Noise Abatement Decision Report

Addendum

Supplemented by the August 2015 Noise Study Report Addendum

San Bernardino and Los Angeles Counties

07-LA-10 PM 44.9/48.3
08-SBD-10 PM 0.0/R37.0

EA 0C2500
EFIS ID 0800000040

August 2015

Caltrans

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Prepared By: Emily A. Hoyt Date: 9/1/15

Emily Hoyt
Associate Planner
Parsons
(949) 333-4546

Reviewed By: David Ovadia Date: 9/1/15

David Ovadia, PE
Senior Project Engineer
Parsons
(949) 333-4549

Approved By: [signature] Date: 9/1/15

David Speirs, PE
Project Manager
Parsons
(949) 333-4535

Concurred By: For Tony Louka Date: 9/10/2015

Tony Louka
Chief Office of Environmental Engineering
California Department of Transportation, District 8
(909) 383-6385

Summary

This addendum to the I-10 Corridor Project Noise Abatement Decision Report (NADR) was prepared to analyze whether feasible and reasonable noise abatement would be possible for impacted receivers located south of the Union Pacific Railroad (UPRR) railroad tracks with a soundwall located on private property. Soundwalls are being considered on private property because 1) UPRR will not allow soundwalls to be constructed on their R/W, 2) soundwall analysis was only performed on the shoulder of I-10, and 3) soundwalls located on the shoulder of I-10 would not provide feasible noise abatement and meet the design goal, as established in the Noise Study Report (NSR) (Parsons, 2015).

The purpose of this NADR Addendum is to evaluate traffic noise impacts and abatement under the requirements of Title 23, Part 772 of the Code of Federal Regulations (Title 23 CFR 772) "Procedures for Abatement of Highway Traffic Noise." Title 23 CFR 772 provides procedures for preparing operational and construction noise studies as well as evaluating noise abatement considered for federal and federal-aid highway projects. According to Title 23 CFR 772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with Federal Highway Administration (FHWA) noise standards.

The California Department of Transportation (Caltrans), in cooperation with the San Bernardino Associated Governments (SANBAG), proposes to add freeway lanes through all or a portion of the 33-mile long stretch of I-10 from the Los Angeles/San Bernardino (LA/SB) county line to Ford Street in San Bernardino County. The project limits including transition areas extend from approximately 0.4 mile west of White Avenue in the City of Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in the City of Yucaipa at PM 37.0. However, for the purpose of this addendum to the I-10 Corridor Project Noise Study Report (NSR) (Parsons, 2015), the project limits extend from Cherry Avenue in the City of Fontana to Cedar Avenue in the City of Bloomington (San Bernardino County).

This addendum analyzes land uses south of I-10 in three distinct segments that are based on major local interchanges. The three segments are:

- Segment 9 – West of Cherry Avenue to Citrus Avenue
- Segment 10 – Citrus Avenue to Sierra Avenue
- Segment 11 – Sierra Avenue to west of Cedar Avenue

Railroad tracks run parallel to I-10 from Segment 9 to 16. However, the study limits of this addendum are land uses south of I-10 in Segments 9, 10, and 11. This is because there are no outdoor use areas south of the train tracks within the study limits in Segments 12 through 14 and the UPRR flyover structure on retaining walls in Segments 15 and 16 would nullify all efforts to provide feasible noise abatement with a soundwall located on private property.

This report analyzes noise barriers with heights from 8 to 24 feet to determine feasible noise abatement for Build Alternatives 2 and 3. Soundwalls are considered feasible when they provide at least 5 dB of noise reduction. The Noise Reduction Design Goal, which is one measure in determining whether a soundwall is reasonable, is achieved when a barrier is predicted to provide a noise reduction of at least 7 dB at one or more benefitted receivers. Two additional measures in determining the reasonableness of a soundwall include considering the viewpoints of property owners and residences of benefitted receivers, and the cost effectiveness of constructing the soundwall.

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List of Acronyms and Abbreviated Terms

Benefitted residence	A dwelling unit expected to receive a noise reduction of at least 5 dB from the proposed abatement measure
Caltrans	California Department of Transportation
CCD	Caltrans Cost Database
CFR	*Code of Federal Regulations*
CPI	Construction Price Index
dB	decibel—A measure of sound pressure level on a logarithmic scale
ED	Environmental Document
FHWA	Federal Highway Administration
I-10	Interstate 10
LA/SB	Los Angeles/San Bernardino
NADR	Noise Abatement Decision Report
NSR	Noise Study Report
PM	Post Mile
Protocol	Caltrans Traffic Noise Analysis Protocol
Reasonable allowance	A single dollar value—a reasonable allowance per benefited residence that embodies three reasonableness factors
SANBAG	San Bernardino Associated Governments
TNM	Traffic Noise Model
UPRR	Union Pacific Railroad

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Chapter 1 Introduction

Caltrans, in cooperation with the San Bernardino Associated Governments (SANBAG), proposes to add freeway lanes through all or a portion of the 33-mile long stretch of I-10 from the Los Angeles/San Bernardino (LA/SB) county line to Ford Street in San Bernardino County. The project limits including transition areas extend from approximately 0.4 mile west of White Avenue in the City of Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in the City of Yucaipa at PM 37.0. However, for the purpose of this addendum to the I-10 Corridor Project Noise Abatement Decision Report (NADR) (Parsons, 2015), the project limits extend from Cherry Avenue in the City of Fontana to Cedar Avenue in the City of Bloomington (San Bernardino County).

This addendum to the NADR analyzes land uses south of I-10 in three distinct segments that are based on major local interchanges. The three segments are:

- Segment 9 – West of Cherry Avenue to Citrus Avenue
- Segment 10 – Citrus Avenue to Sierra Avenue
- Segment 11 – Sierra Avenue to west of Cedar Avenue

This addendum to the I-10 Corridor Project NADR was prepared to determine whether feasible and reasonable noise abatement would be possible for impacted receivers located south of the Union Pacific Railroad (UPRR) railroad tracks with a soundwall located on private property. Soundwalls are being considered on private property because 1) UPRR will not allow soundwalls to be constructed on their R/W, 2) soundwall analysis was only performed on the shoulder of I-10, and 3) soundwalls located on the shoulder of I-10 would not provide feasible noise abatement and meet the design goal, as established in the Noise Study Report (NSR) (Parsons, 2015).

Railroad tracks run parallel to I-10 from Segment 9 to 16. However, the study limits of this addendum are land uses south of I-10 in Segments 9, 10, and 11. This is because there are no outdoor use areas south of the train tracks within the study limits in Segments 12 through 14 and the UPRR flyover structure on retaining walls in Segments 15 and 16 would nullify all efforts to provide feasible noise abatement with a soundwall located on private property.

The areas south of I-10 in Segments 9, 10, and 11 are mixed use containing both residential and commercial uses on the same property. The study area was examined

in detail to confirm that the outdoor use areas are properly represented using the latest available information.

This addendum is based on the I-10 NADR, dated July 2015. This addendum includes the conclusions relating to acoustical feasibility; the 7-dB noise reduction design goal; the reasonable allowances for abatement evaluated; the engineer's cost estimate for evaluated abatement; and the preliminary noise abatement decision as defined in the California Department of Transportation (Caltrans) Traffic Noise Analysis Protocol (Protocol). The Protocol establishes a process for assessing the reasonableness and feasibility of noise abatement. This process is described in detail in the approved I-10 Corridor Project NADR. This report has been approved by a California licensed professional civil engineer. The project-level NSR, NSR Addendum, and NADR (Parsons, 2015) prepared for this project are hereby incorporated by reference.

Chapter 2 Results of the Noise Study Report

The addendum to the NSR was conducted to determine future traffic noise impacts of the proposed project at frequent human use areas within segments 9 through 11 along the I-10 corridor. In Segments 9 through 11, the Union Pacific Railroad (UPRR) mainline runs parallel to the eastbound I-10 mainline. The future worst-case traffic noise impact at frequent outdoor human use areas along the project corridor was modeled for the No Build Alternative and two build alternatives to determine appropriate abatement measures.

In accordance with Title 23 CFR 772, noise abatement is considered where traffic noise impacts are predicted in areas of frequent human use that would benefit from a lowered noise level. Potential noise abatement measures identified in the Protocol include the following:

- Avoiding the impact by using design alternatives, such as altering the horizontal and vertical alignment of the project
- Constructing noise barriers
- Acquiring property to serve as a buffer zone
- Using traffic management measures to regulate types of vehicles and speeds
- Acoustically insulating public use or nonprofit institutional structures

Due to the constrained configuration and suburban location of the project, abatement in the form of noise barriers is the only abatement measure considered to be feasible.

Each noise barrier was evaluated for feasibility based on achievable noise reduction (5 dB or more). For each noise barrier determined to be acoustically feasible and meeting the design goal of achieving 7-dB noise reduction for at least one location, the estimated cost and total cost allowance for the noise barrier were calculated. If the estimated cost is found to be equal to or less than the total cost allowance, then that noise barrier would have met the reasonableness cost criteria. The total cost allowance is calculated by multiplying the number of benefited residences by the cost allowance per benefited receiver/residence. A $71,000 cost allowance per benefited receiver/ residence, which is based on the published Caltrans annual Construction Price Index (CPI), was used.

The noise analysis considered barrier heights ranging from 8 to 24 feet. The barrier heights and locations were evaluated to determine if a minimum 5-dB attenuation at the outdoor frequent use areas of the representative receivers could be achieved. The minimum barrier height required to cut the line-of-sight from each receiver to the exhaust stacks of heavy trucks has been calculated for all feasible barriers. These heights were evaluated through calculations performed by Traffic Noise Model, Version 2.5 (TNM 2.5).

The identified feasible soundwalls are new soundwalls to be built as part of the I-10 Corridor Project. The minimum heights and locations of the soundwalls that would provide feasible abatement and meet the design goal are shown graphically in Appendix C of the NSR addendum. Table 2-1 presents feasible soundwalls that were considered for Alternative 2 and summarizes the data used to assess the reasonableness allowances at each of the considered barrier heights. Table 2-2 presents feasible soundwalls that were considered for Alternative 3 and summarizes the data used to assess the reasonableness allowances at each of the considered barrier heights.

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

Barrier	Location	Station	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Design Goal Achieved?	Reasonable Allowance per Residence	Total Reasonable Allowance
S1818	Private Property South of I-10, East of Citrus Avenue	1813+10 to 1821+10	8	No	0	No	N/A	N/A
			10	No	0	No	N/A	N/A
			12	No	0	No	N/A	N/A
			14	Yes	1	No	$71,000	$71,000
			16	Yes	1	No	$71,000	$71,000
			18	Yes	1	Yes	$71,000	$71,000
			20	Yes	9	Yes	$71,000	$639,000
			22	Yes	9	Yes	$71,000	$639,000
			24	Yes	9	Yes	$71,000	$639,000
S1834	Private Property South of I-10, East of Cypress Avenue	1830+80 to 1839+00	8	No	0	No	N/A	N/A
			10	No	0	No	N/A	N/A
			12	Yes	4	No	$71,000	$284,000
			14	Yes	8	No	$71,000	$568,000
			16	Yes	8	No	$71,000	$568,000
			18	Yes	8	Yes	$71,000	$568,000
			20	Yes	8	Yes	$71,000	$568,000
			22	Yes	8	Yes	$71,000	$568,000
			24	Yes	8	Yes	$71,000	$568,000

N/A = Not applicable. Barrier does not provide 5 dB of noise reduction.

Table 2-2. Summary of Barrier Evaluation from Noise Study Report (Alternative 3)

Barrier	Location	Station	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Design Goal Achieved?	Reasonable Allowance per Residence	Total Reasonable Allowance
S1708	Private Property South of I-10, East of Cherry Avenue	1705+20 to 1708+80	8	No	0	No	N/A	N/A
			10	No	0	No	N/A	N/A
			12	No	0	No	N/A	N/A
			14	No	0	No	N/A	N/A
			16	Yes	1	No	$71,000	$71,000
			18	Yes	1	No	$71,000	$71,000
			20	Yes	1	No	$71,000	$71,000
			22	Yes	2	No	$71,000	$142,000
			24	Yes	2	Yes	$71,000	$142,000
S1748	Private Property South of I-10, at Beach Avenue	1744+40 to 1751+55	8	No	0	No	N/A	N/A
			10	No	0	No	N/A	N/A
			12	No	0	No	N/A	N/A
			14	Yes	3	No	$71,000	$213,000
			16	Yes	3	No	$71,000	$213,000
			18	Yes	3	No	$71,000	$213,000
			20	Yes	3	No	$71,000	$213,000
			22	Yes	3	No	$71,000	$213,000
			24	Yes	3	Yes	$71,000	$213,000

Table 2-2. Summary of Barrier Evaluation from Noise Study Report (Alternative 3)

Barrier	Location	Station	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Design Goal Achieved?	Reasonable Allowance per Residence	Total Reasonable Allowance
S1818	Private Property South of I-10, East of Citrus Avenue	1813+10 to 1821+10	8	No	0	No	N/A	N/A
			10	No	0	No	N/A	N/A
			12	No	0	No	N/A	N/A
			14	Yes	1	No	$71,000	$71,000
			16	Yes	1	No	$71,000	$71,000
			18	Yes	1	No	$71,000	$71,000
			20	Yes	1	No	$71,000	$71,000
			22	Yes	9	Yes	$71,000	$639,000
			24	Yes	9	Yes	$71,000	$639,000
S1934	Private Property South of I-10, at Locust Avenue	1931+70 to 1939+15	8	No	0	No	N/A	N/A
			10	No	0	No	N/A	N/A
			12	Yes	2	No	$71,000	$142,000
			14	Yes	2	No	$71,000	$142,000
			16	Yes	2	Yes	$71,000	$142,000
			18	Yes	3	Yes	$71,000	$213,000
			20	Yes	3	Yes	$71,000	$213,000
			22	Yes	3	Yes	$71,000	$213,000
			24	Yes	3	Yes	$71,000	$213,000

N/A = Not applicable. Barrier does not provide 5 dB of noise reduction.

Chapter 3 Preliminary Noise Abatement Decision

3.1 Summary of Key Information

The NSR addendum analyzes noise barriers with heights from 8 to 24 feet to determine the feasibility of noise abatement. Tables 3-1 and 3-2 summarize the preliminary noise abatement decision for Alternatives 2 and 3 by investigating acoustical feasibility, number of benefited residences, total reasonableness allowance ($71,000 per benefitted receiver/residence), engineer's cost estimate for the abatement, comparison of the estimated construction cost versus allowance, and if the 7-dB reduction design goal is met.

Wall construction cost estimates are based on masonry walls in accordance with Caltrans' standard plans and specifications. Cost estimates are based on the Caltrans Cost Database (CCD) (Caltrans, 2012-2014), which tabulates average unit costs of construction-related items from recent state transportation projects. Cost calculations for soundwalls include the cost of the wall, piles, earthwork, and traffic control. The final cost estimate also includes a 10 percent contingency. Tables in Appendices C and D summarize the engineer's cost estimate for constructing these walls.

Costs of related activities, such as clearing and grubbing, vine landscaping, and typical aesthetic treatments, have not been estimated because these items are variable and could change substantially depending on several project-per-project factors.

Tables 3-1 and 3-2 summarize abatement key information, including reasonableness allowances and estimated construction costs for Alternatives 2 and 3.

