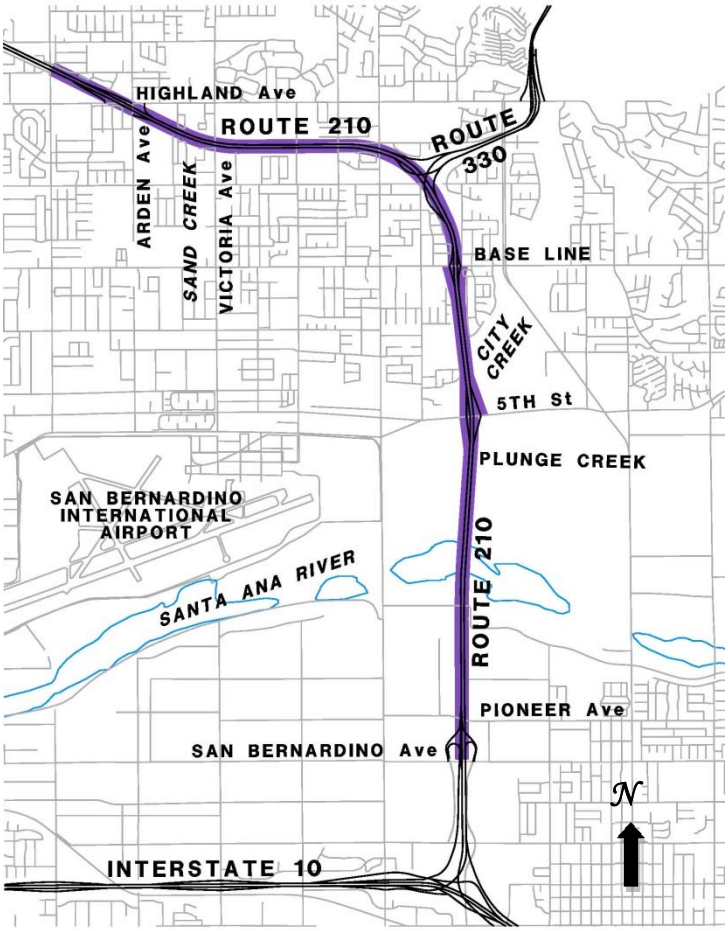
State Route 210 Mixed Flow Lane Addition
From Highland Avenue to San Bernardino Avenue ***NADR***



Noise Abatement Decision Report

Noise Study Report, April 2016
Cities of San Bernardino, Highland and Redlands
San Bernardino County, California
08-SBd-210-PM R25.0/R33.2
EA Number: 0C7000

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EA Number: 0C7000

April 2016

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List of Abbreviated Terms

23 CFR 772	Title 23, Code of Federal Regulations, Part 772
Benefited receptor	A dwelling unit or other equivalent land use expected to receive a noise reduction of at least 5 dBA from the proposed abatement measure
BMP	Best management practice
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIDH	Cast-in-drilled-hole
dB	A measure of sound pressure level on a logarithmic scale
dBA	A-weighted sound pressure level
ED	Environmental Document
EP	Edge of pavement
FHWA	Federal Highway Administration
HDM	Highway Design Manual
I-10	Interstate 10
Leq	Equivalent sound level (energy averaged sound level)
Leq[h]	A-weighted, energy average sound level during a 1-hour period
LOS	Level of Service
NAC	Noise abatement criteria
NADR	Noise Abatement Decision Report
Noise reduction design goal	7 dB of noise reduction at one or more benefited receptors.
NSR	Noise Study Report
PM	Post mile
Protocol	Caltrans Traffic Noise Analysis Protocol
Reasonable allowance	A single dollar value—a reasonable allowance per benefited receptor
ROW	Right of way
SANBAG	San Bernardino Associated Governments
SR-210	State Route 210
SR-330	State Route 330
TCE	Temporary construction easement
TNM 2.5	Federal Highway Administration Traffic Noise Model 2.5

1. Introduction

The Noise Abatement Decision Report (NADR) presents the preliminary noise abatement decision as defined in the California Department of Transportation (Caltrans) Traffic Noise Analysis Protocol (Protocol). This report has been appoved by a California licensed professional civil engineer. The project level Noise Study Report (NSR), State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue, prepared for this project is hereby incorporated by reference.

1.1. Noise Abatement Assessment Requirements

Title 23, Code of Federal Regulations (CFR), Part 772 of the Federal Highway Administration (FHWA) standards (23 CFR 772) and the Protocol require that noise abatement be considered for projects that are predicted to result in traffic noise impacts. A traffic noise impact is considered to occur when future predicted design-year noise levels with the project "approach or exceed" Noise Abatement Criteria (NAC) defined in 23 CFR 772 or when the predicted design-year noise levels with the project substantially exceed existing noise levels. A predicted design-year noise level is considered to "approach" the NAC when it is within 1 dB of the NAC. A substantial increase is defined as being a 12-dB increase above existing conditions.

23 CFR 772 requires that noise abatement measures that are reasonable and feasible and are likely to be incorporated into the project be identified before adoption of the final environmental document (ED).

The Protocol establishes a process for assessing the reasonableness and feasibility of noise abatement. Before publication of the draft ED, a *preliminary noise abatement decision* is made. The preliminary noise abatement decision is based on the *feasibility* of evaluated abatement and the *preliminary reasonableness determination.* Noise abatement is considered to be acoustically feasible if it is predicted to provide noise reduction of at least 5 dBA at an impacted receptor. Other nonacoustical factors relating to geometric standards (e.g., sight distances), safety, maintenance, and security can also affect feasibility.

The overall reasonableness of noise abatement is determined by the following three factors:

- the viewpoints of benefited receptors,
- the cost of noise abatement, and
- the noise reduction design goal.

The preliminary reasonableness determination reported in this document is based on the noise reduction design goal and the cost of abatement. The viewpoints of benefited receptors are determined by a survey that is normally conducted during the public review period for the project ED.

Caltrans' noise reduction design goal is that a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefited receptors. The cost reasonableness of abatement is determined by calculating a cost allowance that is considered to be a reasonable amount of money to spend on abatement. This *reasonble allowance* is then compared to the engineer's cost estimate for the abatement. If the engineer's cost estimate is less than the allowance and the abatement will provide at least 7 dB of noise reduction at one or more benefited receptors, then the preliminary determination is that the abatement is reasonable. If the cost estimate is higher than the allowance or if the design goal cannot be achieved, the preliminary determination is that abatement is not reasonable.

The NADR presents the preliminary noise abatement decision based on acoustical and nonacoustical feasibility factors, the design goal, and the relationship between noise abatement allowances and the engineer's cost estimate. The NADR does not present the final decision regarding noise abatement; rather, it presents key information on abatement to be considered throughout the environmental review process, based on the best available information at the time the draft ED is published. The final overall reasonableness decision will take this information into account, along with the results of the survey of benefited receptors conducted during the environmental review process.

At the end of the public review process for the ED, the final noise abatement decision is made and is indicated in the final ED. The preliminary noise abatement decision will become the final noise abatement decision unless compelling information received during the environmental review process indicates that it should be changed.

1.2. Purpose of the Noise Abatement Decision Report

The purpose of the NADR is to:

- summarize the conclusions of the NSR relating to acoustical feasibility, the design goal, and the reasonable allowances for abatement evaluated,present the engineer's cost estimate for evaluated abatement,
- present the engineer's evaluation of nonacoustical feasibility issues,
- present the preliminary noise abatement decision, and
- present preliminary information on secondary effects of abatement (impacts on cultural resources, scenic views, hazardous materials, biology, etc.).

The NADR does not address noise barriers or other noise-reducing treatments required as mitigation for significant adverse environmental effects identified under the California Environmental Quality Act (CEQA).

1.3. Project Description

The San Bernardino Associated Governments (SANBAG), in cooperation with the California Department of Transportation (Caltrans) District 8 and the City of Highland, proposes to widen State Route 210 (SR-210) from Sterling Avenue to San Bernardino Avenue in the cities of Highland, San Bernardino, and Redlands, as well as a portion of unincorporated San Bernardino County, California to add a third mixed flow lane in each direction.

The widening would occur between post miles (PM) Revised (R) 26.3 and R32.4, for a distance of 6.1 miles. The total length of the proposed project limits is approximately 8.2 miles (PM R25.0 to R33.2), which includes transition striping and signage. Within the limits of the proposed project, SR-210 is a four-lane divided freeway with two 12 foot wide lanes in each direction, which are flanked by five foot wide left and 10 foot wide right shoulders. The purpose of the proposed project is to reduce congestion by eliminating an existing bottleneck caused by the reduction in the number of mixed flow lanes and improve operational efficiency by providing lane continuity with existing segments of freeway west and east of the proposed project limits. The proposed project would not require the acquisition of new permanent right of way.

Build Alternative

The proposed Build Alternative would widen SR-210 from four mixed flow lanes (two lanes in each direction) to six mixed flow lanes (three lanes in each direction) from Highland Avenue to

San Bernardino Avenue by adding a mixed flow lane in each direction within the existing median.

The proposed Build Alternative includes the following design features and elements.

- The existing segment of SR-210 from Highland Avenue to San Bernardino Avenue would be widened from four mixed flow lanes (two lanes in each direction) to six mixed flow lanes (three lanes in each direction) with the addition of one mixed flow lane in each direction. The third lane would be added within the existing SR-210 median. Each of the six resulting mainline lanes would be 12 feet wide. Both directions (eastbound and westbound) would have 10 foot wide left and right shoulders.
- An auxiliary lane would be created in each direction between the Base Line and 5th Street interchanges.
- A deceleration lane would be constructed on eastbound SR-210 from the Sterling Avenue undercrossing to the proposed two-lane exit at Highland Avenue.
- A new acceleration lane would be added at the 5th Street eastbound on-ramp.
- The existing SR-210 median would be re-graded and generally remain unpaved.
- The following existing bridges and undercrossings would be widened to accommodate the new mixed flow lanes: Highland Avenue/Arden Avenue, Sand Creek, Victoria Avenue, 5th Street/Greenspot Road, City Creek, Plunge Creek, Access Road, Santa Ana River, and Pioneer Avenue.
- The proposed project would not require the acquisition of new permanent right of way. Temporary Construction Easements would likely be needed during the construction period for construction of noise barriers and construction access.
- Scour and pier protection features would be installed at the drainages as needed to protect bridge foundations.
- Drainage system improvements would be constructed to carry runoff away from the traveled lanes and into traditional drainage courses.
- Stormwater treatment best management practice features would be included at select locations where identified benefits outweigh impacts. To the fullest extent possible, roadside swales and bio-filtration strips would be used to convey both stormwater quantity flows and peak flows.
- A new fiber optic backbone system would be constructed within the existing median with branch connections linking the backbone system to existing and proposed traffic

management system elements along the corridor, including wireless vehicle detection stations, ramp metering systems, and a changeable message sign.

- Ramp metering systems would be installed on the existing on-ramps at the 5th Street/ Greenspot Road interchange.
- An existing weigh-in-motion system approximately 0.5 mile north of San Bernardino Avenue would be reconstructed to accommodate the additional lanes on the freeway.
- Utilities would be relocated, as needed, to accommodate the widened facility.
- Retaining walls would be constructed, as needed, by changes in elevation that cannot be accommodated by regrading.
- An existing sound wall between Base Line and 5th Street in the eastbound direction would be reconstructed to accommodate the proposed auxiliary lane.

The ultimate corridor for SR-210 within the project limits would be an eight-lane freeway facility (six mixed flow lanes and two high occupancy vehicle lanes). Improving the facility to six mixed flow lanes would be compatible with Route Concept Fact Sheet planning and would not preclude future improvements or make these future improvements more costly to implement.

1.4. Affected Land Uses

A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Land uses along the project alignment consist of residential, active sports and recreational, commercial and industrial, and undeveloped land uses. Although all developed land uses were evaluated in this analysis, as required by the Protocol, noise abatement was considered only for areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residences and recreational areas.

2. Results of the Noise Study Report

The NSR for this project was prepared by ICF International in April 2016, and concurred by Olufemi Odufalu (Office Chief) on XXXX, 2016.

The FHWA Traffic Noise Model 2.5 (TNM 2.5) was utilized for modeling the future noise levels. As stated in the Protocol, noise abatement measures are considered when predicted noise levels in the design year approach or exceed the NAC or when a predicted noise level has a substantial increase of 12 dBA or more. The surrounding residential land use receptors were classified under Activity Category B which establishes a NAC of 67 dBA for the outdoor noise criterion. Recreational land use receptors were classified under Activity Category C that has an established NAC of 67 dBA for exterior noise criterion. In situations where there are no exterior activities or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion for Activity Category D of 52 dBA is used as the basis for determining a noise impact.

To more accurately model the project area, the adjacent land uses were divided into thirteen areas:

- Area A, south of SR-210 and bounded near Del Rosa Avenue to the west and Victoria Avenue to the east.
- Area B, north of SR-210 and bounded by Victoria Avenue to the east, extending to Date Street to the north.
- Area C, south of SR-210 and bounded by Victoria Avenue to the west and Palm Avenue to the east.
- Area D, north of SR-210 and bounded by Victoria Avenue to the west and Central Avenue to the east.
- Area E, north of SR-210 and bounded by Central Avenue to the west and Church Avenue to the east.
- Area F, south of SR-210 and bounded by Palm Avenue to the west and Cienega Drive to the south.
- Area G, west of SR-210 and bounded by Cienega Drive on the north end and Base Line to the south.
- Area H, east of SR-210 and bounded by State Route 330 (SR-330) to the north and La Praix Street to the east.

- Area I, east of SR-210 and bounded by Seine Avenue to the east and Messina Street to the south.
- Area J, west of SR-210 and bounded by Base Line to the north and Temple Street to the south.
- Area K, west of SR-210 and bounded by Temple Street to the north and Powell Drive to the south.
- Area L, east of SR-210 and bounded by Base Line to the north and Dunkirk Avenue / Stoney Creek Court to the south.
- Area M, east and west of SR-210 and bounded by Powell Drive and Dunkirk Avenue / Stoney Creek Court to the north and San Bernardino Avenue to the south.

The results of the analysis indicate that predicted traffic noise levels would approach or exceed the NAC of 67 dBA for Activity Category B (residential) land uses at 47 receptors under design year no-build conditions and at 61 modeled receptors (representative of 74 noise-sensitive receptors) for design year build conditions. These receptors are located in Areas A, B, C and E for no-build conditions and build conditions. Modeled design year no-build noise levels would range from 49 dBA to 75 dBA, whereas modeled build noise levels would range from 50 dBA to 77 dBA. No other areas are predicted to be exposed to traffic noise impacts.

For noise-sensitive receptors where traffic noise levels would approach or exceed the NAC, noise abatement in the form of sound walls was considered. According to the noise abatement criteria adopted in the Protocol, for a proposed noise abatement to be considered feasible, the noise abatement must be designed to provide a minimum of 5 dBA of noise reduction at impacted receptors. In addition to meeting the feasibility criteria, the proposed noise abatement should meet the design goal of 7 dBA insertion loss at a minimum of one receptor location within the noise abatement area and should be reasonable from a cost perspective. Table 2-1 below provides the summary of barrier evaluation, including the locations, heights and the calculated reasonable costs of the modeled walls.

Table 2-1. Summary of Barrier Evaluation from Noise Study Report

Barrier	Location	Station	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Design Goal Achieved?	Reasonable Allowance per Residence	Total Reasonable Allowance
EB-1	EP (EB)	846+51 to 867+00	10	Yes	21	Yes	$80,000	$1,680,000
			12	Yes	22	Yes	$80,000	$1,760,000
			14	Yes	22	Yes	$80,000	$1,760,000
EB-2	EP (EB)	900+60 to 915+04	10	Yes	28	Yes	$80,000	$2,240,000
			12	Yes	29	Yes	$80,000	$2,320,000
EB-3	EP (EB)	898+57 to 904+72	14	Yes	29	Yes	$80,000	$2,320,000
EB-2	EP (EB)	899+11 to 917+79	10	Yes	15	Yes	$80,000	$1,200,000
			12	Yes	18	Yes	$80,000	$1,440,000
			14	Yes	23	Yes	$80,000	$1,840,000
Combined WB-1 & WB-2	EP (WB)	852+45 to 879+29	8	Yes	26	Yes	$80,000	$2,080,000
			10	Yes	32	Yes	$80,000	$2,560,000
			12	Yes	34	Yes	$80,000	$2,720,000
			14	Yes	35	Yes	$80,000	$2,800,000
WB-3A	ROW (WB)	918+63 to 923+79	12	Yes	4	Yes	$80,000	$320,000
			14	Yes	5	Yes	$80,000	$400,000
			16	Yes	6	Yes	$80,000	$480,000
WB-4	ROW (WB)	952+58 to 957+04	8	Yes	3	Yes	$80,000	$240,000
			10	Yes	3	Yes	$80,000	$240,000
			12	Yes	3	Yes	$80,000	$240,000
			14	Yes	3	Yes	$80,000	$240,000
			16	Yes	5	Yes	$80,000	$400,000
WB-5	ROW	965+43	18	Yes	1	Yes	$80,000	$80,000
WB-6	ROW (WB)	966+07 to 978+02	10	Yes	15	Yes	$80,000	$1,200,000
			12	Yes	15	Yes	$80,000	$1,200,000
			14	Yes	15	Yes	$80,000	$1,200,000
			16	Yes	15	Yes	$80,000	$1,200,000
WB-7	ROW (WB)	980+27 to 982+13	8	Yes	1	Yes	$80,000	$80,000
			10	Yes	1	Yes	$80,000	$80,000
			12	Yes	2	Yes	$80,000	$160,000
			14	Yes	2	Yes	$80,000	$160,000
			16	Yes	2	Yes	$80,000	$160,000

ROW = right of way line
EP = edge of pavement
EB = eastbound
WB = westbound

3. Preliminary Noise Abatement Decision

3.1. Summary of Key Information

To determine if the proposed noise abatement is considered reasonable, the construction cost of the sound wall must be equal to or less than the reasonable allowance. The cost estimates were based upon anticipated earthwork, structural requirements, traffic controls, overhead sign impacts, drainage modification, right of way costs, mobilization, miscellaneous items and contingency. The sound walls were assumed to be constructed of masonry block in accordance with Caltrans' standard specifications either supported on a retaining wall or cast-in-drilled-hole (CIDH) piles.

Table 3-1 below includes a summary of the estimated costs for the construction of the sound walls in comparison to the reasonable allowable construction cost for each sound wall height, and the number of benefited receptors for which the line-of-sight criteria is met. The line of sight criteria is met when a sound wall intercepts the line-of-sight between the exhaust stack of a truck and the benefited receptor. Appendix B includes a cost estimate summary for each wall height. Preliminary engineering drawings are provided in Appendix C.

Table 3-1. Summary of Abatement Key Information

Barrier	Height (feet)	Acoustically Feasible	Number of Benefited Residences	Design Goal Achieved	Number of Receptors Meeting Line-of-Sight Criteria	Total Reasonable Allowance	Estimated Construction Cost	Cost Less than Allowance
EB-1	10	Yes	21	Yes	11	$1,680,000	$1,213,000	Yes
	12	Yes	22	Yes	22	$1,760,000	$1,323,000	Yes
	14	Yes	22	Yes	22	$1,760,000	$1,427,000	Yes
EB-2 & EB-3	10	Yes	28	Yes	4	$2,240,000	$1,112,000	Yes
	12	Yes	29	Yes	29	$2,320,000	$1,189,000	Yes
	14	Yes	29	Yes	29	$2,320,000	$1,260,000	Yes
EB-2	10	Yes	15	Yes	4	$1,200,000	$1,005,000	Yes
	12	Yes	18	Yes	18	$1,440,000	$1,106,000	Yes
	14	Yes	23	Yes	23	$1,840,000	$1,200,000	Yes
Combined WB-1 & WB-2	8	Yes	26	Yes	6	$2,080,000	$1,474,000	Yes
	10	Yes	32	Yes	10	$2,560,000	$1,604,000	Yes
	12	Yes	34	Yes	34	$2,720,000	$1,739,000	Yes
	14	Yes	35	Yes	35	$2,800,000	$1,866,000	Yes
WB-3A	12	Yes	4	Yes	4	$320,000	$341,000	No
	14	Yes	5	Yes	4	$400,000	$370,000	Yes
	16	Yes	6	Yes	5	$480,000	$400,000	Yes
WB-4	8	Yes	3	Yes	3	$240,000	$217,000	Yes
	10	Yes	3	Yes	3	$240,000	$256,000	No
	12	Yes	3	Yes	3	$240,000	$281,000	No
	14	Yes	3	Yes	3	$240,000	$304,000	No
	16	Yes	5	Yes	5	$400,000	$328,000	Yes
WB-5	18	Yes	1	Yes	1	$80,000	$47,000	Yes
WB-6	10	Yes	15	Yes	3	$1,200,000	$728,000	Yes
	12	Yes	15	Yes	8	$1,200,000	$798,000	Yes
	14	Yes	15	Yes	15	$1,200,000	$861,000	Yes
	16	Yes	15	Yes	15	$1,200,000	$926,000	Yes
WB-7	8	Yes	1	Yes	1	$80,000	$111,000	No
	10	Yes	1	Yes	1	$80,000	$121,000	No
	12	Yes	2	Yes	2	$160,000	$134,000	Yes
	14	Yes	2	Yes	2	$160,000	$144,000	Yes
	16	Yes	2	Yes	2	$160,000	$156,000	Yes

3.2. Nonacoustical Factors Relating to Feasibility

The Project Engineer evaluated the geometric standards, safety, security, geotechnical considerations, maintenance, drainage and potential utility relocations of the proposed sound walls. It was determined that no nonacoustical factors relating to feasiblilty exist in the locations where sound walls are considered.

Per the Caltrans Highway Design Manual (HDM) Section 1102.3(2), the maximum height permissible for noise barriers shall not exceed 14 feet when located 15 feet or less from the edge of the traveled way. In addition, HDM Section 1102.3(3) states that the noise barrier should intercept the line of sight from the exhaust stack of a truck to the receptor in order to bar noise emitted from the exhaust stack. The truck stack height is assumed to be 11.5 feet above the pavement. Based on these guidelines, sound wall heights of 16 feet are not considered to be feasible for walls EB-1, EB-2, EB-3, WB-1 and WB-2.

3.3. Preliminary Recommendation and Decision

Based on information summarized in Table 3-1 and noise reductions presented in the NSR, the following discussion presents the engineer's recommendation of the proposed height and reasonableness of proposed feasible sound walls for the project. Some of the proposed sound walls were analyzed using a step-down approach at the end of the barrier, where the height was stepped down from the analyzed height to a minimum height of 8 feet. Sound walls EB-1, EB-2, WB-1, and WB-2 incorporated the step-down approach, as shown in the tables below. Costs of these stepped-down noise barriers would be less than the full-height sound walls at each location; therefore, the stepped-down noise barriers would still be reasonable to build. Exhibits depicting the considered sound walls in the studied areas are shown in Appendix A.

