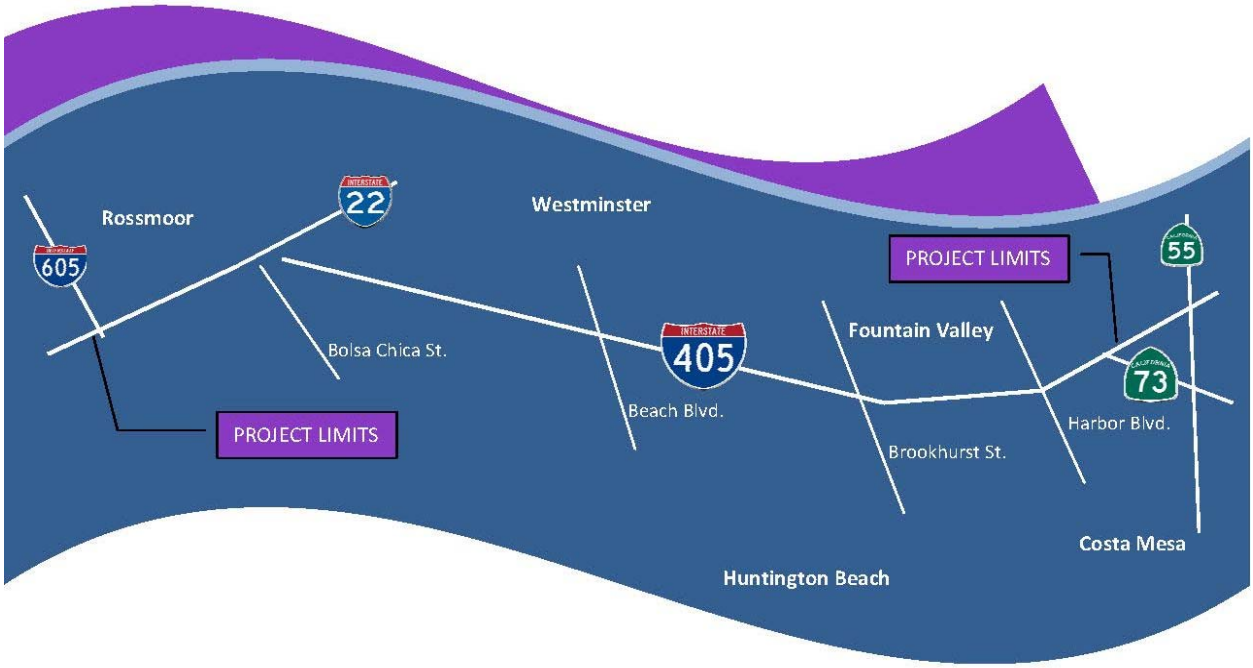
I-405 Improvement Project



Amendment 3

Noise Study Report

I-405 Improvement Project
In Orange County from SR-73 to the I-605 Interchange

Commercial and Residential Areas between
Warner Avenue and Magnolia Street

EA: 12-0H1000

July 2014

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12-0H1000

Prepared for:

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TRANSPORTATION AUTHORITY

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1.0 Introduction

This traffic noise impact assessment has been prepared to reflect an optional design of the Interstate 405 (I-405) Improvement Project between Warner Avenue and Magnolia Street. The Final Noise Study Report (NSR) dated June 2011 had included braided freeway on- and off-ramps for both directions of I-405 between Warner Avenue and Magnolia Street interchange. The design of the braided ramps would have encroached on existing commercial properties along the southbound lanes of I-405 and created a raised off-ramp in front of residential properties along the northbound lanes. An optional design has been developed which has reverted back to the collector-distributor style used by the existing facility. Changes on either one, or both directions of the freeway may be implemented in the final re-design of this segment of I-405 for all three alternatives.

The purpose of this noise amendment is to re-analyze the traffic noise impact of I-405 between Warner Avenue and Magnolia Street on residential and commercial properties on northbound and southbound directions of the freeway as well as identifying the feasible noise abatement measures. With the implementation of the ramp design changes, feasible noise abatement measures need to be revised for the residences located along the northbound I-405. In addition, traffic noise impacts now need to be evaluated for Boomers and Days Inn Hotel that are located along the southbound. These two properties would have been acquired as part of the original design; therefore, traffic noise impacts were not analyzed for these properties. In addition to evaluating traffic noise impacts at the frequent outdoor use areas, interior noise levels at the hotel are evaluated since it does not have an outdoor use area exposed to I-405 traffic noise.

2.0 Project Description

Changes to the braided ramps would be implemented on either or both sides of I-405. The following paragraphs provide a detailed description of the changes to be incorporated along each direction of the freeway:

Southbound

The braided ramps included in the Draft EIR/EIS for the southbound direction of I-405 would have separated the Magnolia Street loop on-ramp and the Warner Avenue loop off-ramp, but this grade separation would be eliminated by the new design option that is being considered. In lieu of the braided ramp configuration, the Magnolia Street loop on-ramp would terminate at the freeway end into a new auxiliary lane adjacent to the general purpose lanes, which would accommodate traffic exiting I-405 onto the Warner Avenue loop off-ramp. The auxiliary lane would terminate south of the off-ramp to Warner Avenue and avoid ROW impacts south of the Warner Avenue interchange. Provision of an auxiliary lane from the Magnolia Street on-ramp south beyond the Warner Avenue off-ramp represents an improvement over the existing condition, which provides an extra-wide outside general purpose lane between the Magnolia Street on-ramp to the Warner Avenue off-ramp.

Northbound

A design option has been developed for all three build alternatives to eliminate the braided ramps. If this design option is included in the Preferred Alternative presented in the Final EIR/EIS, the braided ramps would not be included in the project. Under this design option a collector-distributor road serving the Warner on-ramp to, and the Magnolia Street off-ramp from, northbound I-405 would be provided. The off-ramp to Warner from northbound I-405 would be served by a separate ramp departing the I-405 mainline 1,000 feet upstream of the exit to the proposed collector-distributor road. The on-ramp from

southbound Magnolia Street would be served by a separate ramp entering the I-405 mainline 2,078 feet downstream of the collector-distributor road entrance to the freeway mainline.

3.0 Federal Regulations and State Policies

Caltrans' Traffic Noise Analysis Protocol (2006) was used for this traffic noise study to be consistent with the project Noise Study Report.

4.0 Study Methods and Procedures

No new noise measurements were conducted at the residential receivers located along the northbound side because it was concluded that previously conducted noise measurements were adequate. However, along the southbound side, measurements were required to determine the insertion loss provided by the hotel building. There were no secure locations where a long term noise measurement that would be acoustically representative of the outdoor use areas could be conducted along the southbound.

Under Caltrans' Traffic Noise Analysis Protocol (2006) interior noise levels are addressed and examined using the Noise Abatement Criteria of Title 23, Part 772 of the Code of Federal Regulations (CFR), titled "Procedures for Abatement of Highway Traffic Noise and Construction Noise," (23 CFR 772). This regulation specifies an interior limit of 52 dBA for motels and hotels; therefore, if a building shell of a motel or hotel would attenuate exterior noise levels by approximately 20 dB, exterior noise levels less than 71 dBA would be attenuated below the Caltrans interior noise abatement criteria. Assessments of building shells are done on a case-by-case basis to determine the average noise attenuation for a particular property.

4.1 Building Acoustical Assessment Noise Measurements

A building acoustics assessment of the three story Day's Inn Hotel in Fountain Valley was conducted on August 13, 2013. The following is a brief description of the procedures used for building acoustics assessment noise measurements:

- Sound level meters were calibrated before and after the measurements.
- Following the calibration of equipment, a windscreen was placed over the microphone.
- For each measurement, the overall noise level was recorded with the frequency weighting set on "A" and the slow detector response was selected.
- Wind speed, temperature, humidity, and sky conditions were observed and documented during the exterior noise measurements.

Instruments used for the noise measurements included the following:

- Sound Level Meter – Larson Davis model 870, two channel analyzer with ANSI Type 1 accuracy.
- Microphone System – Larson Davis model PRM 900B microphone preamps, and LD model 2560, ½-inch random-incidence microphones.
- Acoustic Field Calibrators – Larson Davis model CA250.
- Microphone cables; 4-inch diameter windscreens; and tripods.
- Wind Monitor/Temperature and Humidity Gauge – Kestal Weather Meter.

The instrumentation serial numbers, calibration data, noise measurement dates and times, noise measurement data, meteorological data, and measurement locations are noted on the noise measurement field forms and are attached at the end of this report. During the noise measurements, field staff attended

each meter. The calibration of the meter was checked before and after the measurement using a Larson Davis model CAL250 calibrator.

Exterior and interior traffic noise levels were measured simultaneously to determine the noise attenuation provided by the building shell which is commonly referred to as “insertion loss”. Noise measurements were conducted in conformance with Caltrans’ Technical Noise Supplement (TeNS) and the procedures outlined in Building Noise Reduction Measurements in the Vicinity of a Highway in FHWA’s Measurement of Highway-Related Noise. The use of an artificial noise source (i.e., pink noise generator) connected to a loudspeaker was not required for testing the interior noise because during the field investigation it was determined that traffic noise was clearly noticeable inside the rooms to produce reliable results. Noise testing was conducted at two representative rooms on the second floor which had identical but mirrored image floor plans. Rooms in the first and third floors were not available during the testing period, but the floor plan of the rooms used for the measurements was typical throughout the three floors of the hotel.

Microphone within the hotel rooms was located 10 feet from the center of the window which also coincided with the center of the room. The interior microphone was placed at least 5 feet from any wall. An additional interior measurement location of 5 feet from the window was also conducted for more interior noise data acquisition. Figures 1 and 2 show the interior of the hotel room and the placement of the microphone at distances of 5 and 10 feet, respectively.

The exterior microphone was positioned approximately 5 feet from the hotel façade along the roadway and raised to a height that matched the elevation of the interior microphone at the second floor. Microphone was also placed beyond the edge of the hotel in order to avoid noise reflection from the building which could contaminate the results. Figure 3 shows the exterior microphone location at the second floor level. Simultaneous interior and exterior samples of noise levels were first recorded with the windows closed and then with the windows open.

4.2 Building Acoustical Analysis

Each room had a window (5.5 ft width x 4.5 ft height) centered above an air conditioning unit. Figure 4 shows the window and air conditioning unit. Normally, a window is considered as the weak link for transmitting exterior noise to the interior of a building. Field observations indicate that windows are double pane and of good construction that provided a high noise reduction. In this case, the window tracks were in great condition and had good weather stripping.

The air conditioning units are wall mounted where the exposed condenser provides a pathway for noise to penetrate the building façade and enter the room. The hotel owners have tried to reduce the noise leak from this pathway by attaching metal sheeting and a layer of foam to the exterior of the wall units as shown in Figures 5 and 6. Observations of the interior noise point to the opening for the air conditioning units as the strongest source of interior noise leaking from the exterior.

Table 1 presents the results of the measurements for the two rooms which indicated an average insertion loss of approximately 30 dB with windows closed. Because each room has an air conditioning unit; therefore, windows can be kept closed to minimize the traffic noise exposure. This insertion loss will be used with the predicted future traffic noise levels to determine whether or not there will be an interior noise impact.

Table 1 – Measured Exterior and Interior Noise Levels and Resulting Insertion Loss (IL)

Distance from Window	Window	Room 216			Room 211		
		Exterior Noise Level, dBA	Interior Noise Level, dBA	I.L. dB	Exterior Noise Level, dBA	Interior Noise Level, dBA	I.L. dB
5 ft	closed	74	45	29	74	44	30
	open	74	66	8	73	63	10
10 ft	closed	74	42	32	72	41	31
	open	74	63	11	74	64	10

5.0 Existing Noise Environment

It was determined that the noise measurements conducted previously along the northbound will be sufficient. Therefore, no new short term or long term noise measurements were conducted as part of this study for determining the existing traffic noise levels at the frequent outdoor use area. The ground level outdoor existing exterior noise levels along the northbound that are represented by Receivers R2.77 through R2.92 range from 59 to 68 dBA.

