

Appendix I Noise Attenuation

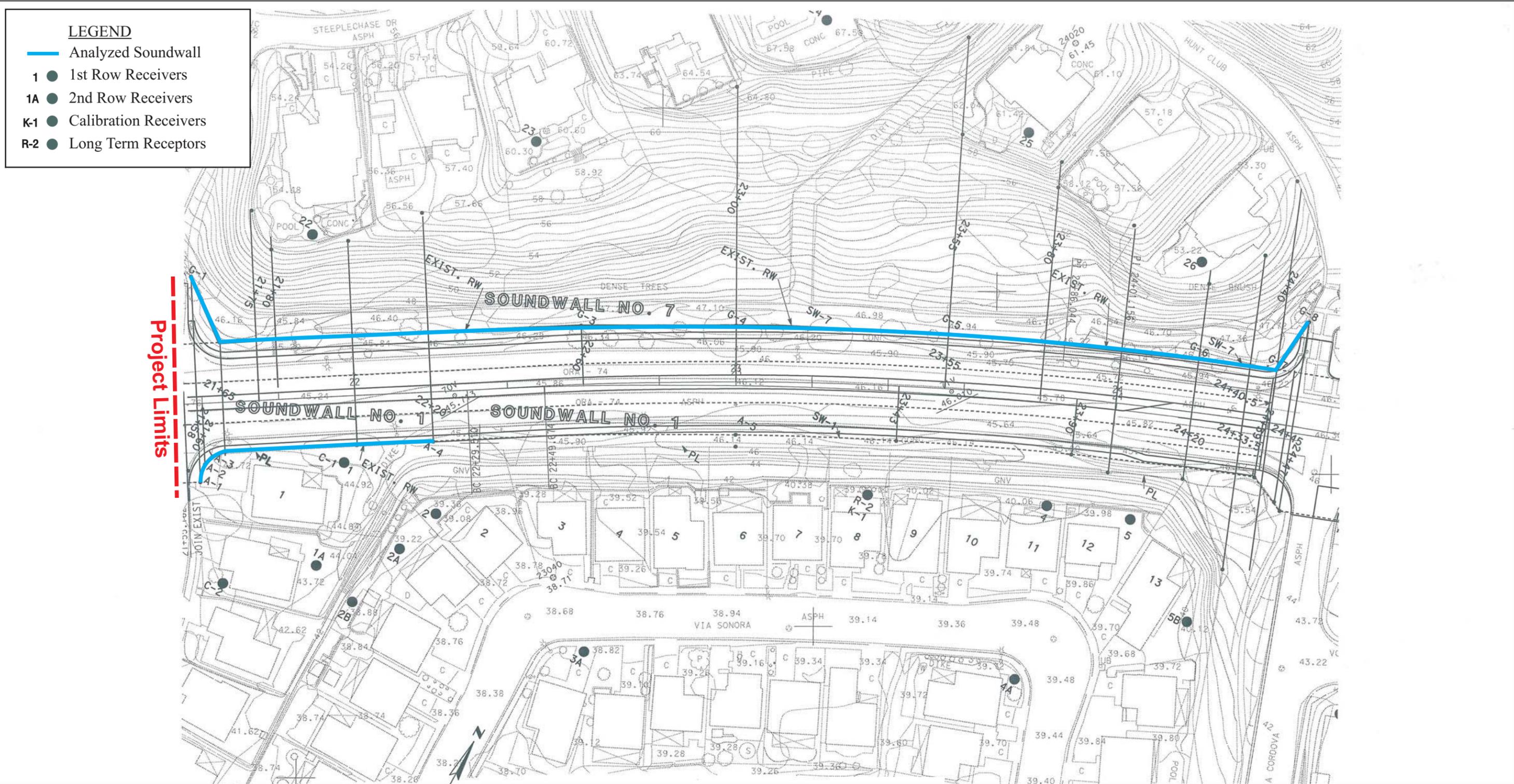
Noise attenuation as a project feature has been recommended for this project as community enhancement to protect residences south of SR-74. The need for this recommendation was based on Caltrans *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects, August 2006*. This protocol is based on the Federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) that govern the analysis of traffic noise impacts. This regulation contains noise abatement criteria (NAC) that are used to determine when a noise barrier is required. The NAC differ depending on the type of land use. For example, the NAC for residences (67 dBA) are lower than the NAC for commercial areas (72 dBA). Table I-1 lists the noise abatement criteria for use in the NEPA 23 CFR 772 analysis. In California, approaching the NAC is defined as coming within 1 dBA of the NAC. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This Appendix discusses noise attenuation including height of these sound walls that have been incorporated in the project. The feasible and reasonable analysis was based on information from Section 2.2.7 such as criteria for noise measurement locations. Figure I-1 shows the noise-sensitive receptor locations and the evaluated noise barriers within the project area (with the wrap-around wall scenario). Figure I-2 shows the noise-sensitive receptor locations and the evaluated noise barriers within the project area (without the wrap-around wall scenario). It should be noted that the reference to soundwalls in Figures I-1 and I-2 are referred to as noise barriers in this section.

Table I-1 Activity Categories and Noise Abatement Criteria (NAC)

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA $L_{eq}(h)$	Description of Activities
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above
D	–	Undeveloped lands
E	52 Interior	Residence, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: FHWA 23 CFR 772.

This page intentionally left blank



LEGEND

- Analyzed Soundwall
- 1 ● 1st Row Receivers
- 1A ● 2nd Row Receivers
- K-1 ● Calibration Receivers
- R-2 ● Long Term Receptors

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

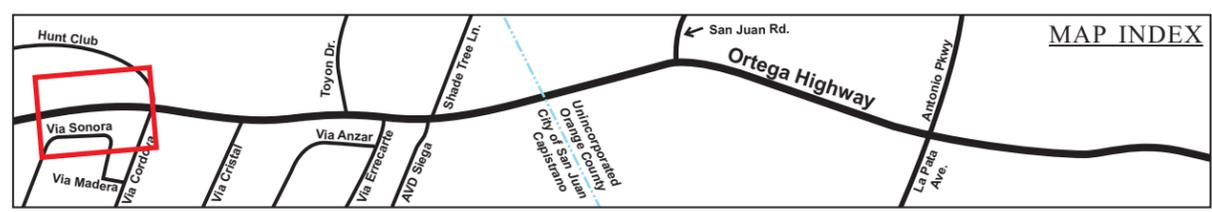
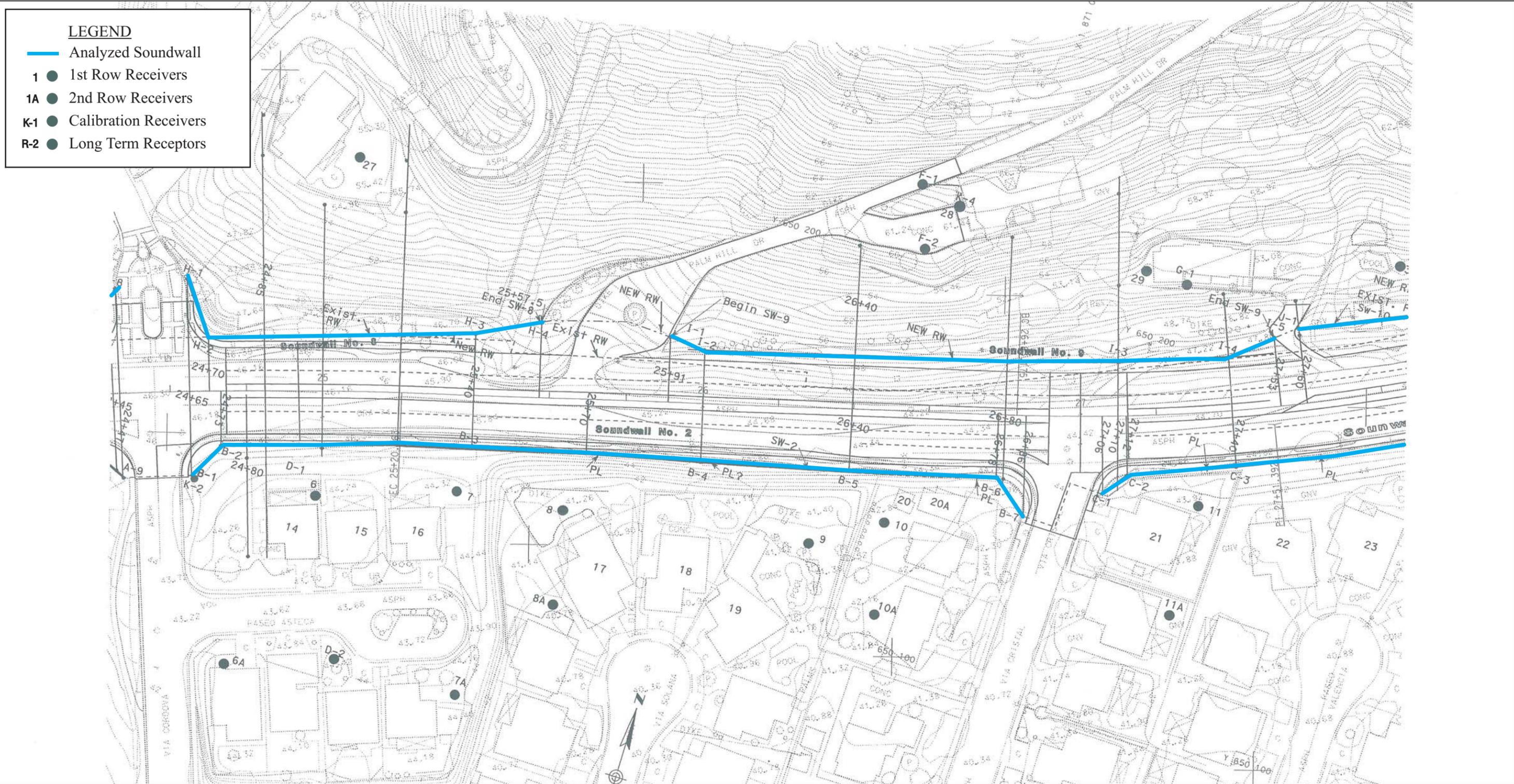


FIGURE I-1
Sheet 1 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920



This page intentionally left blank



- LEGEND**
- Analyzed Soundwall
 - 1 ● 1st Row Receivers
 - 1A ● 2nd Row Receivers
 - K-1 ● Calibration Receivers
 - R-2 ● Long Term Receptors