Table 3-2. Barrier EB-1 Stepped Down Design Heights

Nominal Barrier Height Analyzed in TNM	**Actual Barrier Height Based on Stationing**							
	8 Foot		**10 Foot**		**12 Foot**		**14 Foot**	
	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station
14 Foot	846+51	847+01	847+01	847+51	847+51	848+01	848+01	867+00
12 Foot	846+51	847+01	847+01	847+51	847+51	867+00	--[1]	--[1]
10 Foot	846+51	847+01	847+01	867+00	--[1]	--[1]	--[1]	--[1]
8 Foot	846+51	867+00	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]

[1] – Barrier height was not analyzed as it exceeded the Nominal Analyzed Barrier Height
Source: *SR-210 Mixed Flow Lane Addition Noise Study Report, April 2016*

Table 3-3. Barrier EB-2 Stepped Down Design Heights

Nominal Barrier Height Analyzed in TNM	**Actual Barrier Height Based on Stationing**							
	8 Foot		**10 Foot**		**12 Foot**		**14 Foot**	
	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station
14 Foot	917+02	917+79	916+54	917+02	916+04	916+54	899+11	916+04
12 Foot	917+02	917+79	916+54	917+02	899+11	916+54	--[1]	--[1]
10 Foot	917+02	917+79	899+11	917+02	--[1]	--[1]	--[1]	--[1]
8 Foot	899+11	917+79	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]

[1] – Barrier height was not analyzed as it exceeded the Nominal Analyzed Barrier Height
Source: *SR-210 Mixed Flow Lane Addition Noise Study Report, April 2016*

Table 3-4. Barrier EB-2 and EB-3 Stepped Down Design Heights

Nominal Barrier Height Analyzed in TNM	Actual Barrier Height Based on Stationing							
	8 Foot		10 Foot		12 Foot		14 Foot	
	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station
EB-2 14 Foot	914+54	915+04	914+04	914+54	913+54	914+04	900+60	913+54
EB-2 12 Foot	914+54	915+04	914+04	914+54	900+60	914+04	--[1]	--[1]
EB-2 10 Foot	914+54	915+04	900+60	914+54	--[1]	--[1]	--[1]	--[1]
EB-2 8 Foot	900+60	915+04	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]
EB-3 10 Foot	--[1]	--[1]	898+57	904+72	--[1]	--[1]	--[1]	--[1]

[1] – Barrier height was not analyzed as it exceeded the Nominal Analyzed Barrier Height
Source: *SR-210 Mixed Flow Lane Addition Noise Study Report, April 2016*

Table 3-5. Barrier WB-1 and WB-2 Combined Stepped Down Design Heights

Nominal Barrier Height Analyzed in TNM	Actual Barrier Height Based on Stationing													
	8 Foot		10 Foot		12 Foot		14 Foot		12 Foot		10 Foot		8 Foot	
	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station	Starting Station	Ending Station
14 Foot	852+55	852+95	852+95	853+47	853+47	853+96	853+96	876+29	876+29	877+29	877+29	878+29	878+29	879+29
12 Foot	852+55	852+95	852+95	853+47	853+47	877+29	--[1]	--[1]	853+47	877+29	877+29	878+29	878+29	879+29
10 Foot	852+55	852+95	852+95	878+29	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	852+95	878+29	878+29	879+29
8 Foot	852+55	866+35	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]	852+55	866+35

[1] – Barrier height was not analyzed as it exceeded the Nominal Analyzed Barrier Height
Source: *SR-210 Mixed Flow Lane Addition Noise Study Report, April 2016*

- Sound Wall EB-1

Sound wall EB-1 was found to be feasible and reasonable at heights of 10 feet, 12 feet and 14 feet for a length of 2,050 feet. The 10-foot wall height benefits 21 receptors, and the 12-foot and 14-foot wall heights benefit 22 receptors. The sound wall is located between the eastbound Del Rosa Avenue on-ramp and Sterling Avenue along eastbound SR-210 at the edge of shoulder. A height of 12 feet, with the step-down details from the NSR and as shown in Table 3-2, is recommended for sound wall EB-1. This height benefits the maximum number of receptors at this location, reasonably balances maximum noise reduction with construction cost, and intercepts noise emitted from exhaust stacks of trucks.

- Sound Wall EB-2 and EB-3

Sound walls EB-2 and EB-3 were modeled using two different scenarios. One scenario modeled EB-2 with EB-3, where EB-3 was maintained at a static height of 10 feet. The second scenario modeled EB-2 alone.

Sound wall EB-2 is located along the eastbound Arden Avenue on-ramp edge of shoulder and continues along the edge of shoulder of eastbound SR-210 between the on-ramp and Sand Creek. Sound wall EB-3 is located along the eastbound SR-210 edge of shoulder between Arden Avenue and the eastbound Arden Avenue on-ramp.

Under the first scenario, the combination of sound walls EB-2 and EB-3 were found to be feasible and reasonable at heights of 10 feet, 12 feet and 14 feet for lengths of 1,450 feet and 615 feet, respectively. The 10-foot wall height benefits 28 receptors and the 12-foot and 14-foot wall heights benefit 29 receptors.

Under the second scenario, sound wall EB-2 was found to be feasible and reasonable at heights of 10 feet, 12 feet and 14 feet, for a length of 1,875 feet. The 10-foot wall height benefits 15 recepters, the 12-foot wall height benefits 18 receptors, and the 14-foot wall height benefits 23 receptors. Sound wall EB-2 had the step-down details from the NSR and as shown in Table 3-3 as well.

A combination of sound walls EB-2 and EB-3, with the step-down details from the NSR and as shown in Table 3-4, is recommended at a height of 12 feet for EB-2 and 10 feet for EB-3. This height benefits the maximum number of receptors at this location, reasonably balances maximum noise reduction with construction cost, and intercepts noise emitted from exhaust stacks of trucks.

- Sound Wall WB-1 and WB-2

Sound walls WB-1 and WB-2 were modeled using three different scenarios as part of the Noise Study Report analysis: WB-1 as a standalone wall, WB-2 as a standalone wall, and a combination of walls WB-1 and WB-2. However, only the combination of walls WB-1 and WB-2 without a gap across the Sterling Avenue bridge provide abatement for all receptors. Therefore, this wall combination is the only one considered for the reasonableness analysis.

Sound wall WB-1 is located between the westbound Del Rosa Avenue off-ramp and Sterling Avenue, along the westbound SR-210 edge of shoulder, and sound wall WB-2 is located between the westbound Highland Avenue on-ramp and Sterling Avenue along the westbound SR-210 edge of shoulder. For the combination of wall WB-1 and WB-2, the gap between the two walls would be eliminated by continuing the sound wall across the outside edge of the westbound Sterling Avenue undercrossing.

The combination of sound walls WB-1 and WB-2 was found to be feasible and reasonable at heights of 8 feet, 10 feet, 12 feet and 14 feet, for a total length of 2,685 feet. The 8-foot wall height benefits 26 receptors, the 10-foot wall height benefits 32 receptors, the 12-foot benefits 34 receptors, and the 14-foot wall height benefits 35 receptors.

A combination of sound walls WB-1 and WB-2 is recommended at a height of 14 feet for this location, with the step-down details from the NSR and as shown in Table 3-5. This height benefits the maximum number of receptors at this location, reasonably balances maximum noise reduction with construction cost, and intercepts noise emitted from exhaust stacks of trucks.

- Sound Wall WB-3A

Sound wall WB-3A is located between Sand Creek and Victoria Avenue along westbound SR-210 at the State right of way. Sound wall WB-3A was found to be feasible and reasonable at heights of 12 feet, 14 feet, and 16 feet, for a length of 580 feet. The 12-foot wall height benefits 4 receptors, 14-foot wall height benefits 5 receptors, and 16-foot wall height benefits 6 receptors. Only the 14-foot and 16-foot wall heights were found to be reasonable from a cost perspective. A height of 16 feet is recommended for sound wall WB-3A. This height benefits the maximum number of receptors at this location, reasonably balances maximum noise reduction with construction cost, and intercepts noise emitted from exhaust stacks of trucks for the greatest number of the receptors. A portion of sound wall WB-3A will be constructed beyond the State right of way and; therefore, will need to meet local agency design requirements.

- Sound Wall WB-4

Sound wall WB-4 is located between Central Avenue and Pepper Drive along westbound SR-210 at the State right of way. Sound wall WB-4 was found to be feasible at heights of 8 feet, 10 feet, 12 feet, 14 feet, and 16 feet, for a length of 450 feet. The 8-foot, 10-foot, 12-foot and 14-foot wall heights benefit 3 receptors. The 16-foot wall height benefits 5 receptors. Only the 8-foot and 16-foot wall heights were determined to be reasonable. A height of 16 feet is recommended for sound wall WB-4. This height benefits the maximum number of receptors at this location, reasonably balances maximum noise reduction with construction cost, and intercepts noise emitted from exhaust stacks of trucks.

- Sound Wall WB-5

Sound wall WB-5 is located along the west side of Orange Street, directly north of SR-210 along a residential property. Although the wall was determined to be feasible for heights of 8 feet, 10 feet, 12 feet, 14 feet, 16 feet and 18 feet, the design goal was only achieved at a height of 18 feet. Sound wall WB-5 was found to be reasonable at a height of 18 feet, for a length of 60 feet. The 18-foot wall height benefits 1 receptor and is recommended for this location. Sound wall WB-5 will be constructed beyond the State right of way and; therefore, will need to meet local agency design requirements.

- Sound Wall WB-6

Sound wall WB-6 is located between Orange Street and Palm Avenue along westbound SR-210 at the State right of way. Sound wall WB-6 was found to be feasible at heights of 10 feet, 12 feet, 14 feet, and 16 feet, for a length of 1,245 feet. All wall heights benefit 15 receptors; however, only the 14-foot and 16-foot wall heights intercept the truck exhaust line-of-sight for all 15 receptors. The 10-foot wall height and 12-foot wall height intercept the truck exhaust line-of-sight for 3 receptors and 8 receptors, respectively. A height of 14 feet is recommended for sound wall WB-6. This height benefits the maximum number of receptors at this location, and reasonably balances maximum noise reduction and line-of-sight criteria with construction cost.

- Sound Wall WB-7

Sound wall WB-7 is located between Palm Avenue and Lunt Lane along westbound SR-210 at the State right of way. Sound wall WB-7 was found to be feasible at heights of 8 feet, 10 feet, 12 feet, 14 feet, and 16 feet, for a length of 220 feet. The 8-foot and 10-foot wall heights benefit 1 receptor, and the remaining wall heights benefit 2 receptors. The 12-foot, 14-foot and 16-foot wall heights were determined to be reasonable from a cost perspective. A height of 12 feet is recommended for sound wall WB-7. This height benefits the maximum number of receptors at

this location, reasonably balances maximum noise reduction with construction cost, and intercepts noise emitted from exhaust stacks of trucks.

The preliminary noise abatement decision presented in this report is based on preliminary project alignments and profiles, which may be subject to change. As such, the physical characteristics of noise abatement described herein also may be subject to change. If pertinent parameters change substantially during the final project design, the preliminary noise abatement decision may be changed or eliminated from the final project design. A final decision to construct noise abatement will be made upon completion of the project design.

The preliminary noise abatement decision presented here will be included in the draft environmental document (ED), which will be circulated for public review.

4. Secondary Effects of Abatement

There are no additional impacts expected to occur or secondary effects on cultural resources, scenic views, hazardous materials, biology, or other resources.

5. References

California Department of Transportation, *Traffic Noise Analysis Protocol*, May 2011.

California Department of Transportation, *Technical Noise Supplement - Technical Noise Supplement to the Traffic Noise Analysis Protocol*, November 2009.

ICF International, *State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue Noise Study Report*, April 2016.

Appendix A **Modeled Barrier and Receiver Locations**

Source: ICF International, *State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue Noise Study Report*, April 2016.

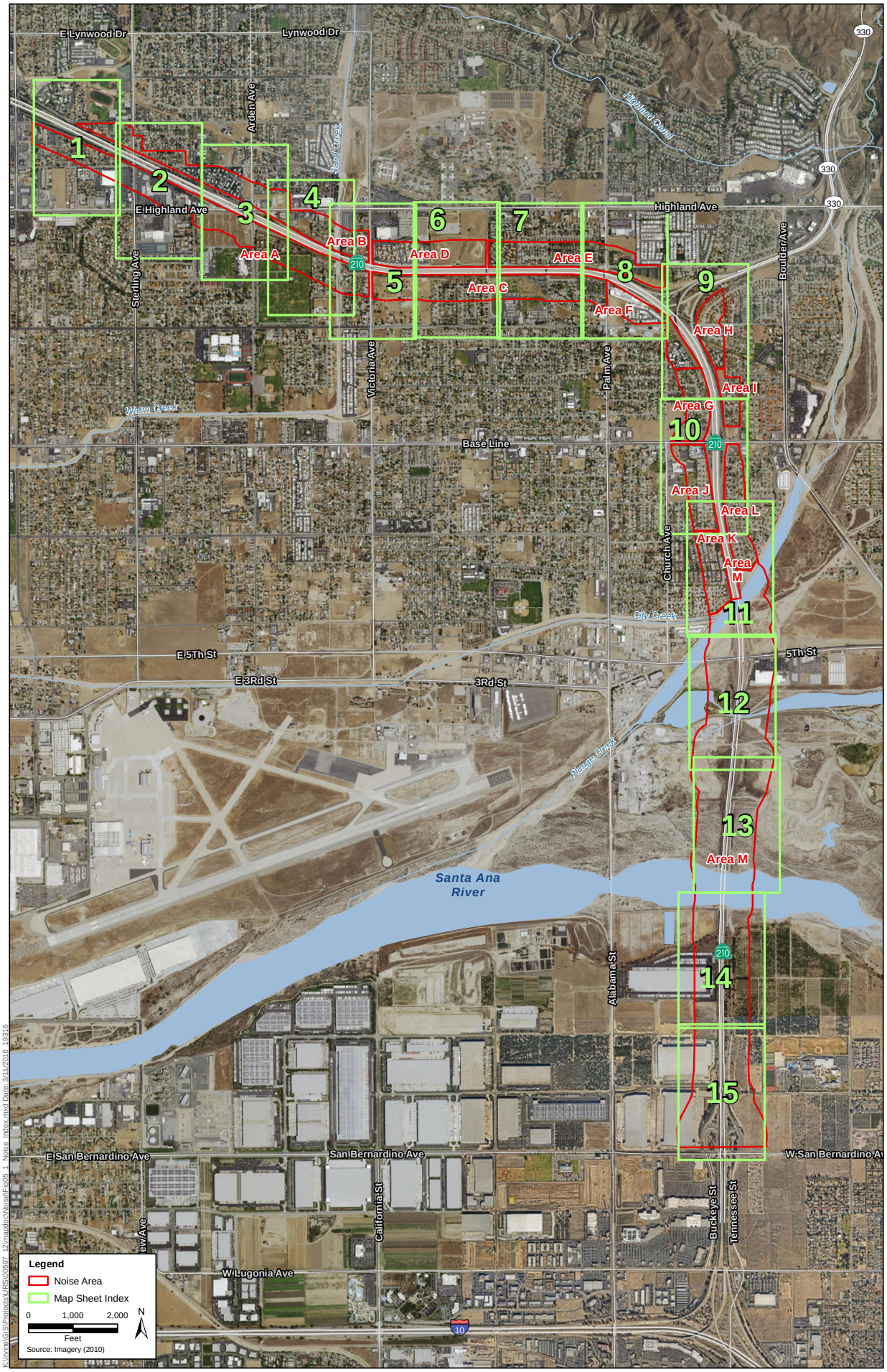
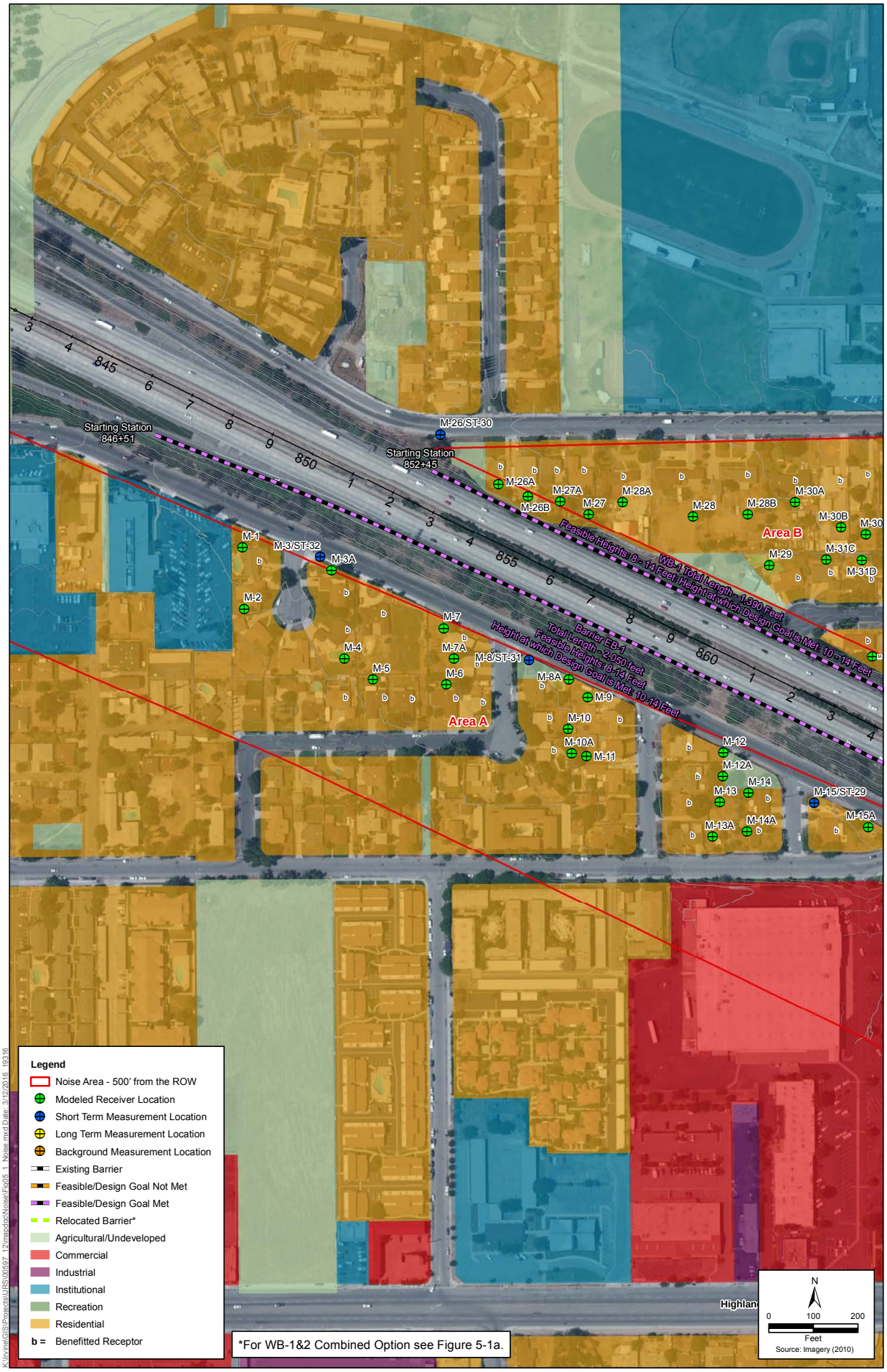
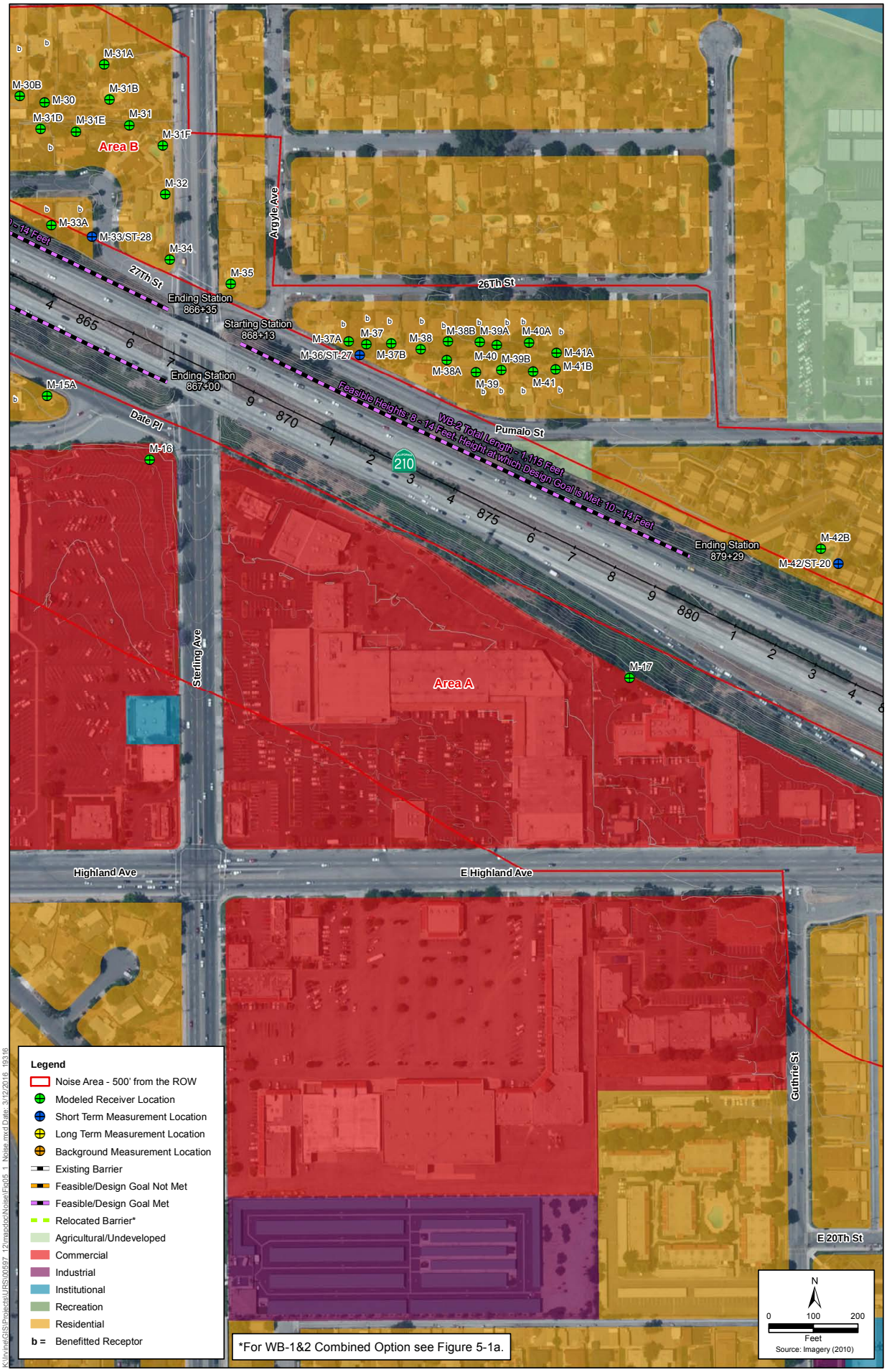


Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Index Map
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



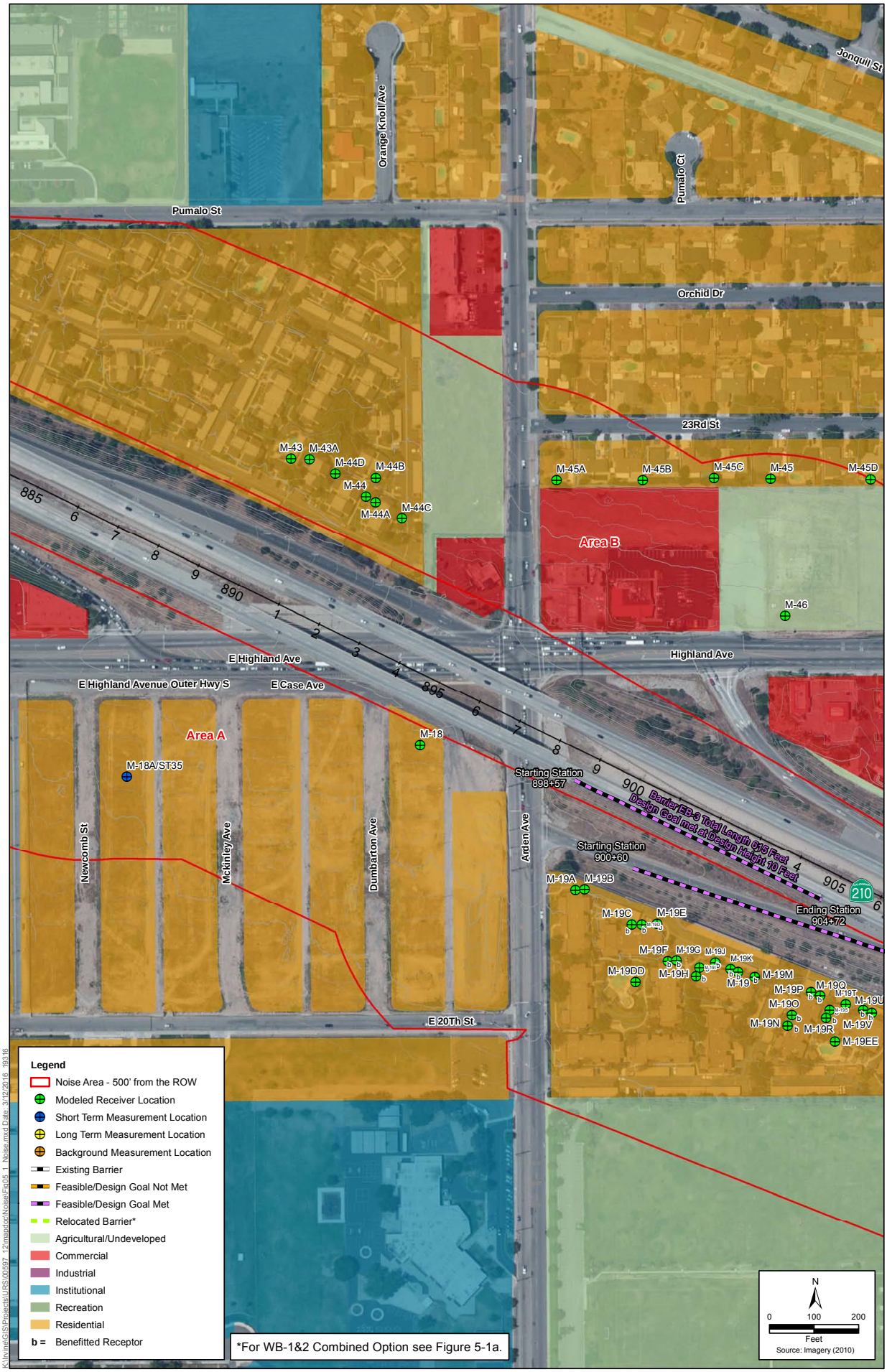
* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 1
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



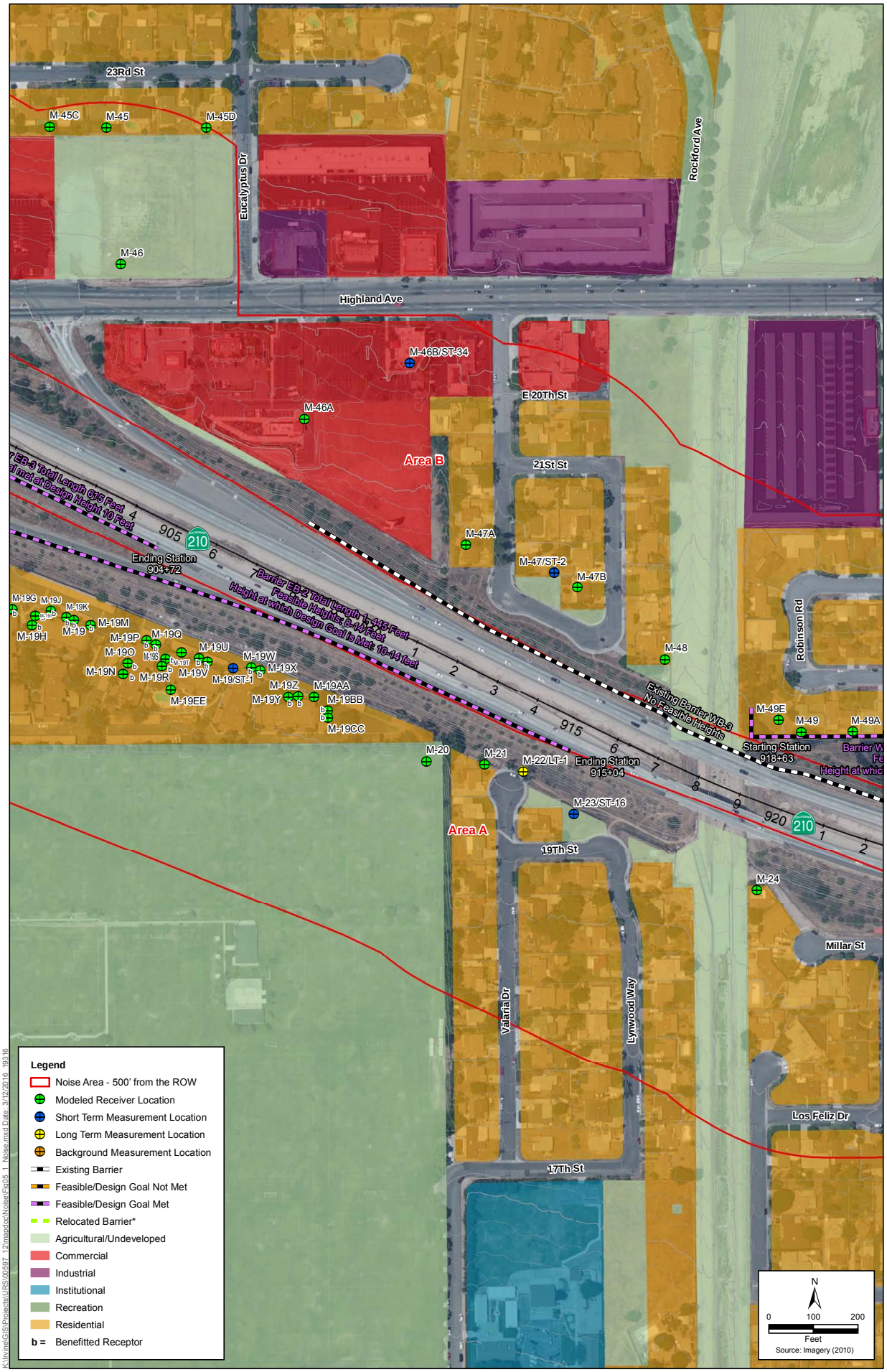
* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 2
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



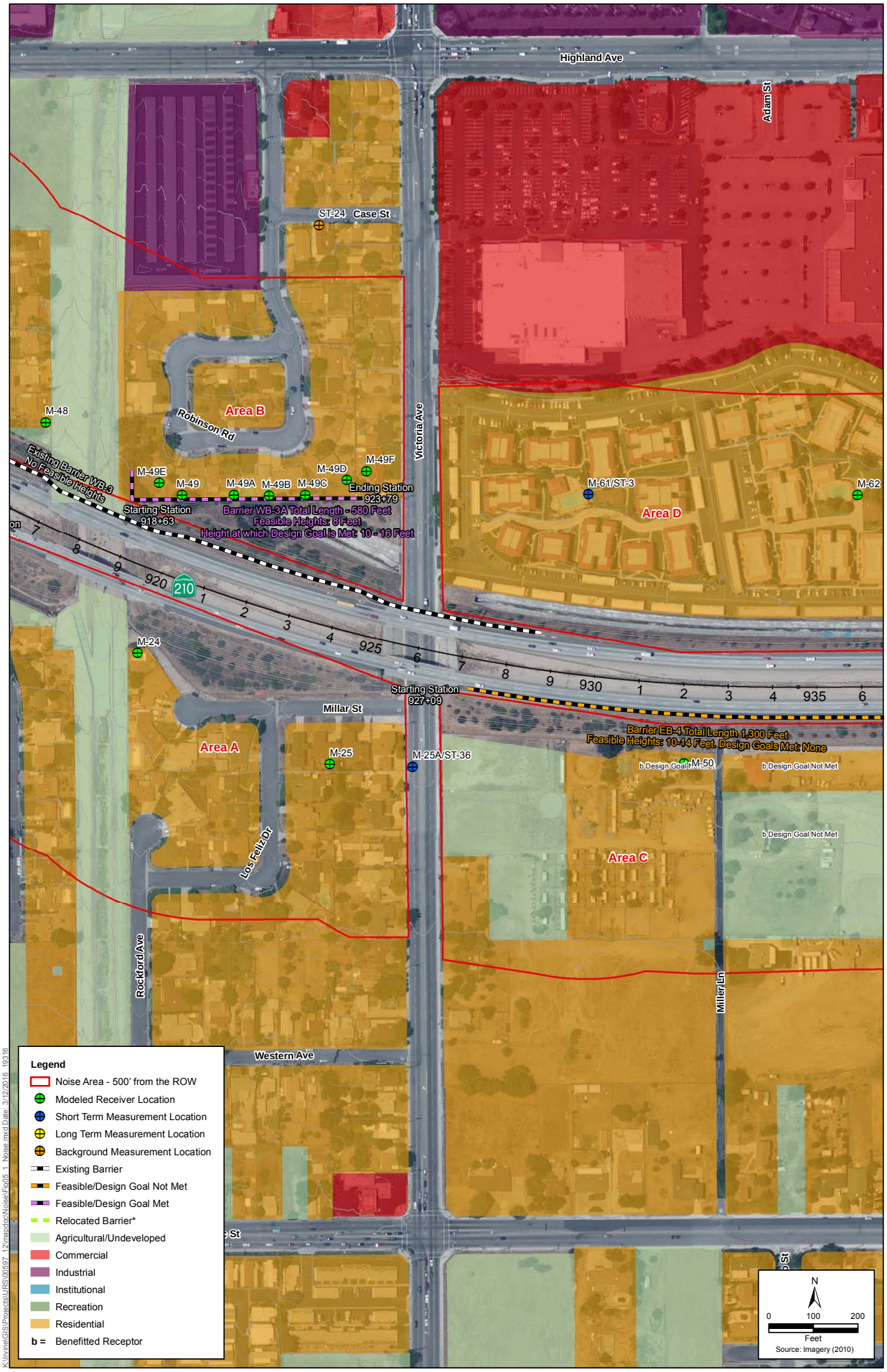
* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 3
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

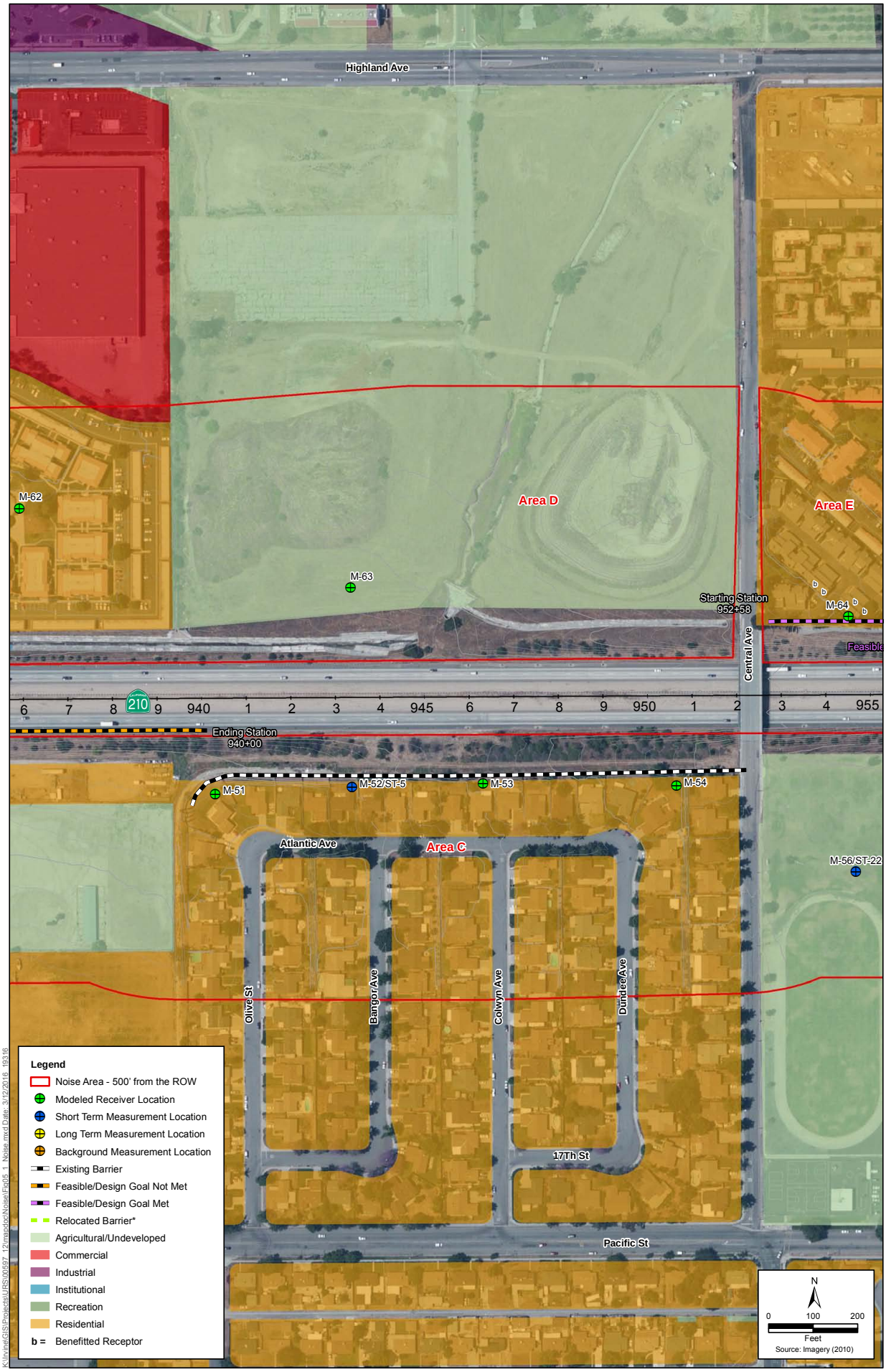
Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 4
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1

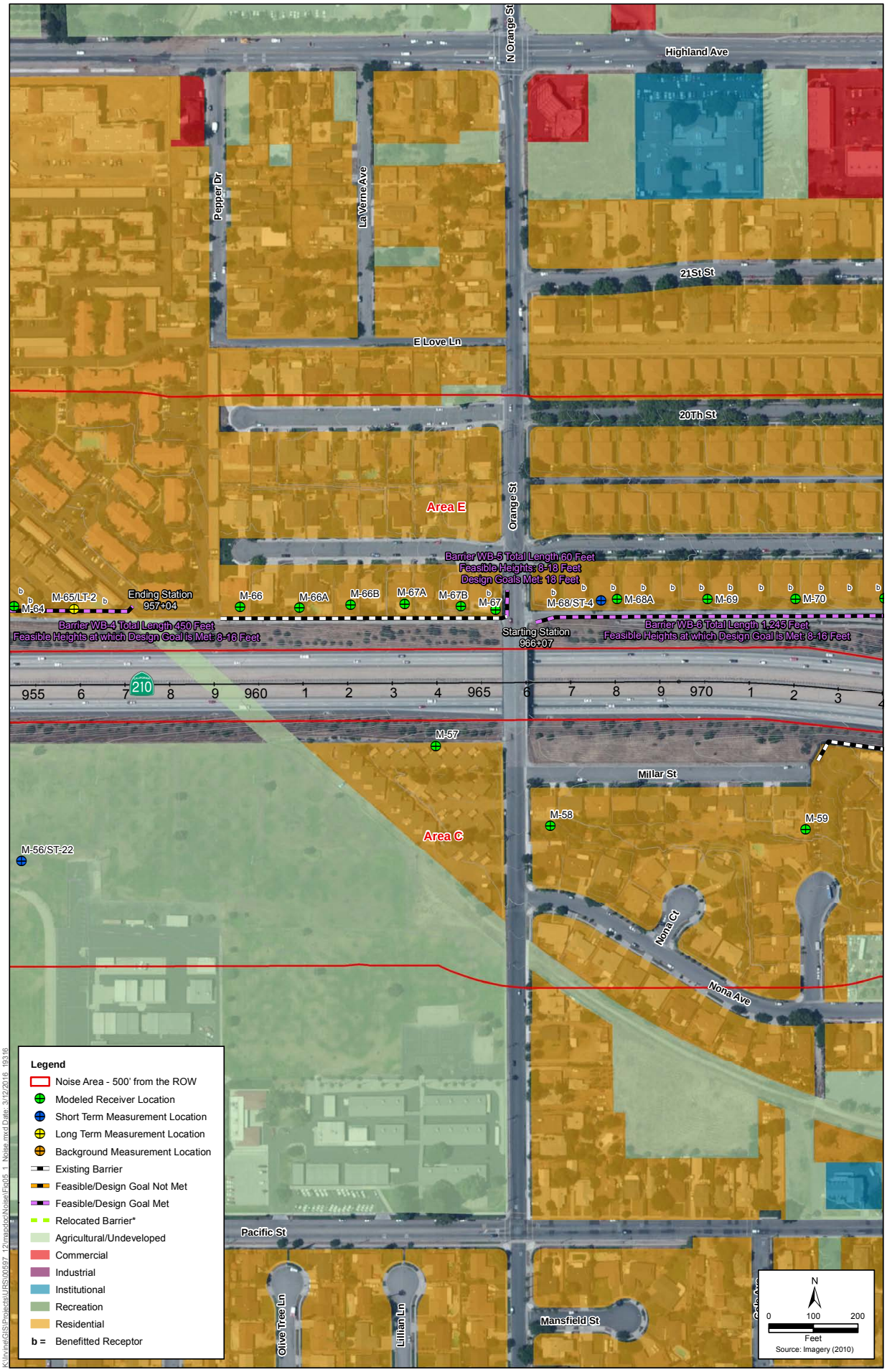
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 5
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1

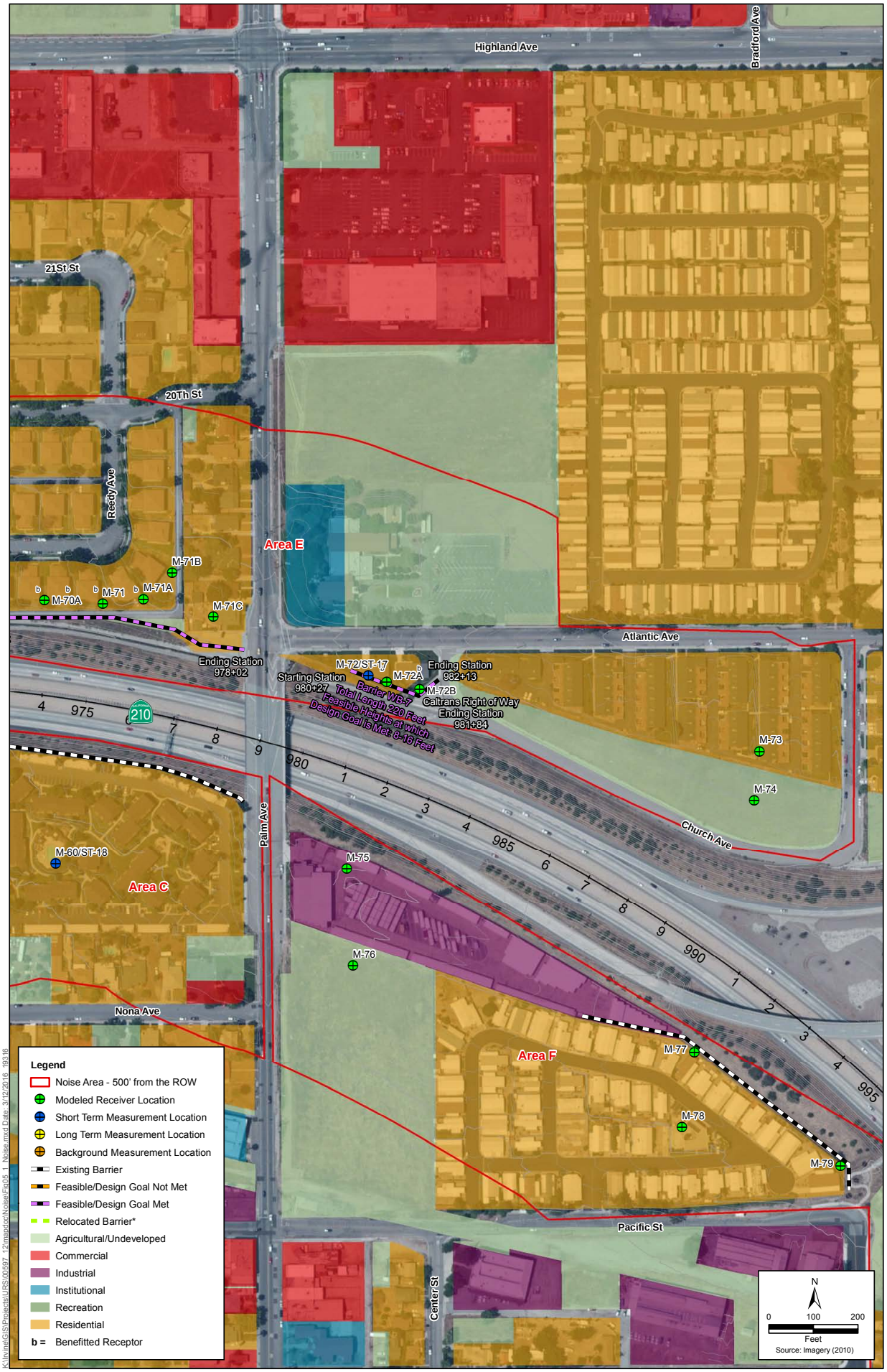
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 6
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1