Table 3-1. Summary of Abatement Key Information (Alternative 2)

Barrier	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Design Goal Achieved?	Total Reasonable Allowance	Estimated Construction Cost	Cost Less than Allowance?
S1818	8	No	0	No	N/A	N/A	N/A
	10	No	0	No	N/A	N/A	N/A
	12	No	0	No	N/A	N/A	N/A
	14	Yes	1	No	$71,000	$324,000	No
	16	Yes	1	No	$71,000	$359,500	No
	18	Yes	1	Yes	$71,000	$395,900	No
	20	Yes	9	Yes	$639,000	$433,500	Yes
	22	Yes	9	Yes	$639,000	$472,700	Yes
	24	Yes	9	Yes	$639,000	$514,200	Yes
S1834	8	No	0	No	N/A	N/A	N/A
	10	No	0	No	N/A	N/A	N/A
	12	Yes	4	No	$284,000	$290,300	No
	14	Yes	8	No	$568,000	$326,000	Yes
	16	Yes	8	No	$568,000	$361,700	Yes
	18	Yes	8	Yes	$568,000	$398,300	Yes
	20	Yes	8	Yes	$568,000	$436,200	Yes
	22	Yes	8	Yes	$568,000	$475,700	Yes
	24	Yes	8	Yes	$568,000	$517,400	Yes

N/A = Not applicable. Barrier does not provide 5 dB of noise reduction.

Table 3-2. Summary of Abatement Key Information (Alternative 3)

Barrier	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Design Goal Achieved?	Total Reasonable Allowance	Estimated Construction Cost	Cost Less than Allowance?
S1708	8	No	0	No	N/A	N/A	N/A
	10	No	0	No	N/A	N/A	N/A
	12	No	0	No	N/A	N/A	N/A
	14	No	0	No	N/A	N/A	N/A
	16	Yes	1	No	$71,000	$169,600	No
	18	Yes	1	No	$71,000	$186,700	No
	20	Yes	1	No	$71,000	$204,300	No
	22	Yes	2	No	$142,000	$222,800	No
	24	Yes	2	Yes	$142,000	$242,200	No
S1748	8	No	0	No	N/A	N/A	N/A
	10	No	0	No	N/A	N/A	N/A
	12	No	0	No	N/A	N/A	N/A
	14	Yes	3	No	$213,000	$288,200	No
	16	Yes	3	No	$213,000	$319,800	No
	18	Yes	3	No	$213,000	$352,100	No
	20	Yes	3	No	$213,000	$385,600	No
	22	Yes	3	No	$213,000	$420,400	No
	24	Yes	3	Yes	$213,000	$457,300	No

Table 3-2. Summary of Abatement Key Information (Alternative 3)

Barrier	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Design Goal Achieved?	Total Reasonable Allowance	Estimated Construction Cost	Cost Less than Allowance?
S1818	8	No	0	No	N/A	N/A	N/A
	10	No	0	No	N/A	N/A	N/A
	12	No	0	No	N/A	N/A	N/A
	14	Yes	1	No	$71,000	$324,000	No
	16	Yes	1	No	$71,000	$359,500	No
	18	Yes	1	No	$71,000	$395,900	No
	20	Yes	1	No	$71,000	$433,500	No
	22	Yes	9	Yes	$639,000	$472,700	Yes
	24	Yes	9	Yes	$639,000	$514,200	Yes
S1934	8	No	0	No	N/A	N/A	N/A
	10	No	0	No	N/A	N/A	N/A
	12	Yes	2	No	$142,000	$265,500	No
	14	Yes	2	No	$142,000	$298,200	No
	16	Yes	2	Yes	$142,000	$330,800	No
	18	Yes	3	Yes	$213,000	$364,300	No
	20	Yes	3	Yes	$213,000	$398,900	No
	22	Yes	3	Yes	$213,000	$435,000	No
	24	Yes	3	Yes	$213,000	$473,100	No

N/A = Not applicable. Barrier does not provide 5 dB of noise reduction.

3.2 Nonacoustical Factors Relating to Feasibility

Based on the preliminary project and abatement design, no nonacoustical factors related to feasibility have been identified that would be considered out of the ordinary for soundwall construction. The nonacoustical factors considered are geometric standards (e.g., sight distances), safety, maintenance, security, geotechnical issues, and utility relocations. Some of these nonacoustical factors, including geotechnical issues, will have to be investigated at the design phase.

All barriers included in this addendum are proposed to be constructed on private property; therefore, all of the residences behind these barriers on private property would need to sign a Temporary Construction Easement Form prior to the beginning of construction. These barriers would not substantially affect the cost or design of the project in its entirety. Construction requirements are considered typical for soundwall construction.

3.3 Preliminary Recommendation and Decision

Several factors were considered in making each soundwall recommendation:

- Line-of-sight break between a receptor and an 11.5-foot-high truck stack;
- Number of benefited receptors;
- Cost per benefited receptor;
- Degree of noise reduction (a barrier that provides only 1 dB of improved noise reduction over a lower barrier and costs substantially more may not be favored over the lower barrier); and
- 15-year minimum life cycle.

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 ED, which will be circulated for public review.

Alternative 2

Based on the information summarized in Table 3-1 and noise reductions specified in the NSR Addendum, the following discussion presents the engineer's recommendation on the proposed height and reasonableness of each feasible and proposed soundwall for Alternative 2.

Segment 9 – West of Cherry Avenue to Citrus Avenue

There are no frequent outdoor use areas in this segment that are impacted by Alternative 2 where it is feasible to apply standard noise abatement techniques.

Segment 10 – Citrus Avenue to Sierra Avenue

Soundwall S1818: Soundwall S1818 would be 810 feet long and located on private property, south of I-10, east of Citrus Avenue. Figure 78 in Appendix C of the NSR Addendum shows the location, minimum length, and height required for this soundwall to provide feasible traffic noise abatement and meet the design goal. Soundwall S1818 meets the 7-dB noise reduction design goal at 18 feet. The estimated total construction cost of $395,900 for this 18-foot high wall exceeds the reasonable cost allowance of $71,000. However, the estimated total construction cost for the 20-foot high wall option is $433,500, which is less than the reasonable cost allowance of $639,000.

With consideration of the acoustic benefit and the incremental cost, Soundwall S1818 is feasible and reasonable, and is recommended to be a 20-foot-high masonry wall, as shown in Figure 78 in Appendix A of this report.

Soundwall S1834: Soundwall S1834 would be 815 feet long and located on private property, south of I-10, east of Cypress Avenue. Figure 79 in Appendix C of the NSR Addendum shows the location, minimum length, and height required for this soundwall to provide feasible traffic noise abatement and meet the design goal. Soundwall S1834 meets the 7-dB noise reduction goal at 18 feet. The estimated total construction cost of $398,300 for this 18-foot wall is less than the reasonable cost allowance of $568,000. Soundwall S1834 was also analyzed as a 20-, 22-, and 24-foot high wall, but the number of benefitted receivers would remain the same.

With consideration of the acoustic benefit and the incremental cost, Soundwall S1834 is feasible and reasonable, and is recommended to be an 18-foot-high masonry wall, as shown in Figure 79 in Appendix A of this report.

Segment 11 – Sierra Avenue to Cedar Avenue

There are no frequent outdoor use areas in this segment that are impacted by Alternative 2; therefore, noise abatement was not required.

Alternative 3

Based on the information summarized in Table 3-2 and noise reductions specified in the NSR Addendum, the following discussion presents the engineer's recommendation on the proposed height and reasonableness of each feasible and proposed soundwall for Alternative 3.

West of Cherry Avenue to Citrus Avenue

Soundwall S1708: Soundwall S1708 would be 380 feet long and located on private property, south of I-10, east of Cherry Avenue. Figure 130 in Appendix C of the NSR Addendum shows the location, minimum length, and height required for this soundwall to provide feasible traffic noise abatement and meet the design goal. Soundwall S1708 meets the 7-dB noise reduction goal at 24 feet; however, the estimated construction cost of $242,200 exceeds the reasonable cost allowance of $142,000.

With consideration of acoustic benefit and the incremental cost, Soundwall S1708 is not reasonable; therefore, it is not recommended.

Soundwall S1748: Soundwall S1748 would be 720 feet long and located on private property, south of I-10 at Beech Avenue. Figure 131 in Appendix C of the NSR Addendum shows the location, minimum length, and height required for this soundwall to provide feasible traffic noise abatement and meet the design goal. Soundwall S1748 meets the 7-dB noise reduction goal at 24 feet. The estimated total construction cost of $457,300 is more than the reasonable cost allowance of $213,000.

With consideration of acoustic benefit and the incremental cost, Soundwall S1748 is not reasonable; therefore, it is not recommended.

Citrus Avenue to Sierra Avenue

Soundwall S1818: Soundwall S1818 would be 810 feet long and located on private property, south of I-10, east of Citrus Avenue. Figure 133 in Appendix C of the NSR Addendum shows the location, minimum length, and height required for this soundwall to provide feasible traffic noise abatement and meet the design goal.

Soundwall S1818 meets the 7-dB noise reduction goal at 22 feet. The estimated total construction cost of $472,700 is less than the reasonable cost allowance of $639,000. As a 22-foot wall, Soundwall S1818 benefits 9 receivers. A 24-foot wall was also analyzed for Soundwall S1818, but the number of benefitted receivers would remain the same, and no additional noise reduction would be achieved.

With consideration of acoustic benefit and the incremental cost, Soundwall S1818 is reasonable and is recommended to be a 22-foot high masonry wall, as shown in Figure 133 in Appendix B of this report.

Sierra Avenue to Cedar Avenue

Soundwall S1934: Soundwall S1934 would be 745 feet long and located on private property, south of I-10, at Locust Avenue. Figure 137 in Appendix C of the NSR Addendum shows the location, minimum length, and height required for this soundwall to provide feasible traffic noise abatement and meet the design goal. Soundwall S1934 meets the 7-dB noise reduction goal at 16 feet. The estimated total construction cost of $330,800 exceeds the reasonable cost allowance of $142,000.

With consideration of acoustic benefit and the incremental cost, Soundwall S1934 is not reasonable; therefore, it is not recommended.

Chapter 4 Secondary Effects of Abatement

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

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Chapter 5 References

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Chapter 6 List of Preparers

Emily Hoyt, Associate Planner. B.A. Urban Studies, Loyola Marymount University. 2 years of environmental planning experience. Contribution: Author of Noise Abatement Decision Report.

David Ovadia, P.E., Senior Project Engineer, B.S. Civil Engineering, California State University Long Beach, 20 years of experience. Contribution: Cost Estimates.

Areg Gharabegian, P.E., Program Director, B.S. Mechanical Engineering, Pahlavi University, M.S. Energy, Resources, and Environment, George Washington University, 36 years of experience in conducting noise and vibration studies. Contribution: Technical directions and quality control for the Noise Study Report and NADR.

Greg Berg, Senior Scientist - Noise and Vibration, B.A. Acoustics, Columbia College Chicago; 10 years of experience. Contribution: Author of Noise Study Report.

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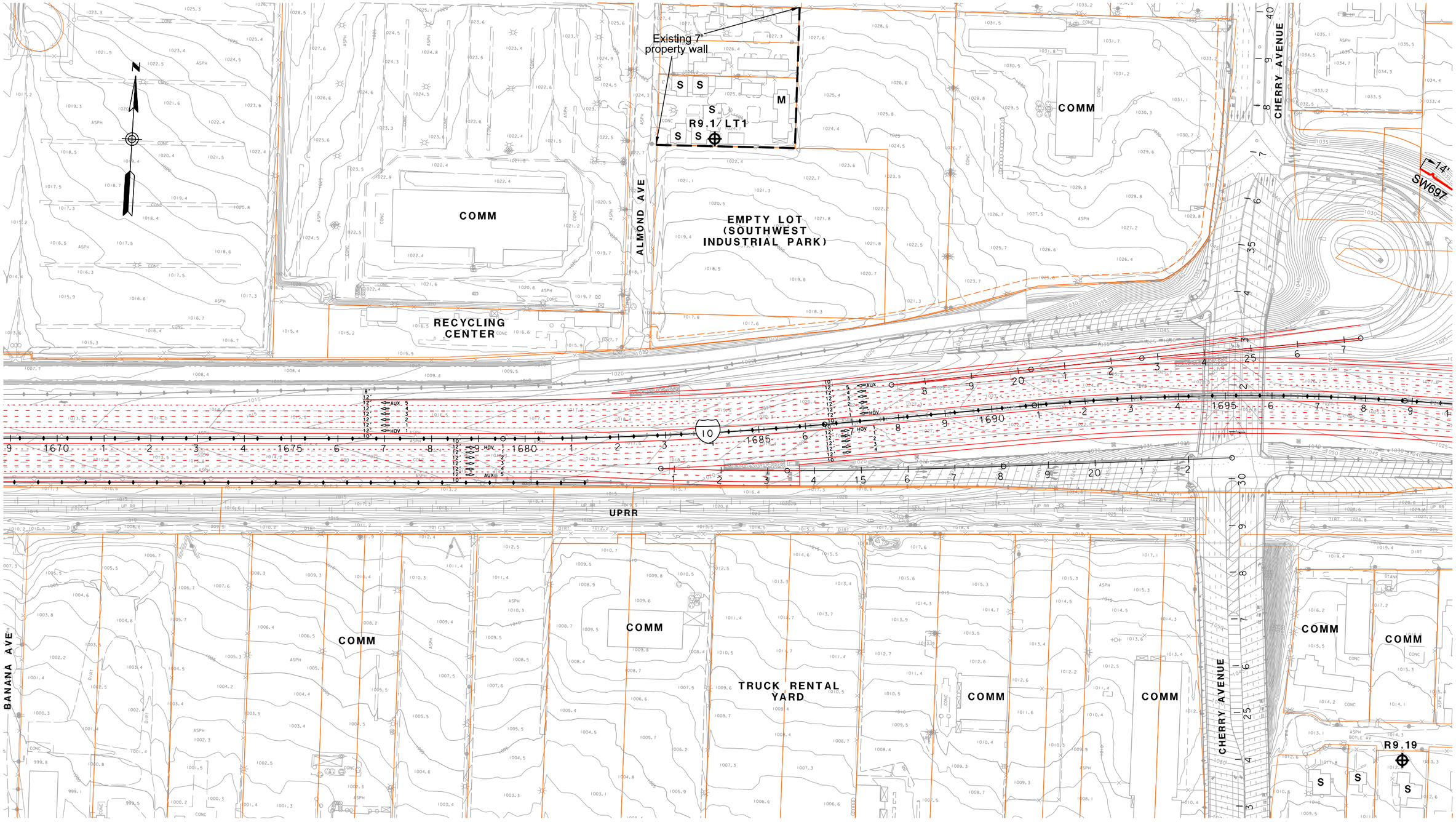
Appendix A Alternative 2 – Figures Showing Recommended Barrier Heights and Locations

TABLE 1 – Noise Abatement Information (Alternative 2)

Barrier	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Total Reasonable Allowance	Masonry Estimated Construction Cost	Cost Less than Allowance	Preliminary Noise Abatement Decision
S1818	20	Yes	9	$639,000	$433,500	Yes	Reasonable
S1834	18	Yes	8	$568,000	$398,300	Yes	Reasonable



LEGEND

- RXX - RECEIVER SITE
- CAL - CALIBRATION SITE
- LT - LONG-TERM MEASUREMENT
- ST - SHORT-TERM MEASUREMENT

- SFR OR S - SINGLE FAMILY RESIDENCE
- MFR OR M - MULTI-FAMILY RESIDENCE
- COMM OR C - COMMERCIAL/NO OUTDOOR USE AREA
- b - BENEFITED RESIDENCE
- HXX - IN/OUTDOOR MEASUREMENT

- EXISTING PROPERTY WALL
- EXISTING SOUNDWALL
- PROPOSED SOUNDWALL
- REPLACEMENT IN KIND SOUNDWALL
- NON-REASONABLE SOUNDWALL
- RETAINING WALL
- SAFETY BARRIER

1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 2 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

