Noise Study Report
PROPOSED INTERSTATE 5 HOV LANE IMPROVEMENTS (SR-55 TO SR-57) PROJECT

OCTA I-5 HOV Lane Project
Orange County, California

12-ORA-5 PM 31.3/34.2
12-0C8900
Project ID No. 12-0000-0085

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Summary

The purpose of this noise study report (NSR) is to assess the potential noise impacts and identify feasible noise abatement measures for the Interstate 5 (I-5) High Occupancy Vehicle (HOV) Lanes Improvement Project. The primary purpose of the proposed project is to improve traffic operations and reduce congestion on I-5 from north of State Route 55 (SR-55) to south of State Route (SR-57). This will improve the safe and efficient local and regional movement of people and goods, while minimizing environmental and community impacts. The I-5 freeway is the primary route connecting Los Angeles, Orange, and San Diego counties. The project would extend along I-5 for approximately 2.9 miles through the urban core of Orange County. In Orange County, I-5 continues to experience significant traffic, making the proposed project integral to the local community and the region.

The proposed improvements include the addition of an HOV lane in each direction of the project segment on I-5. This NSR considers one proposed Build Alternative, Alternative 5B.

Existing land use within the study area includes residential neighborhoods, commercial development, a senior center, parks, hotels, baseball fields, schools, and churches. There are also several vacant, undeveloped lots. Residential development includes single-family residences, multi-family residences, and a mobile home park.

Within the project limits, I-5 consists of five general-use travel lanes and one at-grade HOV lane in each direction. The existing northbound (NB) and southbound (SB) HOV lanes are elevated in some areas along the center of the highway alignment. The profile of I-5 within the project study area is undulating, with some areas above, at-grade, or slightly below the elevation of the adjacent receptors. The segment of I-5 between SR-55 and SR-57 currently has nearly continuous sound barriers along the right-of-way (ROW) on both sides of the freeway.

The existing noise environment in the project area was characterized based on short- and long-term ambient noise monitoring conducted in October 2012, September 2013, and January 2014. Nineteen short-term (approximately 10 to 20 minutes) and four long-term (24-hour) measurements were conducted. The purpose of the long-term measurements was to describe variations in sound levels throughout the day for a larger area with a similar noise environment. Table 4 and Figure 4 in Chapter 6 of this report summarize the long-term monitoring. The purpose of the short-term measurements was to capture

the absolute sound levels at a specific time of day for a specific receptor of concern. Table 3 in Chapter 6 of this report summarizes the short-term monitoring. Measured short-term noise levels ranged from 57.4 to 70.0 dBA L_{eq}. The monitoring results indicate that the existing traffic noise levels already approach or exceed the Federal Highway Administration's (FHWA's) Noise Abatement Criteria (NAC) at a number of receptors scattered throughout the project area.

The FHWA's Traffic Noise Model (TNM) Version 2.5 was used to predict noise levels under existing and future conditions. Future noise levels were predicted under the proposed build and no-build conditions.

Existing, future no-build and build condition noise levels were predicted at 202 discrete receiver locations using TNM Version 2.5. These noise levels are shown in Table 6 in Chapter 7 of this report. Modeling results indicate that predicted traffic noise levels for the 2040 design-year build condition approach or exceed the NAC of 67 dBA $L_{eq(h)}$ for Activity Category B land uses at 45 modeled residential receivers, and six modeled Category C receivers. Build condition noise levels are also predicted to exceed the NAC of 72 dBA $L_{eq\,(h)}$ for activity land uses at five modeled Category E receivers. The receivers where predicted noise levels approach or exceed the NAC are not focused around any specific locations within the project area; they are scattered throughout the corridor on both sides of I-5.

Noise abatement must be considered where traffic noise impacts are identified. Impacts have been identified at modeled receiver locations within the project area. Sound walls were evaluated for feasibility and whether they achieve the noise reduction design goal based on achievable noise reduction. A wall is considered acoustically feasible if it is capable of providing a minimum noise reduction of 5 dBA at an impacted receiver. The noise reduction design goal is a factor in determining reasonableness; for a wall to be considered reasonable, it must provide at least 7 dB of noise reduction at one or more benefitted receivers.