There were no secure locations where a long term noise measurement could be conducted along the southbound that would be acoustically representative of the outdoor use areas. Furthermore, between the time of the Final Noise Study and Amendment 3, rubberized asphalt had been implemented in this area across all travel lanes. Short-term measurements conducted with rubberized asphalt in place indicated a discernible reduction in traffic noise levels as compared to the previously measured traffic noise levels. Based on the previous results of the noise study before the change in pavement materials, the existing and predicted future no build peak noise levels were almost the same values along the northbound lanes for this particular area. Therefore, in order to be consistent with the rest of the noise study, it was decided to use the predicted future no build noise levels as the existing noise levels for the southbound as well. Estimated ground level existing exterior noise levels along the southbound at Boomers and Day's Inn Hotel range from 79 to 81 dBA along the right of way fence and 60 dBA at the hotel pool area which is protected from the traffic noise by the building. This area is now represented by Receivers R2.93 through R2.99. The estimated existing interior noise levels in the Day's Inn Hotel rooms is 51 dBA.

6.0 Future Noise Environment, Impacts, and Considered Abatement

Traffic noise levels were predicted and feasible noise abatement measures were identified for the single family residences located along the northbound as well as Boomers and Day's Inn Hotel located on the southbound side.

6.1 Northbound

Under the new configuration between Warner Avenue and Magnolia Street, traffic noise levels at the single family residences along northbound I-405 represented by Receivers R2.77 through R2.92 were re-addressed following the Caltrans' 2006 Protocol which was used for the original traffic noise study. The future predicted exterior noise levels along this side of the freeway for Alternative 1 range from 58 to 69 dBA. Traffic noise impacts are identified for six Category B receivers which represent 19 single-family residences. The future predicted exterior noise levels along this side of the freeway for Alternatives 2 and 3 range from 59 to 70 dBA where the majority approach or exceeds the NAC for Category B. Traffic

noise impacts are identified for seven Category B receivers which represent 22 single-family residences. Traffic noise impacts were also identified for one Category B receiver which represents the El Dorado pre-school. The future predicted exterior noise level this receiver for Alternative 1 is 76 dBA while the noise level for both Alternatives 2 and 3 is 77 dBA which exceeds the NAC for Category B. Figures 10 and 11 for each alternative show the study area.

Soundwall S776: This soundwall was initially analyzed for Amendment 2 after the Final NSR was released and when the El Dorado pre-school opened for business. Due to the proposed changes to the Warner Avenue ramps, this soundwall is being re-analyzed and updated to reflect these changes. Soundwall S776 would be located along the right-of-way line on the northbound side of I-405. Traffic noise impacts are predicted at the playground of El Dorado pre-school represented by Receiver R2.77A. It was assumed that the Receiver R2.77A would represent one frontage unit. Feasible traffic noise abatement in the form of a soundwall has been identified for Alternatives 1, 2, and 3 for the small playground exposed to traffic noise levels from I-405. The traffic noise analysis was conducted with barrier heights ranging from 8 to 16 feet. A 12-foot high soundwall located at the right of way line would provide feasible abatement and would cut line of sight to the truck stack.

The predicted peak hour noise level is above 75 dBA without a soundwall in place; thus, this playground would be considered severely impacted. Where severe impacts are identified, unusual and extraordinary abatement must be considered. If Soundwall S776 is determined to be unreasonable based on cost, providing the soundwall will still be required for this receptor.

Figures 10 and 11 show the minimum height and lengths of Soundwall S776 required to provide feasible traffic noise abatement. Tables 2, 3, and 4 summarize predicted soundwall performance and associated cost allowance information for Alternatives 1, 2, and 3, respectively. Tables 13, 14, and 15 show the top of wall elevations and soundwall lengths for Alternatives 1, 2, and 3, respectively.

Soundwalls S786 and S790: Soundwalls S786 and S790 which act as a system would be located on the right of way line along the northbound on-ramp from Warner Avenue. Part of this soundwall system would replace an existing soundwall along northbound on-ramp from Warner Avenue, connect to an existing 12-foot high soundwall at one end and follows the right of way along the ramp on the other end. Soundwall S790 would be a 14-foot high replacement of a portion of an existing 12 feet soundwall and it will connect to the existing 12-foot high soundwall at its northernmost end. At its southernmost end, Soundwall S790 would connect to Soundwall S786. These two soundwalls would provide abatement for three single-family residences represented by Receiver R2.81 for Alternatives 1, 2, and 3. Soundwall S786 would need to be 16 feet in height under Alternative 1 and 14 feet in height for both Alternatives 2 and 3.

These two soundwalls would be replacement for Soundwalls S786, S788, and S792 of the NSR dated June 2011 but with much shorter length because a large portion of an existing 12-foot high soundwall located on the right of way line would not be replaced as part of the new optional design.

Traffic noise impacts are predicted within the outdoor frequent use areas of an additional 19 single-family residences in this area for all alternatives, but this soundwall system would not provide 5 dB or more of traffic noise reduction for those residences. There would be less impacted residences with the braided ramp design because the retaining wall which is part of that design would act as noise barrier. Therefore, the number of the impacted residences that would not receive 5 dB reduction would also be less with the braided ramp design.

Figures 10 and 11 show the minimum heights and lengths of Soundwalls S786 and S790 required to provide feasible abatement. Tables 5 and 6 summarize predicted soundwall performance and associated cost allowance information for Alternative 1, as well as for both Alternatives 2 and 3, respectively. Tables 13, 14, and 15 show the top of wall elevations and soundwall lengths for Alternatives 1, 2 and 3, respectively.

6.2 Southbound

Noise levels at the commercial properties along southbound of I-405 were also analyzed, since they are no longer being acquired by the project. As a result of high exterior traffic noise levels and no outdoor use areas impacted by the traffic noise, interior traffic noise levels at the Day's Inn Hotel were also addressed. Noise analysis was conducted for all three alternatives separately, but noise levels for Alternatives 1 and 2 are almost identical.

The future predicted exterior noise levels for Alternatives 1 and 2 at the façade of the building range from 80 to 83 dBA where the majority exceed the NAC for Category B and the predicted interior noise levels of the Day's Inn Hotel are at 52 dBA which approaches the NAC for Category E; therefore, consideration of noise abatement is required. Traffic noise impacts are identified at outdoor use areas of the Boomers and 66 hotel rooms facing the freeway.

The future predicted exterior noise levels for Alternative 3 at the façade of the building range from 81 to 84 dBA where the majority exceeds the NAC for Category B and the predicted interior noise levels of the Day's Inn Hotel are at 53 and 54 dBA which exceeds the NAC for Category E; therefore, consideration of noise abatement is required.

Soundwall S795: Soundwall S795 would be located on the edge of shoulder of the southbound I-405 between Warner Avenue and Magnolia Street. This soundwall would provide traffic noise abatement for the Day's Inn Hotel and Boomers represented by Receivers R2.93 to R2.99. Under all three alternatives an 8-foot high soundwall would provide feasible abatement to the outdoor use areas of the Boomers.

Under Alternatives 1 and 2, a 12-foot high soundwall would be required to provide feasible abatement for the first and second floor rooms of the hotel while a 14-foot high soundwall would be required under Alternative 3. A soundwall under Alternatives 1 and 2 is more effective in providing abatement to the second floor rooms due to its distance from the hotel building. Soundwall would be located within few feet of the building under Alternative 3 which makes it not as effective in providing abatement to the second floor rooms. Under all three alternatives, rooms located at the third floor would not receive the 5 dB minimum required noise reduction with a soundwall as high as 16 feet.

Providing different type of air conditioning system that eliminates the noise leak from outside could reduce the traffic noise in the third floor rooms. During the site visit it was noticed that traffic noise was penetrating inside the rooms through the air conditioning units even thought hotel owners had installed a protection shields in front of the outside openings. A more effective shield could also reduce the interior noise levels.

Noise levels could be further reduced in the third floor rooms by using non operable windows with high noise reduction. A non-operable window typically has a higher noise reduction in comparison to a similar operable window due to the small air gaps that may exist in operable windows.

Figures 10 and 11 show the minimum heights and length of Soundwall S795, to provide feasible abatement. Tables 7, 8, and 9 summarize predicted soundwall performance and associated cost allowance

information for Alternatives 1, 2, and 3, respectively. Tables 13, 14, and 15 show the top of wall elevations and soundwall lengths for Alternatives 1, 2 and 3, respectively.

Table 2. Summary of Reasonableness Determination Data – Alternative 1 Soundwall S776

Barrier I.D.: S776					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.77A					
Design Year Noise Level, dBA L_{eq}(h): 76					
Design Year Noise Level Minus Existing Noise Level: 2					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	5	6	7	7	7
Number of Benefited Residences	1	1	1	1	1
New Highway or More than 50% of Residences Predate 1978[b]	No	No	No	No	No
Reasonable Allowance Per Benefited Residence	$37,000	$39,000	$39,000	$39,000	$39,000
Total Reasonable Allowance	$37,000	$39,000	$39,000	$39,000	$39,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 3. Summary of Reasonableness Determination Data – Alternative 2 Soundwall S776

Barrier I.D.: S776					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.77A					
Design Year Noise Level, dBA L_{eq}(h): 77					
Design Year Noise Level Minus Existing Noise Level: 3					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	5	6	7	7	7
Number of Benefited Residences	1	1	1	1	1
New Highway or More than 50% of Residences Predate 1978[b]	No	No	No	No	No
Reasonable Allowance Per Benefited Residence	$39,000	$41,000	$41,000	$41,000	$41,000
Total Reasonable Allowance	$39,000	$41,000	$41,000	$41,000	$41,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 4. Summary of Reasonableness Determination Data – Alternative 3 Soundwall S776

Barrier I.D.: S776					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.77A					
Design Year Noise Level, dBA L_{eq}(h): 77					
Design Year Noise Level Minus Existing Noise Level: 3					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	5	6	6	7	7
Number of Benefited Residences	1	1	1	1	1
New Highway or More than 50% of Residences Predate 1978[b]	No	No	No	No	No
Reasonable Allowance Per Benefited Residence	$39,000	$41,000	$41,000	$41,000	$41,000
Total Reasonable Allowance	$39,000	$41,000	$41,000	$41,000	$41,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 5. Summary of Reasonableness Determination Data – Alternative 1 Soundwalls S786 and S790

Barrier I.D.: S786 & S790					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.81					
Design Year Noise Level, dBA L_{eq}(h): 69					
Design Year Noise Level Minus Existing Noise Level: 1					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	N/A	N/A	N/A	N/A	5
Number of Benefited Residences	N/A	N/A	N/A	N/A	3
New Highway or More than 50% of Residences Predate 1978[b]	N/A	N/A	N/A	N/A	Yes
Reasonable Allowance Per Benefited Residence	N/A	N/A	N/A	N/A	$43,000
Total Reasonable Allowance	N/A	N/A	N/A	N/A	$129,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 6. Summary of Reasonableness Determination Data – Alternatives 2 and 3 Soundwalls S786 and S790

Barrier I.D.: S786 & S790					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.81					
Design Year Noise Level, dBA L_{eq}(h): 70					
Design Year Noise Level Minus Existing Noise Level: 2					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	N/A	N/A	N/A	5	6
Number of Benefited Residences	N/A	N/A	N/A	3	3
New Highway or More than 50% of Residences Predate 1978[b]	Yes	Yes	Yes	Yes	Yes
Reasonable Allowance Per Benefited Residence	N/A	N/A	N/A	$45,000	$47,000
Total Reasonable Allowance	N/A	N/A	N/A	$135,000	$141,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 7. Summary of Reasonableness Determination Data – Alternative 1 Soundwall S795