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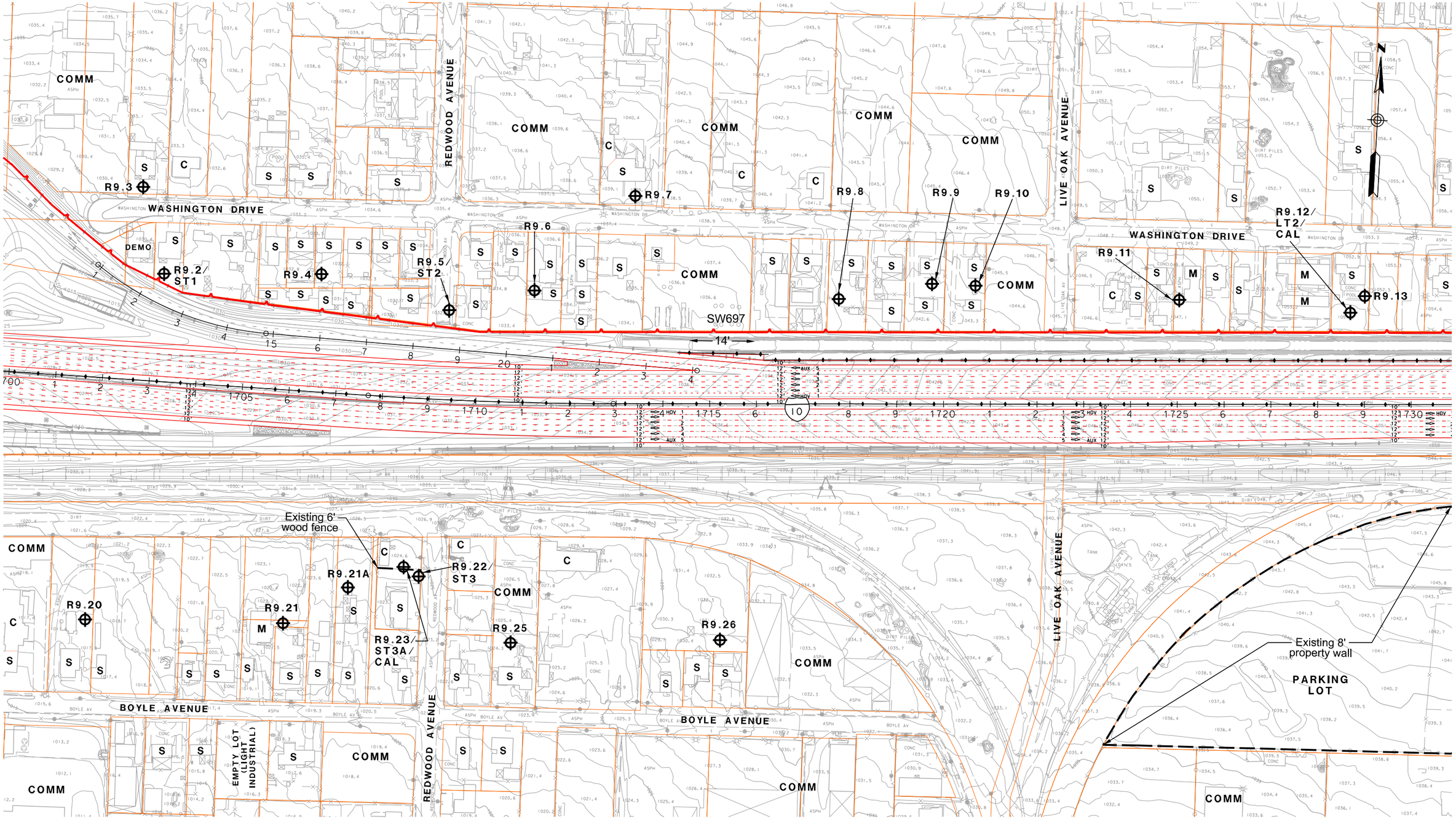
FIGURE 74



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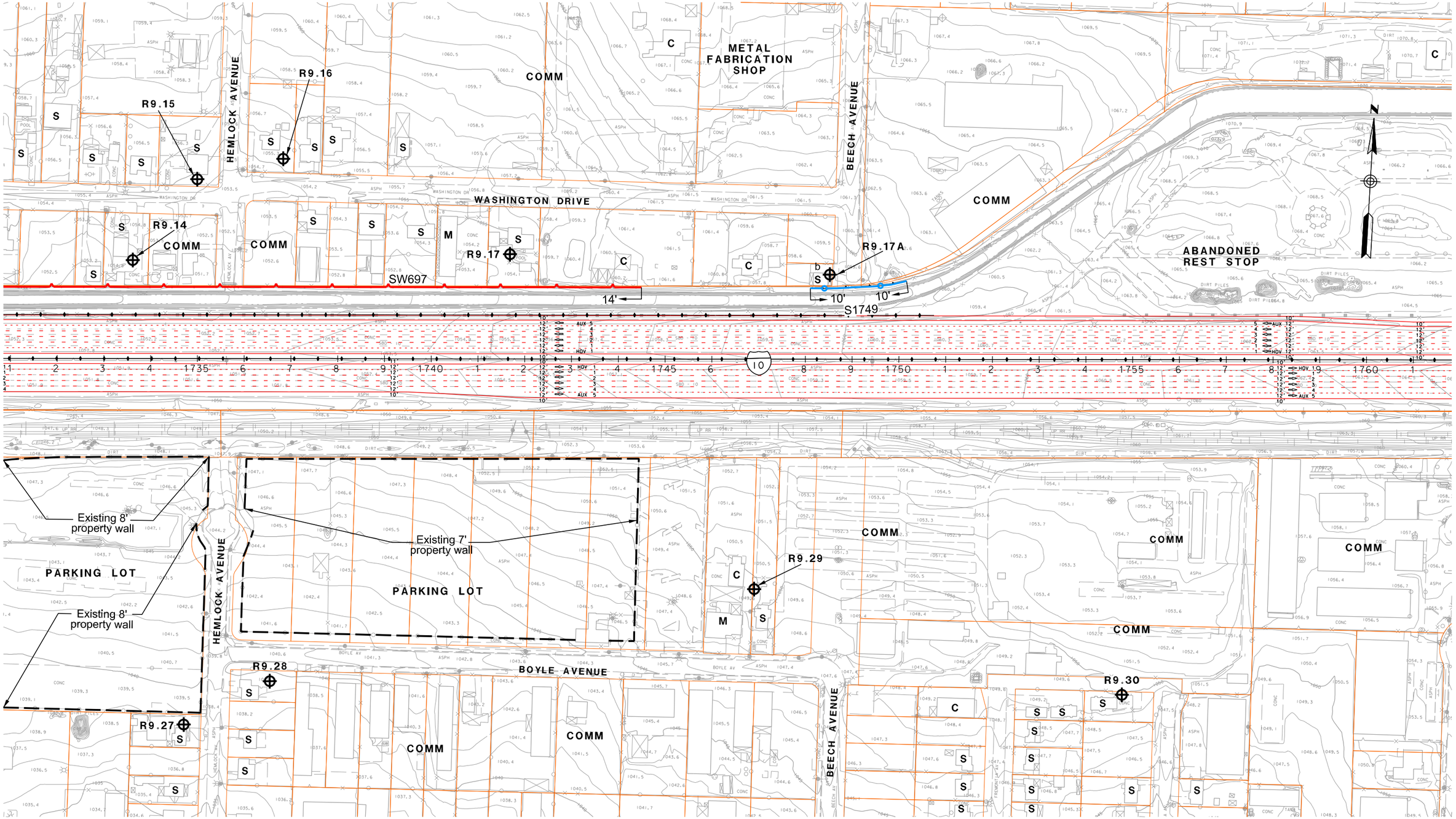
I-10 CORRIDOR ALTERNATIVE 2 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 75



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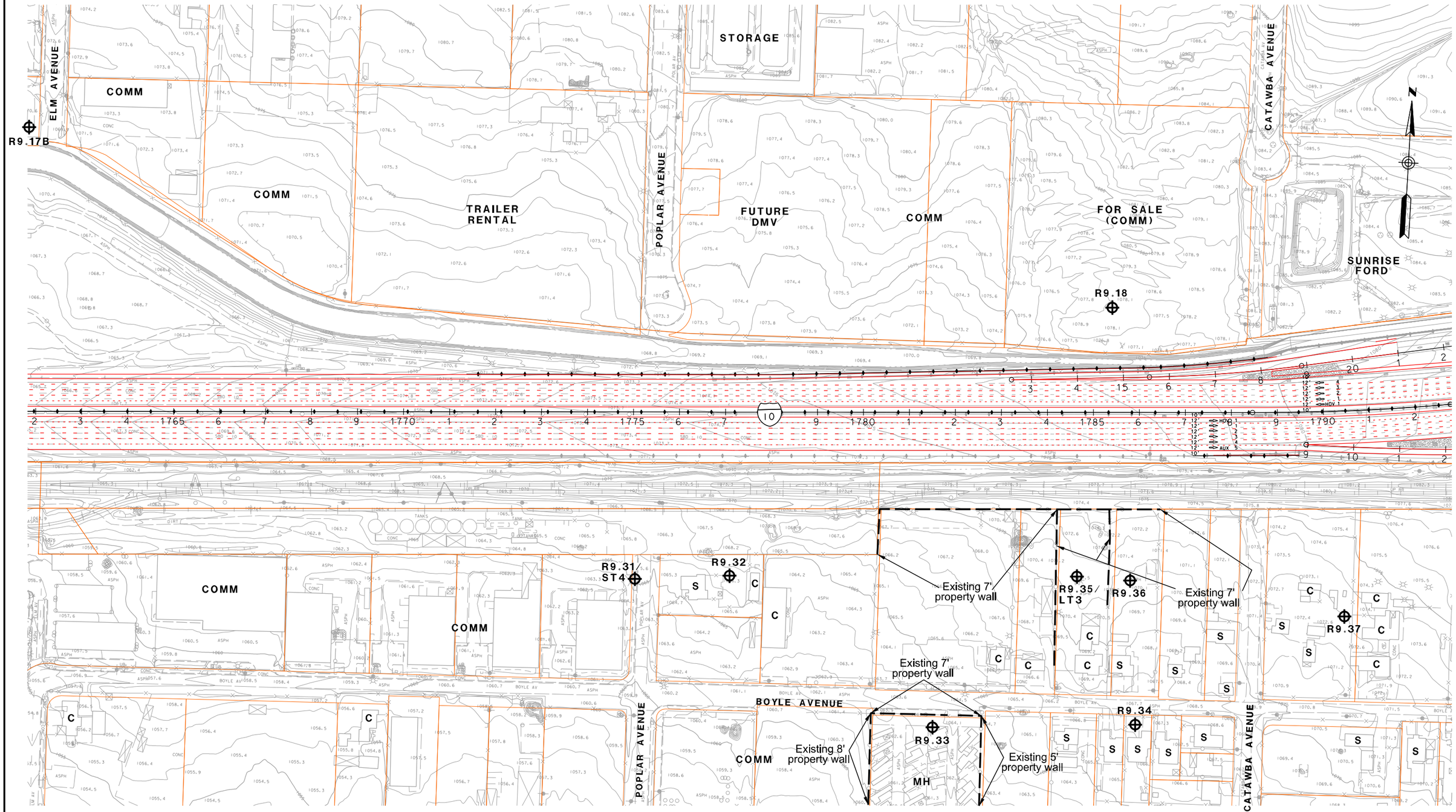
I-10 CORRIDOR ALTERNATIVE 2 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 76



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AUGUST 12, 2015

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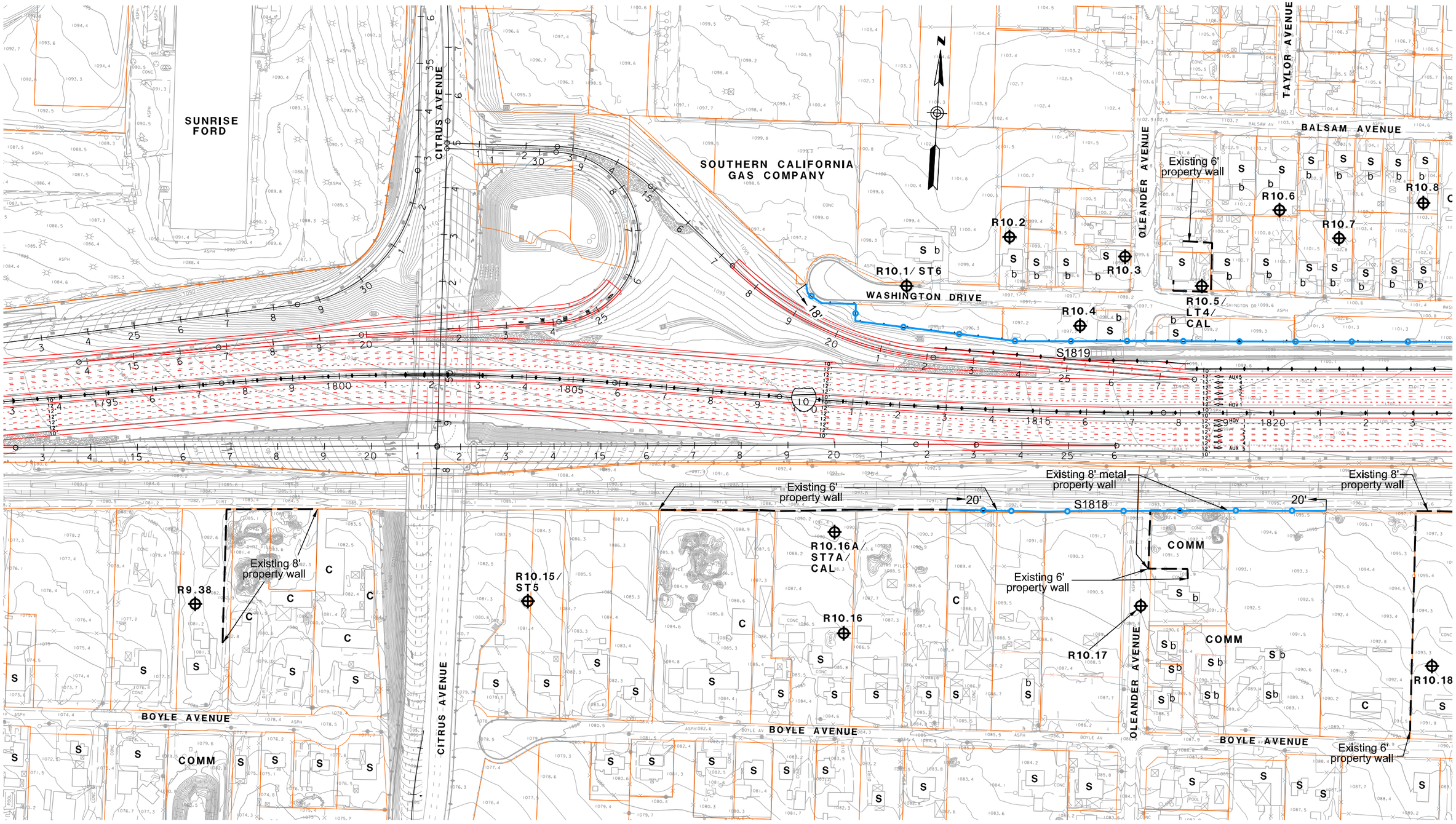