Category E receivers (M-042, M-070, M-165, and M-178) represent a parking area, office building, and two commercial parking lots respectively. For these receivers, there are no outdoor areas of frequent human use that would benefit from a reduced noise level. Receiver M-118 represents the parking/display area of a car dealership, a land use which would generate a secondary on-site noise source. Therefore, abatement is not considered for receivers M-070, M-042, M-118, M-165, and M-178.

Within the project limits, I-5 currently has near-continuous sound walls along the right-of-way on both sides of the freeway. Most of the impacted receivers are already shielded by an existing sound wall. At these locations, the feasibility of increased height and/or length of the existing sound walls were evaluated. Several impacted receiver locations were not shielded by an existing sound wall. For these receivers, potential locations for new sound walls were identified and the feasibility of those walls was evaluated. The new sound wall locations evaluated were assigned an alphabetic ID number (i.e., SW-A New through SW-F New), while the numbered sound walls indicate evaluation of an existing sound wall.

A total of 15 sound walls were evaluated in areas adjacent to impacted residences. The results of the sound wall evaluation are shown in Table 6. Modeled sound walls and Build Alternative 5B are also shown in Figure 5-1 through 5-13. The results of the modeling analysis indicate that the following twelve sound walls would not be acoustically feasible: SW-06 New, SW-11 New, SW-15a New, SW-15b New, SW-16b New, SW-19 New, SW-20 New, SW-22 New, SW-25 New, SW-26 New, SW-C New, and SW-F New.

Of the 15 sound walls analyzed, 3 were capable of reducing noise levels by 5 dBA or more and are, therefore, considered feasible. The following 3 feasible sound walls achieved the 7 dB design goal for at least one benefitted receiver and are, therefore, considered reasonable: SW-A New, SW-D New, and SW-E New.

For each sound wall found to be both acoustically feasible and able to achieve the 7 dB design goal, reasonable cost allowances were calculated.

Temporary construction impacts that might be caused by this project are discussed in Chapter 8 of this report.

Based on the studies so far accomplished, Caltrans intends to consider noise abatement measures in the form of barrier(s) at locations, with respective lengths and heights as shown in this Noise Study Report. The design of noise barriers presented in this report is preliminary and has been conducted at a level appropriate for environmental review and not for final design of the proposed project. If pertinent parameters change substantially during the final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of the noise abatement will be made upon completion of the public involvement process and the final project design process.

National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) Consideration

Section 7 of the Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol) explains in detail how Caltrans' policies and procedures apply (23 Code of Federal Regulations [CFR] 772). It also explains how traffic noise impacts are evaluated under CEQA and NEPA. Based on Section 7 of the Protocol, this NSR contains existing noise levels and future predicted noise levels for the no-build and future build conditions. All data, analysis, and information needed to satisfy the requirements of NEPA and/or CEQA have already been provided in this NSR. This allows the produced data to be used under CEQA or NEPA if either of these Acts apply during the environmental phase of the proposed project.

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List of Abbreviated Terms

BMP	best management practice
CAD	computer-aided design
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CNEL	Community Noise Equivalent Level
dB	Decibel
dBA	A-weighted decibel
EA	Expenditure Authorization
EB	Eastbound
FHWA	Federal Highway Administration
HOV	high occupancy vehicle
Hz	Hertz
I-5	Interstate 5
kHz	Kilohertz
L_{dn}	Day-Night Level
L_{eq}	Equivalent Sound Level
$L_{eq(h)}$	Equivalent Sound Level over 1 hour
L_{max}	Maximum Sound Level
LOS	Level of Service
L_{xx}	Percentile-Exceeded Sound Level
mPa	micro-Pascals
mph	miles per hour
NAC	noise abatement criteria
NADR	Noise Abatement Decision Report
NB	Northbound
NEPA	National Environmental Policy Act
NSR	noise study report
OCTA	Orange County Transportation Authority
Protocol	Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects
ROW	right-of-way
SB	Southbound
SPL	sound pressure level
SR	State Route
TeNS	Caltrans' Technical Noise Supplement
TNM 2.5	FHWA Traffic Noise Model Version 2.5
WB	Westbound