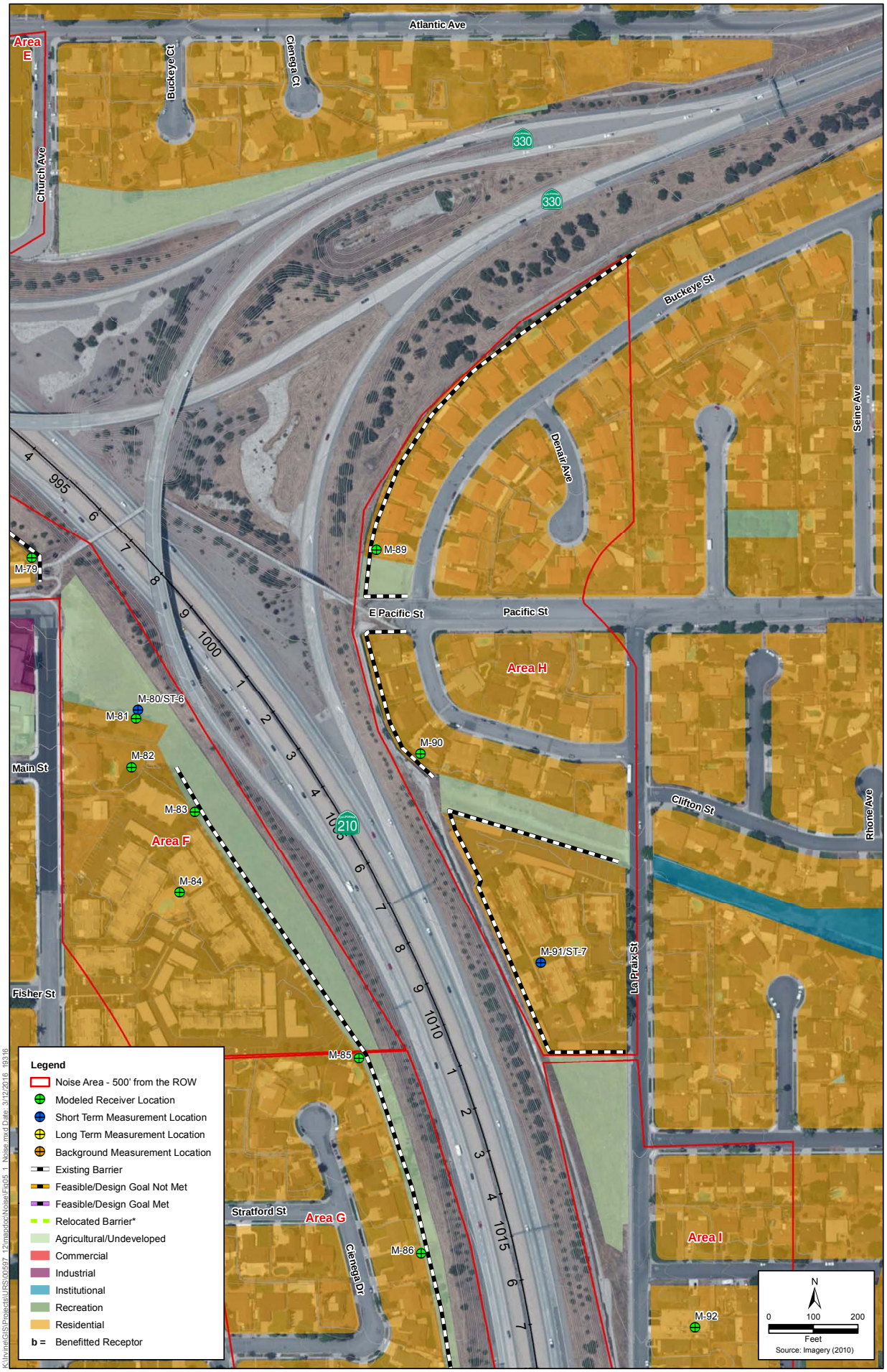
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 7
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

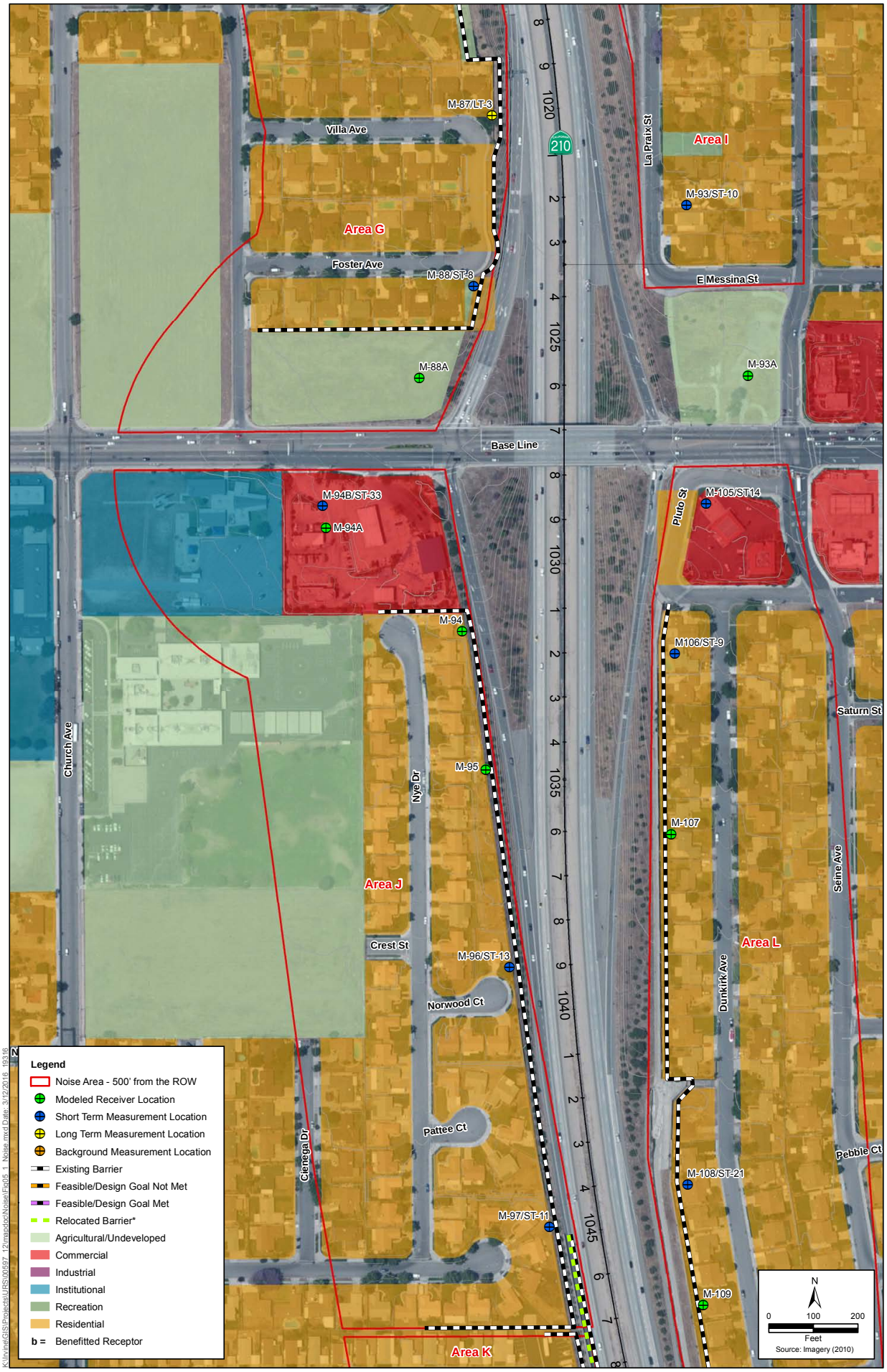
Figure 5-1

Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 8
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



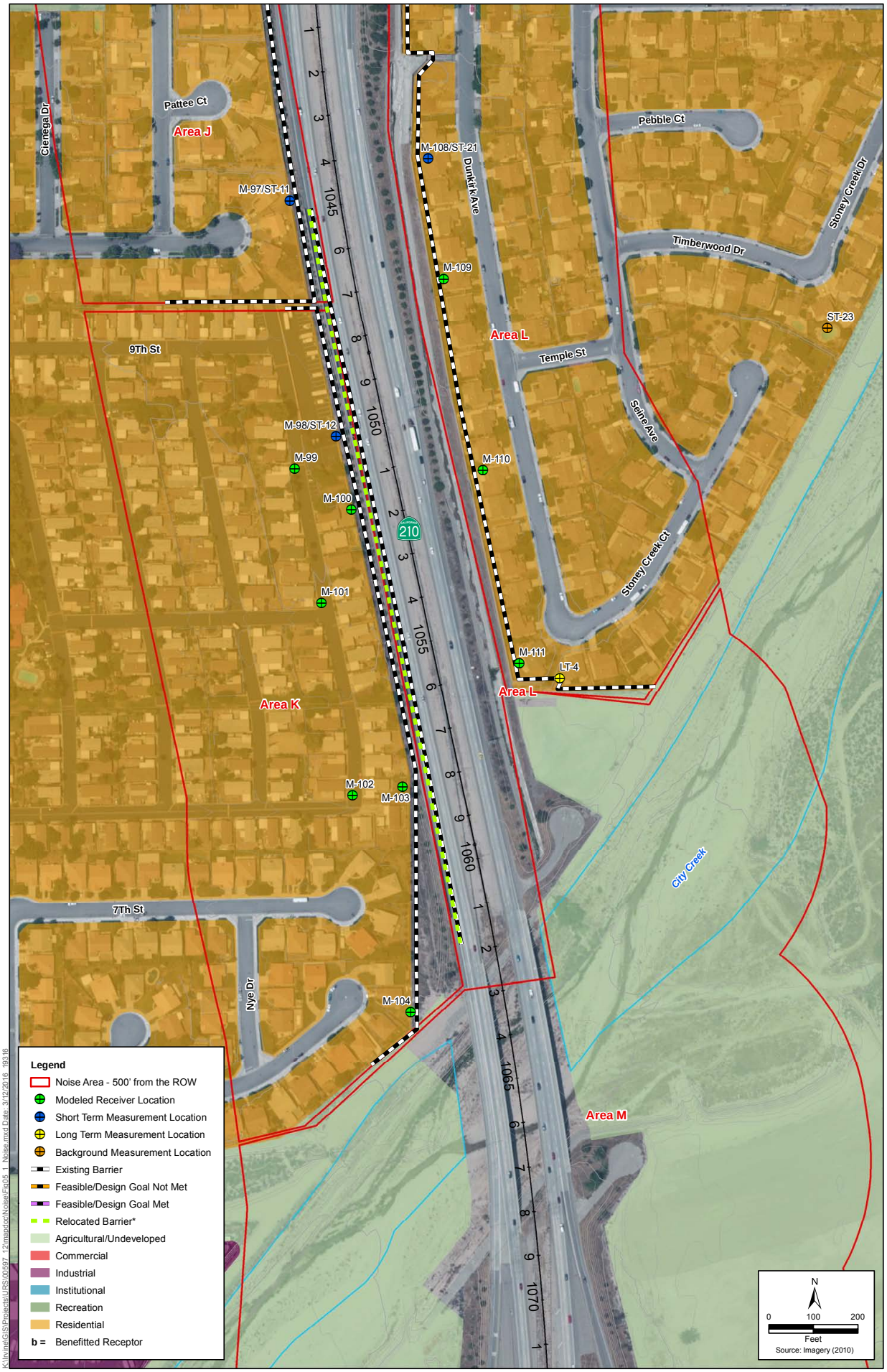
* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 9
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



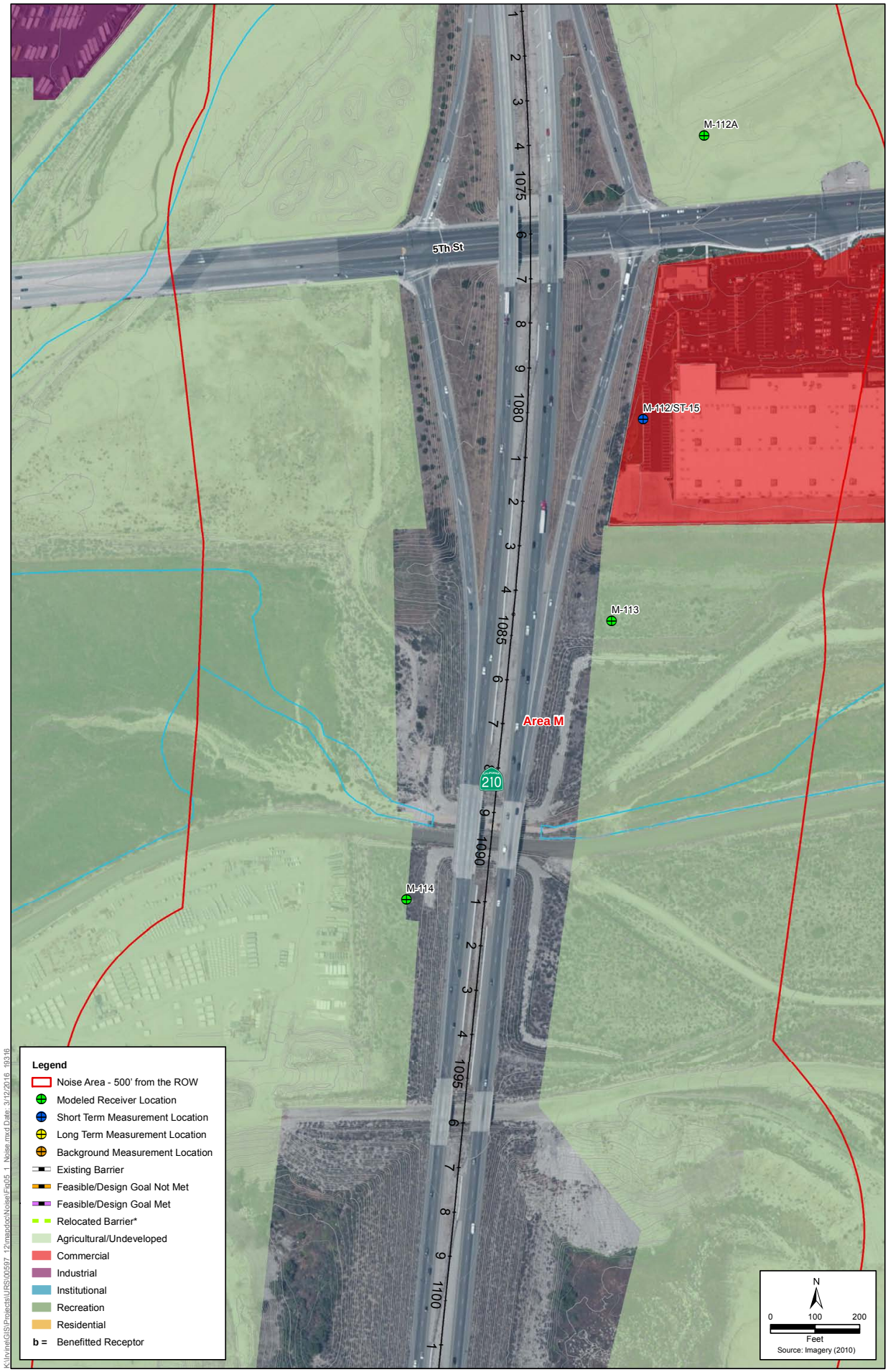
* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 10
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 11
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

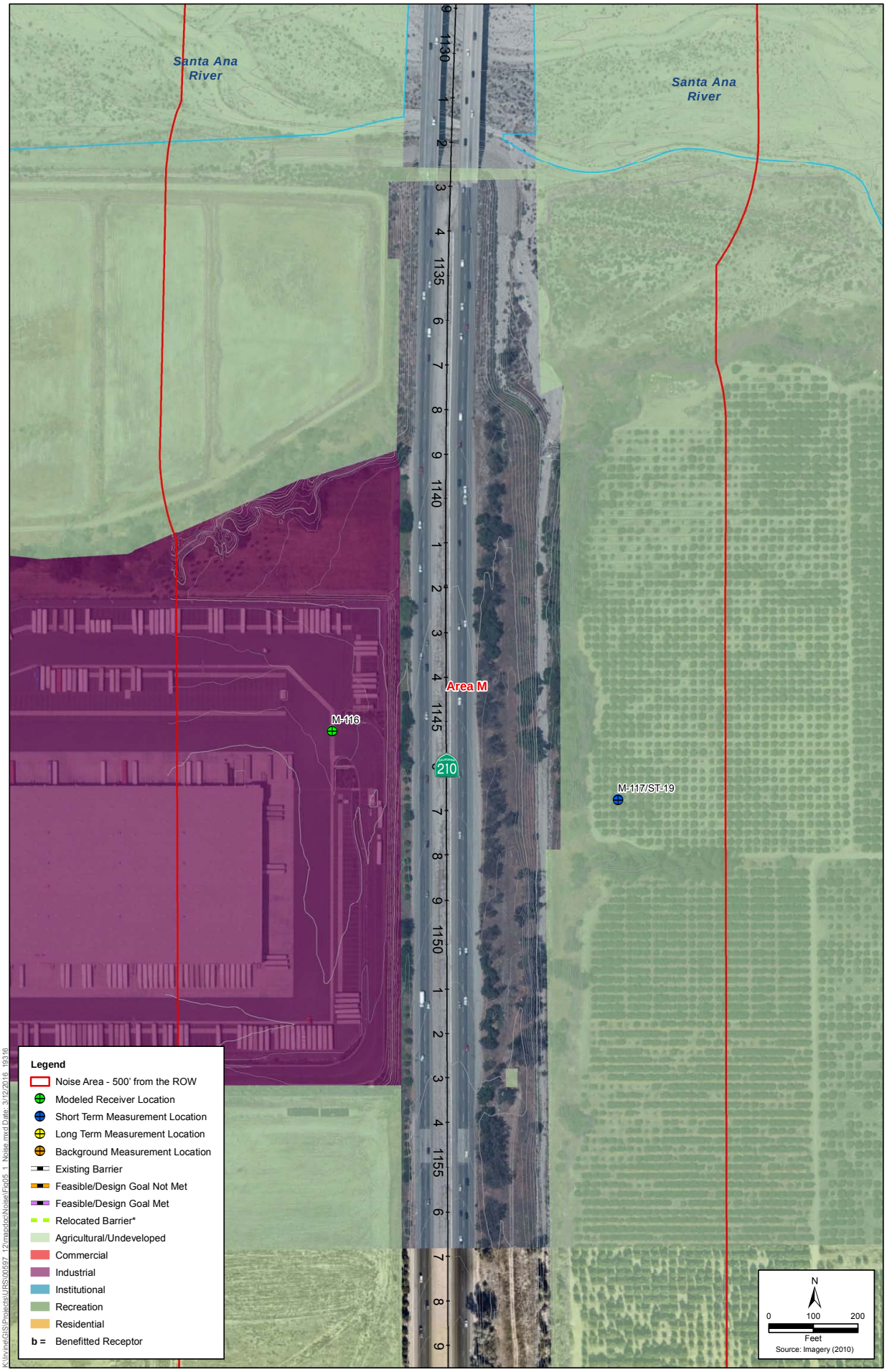


* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 12
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

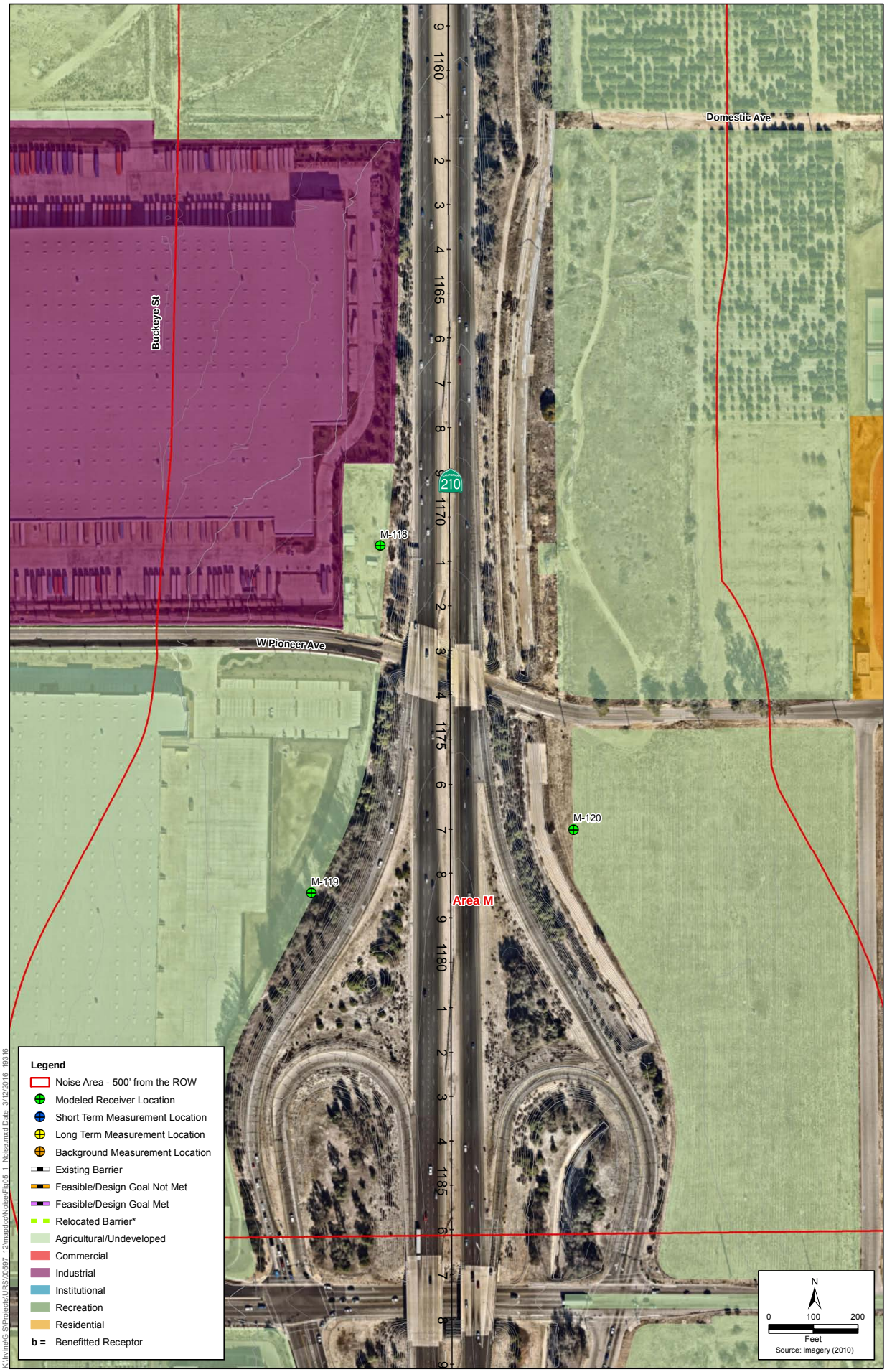
* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 13
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 14
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue



* Barrier relocated to accommodate auxiliary lane designed for the project under the build condition.