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AUGUST 12, 2015

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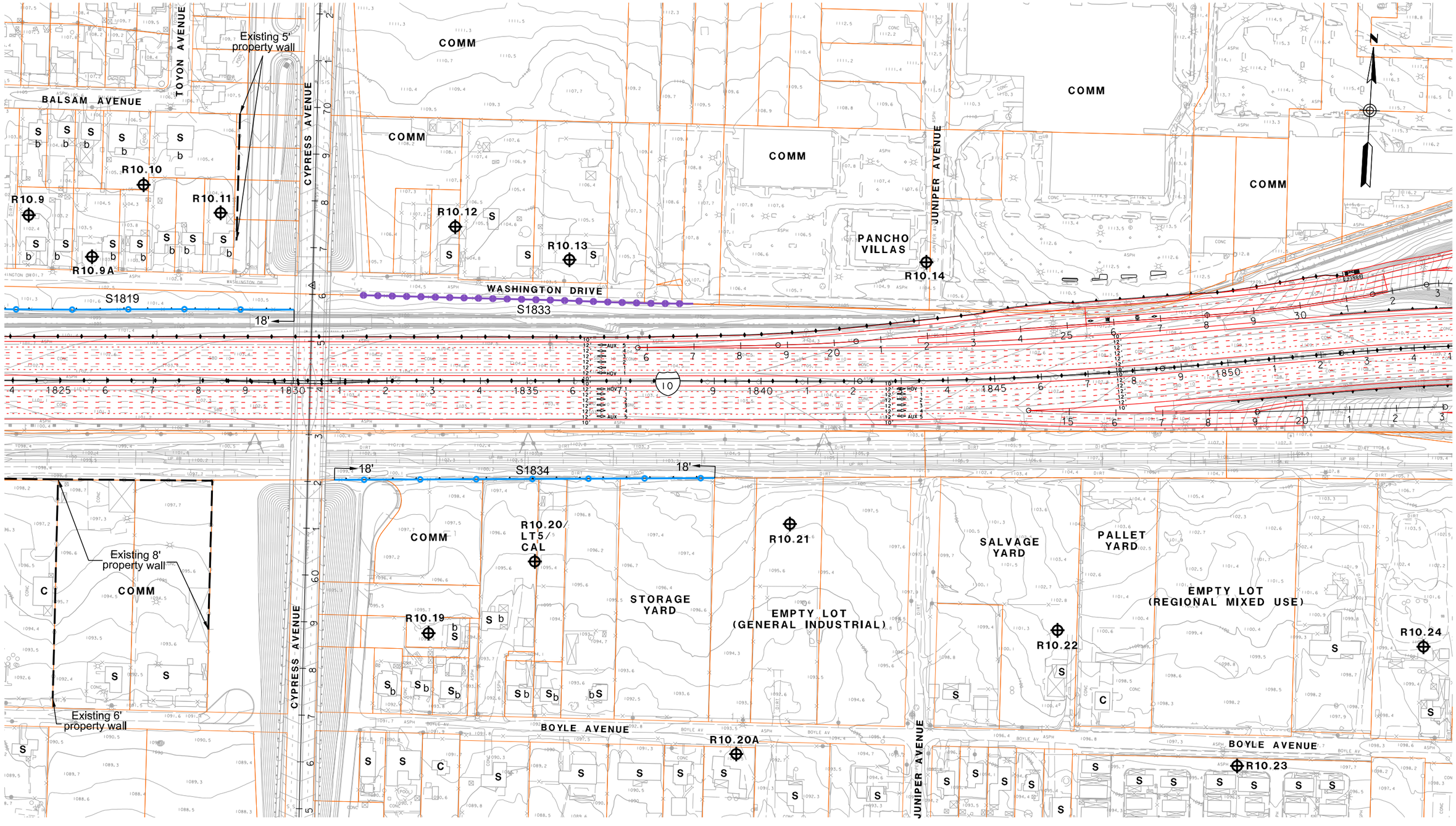

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AUGUST 12, 2015

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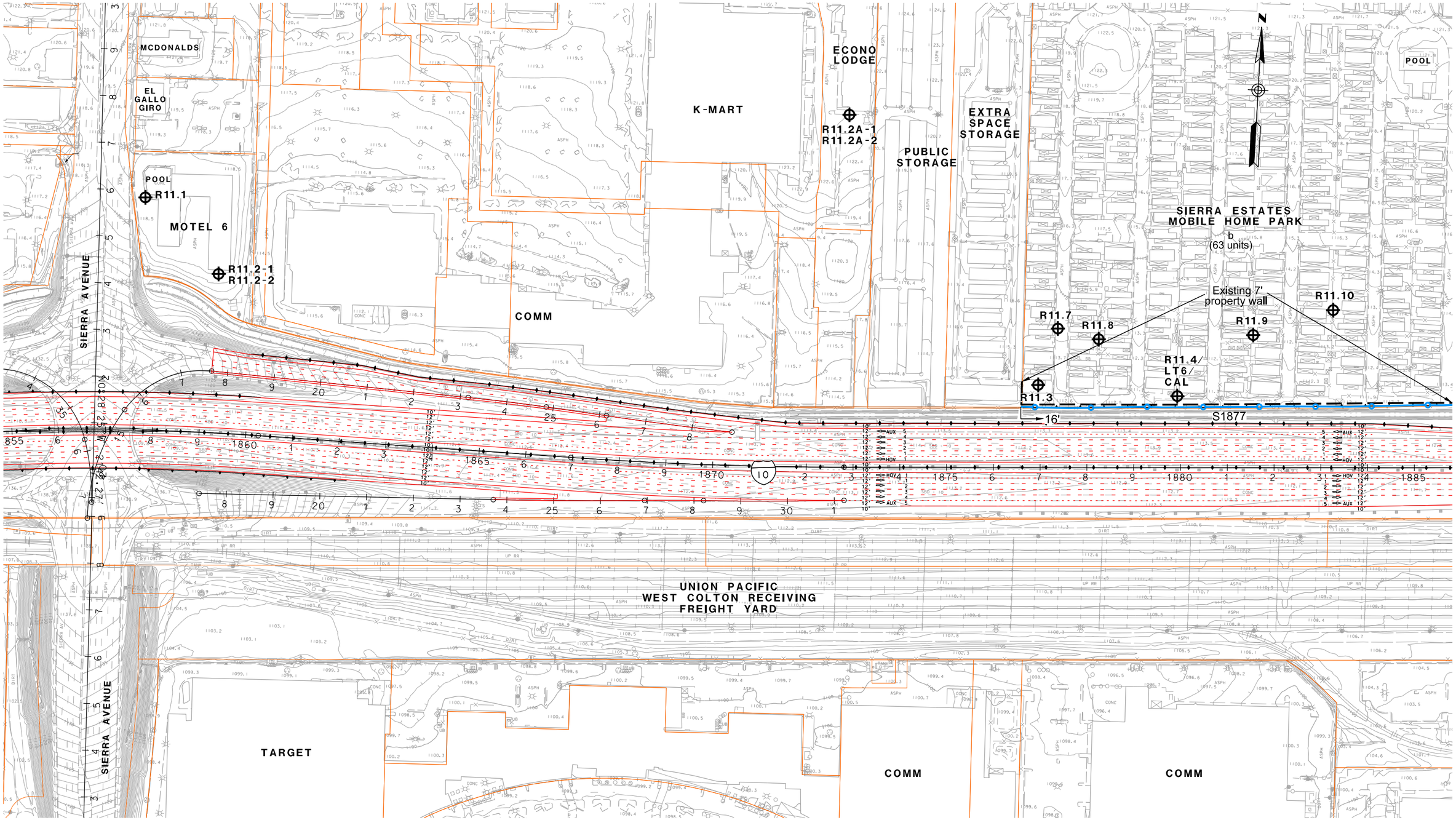

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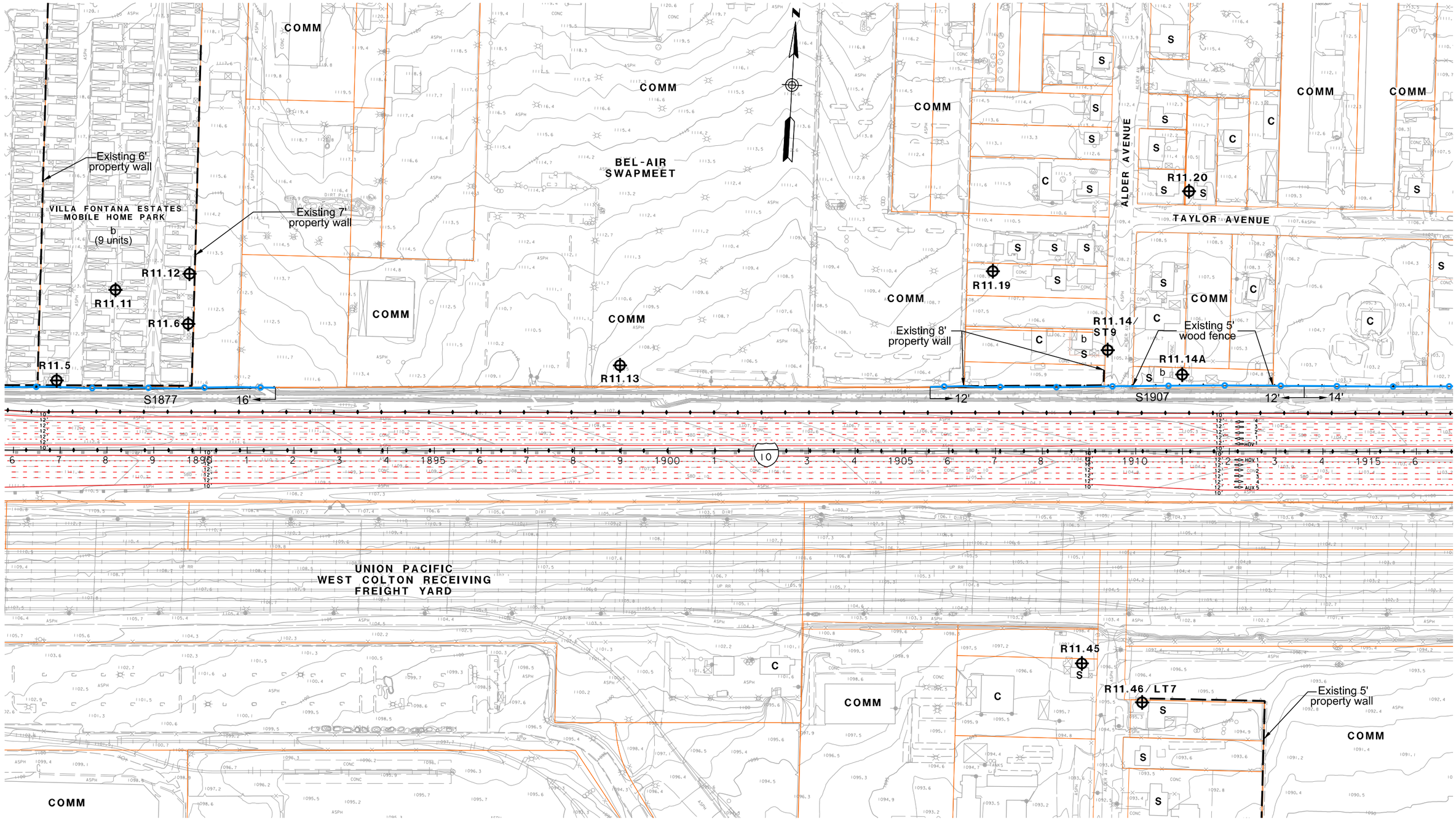
I-10 CORRIDOR ALTERNATIVE 2 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 80



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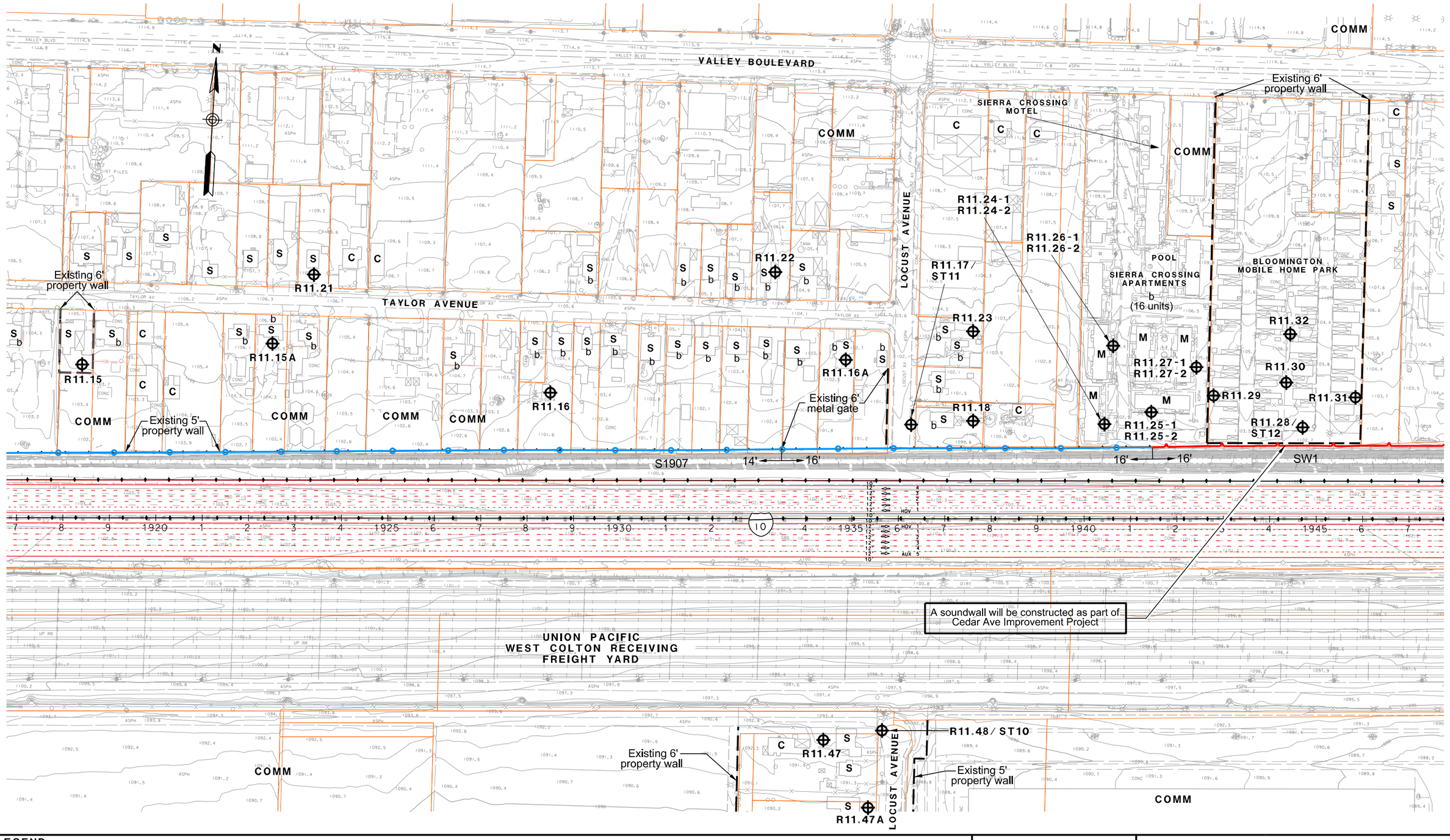
1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 2 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 81