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

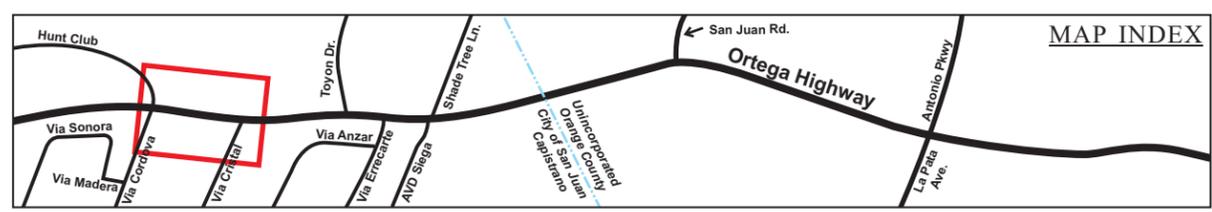
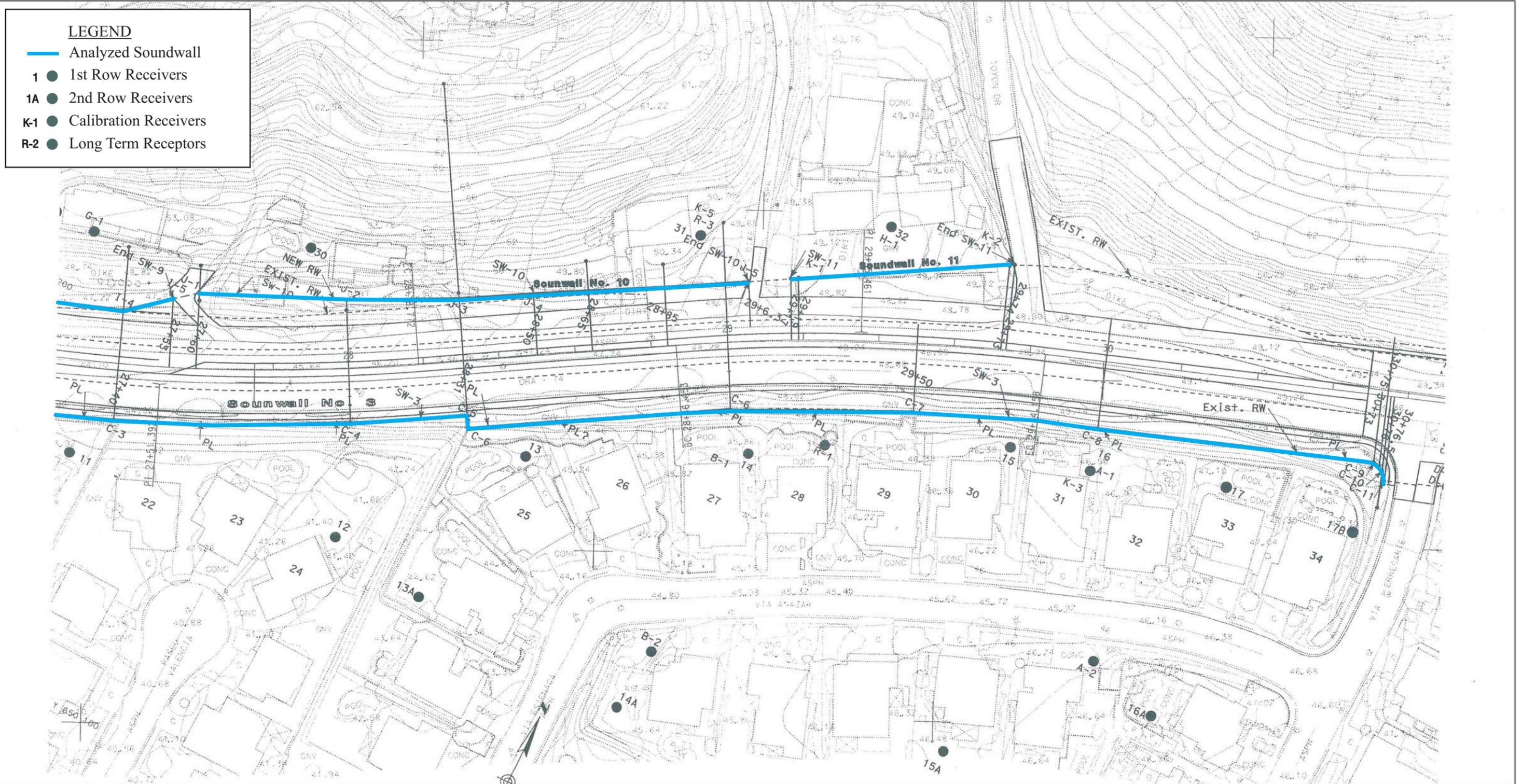


FIGURE I-1
Sheet 2 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920



This page intentionally left blank



- LEGEND**
- Analyzed Soundwall
 - 1 ● 1st Row Receivers
 - 1A ● 2nd Row Receivers
 - K-1 ● Calibration Receivers
 - R-2 ● Long Term Receptors

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

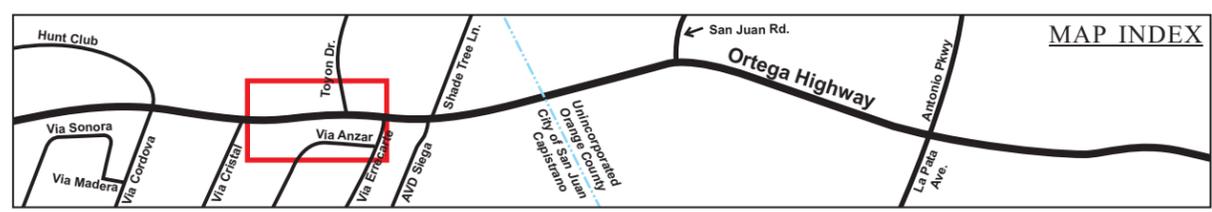


FIGURE I-1
Sheet 3 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920



This page intentionally left blank



- LEGEND**
- Analyzed Soundwall
 - 1 ● 1st Row Receivers
 - 1A ● 2nd Row Receivers
 - K-1 ● Calibration Receivers
 - R-2 ● Long Term Receptors

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

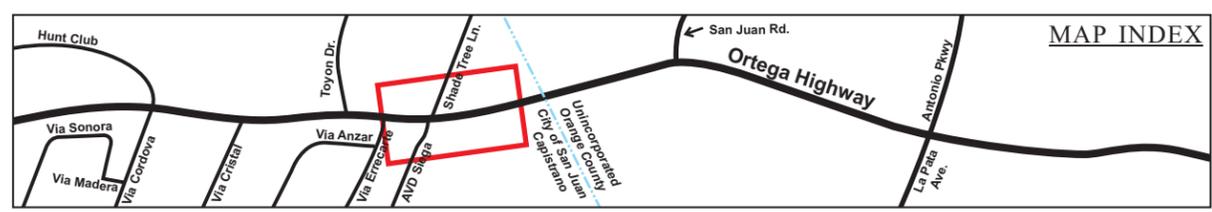
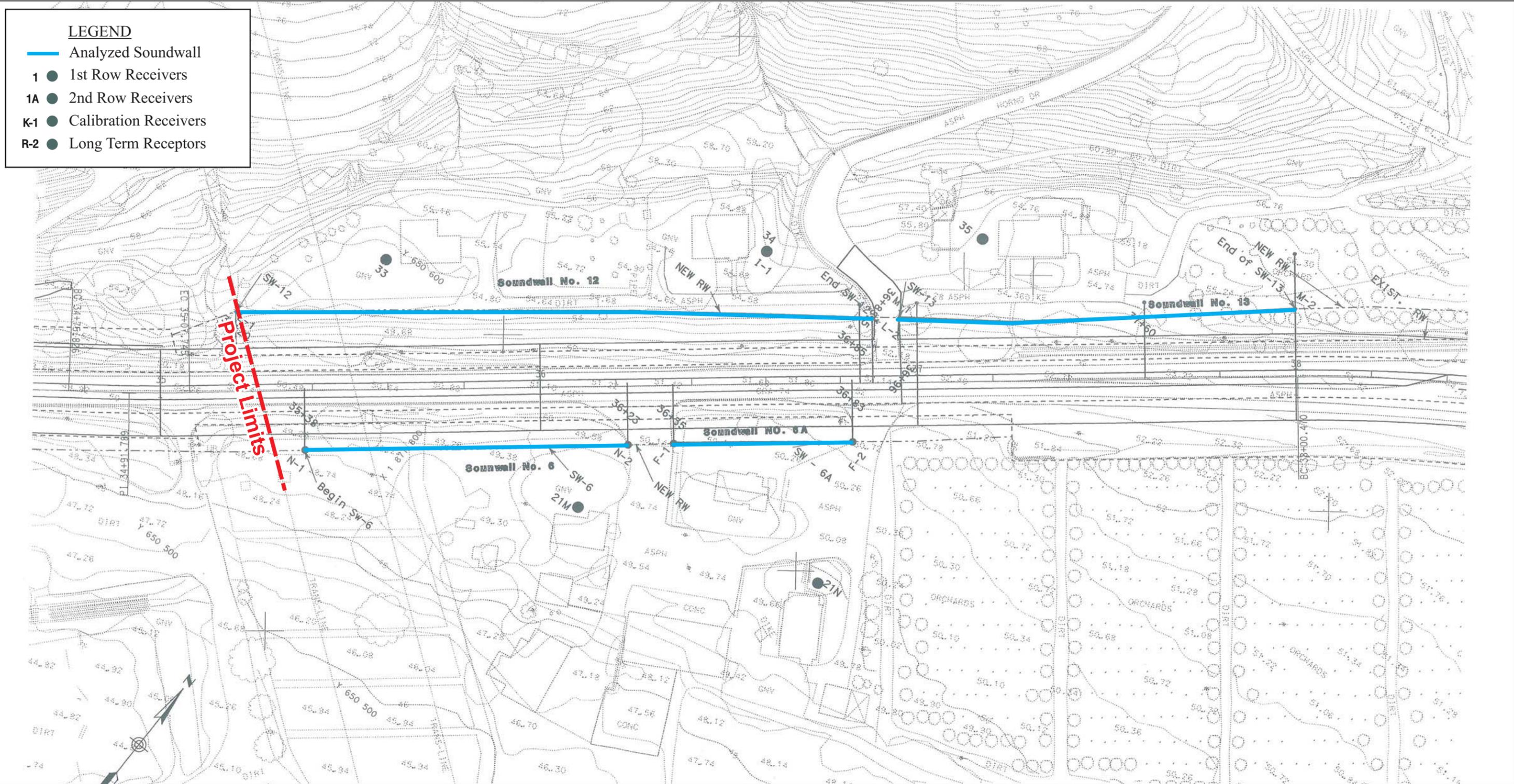


FIGURE I-1
Sheet 4 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920



This page intentionally left blank



LEGEND

- Analyzed Soundwall
- 1 ● 1st Row Receivers
- 1A ● 2nd Row Receivers
- K-1 ● Calibration Receivers
- R-2 ● Long Term Receptors

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

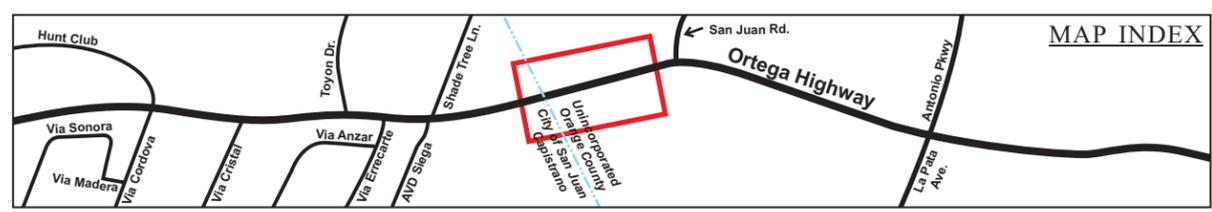
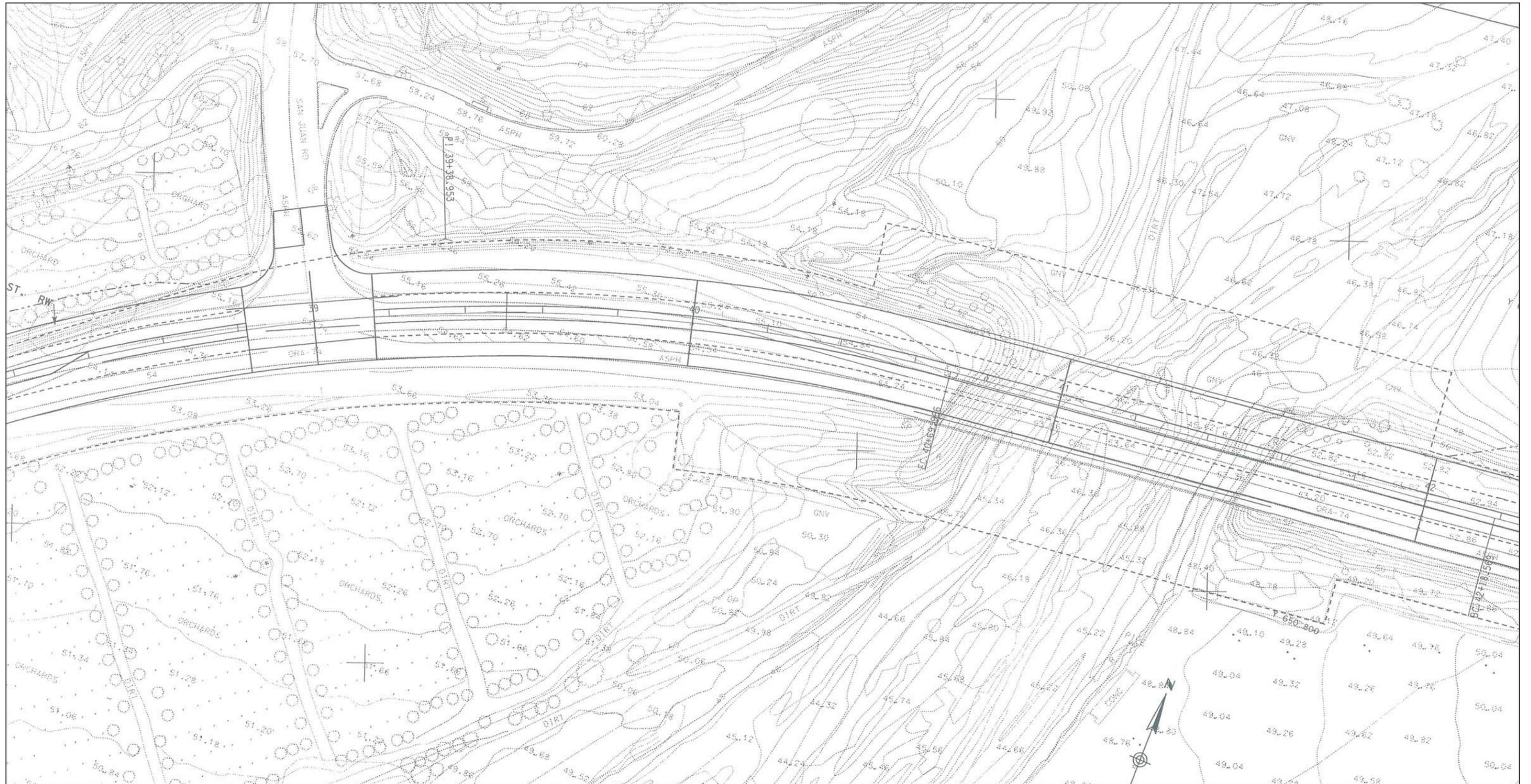