Barrier I.D.: S795					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.95					
Design Year Noise Level, dBA L_{eq}(h): 82					
Design Year Noise Level Minus Existing Noise Level: 1					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	12	13	14	15	16
Number of Benefited Residences	31	31	53	53	53
New Highway or More than 50% of Residences Predate 1978[b]	No	No	No	No	No
Reasonable Allowance Per Benefited Residence	$45,000	$45,000	$45,000	$45,000	$45,000
Total Reasonable Allowance	$1,395,000	$1,395,000	$2,385,000	$2,385,000	$2,385,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 8. Summary of Reasonableness Determination Data – Alternative 2 Soundwall S795

Barrier I.D.: S795					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.95					
Design Year Noise Level, dBA L_{eq}(h): 82					
Design Year Noise Level Minus Existing Noise Level: 1					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	11	13	14	15	16
Number of Benefited Residences	31	31	53	53	53
New Highway or More than 50% of Residences Predate 1978[b]	No	No	No	No	No
Reasonable Allowance Per Benefited Residence	$43,000	$45,000	$45,000	$45,000	$45,000
Total Reasonable Allowance	$1,333,000	$1,395,000	$2,385,000	$2,385,000	$2,385,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 9. Summary of Reasonableness Determination Data – Alternative 3 Soundwall S795

Barrier I.D.: S795					
Predicted Sound Level without Barrier					
Critical Design Receiver: R2.95					
Design Year Noise Level, dBA L_{eq}(h): 83					
Design Year Noise Level Minus Existing Noise Level: 2					
Design Year with Barrier	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**
Barrier Noise Reduction, dB	13	15	16	17	18
Number of Benefited Residences	31	31	31	53	53
New Highway or More than 50% of Residences Predate 1978[b]	No	No	No	No	No
Reasonable Allowance Per Benefited Residence	$45,000	$45,000	$45,000	$45,000	$45,000
Total Reasonable Allowance	$1,395,000	$1,395,000	$1,395,000	$2,385,000	$2,385,000

Note: N/A-Not applicable. Barrier does not provide 5 dB of noise reduction.

[a] A NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.

[b] This adjustment increases the abatement allowance by $10,000 if the project is new highway construction or if most of the benefited residences (more than 50%) existed before January 1, 1978.

Table 10. Future No Build and Build Noise Levels – Alternative 1

Receiver I.D.	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Noise Level Leq(h), dBA[1,3]	I-405 PA-ED Alternative 1 Future Worst Hour Noise Levels - Leq(h), dBA[1,6]						Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)														
					Design Year No Build Noise Level Leq(h), dBA[1]	Design Year Build Noise Level Leq(h), dBA[1]	Design Year No Build Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[4]	8 feet			10 feet			12 feet			14 feet			16 feet		
											Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*
R 2.77A W,C	S776 / Shoulder	REC	1	74 MOD	75	76	1	1	B (67)	A/E	71	5	*1*	70	6	*1*	**69 R,T**	**7**	***1***	69	7	*1*	69	7	*1*
R 2.77 W	--	MFR	2	60 MOD	61	59	1	-2	B (67)	NONE	59	0	*0*	59	0	*0*	59	0	*0*	58	1	*0*	58	1	*0*
R 2.78 W		MFR	4	61 M,ST19	62	60	1	-2	B (67)	NONE	60	0	*0*	60	0	*0*	60	0	*0*	60	0	*0*	60	0	*0*
R 2.79 W		MFR	4	65 MOD	66	64	1	-2	B (67)	NONE	64	0	*0*	64	0	*0*	64	0	*0*	64	0	*0*	63	1	*0*
R 2.80 W	S786 & S790 / R/W	SFR	3	64 MOD	65	65	1	0	B (67)	NONE	65	0	*0*	65	0	*0*	64 T	1	*0*	64	1	*0*	64	1	*0*
R 2.81 W,C		SFR	3	68 MOD	69	69	1	0	B (67)	A/E	67	2	*0*	67	2	*0*	66 T	3	*0*	65	4	*0*	**64 R**	**5**	***3***
R 2.82 W		SFR	2	67 MOD	68	69	1	1	B (67)	A/E	--	--	--	--	--	--	67 T	2	*0*	66	3	*0*	65	4	*0*
R 2.83 W		SFR	3	66 MOD	66	67	0	1	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	66	1	*0*	65	2	*0*
R 2.84 W		SFR	4	66 M,LT11,CAL	66	67	0	1	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	65	2	*0*	65	2	*0*
R 2.85 W		SFR	4	66 MOD	66	67	0	1	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	66	1	*0*	65	2	*0*
R 2.86 W	--	SFR	3	65 MOD	65	66	0	1	B (67)	A/E	--	--	--	--	--	--	--	--	--	65	1	*0*	64	2	*0*
R 2.87 W		SFR	4	64 MOD	64	64	0	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	63	1	*0*	62	2	*0*
R 2.88 W	--	SFR	4	62 MOD	62	62	0	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.89 W		SFR	3	63 MOD	63	59	0	-4	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.90 W		SFR	3	61 MOD	61	58	0	-3	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.91 W		SFR	2	62 MOD	62	62	0	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.92 W		SFR	1	59 MOD	59	60	0	1	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile Home; MOT - motel/hotel; SCH - school; REC - recreational/park; REL - religious institution; LIB - library.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - noise model calibration site; MOD - Estimated from No-Build Alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height needed to meet requirements at adjacent receptor(s).

6 - Traffic noise from the freeway only; other local noise sources are not included.

7 - Existing soundwall is at a height of 16 feet.

R - The minimum height to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical design receiver.

Int - The modeled exterior noise levels have been reduced based on window types ar
interior noise criteria has been used for this receiver because there is no outdoo

W - Reciever protected by existing private property wall or soundwall.

* - Non first row residences.

Table 10. Future No Build and Build Noise Levels – Alternative 1 (Con't)

Receiver I.D.	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Noise Level Leq(h), dBA[1,3]	I-405 PA-ED Alternative 1 Future Worst Hour Noise Levels - Leq(h), dBA[1,6]						Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)														
					Design Year No Build Noise Level Leq(h), dBA[1]	Design Year Build Noise Level Leq(h), dBA[1]	Design Year No Build Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[4]	8 feet			10 feet			12 feet			14 feet			16 feet		
											Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR
R 2.93	S795 / Shoulder	MOT	7	81 MOD	81	82	0	1	B (67)	A/E	71 T	11	7	71	11	7	**70 R,5**	**12**	***7***	70	12	7	69	13	7
R 2.94		MOT	--	81 MOD	81	82	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94 Int		MOT	8	51 MOD	51	52	0	1	E (52)	A/E	40 T	12	8	38	14	8	**37 R,5**	**15**	***8***	36	16	8	35	17	8
R 2.94A		MOT	--	81 MOD	81	82	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94A Int		MOT	22	51 MOD	51	52	0	1	E (52)	A/E	52 T	0	0	51	1	0	**46 R**	**6**	***22***	42	10	22	40	12	22
R 2.94B		MOT	--	81 MOD	81	82	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94B Int		MOT	22	51 MOD	51	52	0	1	E (52)	A/E	52 T	0	0	52	0	0	52	0	0	52	0	0	52	0	0
R 2.95 C		MOT	7	81 MOD	81	82	0	1	B (67)	A/E	70	12	7	69 T	13	7	**68 R,5**	**14**	***7***	67	15	7	66	16	7
R 2.96		MOT	1	60 MOD	60	61	0	1	B (67)	NONE	59	2	0	59	2	0	59	2	0	59	2	0	59	2	0
R 2.97		REC	3	79 MOD	79	80	0	1	B (67)	A/E	**71 R**	**9**	***3***	69 T	11	3	68	12	3	67	13	3	66	14	3
R 2.97A		REC	--	79 MOD	79	80	0	1	B (67)	A/E	69	11	--	68 T	12	--	67	13	--	67	13	--	66	14	--
R 2.98		REC	3	79 MOD	79	80	0	1	B (67)	A/E	**69 R**	**11**	***3***	68 T	12	3	67	13	3	67	13	3	66	14	3
R 2.99		REC	3	79 MOD	79	80	0	1	B (67)	A/E	**70 R**	**10**	***3***	73 T	7	3	73	7	3	73	7	3	72	8	3

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile Home; MOT - motel/hotel; SCH - school; REC - recreational/park; REL - religious institution; LIB - library.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - noise model calibration site; MOD - Estimated from No-Build Alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height needed to meet requirements at adjacent receptor(s).

6 - Traffic noise from the freeway only; other local noise sources are not included.

7 - Existing soundwall is at a height of 16 feet.

R - The minimum height to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical design receiver.

Int - The modeled exterior noise levels have been reduced based on window types ar interior noise criteria has been used for this receiver because there is no outdoo

W - Reciever protected by existing private property wall or soundwall.

* - Non first row residences.

Table 11. Future No Build and Build Noise Levels – Alternative 2

Receiver I.D.	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Noise Level Leq(h), dBA[1,3]	I-405 PA-ED Alternative 2 Future Worst Hour Noise Levels - Leq(h), dBA[1,6]						Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)														
					Design Year No Build Noise Level Leq(h), dBA[1]	Design Year Build Noise Level Leq(h), dBA[1]	Design Year No Build Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[4]	8 feet			10 feet			12 feet			14 feet			16 feet		
											Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*
R 2.77A W,C	S776 / Shoulder	REC	1	74 MOD	75	77	1	2	B (67)	A/E	72	5	*1*	71	6	*1*	**70 R,T**	**7**	***1***	70	7	*1*	70	7	*1*
R 2.77 W	--	MFR	2	60 MOD	61	59	1	-2	B (67)	NONE	59	0	*0*	59	0	*0*	59	0	*0*	59	0	*0*	59	0	*0*
R 2.78 W		MFR	4	61 M,ST19	62	60	1	-2	B (67)	NONE	60	0	*0*	60	0	*0*	60	0	*0*	60	0	*0*	60	0	*0*
R 2.79 W		MFR	4	65 MOD	66	64	1	-2	B (67)	NONE	64	0	*0*	64	0	*0*	64	0	*0*	64	0	*0*	64	0	*0*
R 2.80 W	S786 & S790 / R/W	SFR	3	64 MOD	65	66	1	1	B (67)	A/E	65	1	*0*	65	1	*0*	65 T	1	*0*	65	1	*0*	64	2	*0*
R 2.81 W,C		SFR	3	68 MOD	69	70	1	1	B (67)	A/E	68	2	*0*	68	2	*0*	66 T	4	*0*	**65 R**	**5**	***3***	64	6	*3*
R 2.82 W		SFR	2	67 MOD	68	69	1	1	B (67)	A/E	--	--	--	--	--	--	67 T	2	*0*	67	2	*0*	66	3	*0*
R 2.83 W		SFR	3	66 MOD	66	68	0	2	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	66	2	*0*	66	2	*0*
R 2.84 W		SFR	4	66 M,LT11,CAL	66	67	0	1	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	66	1	*0*	65	2	*0*
R 2.85 W		SFR	4	66 MOD	66	67	0	1	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	66	1	*0*	65	2	*0*
R 2.86 W	--	SFR	3	65 MOD	65	67	0	2	B (67)	A/E	--	--	--	--	--	--	--	--	--	65	2	*0*	64	3	*0*
R 2.87 W		SFR	4	64 MOD	64	65	0	1	B (67)	NONE	--	--	--	--	--	--	--	--	--	63	2	*0*	63	2	*0*
R 2.88 W	--	SFR	4	62 MOD	62	63	0	1	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.89 W		SFR	3	63 MOD	63	59	0	-4	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.90 W		SFR	3	61 MOD	61	59	0	-2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.91 W		SFR	2	62 MOD	62	62	0	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.92 W		SFR	1	59 MOD	59	61	0	2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile Home; MOT - motel/hotel; SCH - school; REC - recreational/park; REL - religious institution; LIB - library.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - noise model calibration site; MOD - Estimated from No-Build Alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/

5 - Barrier height needed to meet requirements at adjacent receptor(s).