Chapter 1. Introduction

1.1. Purpose of the Noise Study Report

The purpose of this noise study report (NSR) is to evaluate noise impacts and abatement under the requirements of Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) "Procedures for Abatement of Highway Traffic Noise." 23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. According to 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 Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol) (Caltrans 2011) provides the California Department of Transportation (Caltrans) policy for implementing 23 CFR 772 in California. The Protocol outlines the requirements for preparing an NSR. Noise impacts associated with this project under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) are evaluated in the Environmental Assessment/Initial Study being prepared for this project (EA Number OC8900).

1.2. Project Purpose and Need

The Orange County Transportation Authority (OCTA) is the project sponsor. Caltrans is the lead agency and provides oversight under CEQA and NEPA under the NEPA authority assigned to Caltrans by the US Department of Transportation (NEPA Assignment MOU), effective October 1, 2012, for Caltrans' participation in the Surface Transportation Project Delivery Program, pursuant to, 23 USC 327, as amended by Moving Ahead for Progress in the 21st Century Act (MAP-21).

The primary purpose of the proposed project is to improve traffic operations and reduce congestion on I-5 from north of SR-55 HOV viaduct connection to I-5 to south of SR-57. This will improve the safe and efficient local and regional movement of people and goods while minimizing environmental and community impacts. I-5 is the primary freeway route connecting Los Angeles, Orange, and San Diego counties. The project would extend along I-5 for approximately 2.9 miles through the urban core of Orange County. In Orange County, I-5 continues to experience significant traffic congestion, making the proposed project integral to the local community and the region. The proposed project is

designed to address congestion and travel delay in the HOV lanes within the project limits.

The traffic congestion results in substantial motorist delay, reduced traffic circulation and level of service (LOS), and increased air pollution from idling vehicles. The proposed improvements would provide additional HOV capacity in both I-5 directions, which would reduce traffic congestion in the HOV and general-purpose lanes within the project limits.

Chapter 2. Project Description

The California Department of Transportation – District 12 (Caltrans), in cooperation with the Orange County Transportation Authority (OCTA), is proposing to improve I-5 between SR-55 HOV viaduct connection and SR-57, within the cities of Tustin, Santa Ana, and Orange in Orange County. I-5 (SR-55 to SR-57) HOV Lanes Improvement Project (project) proposes the addition of one high occupancy vehicle (HOV) lane in each direction on a 2.9-mile stretch of I-5 through the urban core of Orange County, providing additional HOV capacity and reducing freeway congestion. In addition to the HOV lane improvements, the project proposes the removal of the southbound off-ramp and northbound on-ramp HOV structure at Main Street (referred to as the "Main Street HOV drop structure"). All of the key project improvements are proposed to take place within the existing state right of way; however, where necessary, sound walls outside of the existing state right of way were evaluated. It is necessary to evaluate sound walls outside of existing state right of way where sound walls within state right of way were not feasible. See Chapter 7 of this report for more detail on the sound walls evaluated outside of existing state right of way. The project is primarily funded by OCTA with State Transportation Improvement Program (STIP) and Surface Transportation Program (STP) funds and is proposed to start construction in 2016 and be completed in 2018. Figures 1 and 2 locate the project regionally and locally.