FIGURE I-1
Sheet 5 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920



This page intentionally left blank



NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.



NO SCALE
SOURCE: Caltrans

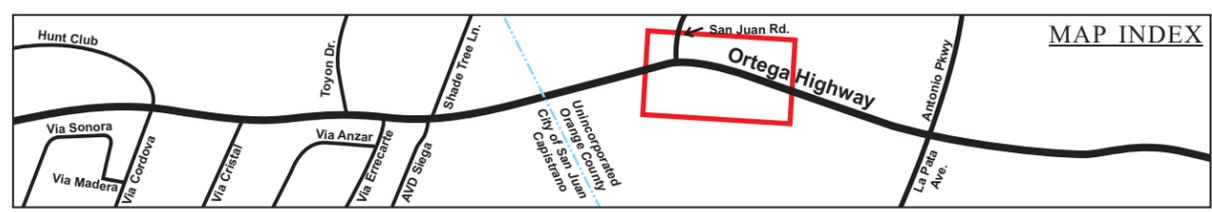


FIGURE I-1
Sheet 6 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920

This page intentionally left blank

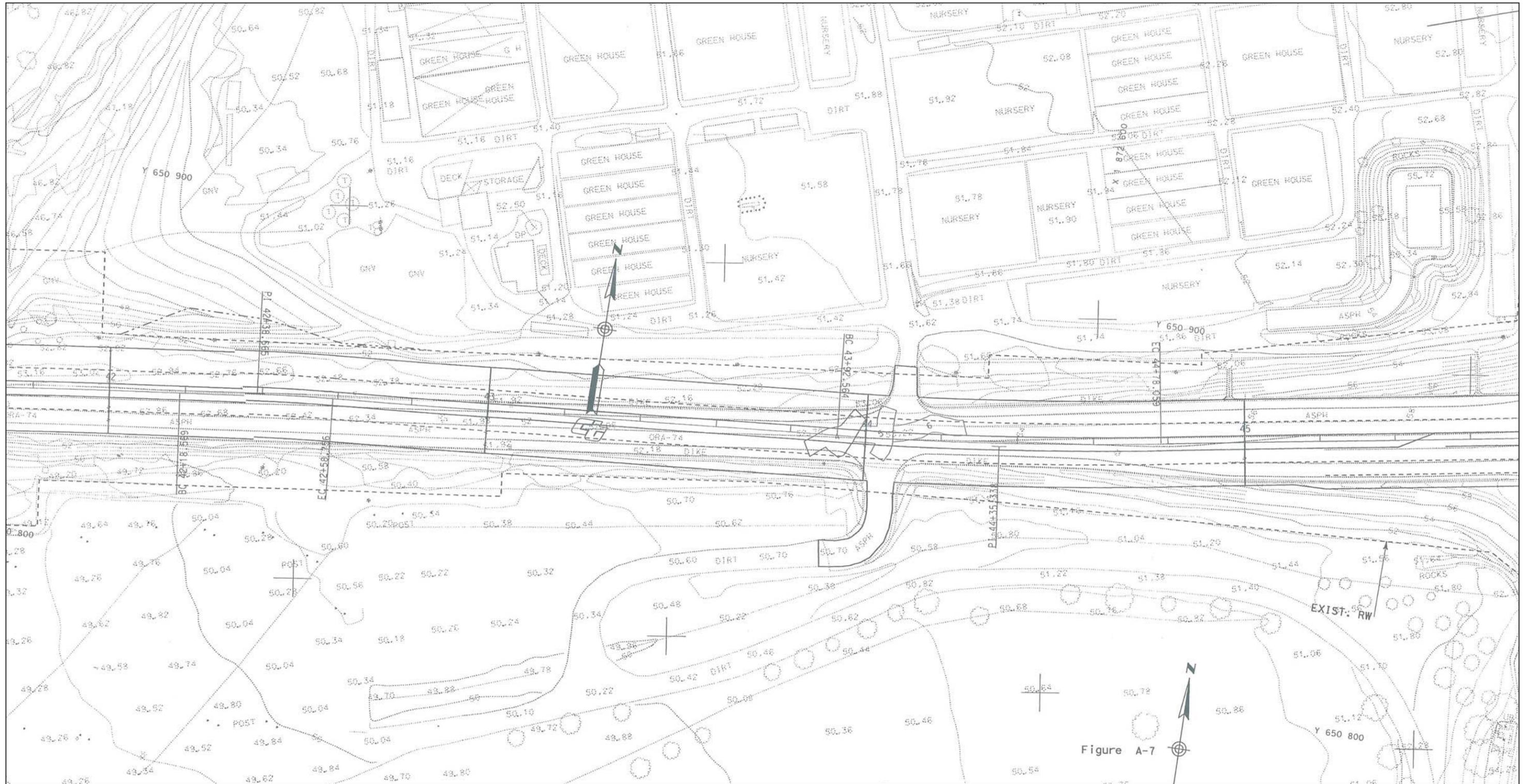


Figure A-7

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.



NO SCALE
SOURCE: Caltrans

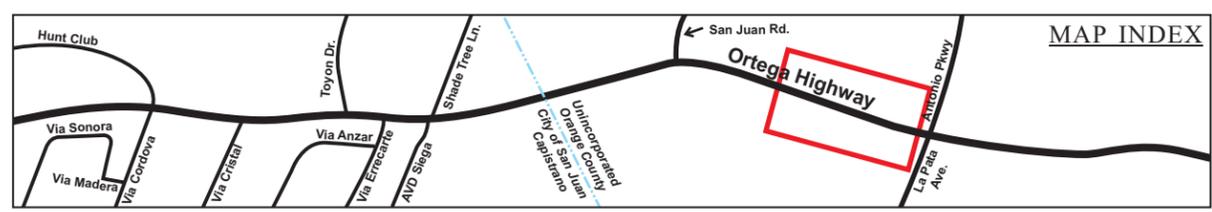


FIGURE I-1
Sheet 7 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920

This page intentionally left blank



NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.



NO SCALE
SOURCE: Caltrans

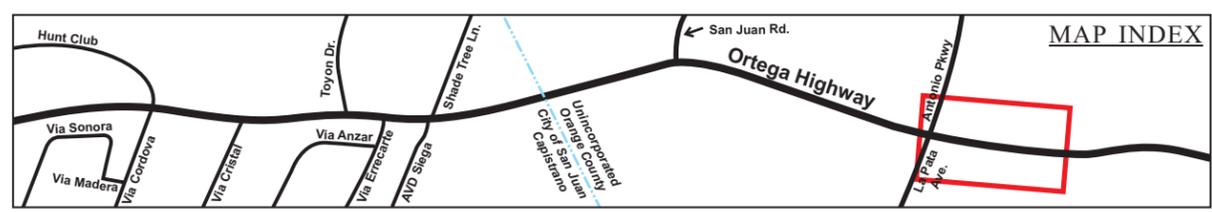
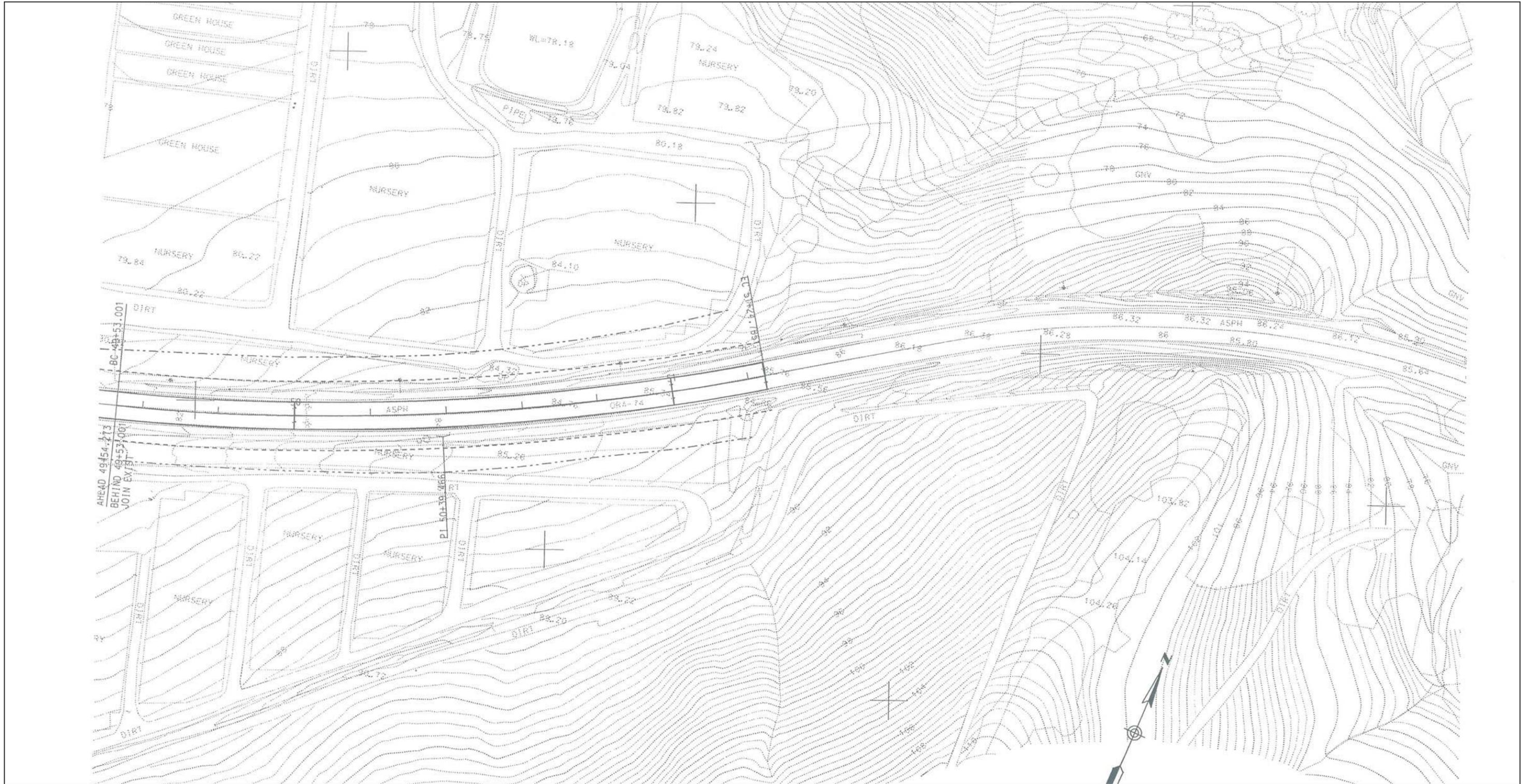


FIGURE I-1
Sheet 8 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920

This page intentionally left blank



NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+06 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.



