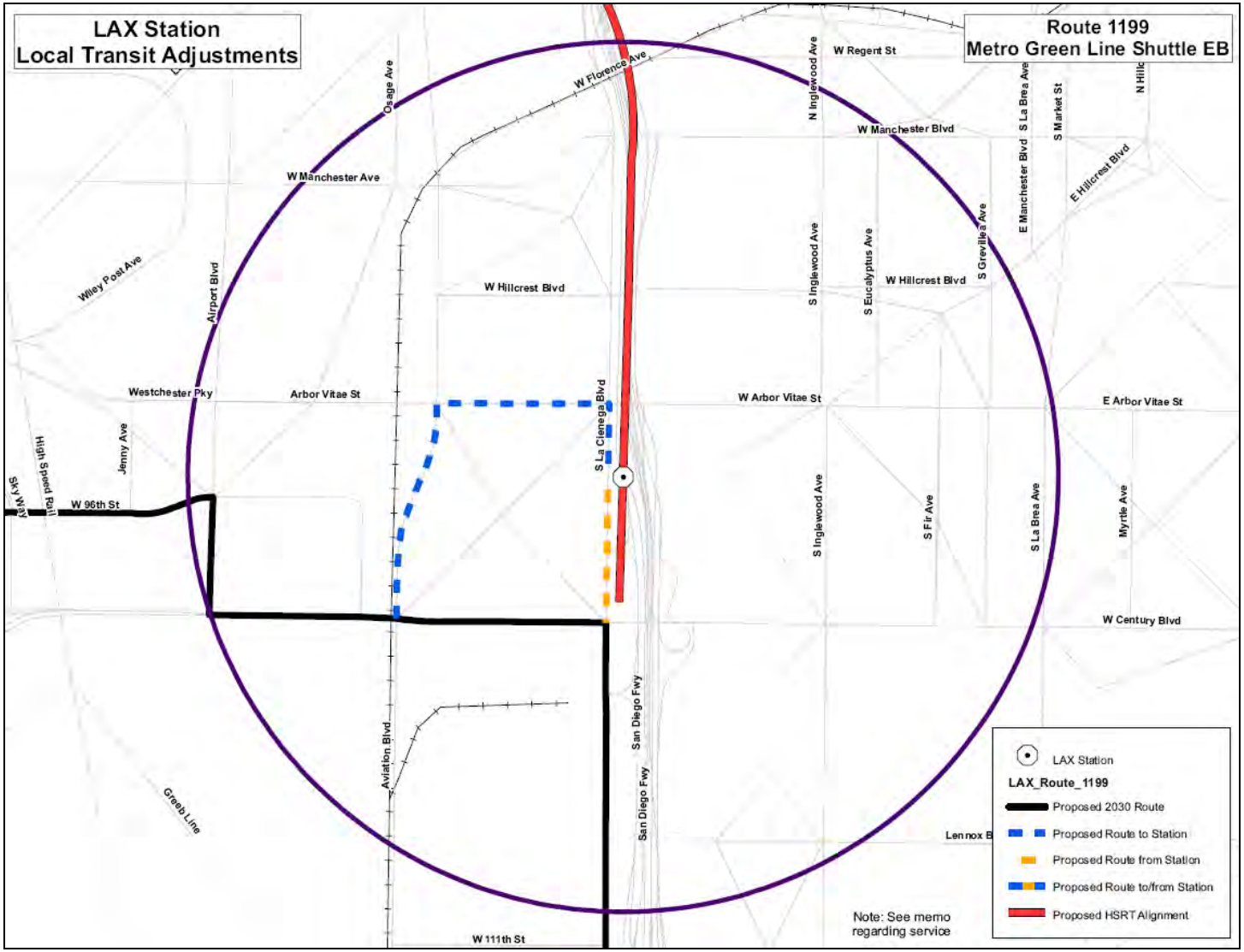


Figure 8.30 Adjustment to Metro Green Line Shuttle, Westbound

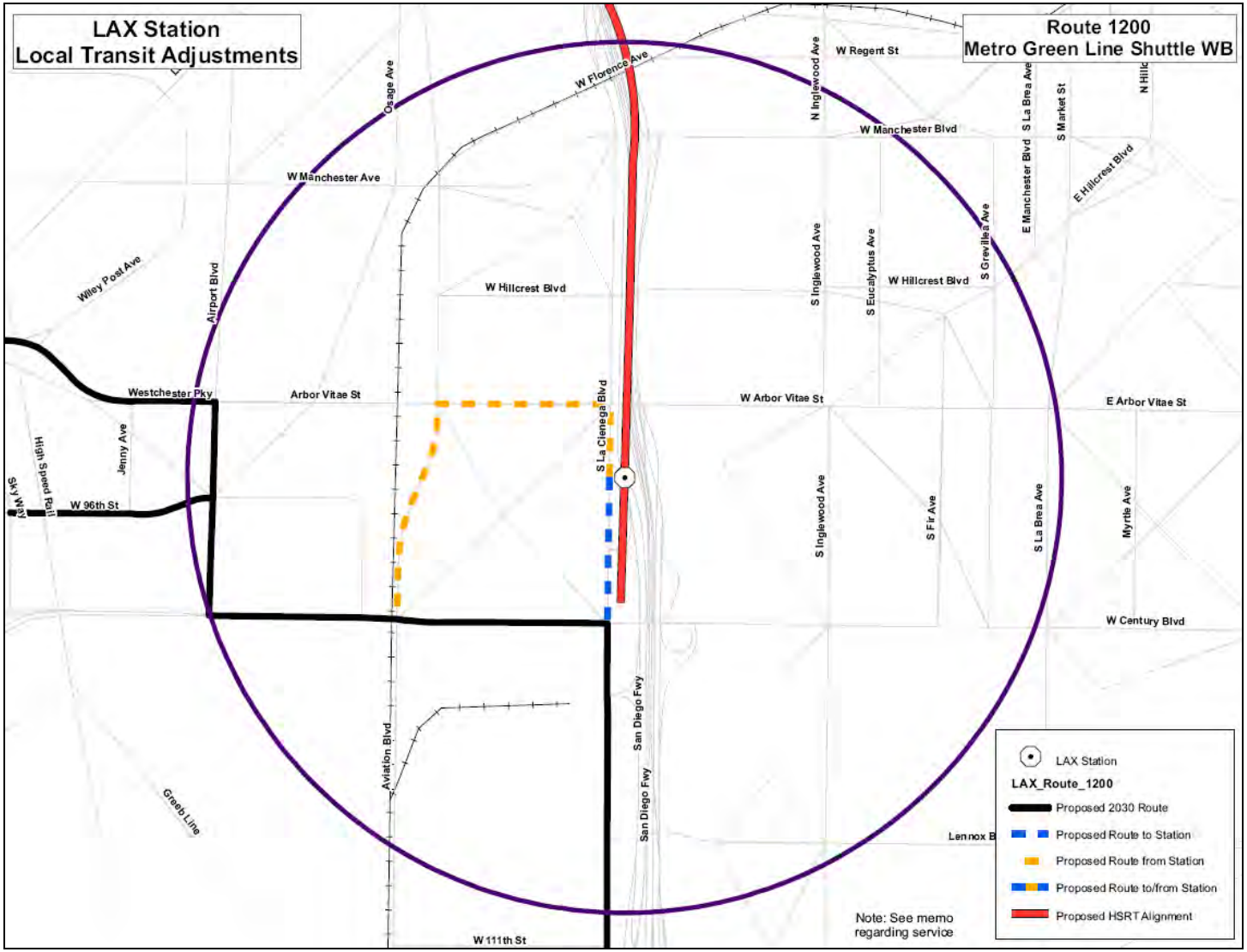


Figure 8.31 Adjustment to Metro Route 3, Southbound

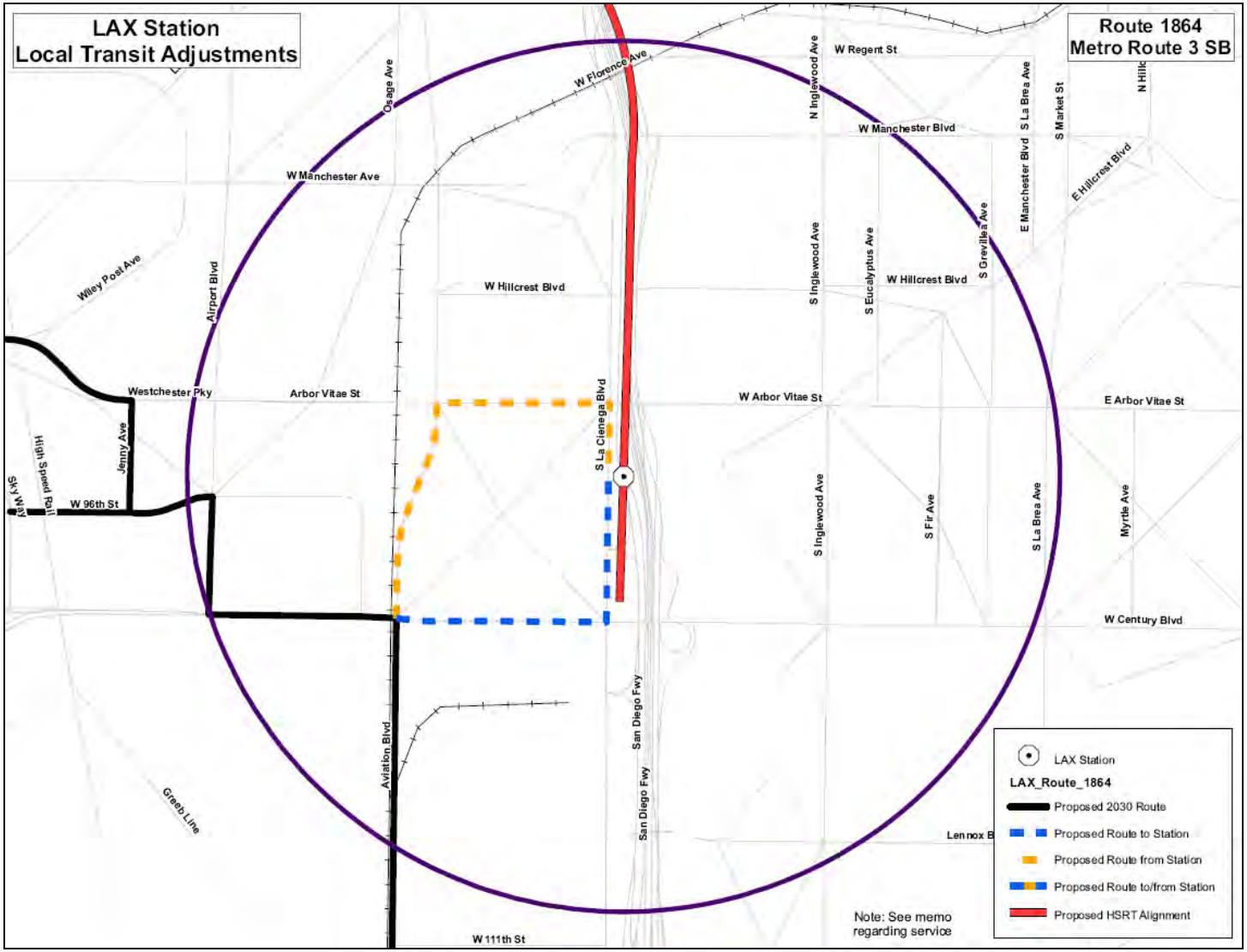


Figure 8.32 Adjustment to Metro Route 3, Southbound/1

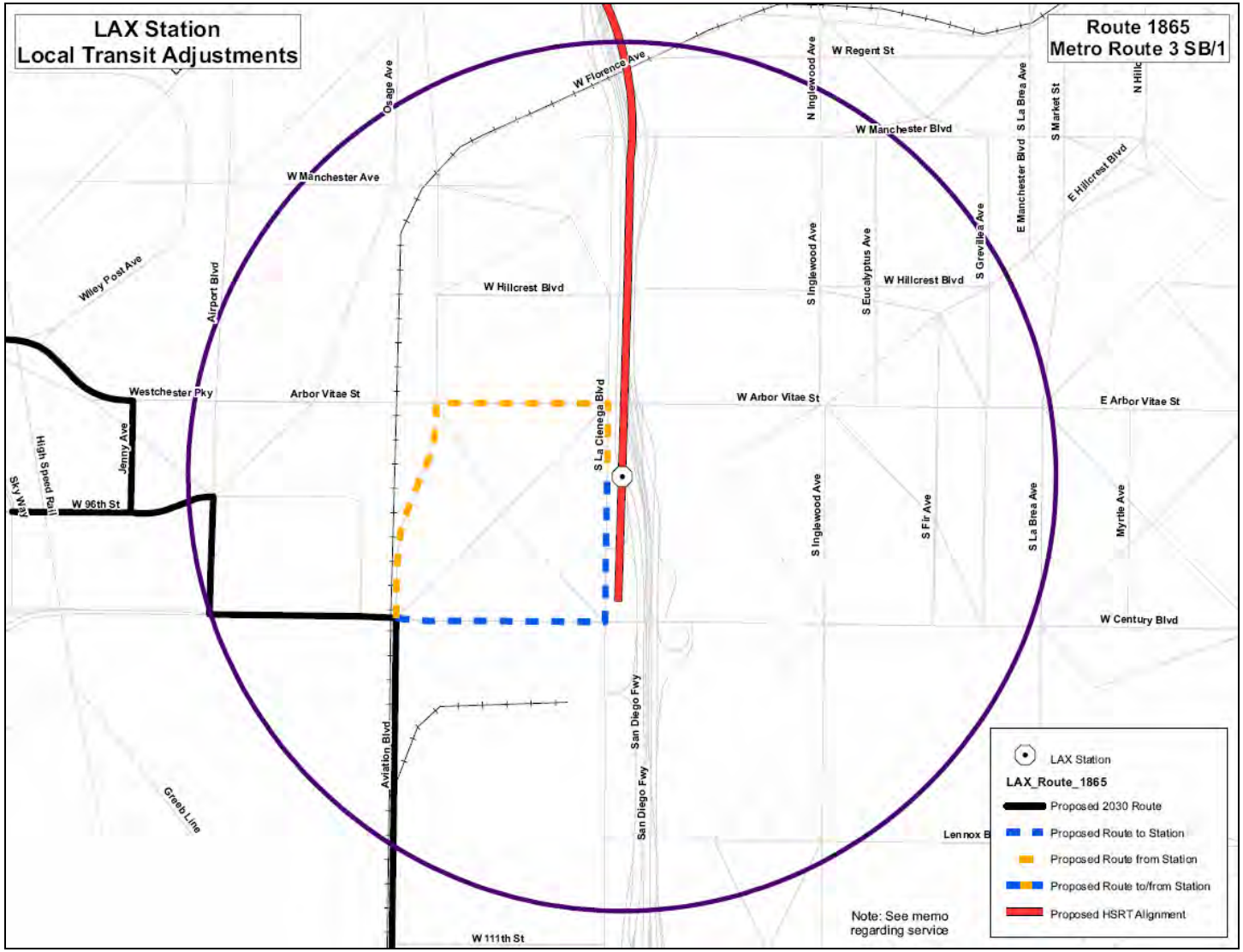


Figure 8.33 Adjustment to Metro Route 3, Northbound/1

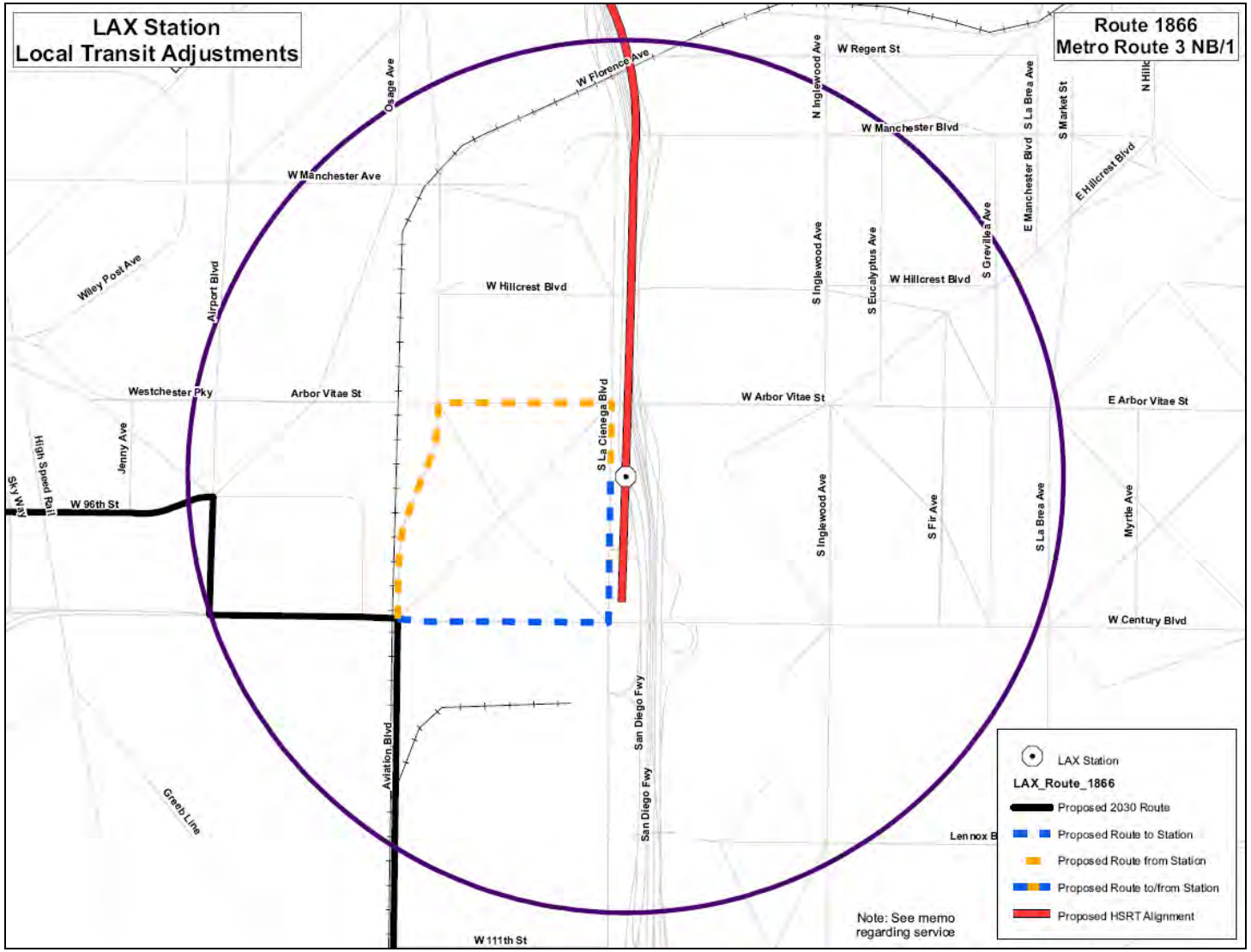
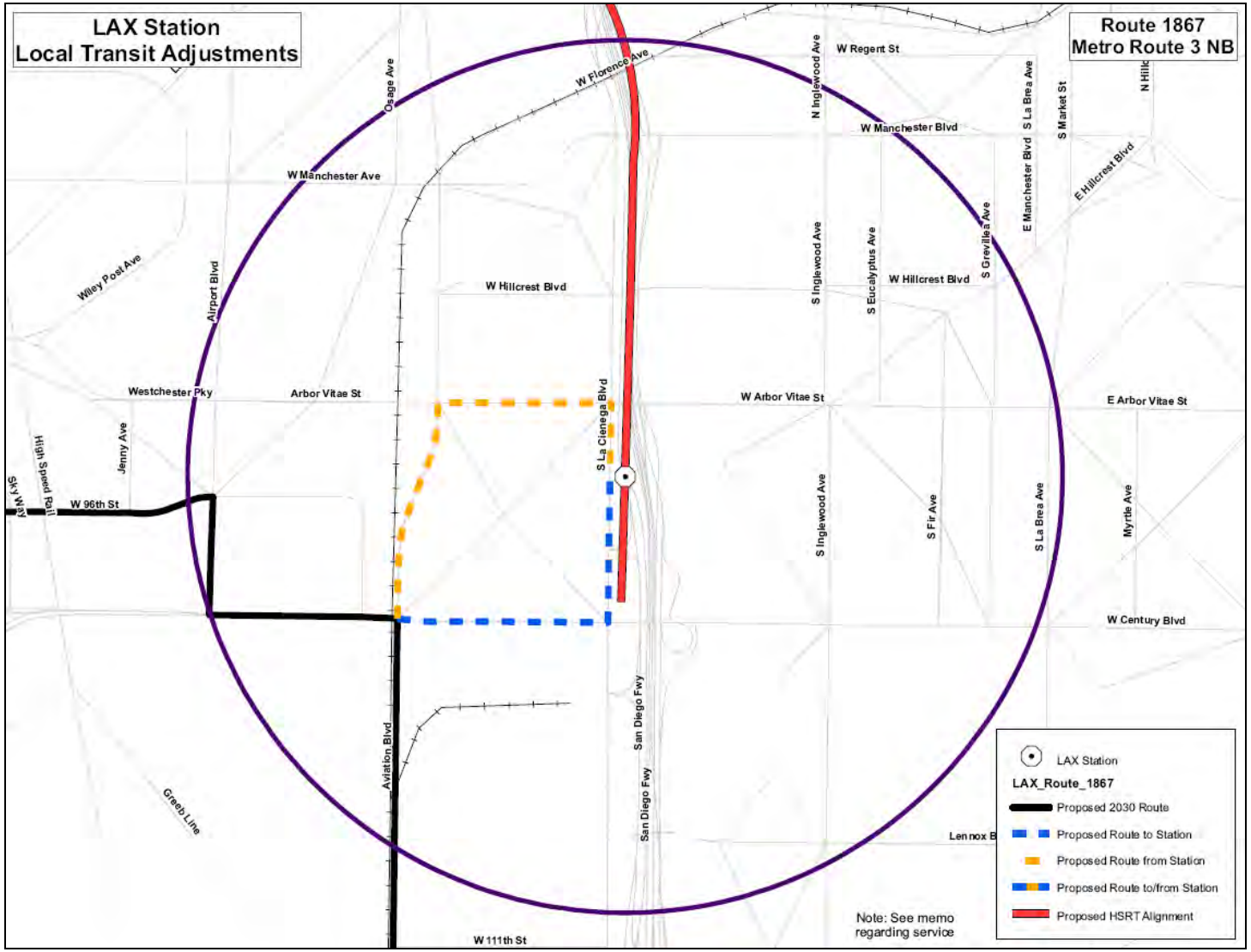


Figure 8.34 Adjustment to Metro Route 3, Northbound



9.0 Identification of Additional Stations

This section describes the process of identifying additional HSRT stations for the Maglev on I-10 alternative. The base Maglev on I-10 alternative has four HSRT stations, located at West LA, LAUS, West Covina, and Ontario Airport (see Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*).

A two-step process was used to identify the locations of additional HSRT stations. The first step identified relatively denser areas along the I-10 alignment by mapping forecasted population plus employment density in 2035. The second step performed a more detailed analysis of those areas considered denser in order to identify the specific locations for the additional HSRT stations. In this step, in addition to the population and employment density nearby, proximity to other transit services and engineering constraints such as alignment geometry and availability of right-of-way were considered.