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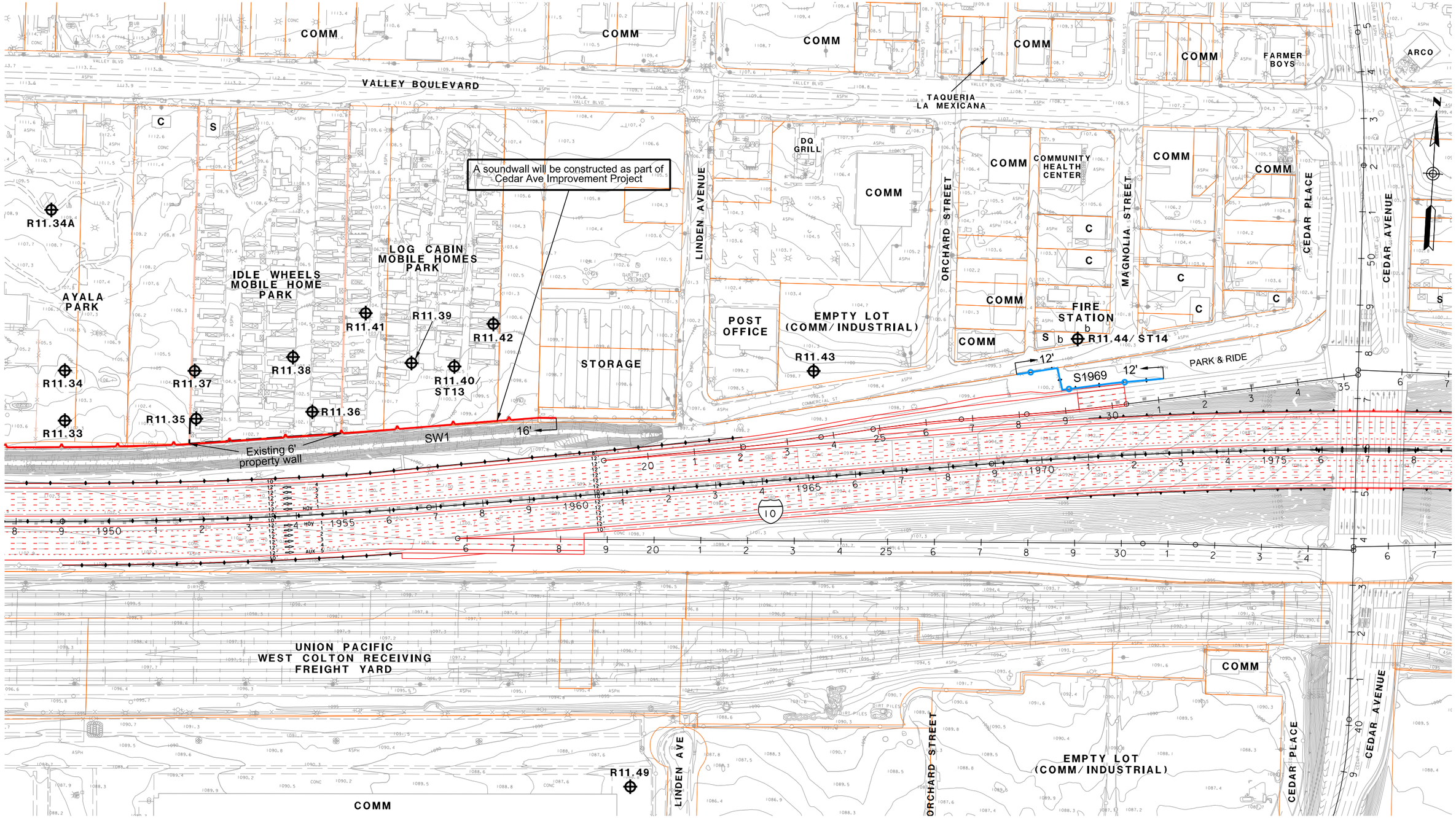
1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 2 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 82



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1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 2 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

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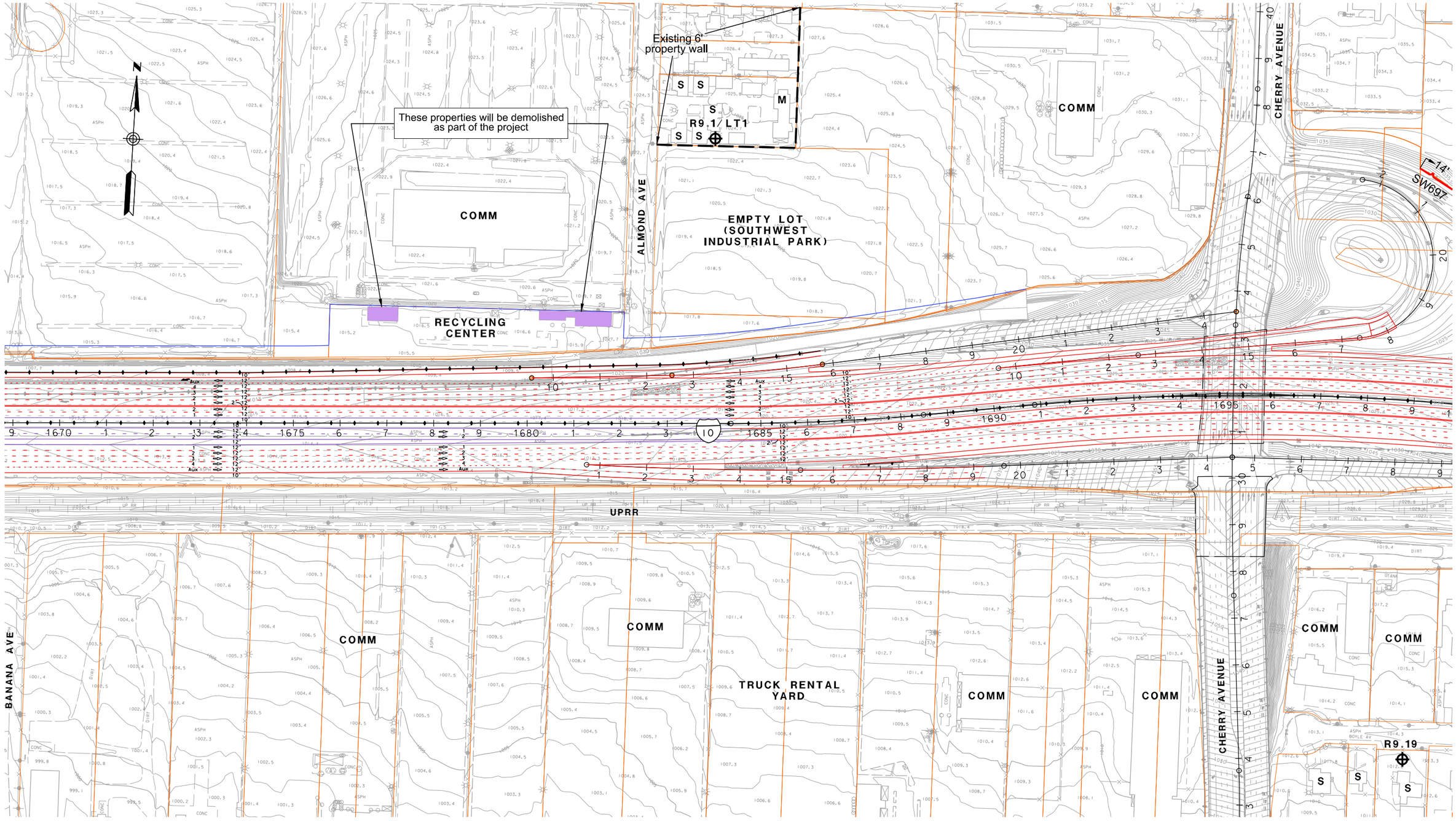
FIGURE 83

Appendix B Alternative 3 – Figures Showing Recommended Barrier Heights and Locations

TABLE 2 – Noise Abatement Information (Alternative 3)

Barrier	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Total Reasonable Allowance	Masonry Estimated Construction Cost	Cost Less than Allowance	Preliminary Noise Abatement Decision
S1708	24	Yes	2	$142,000	$242,200	No	Not Reasonable
S1748	24	Yes	3	$213,000	$457,300	No	Not Reasonable
S1818	22	Yes	9	$639,000	$472,700	Yes	Reasonable
S1934	16	Yes	3	$142,000	$330,800	No	Not Reasonable



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- RETAINING WALL
- SAFETY BARRIER

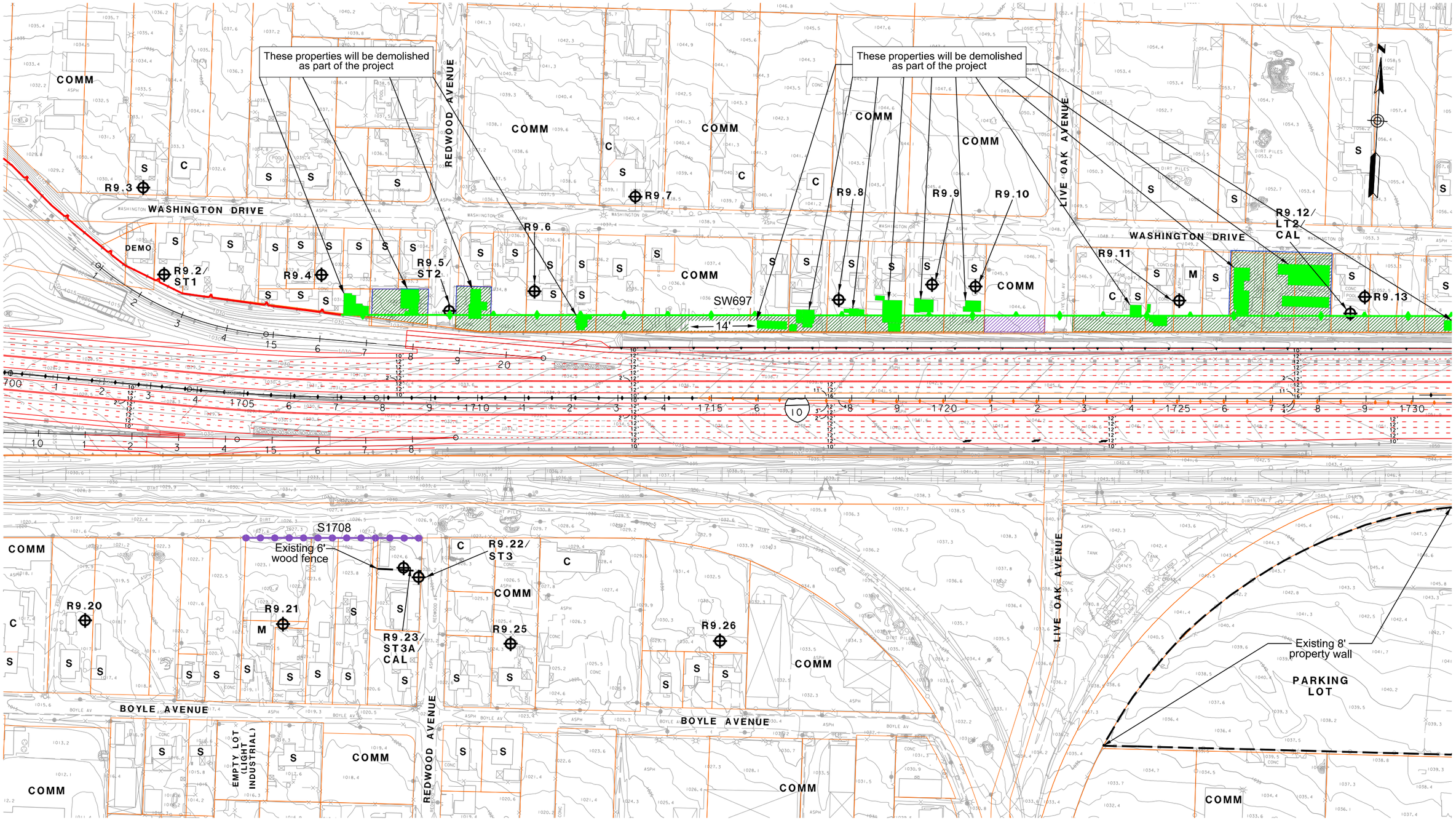
1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 3 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 129



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- SAFETY BARRIER

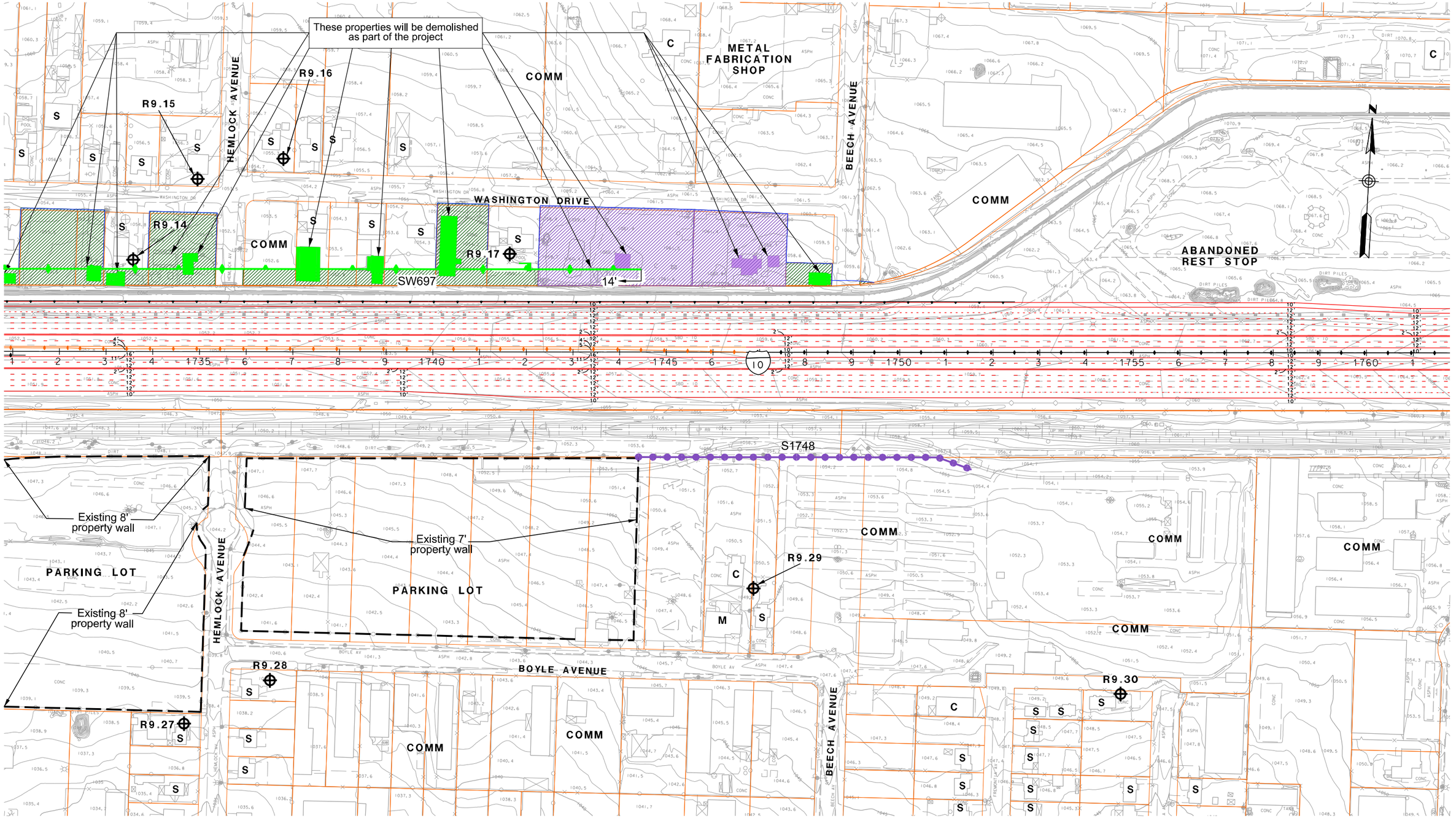
1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 3 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 130



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1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 3 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