Figure 5-1
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 15
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

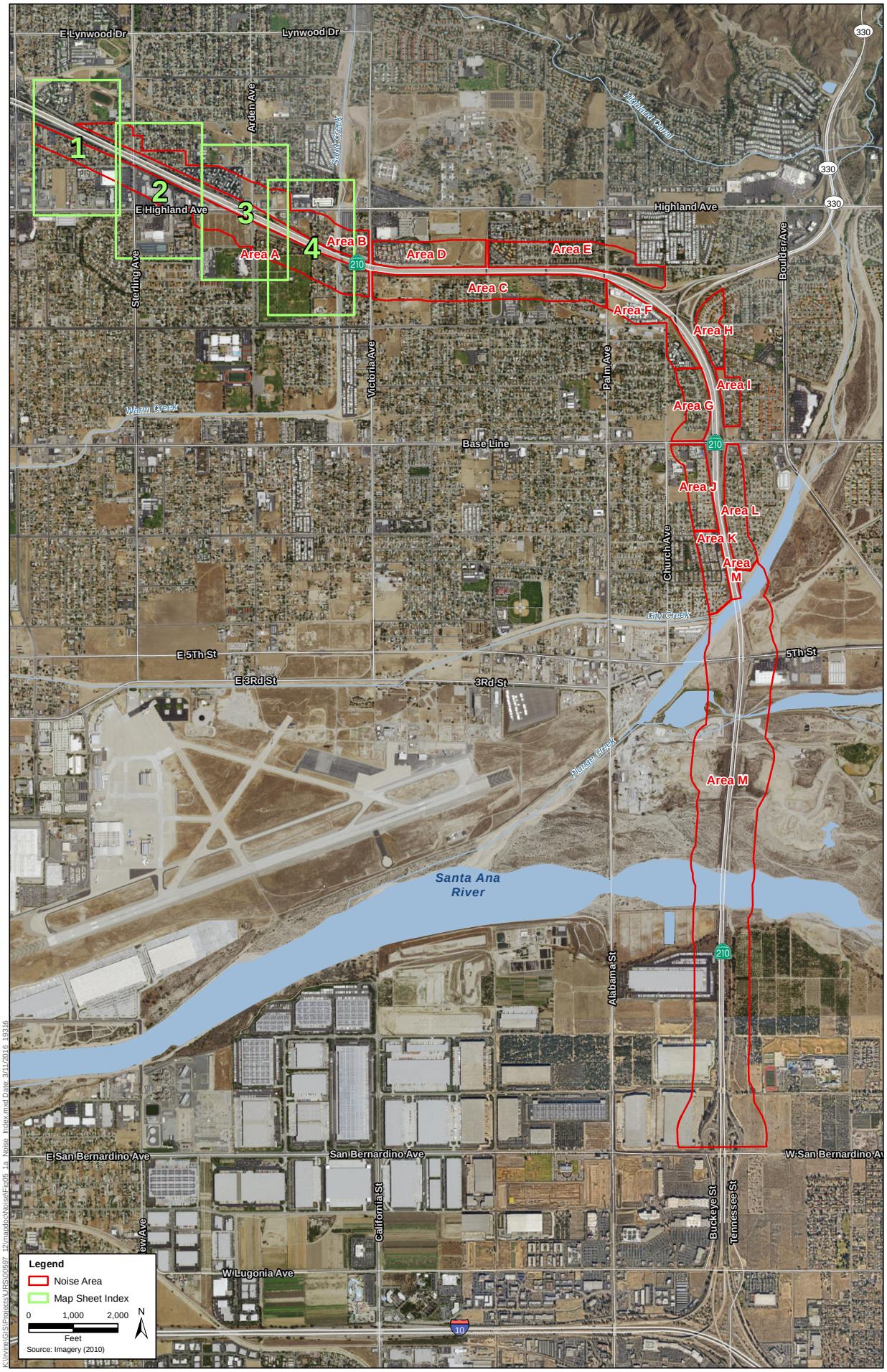


Figure 5-1a
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Index Map
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

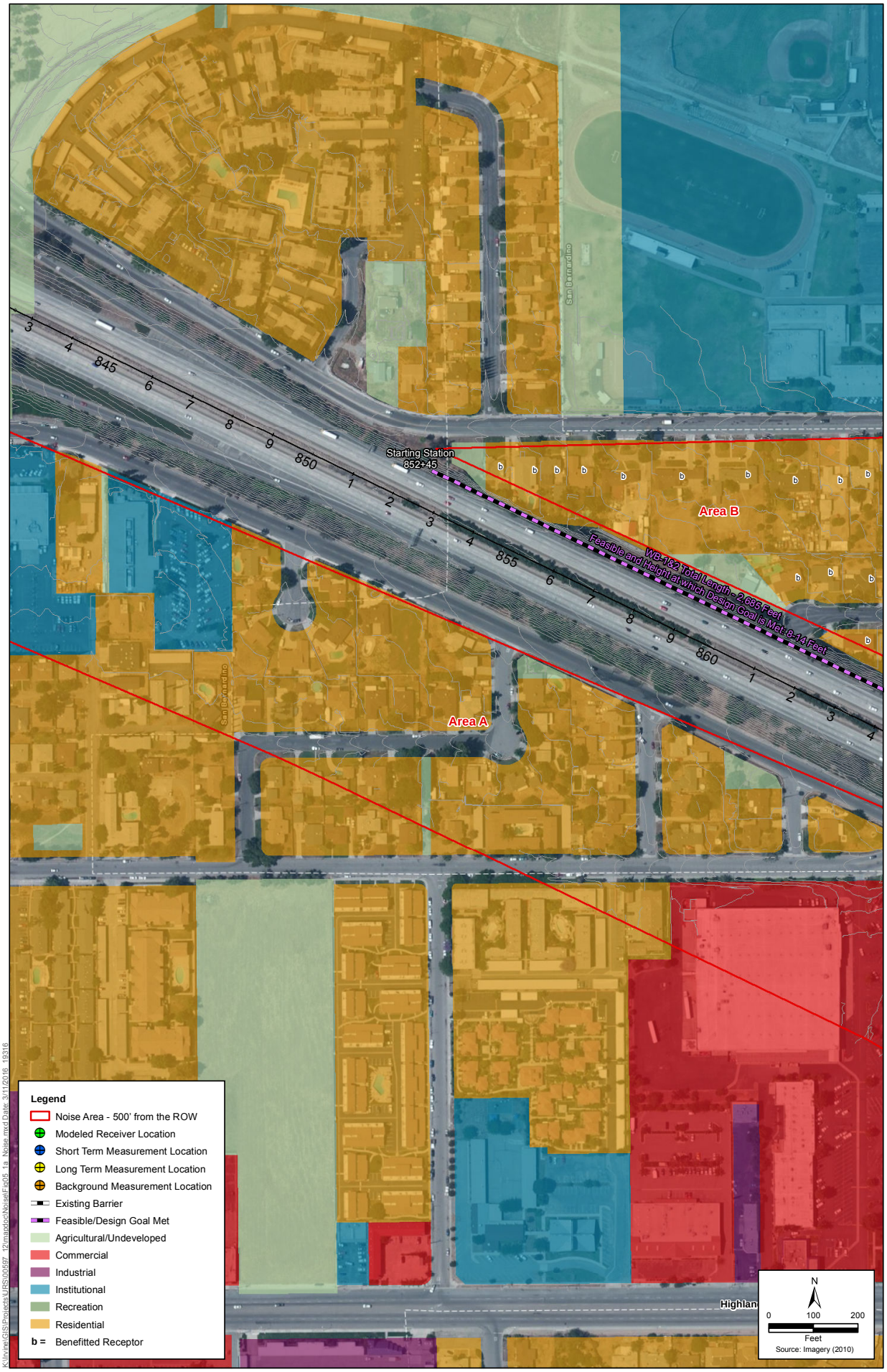


Figure 5-1a
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 1
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

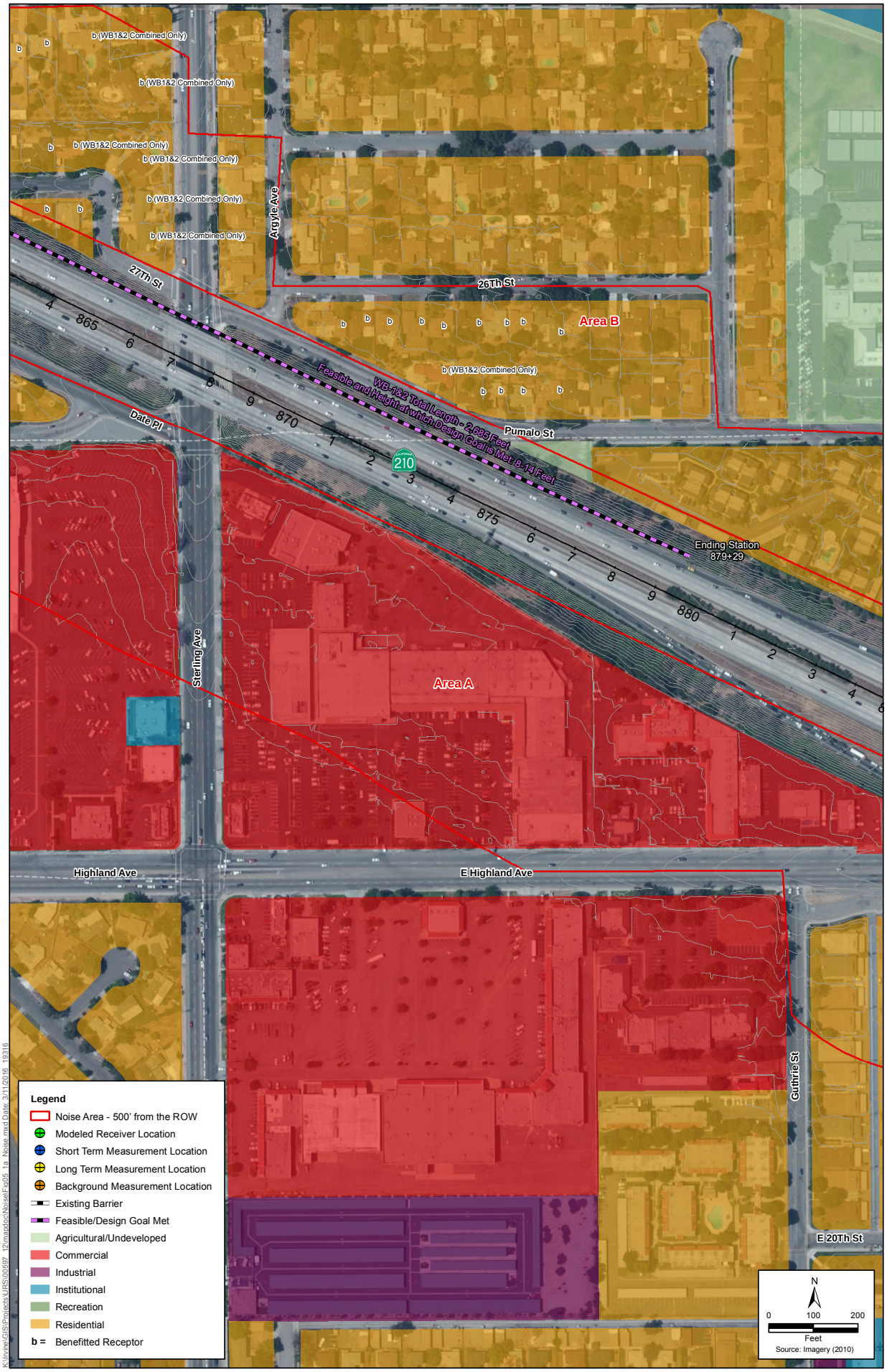


Figure 5-1a
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 2
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

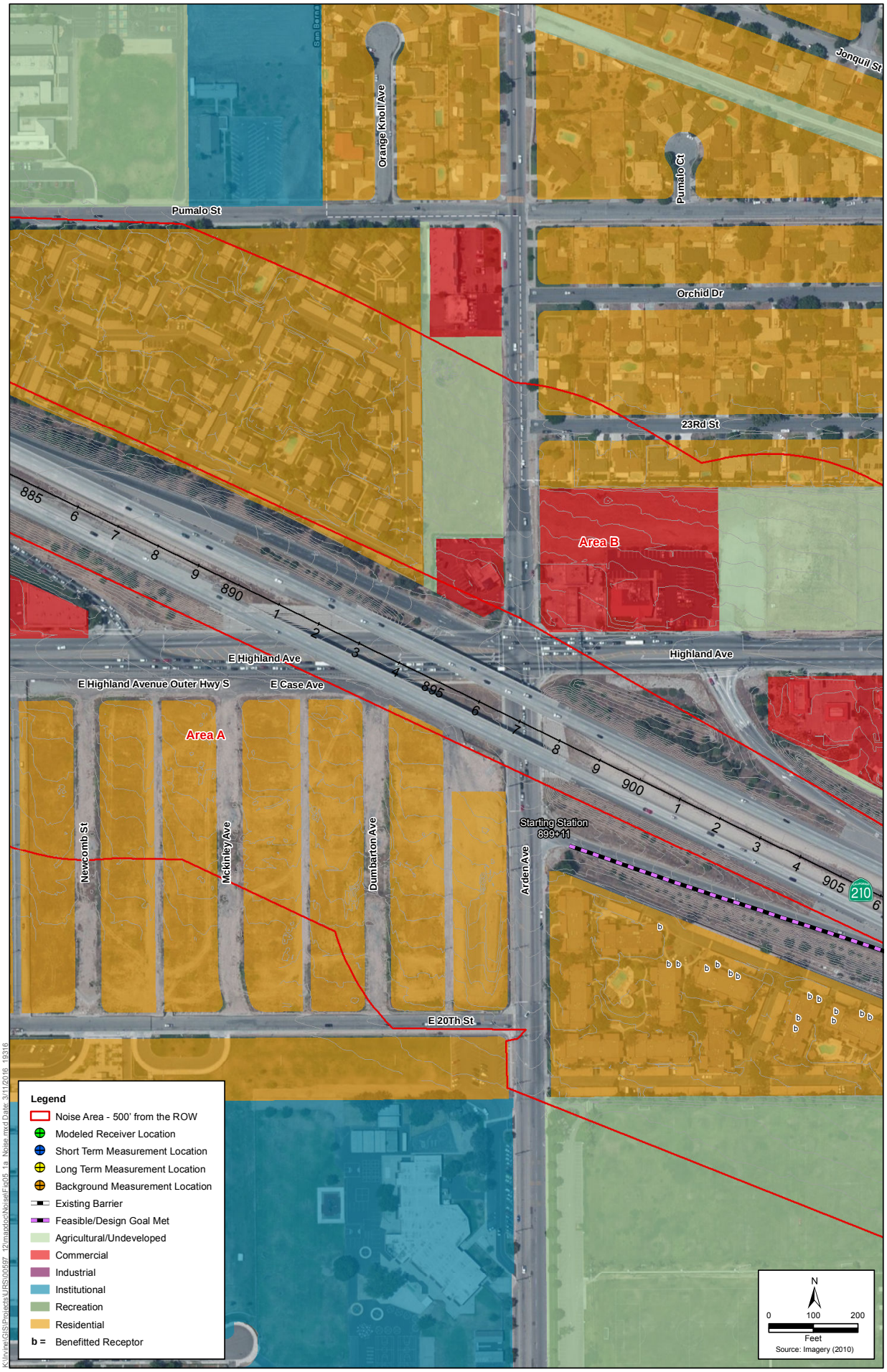


Figure 5-1a
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 3
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

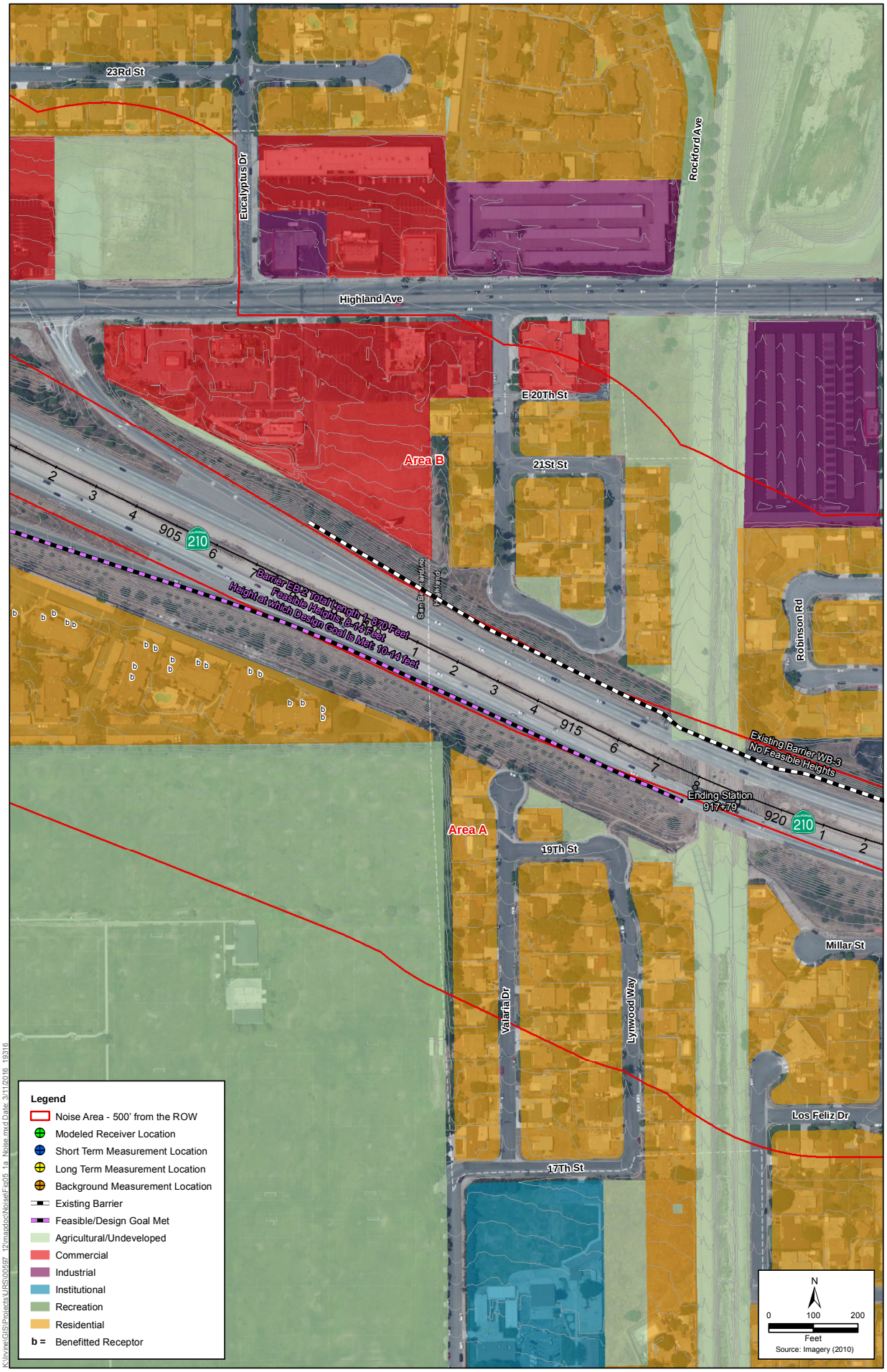


Figure 5-1a
Analysis Areas, Noise Monitoring and Modeling Locations, and Locations of Evaluated Noise Barriers - Sheet 4
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

Appendix B **Cost Estimate**

SR-210 Mixed Flow Lane Addition - Sound Wall Cost Estimates

Barrier EB-1

L	2050	Edge of Pavement												HEIGHT
					8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	1,559	$94,000	1,666	$100,000	1,881	$113,000	1,989	$120,000	2,096	$126,000
2	839734	CONCRETE BARRIER	LF	$150	2,050	$308,000	2,050	$308,000	2,050	$308,000	2,050	$308,000	2,050	$308,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	10,250	$205,000	14,350	$287,000	18,450	$369,000	22,550	$451,000	26,650	$533,000
4		*SUBTRACT SOUND WALL (MASONRY BLOCK) FOR "STEP-DOWN"*	SF	$20	0	$0	-100	($2,000)	-200	($4,000)	-300	($6,000)	0	$0
5	150662	REMOVE MBGR	LF	$10	2,100	$21,000	2,100	$21,000	2,100	$21,000	2,100	$21,000	2,100	$21,000
6	150742	REMOVE ROADSIDE SIGN	EA	$150	5	$800	5	$800	5	$800	5	$800	5	$800
7	150760	REMOVE SIGN STRUCTURE	EA	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000
8	150771	REMOVE ASPHALT CONCRETE DIKE	LF	$5	2,100	$11,000	2,100	$11,000	2,100	$11,000	2,100	$11,000	2,100	$11,000
9	150809	REMOVE CULVERT	LF	$50	20	$1,000	20	$1,000	20	$1,000	20	$1,000	20	$1,000
10	150820	REMOVE INLET	EA	$1,300	1	$2,000	1	$2,000	1	$2,000	1	$2,000	1	$2,000
11	190101	ROADWAY EXCAVATION	CY	$20	775	$16,000	775	$16,000	775	$16,000	775	$16,000	775	$16,000
12	260203	CLASS 2 AGGREGATE BASE (CY)	CY	$40	296	$12,000	296	$12,000	296	$12,000	296	$12,000	296	$12,000
13	390132	HOT MIX ASPHALT (TYPE A)	TON	$80	278	$23,000	278	$23,000	278	$23,000	278	$23,000	278	$23,000
14	498052	60" CIDH CONCRETE PILE (SIGN FOUNDATION)	LF	$1,000	25	$25,000	25	$25,000	25	$25,000	25	$25,000	25	$25,000
15	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	$1,800	4	$8,000	4	$8,000	4	$8,000	4	$8,000	4	$8,000
16	560244	FURNISH LAMINATED PANEL SIGN (1"-TYPE A)	SF	$30	200	$6,000	200	$6,000	200	$6,000	200	$6,000	200	$6,000
17	560218	FURNISH SIGN STRUCTURE (TRUSS)	LB	$4	21,000	$84,000	21,000	$84,000	21,000	$84,000	21,000	$84,000	21,000	$84,000
18	560219	INSTALL SIGN STRUCTURE (TRUSS)	LB	$1	21,000	$11,000	21,000	$11,000	21,000	$11,000	21,000	$11,000	21,000	$11,000
19	562004	METAL (RAIL MOUNTED SIGN)	LB	$30	400	$12,000	400	$12,000	400	$12,000	400	$12,000	400	$12,000
20	839543	TRANSITION RAILING (TYPE WB-31)	EA	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000
21	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000
22		REPLACE LUMINAIRES	LS	$10,000	1	$10,000	1	$10,000	1	$10,000	1	$10,000	1	$10,000
23	120100	TRAFFIC CONTROL SYSTEM	LS	$13,000	1	$13,000	1	$13,000	1	$13,000	1	$13,000	1	$13,000
24	129000	TEMPORARY RAILING (TYPE K)	LF	$10	2,200	$22,000	2,200	$22,000	2,200	$22,000	2,200	$22,000	2,200	$22,000
25	129100	TEMPORARY CRASH CUSHION MODULE	EA	$200	11	$2,200	11	$2,200	11	$2,200	11	$2,200	11	$2,200
26	130100	JOB SITE MANAGEMENT	LS	$14,000	1	$14,000	1	$14,000	1	$14,000	1	$14,000	1	$14,000
27		LANDSCAPING AND IRRIGATION	LS	$22,000	1	$22,000	1	$22,000	1	$22,000	1	$22,000	1	$22,000
*Anchor block included in Minor Concrete (Minor Structure)					WALL SUBTOTAL	$935,000		$1,021,000		$1,114,000		$1,201,000		$1,295,000
					MOBILIZATION (8%)	$74,800		$81,680		$89,120		$96,080		$103,600
					CONTINGENCY (10%)	$100,980		$110,268		$120,312		$129,708		$139,860
					WALL TOTAL	**$1,110,800**		**$1,213,000**		**$1,323,500**		**$1,426,800**		**$1,538,500**