6 - Traffic noise from the freeway only; other local noise sources are not included.

7 - Existing soundwall is at a height of 16 feet.

R - The minimum height to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical design receiver.

Int - The modeled exterior noise levels have been reduced based on window types and the interior noise criteria has been used for this receiver because there is no outdoor use.

W - Reciever protected by existing private property wall or soundwall.

* - Non first row residences.

Table 11. Future No Build and Build Noise Levels – Alternative 2 (Con't)

Receiver I.D.	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Noise Level Leq(h), dBA[1,3]	I-405 PA-ED Alternative 2 Future Worst Hour Noise Levels - Leq(h), dBA[1,6]						Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)														
					Design Year No Build Noise Level Leq(h), dBA[1]	Design Year Build Noise Level Leq(h), dBA[1]	Design Year No Build Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[4]	8 feet			10 feet			12 feet			14 feet			16 feet		
											Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR
R 2.93	S795 / Shoulder	MOT	7	81 MOD	81	83	0	2	B (67)	A/E	72 T	11	7	71	12	7	**71 R,5**	**12**	**7**	70	13	7	70	13	7
R 2.94		MOT	--	81 MOD	81	83	0	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94 Int		MOT	8	51 MOD	51	53	0	2	E (52)	A/E	41 T	12	8	39	14	8	**38 R,5**	**15**	**8**	37	16	8	36	17	8
R 2.94A		MOT	--	81 MOD	81	83	0	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94A Int		MOT	22	51 MOD	51	53	0	2	E (52)	A/E	52 T	1	0	51	2	0	**46 R**	**7**	**22**	42	11	22	40	13	22
R 2.94B		MOT	--	81 MOD	81	83	0	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94B Int		MOT	22	51 MOD	51	53	0	2	E (52)	A/E	53 T	0	0	53	0	0	53	0	0	52	1	0	52	1	0
R 2.95 C		MOT	7	81 MOD	81	82	0	1	B (67)	A/E	71	11	7	69 T	13	7	**69 R,5**	**13**	**7**	67	15	7	66	16	7
R 2.96		MOT	1	60 MOD	60	61	0	1	B (67)	NONE	60	1	0	60	1	0	60	1	0	59	2	0	59	2	0
R 2.97		REC	3	79 MOD	79	81	0	2	B (67)	A/E	**71 R**	**10**	**3**	70 T	11	3	71	10	3	67	14	3	67	14	3
R 2.97A		REC	--	79 MOD	79	81	0	2	B (67)	A/E	70	11	--	69 T	12	--	70	11	--	67	14	--	66	15	--
R 2.98		REC	3	79 MOD	79	81	0	2	B (67)	A/E	**70 R**	**11**	**3**	69 T	12	3	70	11	3	68	13	3	67	14	3
R 2.99		REC	3	79 MOD	79	81	0	2	B (67)	A/E	**75 R**	**6**	**3**	74 T	7	3	75	6	3	74	7	3	74	7	3

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile Home; MOT - motel/hotel; SCH - school; REC - recreational/park; REL - religious institution; LIB - library.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - noise model calibration site; MOD - Estimated from No-Build Alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height needed to meet requirements at adjacent receptor(s).

6 - Traffic noise from the freeway only; other local noise sources are not included.

7 - Existing soundwall is at a height of 16 feet.

R - The minimum height to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical design receiver.

Int - The modeled exterior noise levels have been reduced based on window types and the interior noise criteria has been used for this receiver because there is no outdoor use.

W - Reciever protected by existing private property wall or soundwall.

* - Non first row residences.

Table 12. Future No Build and Build Noise Levels – Alternative 3

Receiver I.D.	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Noise Level Leq(h), dBA[1,3]	I-405 PA-ED Alternative 3 Future Worst Hour Noise Levels - Leq(h), dBA[1,6]						Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)														
					Design Year No Build Noise Level Leq(h), dBA[1]	Design Year Build Noise Level Leq(h), dBA[1]	Design Year No Build Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[4]	8 feet			10 feet			12 feet			14 feet			16 feet		
											Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*	Leq(h)	I.L.	*NBR*
R 2.77A W,C	S776 / Shoulder	REC	1	74 MOD	75	77	1	2	B (67)	A/E	72	5	*1*	71	6	*1*	**71 R,T**	**6**	***1***	70	7	*1*	70	7	*1*
R 2.77 W	--	MFR	2	60 MOD	61	59	1	-2	B (67)	NONE	59	0	*0*	59	0	*0*	59	0	*0*	59	0	*0*	59	0	*0*
R 2.78 W		MFR	4	61 M,ST19	62	60	1	-2	B (67)	NONE	60	0	*0*	60	0	*0*	60	0	*0*	60	0	*0*	60	0	*0*
R 2.79 W		MFR	4	65 MOD	66	65	1	-1	B (67)	NONE	65	0	*0*	65	0	*0*	65	0	*0*	65	0	*0*	65	0	*0*
R 2.80 W	S786 & S790 / R/W	SFR	3	64 MOD	65	66	1	1	B (67)	A/E	66	0	*0*	65	1	*0*	65 T	1	*0*	65	1	*0*	65	1	*0*
R 2.81 W,C		SFR	3	68 MOD	69	70	1	1	B (67)	A/E	68	2	*0*	68	2	*0*	66 T	4	*0*	**65 R**	**5**	***3***	64	6	*3*
R 2.82 W		SFR	2	67 MOD	68	69	1	1	B (67)	A/E	--	--	--	--	--	--	67 T	2	*0*	67	2	*0*	66	3	*0*
R 2.83 W		SFR	3	66 MOD	66	68	0	2	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	67	1	*0*	66	2	*0*
R 2.84 W		SFR	4	66 M,LT11,CAL	66	67	0	1	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	66	1	*0*	65	2	*0*
R 2.85 W		SFR	4	66 MOD	66	67	0	1	B (67)	A/E	--	--	--	--	--	--	-- T	--	--	66	1	*0*	65	2	*0*
R 2.86 W	--	SFR	3	65 MOD	65	67	0	2	B (67)	A/E	--	--	--	--	--	--	--	--	--	65	2	*0*	64	3	*0*
R 2.87 W		SFR	4	64 MOD	64	65	0	1	B (67)	NONE	--	--	--	--	--	--	--	--	--	64	1	*0*	63	2	*0*
R 2.88 W	--	SFR	4	62 MOD	62	63	0	1	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.89 W		SFR	3	63 MOD	63	59	0	-4	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.90 W		SFR	3	61 MOD	61	59	0	-2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.91 W		SFR	2	62 MOD	62	62	0	0	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.92 W		SFR	1	59 MOD	59	61	0	2	B (67)	NONE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile Home; MOT - motel/hotel; SCH - school; REC - recreational/park; REL - religious institution; LIB - library.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - noise model calibration site; MOD - Estimated from No-Build Alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height needed to meet requirements at adjacent receptor(s).

6 - Traffic noise from the freeway only; other local noise sources are not included.

7 - Existing soundwall is at a height of 16 feet.

R - The minimum height to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical design receiver.

Int - The modeled exterior noise levels have been reduced based on window types and the interior noise criteria has been used for this receiver because there is no outdoor use.

W - Reciever protected by existing private property wall or soundwall.

* - Non first row residences.

Table 12. Future No Build and Build Noise Levels – Alternative 3 (Con't)

Receiver I.D.	Barrier I.D. and Location	Land Use[2]	Number of Dwelling Units	Existing Noise Level Leq(h), dBA[1,3]	I-405 PA-ED Alternative 3 Future Worst Hour Noise Levels - Leq(h), dBA[1,6]						Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefitted Receivers (NBR)														
					Design Year No Build Noise Level Leq(h), dBA[1]	Design Year Build Noise Level Leq(h), dBA[1]	Design Year No Build Noise Level Minus Existing Conditions Leq(h), dBA	Design Year Build Noise Level Minus No Build Conditions Leq(h), dBA	Activity Category (NAC)	Impact Type[4]	8 feet			10 feet			12 feet			14 feet			16 feet		
											Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR
R 2.93	S795 / Shoulder	MOT	7	81 MOD	81	83	0	2	B (67)	A/E	70	13	*7*	70	13	*7*	69	14	*7*	**69 R,5**	**14**	***7***	68	15	*7*
R 2.94		MOT	--	81 MOD	81	83	0	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94 Int		MOT	8	51 MOD	51	53	0	2	E (52)	A/E	39	14	*8*	38	15	*8*	36	17	*8*	**35 R,5**	**18**	***8***	34	19	*8*
R 2.94A		MOT	--	81 MOD	81	84	0	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94A Int		MOT	22	51 MOD	51	54	0	3	E (52)	A/E	54	0	*0*	54	0	*0*	52	2	*0*	**44 R**	**10**	***22***	40	14	*22*
R 2.94B		MOT	--	81 MOD	81	83	0	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R 2.94B Int		MOT	22	51 MOD	51	53	0	2	E (52)	A/E	53	0	*0*	53	0	*0*	53	0	*0*	53	0	*0*	53	0	*0*
R 2.95 C		MOT	7	81 MOD	81	83	0	2	B (67)	A/E	70	13	*7*	68 T	15	*7*	67	16	*7*	**66 R**	**17**	***7***	65	18	*7*
R 2.96		MOT	1	60 MOD	60	61	0	1	B (67)	NONE	60	1	*0*	60	1	*0*	60	1	*0*	60	1	*0*	59	2	*0*
R 2.97		REC	3	79 MOD	79	81	0	2	B (67)	A/E	72	9	*3*	**72 R,5**	**9**	***3***	69	12	*3*	67	14	*3*	67	14	*3*
R 2.97A		REC	--	79 MOD	79	81	0	2	B (67)	A/E	70	11	--	70	11	--	68	13	--	67	14	--	66	15	--
R 2.98		REC	3	79 MOD	79	81	0	2	B (67)	A/E	**70 R**	**11**	***3***	69	12	*3*	68	13	*3*	67	14	*3*	66	15	*3*
R 2.99		REC	3	79 MOD	79	82	0	3	B (67)	A/E	**70 R**	**12**	***3***	69	13	*3*	67	15	*3*	67	15	*3*	66	16	*3*

Notes:

1 - Leq(h) are A-weighted, peak hour noise levels in decibels.

2 - Land Use: SFR - single-family residence; MFR - multi-family residence; MH - mobile Home; MOT - motel/hotel; SCH - school; REC - recreational/park; REL - religious institution; LIB - library.

3 - M - Measured noise level; STxx or LTxx - measurement site number; CAL - noise model calibration site; MOD - Estimated from No-Build Alternative and measurement sites.

4 - S = Substantial Increase (12 dBA or more); A/E = Approach or exceed NAC.

5 - Barrier height needed to meet requirements at adjacent receptor(s).

6 - Traffic noise from the freeway only; other local noise sources are not included.

7 - Existing soundwall is at a height of 16 feet.

R - The minimum height to meet feasibility requirements of Caltrans' Noise Abatement Criteria.

T - Minimum height required to block the line-of-sight from the receptor to truck exhaust stacks.

C - Critical design receiver.