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FIGURE 131

ELM AVENUE
COMM
R9.17B
COMM
TRAILER RENTAL
POPLAR AVENUE
STORAGE
FUTURE DMV
COMM
FOR SALE (COMM)
CATAWBA AVENUE
R9.18
SUNRISE FORD
N
10
1765
1770
1775
1780
1785
1790
COMM
COMM
R9.31 / ST4
R9.32
Existing 7' property wall
R9.35 / LT3
R9.36
Existing 7' property wall
R9.37
Existing 7' property wall
BOYLE AVENUE
POPLAR AVENUE
COMM
Existing 8' property wall
R9.33
MH
Existing 5' property wall
R9.34
CATAWBA AVENUE

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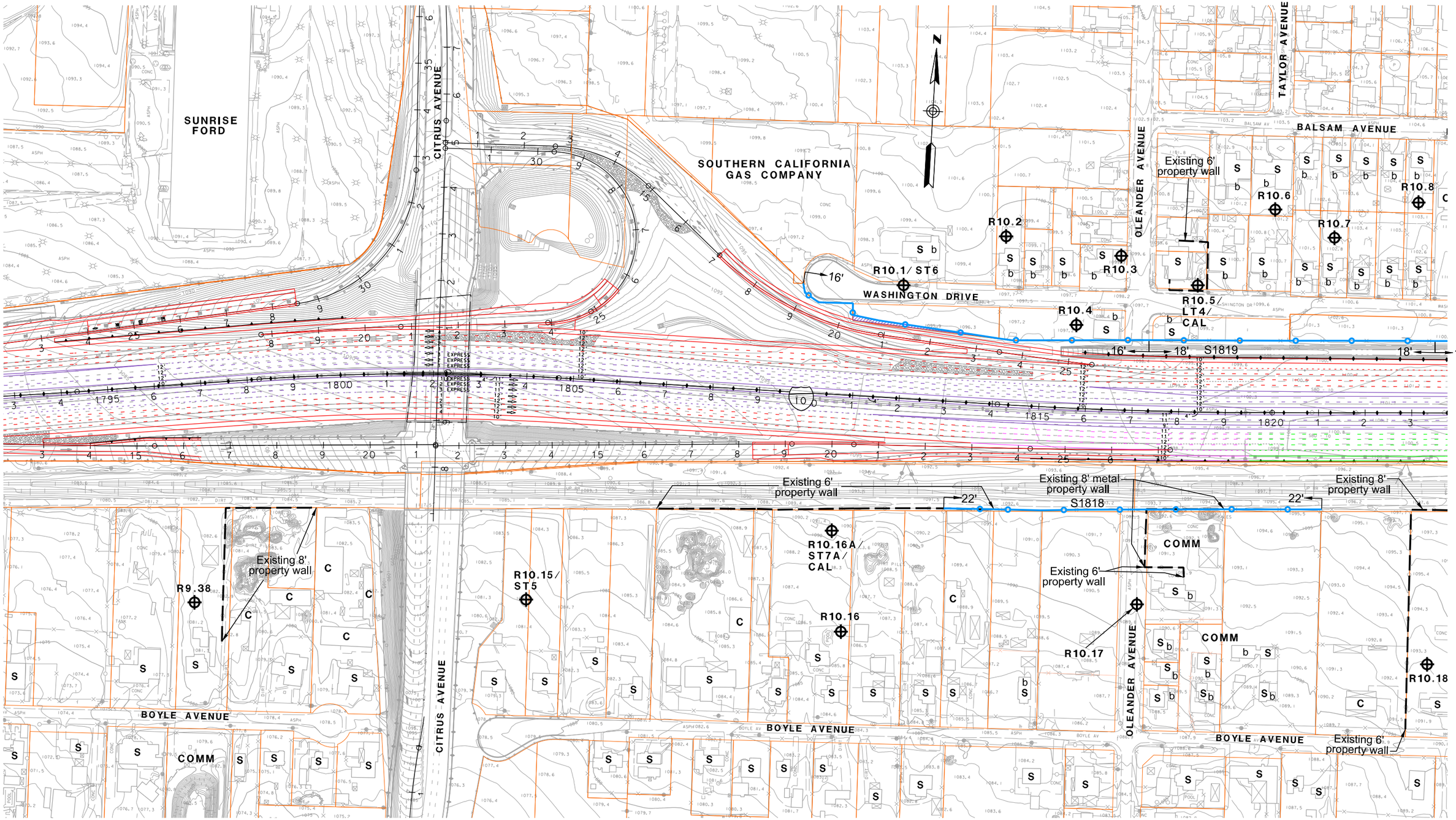
1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 3 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 132



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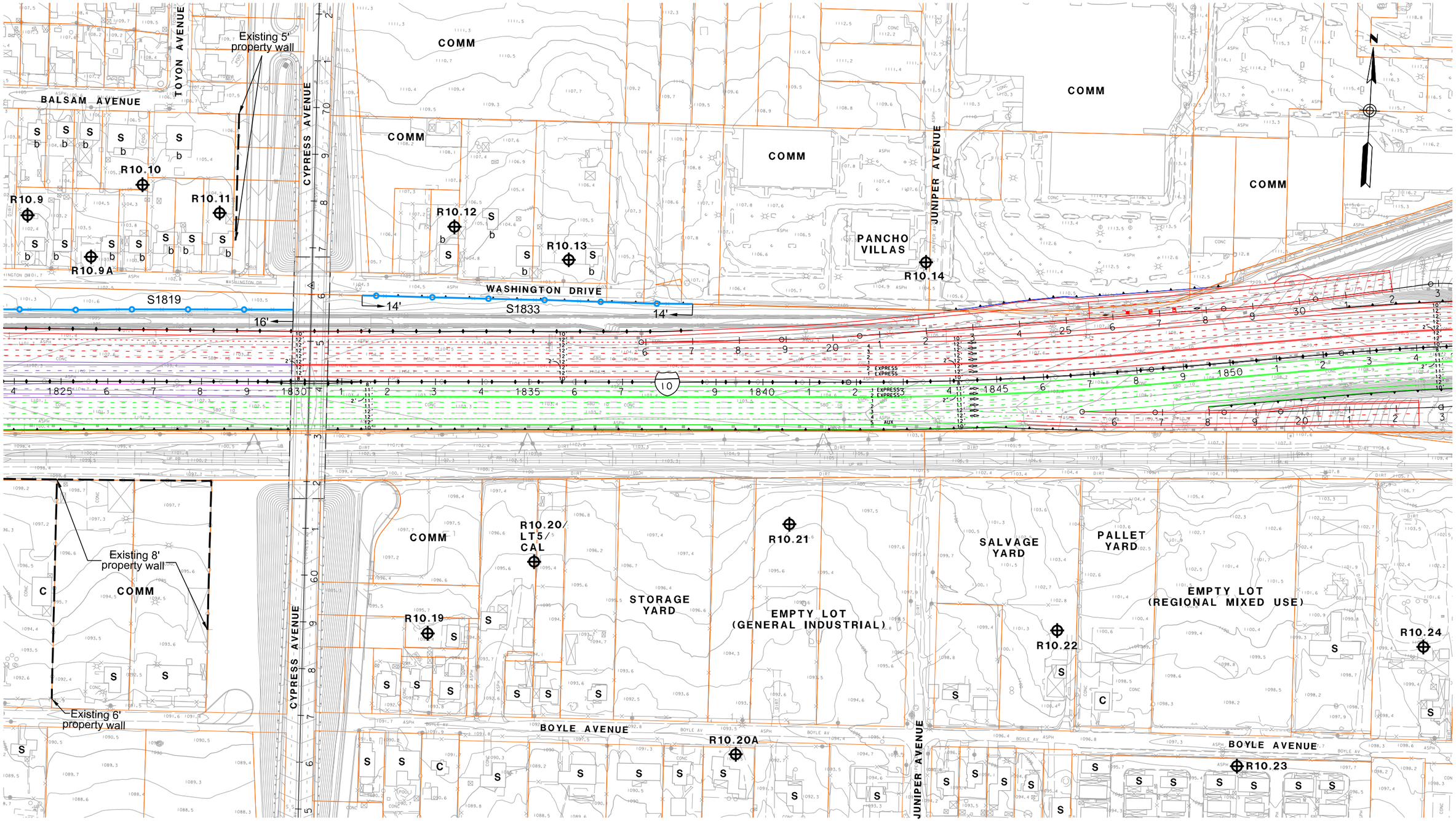
1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 3 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 133



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1in : 200ft

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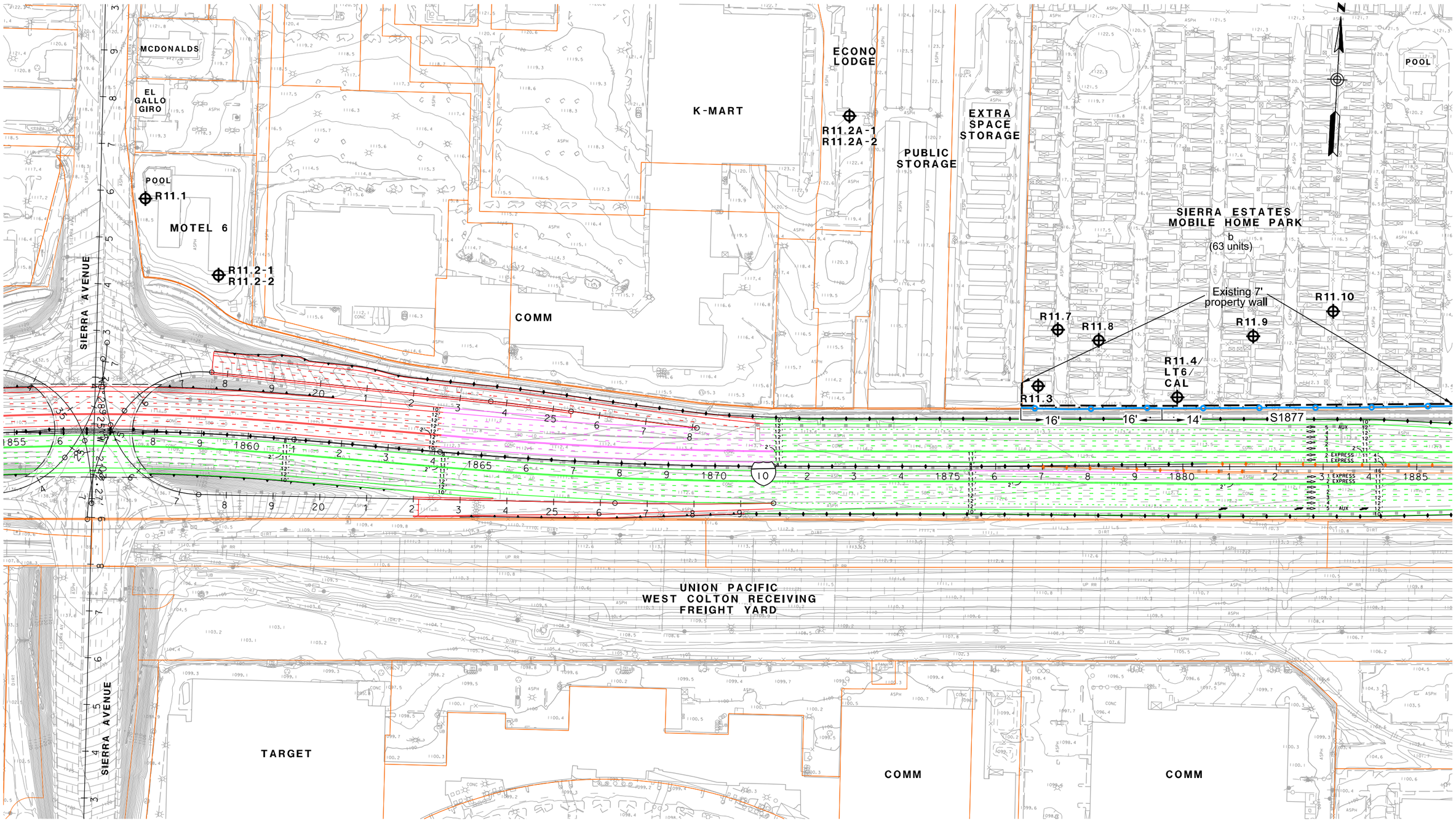
I-10 CORRIDOR ALTERNATIVE 3 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 134



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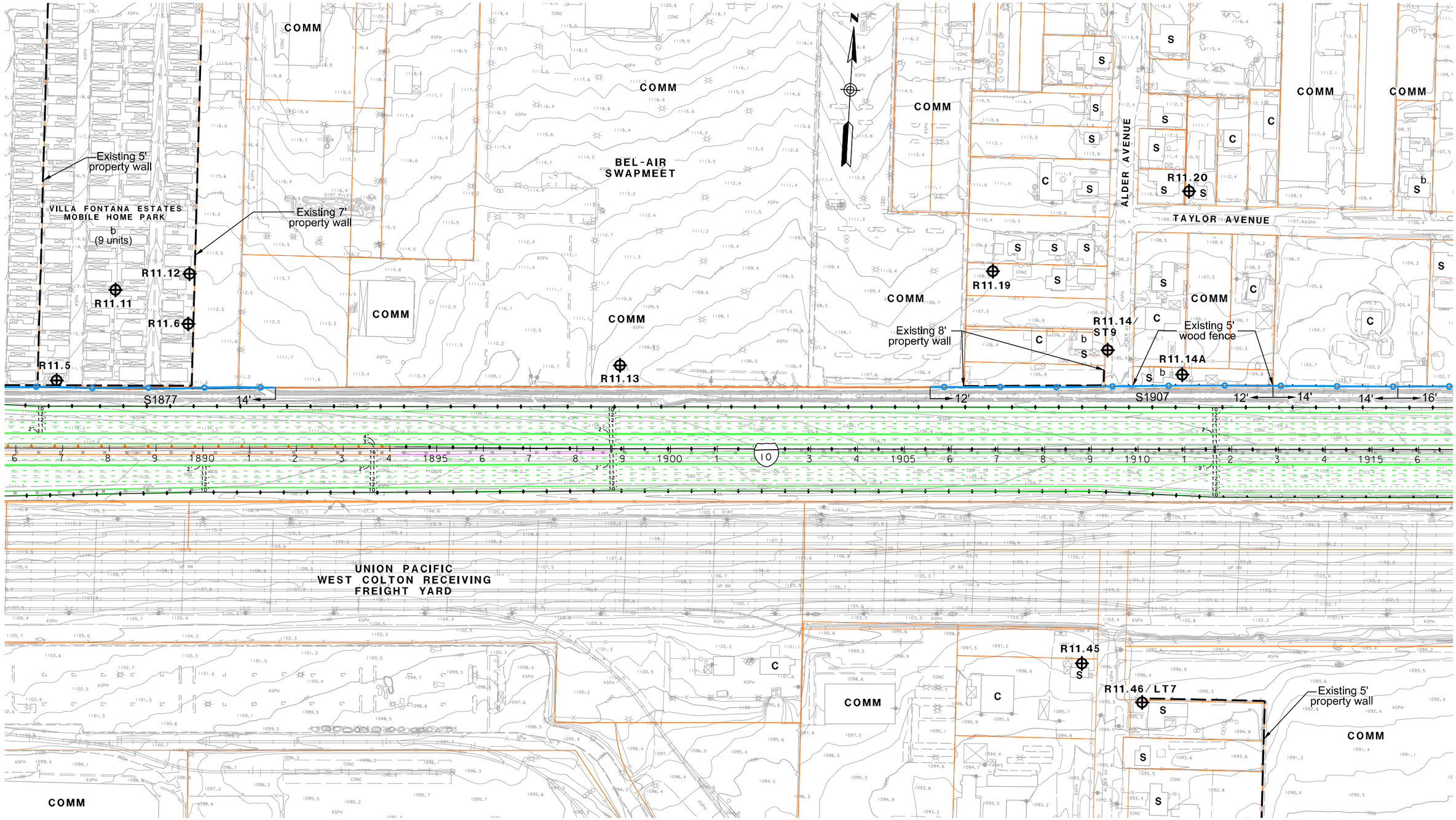
1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 3
NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 135