Based on the analysis, three additional stations are proposed at the following locations (see Figure 9.1):

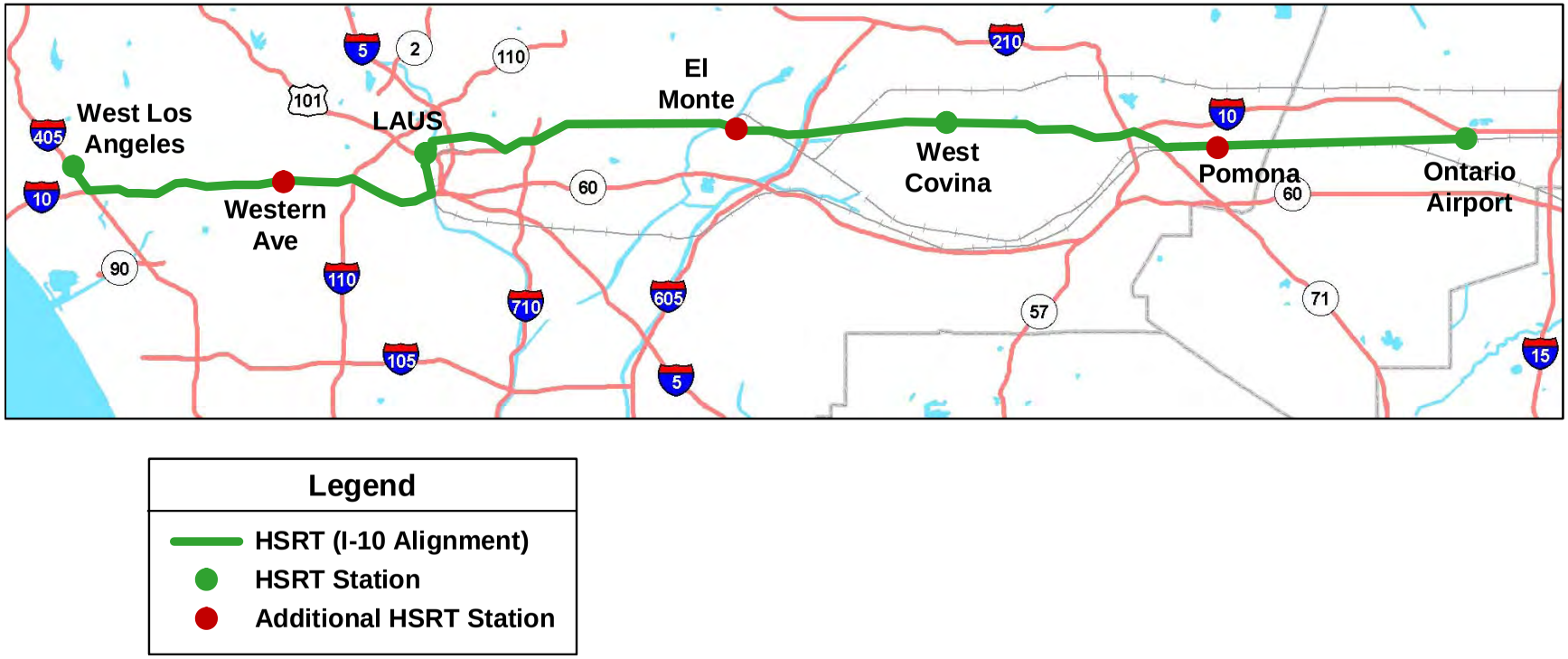
1. I-10 and Western Avenue, Los Angeles;
2. I-10 and Santa Anita Avenue, El Monte; and
3. UPRR tracks and Garey Avenue, Pomona.

9.1 Step One – Identification of Relatively Denser Areas

The first step consisted of identifying relatively denser areas along the I-10 alignment. Figure 9.2 displays the population plus employment per square mile along the I-10 alignment in 2035. Relatively denser areas not already served by the four base HSRT stations include the following:

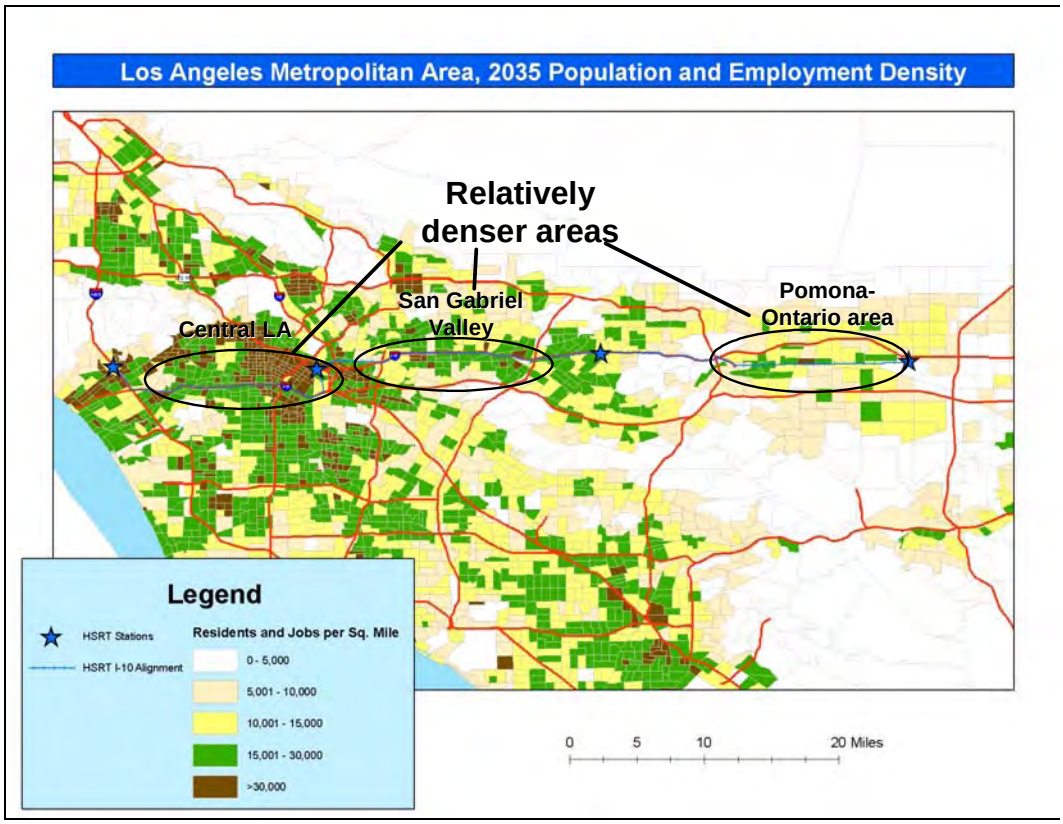
- **Central Los Angeles, roughly between I-405 and I-110.** Population plus employment density reaches over 30,000 per square mile in many parts of this area, particularly between La Brea Boulevard and I-110.
- **San Gabriel Valley, roughly between I-710 and I-605.** Relatively moderate to high density occurs in two areas, roughly surrounding the central parts of Monterey Park and El Monte.

Figure 9.1 Additional HSRT Stations



- **Pomona-Ontario, roughly between SR 57 and Ontario Airport.** Population plus employment density is relatively moderate to low in this area, with some denser development surrounding the central parts of Pomona and Ontario.

Figure 9.2 Relatively Denser Areas Along I-10 Alignment



9.2 STEP TWO – DETAILED ANALYSIS OF RELATIVELY DENSER AREAS

Central Los Angeles

As Figure 9.3 and Figure 9.4 show, Central Los Angeles is a trip generator rather than a trip attractor since its population density is much higher than its employment density. The additional HSRT station is at the intersection of the I-10 and Western Avenue, where the number of residents within 0.5 mile is expected to reach nearly 21,000 people and the number of jobs more than 4,000 by 2035. Three major bus lines currently serve this intersection: Metro Rapid 757, Metro Express 550, and Metro Local line 207. The HSRT alignment would require some straightening to accommodate a station in this location. The station

itself would likely be in an aerial structure traversing Western Avenue. Some existing buildings in the immediate vicinity of the HSRT station would likely be displaced to accommodate HSRT parking structures.

Another location considered was the intersection of I-10 and Vermont Avenue given the high levels of population density nearby. However Vermont Avenue has less transit connectivity, with only has one Metro Rapid Line (754) and one Metro Local line (204).

San Gabriel Valley

As Figure 9.5 and Figure 9.6 show, the San Gabriel Valley is expected to be a trip generator rather than a trip attractor since its population density is much higher than its employment density. The proposed HSRT station is at the intersection of the I-10 and Santa Anita Avenue in El Monte where the number of residents within 0.5 mile radii is expected to reach more than 7,000 people and the number of jobs around 2,000 by 2035. Several bus lines serve the El Monte Transit Center at this location: Metro Rapid 770, Metro Local 70, Metro Express 484 and 490, Foothill Transit Silver Streak and several Foothill Transit local routes. The proposed HSRT station is also about three-quarter mile from the El Monte Metrolink station. The HSRT alignment would require some straightening to accommodate a station at this location. There is an existing MTA bus yard and facility to the west of Santa Anita Avenue just north of I-10. The HSRT station could be located in the back of this facility, with access via Santa Anita Avenue.