NO SCALE
SOURCE: Caltrans

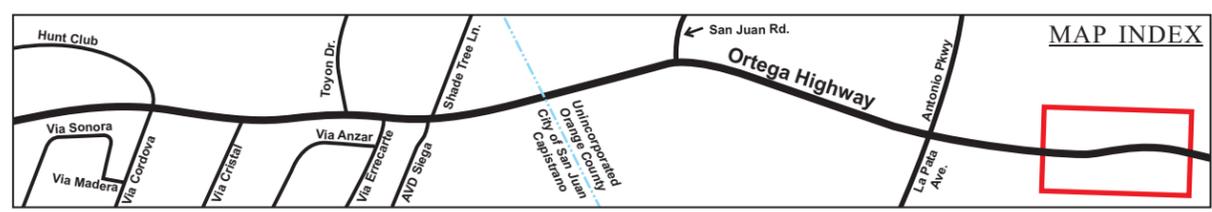
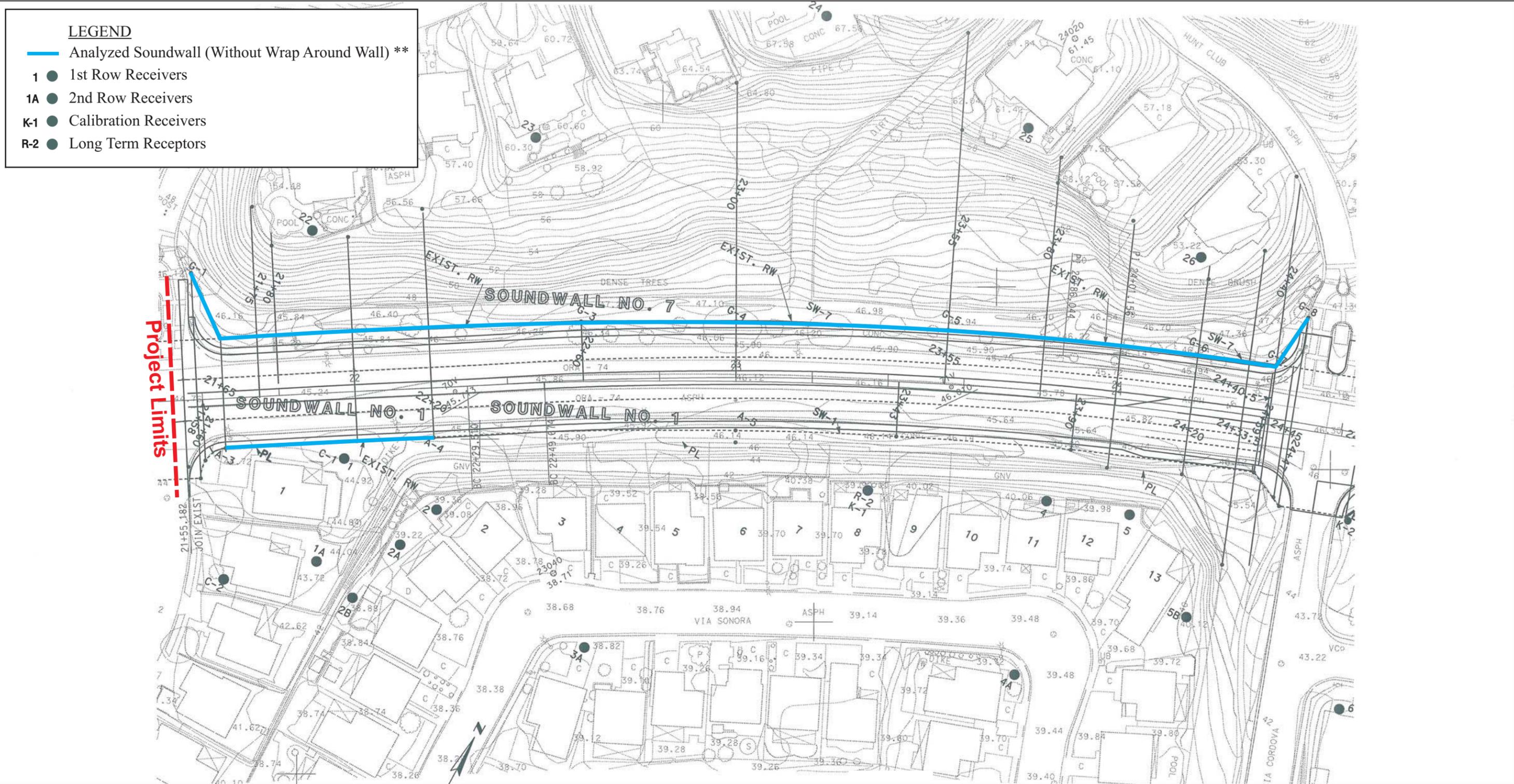


FIGURE I-1
Sheet 9 of 9

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
12-ORA-74 PM 1.0/1.9
EA No. 086920

This page intentionally left blank



LEGEND

- Analyzed Soundwall (Without Wrap Around Wall) **
- 1 ● 1st Row Receivers
- 1A ● 2nd Row Receivers
- K-1 ● Calibration Receivers
- R-2 ● Long Term Receptors

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+12 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

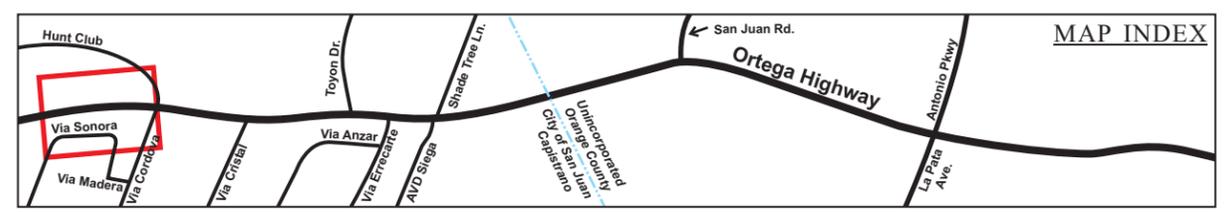
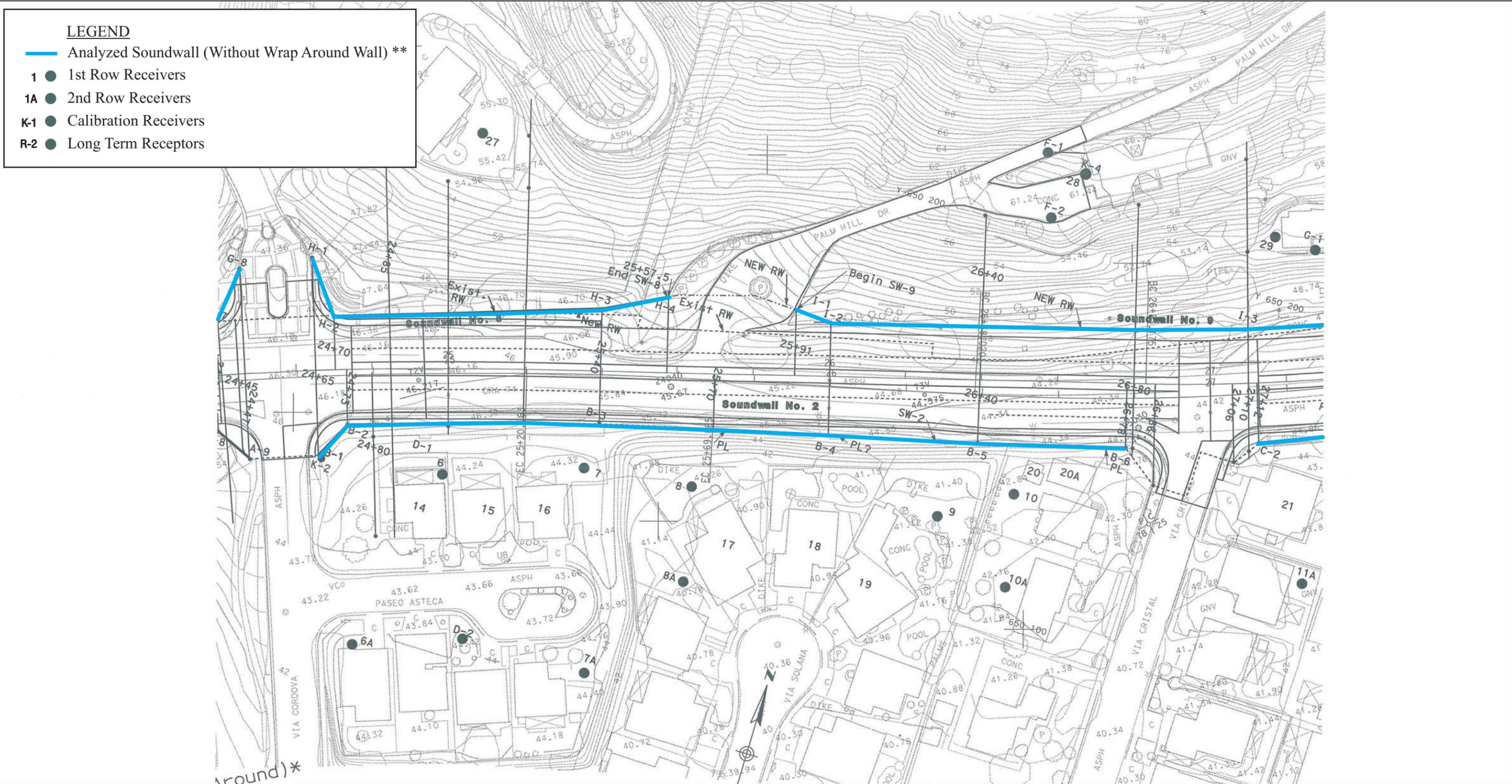


FIGURE I-2
Sheet 1 of 3

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
Without Wrap Around
12-ORA-74 PM 1.0/1.9
EA No. 086920

NO SCALE
SOURCE: Caltrans

This page intentionally left blank



LEGEND

- Analyzed Soundwall (Without Wrap Around Wall) **
- 1 ● 1st Row Receivers
- 1A ● 2nd Row Receivers
- K-1 ● Calibration Receivers
- R-2 ● Long Term Receptors

NOTES:

- * Caltrans station designation numbering is in metric units.
- ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
- * The figure shown are the original drawings in metric units.
- * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+12 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