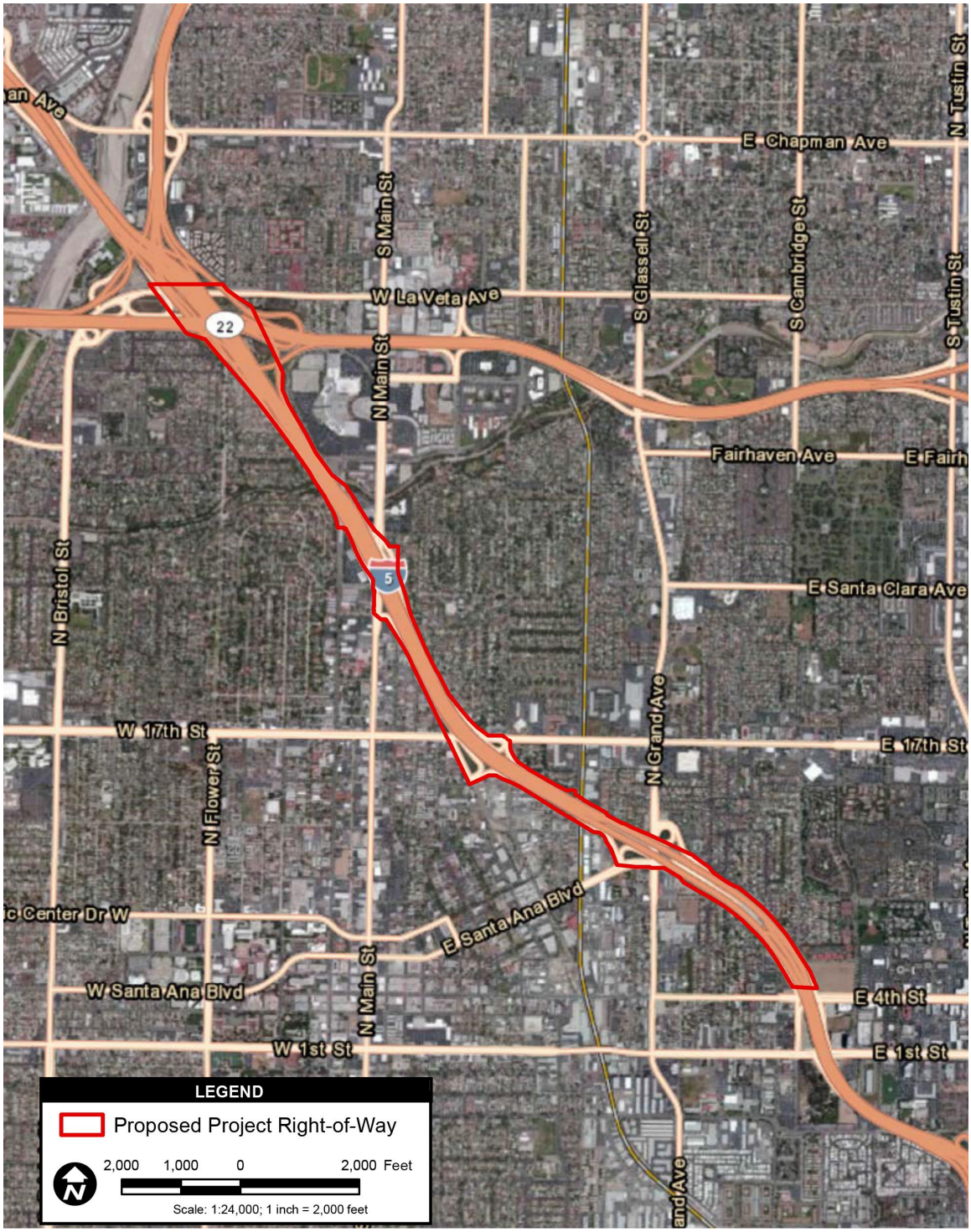
The build condition under consideration is described below. The build condition is Build Alternative 5B, as referenced in Caltrans's previously completed Project Study Report (PSR). Other preceding numbered alternatives have been rejected from further consideration.

2.1. Proposed Build Condition

The build condition would add one new HOV lane (HOV-2) adjacent to the existing HOV lane (HOV-1) in both directions of I-5 between Santa Ana Boulevard/Grand Avenue HOV ramps and SR-57. The concrete barriers that currently separate the HOV-1 lane from the general purpose (GP) lanes in this span of I-5 would be removed. Continuous ingress/egress striping would be provided between the HOV-2 lane and the GP lanes throughout the project limits, except at locations where existing bridge columns are located between the HOV lanes and the GP lanes, including the Lincoln Avenue overcrossing, the North Broadway overcrossing, and the SR-22 separation. All of the key improvements would occur within the existing right of way boundaries.