Figure 9.3 Central Los Angeles, 2035 Population Density

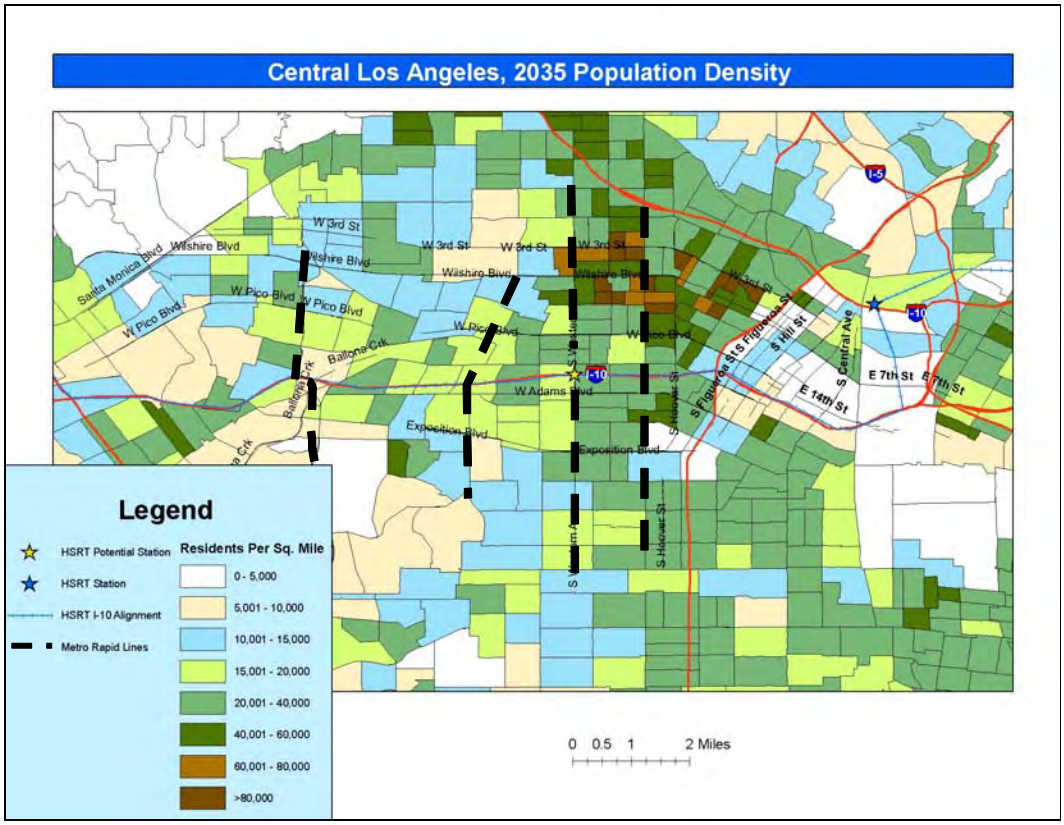


Figure 9.4 Central Los Angeles, 2035 Employment Density

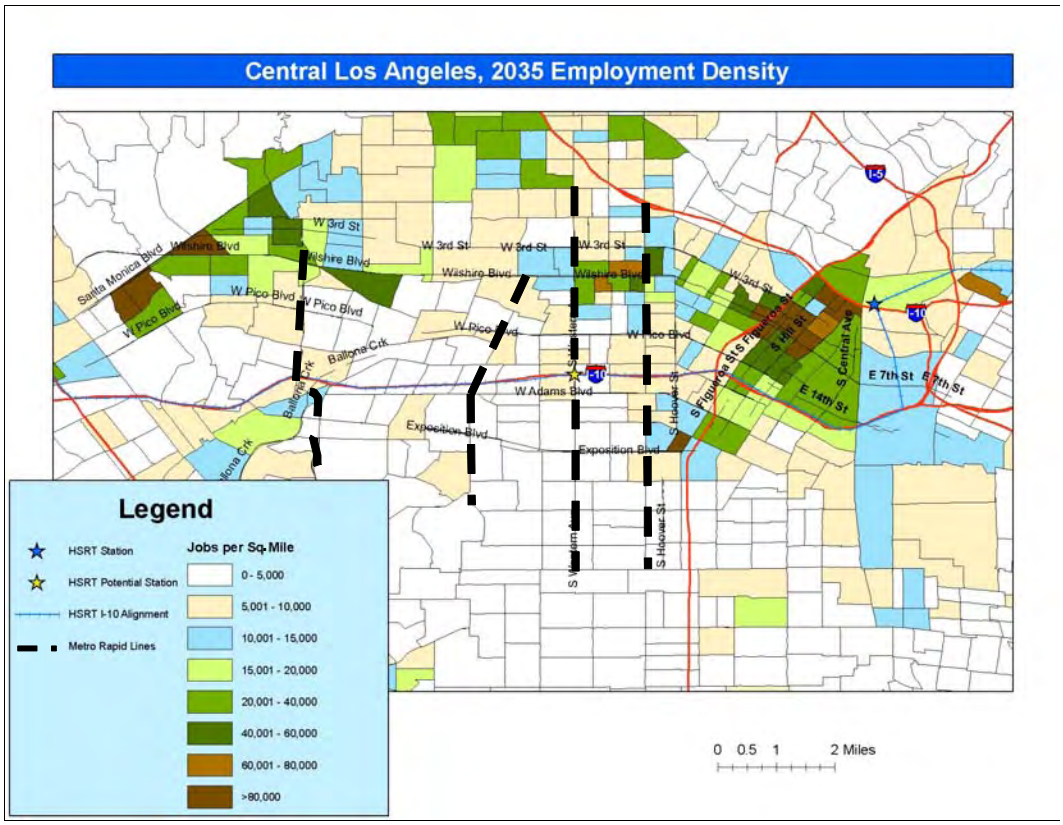


Figure 9.5 San Gabriel Valley, 2035 Population Density

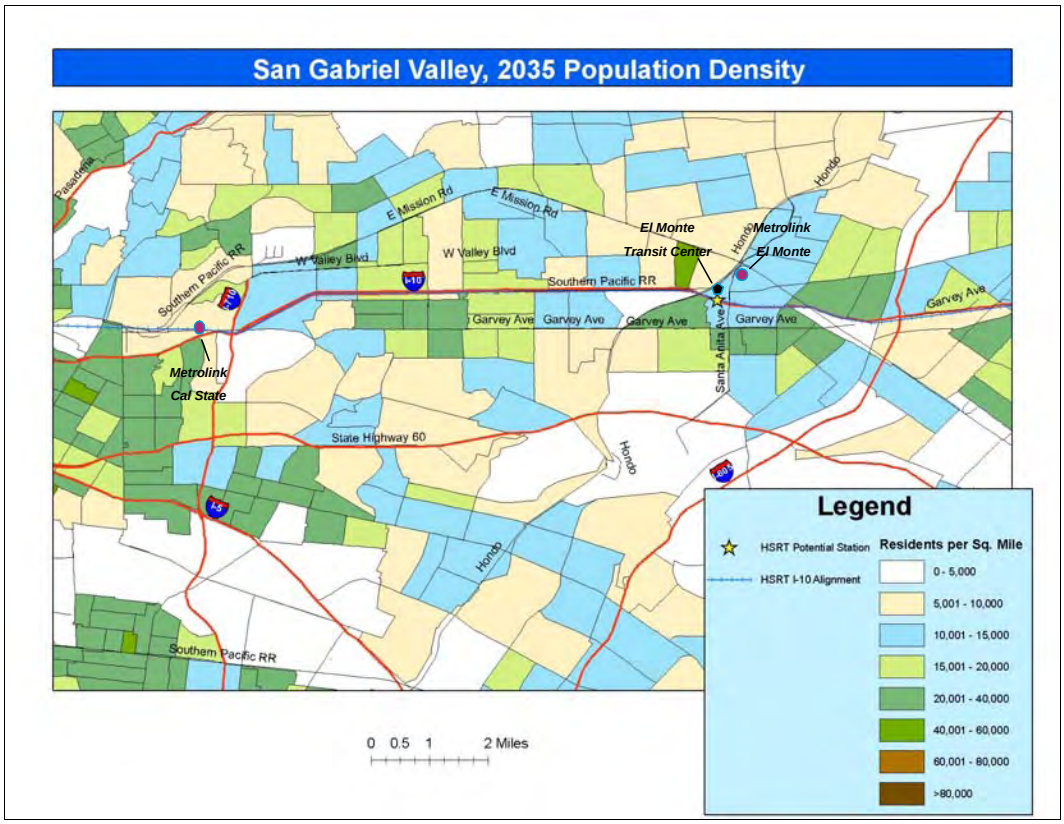
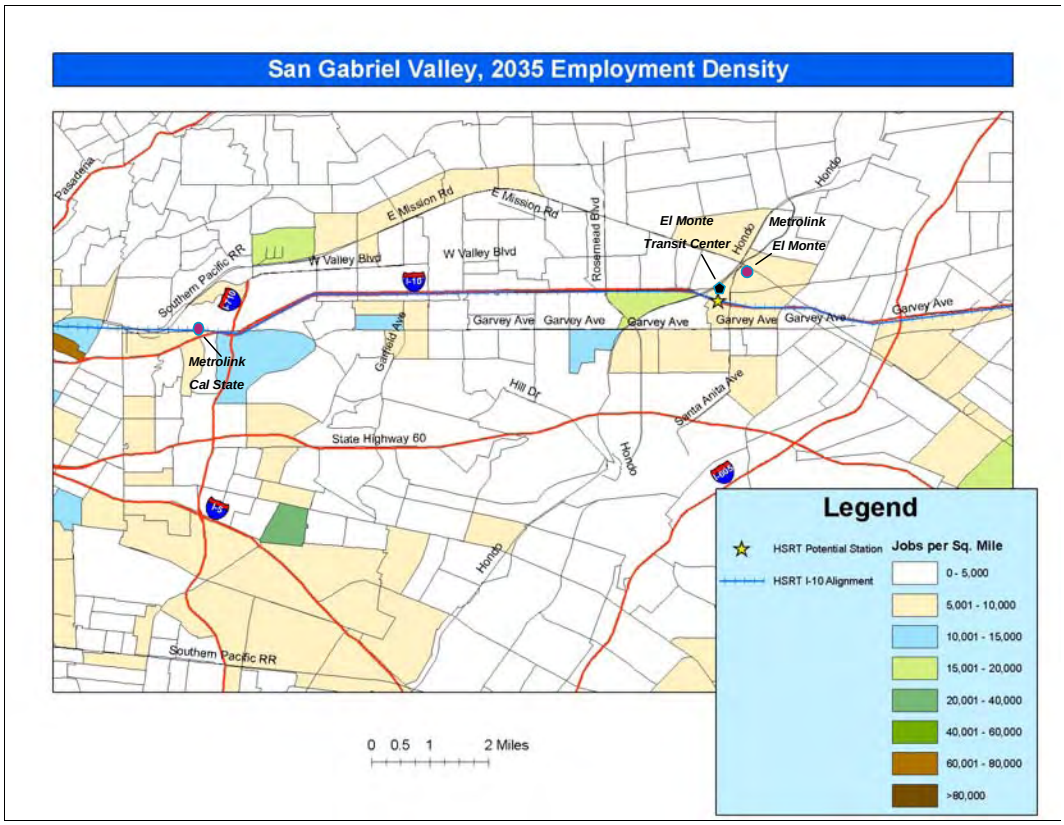


Figure 9.6 San Gabriel Valley, 2035 Employment Density



Pomona-Ontario Area

As Figure 9.7 and Figure 9.8 show, the Pomona – Ontario area is expected to have modest population and employment density relative to Central Los Angeles and the San Gabriel Valley, with population density below 25,000 residents per square mile and employment density below 15,000 jobs per square mile in 2035. The proposed