Barrier EB-3

L	615	Edge of Pavement												HEIGHT
					10		10		10		10		10	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	496	$30,000	496	$30,000	496	$30,000	496	$30,000	496	$30,000
2	839734	CONCRETE BARRIER	LF	$150	615	$93,000	615	$93,000	615	$93,000	615	$93,000	615	$93,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	4,305	$87,000	4,305	$87,000	4,305	$87,000	4,305	$87,000	4,305	$87,000
4	150662	REMOVE MBGR	LF	$10	335	$4,000	335	$4,000	335	$4,000	335	$4,000	335	$4,000
5	150820	REMOVE INLET	EA	$1,300	2	$3,000	2	$3,000	2	$3,000	2	$3,000	2	$3,000
6	150771	REMOVE ASPHALT CONCRETE DIKE	LF	$5	615	$4,000	615	$4,000	615	$4,000	615	$4,000	615	$4,000
7	150809	REMOVE CULVERT	LF	$50	20	$1,000	20	$1,000	20	$1,000	20	$1,000	20	$1,000
8	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	$1,800	4	$8,000	4	$8,000	4	$8,000	4	$8,000	4	$8,000
9		12" PIPE CULVERT (DOWN DRAIN)	LF	$60	20	$1,200	20	$1,200	20	$1,200	20	$1,200	20	$1,200
10		REPLACE LUMINAIRES	LS	$10,000	1	$10,000	1	$10,000	1	$10,000	1	$10,000	1	$10,000
11	120100	TRAFFIC CONTROL SYSTEM	LS	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000
12	129000	TEMPORARY RAILING (TYPE K)	LF	$10	700	$7,000	700	$7,000	700	$7,000	700	$7,000	700	$7,000
13	129100	TEMPORARY CRASH CUSHION MODULE	EA	$200	11	$2,200	11	$2,200	11	$2,200	11	$2,200	11	$2,200
14	130100	JOB SITE MANAGEMENT	LS	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000
15		LANDSCAPING AND IRRIGATION	LS	$6,000	1	$6,000	1	$6,000	1	$6,000	1	$6,000	1	$6,000
					WALL SUBTOTAL	$263,400		$263,400		$263,400		$263,400		$263,400
					MOBILIZATION (8%)	$21,072		$21,072		$21,072		$21,072		$21,072
					CONTINGENCY (10%)	$28,447		$28,447		$28,447		$28,447		$28,447
					WALL TOTAL	**$313,000**		**$313,000**		**$313,000**		**$313,000**		**$313,000**

SR-210 Mixed Flow Lane Addition - Sound Wall Cost Estimates

Barrier EB-2 (with EB-3)

L	1450	Edge of Pavement												
					HEIGHT									
					8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	1,095	$66,000	1,170	$71,000	1,321	$80,000	1,397	$84,000	1,472	$89,000
2	839734	CONCRETE BARRIER	LF	$150	1,450	$218,000	1,450	$218,000	1,450	$218,000	1,450	$218,000	1,450	$218,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	7,250	$145,000	10,150	$203,000	13,050	$261,000	15,950	$319,000	18,850	$377,000
4		*SUBTRACT SOUND WALL (MASONRY BLOCK) FOR "STEP-DOWN"*	SF	$20	0	$0	-100	($2,000)	-200	($4,000)	-300	($6,000)	0	$0
5	150662	REMOVE MBGR	LF	$10	1,600	$16,000	1,600	$16,000	1,600	$16,000	1,600	$16,000	1,600	$16,000
6	150742	REMOVE ROADSIDE SIGN	EA	$150	2	$300	2	$300	2	$300	2	$300	2	$300
7	150771	REMOVE ASPHALT CONCRETE DIKE	LF	$5	1,450	$8,000	1,450	$8,000	1,450	$8,000	1,450	$8,000	1,450	$8,000
8	150809	REMOVE CULVERT	LF	$50	190	$10,000	190	$10,000	190	$10,000	190	$10,000	190	$10,000
9	150820	REMOVE INLET	EA	$1,300	2	$3,000	2	$3,000	2	$3,000	2	$3,000	2	$3,000
10	190101	ROADWAY EXCAVATION	CY	$20	370	$8,000	370	$8,000	370	$8,000	370	$8,000	370	$8,000
11	260203	CLASS 2 AGGREGATE BASE (CY)	CY	$40	259	$11,000	259	$11,000	259	$11,000	259	$11,000	259	$11,000
12	390132	HOT MIX ASPHALT (TYPE A)	TON	$80	244	$20,000	244	$20,000	244	$20,000	244	$20,000	244	$20,000
13	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	$1,800	6	$11,000	6	$11,000	6	$11,000	6	$11,000	6	$11,000
14	562004	METAL (RAIL MOUNTED SIGN)	LB	$30	160	$5,000	160	$5,000	160	$5,000	160	$5,000	160	$5,000
15		24" PIPE CULVERT	LF	$70	190	$14,000	190	$14,000	190	$14,000	190	$14,000	190	$14,000
16	839543	TRANSITION RAILING (TYPE WB-31)	EA	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000
17	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000
18		REPLACE LUMINAIRES	LS	$10,000	2	$20,000	2	$20,000	2	$20,000	2	$20,000	2	$20,000
19	120100	TRAFFIC CONTROL SYSTEM	LS	$9,000	1	$9,000	1	$9,000	1	$9,000	1	$9,000	1	$9,000
20	129000	TEMPORARY RAILING (TYPE K)	LF	$10	1,500	$15,000	1,500	$15,000	1,500	$15,000	1,500	$15,000	1,500	$15,000
21	129100	TEMPORARY CRASH CUSHION MODULE	EA	$200	11	$2,200	11	$2,200	11	$2,200	11	$2,200	11	$2,200
22	130100	JOB SITE MANAGEMENT	LS	$9,000	1	$9,000	1	$9,000	1	$9,000	1	$9,000	1	$9,000
23		LANDSCAPING AND IRRIGATION	LS	$14,000	1	$14,000	1	$14,000	1	$14,000	1	$14,000	1	$14,000
*Anchor block included in Minor Concrete (Minor Structure)					WALL SUBTOTAL	$611,500		$672,500		$737,500		$797,500		$866,500
					MOBILIZATION (8%)	$48,920		$53,800		$59,000		$63,800		$69,320
					CONTINGENCY (10%)	$66,042		$72,630		$79,650		$86,130		$93,582
					WALL TOTAL	**$726,500**		**$799,000**		**$876,200**		**$947,500**		**$1,029,500**

Barrier EB-2 (standalone)

L	1875	Edge of Pavement												
					HEIGHT									
					8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	1,421	$86,000	1,519	$92,000	1,715	$103,000	1,813	$109,000	1,911	$115,000
2	839734	CONCRETE BARRIER	LF	$150	1,875	$282,000	1,875	$282,000	1,875	$282,000	1,875	$282,000	1,875	$282,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	9,375	$188,000	13,125	$263,000	16,875	$338,000	20,625	$413,000	24,375	$488,000
4		*SUBTRACT SOUND WALL (MASONRY BLOCK) FOR "STEP-DOWN"*	SF	$20	0	$0	-154	($4,000)	-250	($5,000)	-350	($7,000)	0	$0
5	150662	REMOVE MBGR	LF	$10	1,600	$16,000	1,600	$16,000	1,600	$16,000	1,600	$16,000	1,600	$16,000
6	150742	REMOVE ROADSIDE SIGN	EA	$150	4	$600	4	$600	4	$600	4	$600	4	$600
7	150771	REMOVE ASPHALT CONCRETE DIKE	LF	$5	1,875	$10,000	1,875	$10,000	1,875	$10,000	1,875	$10,000	1,875	$10,000
8	150809	REMOVE CULVERT	LF	$50	190	$10,000	190	$10,000	190	$10,000	190	$10,000	190	$10,000
9	150820	REMOVE INLET	EA	$1,300	2	$3,000	2	$3,000	2	$3,000	2	$3,000	2	$3,000
10	190101	ROADWAY EXCAVATION	CY	$20	370	$8,000	370	$8,000	370	$8,000	370	$8,000	370	$8,000
11	260203	CLASS 2 AGGREGATE BASE (CY)	CY	$40	259	$11,000	259	$11,000	259	$11,000	259	$11,000	259	$11,000
12	390132	HOT MIX ASPHALT (TYPE A)	TON	$80	244	$20,000	244	$20,000	244	$20,000	244	$20,000	244	$20,000
13	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	$1,800	6	$11,000	6	$11,000	6	$11,000	6	$11,000	6	$11,000
14	562004	METAL (RAIL MOUNTED SIGN)	LB	$30	320	$10,000	320	$10,000	320	$10,000	320	$10,000	320	$10,000
15		24" PIPE CULVERT	LF	$70	190	$14,000	190	$14,000	190	$14,000	190	$14,000	190	$14,000
16	839543	TRANSITION RAILING (TYPE WB-31)	EA	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000
17	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000
18		REPLACE LUMINAIRES	LS	$10,000	3	$30,000	3	$30,000	3	$30,000	3	$30,000	3	$30,000
19	120100	TRAFFIC CONTROL SYSTEM	LS	$11,000	1	$11,000	1	$11,000	1	$11,000	1	$11,000	1	$11,000
20	129100	TEMPORARY CRASH CUSHION MODULE	EA	$200	11	$2,200	11	$2,200	11	$2,200	11	$2,200	11	$2,200
21	129000	TEMPORARY RAILING (TYPE K)	LF	$10	2,000	$20,000	2,000	$20,000	2,000	$20,000	2,000	$20,000	2,000	$20,000
22	130100	JOB SITE MANAGEMENT	LS	$11,000	1	$11,000	1	$11,000	1	$11,000	1	$11,000	1	$11,000
23		LANDSCAPING AND IRRIGATION	LS	$18,000	1	$18,000	1	$18,000	1	$18,000	1	$18,000	1	$18,000
*Anchor block included in Minor Concrete (Minor Structure)					WALL SUBTOTAL	$768,800		$845,800		$930,800		$1,009,800		$1,097,800
					MOBILIZATION (8%)	$61,504		$67,664		$74,464		$80,784		$87,824
					CONTINGENCY (10%)	$83,030		$91,346		$100,526		$109,058		$118,562
					WALL TOTAL	**$913,400**		**$1,004,900**		**$1,105,800**		**$1,199,700**		**$1,304,200**

SR-210 Mixed Flow Lane Addition - Sound Wall Cost Estimates

Barrier WB-1 (with WB-2)

L	1390	Edge of Pavement			HEIGHT									
					8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	1,051	$64,000	1,124	$68,000	1,269	$77,000	1,341	$81,000	1,414	$85,000
2	839734	CONCRETE BARRIER	LF	$150	1,390	$209,000	1,390	$209,000	1,390	$209,000	1,390	$209,000	1,390	$209,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	6,950	$139,000	9,730	$195,000	12,510	$251,000	15,290	$306,000	18,070	$362,000
4		*SUBTRACT SOUND WALL (MASONRY BLOCK) FOR "STEP-DOWN"*	SF	$20	0	$0	-80	($2,000)	-184	($4,000)	-282	($6,000)	0	$0
5	150662	REMOVE MBGR	LF	$10	1,490	$15,000	1,490	$15,000	1,490	$15,000	1,490	$15,000	1,490	$15,000
6	150742	REMOVE ROADSIDE SIGN	EA	$150	2	$300	2	$300	2	$300	2	$300	2	$300
7	150771	REMOVE ASPHALT CONCRETE DIKE	LF	$5	1,490	$8,000	1,490	$8,000	1,490	$8,000	1,490	$8,000	1,490	$8,000
8	150809	REMOVE CULVERT	LF	$50	168	$9,000	168	$9,000	168	$9,000	168	$9,000	168	$9,000
9	150820	REMOVE INLET	EA	$1,300	3	$4,000	3	$4,000	3	$4,000	3	$4,000	3	$4,000
10	190101	ROADWAY EXCAVATION	CY	$20	242	$5,000	242	$5,000	242	$5,000	242	$5,000	242	$5,000
11	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	$1,800	5	$9,000	5	$9,000	5	$9,000	5	$9,000	5	$9,000
12	562004	METAL (RAIL MOUNTED SIGN)	LB	$30	160	$5,000	160	$5,000	160	$5,000	160	$5,000	160	$5,000
13		24" PIPE CULVERT	LF	$70	168	$12,000	168	$12,000	168	$12,000	168	$12,000	168	$12,000
14		24" FLARED END SECTION	EA	$600	2	$2,000	2	$2,000	2	$2,000	2	$2,000	2	$2,000
15	721013	ROCK SLOPE PROTECTION	CY	$130	36	$5,000	36	$5,000	36	$5,000	36	$5,000	36	$5,000
16	729011	ROCK SLOPE FABRIC (CLASS 8)	SY	$10	85	$1,000	85	$1,000	85	$1,000	85	$1,000	85	$1,000
17	120100	TRAFFIC CONTROL SYSTEM	LS	$8,000	1	$8,000	1	$8,000	1	$8,000	1	$8,000	1	$8,000
18	129000	TEMPORARY RAILING (TYPE K)	LF	$10	1,670	$17,000	1,670	$17,000	1,670	$17,000	1,670	$17,000	1,670	$17,000
19	130100	JOB SITE MANAGEMENT	LS	$9,000	1	$9,000	1	$9,000	1	$9,000	1	$9,000	1	$9,000
20		LANDSCAPING AND IRRIGATION	LS	$12,000	1	$12,000	1	$12,000	1	$12,000	1	$12,000	1	$12,000
					WALL SUBTOTAL	$533,300		$591,300		$654,300		$711,300		$777,300
					MOBILIZATION (8%)	$42,664		$47,304		$52,344		$56,904		$62,184
					CONTINGENCY (10%)	$57,596		$63,860		$70,664		$76,820		$83,948
					WALL TOTAL	**$633,600**		**$702,500**		**$777,400**		**$845,100**		**$923,500**

Barrier WB-2 (with WB-1)

L	1115	Edge of Pavement			HEIGHT									
					8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	522	$32,000	558	$34,000	630	$38,000	666	$40,000	702	$43,000
2	839734	CONCRETE BARRIER	LF	$150	1,115	$168,000	1,115	$168,000	1,115	$168,000	1,115	$168,000	1,115	$168,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	5,575	$112,000	7,805	$157,000	10,035	$201,000	12,265	$246,000	14,495	$290,000
4		*SUBTRACT SOUND WALL (MASONRY BLOCK) FOR "STEP-DOWN"*	SF	$20	0	$0	-200	($4,000)	-400	($8,000)	-600	($12,000)	0	$0
5	150662	REMOVE MBGR	LF	$10	1,115	$12,000	1,115	$12,000	1,115	$12,000	1,115	$12,000	1,115	$12,000
6	150742	REMOVE ROADSIDE SIGN	EA	$150	2	$300	2	$300	2	$300	2	$300	2	$300
7	150760	REMOVE SIGN STRUCTURE	EA	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000
8	150771	REMOVE ASPHALT CONCRETE DIKE	LF	$5	1,115	$6,000	1,115	$6,000	1,115	$6,000	1,115	$6,000	1,115	$6,000
9	150820	REMOVE INLET	EA	$1,300	1	$2,000	1	$2,000	1	$2,000	1	$2,000	1	$2,000
10	190101	ROADWAY EXCAVATION	CY	$20	457	$10,000	457	$10,000	457	$10,000	457	$10,000	457	$10,000
11	260203	CLASS 2 AGGREGATE BASE (CY)	CY	$40	102	$5,000	102	$5,000	102	$5,000	102	$5,000	102	$5,000
12	390132	HOT MIX ASPHALT (TYPE A)	TON	$80	96	$8,000	96	$8,000	96	$8,000	96	$8,000	96	$8,000
13	498052	60" CIDH CONCRETE PILE (SIGN FOUNDATION)	LF	$1,000	25	$25,000	25	$25,000	25	$25,000	25	$25,000	25	$25,000
14	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	$1,800	4	$8,000	4	$8,000	4	$8,000	4	$8,000	4	$8,000
15	560244	FURNISH LAMINATED PANEL SIGN (1"-TYPE A)	SF	$30	200	$6,000	200	$6,000	200	$6,000	200	$6,000	200	$6,000
16	560218	FURNISH SIGN STRUCTURE (TRUSS)	LB	$4	21,000	$84,000	21,000	$84,000	21,000	$84,000	21,000	$84,000	21,000	$84,000
17	560219	INSTALL SIGN STRUCTURE (TRUSS)	LB	$1	21,000	$11,000	21,000	$11,000	21,000	$11,000	21,000	$11,000	21,000	$11,000
18	562004	METAL (RAIL MOUNTED SIGN)	LB	$30	160	$5,000	160	$5,000	160	$5,000	160	$5,000	160	$5,000
19	839543	TRANSITION RAILING (TYPE WB-31)	EA	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000
20	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000
21		REPLACE LUMINAIRES	LS	$10,000	1	$10,000	1	$10,000	1	$10,000	1	$10,000	1	$10,000
22	120100	TRAFFIC CONTROL SYSTEM	LS	$8,000	1	$8,000	1	$8,000	1	$8,000	1	$8,000	1	$8,000
23	129000	TEMPORARY RAILING (TYPE K)	LF	$10	1,116	$12,000	1,116	$12,000	1,116	$12,000	1,116	$12,000	1,116	$12,000
24	129100	TEMPORARY CRASH CUSHION MODULE	EA	$200	11	$2,200	11	$2,200	11	$2,200	11	$2,200	11	$2,200
25	130100	JOB SITE MANAGEMENT	LS	$8,000	1	$8,000	1	$8,000	1	$8,000	1	$8,000	1	$8,000
26		LANDSCAPING AND IRRIGATION	LS	$12,000	1	$12,000	1	$12,000	1	$12,000	1	$12,000	1	$12,000
					WALL SUBTOTAL	$558,500		$601,500		$645,500		$688,500		$747,500
					MOBILIZATION (8%)	$44,680		$48,120		$51,640		$55,080		$59,800
					CONTINGENCY (10%)	$60,318		$64,962		$69,714		$74,358		$80,730
					WALL TOTAL	**$663,500**		**$714,600**		**$766,900**		**$818,000**		**$888,100**

*Anchor block included in Minor Concrete (Minor Structure)

SR-210 Mixed Flow Lane Addition - Sound Wall Cost Estimates

Barrier WB-3A

L 580 R/W - top of slope

HEIGHT

ITEM NO.	ITEM CODE	DESCRIPTION	UNIT	UNIT PRICE	8 QUANTITY	8 COST	10 QUANTITY	10 COST	12 QUANTITY	12 COST	14 QUANTITY	14 COST	16 QUANTITY	16 COST
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	152	$10,000	473	$29,000	534	$33,000	564	$34,000	595	$36,000
2	510061	STRUCTURAL CONCRETE, SOUND WALL	CY	$750	56	$43,000	56	$43,000	56	$43,000	56	$43,000	56	$43,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	4,640	$93,000	5,800	$116,000	6,960	$140,000	8,120	$163,000	9,280	$186,000
4	150604	REMOVE WOOD FENCE	LF	$10	266	$3,000	266	$3,000	266	$3,000	266	$3,000	266	$3,000
5	150605	REMOVE FENCE	LF	$6	580	$4,000	580	$4,000	580	$4,000	580	$4,000	580	$4,000
6	153253	REMOVE SOUND WALL	SF	$5	1,432	$8,000	1,432	$8,000	1,432	$8,000	1,432	$8,000	1,432	$8,000
7		EXTEND PROPERTY WALLS (APPROXIMATELY 4 FEET)	LF	$30	27	$1,000	27	$1,000	27	$1,000	27	$1,000	27	$1,000
8	130100	JOB SITE MANAGEMENT	LS	$2,500	1	$2,500	1	$2,500	1	$2,500	1	$2,500	1	$2,500
9		LANDSCAPING AND IRRIGATION	LS	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000
					WALL SUBTOTAL	$168,500		$210,500		$238,500		$262,500		$287,500
					MOBILIZATION (8%)	$13,480		$16,840		$19,080		$21,000		$23,000
					CONTINGENCY (10%)	$18,198		$22,734		$25,758		$28,350		$31,050
					TCE	$58,000		$58,000		$58,000		$58,000		$58,000
					WALL TOTAL	**$258,200**		**$308,100**		**$341,400**		**$369,900**		**$399,600**

Barrier WB-4

L 450 R/W - top of slope

HEIGHT

ITEM NO.	ITEM CODE	DESCRIPTION	UNIT	UNIT PRICE	8 QUANTITY	8 COST	10 QUANTITY	10 COST	12 QUANTITY	12 COST	14 QUANTITY	14 COST	16 QUANTITY	16 COST
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	131	$8,000	372	$23,000	420	$26,000	444	$27,000	468	$29,000
2	510061	STRUCTURAL CONCRETE, SOUND WALL	CY	$750	44	$33,000	44	$33,000	44	$33,000	44	$33,000	44	$33,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	3,600	$72,000	4,500	$90,000	5,400	$108,000	6,300	$126,000	7,200	$144,000
4		REMOVE WALL	SF	$5	2,892	$15,000	2,892	$15,000	2,892	$15,000	2,892	$15,000	2,892	$15,000
5		REMOVE WROUGHT IRON FENCE	LF	$5	360	$2,000	360	$2,000	360	$2,000	360	$2,000	360	$2,000
6	153121	REMOVE CONCRETE (CY)	CY	$120	12	$2,000	12	$2,000	12	$2,000	12	$2,000	12	$2,000
7	721420	CONCRETE (DITCH LINING)	CY	$450	12	$6,000	12	$6,000	12	$6,000	12	$6,000	12	$6,000
8	130100	JOB SITE MANAGEMENT	LS	$2,500	1	$3,000	1	$3,000	1	$3,000	1	$3,000	1	$3,000
9		LANDSCAPING AND IRRIGATION	LS	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000	1	$4,000
					WALL SUBTOTAL	$145,000		$178,000		$199,000		$218,000		$238,000
					MOBILIZATION (8%)	$11,600		$14,240		$15,920		$17,440		$19,040
					CONTINGENCY (10%)	$15,660		$19,224		$21,492		$23,544		$25,704
					TCE	$45,000		$45,000		$45,000		$45,000		$45,000
					WALL TOTAL	**$217,300**		**$256,500**		**$281,500**		**$304,000**		**$327,800**