Int - The modeled exterior noise levels have been reduced based on window types and the interior noise criteria has been used for this receiver because there is no outdoor use.

W - Reciever protected by existing private property wall or soundwall.

* - Non first row residences.

Table 13. Barrier Locations and Elevations - Alternative 1

Barrier No.	Receivers Protected (Receiverr No.)	Barrier Location / Hwy. Side	Barrier Stations[1]	Approximate Barrier Height, ft	Top of Barrier Elevation[2], ft
S776	R2.77A	Shoulder / Northbound	774+00 [5]	12	43.2
			774+25 [5]	12	43.1
			774+50 [5]	12	43.1
			774+75 [5]	12	43.0
			775+00 [5]	12	42.9
			776+00 [5]	12	42.6
			776+50 [5]	12	42.5
		Approximate Length: 251 ft			
S786	R2.81	R/W / Northbound	785+02 [4]	16	44.0
			785+89 [4]	16	44.5
			786+53 [4]	16	44.7
			787+10 [4]	16	44.7
			787+34 [4]	16	45.0
			787+80 [4]	16	44.8
			788+18 [4]	16	45.0
			788+58 [4]	16	45.0
			789+14 [4]	16	46.0
		Approximate Length: 332 ft			
S790 [3]	R2.81	R/W / Northbound	789+14 [4]	14	44.0
			789+40 [4]	14	44.0
			789+58 [4]	14	44.0
			790+27 [4]	14	45.1
		Approximate Length: 115 ft			
S795	R2.93 to R2.99	Shoulder / Southbound	790+00	12	44.9
			791+00	12	45.0
			792+00	12	45.1
			793+00	12	45.3
			793+00	10	43.3
			794+00	10	43.5
			794+00	8	41.5
			795+00	8	41.7
			796+00	8	41.8
			797+00	8	42.0
			798+00	8	42.2
			799+00	8	42.5
			800+00	8	42.8
			801+00	8	42.9
		Approximate Length: 1,100 ft			

Notes:

1 - Stations correspond to that of I-405 mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Replacement of existing soundwall at new location with new height.

4 - Stations correspond to that of the northbound on-ramp at Warner Avenue.

5 - Stations correspond to that of the northbound off-ramp at Warner Avenue.

Table 14. Barrier Locations and Elevations - Alternative 2

Barrier No.	Receivers Protected (Receiverr No.)	Barrier Location / Hwy. Side	Barrier Stations[1]	Approximate Barrier Height, ft	Top of Barrier Elevation[2], ft
S776	R2.77A	Shoulder / Northbound	774+00 [5]	12	43.2
			774+25 [5]	12	43.1
			774+50 [5]	12	43.1
			774+75 [5]	12	43.0
			775+00 [5]	12	42.9
			776+00 [5]	12	42.6
			776+50 [5]	12	42.5
		Approximate Length: 251 ft			
S786	R2.81	R/W / Northbound	785+02 [4]	14	42.0
			785+89 [4]	14	42.5
			786+53 [4]	14	42.7
			787+10 [4]	14	42.7
			787+34 [4]	14	43.0
			787+80 [4]	14	42.8
			788+18 [4]	14	43.0
			788+58 [4]	14	43.0
			789+14 [4]	14	44.0
		Approximate Length: 332 ft			
S790 [3]	R2.81	R/W / Northbound	789+14 [4]	14	44.0
			789+40 [4]	14	44.0
			789+58 [4]	14	44.0
			790+27 [4]	14	45.1
		Approximate Length: 115 ft			
S795	R2.93 to R2.99	Shoulder / Southbound	790+00	12	44.9
			791+00	12	45.0
			792+00	12	45.1
			793+00	12	45.3
			793+00	10	43.3
			794+00	10	43.5
			794+00	8	41.5
			795+00	8	41.7
			796+00	8	41.8
			797+00	8	42.0
			798+00	8	42.2
			799+00	8	42.5
			800+00	8	42.8
			801+00	8	42.9
		Approximate Length: 1,100 ft			

Notes:

1 - Stations correspond to that of I-405 mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Replacement of existing soundwall at new location with new height.

4 - Stations correspond to that of the northbound on ramp at Warner Avenue.

5 - Stations correspond to that of the northbound off-ramp at Warner Avenue.

Table 15. Barrier Locations and Elevations - Alternative 3

Barrier No.	Receivers Protected (Receiverr No.)	Barrier Location / Hwy. Side	Barrier Stations[1]	Approximate Barrier Height, ft	Top of Barrier Elevation[2], ft
S776	R2.77A	Shoulder / Northbound	774+00 [5]	12	43.2
			774+25 [5]	12	43.1
			774+50 [5]	12	43.1
			774+75 [5]	12	43.0
			775+00 [5]	12	42.9
			776+00 [5]	12	42.6
			776+50 [5]	12	42.5
		Approximate Length: 251 ft			
S786	R2.81	R/W / Northbound	785+02 [4]	14	42.0
			785+89 [4]	14	42.5
			786+53 [4]	14	42.7
			787+10 [4]	14	42.7
			787+34 [4]	14	43.0
			787+80 [4]	14	42.8
			788+18 [4]	14	43.0
			788+58 [4]	14	43.0
			789+14 [4]	14	44.0
		Approximate Length: 332 ft			
S790 [3]	R2.81	R/W / Northbound	789+14 [4]	14	44.0
			789+40 [4]	14	44.0
			789+58 [4]	14	42.2
			790+27 [4]	14	45.1
		Approximate Length: 115 ft			
S795	R2.93 to R2.99	Shoulder / Southbound	790+00	14	46.1
			791+00	14	46.5
			792+00	14	46.9
			793+00	14	47.0
			793+00	12	47.0
			794+00	12	45.0
			794+00	8	45.0
			795+00	8	45.1
			796+00	8	43.1
			797+00	8	43.3
			798+00	8	41.5
			799+00	8	41.8
			800+00	8	42.2
			801+00	8	42.8
		Approximate Length: 1,100 ft			

Notes:

1 - Stations correspond to that of I-405 mainline unless otherwise noted.

2 - Top of barrier elevations shall take precedence over specified barrier heights for design and construction purposes.

3 - Replacement of existing soundwall at new location with new height.

4 - Stations correspond to that of the northbound on ramp at Warner Avenue.

5 - Stations correspond to that of the northbound off-ramp at Warner Avenue.

Figure 1 – Interior Microphone Placement (5 feet from window)

Figure 2 – Interior Microphone Placement (10 feet from window)

Figure 3 – Exterior Microphone Placement (at second floor level)

Figure 4 – Window and Air Conditioning Unit

Figure 5 –Metal Sheeting and Foam Covering Air Conditioning Unit (from Exterior)

Figure 6 –Metal Sheeting and Foam Covering Air Conditioning Unit (from Interior)

FIELD SURVEY FORM

PROJECT: I-405 Improvement Project
ENGINEER: OGDEN
DATE: 8/13/13
MEASUREMENT ADDRESS: Days Inn
CITY: Fountain Valley
☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial
SITE NO.:

SOUND LEVEL METER: ☒ LD-870 ☐ LD-820 ☐ LD-824 ☐ LD-812 ☐ B&K-2250 ☐ _____
SERIAL #: 0128

MICROPHONE: ☒ WIND SCREEN ☒ NON-POLAR ☐ POLARIZED ☒ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☒ RANDOM
SERIAL #: 2313

PRE AMP: ☒ LD-900 ☐ LD-828 ☐ _____
SERIAL #: 2771

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: 73 °F R.H.: 61 %
WIND SPEED: 3 MPH
TOWARD (DIR): Variable
SKIES: Clear
CAMERA _____
PHOTO NOs. _____

CALIBRATOR: ☒ LD CA250 ☐ B&K 4231 S/N 2127
Freq, Hz.: ☒ 250 ☐ 1000 ☐ _____

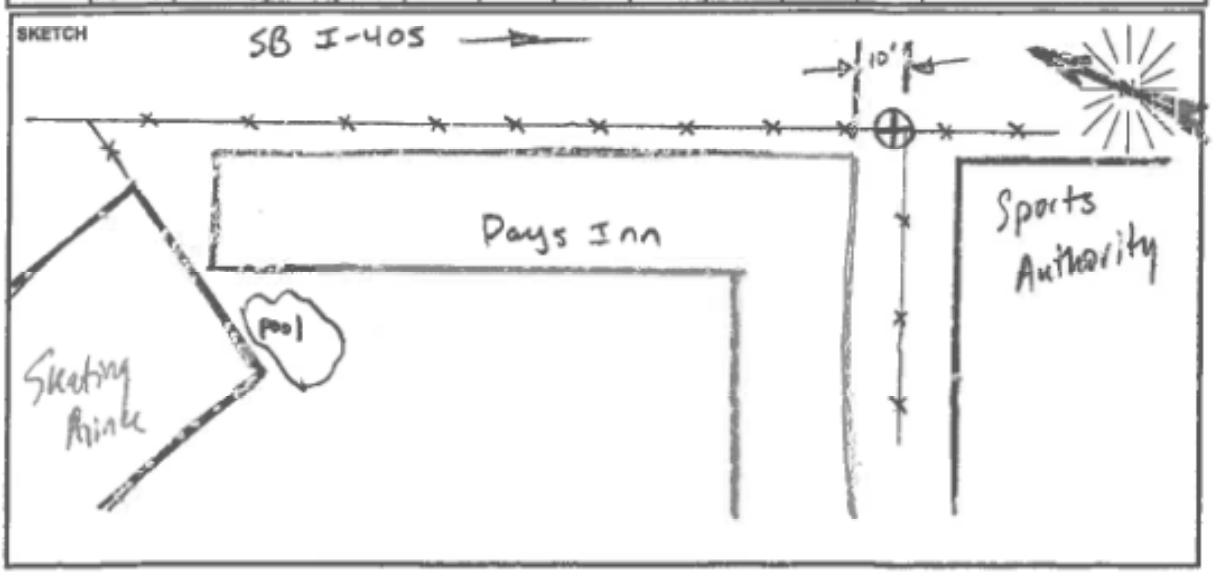
CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time
Before 114, 114.0, 22.5, 10:44
After 114, 113.8, 22.5, 13:21

METER SETTINGS: ☒ A-WTD ☐ C-WTD ☐ LINEAR ☐ IMPULSE ☒ SLOW ☐ FAST ☐ 1/1 OCT ☐ 1/3 OCT ☒ INTERVALS 10 - MINUTE ☒ L_n PERCENTILE VALUES

NOTES: 10min Log
1 min time history; see logs to match interior intervals
Dist. to Center of Nearest Lane _____ ☐ Video ☐ Radar
Counts: AT MT HT
MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{95}	L_{90}	L_{50}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:
8/13	12:09	12:19	67.6	68.6	71.0	73.2	74.5	75.4	78.5	80.6	73.7	Exterior mic
	12:19	12:29	68.0	69.1	70.7	73.0	74.0	75.3	77.8	80.3	73.4	height matched
	12:29	12:39	68.4	69.2	70.8	73.4	74.6	75.9	79.1	82.5	73.9	interior mic
	12:39	12:49	67.1	68.5	70.9	72.9	74.0	75.6	80.0	80.4	73.6	@ 2nd floor
	12:49	12:59	67.8	68.4	70.4	72.7	74.0	75.3	77.3	79.3	73.2	
	12:59	13:09	67.6	68.6	70.5	72.6	73.7	74.9	78.3	85.6	73.3	
	13:09	13:14	66.3	68.1	70.2	72.9	74.2	75.6	77.9	78.7	73.4	

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT: I-405 Improvement Project
ENGINEER: Bryan Jarjoura
DATE: 8/13/13
MEASUREMENT ADDRESS: Days Inn / Room 211
CITY: Fountain Valley
☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial
SITE NO.:

SOUND LEVEL METER: ☒ LD-870 ☐ LD-820 ☐ LD-824 ☐ LD-812 ☐ B&K-2250 ☐ _____
SERIAL #: 0344
MICROPHONE: ☒ WIND SCREEN ☒ NON-POLAR ☐ POLARIZED ☒ 1/2-INCH ☒ FREEFIELD ☐ 1-INCH ☐ RANDOM
SERIAL #: 2560/3378
PRE AMP: ☒ LD-900 ☐ LD-828 ☐ _____
SERIAL #: 3095

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: 72 °F R.H.: _____ %
WIND SPEED: / MPH
TOWARD (DIR): /
SKIES: Clear
CAMERA _____
PHOTO NOs. _____

CALIBRATOR: ☒ LD CA250 ☐ B&K 4231 S/N 2127
Freq, Hz. ☒ 250 ☐ 1000 ☐ _____
CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time
Before 114, 113.9, 9.4, 13:41
After 114, 113.9, 9.4, 13:19

METER SETTINGS: ☒ A-WTD ☐ C-WTD ☐ LINEAR ☐ IMPULSE ☒ SLOW ☐ FAST ☐ 1/1 OCT ☐ 1/3 OCT ☒ INTERVALS 1 - MINUTE ☒ L_n PERCENTILE VALUES

NOTES: See time history for interval w/out contaminations
Dist. to Center of Nearest Lane _____ ☐ Video ☐ Radar
Counts AT MT HT
MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{95}	L_{90}	L_{50}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:	Quiet Min
8/13	12:56	12:58	39.7	40.1	41.4	44.2	46.1	48.4	52.5	53.5	45.5	5' from window closed	12:58
	12:59	13:01	62.0	62.3	63.3	65.5	66.8	67.9	72.2	70.4	66.0	5' window open	13:01
	13:05	13:07	38.4	38.3	40.0	42.1	43.7	46.3	60.3	61.1	46.6	10' window closed	13:06
	13:08	13:10	58.8	60.1	61.5	63.3	65.3	66.9	69.7	70.2	64.6	10' window open	13:08

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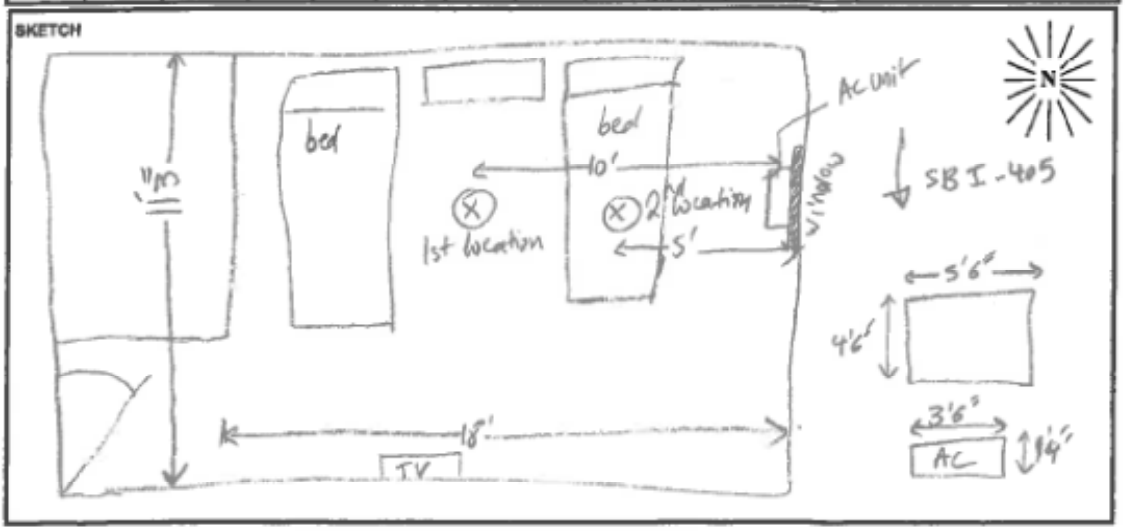

PARSONS

FIELD SURVEY FORM

PROJECT: I-405 Improvement Project
ENGINEER: Bryan Jarjoura
DATE: 8/13/13
MEASUREMENT ADDRESS: Days Inn / Room 216
CITY: Fountain Valley
☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial
SITE NO.:

SOUND LEVEL METER: ☒ LD-870 ☐ LD-820 ☐ LD-824 ☐ LD-812 ☐ B&K-2250 ☐ _____
SERIAL #: 0344

MICROPHONE: ☒ WIND SCREEN ☒ NON-POLAR ☐ POLARIZED ☒ 1/2-INCH ☒ FREEFIELD ☐ 1-INCH ☐ RANDOM
SERIAL #: 2560 / 3378

PRE AMP: ☒ LD-900 ☐ LD-828 ☐ _____
SERIAL #: 3095

CALIBRATOR: ☒ LD CA250 ☐ B&K 4231
S/N 2127
Freq, Hz.: ☒ 250 ☐ 1000 ☐ _____

CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time
Before 114, 114.0, 9.4, 10:40
After _____, _____, 9.4, 12:41

METER SETTINGS: ☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS 1 - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☒ L_n PERCENTILE VALUES

NOTES:
SYSTEM PWR: ☒ BAT ☐ AC
(observations at start of measurement)
TEMP: 72 °F R.H.: _____ %
WIND SPEED: / MPH
TOWARD (DIR): /
SKIES: Clear
CAMERA _____
PHOTO NOs. _____

NOTES: See time history for interval w/out contaminations
Dist. to Center of Nearest Lane _____ ☐ Video ☐ Radar
Counts AT MT HT
MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{90}	L_{50}	L_{25}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:	Quiet Min.
8/13	12:23	12:25	37.6	37.9	39.9	41.9	43.6	46.1	50.3	51.7	43.4	10' from window closed	12:24
|	12:26	12:28	58.5	58.9	60.5	63.2	64.3	65.6	68.1	68.7	63.5	10' window open	12:27
|	12:32	12:34	41.0	41.2	42.5	45.7	47.8	49.9	53.0	53.5	47.0	5' window closed	12:33
|	12:35	12:37	59.7	61.4	63.7	66.0	67.0	69.5	70.7	71.7	66.4	5' window open	12:36

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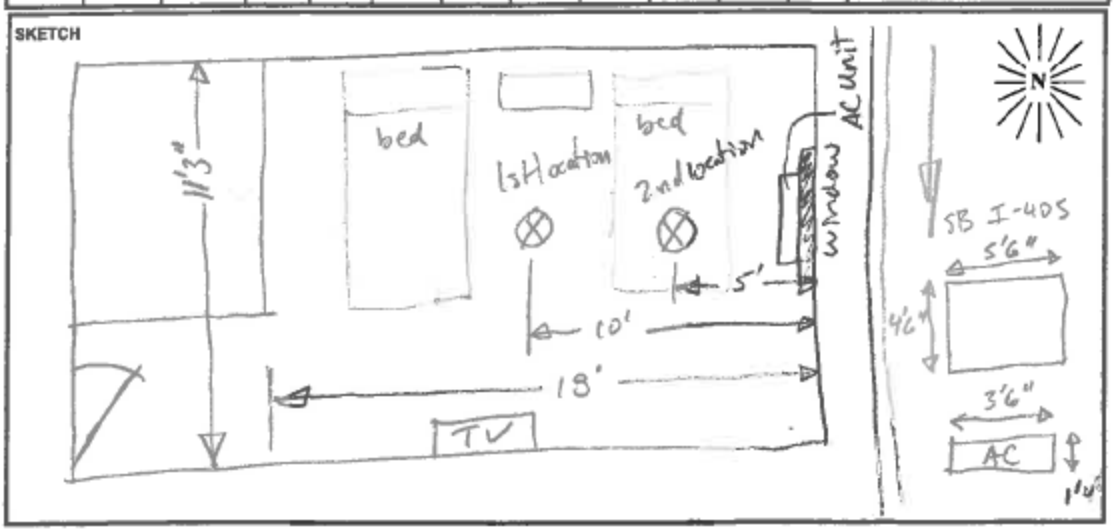
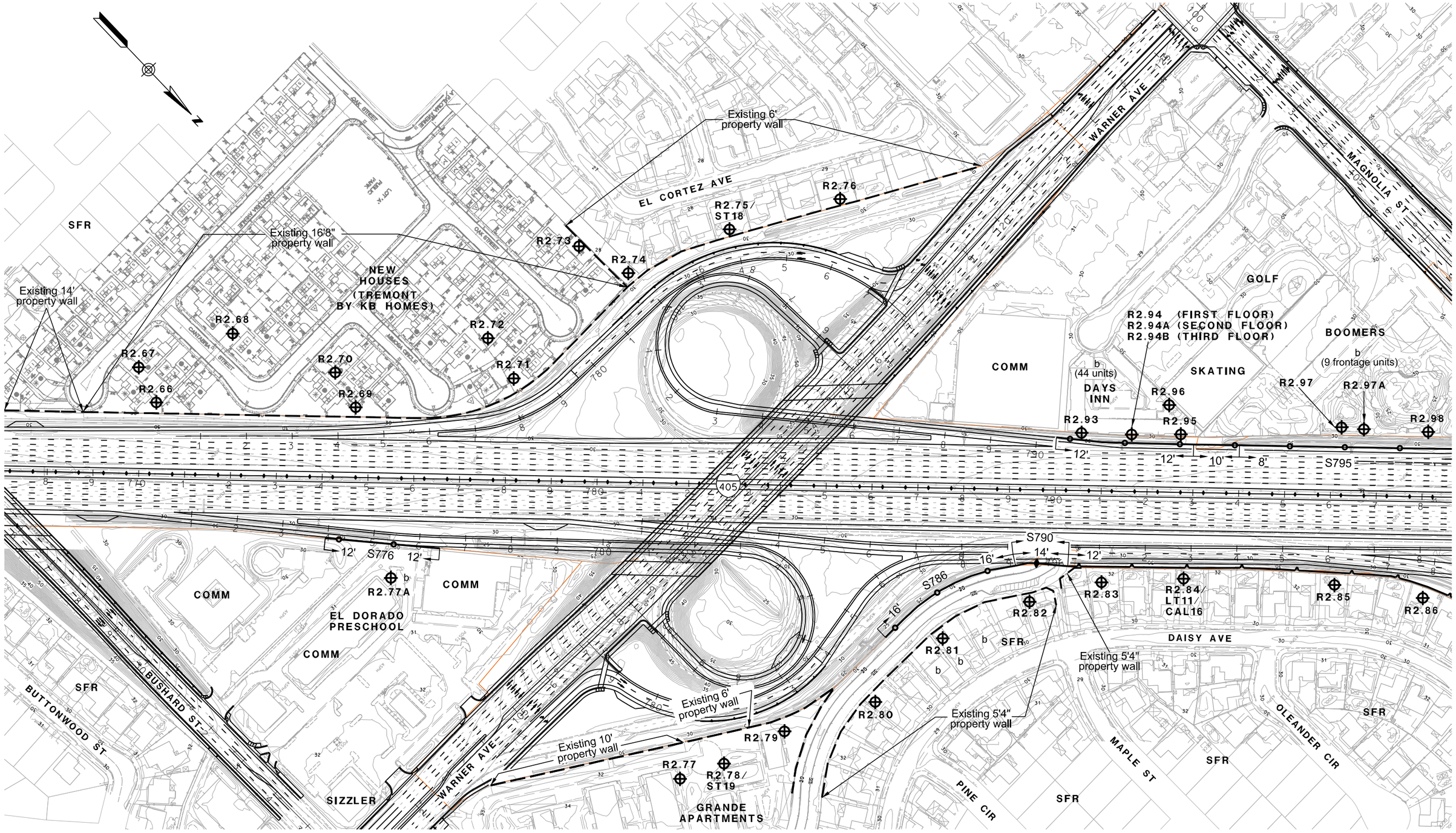