HSRT station is located in a relatively denser area, at the intersection of the UPRR tracks and Garey Avenue in Downtown Pomona. The number of residents within 0.5 mile or walking distance from the station is expected to reach 6,000 people and the number of jobs more than 8,000 by 2035. This location is currently a station on the Metrolink Riverside line and is also the Pomona Transit Center, with Foothill Transit Silver Streak bus service, as well as several Foothill Transit local routes. From an engineering perspective, building a HSRT station at this location is relatively straightforward.

Figure 9.7 Pomona-Ontario Area, 2035 Population Density

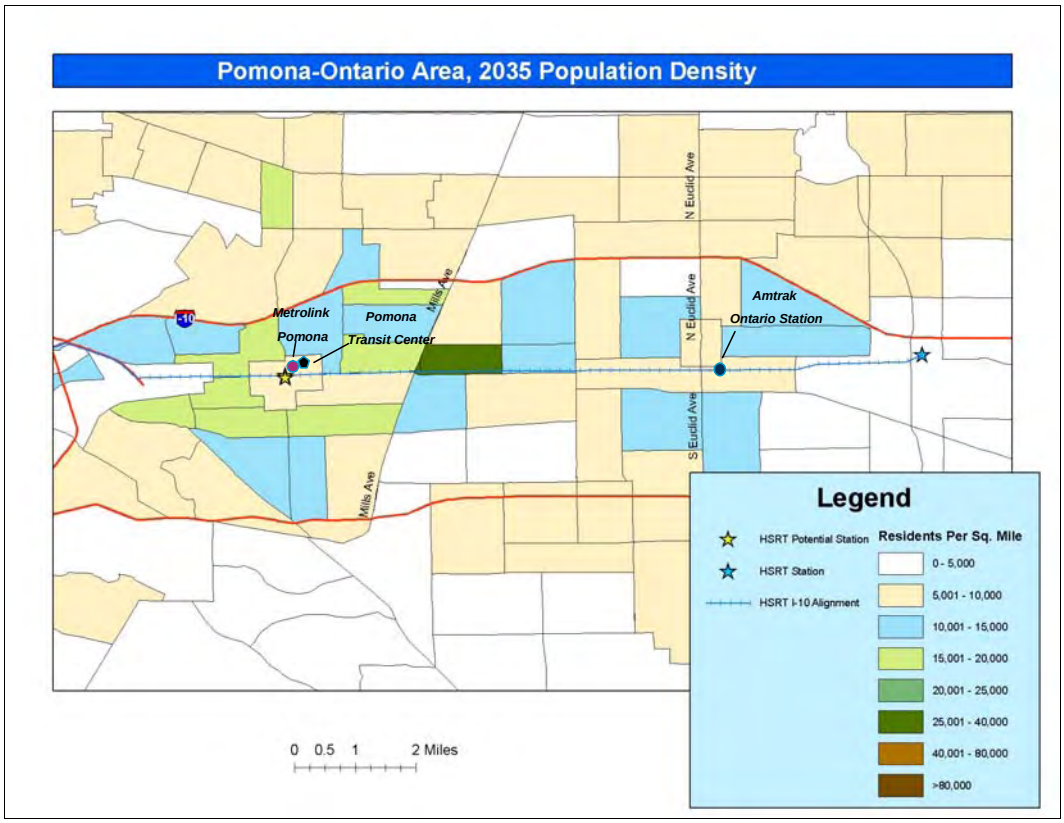
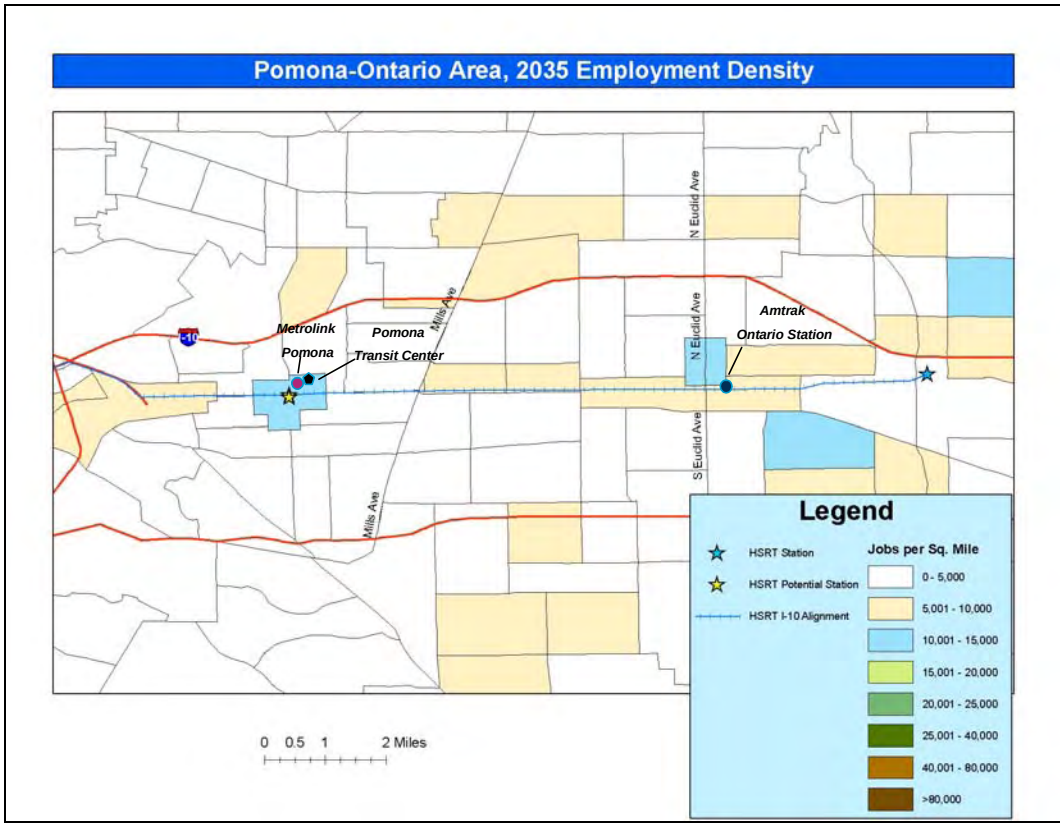