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1in : 200ft

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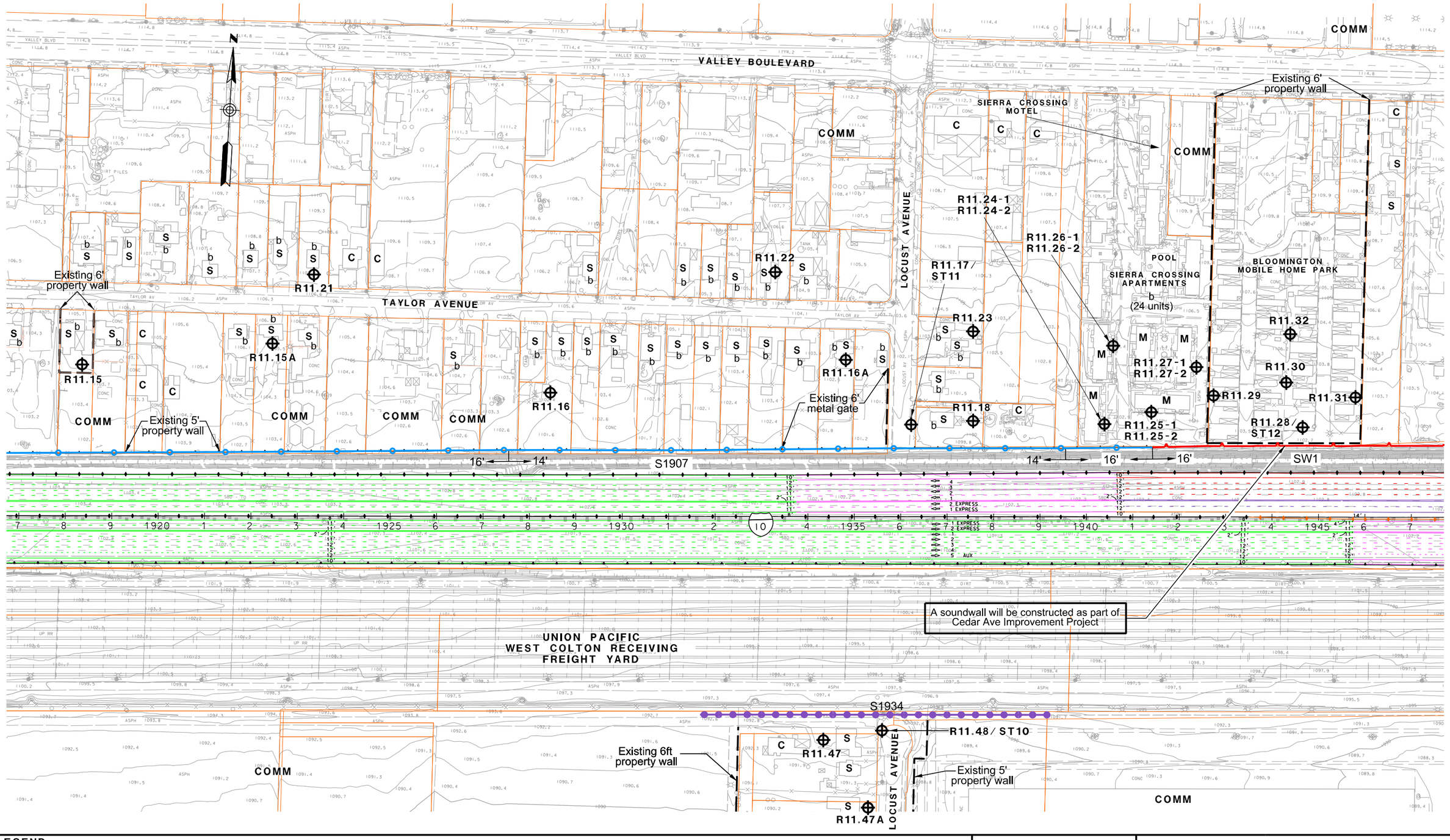
I-10 CORRIDOR ALTERNATIVE 3
NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 136



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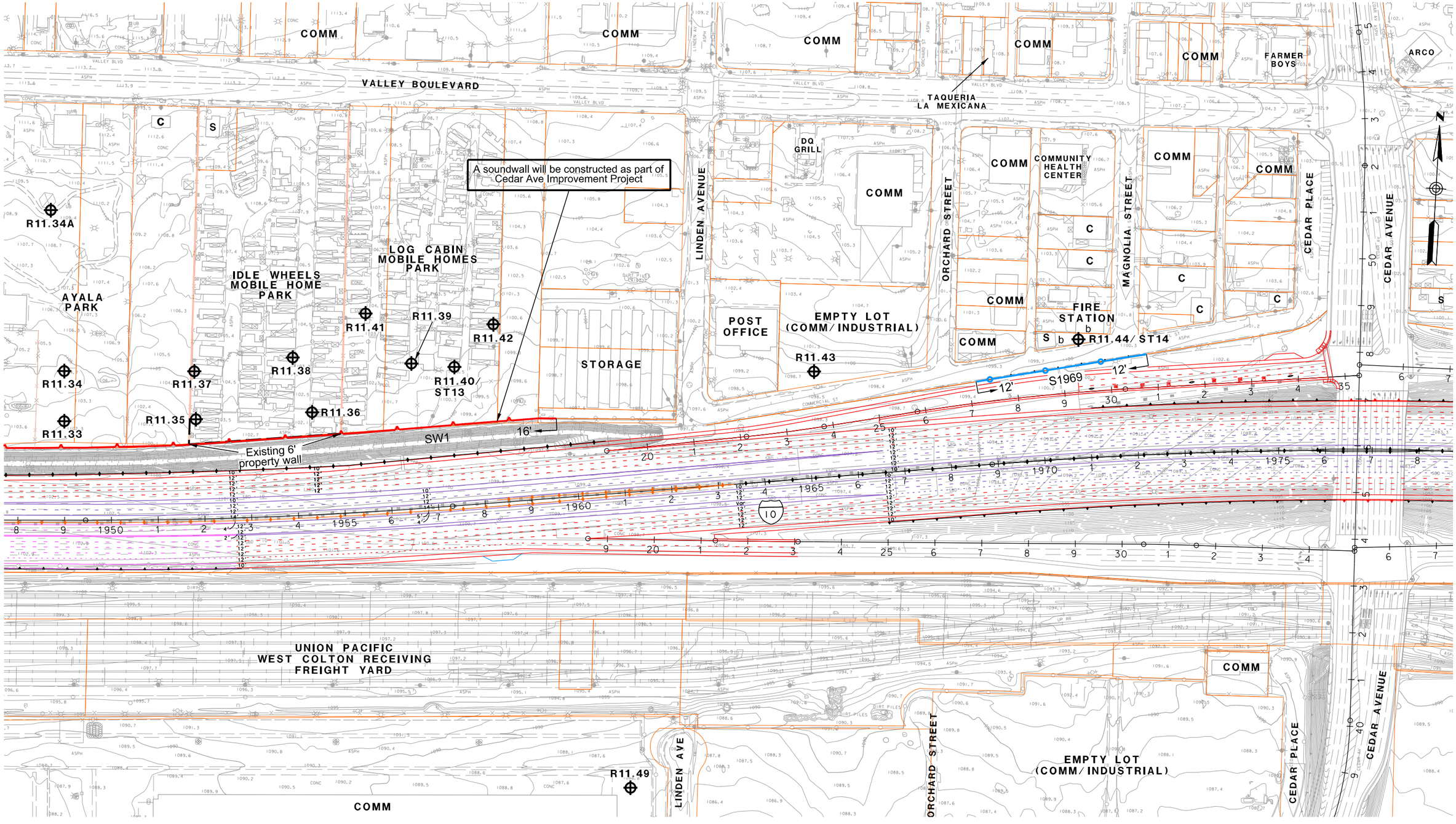
AUGUST 12, 2015

FIGURE 137



LEGEND

- RXX - RECEIVER SITE
- CAL - CALIBRATION SITE
- LT - LONG-TERM MEASUREMENT
- ST - SHORT-TERM MEASUREMENT

- SFR OR S - SINGLE FAMILY RESIDENCE
- MFR OR M - MULTI-FAMILY RESIDENCE
- COMM OR C - COMMERCIAL/NO OUTDOOR USE AREA
- b - BENEFITED RESIDENCE
- HXX - IN/OUTDOOR MEASUREMENT

- EXISTING PROPERTY WALL
- EXISTING SOUNDWALL
- PROPOSED SOUNDWALL
- REPLACEMENT IN KIND SOUNDWALL
- NON-REASONABLE SOUNDWALL
- RETAINING WALL
- SAFETY BARRIER

1in : 200ft

0 ft 100ft 200ft 300ft

I-10 CORRIDOR ALTERNATIVE 3 NADR RECOMMENDED BARRIER HEIGHTS & LOCATIONS

AUGUST 12, 2015

FIGURE 138

Appendix C Alternative 2 – Cost Analysis

I-10 Corridor Soundwall Cost Estimate
Alternative 2 - HOV

Existing Condition	Fence
Proposed Wall type	Sound wall on piles
Sound Wall type	Sound wall masonary block on pile cap
Wall type case(1/2)	Case 1
Friction angle	25
Barrier depth H_e	
Wall Length (FT)	810

Location: Private Property South of I-10, East of Citrus
Station: 1812+00.00

Cost Estimate for Barrier S1818 (Alternative 2 - HOV)

Items	Unit Cost	Barrier Height, ft									Design Barrier
		8	10	12	14	16	18	20	22	24	
Pile Length (ft)		8.5	10	11.5	11.5	12	12.5	13	13.5	14	Varies
Pile Spacing (ft)		16	16	15	13	12	11	10	9	8	Varies
# of Piles		52	52	55	63	69	75	82	91	102	Varies
Total Pile Length (ft)		439	516	633	728	822	933	1066	1229	1432	#N/A
Pile cost (Drill & Cast)	$50/LF	$21,940.63	$25,812.50	$31,625.00	$36,401.92	$41,100.00	$46,647.73	$53,300.00	$61,425.00	$71,575.00	#N/A
Sound Wall Area (SQFT)		6480	8100	9720	11340	12960	14580	16200	17820	19440	#N/A
Masonry Cost[2]	$17/SQFT	$110,160.00	$137,700.00	$165,240.00	$192,780.00	$220,320.00	$247,860.00	$275,400.00	$302,940.00	$330,480.00	#N/A
Pile Cap (CY)		78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	#N/A
Structure Conc. Cost	$650/CY	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	#N/A
Bridge		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Structure Excavation (CY)		78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	#N/A
Structure Excavation Cost	$65/CY	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	#N/A
Remove Exist Wall Cost	$17/LF	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Remove Exist Retaining Wall Cost	$40/LF										
Retaining Wall Area (SQFT)											
Retaining Wall Cost	$100/SQFT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Barrier (Type 736S)	$90/LF										
Barrier (Type SV)	$135/LF										
Temporary & Access Easement		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Wall Cost (Masonry)		$188,406.88	$219,818.75	$253,171.25	$285,488.17	$317,726.25	$350,813.98	$385,006.25	$420,671.25	$458,361.25	#N/A
Traffic Control	$11/LF	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	#N/A
Contingencies (10%)		$18,840.69	$21,981.88	$25,317.13	$28,548.82	$31,772.63	$35,081.40	$38,500.63	$42,067.13	$45,836.13	#N/A
Total Wall Cost (Masonry)		**$217,257.56**	**$251,810.63**	**$288,498.38**	**$324,046.99**	**$359,508.88**	**$395,905.38**	**$433,516.88**	**$472,748.38**	**$514,207.38**	**#N/A**
Total Wall Cost (Masonry)		**$217,300**	**$251,800**	**$288,500**	**$324,000**	**$359,500**	**$395,900**	**$433,500**	**$472,700**	**$514,200**	**#N/A**
Design Barrier Length Per Height (FT)		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

Notes:
1. Estimates are based on Caltrans Database cost for 2012-2014.
2. Includes cost for masonry, steel, cell fill material, scaffolding, and mobilization.
3. No structure excavation associated with piling.
4. Wall designs based on 2010 Caltrans Standard Plans.

Location: Private Property South of I-10, East of Citrus
Station: 1812+00

Wall #: S1818

I-10 Corridor Soundwall Cost Estimate
Alternative 2 - HOV

Existing Condition	Fence
Proposed Wall type	Sound wall on piles
Sound Wall type	Sound wall masonary block on pile cap
Wall type case(1/2)	Case 1
Friction angle	25
Barrier depth H_e	
Wall Length (FT)	815

Location: Private Property South of I-10, East of Cypress
Station: 1830+75.00

Cost Estimate for Barrier S1834 (Alternative 2 - HOV)

Items	Unit Cost	Barrier Height, ft									Design Barrier
		8	10	12	14	16	18	20	22	24	
Pile Length (ft)		8.5	10	11.5	11.5	12	12.5	13	13.5	14	Varies
Pile Spacing (ft)		16	16	15	13	12	11	10	9	8	Varies
# of Piles		52	52	55	64	69	75	83	92	103	Varies
Total Pile Length (ft)		441	519	636	732	827	939	1073	1236	1440	#N/A
Pile cost (Drill & Cast)	$50/LF	$22,073.44	$25,968.75	$31,816.67	$36,623.08	$41,350.00	$46,931.82	$53,625.00	$61,800.00	$72,012.50	#N/A
Sound Wall Area (SQFT)		6520	8150	9780	11410	13040	14670	16300	17930	19560	#N/A
Masonry Cost[2]	$17/SQFT	$110,840.00	$138,550.00	$166,260.00	$193,970.00	$221,680.00	$249,390.00	$277,100.00	$304,810.00	$332,520.00	#N/A
Pile Cap (CY)		79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2	#N/A
Structure Conc. Cost	$650/CY	$51,503.47	$51,503.47	$51,503.47	$51,503.47	$51,503.47	$51,503.47	$51,503.47	$51,503.47	$51,503.47	#N/A
Bridge		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Structure Excavation (CY)		79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2	#N/A
Structure Excavation Cost	$65/CY	$5,150.35	$5,150.35	$5,150.35	$5,150.35	$5,150.35	$5,150.35	$5,150.35	$5,150.35	$5,150.35	#N/A
Remove Exist Wall Cost	$17/LF	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Remove Exist Retaining Wall Cost	$40/LF										
Retaining Wall Area (SQFT)											
Retaining Wall Cost	$100/SQFT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Barrier (Type 736S)	$90/LF										
Barrier (Type SV)	$135/LF										
Temporary & Access Easement		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Wall Cost (Masonry)		$189,567.26	$221,172.57	$254,730.49	$287,246.90	$319,683.82	$352,975.64	$387,378.82	$423,263.82	$461,186.32	#N/A
Traffic Control	$11/LF	$10,065.00	$10,065.00	$10,065.00	$10,065.00	$10,065.00	$10,065.00	$10,065.00	$10,065.00	$10,065.00	#N/A
Contingencies (10%)		$18,956.73	$22,117.26	$25,473.05	$28,724.69	$31,968.38	$35,297.56	$38,737.88	$42,326.38	$46,118.63	#N/A
Total Wall Cost (Masonry)		**$218,588.98**	**$253,354.83**	**$290,268.53**	**$326,036.59**	**$361,717.20**	**$398,338.20**	**$436,181.70**	**$475,655.20**	**$517,369.95**	**#N/A**
Total Wall Cost (Masonry)		**$218,600**	**$253,400**	**$290,300**	**$326,000**	**$361,700**	**$398,300**	**$436,200**	**$475,700**	**$517,400**	**#N/A**
Design Barrier Length Per Height (FT)		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

Notes:
1. Estimates are based on Caltrans Database cost for 2012-2014.
2. Includes cost for masonry, steel, cell fill material, scaffolding, and mobilization.
3. No structure excavation associated with piling.
4. Wall designs based on 2010 Caltrans Standard Plans.