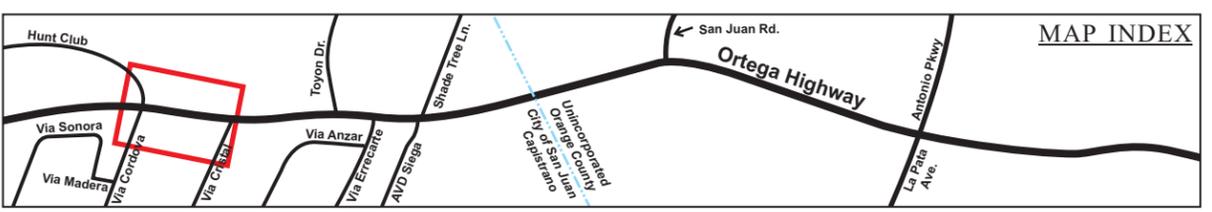
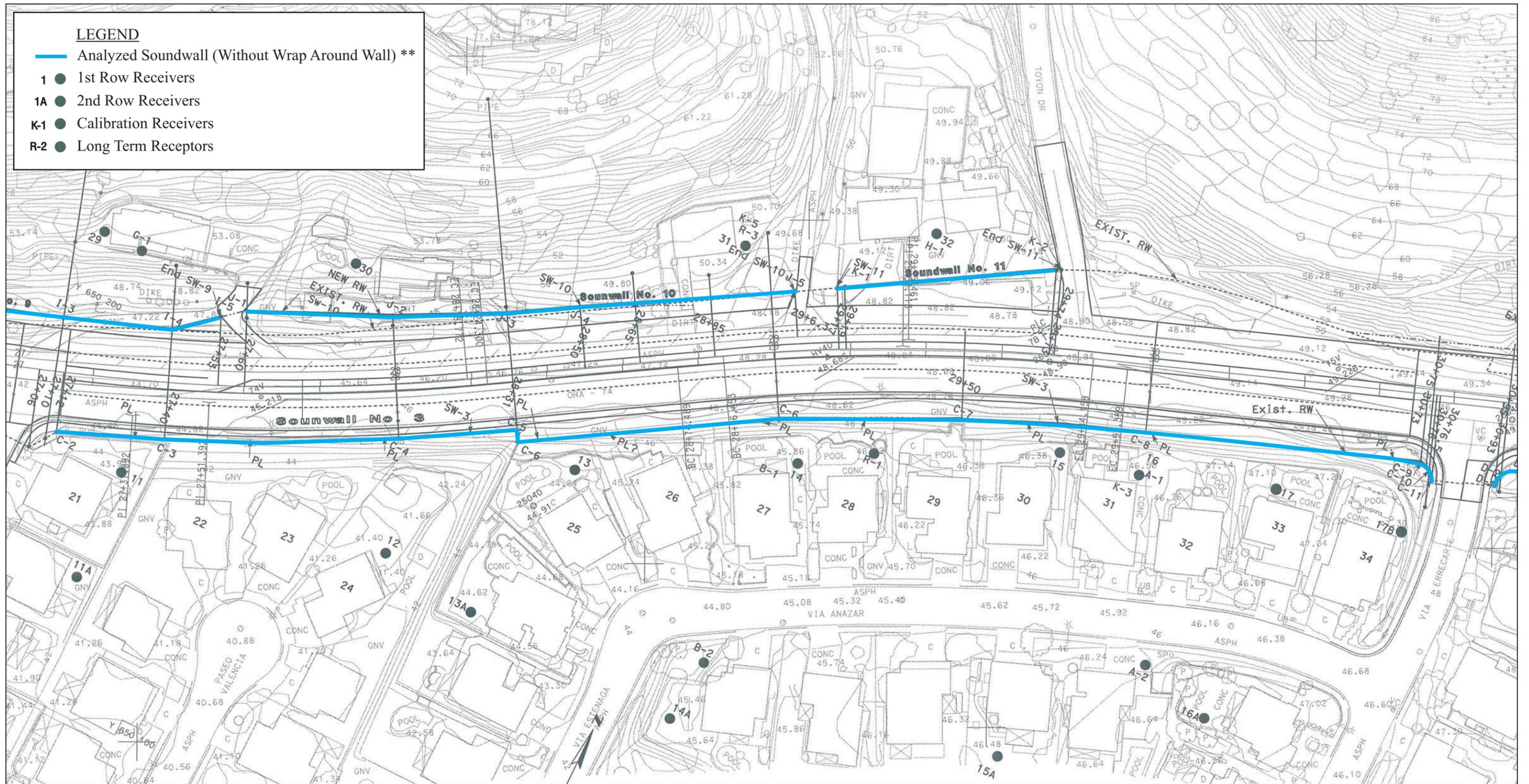


FIGURE I-2
Sheet 2 of 3

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
Without Wrap Around
12-ORA-74 PM 1.0 / 1.9
EA No. 086920



This page intentionally left blank



LEGEND

- Analyzed Soundwall (Without Wrap Around Wall) **
- 1 ● 1st Row Receivers
- 1A ● 2nd Row Receivers
- K-1 ● Calibration Receivers
- R-2 ● Long Term Receptors

- NOTES:**
- * Caltrans station designation numbering is in metric units.
 - ** Sheets 5 through 9 showing the County portion of the project is proceeding under a separate project and not analyzed as part of this EIR section.
 - * The figure shown are the original drawings in metric units.
 - * Based on the new plans, the maximum wall height for SW-3 is 4.3 m (14 ft) from STA 27+12 to STA 28+43 and 4.9 m (16 ft) from STA 28+43 to STA 30+76.5.

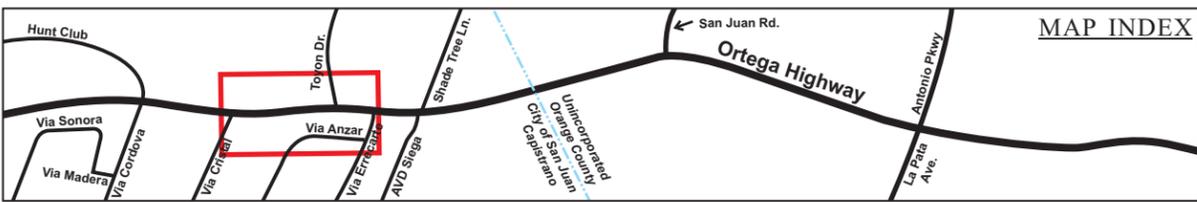


FIGURE I-2
Sheet 3 of 3

Lower SR-74 Widening Project
Receptors and Modeled Soundwall
Without Wrap Around
12-ORA-74 PM 1.0/1.9
EA No. 086920

NO SCALE
SOURCE: Caltrans

This page intentionally left blank

Feasibility

Feasibility is defined as engineering considerations. Section 3 of the Protocol states that a minimum noise reduction of 5 dBA must be achieved at the impacted receivers in order for the proposed noise abatement measure to be considered feasible. The feasibility criterion is not necessarily a noise abatement design goal. Greater noise reductions are encouraged if they can be reasonably achieved. The following elements may restrict feasibility:

- Topography
- Access requirements for driveways, ramps, etc.
- Location of local streets in relation to the proposed project
- Other noise sources in the area
- Safety considerations

Tables I-2 and I-3 show the sound levels at the sensitive receptors for with and without wrap-around wall scenarios. Underlined noise levels represent a minimum of 5 dBA in noise reduction resulting from the noise barrier height listed.

Based on the noise attenuation values shown in Tables I-2 and I-3, minimum noise reductions of 5 dBA have been achieved for the impacted receivers for NB-1, NB-2, NB-3, NB-4, NB-5, NB-9, NB-10, and NB-11. Table I-4 lists the feasible noise barriers for both with and without wrap-around wall scenarios. It should be noted that NB-7 and NB-8 were determined to be not feasible because these barriers would not reduce noise levels by 5 dBA or more and are therefore not shown in Table I-4. Table I-4 also lists the feasible noise barriers and the noise barrier heights, approximate lengths, and locations, as well as the beginning and ending noise wall station numbers and the locations of noise barriers in the figures included in this noise analysis.

This page intentionally left blank

Table I-2 Summary of Predicted Noise Levels (With Wrap-Around Wall)¹

No.	SW No.	Rec No.	Land Use	Activity Category	Existing Noise Levels	Future (Worst-Case)	With Barrier H = 2.4 m (8 ft)		With Barrier H = 3.05 m (10 ft)		With Barrier H = 3.7 m (12 ft)		With Barrier H = 4.3 m (14 ft)		With Barrier H = 4.9 m (16 ft)		Critical Receiver No.
							L _{eq}	I.L. ²	L _{eq}	I.L.	L _{eq}	I.L.	L _{eq}	I.L.	L _{eq}	I.L.	
Eastbound Side																	
1	NB-1	1	SFR ³	B(67)	70.9⁴	72.8	68.0	4.8	65.2	7.6⁵	63.1	9.7	61.5	11.3	60.2	12.6	1
2	NB-1	1A	SFR	B(67)	58.4	60.3	-- ⁶	--	--	--	--	--	--	--	--	--	
3	NB-1	2	SFR	B(67)	61.8	63.7	--	--	--	--	--	--	--	--	--	--	
4	NB-1	2A	SFR	B(67)	55.9	57.8	--	--	--	--	--	--	--	--	--	--	
5	NB-1	2B	SFR	B(67)	55.4	57.3	--	--	--	--	--	--	--	--	--	--	
6	NB-1	3A	SFR	B(67)	54.0	55.9	--	--	--	--	--	--	--	--	--	--	
7	NB-1	R-2 K-1	SFR	B(67)	60.5	62.1	--	--	--	--	--	--	--	--	--	--	
8	NB-1	4	SFR	B(67)	60.2	61.8	--	--	--	--	--	--	--	--	--	--	
9	NB-1	4A	SFR	B(67)	54.2	55.9	--	--	--	--	--	--	--	--	--	--	
10	NB-1	5	SFR	B(67)	59.7	61.3	--	--	--	--	--	--	--	--	--	--	
11	NB-1	5B	SFR	B(67)	62.7	64.5	--	--	--	--	--	--	--	--	--	--	
12	NB-2	6	SFR	B(67)	68.6	70.1	64.8	5.3	63.1	7.0	61.5	8.6	60.2	9.9	59.2	10.9	
13	NB-2	6A	SFR	B(67)	56.7	58.6	56.6	2.0	55.5	3.1	54.6	4.0	53.8	4.8	53.5	5.1	
14	NB-2	7	SFR	B(67)	70.6	71.4	65.3	6.1	63.5	7.9	61.9	9.5	60.5	10.9	59.4	12.0	7
15	NB-2	7A	SFR	B(67)	55.8	57.4	55.7	1.7	54.5	2.9	53.2	4.2	52.1	5.3	51.3	6.1	
16	NB-2	8	SFR	B(67)	65.8	65.7	62.2	3.5	60.7	5.0	59.4	6.3	58.3	7.4	57.5	8.2	
17	NB-2	8A	SFR	B(67)	57.5	58.7	55.3	3.4	53.8	4.9	52.4	6.3	51.3	7.4	50.4	8.3	
18	NB-2	9	SFR	B(67)	67.0	66.0	63.6	2.4	61.9	4.1	60.4	5.6	59.1	6.9	58.0	8.0	
19	NB-2	10	SFR	B(67)	69.6	70.1	65.8	4.3	63.8	6.3	62.1	8.0	60.6	9.5	59.3	10.8	
20	NB-2	10A	SFR	B(67)	58.4	59.4	57.4	2.0	56.1	3.3	54.6	4.8	53.4	6.0	52.4	7.0	
21	NB-3 ⁷	11	SFR	B(67)	70.2	70.4	66.5	3.9	64.4	6.0	62.6	7.8	61.1	9.3	61.0	9.4	11
22	NB-3 ⁷	11A	SFR	B(67)	57.9	59.2	57.9	1.3	57.0	2.2	56.1	3.1	55.4	3.8	55.2	4.0	
23	NB-3 ⁷	12	SFR	B(67)	64.2	65.2	62.3	2.9	60.7	4.5	59.4	5.8	58.2	7.0	57.8	7.4	
24	NB-3 ⁷	13	SFR	B(67)	65.2	66.2	63.4	2.8	61.8	4.4	60.4	5.8	59.2	7.0	58.5	7.7	
25	NB-3 ⁷	13A	SFR	B(67)	56.6	58.2	56.7	1.5	55.2	3.0	53.7	4.5	52.4	5.8	51.8	6.4	
26	NB-3 ⁷	14	SFR	B(67)	64.3	65.5	63.1	2.4	61.6	3.9	60.2	5.3	59.0	6.5	58.0	7.5	
27	NB-3 ⁷	14A	SFR	B(67)	54.0	55.6	54.9	0.7	53.6	2.0	52.2	3.4	51.0	4.6	50.3	5.3	
28	NB-3 ⁷	R-1	SFR	B(67)	63.6	64.8	62.7	2.1	61.1	3.7	59.8	5.0	58.7	6.1	57.8	7.0	
29	NB-3 ⁷	15	SFR	B(67)	62.9	64.2	62.2	2.0	60.7	3.5	59.5	4.7	58.5	5.7	57.8	6.4	
30	NB-3 ⁷	15A	SFR	B(67)	53.1	54.8	54.2	0.6	53.0	1.8	51.7	3.1	50.6	4.2	49.8	5.0	
31	NB-3 ⁷	16 K-3	SFR	B(67)	65.1	66.2	62.9	3.3	61.3	4.9	59.9	6.3	58.8	7.4	57.8	8.4	
32	NB-3 ⁷	16A	SFR	B(67)	53.9	55.6	54.9	0.7	53.7	1.9	52.5	3.1	51.5	4.1	50.8	4.8	
33	NB-3 ⁷	17	SFR	B(67)	64.1	65.3	63.1	2.2	61.5	3.8	60.1	5.2	58.9	6.4	57.9	7.4	
34	NB-3 ⁷	17B	SFR	B(67)	65.2	66.6	66.3	0.3	65.7	0.9	65.2	1.4	64.9	1.7	64.7	1.9	
35	NB-4	17A	SFR	B(67)	59.2	60.5	59.1	1.4	58.0	2.5	56.8	3.7	55.8	4.7	55.0	5.5	