PARSONS



LEGEND

- RXX – RECEIVER SITE
- LT – LONGTERM MEASUREMENT
- ST – SHORTTERM MEASUREMENT
- CAL – CALIBRATION SITE
- EXISTING WALL
- SOUNDWALL
- EXISTING SOUNDWALL
- REPLACEMENT IN KIND SOUNDWALL
- SFR – SINGLE FAMILY RESIDENCE
- MFR – MULTI-FAMILY RESIDENCE
- COMM – COMMERCIAL
- b – BENEFITED RESIDENCE

1in : 200ft

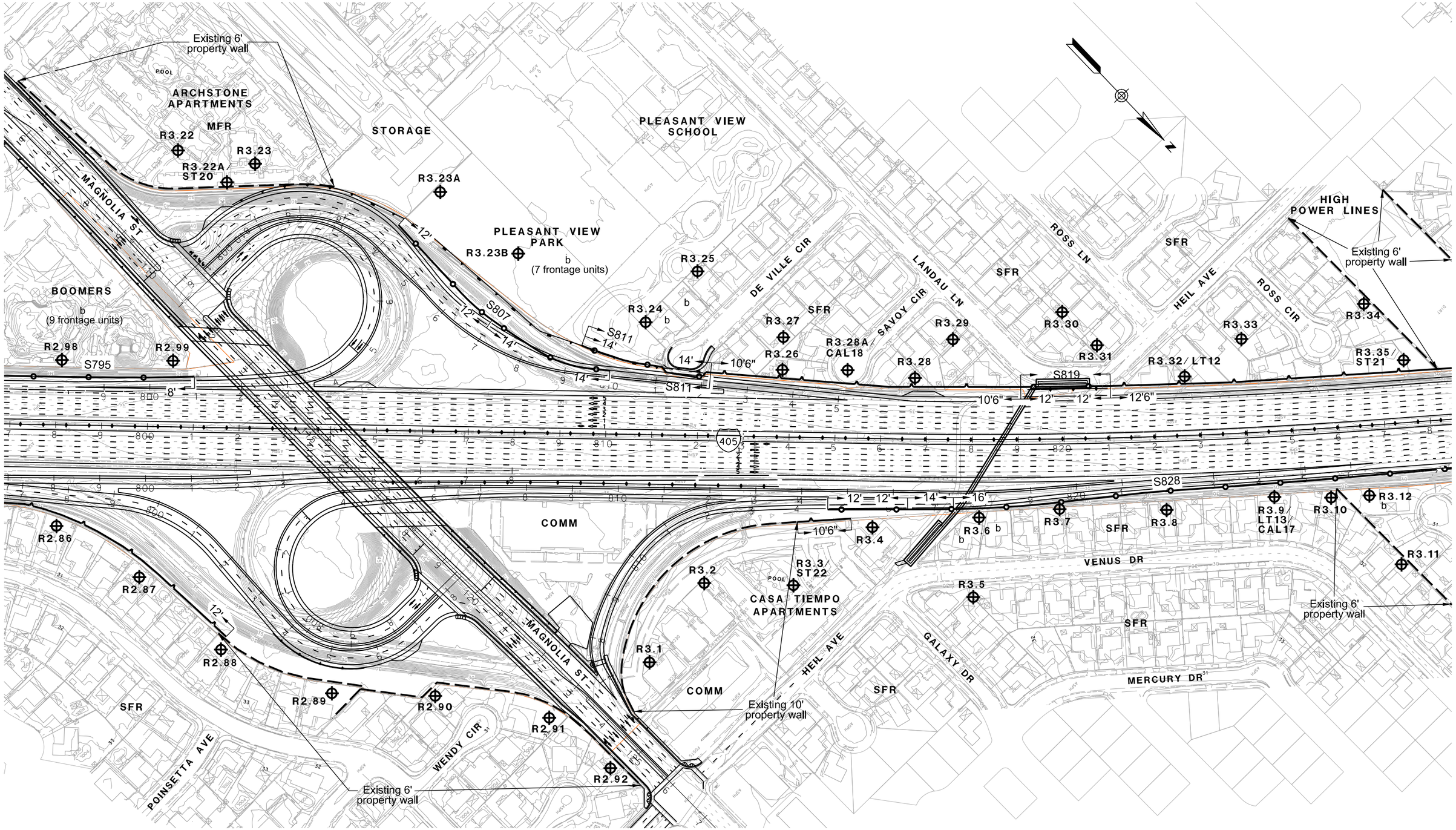
0 ft 100ft 200ft 300ft

PARSONS
100 WEST WALNUT ST.
PASADENA, CA 91124
(626) 440-6100

I-405 WIDENING PA/ED PROJECT NOISE RECEIVER & BARRIER LOCATIONS ALT1

MAY 28, 2014

FIGURE 10



LEGEND

- RXX – RECEIVER SITE
- LT – LONGTERM MEASUREMENT
- ST – SHORTTERM MEASUREMENT
- CAL – CALIBRATION SITE
- EXISTING WALL
- SOUNDWALL
- EXISTING SOUNDWALL
- REPLACEMENT IN KIND SOUNDWALL
- SFR – SINGLE FAMILY RESIDENCE
- MFR – MULTI-FAMILY RESIDENCE
- COMM – COMMERCIAL
- b – BENEFITED RESIDENCE

1in : 200ft

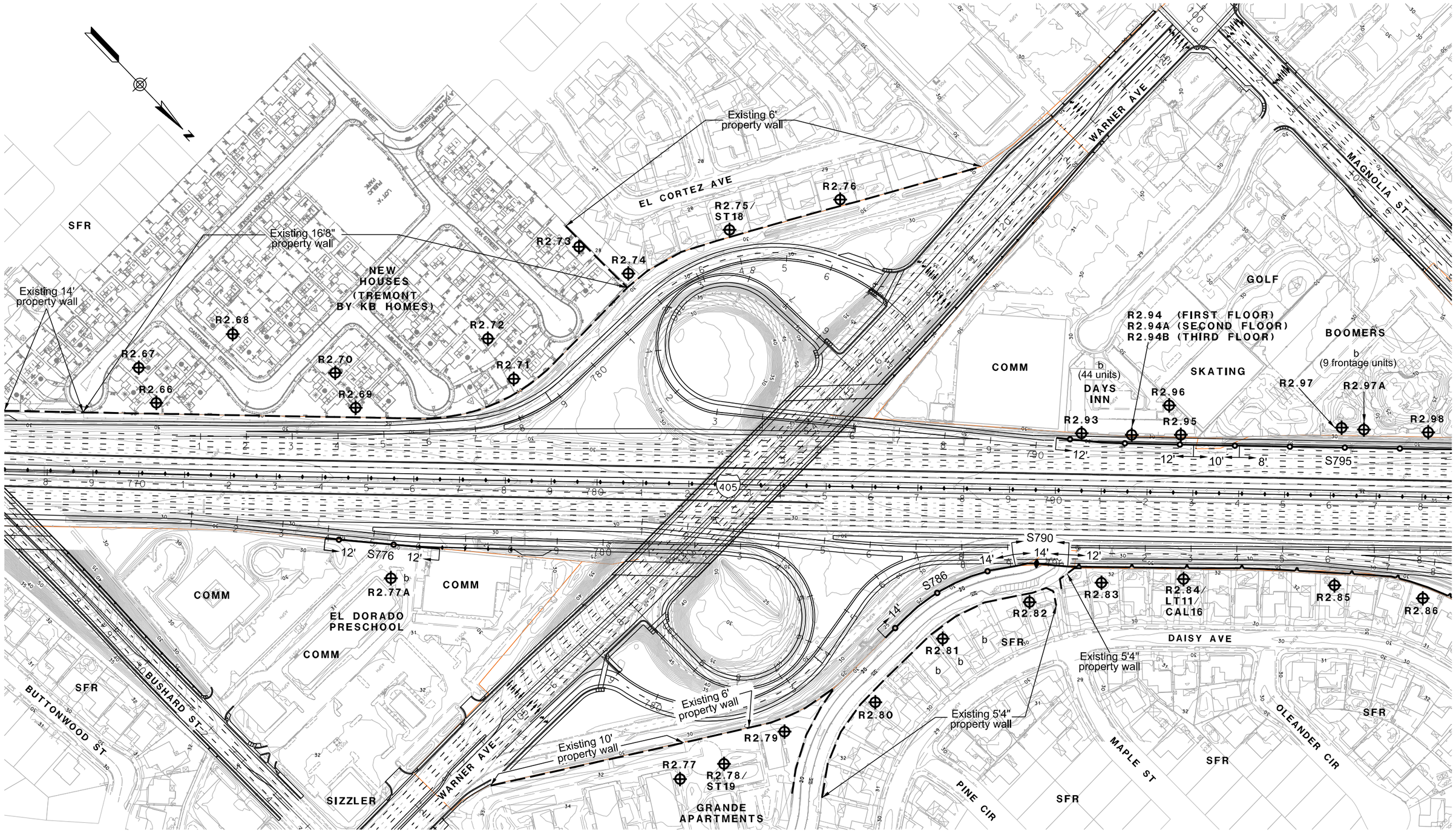
0 ft 100ft 200ft 300ft

PARSONS
100 WEST WALNUT ST.
PASADENA, CA 91124
(626) 440-6100

I-405 WIDENING PA/ED PROJECT NOISE RECEIVER & BARRIER LOCATIONS ALT1

MAY 28, 2014

FIGURE 11



LEGEND

- RXX – RECEIVER SITE
- LT – LONGTERM MEASUREMENT
- ST – SHORTTERM MEASUREMENT
- CAL – CALIBRATION SITE
- EXISTING WALL
- SOUNDWALL
- EXISTING SOUNDWALL
- REPLACEMENT IN KIND SOUNDWALL
- SFR – SINGLE FAMILY RESIDENCE
- MFR – MULTI-FAMILY RESIDENCE
- COMM – COMMERCIAL
- b – BENEFITED RESIDENCE