Barrier WB-5

L 60 R/W - top of slope

HEIGHT

ITEM NO.	ITEM CODE	DESCRIPTION	UNIT	UNIT PRICE	8 QUANTITY	8 COST	10 QUANTITY	10 COST	12 QUANTITY	12 COST	14 QUANTITY	14 COST	16 QUANTITY	16 COST	18 QUANTITY	18 COST
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	44	$3,000	47	$3,000	53	$4,000	56	$4,000	59	$4,000	62	$4,000
2	510061	STRUCTURAL CONCRETE, SOUND WALL	CY	$750	6	$5,000	6	$5,000	6	$5,000	6	$5,000	6	$5,000	6	$5,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	480	$10,000	600	$12,000	720	$15,000	840	$17,000	960	$20,000	1,080	$22,000
4	150604	REMOVE WOOD FENCE	LF	$10	60	$1,000	60	$1,000	60	$1,000	60	$1,000	60	$1,000	60	$1,000
5	153121	REMOVE CONCRETE (CY)	CY	$120	9	$2,000	9	$2,000	9	$2,000	9	$2,000	9	$2,000	9	$2,000
6	130100	JOB SITE MANAGEMENT	LS	$400	1	$400	1	$400	1	$400	1	$400	1	$400	1	$400
					WALL SUBTOTAL	$21,400		$23,400		$27,400		$29,400		$32,400		$34,400
					MOBILIZATION (8%)	$1,712		$1,872		$2,192		$2,352		$2,592		$2,752
					CONTINGENCY (10%)	$2,311		$2,527		$2,959		$3,175		$3,499		$3,715
					TCE	$6,000		$6,000		$6,000		$6,000		$6,000		$6,000
					WALL TOTAL	**$31,500**		**$33,800**		**$38,600**		**$41,000**		**$44,500**		**$46,900**

SR-210 Mixed Flow Lane Addition - Sound Wall Cost Estimates

Barrier WB-6

L	1245	R/W - top of slope			HEIGHT 8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	885	$54,000	946	$57,000	1,068	$65,000	1,129	$68,000	1,190	$72,000
2	498022	24" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$150	44	$7,000	47	$7,000	53	$8,000	56	$9,000	62	$10,000
3	839734	CONCRETE BARRIER	LF	$150	1,245	$187,000	1,245	$187,000	1,245	$187,000	1,245	$187,000	1,245	$187,000
4	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	6,225	$125,000	8,715	$175,000	11,205	$225,000	13,695	$274,000	16,185	$324,000
5	150605	REMOVE FENCE	LF	$6	1,245	$8,000	1,245	$8,000	1,245	$8,000	1,245	$8,000	1,245	$8,000
6		REMOVE AND EXTEND PROPERTY FENCE	LF	$10	20	$1,000	20	$1,000	20	$1,000	20	$1,000	20	$1,000
7	721420	CONCRETE (DITCH LINING)	CY	$450	116	$53,000	116	$53,000	116	$53,000	116	$53,000	116	$53,000
8	130100	JOB SITE MANAGEMENT	LS	$7,500	1	$7,500	1	$7,500	1	$7,500	1	$7,500	1	$7,500
9		LANDSCAPING AND IRRIGATION	LS	$12,000	1	$12,000	1	$12,000	1	$12,000	1	$12,000	1	$12,000
					WALL SUBTOTAL	$454,500		$507,500		$566,500		$619,500		$674,500
					MOBILIZATION (8%)	$36,360		$40,600		$45,320		$49,560		$53,960
					CONTINGENCY (10%)	$49,086		$54,810		$61,182		$66,906		$72,846
					TCE	$125,000		$125,000		$125,000		$125,000		$125,000
					WALL TOTAL	**$665,000**		**$728,000**		**$798,100**		**$861,000**		**$926,400**

Barrier WB-7

L	220	R/W - top of slope			HEIGHT 8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	498016	16" CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	LF	$60	167	$11,000	178	$11,000	201	$13,000	213	$13,000	224	$14,000
2	510061	STRUCTURAL CONCRETE, SOUND WALL	CY	$750	21	$17,000	21	$17,000	21	$17,000	21	$17,000	21	$17,000
3	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	1,760	$36,000	2,200	$44,000	2,640	$53,000	3,080	$62,000	3,520	$71,000
4	150604	REMOVE WOOD FENCE	LF	$10	163	$2,000	163	$2,000	163	$2,000	163	$2,000	163	$2,000
5	150605	REMOVE FENCE	LF	$6	65	$1,000	65	$1,000	65	$1,000	65	$1,000	65	$1,000
6		REMOVE AND EXTEND PROPERTY FENCE	LF	$10	26	$1,000	26	$1,000	26	$1,000	26	$1,000	26	$1,000
7	153121	REMOVE CONCRETE (CY)	CY	$120	2	$1,000	2	$1,000	2	$1,000	2	$1,000	2	$1,000
8	160120	REMOVE TREE (EA)	EA	$500	6	$3,000	6	$3,000	6	$3,000	6	$3,000	6	$3,000
9	130100	JOB SITE MANAGEMENT	LS	$1,000	1	$1,000	1	$1,000	1	$1,000	1	$1,000	1	$1,000
10		LANDSCAPING AND IRRIGATION	LS	$2,000	1	$2,000	1	$2,000	1	$2,000	1	$2,000	1	$2,000
					WALL SUBTOTAL	$75,000		$83,000		$94,000		$103,000		$113,000
					MOBILIZATION (8%)	$6,000		$6,640		$7,520		$8,240		$9,040
					CONTINGENCY (10%)	$8,100		$8,964		$10,152		$11,124		$12,204
					TCE	$22,000		$22,000		$22,000		$22,000		$22,000
					WALL TOTAL	**$111,100**		**$120,700**		**$133,700**		**$144,400**		**$156,300**

Sound wall across WB Sterling Ave UC (added to combined WB-1 and WB-2)

L	180	Edge of Pavement			HEIGHT 8		10		12		14		16	
ITEM NO.	**ITEM CODE**	**DESCRIPTION**	**UNIT**	**UNIT PRICE**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**	**QUANTITY**	**COST**
1	839734	CONCRETE BARRIER	LF	$150	180	$27,000	180	$27,000	180	$27,000	180	$27,000	180	$27,000
2	518002	SOUND WALL (MASONRY BLOCK)	SF	$20	900	$18,000	1,260	$26,000	1,620	$33,000	1,980	$40,000	2,340	$47,000
3	120100	TRAFFIC CONTROL SYSTEM	LS	$2,000	1	$2,000	1	$2,000	1	$2,000	1	$2,000	1	$2,000
4	129000	TEMPORARY RAILING (TYPE K)	LF	$10	180	$2,000	180	$2,000	180	$2,000	180	$2,000	180	$2,000
5		STRENGTHENING OF OUTSIDE BRIDGE EDGE	LS	$100,000	1	$100,000	1	$100,000	1	$100,000	1	$100,000	1	$100,000
					WALL SUBTOTAL	$149,000		$157,000		$164,000		$171,000		$178,000
					MOBILIZATION (8%)	$11,920		$12,560		$13,120		$13,680		$14,240
					CONTINGENCY (10%)	$16,092		$16,956		$17,712		$18,468		$19,224
					WALL TOTAL	**$177,100**		**$186,600**		**$194,900**		**$203,200**		**$211,500**

Appendix C **Preliminary Layout Sheets**

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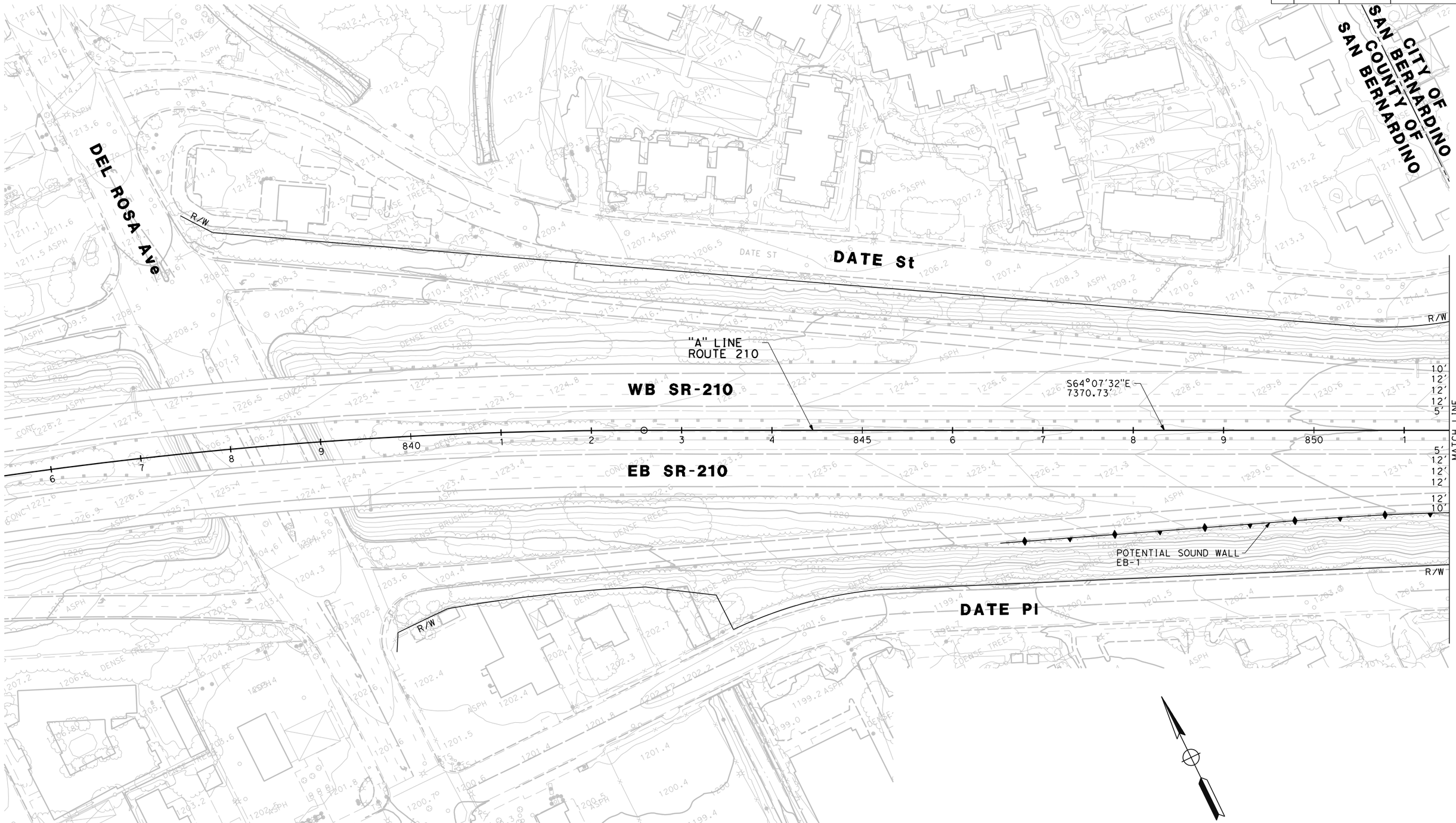

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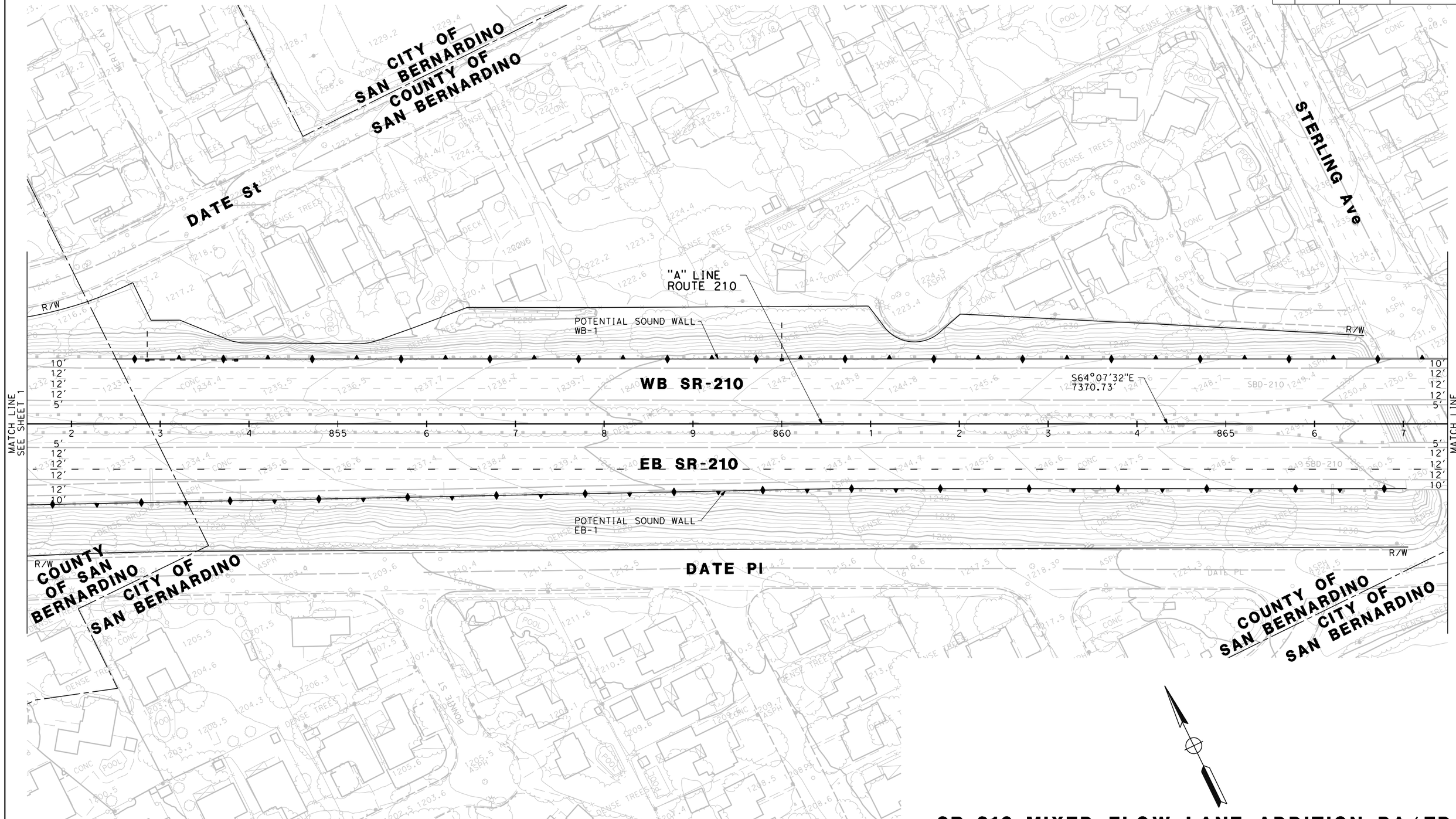

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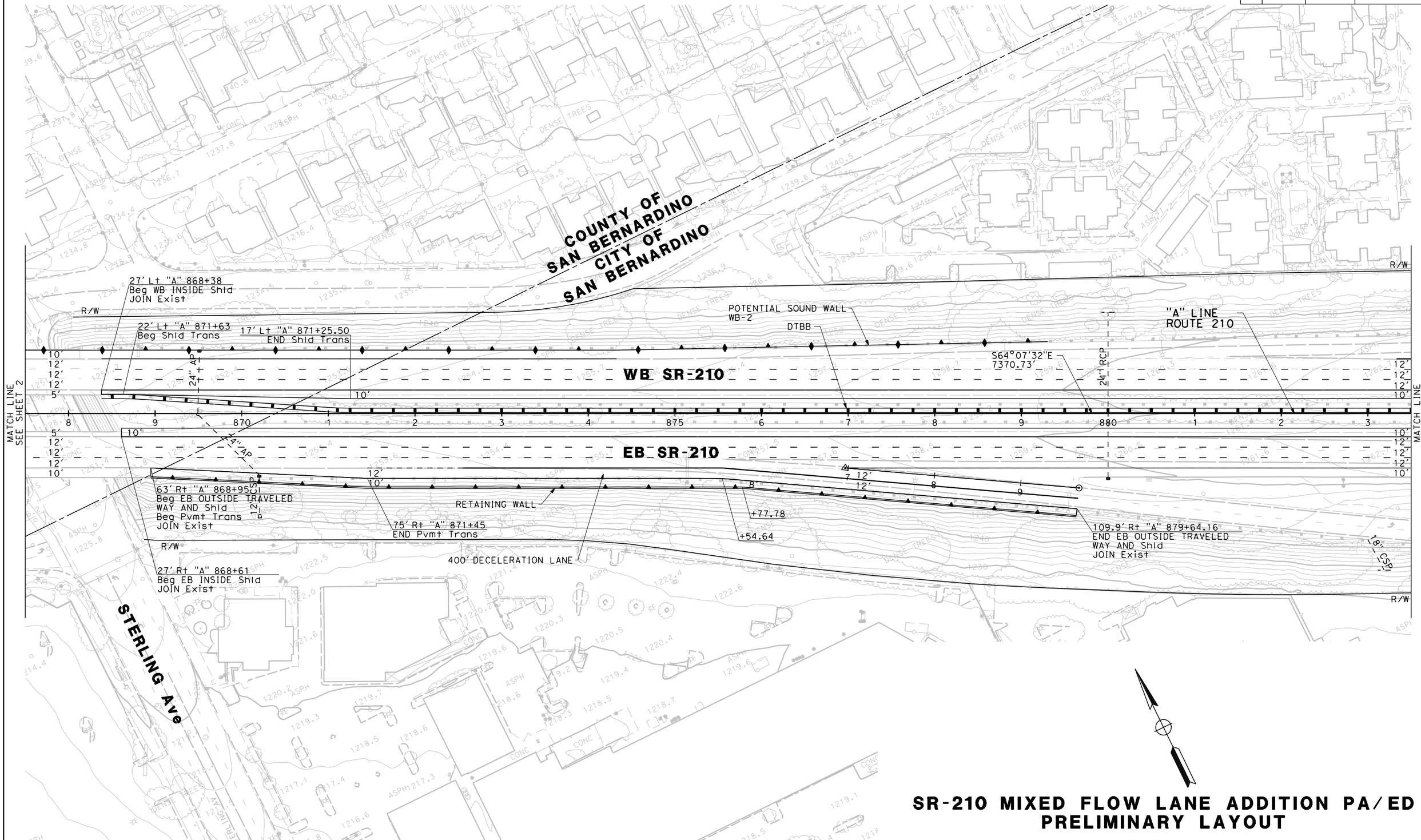

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PRELIMINARY LAYOUT

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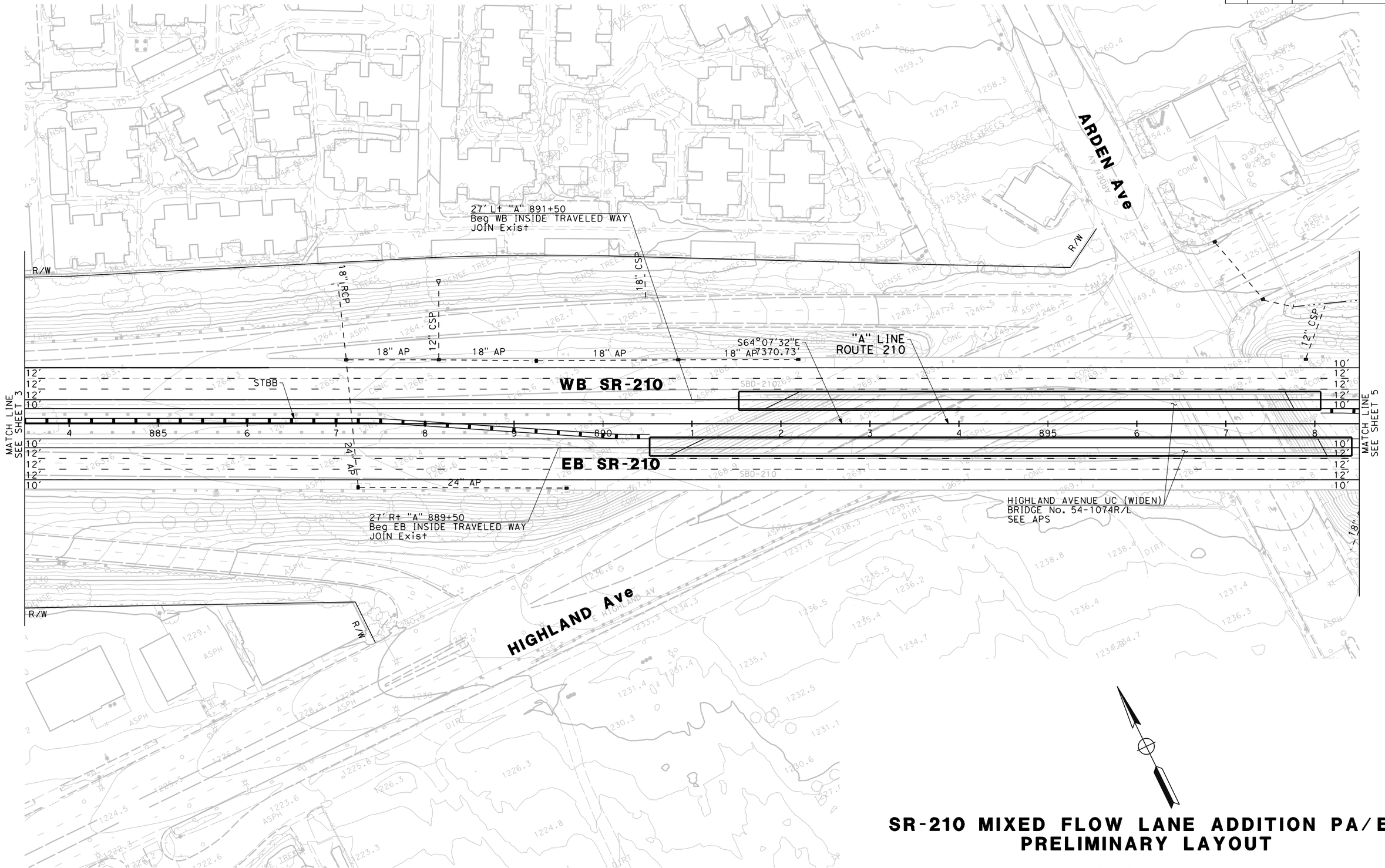