Location: Private Property South of I-10, East of Cypress
Station: 1830+75

Wall #: S1834

Appendix D Alternative 3 – Cost Analysis

I-10 Corridor Soundwall Cost Estimate
Alternative 3 - Express Lanes

Existing Condition	Fence
Proposed Wall type	Sound wall on piles
Sound Wall type	Sound wall masonary block on pile cap
Wall type case(1/2)	Case 1
Friction angle	25
Barrier depth H_e	
Wall Length (FT)	380

Location: Private Property South of I-10, East of Cherry
Station: 1705+00.00

Cost Estimate for Barrier S1708 (Alternative 3 - Express Lanes)

Items	Unit Cost	Barrier Height, ft									Design Barrier
		8	10	12	14	16	18	20	22	24	
Pile Length (ft)		8.5	10	11.5	11.5	12	12.5	13	13.5	14	Varies
Pile Spacing (ft)		16	16	15	13	12	11	10	9	8	Varies
# of Piles		25	25	26	30	33	36	39	43	49	Varies
Total Pile Length (ft)		210	248	303	348	392	444	507	584	679	#N/A
Pile cost (Drill & Cast)	$50/LF	$10,518.75	$12,375.00	$15,141.67	$17,382.69	$19,600.00	$22,215.91	$25,350.00	$29,175.00	$33,950.00	#N/A
Sound Wall Area (SQFT)		3040	3800	4560	5320	6080	6840	7600	8360	9120	#N/A
Masonry Cost[2]	$17/SQFT	$51,680.00	$64,600.00	$77,520.00	$90,440.00	$103,360.00	$116,280.00	$129,200.00	$142,120.00	$155,040.00	#N/A
Pile Cap (CY)		36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	#N/A
Structure Conc. Cost	$650/CY	$24,013.89	$24,013.89	$24,013.89	$24,013.89	$24,013.89	$24,013.89	$24,013.89	$24,013.89	$24,013.89	#N/A
Bridge		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Structure Excavation (CY)		36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	#N/A
Structure Excavation Cost	$65/CY	$2,401.39	$2,401.39	$2,401.39	$2,401.39	$2,401.39	$2,401.39	$2,401.39	$2,401.39	$2,401.39	#N/A
Remove Exist Wall Cost	$17/LF	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Remove Exist Retaining Wall Cost	$40/LF										
Retaining Wall Area (SQFT)											
Retaining Wall Cost	$100/SQFT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Barrier (Type 736S)	$90/LF										
Barrier (Type SV)	$135/LF										
Temporary & Access Easement		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Wall Cost (Masonry)		$88,614.03	$103,390.28	$119,076.94	$134,237.97	$149,375.28	$164,911.19	$180,965.28	$197,710.28	$215,405.28	#N/A
Traffic Control	$11/LF	$5,280.00	$5,280.00	$5,280.00	$5,280.00	$5,280.00	$5,280.00	$5,280.00	$5,280.00	$5,280.00	#N/A
Contingencies (10%)		$8,861.40	$10,339.03	$11,907.69	$13,423.80	$14,937.53	$16,491.12	$18,096.53	$19,771.03	$21,540.53	#N/A
Total Wall Cost (Masonry)		**$102,755.43**	**$119,009.31**	**$136,264.64**	**$152,941.77**	**$169,592.81**	**$186,682.31**	**$204,341.81**	**$222,761.31**	**$242,225.81**	**#N/A**
Total Wall Cost (Masonry)		**$102,800**	**$119,000**	**$136,300**	**$152,900**	**$169,600**	**$186,700**	**$204,300**	**$222,800**	**$242,200**	**#N/A**
Design Barrier Length Per Height (FT)		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

Notes:
1. Estimates are based on Caltrans Database cost for 2012-2014.
2. Includes cost for masonry, steel, cell fill material, scaffolding, and mobilization.
3. No structure excavation associated with piling.
4. Wall designs based on 2010 Caltrans Standard Plans.

Location: Private Property South of I-10, East of Cherry
Station: 1705+00

Wall #: S1708

I-10 Corridor Soundwall Cost Estimate
Alternative 3 - Express Lanes

Existing Condition	Nothing
Proposed Wall type	Sound wall on piles
Sound Wall type	Sound wall masonary block on pile cap
Wall type case(1/2)	Case 1
Friction angle	25
Barrier depth H_e	
Wall Length (FT)	720

Location: Private Property South of I-10, at Beech
Station: 1744+50.00

Cost Estimate for Barrier S1748 (Alternative 3 - Express Lanes)

Items	Unit Cost	Barrier Height, ft									Design Barrier
		8	10	12	14	16	18	20	22	24	
Pile Length (ft)		8.5	10	11.5	11.5	12	12.5	13	13.5	14	Varies
Pile Spacing (ft)		16	16	15	13	12	11	10	9	8	Varies
# of Piles		46	46	49	56	61	66	73	81	91	Varies
Total Pile Length (ft)		391	460	564	648	732	831	949	1094	1274	#N/A
Pile cost (Drill & Cast)	$50/LF	$19,550.00	$23,000.00	$28,175.00	$32,421.15	$36,600.00	$41,534.09	$47,450.00	$54,675.00	$63,700.00	#N/A
Sound Wall Area (SQFT)		5760	7200	8640	10080	11520	12960	14400	15840	17280	#N/A
Masonry Cost[2]	$17/SQFT	$97,920.00	$122,400.00	$146,880.00	$171,360.00	$195,840.00	$220,320.00	$244,800.00	$269,280.00	$293,760.00	#N/A
Pile Cap (CY)		70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	#N/A
Structure Conc. Cost	$650/CY	$45,500.00	$45,500.00	$45,500.00	$45,500.00	$45,500.00	$45,500.00	$45,500.00	$45,500.00	$45,500.00	#N/A
Bridge		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Structure Excavation (CY)		70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	#N/A
Structure Excavation Cost	$65/CY	$4,550.00	$4,550.00	$4,550.00	$4,550.00	$4,550.00	$4,550.00	$4,550.00	$4,550.00	$4,550.00	#N/A
Remove Exist Wall Cost	$17/LF	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Remove Exist Retaining Wall Cost	$40/LF										
Retaining Wall Area (SQFT)											
Retaining Wall Cost	$100/SQFT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Barrier (Type 736S)	$90/LF										
Barrier (Type SV)	$135/LF										
Temporary & Access Easement		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Wall Cost (Masonry)		$167,520.00	$195,450.00	$225,105.00	$253,831.15	$282,490.00	$311,904.09	$342,300.00	$374,005.00	$407,510.00	#N/A
Traffic Control	$11/LF	$9,020.00	$9,020.00	$9,020.00	$9,020.00	$9,020.00	$9,020.00	$9,020.00	$9,020.00	$9,020.00	#N/A
Contingencies (10%)		$16,752.00	$19,545.00	$22,510.50	$25,383.12	$28,249.00	$31,190.41	$34,230.00	$37,400.50	$40,751.00	#N/A
Total Wall Cost (Masonry)		**$193,292.00**	**$224,015.00**	**$256,635.50**	**$288,234.27**	**$319,759.00**	**$352,114.50**	**$385,550.00**	**$420,425.50**	**$457,281.00**	**#N/A**
Total Wall Cost (Masonry)		**$193,300**	**$224,000**	**$256,600**	**$288,200**	**$319,800**	**$352,100**	**$385,600**	**$420,400**	**$457,300**	**#N/A**
Design Barrier Length Per Height (FT)		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

Notes:
1. Estimates are based on Caltrans Database cost for 2012-2014.
2. Includes cost for masonry, steel, cell fill material, scaffolding, and mobilization.
3. No structure excavation associated with piling.
4. Wall designs based on 2010 Caltrans Standard Plans.

Location: Private Property South of I-10, at Beech
Station: 1744+50

Wall #: S1748

I-10 Corridor Soundwall Cost Estimate
Alternative 3 - Express Lanes

Existing Condition	Fence
Proposed Wall type	Sound wall on piles
Sound Wall type	Sound wall masonary block on pile cap
Wall type case(1/2)	Case 1
Friction angle	25
Barrier depth H_e	
Wall Length (FT)	810

Location: Private Property South of I-10, East of Citrus
Station: 1812+00.00

Cost Estimate for Barrier S1818 (Alternative 3 - Express Lanes)

Items	Unit Cost	Barrier Height, ft									Design Barrier
		8	10	12	14	16	18	20	22	24	
Pile Length (ft)		8.5	10	11.5	11.5	12	12.5	13	13.5	14	Varies
Pile Spacing (ft)		16	16	15	13	12	11	10	9	8	Varies
# of Piles		52	52	55	63	69	75	82	91	102	Varies
Total Pile Length (ft)		439	516	633	728	822	933	1066	1229	1432	#N/A
Pile cost (Drill & Cast)	$50/LF	$21,940.63	$25,812.50	$31,625.00	$36,401.92	$41,100.00	$46,647.73	$53,300.00	$61,425.00	$71,575.00	#N/A
Sound Wall Area (SQFT)		6480	8100	9720	11340	12960	14580	16200	17820	19440	#N/A
Masonry Cost[2]	$17/SQFT	$110,160.00	$137,700.00	$165,240.00	$192,780.00	$220,320.00	$247,860.00	$275,400.00	$302,940.00	$330,480.00	#N/A
Pile Cap (CY)		78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	#N/A
Structure Conc. Cost	$650/CY	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	$51,187.50	#N/A
Bridge		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Structure Excavation (CY)		78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	#N/A
Structure Excavation Cost	$65/CY	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	$5,118.75	#N/A
Remove Exist Wall Cost	$17/LF	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Remove Exist Retaining Wall Cost	$40/LF										
Retaining Wall Area (SQFT)											
Retaining Wall Cost	$100/SQFT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Barrier (Type 736S)	$90/LF										
Barrier (Type SV)	$135/LF										
Temporary & Access Easement		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Wall Cost (Masonry)		$188,406.88	$219,818.75	$253,171.25	$285,488.17	$317,726.25	$350,813.98	$385,006.25	$420,671.25	$458,361.25	#N/A
Traffic Control	$11/LF	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	$10,010.00	#N/A
Contingencies (10%)		$18,840.69	$21,981.88	$25,317.13	$28,548.82	$31,772.63	$35,081.40	$38,500.63	$42,067.13	$45,836.13	#N/A
Total Wall Cost (Masonry)		**$217,257.56**	**$251,810.63**	**$288,498.38**	**$324,046.99**	**$359,508.88**	**$395,905.38**	**$433,516.88**	**$472,748.38**	**$514,207.38**	**#N/A**
Total Wall Cost (Masonry)		**$217,300**	**$251,800**	**$288,500**	**$324,000**	**$359,500**	**$395,900**	**$433,500**	**$472,700**	**$514,200**	**#N/A**
Design Barrier Length Per Height (FT)		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

Notes:
1. Estimates are based on Caltrans Database cost for 2012-2014.
2. Includes cost for masonry, steel, cell fill material, scaffolding, and mobilization.
3. No structure excavation associated with piling.
4. Wall designs based on 2010 Caltrans Standard Plans.

Location: Private Property South of I-10, East of Citrus
Station: 1812+00

Wall #: S1818

I-10 Corridor Soundwall Cost Estimate
Alternative 3 - Express Lanes

Existing Condition	Blockwall
Proposed Wall type	Sound wall on piles
Sound Wall type	Sound wall masonary block on pile cap
Wall type case(1/2)	Case 1
Friction angle	25
Barrier depth H_e	
Wall Length (FT)	745

Location: Private Property South of I-10, at Locust
Station: 1931+50.00

Cost Estimate for Barrier S1934 (Alternative 3 - Express Lanes)

Items	Unit Cost	Barrier Height, ft									Design Barrier
		8	10	12	14	16	18	20	22	24	
Pile Length (ft)		8.5	10	11.5	11.5	12	12.5	13	13.5	14	Varies
Pile Spacing (ft)		16	16	15	13	12	11	10	9	8	Varies
# of Piles		48	48	51	58	63	69	76	84	94	Varies
Total Pile Length (ft)		404	476	583	671	757	859	982	1131	1318	#N/A
Pile cost (Drill & Cast)	$50/LF	$20,214.06	$23,781.25	$29,133.33	$33,526.92	$37,850.00	$42,954.55	$49,075.00	$56,550.00	$65,887.50	#N/A
Sound Wall Area (SQFT)		5960	7450	8940	10430	11920	13410	14900	16390	17880	#N/A
Masonry Cost[2]	$17/SQFT	$101,320.00	$126,650.00	$151,980.00	$177,310.00	$202,640.00	$227,970.00	$253,300.00	$278,630.00	$303,960.00	#N/A
Pile Cap (CY)		72.4	72.4	72.4	72.4	72.4	72.4	72.4	72.4	72.4	#N/A
Structure Conc. Cost	$650/CY	$47,079.86	$47,079.86	$47,079.86	$47,079.86	$47,079.86	$47,079.86	$47,079.86	$47,079.86	$47,079.86	#N/A
Bridge		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Structure Excavation (CY)		72.4	72.4	72.4	72.4	72.4	72.4	72.4	72.4	72.4	#N/A
Structure Excavation Cost	$65/CY	$4,707.99	$4,707.99	$4,707.99	$4,707.99	$4,707.99	$4,707.99	$4,707.99	$4,707.99	$4,707.99	#N/A
Remove Exist Wall Cost	$17/LF	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Remove Exist Retaining Wall Cost	$40/LF										
Retaining Wall Area (SQFT)											
Retaining Wall Cost	$100/SQFT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Barrier (Type 736S)	$90/LF										
Barrier (Type SV)	$135/LF										
Temporary & Access Easement		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	#N/A
Wall Cost (Masonry)		$173,321.91	$202,219.10	$232,901.18	$262,624.77	$292,277.85	$322,712.39	$354,162.85	$386,967.85	$421,635.35	#N/A
Traffic Control	$11/LF	$9,295.00	$9,295.00	$9,295.00	$9,295.00	$9,295.00	$9,295.00	$9,295.00	$9,295.00	$9,295.00	#N/A
Contingencies (10%)		$17,332.19	$20,221.91	$23,290.12	$26,262.48	$29,227.78	$32,271.24	$35,416.28	$38,696.78	$42,163.53	#N/A
Total Wall Cost (Masonry)		**$199,949.10**	**$231,736.01**	**$265,486.30**	**$298,182.25**	**$330,800.63**	**$364,278.63**	**$398,874.13**	**$434,959.63**	**$473,093.88**	**#N/A**
Total Wall Cost (Masonry)		**$199,900**	**$231,700**	**$265,500**	**$298,200**	**$330,800**	**$364,300**	**$398,900**	**$435,000**	**$473,100**	**#N/A**
Design Barrier Length Per Height (FT)		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

Notes:
1. Estimates are based on Caltrans Database cost for 2012-2014.
2. Includes cost for masonry, steel, cell fill material, scaffolding, and mobilization.
3. No structure excavation associated with piling.
4. Wall designs based on 2010 Caltrans Standard Plans.

Location: Private Property South of I-10, at Locust
Station: 1931+50

Wall #: S1934

I-10 Corridor Project
EA 0C2500, PN 0800000040
07-LA-10 PM 44.9/48.3
08-SBd-10 PM 0.0/R37.0
Program Code 400.010/HB5

This Noise Barrier Cost Estimate has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein.

David Ovadia

8/25/15

David Ovadia
Registered Civil Engineer
Parsons

Date