Table I-2 Summary of Predicted Noise Levels (With Wrap-Around Wall)¹

No.	SW No.	Rec No.	Land Use	Activity Category	Existing Noise Levels	Future (Worst-Case)	With Barrier H = 2.4 m (8 ft)		With Barrier H = 3.05 m (10 ft)		With Barrier H = 3.7 m (12 ft)		With Barrier H = 4.3 m (14 ft)		With Barrier H = 4.9 m (16 ft)		Critical Receiver No.
							L _{eq}	I.L. ²	L _{eq}	I.L.	L _{eq}	I.L.	L _{eq}	I.L.	L _{eq}	I.L.	
36	NB-4	18	SFR	B(67)	66.9	66.9	63.9	3.0	62.1	4.8	60.5	6.4	59.2	7.7	58.1	8.8	18
37	NB-4	18A	SFR	B(67)	56.6	58.4	56.5	1.9	55.2	3.2	54.1	4.3	53.2	5.2	52.5	5.9	
38	NB-4	19	SFR	B(67)	63.6	64.3	62.2	2.1	60.6	3.7	59.2	5.1	58.1	6.2	57.3	7.0	
39	NB-5	19A	SFR	B(67)	54.9	56.7	56.3	0.4	55.6	1.1	54.8	1.9	54.2	2.5	53.7	3.0	
40	NB-5	20	SFR	B(67)	62.8	64.3	62.5	1.8	60.8	3.5	59.3	5.0	58.1	6.2	57.2	7.1	
41	NB-5	21	SFR	B(67)	63.7	65.7	63.5	2.2	62.0	3.7	60.7	5.0	59.5	6.2	58.5	7.2	21
42 ³	NB-6	21M	SFR	B(67)	69.5	71.8	69.1	2.7	68.7	3.1	67.2	4.6	66.1	5.7	65.3	6.5	21M
43	NB-6A	21N	SFR	B(67)	66.2	68.3	67.3	1.0	68.1	0.2	66.4	1.9	66.0	2.3	65.7	2.6	
Westbound Side																	
1	NB-7	22	SFR	B(67)	69.3	71.3	70.7	0.6	70.5	0.8	69.5	1.8	69.1	2.2	68.0	3.3	
2	NB-7	23	SFR	B(67)	66.3	68.4	67.9	0.5	67.7	0.7	67.2	1.2	66.7	1.7	66.2	2.2	
3	NB-7	24	SFR	B(67)	62.2	64.1	64.1	0.0	64.0	0.1	63.6	0.5	63.3	0.8	63.1	1.0	
4	NB-7	25	SFR	B(67)	65.8	67.9	67.4	0.5	67.1	0.8	66.5	1.4	66.1	1.8	65.3	2.6	
5	NB-7	26	SFR	B(67)	67.6	69.6	69.5	0.1	69.0	0.6	68.7	0.9	67.8	1.8	67.0	2.6	
6	NB-8	27	SFR	B(67)	63.4	65.5	65.0	0.5	64.7	0.8	64.2	1.3	63.8	1.7	63.1	2.4	
7	NB-9	28 K4	SFR	B(67)	67.2	69.6	68.4	1.2	68.0	1.6	67.4	2.2	67.2	2.4	66.8	2.8	
8	NB-9	29	SFR	B(67)	69.9	72.5	69.9	2.6	69.1	3.4	68.0	4.5	67.2	5.3	66.1	6.4	29
9	NB-10	30	SFR	B(67)	71.1	73.0	71.5	1.5	70.1	2.9	68.9	4.1	67.5	5.5	65.9	7.1	30
10	NB-10	31 K5	SFR	B(67)	71.4	77.1	74.4	2.7	73.5	3.6	72.3	4.8	71.1	6.0	70.2	6.9	
11	NB-11	32	SFR	B(67)	68.5	73.8	72.2	1.6	70.5	3.3	69.0	4.8	67.9	5.9	67.1	6.7	32
12	NB-12	33	SFR	B(67)	68.0	73.0	70.5	2.5	69.2	3.8	68.1	4.9	67.3	5.7	66.7	6.3	
13	NB-12	34	SFR	B(67)	69.1	73.6	72.1	1.5	70.7	2.9	69.2	4.4	67.7	5.9	66.6	7.0	34
14	NB-13	35	SFR	B(67)	68.6	73.5	71.6	1.9	69.9	3.6	68.4	5.1	67.1	6.4	66.0	7.5	35

Source: LSA Associates, Inc., Final Technical Noise Impact Analysis Addendum, July 2008.

¹ With wrap-around wall for the west end of NB-1, east end of NB-2, and west end of NB-3.

² I.L.: Insertion Loss.

³ SFR = Single-Family Residence

⁴ Numbers in bold represent noise levels that approach or exceed the NAC.

⁵ Numbers underlined have been attenuated by at least 5 dBA (i.e., feasible wall height)

⁶ No barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.

⁷ Noise barrier modeling for NB-3 under the 16 ft height column was modeled with a 4.3 m (14 ft) high wall from STA 27+06 to STA 28+43 and a 4.9 m (16 ft) high wall from STA 28+43 to STA 30+76.5. Station number STA 28+43 is based on current design plans provided by the Department District 12 Design Branch.

⁸ Shaded row indicate that receptors are located outside of the project limits and was not evaluated.

dBA = A-weighted decibels ft = feet m = meters NAC = Noise Abatement Criteria

Table I-3 Summary of Predicted Noise Levels (Without Wrap-Around Wall)¹

No.	SW No.	Rec No.	Land Use	Activity Category	Existing Noise Levels	Future (Worst-Case)	With Barrier H = 2.4 m (8 ft)		With Barrier H = 3.05 m (10 ft)		With Barrier H = 3.7 m (12 ft)		With Barrier H = 4.3 m (14 ft)		With Barrier H = 4.9 m (16 ft)		Critical Receiver No.
							L _{eq}	I.L. ²	L _{eq}	I.L.	L _{eq}	I.L.	L _{eq}	I.L.	L _{eq}	I.L.	
Eastbound Side																	
1	NB-1	1	SFR ³	B(67)	70.9⁴	72.8	68.0	4.8	65.5	7.3⁵	63.6	9.2	62.2	10.6	61.3	11.5	1
2	NB-1	1A	SFR	B(67)	58.4	60.3	-- ⁶	--	--	--	--	--	--	--	--	--	
3	NB-1	2	SFR	B(67)	61.8	63.7	--	--	--	--	--	--	--	--	--	--	
4	NB-1	2A	SFR	B(67)	55.9	57.8	--	--	--	--	--	--	--	--	--	--	
5	NB-1	2B	SFR	B(67)	55.4	57.3	--	--	--	--	--	--	--	--	--	--	
6	NB-1	3A	SFR	B(67)	54.0	55.9	--	--	--	--	--	--	--	--	--	--	
7	NB-1	R-2 K-1	SFR	B(67)	60.5	62.1	--	--	--	--	--	--	--	--	--	--	
8	NB-1	4	SFR	B(67)	60.2	61.8	--	--	--	--	--	--	--	--	--	--	
9	NB-1	4A	SFR	B(67)	54.2	55.9	--	--	--	--	--	--	--	--	--	--	
10	NB-1	5	SFR	B(67)	59.7	61.3	--	--	--	--	--	--	--	--	--	--	
11	NB-1	5B	SFR	B(67)	62.7	64.5	--	--	--	--	--	--	--	--	--	--	
12	NB-2	6	SFR	B(67)	68.6	70.1	64.8	5.3	63.1	7.0	61.5	8.6	60.2	9.9	59.1	11.0	
13	NB-2	6A	SFR	B(67)	56.7	58.6	56.6	2.0	55.5	3.1	54.6	4.0	53.8	4.8	53.3	5.3	
14	NB-2	7	SFR	B(67)	70.6	71.4	65.3	6.1	63.5	7.9	61.9	9.5	60.5	10.9	59.3	12.1	7
15	NB-2	7A	SFR	B(67)	55.8	57.4	55.7	1.7	54.6	2.8	53.3	4.1	52.2	5.2	51.3	6.1	
16	NB-2	8	SFR	B(67)	65.8	65.7	62.2	3.5	60.7	5.0	59.4	6.3	58.3	7.4	57.4	8.3	
17	NB-2	8A	SFR	B(67)	57.5	58.7	55.3	3.4	53.9	4.8	52.7	6.0	51.7	7.0	50.9	7.8	
18	NB-2	9	SFR	B(67)	67.0	66.0	64.0	2.0	62.6	3.4	61.6	4.4	60.8	5.2	60.2	5.8	
19	NB-2	10	SFR	B(67)	69.6	70.1	66.2	3.9	64.7	5.4	63.6	6.5	62.8	7.3	62.2	7.9	
20	NB-2	10A	SFR	B(67)	58.4	59.4	57.9	1.5	56.8	2.6	55.8	3.6	55.0	4.4	54.4	5.0	
21	NB-3 ⁷	11	SFR	B(67)	70.2	70.4	67.1	3.3	65.7	4.7	64.7	5.7	64.0	6.4	63.9	6.5	11
22	NB-3 ⁷	11A	SFR	B(67)	57.9	59.2	58.4	0.8	57.7	1.5	57.1	2.1	56.6	2.6	56.4	2.8	
23	NB-3 ⁷	12	SFR	B(67)	64.2	65.2	62.4	2.8	60.9	4.3	59.7	5.5	58.7	6.5	58.4	6.8	
24	NB-3 ⁷	13	SFR	B(67)	65.2	66.2	63.4	2.8	61.8	4.4	60.4	5.8	59.2	7.0	58.5	7.7	
25	NB-3 ⁷	13A	SFR	B(67)	56.6	58.2	56.7	1.5	55.2	3.0	53.8	4.4	52.5	5.7	52.0	6.2	
26	NB-3 ⁷	14	SFR	B(67)	64.3	65.5	63.1	2.4	61.6	3.9	60.2	5.3	59.0	6.5	58.0	7.5	
27	NB-3 ⁷	14A	SFR	B(67)	54.0	55.6	54.9	0.7	53.6	2.0	52.3	3.3	51.1	4.5	50.3	5.3	
28	NB-3 ⁷	R-1	SFR	B(67)	63.6	64.8	62.7	2.1	61.1	3.7	59.8	5.0	58.7	6.1	57.8	7.0	
29	NB-3 ⁷	15	SFR	B(67)	62.9	64.2	62.2	2.0	60.7	3.5	59.5	4.7	58.5	5.7	57.8	6.4	
30	NB-3 ⁷	15A	SFR	B(67)	53.1	54.8	54.2	0.6	53.0	1.8	51.7	3.1	50.6	4.2	49.8	5.0	
31	NB-3 ⁷	16 K-3	SFR	B(67)	65.1	66.2	62.9	3.3	61.3	4.9	59.9	6.3	58.8	7.4	57.8	8.4	
32	NB-3 ⁷	16A	SFR	B(67)	53.9	55.6	54.9	0.7	53.7	1.9	52.5	3.1	51.5	4.1	50.8	4.8	

Table I-3 Summary of Predicted Noise Levels (Without Wrap-Around Wall)¹

No.	SW No.	Rec No.	Land Use	Activity Category	Existing Noise Levels	Future (Worst-Case)	With Barrier H = 2.4 m (8 ft)		With Barrier H = 3.05 m (10 ft)		With Barrier H = 3.7 m (12 ft)		With Barrier H = 4.3 m (14 ft)		With Barrier H = 4.9 m (16 ft)		Critical Receiver No.
							<u>L_{eq}</u>	I.L. ²	<u>L_{eq}</u>	I.L.	<u>L_{eq}</u>	I.L.	<u>L_{eq}</u>	I.L.	<u>L_{eq}</u>	I.L.	
33	NB-3 ⁷	17	SFR	B(67)	64.1	65.3	63.1	2.2	61.5	3.8	<u>60.1</u>	<u>5.2</u>	<u>58.9</u>	<u>6.4</u>	<u>57.9</u>	<u>7.4</u>	
34	NB-3 ⁷	17B	SFR	B(67)	65.2	66.6	66.3	0.3	65.7	0.9	65.2	1.4	64.9	1.7	64.7	1.9	

Source: LSA Associates, Inc., Final Technical Noise Impact Analysis Report Addendum, July 2008.