1in : 200ft

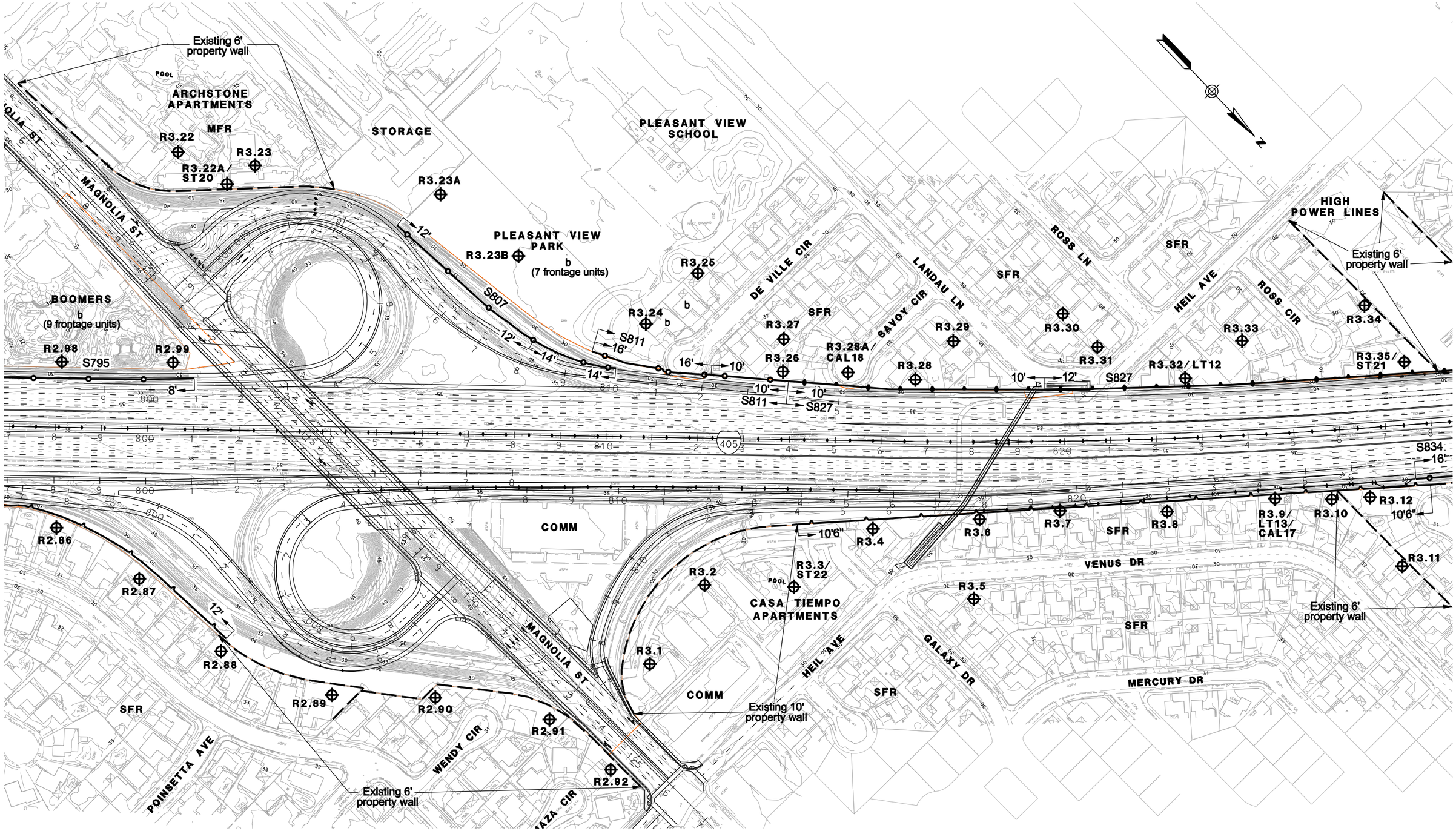
0 ft 100ft 200ft 300ft

PARSONS
100 WEST WALNUT ST.
PASADENA, CA 91124
(626) 440-6100

I-405 WIDENING PA/ED PROJECT NOISE RECEIVER & BARRIER LOCATIONS ALT2

MAY 28, 2014

FIGURE 10



LEGEND

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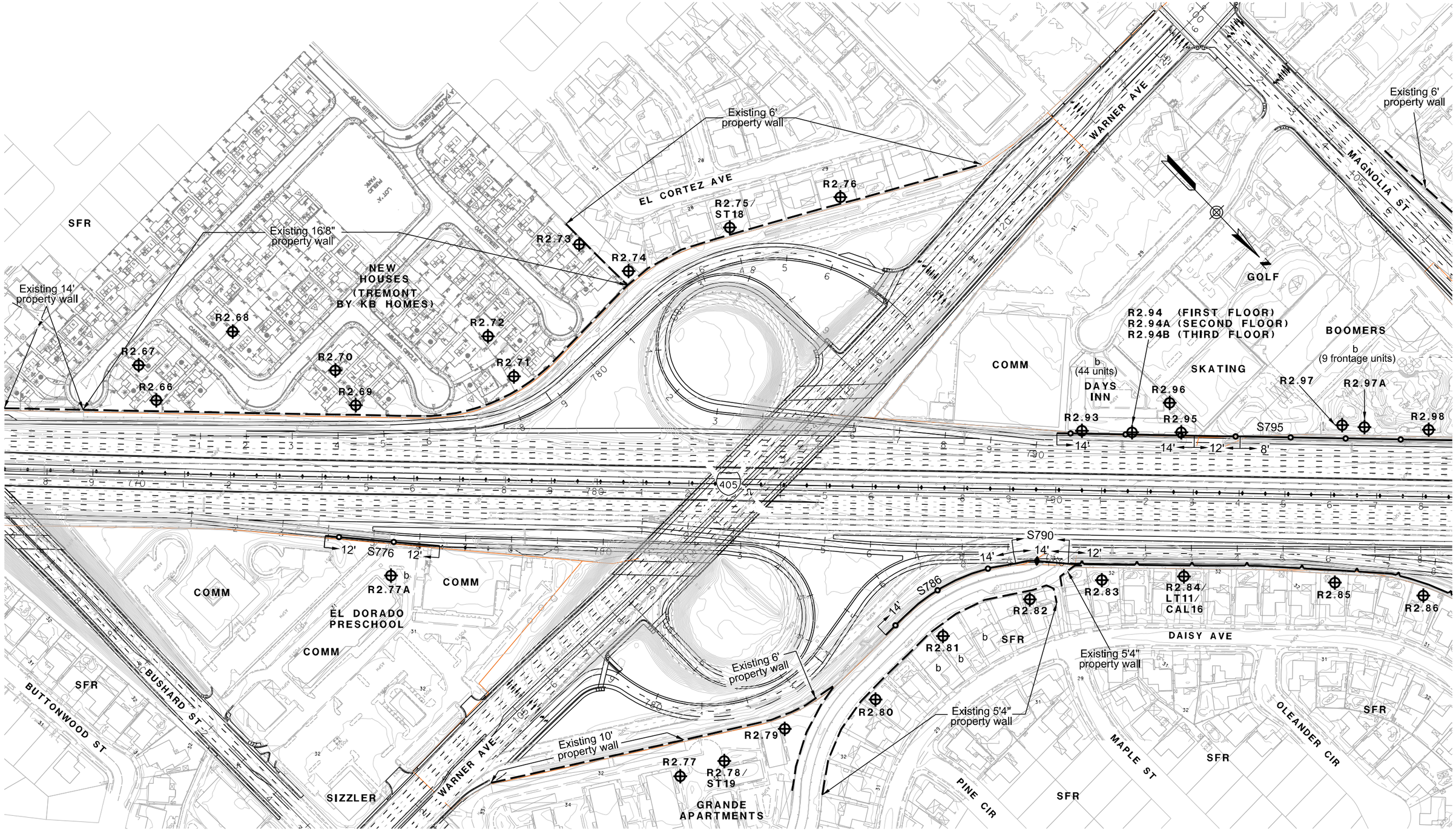
100 WEST WALNUT ST.
PASADENA, CA 91124
(626) 440-6100

I-405 WIDENING PA/ED PROJECT NOISE RECEIVER & BARRIER LOCATIONS ALT2

NOVEMBER 25, 2013

FIGURE 11



LEGEND

- RXX – RECEIVER SITE
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1in : 200ft

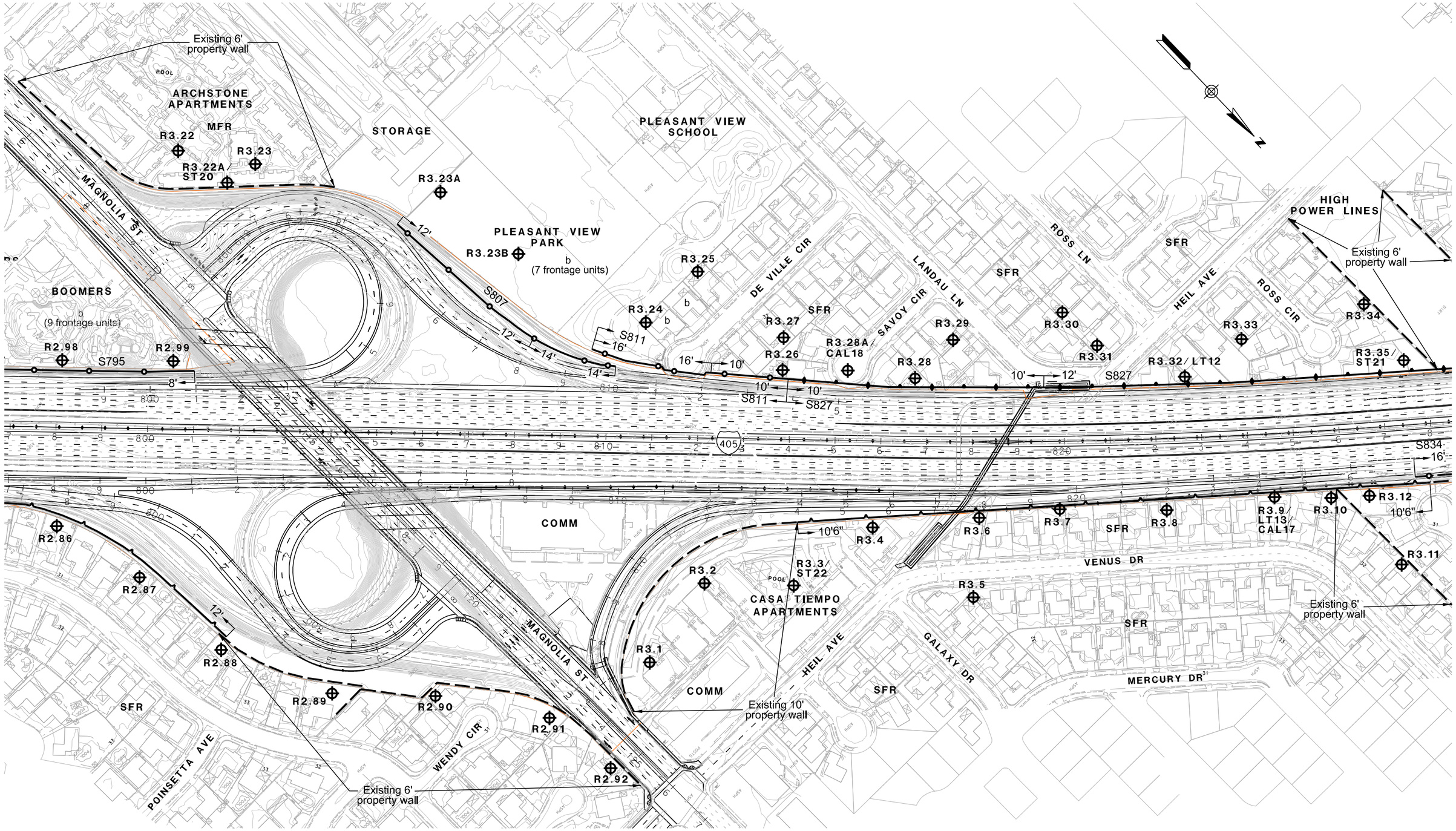
0 ft 100ft 200ft 300ft

PARSONS
100 WEST WALNUT ST.
PASADENA, CA 91124
(626) 440-6100

I-405 WIDENING PA/ED PROJECT NOISE RECEIVER & BARRIER LOCATIONS ALT3

MAY 28, 2014

FIGURE 10



LEGEND

- RXX – RECEIVER SITE
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- ST – SHORTTERM MEASUREMENT
- CAL – CALIBRATION SITE
- EXISTING WALL
- SOUNDWALL
- EXISTING SOUNDWALL
- REPLACEMENT IN KIND SOUNDWALL
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- MFR – MULTI-FAMILY RESIDENCE
- COMM – COMMERCIAL
- b – BENEFITED RESIDENCE

1in : 200ft

0 ft 100ft 200ft 300ft

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PASADENA, CA 91124
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I-405 WIDENING PA/ED PROJECT NOISE RECEIVER & BARRIER LOCATIONS ALT3

MAY 28, 2014

FIGURE 11