Figure 1: Regional Map

Figure 2: Project Study Area Map



To accommodate the addition of the HOV-2 lanes, each HOV-1 lane would be moved slightly toward the freeway centerline and the left shoulder would be modified. The existing center median concrete barrier would be relocated at various locations, and existing drainage inlets located along the concrete barriers would be relocated, as necessary. The GP lanes would be shifted slightly toward the outside and the right shoulder would also be modified to accommodate this shift. Shifting the GP lanes to the outside would be accomplished within the paved or landscaped Caltrans right-of-way. In the vicinity of the Lincoln Avenue overcrossing, moving the GP lanes toward the outside would require construction of a new tie-back retaining wall on the northbound and southbound sides of the freeway. Widening in the vicinity of the overcrossing would entail approximately 12 feet of additional pavement width on each side, with an additional 10 feet of reconstruction on existing freeway pavement.

A portion of existing sound wall 23b shown on Figure 3-10 would be reconstructed. The wall is located along the southbound side of the freeway and adjacent to the Santa Ana Boulevard/Grand Avenue exit ramp. Sound wall 23b is a barrier that sits atop the existing retaining wall that runs along the exit ramp. Project improvements would conflict with the structural foundation of the retaining wall underlying SW-23b, requiring reconstruction of both the retaining wall and SW-23b. The retaining wall would be removed and reconstructed in the same location, and SW-23b would be reconstructed to achieve the same top of wall elevations and horizontal extents as existing SW-23b, therefore, the noise modeling for the existing and future conditions show the same wall. The primary change to the wall would be that the wall foundation would be constructed at a lower elevation to accommodate the ramp widening. Approximately 200 linear feet of the wall would require reconstruction.

California Highway Patrol (CHP) median enforcement areas would be constructed adjacent to the HOV lanes in both freeway directions. On the southbound side, the enforcement areas would be constructed between 17th Street and Main Street. On the northbound side, they would be constructed between the Broadway Street overcrossing and the I-5 SB to State Route 22 (SR-22) Eastbound (EB) connector overcrossing.

Storm water treatment best management practices (BMPs) would be constructed where feasible within the project area.

A storm water pump station located along SB I-5, just north of the Lincoln Avenue overcrossing, would be reconstructed, along with its inlet pipe and access staircase, to accommodate the lane configuration and proposed retaining wall.

Slight adjustments would be made to the following entrance/exit ramp areas to accommodate the proposed lane configurations described above:

- Southbound (SB) I-5 Grand Avenue HOV entrance ramp
- SB I-5 to Santa Ana Boulevard/Grand Avenue exit ramp
- 17th Street to SB I-5 entrance ramp
- Northbound (NB) I-5 to 17th Street exit ramp
- Santa Clara Avenue to NB I-5 entrance ramp

Five existing overhead sign structures would be relocated and new sign structures for the modified HOV configurations would be installed.

Another feature of the build condition is removal of the Main Street HOV drop structure located west of the intersection of Main Street and Edgewood Road. Under existing conditions, a concrete structure that crosses over the northbound side of I-5 provides a direct entrance to the northbound HOV lanes and a direct exit from the southbound HOV lanes, with access to and from North Main Street and Edgewood Road. This overcrossing would be demolished and removed and the access to and from the HOV lanes would be eliminated. A new concrete barrier would be installed on the west side of the affected portion of North Main Street, which in turn would be restriped to remove the lanes that currently access this ramp. This also would require a reconfiguration of the signal at the intersection of North Main Street and Edgewood Road. Below the structure, existing concrete barriers and retaining walls that currently separate the ramp lanes from the HOV lanes would be removed and a new retaining wall would be constructed to account for the southbound HOV lanes' higher elevation relative to the northbound HOV lanes.

2.2. No Build Condition

Under the no-build condition, no changes would be made to I-5 in the project area.

Chapter 3. Fundamentals of Traffic Noise

The following is a brief summary of fundamental traffic noise concepts. For a detailed discussion, please refer to Caltrans' Technical Noise Supplement (TeNS) (Caltrans 2009), a technical supplement to the Protocol that is available on Caltrans website (http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf).

3.1. Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as a loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

3.2. Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

3.3. Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this huge range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

3.4. Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

3.5. A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an “A-weighted” sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway-traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. Table 1 describes typical A-weighted noise levels for various noise sources.