¹ Without wrap-around wall for the west end of NB-1, east end of NB-2, and west end of NB-3.

² I.L.: Insertion Loss.

³ SFR = Single-Family Residence

⁴ Numbers in bold represent noise levels that approach or exceed the NAC.

⁵ Numbers underlined have been attenuated by at least 5 dBA (i.e., feasible wall height)

⁶ No barrier was analyzed at this location because the modeled receptor would not approach or exceed the NAC.

⁷ Noise barrier modeling for NB-3 under the 16 ft height column was modeled with a 4.3 m (14 ft) high wall from STA 27+12 to STA 28+43 and a 4.9 m (16 ft) high wall from STA 28+43 to STA 30+76.5. Station number STA 28+43 is based on current design plans provided by the Department District 12 Design Branch.

dBA = A-weighted decibels

ft = feet

m = meters

NAC = Noise Abatement Criteria

Table I-4 Feasible Noise Barriers

Noise Barrier No.	Height m (ft)	Approximate Length m (ft)	Location	Top of the Barrier Elevations ¹	Station Number ²		Location of Noise Barrier in Report Graphics
					Begin	End	
With Wrap-Around Wall ³							
NB-1	3.05 (10)	66 (215)	Eastbound Side Right-of-way	Plus 3.05 m (10 ft)	21+58	22+20	Figure 2.2.7-1 Sheet 1
	3.7 (12)	66 (215)		Plus 3.7 m (12 ft)			
	4.3 (14)	66 (215)		Plus 4.3 m (14 ft)			
	4.9 (16)	66 (215)		Plus 4.9 m (16 ft)			
NB-2	2.4 (8)	228 (747)	Eastbound Side Right-of-way	Plus 2.4m (8 ft)	24+65	26+86	Figure 2.2.7-1 Sheet 2
	3.05 (10)	228 (747)		Plus 3.05 m (10 ft)			
	3.7 (12)	228 (747)		Plus 3.7 m (12 ft)			
	4.3 (14)	228 (747)		Plus 4.3 m (14 ft)			
	4.9 (16)	228 (747)		Plus 4.9 m (16 ft)			
NB-3	3.05 (10)	228 (747)	Eastbound Side Right-of-way	Plus 3.05 m (10 ft)	27+06/ 28+43 ⁵	28+43 ⁵ / 30+76.5	Figure 2.2.7-1 Sheet 3
	3.7 (12)	374 (1,228)		Plus 3.7 m (12 ft)			
	4.3 (14)	374 (1,228)		Plus 4.3 m (14 ft)			
	4.3/4.9 (14/16) ⁴	374 (1,228)		Plus 4.3/4.9 m (14/16 ft)			
NB-4	3.7 (12)	103 (338)	Eastbound Side Right-of-way	Plus 3.7 m (12 ft)	30+93	31+92	Figure 2.2.7-1 Sheet 4
	4.3 (14)	103 (338)		Plus 4.3 m (14 ft)			
	4.9 (16)	103 (338)		Plus 4.9 m (16 ft)			
NB-5	3.7 (12)	123 (404)	Eastbound Side Right-of-way	Plus 3.7 m (12 ft)	32+13.5	33+29	Figure 2.2.7-1 Sheet 4
	4.3 (14)	123 (404)		Plus 4.3 m (14 ft)			
	4.9 (16)	123 (404)		Plus 4.9 m (16 ft)			
NB-6 ⁶	4.3 (14)	85 (279)	Eastbound Side Right-of-way	Plus 4.3 m (14 ft)	35+38	36+23	Figure 2.2.7-1 Sheet 5
	4.9 (16)	85 (279)		Plus 4.9 m (16 ft)			
NB-9	4.3 (14)	161 (529)	Westbound Side Right-of-way	Plus 4.3 m (14 ft)	25+91	27+53	Figure 2.2.7-1 Sheet 2
	4.9 (16)	161 (529)		Plus 4.9 m (16 ft)			
NB-10	4.3 (14)	145 (475)	Westbound Side Right-of-way	Plus 4.3 m (14 ft)	27+60	29+6.3	Figure 2.2.7-1 Sheet 3
	4.9 (16)	145 (475)		Plus 4.9 m (16 ft)			
NB-11	4.3 (14)	59 (195)	Westbound Side Right-of-way	Plus 4.3 m (14 ft)	29+17	29+74	Figure 2.2.7-1 Sheet 3
	4.9 (16)	59 (195)		Plus 4.9 m (16 ft)			
NB-12	4.3 (14)	168 (552)	Westbound Side Right-of-way	Plus 4.3 m (14 ft)	35+20	36+88.5	Figure 2.2.7-1 Sheet 5
	4.9 (16)	168 (552)		Plus 4.9 m (16 ft)			
NB-13	3.7 (12)	104 (343)	Westbound Side Right-of-way	Plus 3.7 m (12 ft)	36+96	38+00	Figure 2.2.7-1 Sheet 5
	4.3 (14)	104 (343)		Plus 4.3 m (14 ft)			
	4.9 (16)	104 (343)		Plus 4.9 m (16 ft)			
Without Wrap-Around Wall ⁷							
NB-1	3.05 (10)	55 (179)	Eastbound Side Right-of-way	Plus 3.05 m (10 ft)	21+65	22+20	Figure 2.2.7-2 Sheet 3
	3.7 (12)	55 (179)		Plus 3.7 m (12 ft)			
	4.3 (14)	55 (179)		Plus 4.3 m (14 ft)			
	4.9 (16)	55 (179)		Plus 4.9 m (16 ft)			
NB-2	2.4 (8)	215 (707)	Eastbound Side Right-of-way	Plus 3.05 m (10 ft)	24+65	26+78	Figure 2.2.7-2 Sheet 2
	3.05 (10)	215 (707)		Plus 3.7 m (12 ft)			
	3.7 (12)	215 (707)		Plus 4.3 m (14 ft)			
	4.3 (14)	215 (707)		Plus 4.9 m (16 ft)			
	4.9 (16)	215 (707)		Plus 3.05 m (10 ft)			

Table I-4 Feasible Noise Barriers

Noise Barrier No.	Height m (ft)	Approximate Length m (ft)	Location	Top of the Barrier Elevations ¹	Station Number ²		Location of Noise Barrier in Report Graphics
					Begin	End	
NB-3	3.7 (12)	366 (1,202)	Eastbound Side Right-of-way	Plus 3.7 m (12 ft)	27+12/ 28+43 ⁵	28+43 ⁵ / 30+76.5	Figure 2.2.7-2 Sheet 3
	4.3 (14)	366 (1,202)		Plus 4.3 m (14 ft)			
	4.3/4.9 (14/16) ⁸	366 (1,202)		Plus 4.3/4.9 m (14/16 ft)			

Source: LSA Associates, Inc., Final Technical Noise Impact Analysis Report Addendum, July 2008.

¹ From the existing elevation.

² The station numbers are based on the Department station designation numbering in metric units, as shown on the figures.

³ With wrap-noise barrier for the west end of NB-1, east end of NB-2, and west end of NB-3.

⁴ With wrap-around scenario for NB-3 from station number 27+06 to 28+43 is less than 4.5 m (15 ft) from the nearest travel lane, and therefore the maximum height is 4.3 m (14 ft).

⁵ This station number is based on current design plans provided by the Department District 12 Design Branch.

⁶ Shaded rows indicate that noise barriers are located outside of the project limits and were not evaluated.

⁷ Without wrap-around barrier for the west end of NB-1, east end of NB-2, and west end of NB-3.

⁸ Without wrap-around scenario for NB-3 from station number 27+12 to 28+43 is less than 4.5 m (15 ft) from the nearest travel lane, and therefore the maximum height is 4.3 m (14 ft).

ft = feet m = meters

Reasonableness

The overall reasonableness of noise abatement is determined by considering a multitude of factors, including but not necessarily limited to, the following:

- Cost of the abatement
- Absolute noise levels
- Change in noise levels
- Noise abatement benefits
- Date of development along the highway
- Lifecycle of abatement measures
- Environmental impact of abatement construction
- Views (opinions) of impacted residents
- Input from the public and local agencies
- Social, economic, environmental, legal, and technological factors

The lifecycle of the noise abatement (above factor [f]) is a consideration in the preliminary reasonableness decision. It is normally not reasonable to construct a wall where planned future use would limit its useful life to less than 20 years.

Section 3 of the Protocol states that a preliminary reasonableness determination of providing noise abatement for the exteriors of residential areas in Activity Category B

(which includes residential areas) begins with a \$36,000 base allowance¹ per benefited residence. The \$36,000 base allowance is adjusted using the following five factors in order to determine the total reasonable allowance per residence:

- Absolute noise level
- Design year increase over existing noise levels
- Achievable noise reduction
- New highway construction or pre-1978 residences
- Total reasonableness allowance versus project cost

It should be noted that noise abatement is not normally designed for the second-floor level (Caltrans 1998a). However, noise abatement designed to provide a 5 dBA noise reduction for the second-floor level without exceeding the modified allowance is considered within the scope of reasonableness.

NB-1 through NB-5 and NB-9 through NB-11 have been assessed for feasibility based on providing a minimum of 5 dBA or more noise reduction. Cost effectiveness was then evaluated for the feasible noise barriers. These noise barriers provide noise abatement for the residential structures with frequent outdoor/human activities and are assessed based on the number of benefited residences for the residential area.

Based on the critical design receiver, the impacted receptor for which the absolute noise levels, build versus existing noise levels, or achievable noise reduction will be at a maximum when the noise abatement is considered. Table I-5 summarizes the reasonableness of each noise barrier. The estimated noise barrier construction cost was provided by the Department District 12 Design Branch. These costs also include excavation for pile caps; pile caps; masonry blocks; 400-millimeter (mm) CIDH pilings; 15 percent for drainage, traffic, and landscape; and a 10 percent contingency.

Table I-5 shows that NB-2 at 3.7 meters (m) (12 ft) to 4.9 m (16 ft) under the with wrap-around barrier scenario and 3.05 m (10 ft) to 4.9 m (16 ft) under the without wrap-around barrier scenario were determined to be reasonable because the estimated noise barrier construction cost does not exceed the total reasonable allowance. Also, NB-3 with a 4.3 m (14 ft) barrier from STA 27+06 to STA 28+43 and 4.9 m (16 ft) barrier from STA 28+43 to STA 30+76.5 under both the with and without wrap-around barrier scenarios was determined to be reasonable. It should be

¹ Source: Caltrans Traffic Noise Analysis Protocol, August 2006.