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PRELIMINARY LAYOUT

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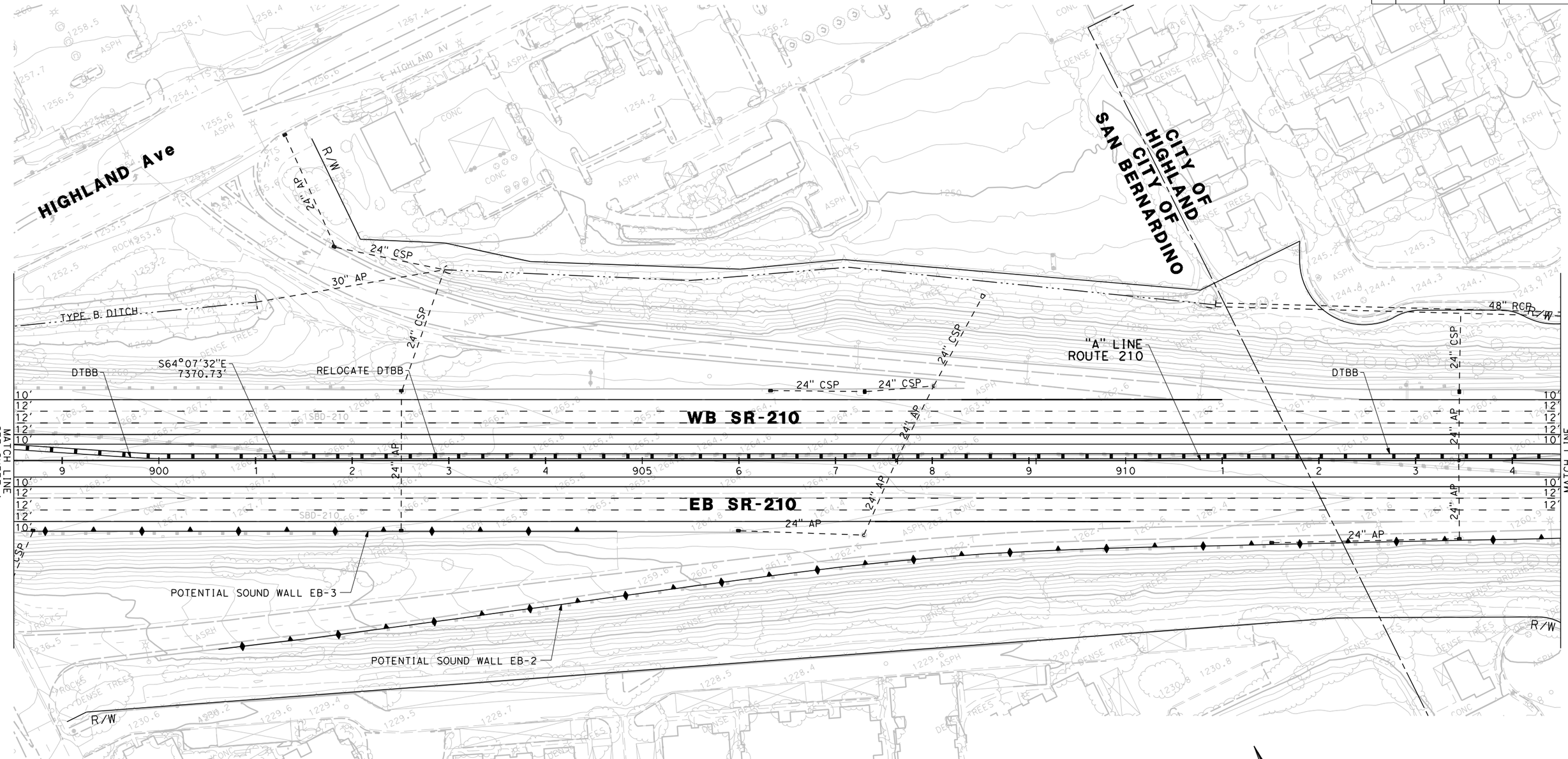

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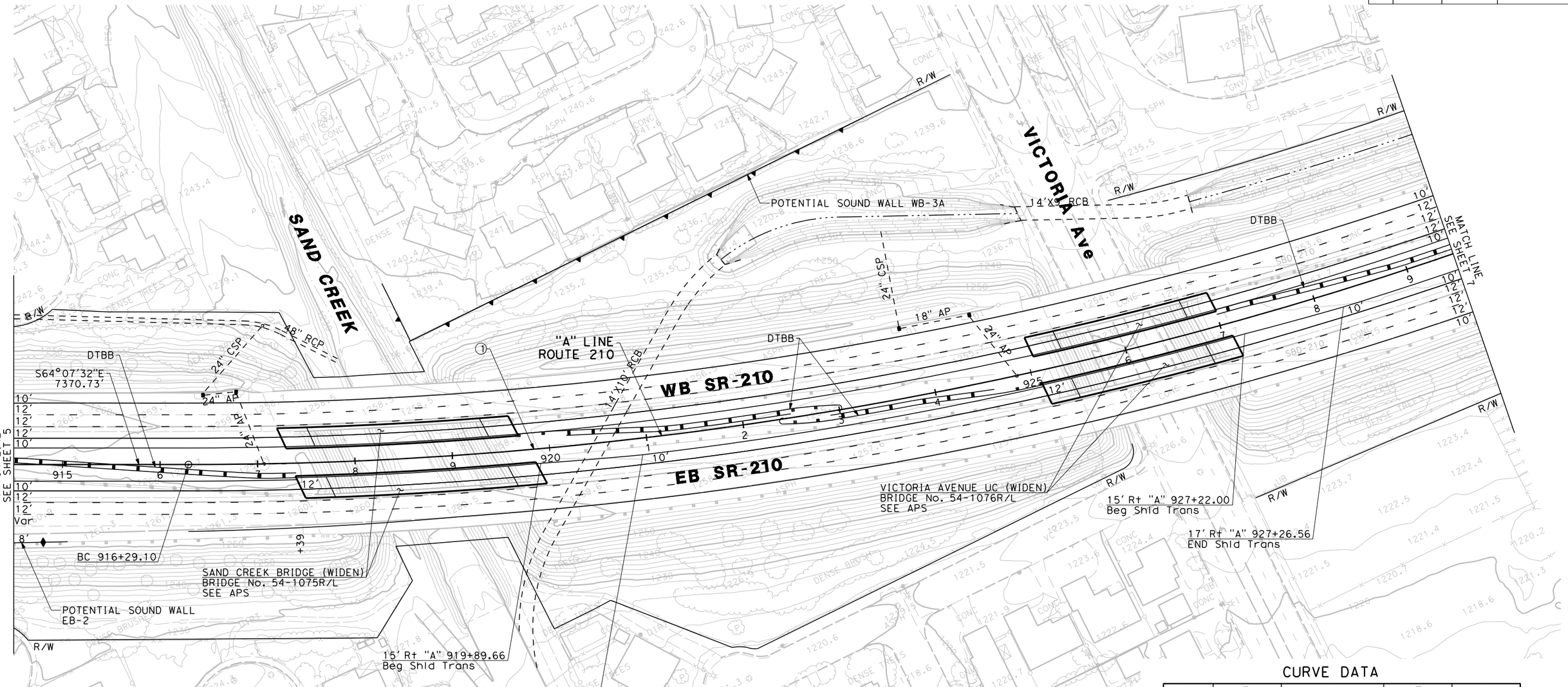

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SR-210 MIXED FLOW LANE ADDITION PA/ED
PRELIMINARY LAYOUT

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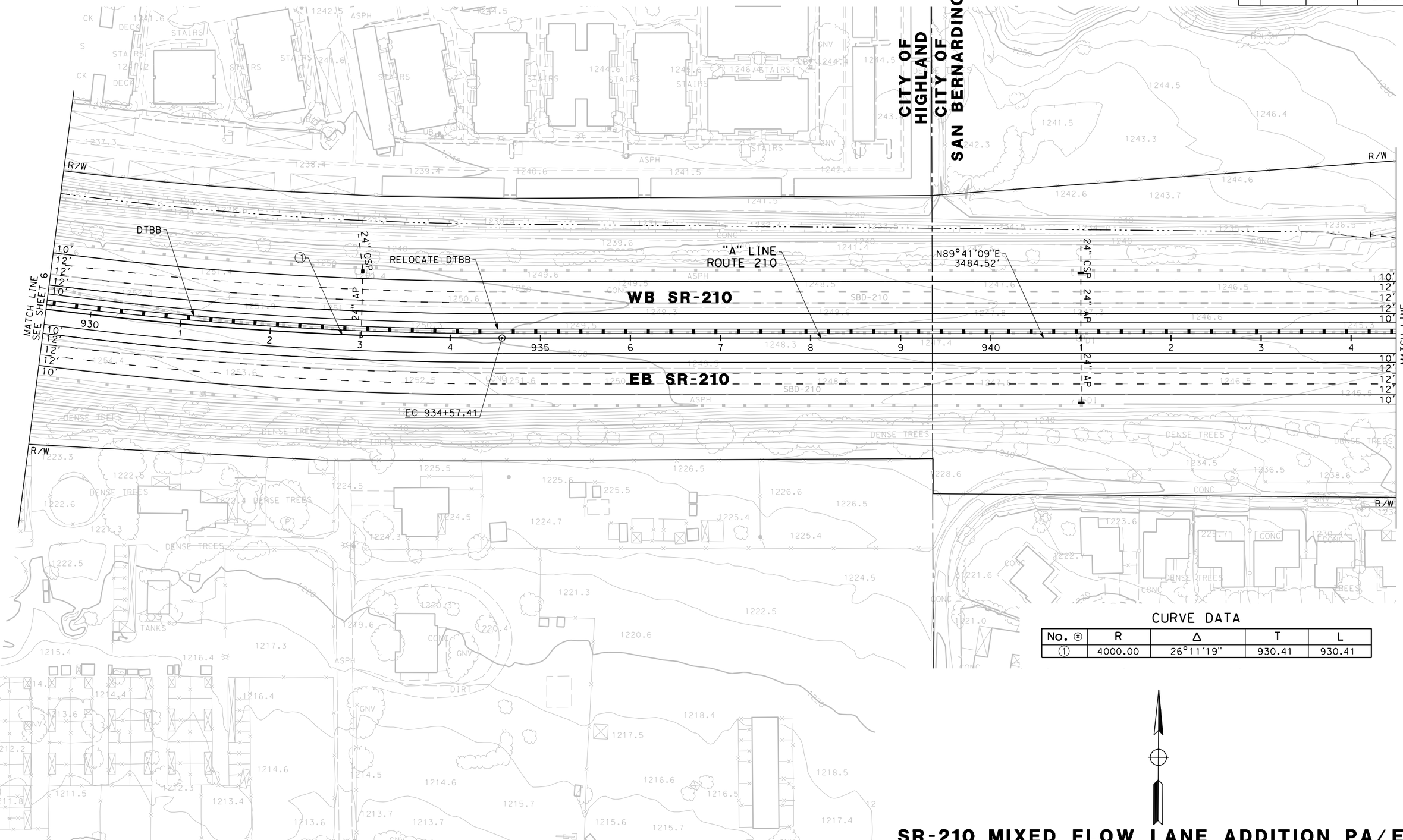

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SR-210 MIXED FLOW LANE ADDITION PA/ED PRELIMINARY LAYOUT

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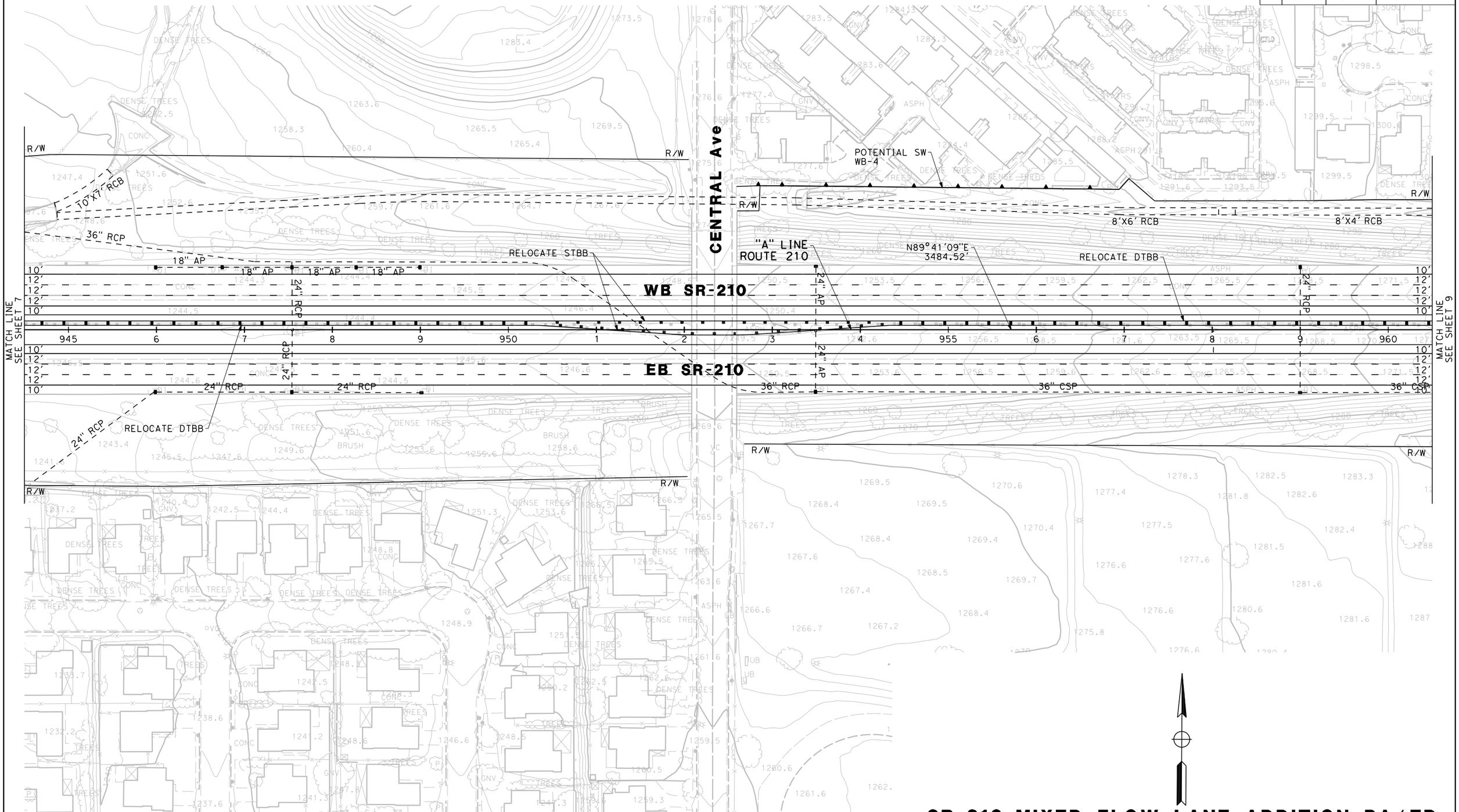

SR-210 MIXED FLOW LANE ADDITION PA/ED
PRELIMINARY LAYOUT

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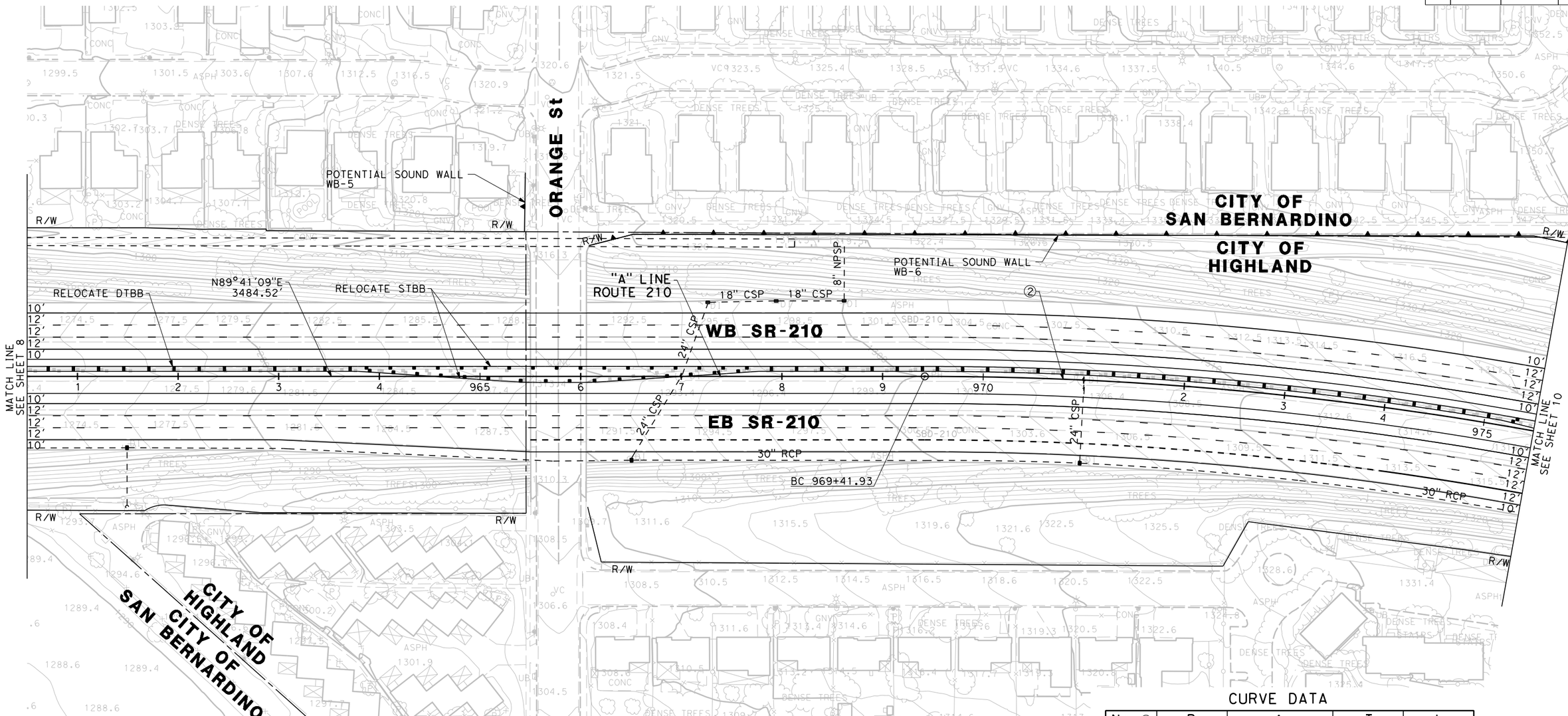

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SR-210 MIXED FLOW LANE ADDITION PA/ED
PRELIMINARY LAYOUT

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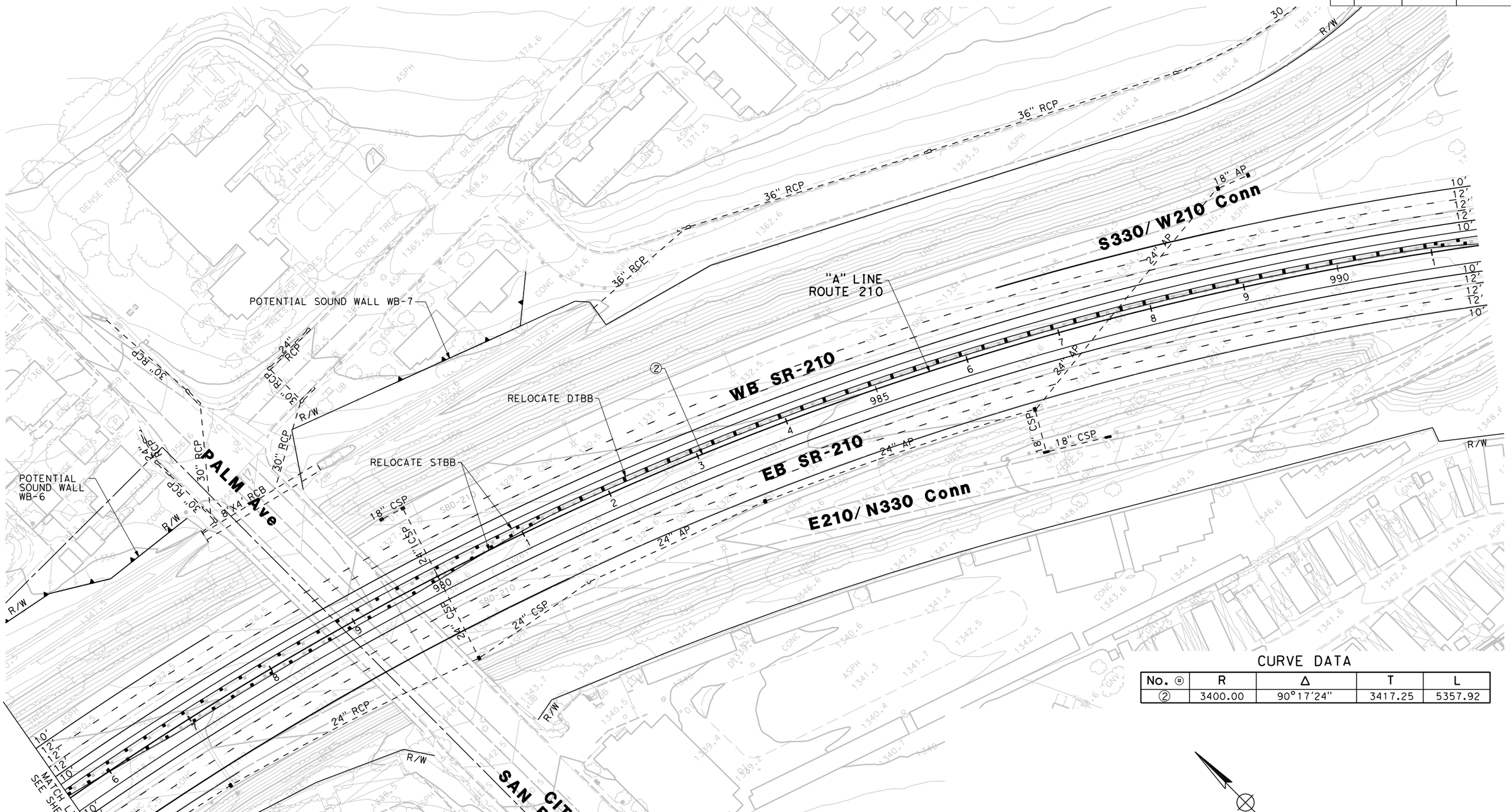

CURVE DATA

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SR-210 MIXED FLOW LANE ADDITION PA/ED PRELIMINARY LAYOUT

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