Figure 9.8 Pomona-Ontario Area, 2035 Employment Density



10.0 Benefit Assessment Districts and Tax Increment Financing

Benefit assessment districts and tax increment financing are two potential mechanisms for generating revenues from the potential benefits that a HSRT system might bring to the surrounding communities. Some of the differences between these two financing are:

1. The theory behind *benefit assessments* is that the public pays for benefits that they receive from an infrastructure improvement. A benefit assessment district could be formed in areas in which all business or property owners are determined to benefit equally from the HSRT line. A fee is assessed on all businesses or property owners in the district to finance the new rail infrastructure. Unlike tax increment financing, beneficiaries pay a new fee on top of existing taxes.
2. *Tax increment financing* does not impose additional fees. Instead, property tax revenues are frozen at a base year level and additional revenues are diverted into a separate pool to finance improvements. A tax increment financing district (typically a redevelopment agency or an infrastructure financing district) collects the incremental tax revenues generated and uses these revenues to repay project financing costs.

We examined the five station locations included in the IOS alignments along the I-10 and UPRR rights-of-way. We discovered that most of the cities already have redevelopment districts and agencies administering tax increment financing:

- **Los Angeles.** Community Redevelopment Agency (LA/CRA);
- **West Covina.** Redevelopment Agency of the City of West Covina;
- **City of Industry.** City of Industry Public Facilities Authority; and
- **Ontario Airport.** Ontario Redevelopment Financing Authority.

Only the proposed West Los Angeles HSRT station has no redevelopment district in its vicinity, and thus is a possible candidate for a new redevelopment district supporting HSRT.

With the help of SCAG staff, we reviewed annual reports and revenue bond issues from the redevelopment agencies. These documents indicate that the districts generate total net revenues of roughly $60 million per year (in YOE dollars). Table 10.1 details some of the redevelopment projects already proposed to use these net revenues.

Table 10.1 Redevelopment Projects near Proposed IOS HSRT Stations

Project Name	Project Area	Size	Nature of Project
City of Los Angeles Redevelopment Projects near Union Station			
Central Industrial	Area bounded by Third St on the north, LA River on the east, Washington Blvd and I-10 freeway on the south, and San Pedro and Stanford Streets on the west	738 acres	• Economic redevelopment • Affordable housing
Chinatown Redevelopment Project	Area bounded by I-110 freeway on the north, North Broadway and North Main Street on the east, Cesar E. Chavez Avenue and I-5 on the south, and Beaudry Avenue on the west	303 acres	• Affordable housing • Cultural and historic preservation
City of West Covina Redevelopment Projects			
Glendora Avenue Retail	Near I-10 freeway, across from The Lakes at West Covina and Edwards Cinema	7.01 acres	• Retail
Market Place II at The Lakes	South end of The Lakes complex near I-10	12.67 acres	• Retail
K-Mart Plaza	Part of Westfield Mall West Covina	11.92 acres	• Retail
Sunset/Francisquito Center	Approximately 1 mile south of I-10 freeway	12.5 acres	• Retail/mixed-use
Sunset Parkway Center	Adjacent to Westfield Mall West Covina	4.7 acres	• Retail
City of Ontario Redevelopment Projects			
Center City Project	Historic Downtown Ontario, East Holt Blvd (gateway to Ontario Airport and the Ontario Convention Center), Ontario Hicy Hall, Civic Center, Senior Center, Main Library, the Museum of History and Art, and the Law School of the University of La Verne		• Corridor aesthetics improvements • Mixed-use urban village
Guasti Project	19 contiguous parcels between I-10 freeway and the Ontario Airport	~180 acres	• 100-unit senior housing
The Ontario Airport Towers Project	Adjacent to I-10 freeway between Archibald and Turner Avenues, the main entrance to Ontario Airport	425,000 square feet	• Two six-story and one five-story class A office buildings • Retail building and full service hotel

11.0 Potential for HSRT Goods Movement Revenue

This section presents the results of research and interviews conducted to evaluate the potential of the HSRT system to benefit small-package freight providers such as United Parcel Service (UPS) and Federal Express.

Representatives of UPS and Federal Express both believe that HSRT would not benefit their respective businesses due to the nature of their distribution systems.

11.1 UNITED PARCEL SERVICE

A discussion was held on June 13, 2006, with Mr. Bruce McRae, Public Affairs Manager for the UPS Pacific Region, to assess whether the proposed HSRT IOS system would benefit UPS' operations.