Table 1: Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: Caltrans 2009.

3.6. Human Response to Changes in Noise Levels

As described above, doubling sound energy results in a 3-dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels, when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

3.7. Noise Descriptors

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but some are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in traffic noise analysis.

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level ($L_{eq(h)}$) is the energy average of A-weighted sound levels occurring during a 1-hour period, and is the basis for noise abatement criteria (NAC) used by Caltrans and FHWA.

- **Percentile-Exceeded Sound Level (L_{xx}):** L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time).

- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.

- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 p.m. and 7 a.m.

- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m., and a 5-dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

3.8. Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

3.8.1. Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

3.8.2. Ground Absorption

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance.

3.8.3. Atmospheric Effects

Receptors downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors, such as air temperature, humidity, and turbulence, can also have significant effects.

3.8.4. Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often

constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line-of-sight between a source and a receiver will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction. Vegetation between the highway and receiver is rarely effective in reducing noise because it does not create a solid barrier.

Chapter 4. Federal Regulations and State Policies

This report focuses on the requirements of 23 CFR 772, as described below.

4.1. Federal Regulations

4.1.1. 23 CFR 772

23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23 CFR 772.7, projects that require a noise analysis are categorized as Type I or Type II projects. FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes. A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment.

Type I projects include those that create a completely new noise source, as well as those that increase the volume or speed of traffic or move the traffic closer to a receiver. Type I projects include the addition of an interchange, ramp, auxiliary lane, or truck-climbing lane to an existing highway, or the widening of an existing ramp by a full lane width for its entire length. Projects unrelated to increased noise levels, such as striping, lighting, signing, and landscaping projects, are not considered Type I projects.

Under 23 CFR 772.11, noise abatement must be considered for Type I projects if the project is predicted to result in a traffic noise impact. In such cases, 23 CFR 772 requires that the project sponsor consider noise abatement before adoption of the final NEPA document. This process involves the identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project, and of noise impacts for which no apparent solution is available.

Traffic noise impacts, as defined in 23 CFR 772.5, occur when the predicted noise level in the design year approaches or exceeds the NAC specified in 23 CFR 772, or a predicted noise level substantially exceeds the existing noise level (a “substantial” noise increase). 23 CFR 772 does not specifically define the terms “substantial increase” or “approach”; these criteria are defined in the Protocol, as described below.

Table 2 summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual land use in a given area.

Table 2: Activity Categories and Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level (dBA- $L_{eq(h)}$) [1]	Evaluation Location	Description of Activities
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	Exterior	Residential.
C[2]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A–D or F.
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	Undeveloped lands that are not permitted.

[1] *The $L_{eq(h)}$ activity criteria values are for impact determination only and are not design standards for noise abatement measures. All values are A-weighted decibels (dBA).*
[2] *Includes undeveloped lands permitted for this activity category.*
Source: 23 CFR Part 772, 2010.

Predicted exterior traffic noise levels at land uses in Activity Categories A, B, C, and E are evaluated to determine whether traffic noise impacts are predicted to occur. In determining traffic noise impacts for these activity categories, primary consideration is given to exterior areas of frequent human use. In situations where there are no exterior activities, or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion (Activity Category D) is used as the basis for determining a noise impact.

4.2. State Regulations and Policies

4.2.1. Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects

The Protocol specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or federal-aid highway projects. The NAC specified in the Protocol are the same as those specified in 23 CFR 772. The Protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA. The Protocol also states that a sound level is considered to approach an NAC level when the sound level is within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

The TeNS to the Protocol provides detailed technical guidance for the evaluation of highway traffic noise. This includes field measurement methods, noise modeling methods, and report preparation guidance.

4.2.2. Section 216 of the California Streets and Highways Code

Section 216 of the California Streets and Highways Code relates to the noise effects of a proposed freeway project on public and private elementary and secondary schools. Under this code, a noise impact occurs if, as a result of a proposed freeway project, noise levels exceed 52 dBA- $L_{eq(h)}$) in the interior of public or private elementary or secondary classrooms, libraries, multipurpose rooms, or spaces. This requirement must be addressed in addition to the requirements of 23 CFR 772.