Table I-5 Total Reasonable Allowance per Noise Barrier

Noise Barrier No.	Height m (ft)	Approximate Length m (ft)	Noise Attenuation (dBA)	Number of Benefited Residences ¹	Reasonable Allowance per Residence	Total Reasonable Allowance	Estimated Noise Barrier Construction Cost ²	Station Number ³		Reasonable?
								Begin	End	
With Wrap-Around Wall ⁴										
NB-1	3.05 (10)	66 (215)	7.9	1	\$52,000	\$52,000	\$93,150	21+58	22+20	No
	3.7 (12)	66 (215)	10.0	1	\$54,000	\$54,000	\$110,590			No
	4.3 (14)	66 (215)	11.7	1	\$54,000	\$54,000	\$128,580			No
	4.9 (16)	66 (215)	12.9	1	\$54,000	\$54,000	\$142,030			No
NB-2	2.4 (8)	228 (747)	6.0	3	\$52,000	\$156,000	\$272,000	24+65	26+86	No
	3.05 (10)	228 (747)	7.8	6	\$52,000	\$312,000	\$321,390			No
	3.7 (12)	228 (747)	9.3	8	\$54,000	\$432,000	\$381,560			Yes
	4.3 (14)	228 (747)	10.7	11	\$54,000	\$594,000	\$443,620			Yes
	4.9 (16)	228 (747)	11.9	13	\$56,000	\$728,000	\$490,030			Yes
NB-3	3.05 (10)	374 (1,228)	6.1	1	\$42,000	\$42,000	\$528,390	27+06/ 28+43 ⁶	28+43 ⁶ / 30+76.5	No
	3.7 (12)	374 (1,228)	7.9	12	\$42,000	\$504,000	\$627,320			No
	4.3 (14)	374 (1,228)	9.4	14	\$44,000	\$616,000	\$729,360			No
	4.3/4.9 (14/16) ⁵	374 (1,228)	9.4	19	\$44,000	\$836,000	\$788,060			Yes
NB-4	3.7 (12)	103 (338)	6.4	2	\$40,000	\$80,000	\$172,580	30+93	31+92	No
	4.3 (14)	103 (338)	7.7	3	\$40,000	\$120,000	\$200,660			No
	4.9 (16)	103 (338)	8.8	4	\$40,000	\$160,000	\$221,650			No
NB-5	3.7 (12)	123 (404)	5.0	2	\$48,000	\$96,000	\$206,100	32+13.5	33+29	No
	4.3 (14)	123 (404)	6.2	2	\$50,000	\$100,000	\$239,620			No
	4.9 (16)	123 (404)	7.2	2	\$50,000	\$100,000	\$264,690			No
NB-6 ⁷	4.3 (14)	85 (279)	5.7	1	\$50,000	\$50,000	\$165,590	35+38	36+23	No
	4.9 (16)	85 (279)	6.5	1	\$52,000	\$52,000	\$182,910			No
NB-9	4.3 (14)	161 (529)	5.3	1	\$50,000	\$50,000	\$313,650	25+91	27+53	No
	4.9 (16)	161 (529)	6.4	1	\$52,000	\$52,000	\$346,460			No
NB-10	4.3 (14)	145 (475)	5.5	2	\$56,000	\$112,000	\$282,480	27+60	29+6.3	No
	4.9 (16)	145 (475)	7.1	2	\$56,000	\$112,000	\$312,030			No
NB-11	4.3 (14)	59 (195)	5.9	1	\$52,000	\$52,000	\$114,940	29+17	29+74	No
	4.9 (16)	59 (195)	6.7	1	\$54,000	\$54,000	\$126,960			No
NB-12	4.3 (14)	168 (552)	5.9	2	\$52,000	\$104,000	\$327,280	35+20	36+88.5	No
	4.9 (16)	168 (552)	7.0	2	\$54,000	\$108,000	\$361,520			No

Table I-5 Total Reasonable Allowance per Noise Barrier

Noise Barrier No.	Height m (ft)	Approximate Length m (ft)	Noise Attenuation (dBA)	Number of Benefited Residences ¹	Reasonable Allowance per Residence	Total Reasonable Allowance	Estimated Noise Barrier Construction Cost ²	Station Number ³		Reasonable?
								Begin	End	
NB-13	3.7 (12)	104 (343)	5.1	1	\$52,000	\$52,000	\$174,260	36+96	38+00	No
	4.3 (14)	104 (343)	6.4	1	\$54,000	\$54,000	\$202,600			No
	4.9 (16)	104 (343)	7.5	1	\$54,000	\$54,000	\$223,800			No
Without Wrap-Around Wall ⁵										
NB-1	3.05 (10)	55 (179)	7.9	1	\$52,000	\$52,000	\$77,620	21+65	22+20	No
	3.7 (12)	55 (179)	10.0	1	\$54,000	\$54,000	\$92,160			No
	4.3 (14)	55 (179)	11.7	1	\$54,000	\$54,000	\$107,150			No
	4.9 (16)	55 (179)	12.9	1	\$54,000	\$54,000	\$118,360			No
NB-2	2.4 (8)	215 (707)	6.0	3	\$52,000	\$156,000	\$257,290	24+65	26+78	No
	3.05 (10)	215 (707)	7.8	6	\$52,000	\$312,000	\$304,010			Yes
	3.7 (12)	215 (707)	9.3	7	\$54,000	\$378,000	\$360,930			Yes
	4.3 (14)	215 (707)	10.7	10	\$54,000	\$540,000	\$419,630			Yes
NB-3	4.9 (16)	215 (707)	11.8	13	\$56,000	\$728,000	\$463,530	27+12/ 28+43 ⁶	28+43 ⁶ / 30+76.5	Yes
	3.7 (12)	366 (1,202)	5.7	12	\$40,000	\$480,000	\$613,840			No
	4.3 (14)	366 (1,202)	6.4	14	\$42,000	\$588,000	\$713,680			No
	4.3/4.9 (14/16) ⁹	366 (1,202)	6.5	19	\$42,000	\$798,000	\$742,550			Yes

Source: LSA Associates, Inc., Final Technical Noise Impact Analysis Report Addendum, July 2008.

¹ Number of residences that are attenuated by 5 dBA or more by the modeled barrier.

² Construction cost calculations provided by the Department District 12 Design Branch. These costs include excavation for pile caps; pile caps; masonry blocks; 400mm CIDH pilings; 15 percent for drainage; traffic, and landscape; and 10 percent contingency.

³ The station numbers are based on the Department station designation numbering in metric units, as shown on the figures.

⁴ With wrap-around barrier for the west end of NB-1, east end of NB-2, and west end of NB-3.

⁵ With wrap-around scenario for NB-3 from station number 27+06 to 28+43 is less than 4.5 m (15 ft) from the nearest travel lane, and therefore the maximum height is 4.3 m (14 ft).

⁶ This station number is based on current design plans provided by the Department District 12 Design Branch.

⁷ Shaded row indicate that noise barriers are located outside of the project limits and was not evaluated.

⁸ Without wrap-around barrier for the west end of NB-1, east end of NB-2, and west end of NB-3.

⁹ Without wrap-around scenario for NB-3 from station number 27+12 to 28+43 is less than 4.5 m (15 ft) from the nearest travel lane, and therefore the maximum height is 4.3 m (14 ft).

CIDM = case-in-drilled hole

dBA = A-weighted decibels

ft = feet

m = meters

noted the NB-3 from STA 27+06 to STA 28+43 is located less than 4.5 m (15 ft) from the nearest travel lane; therefore, the maximum noise barrier height is 4.3 m (14 ft). NB-1, NB-4, NB-5, NB-9, NB-10, NB-11, and the remaining noise barrier heights for NB-2 and NB-3 for both with and without the wrap-around barrier scenarios were determined to be not reasonable because the estimated noise barrier construction cost exceeds the total reasonable allowance.

Parallel Barriers

Parallel barrier effects occur when noise barriers or retaining walls are located on both sides of the roadway, reflecting traffic noise back and forth across the roadway multiple times and building up a reverberant sound field between them. This reverberation increases noise levels at nearby receptors on both sides of the roadway, compared to what would exist without the opposite-side barrier. These noise level increases would also potentially reduce a noise barrier's noise attenuation performance. To avoid a reduction in the performance of parallel reflective barriers, the width-to-height ratio of the roadway section to the barriers should be at least 10:1.

Based on the project plans, parallel barriers would be located along Ortega Highway from Palm Hill Drive to Via Errecarte. The project proposes retaining walls on the north side of Ortega Highway and noise barriers (NB-2 and NB-3) on the south side of Ortega Highway. The distances between the retaining walls and noise barriers range from 30.5 m (100 ft) to 54.8 m (125 ft). As the proposed noise barrier heights range from 4.3 m (14 ft) to 4.9 m (16 ft), the width-to-height ratio of the roadway section to the barriers would be less than 10:1. Therefore, parallel barriers along Ortega Highway from Palm Hill Drive to Via Errecarte would potentially create noise level increases due to noise reflections and reduce the noise barrier's noise attenuation performance. However, as a project feature, the project proposes as an option to construct noise barriers with absorptive material (Sound Fighter Systems) on the interior side facing the traffic to reduce or eliminate noise reflections. The Sound Fighter System is rated to have a noise reduction coefficient (NRC) of 1.05, which would absorb 100 percent of the reflective noise. Therefore, no measureable noise level increases would occur as a result of parallel barriers, and noise barrier noise attenuation performance would not be reduced due to parallel barriers.

Preliminary Noise Abatement Decision and Recommendations

Based on this study so far accomplished and consistent with the guidelines in the Department Traffic Noise Analysis Protocol, noise abatement measures in the form of NB-2 and NB-3 are proposed to be constructed as part of the proposed project. Table

I-6 shows NB-2 and NB-3 along with their height, approximate length, location, and beginning and ending station numbers. Figures I-1 and I-2 show the location of NB-2 and NB-3 on Sheets 2 and 3, respectively. It should be noted that the maximum barrier height should not exceed 4.3 m (14 ft) in height (measured from the pavement surface at the face of the safety-shape barrier) when located 4.5 m (15 ft) or less from the edge of the traveled way and should not exceed 4.9 m (16 ft) in height above the ground line when located more than 4.5 m (15 ft) from the traveled way. In addition, noise barriers in this report are not a commitment (see Section 2.2.7 for noise analysis) and are only recommended for consideration. The final decision concerning the noise barriers will be made upon completion of the project design and public involvement process. Based on the Traffic Noise Analysis Protocol, “Noise abatement will not be provided if 50 percent or more of the affected residents do not want it.”

Table I-6 Preliminary Reasonable and Feasible Noise Barriers

Noise Barrier No.	Land Use	Highway Side	Height m (ft)	Beginning and Ending Top of Barrier Elevation (ft)		Beginning and Ending Station Number ¹	
				Begin	End	Begin	End
With Wrap-Around Barrier²							
NB-2	SFR	South	3.7 (12)	161.3	151.4	24+65	26+86
	SFR	South	4.3 (14)	163.3	153.4		
	SFR	South	4.9 (16)	165.3	155.4		
NB-3 ³	SFR	South	4.3(14)/4.9(16)	158.4(160.4)/ 167.3(169.3)	167.3(169.3)/ 178(180)	27+06/ 28+43 ⁴	28+43 ⁴ / 30+76.5
Without Wrap-Around Barrier⁵							
NB-2	SFR	South	3.05 (10)	159.3	155.4	24+65	26+78
	SFR	South	3.7 (12)	161.3	157.4		
	SFR	South	4.3 (14)	163.3	159.4		
	SFR	South	4.9 (16)	165.3	161.4		
NB-3 ⁶	SFR	South	4.3(14)/4.9(16)	160(162)/ 167.3(169.3)	167.3(169.3)/ 178(180)	27+12/ 28+43 ⁴	28+43 ⁴ / 30+76.5

Source: LSA Associates, Inc., July 2008.

¹ The station numbers are based on the Department station designation numbering in metric units, as shown on the figures.

² With wrap-around barrier for the west end of NB-1, east end of NB-2, and west end of NB-3.

³ With wrap-around scenario for NB-3 from station number 27+06 to 28+43 is less than 4.5 m (15 ft) from the nearest travel lane and therefore the maximum height is 4.3 m (14 ft).

⁴ This station number is based on current design plans provided by the Department District 12 Design Branch.

⁵ Without wrap-around barrier for the west end of NB-1, east end of NB-2, and west end of NB-3.

⁶ Without wrap-around scenario for NB-3 from station number 27+12 to 28+43 is less than 4.5 m (15 ft) from the nearest travel lane and therefore the maximum height is 4.3 m (14 ft).

ft = feet

m = meters

This page intentionally left blank