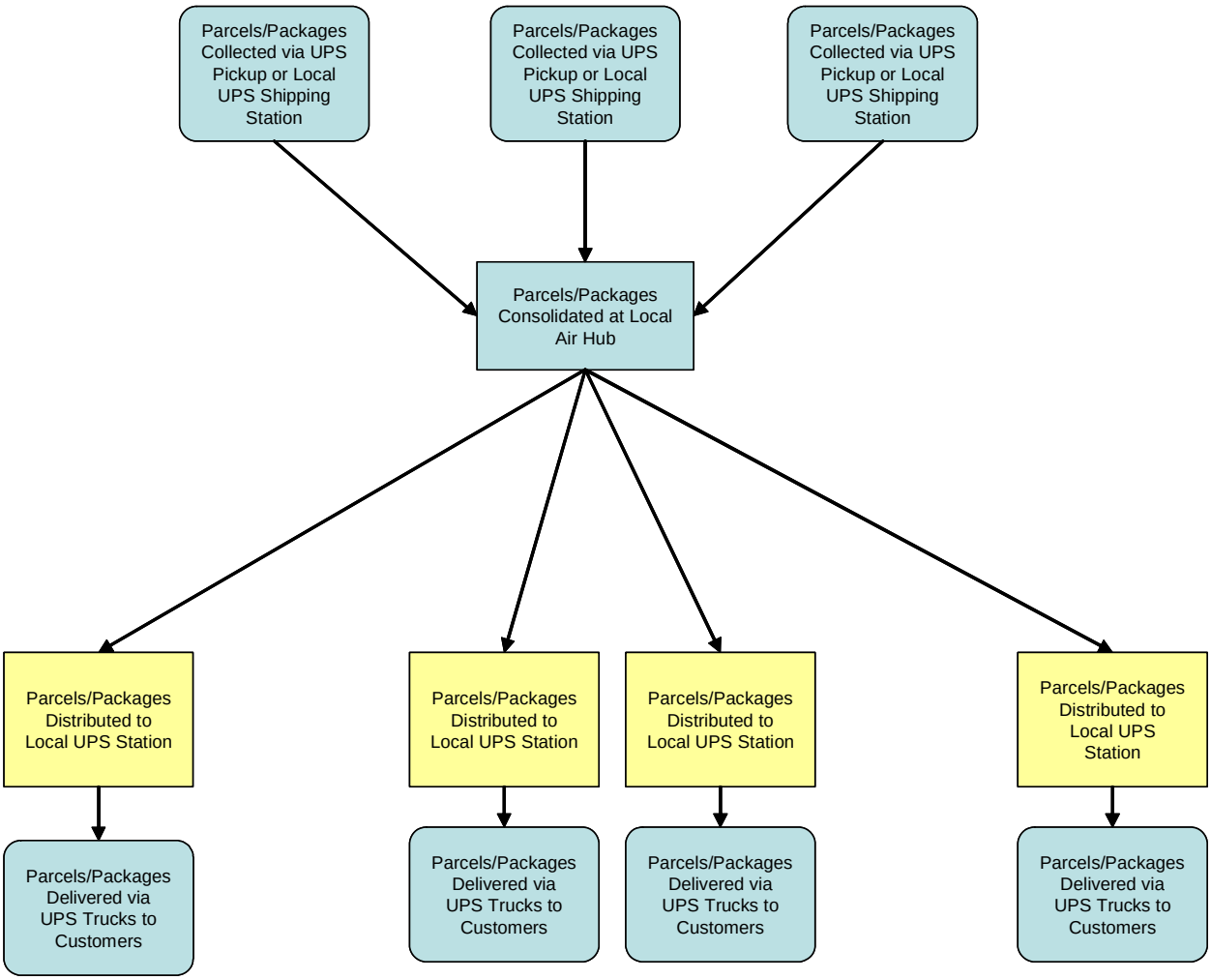
UPS operates a "hub-and-spoke structure" with three major components:

1. **Consolidation.** The first step involves the collection of parcels by trucks assigned to specific routes. Roadway conditions and traffic trends are continuously monitored to ensure that each driver takes the optimal path. From his/her truck, the driver has access to a hand-held computer device (DIAD) that enables the capturing of information about each package and delivery. The parcels are then assembled at the closest distribution center. There are many distribution centers in the Southern California region.
2. **Distribution.** The distribution function works on a hub-to-hub basis. Depending on the distance involved, the mode used between hubs will be truck or air. Trucks are predominantly used for distances less than 400 miles.
3. **Fragmentation.** This step is the inverse of consolidation as parcels have to be delivered to each individual destination. Commonly, fragmentation is combined with consolidation as a delivery truck route can be integrated with a pickup route.

UPS' main air hub in Southern California is at Ontario. As a result, discussions with Mr. McRae were focused mostly on the potential HSRT system between downtown Los Angeles and Ontario Airport.

Packages delivered by air to Ontario Airport are sorted through the system, loaded onto freight trucks, and delivered to multiple local UPS consolidation sites to be further sorted and loaded on different trucks for delivery to businesses or residential customers. The concept is depicted in Figure 11.1.

Figure 11.1 UPS Distribution Network



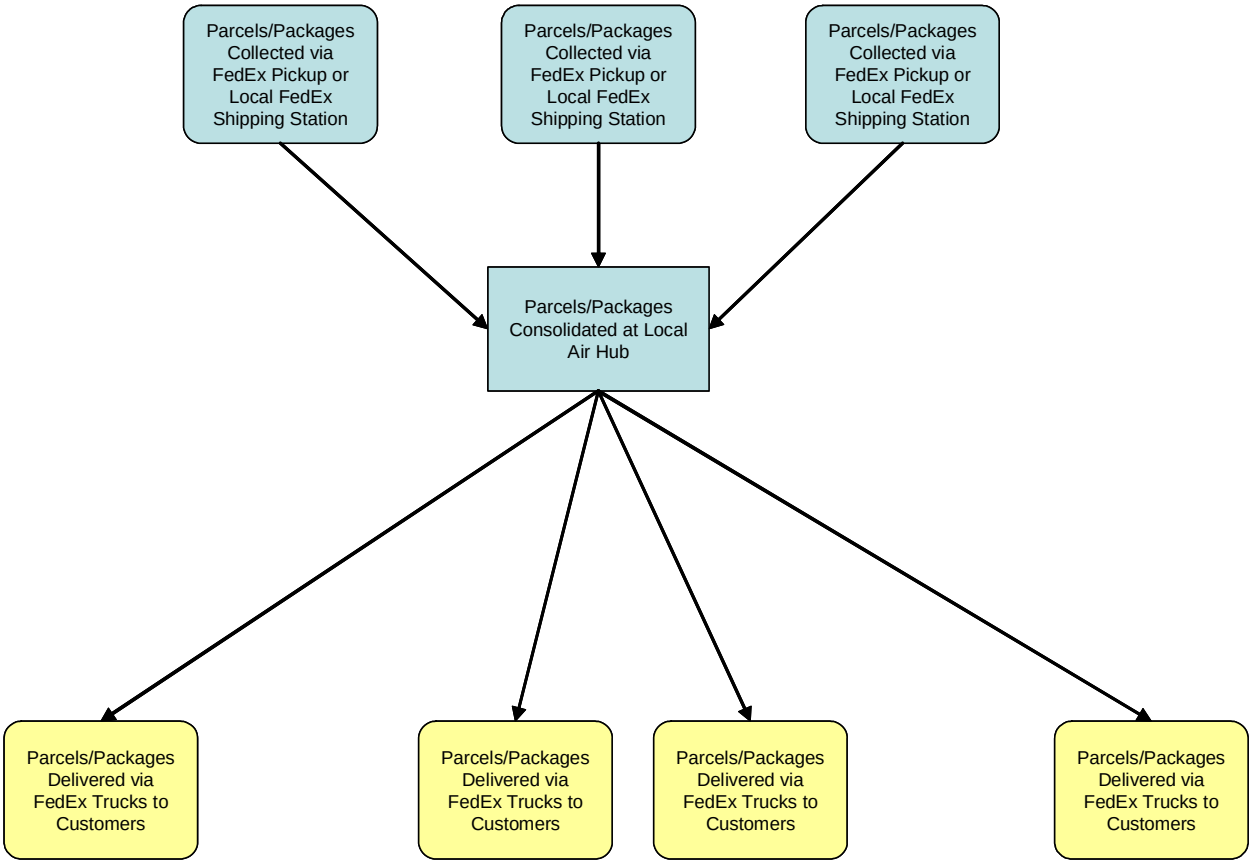
UPS' LAX hub operates in a similar fashion, but on a much smaller scale. Mr. McRae noted that UPS is already a significant user of freight rail services; and due to the multiple delivery operations required for each of the trucks, the HSRT system would not be a benefit to UPS. In fact, Mr. McRae pointed out that, since each of its packages are timed for delivery, the HSRT system, due to its concurrent passenger service, would most likely cause delays to its distribution system. However, the most important factor is that UPS distribution operations relay on multiple distribution centers located in different parts of Southern California. Therefore, a high-speed rail line connecting to one single point downtown would not add any efficiencies.

11.2 FEDERAL EXPRESS

A discussion was held on June 15, 2006, with Mr. Frank Adams of Federal Express. Mr. Adams is the Federal Express SCAG contact for the Maglev Task

Force, and is very familiar with the proposed development of a regional HSRT system. The Federal Express distribution system operates differently than the UPS hub-and-spoke system. Federal Express has air hubs at Ontario, Burbank, LAX, Long Beach, John Wayne, and San Diego in the Southern California area. Once a flight touches down at each of the airports, the packages are sorted into individual delivery vans that deliver to multiple locations within the designated delivery area. In addition, these delivery vans also pickup new packages for delivery along the way. The distribution system is shown in Figure 11.2.

Figure 11.2 Federal Express Distribution Network



Mr. Adams believes the HSRT system would not benefit Federal Express operations, since they do not have one or more centralized distribution centers. Also, there many available and proximate air hubs located throughout Southern California to service Federal Express' widespread delivery and pickup locations.