If a project results in a noise impact under this code, noise abatement must be provided to reduce classroom noise to a level that is at or below 52 dBA- $L_{eq(h)}$. If the noise levels generated from freeway and non-freeway sources exceed 52 dBA- $L_{eq(h)}$ prior to the construction of the proposed freeway project, then noise abatement must be provided to reduce the noise to the level that existed prior to construction of the project.

Chapter 5. Study Methods and Procedures

This section describes the methods and procedures followed for the NSR, including the selection of representative receptor sites, noise measurement procedures, and traffic noise modeling required to conduct the analysis. Portions of this NSR were prepared in accordance with the *Draft Work Plan for the Traffic Noise Study. Interstate 5 HOV Lane Improvements (State Route 55 to State Route 57), Orange County, California,* prepared by AECOM Inc. (AECOM 2012a), and approved by Caltrans (Caltrans 2012a). The work plan identified the framework for the NSR, and established the evaluation criteria and methodologies for the long-term and short-term noise measurements, the roadway traffic noise modeling using Traffic Noise Model (TNM) version 2.5, and the noise abatement recommendations. Following completion of the *Draft Work Plan*, several build alternatives were eliminated from further consideration. This NSR considers one proposed Build Alternative (Alternative 5B). As a result, the project limits considered in this NSR are shorter in length than those documented in the *Draft Work Plan*.

The work plan, the noise monitoring and modeling, and this NSR were prepared in accordance with the Caltrans, November 2009 Technical Noise Supplement, and the May 2011 Traffic Noise Protocol available on the Caltrans website. The traffic data used to prepare this NSR were provided in the project's *Transportation Analysis Report, I-5 from SR-55 to SR-57 HOV Improvement Project PA/ED*, conducted by AECOM, Inc. (AECOM 2012b) and were also based upon assumptions agreed upon the in work plan.

5.1. Methods for Identifying Land Uses and Selecting Receiver Locations

A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Land uses in the project study area were categorized by land use type, activity category as defined in Table 2, and the extent of frequent human use. As stated in the Protocol, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. Although all developed land uses are evaluated in this analysis, the focus is on locations of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential backyards and common use areas at multifamily residences.

Site geometry, such as distances, elevations, and location of walls and buildings, was noted for each measurement location.

Short-term measurement locations were selected to represent each major developed area within the project area. Noise measurement locations were selected to reflect outdoor areas of frequent human use. Generally, noise measurements were taken at outdoor use areas or building facades of the first-row residences closest to the freeway. Long-term measurement sites were selected to identify peak traffic noise hours in the project study area, and were located within single-family residential areas or commercial areas. Short-term measurement sites were selected so they would represent the existing noise level at modeling locations, and were located within single-family residential areas, condominium, apartment, and townhome multifamily residential areas, and outdoor recreational areas. A measurement site was not used if any unusual noise sources were found to be present during a potential measurement period, such as dogs, pool pumps, or loud voices and non-highway traffic local activity.

5.2. Field Measurement Procedures

A field noise study was conducted in accordance with the recommended procedures in TeNS. The purpose of conducting measurements of the existing freeway noise is to establish the noisiest hour baseline conditions. A total of twenty-three measurement sites were identified for the noise monitoring program and are identified in Figures 3-1 through 3-13. Short-term measurements were conducted at 19 sites, while long-term measurements were conducted at 4 sites. The following is a summary of the procedures used to collect short-term and long-term sound level data.

5.2.1. Short-Term Measurements

Short-term monitoring was conducted at a total of 19 locations during three separate monitoring periods. Measurements at 4 locations were conducted in October 2012, measurements at 8 locations were conducted in September 2013, and measurements at 7 locations were conducted in January 2014. Instruments used for the measurements included Larson Davis Model 820 Class 1 Sound Level Meters (serial numbers 1298, 1573, and 1671) and Larson Davis System 824 Class I Sound Level Meters (serial numbers 2624 and 3007). Measurements were taken at each site over a 10-, 15- or 20-minute period. Short-term monitoring was conducted at Activity Category B and C land uses. The short-term measurement locations are identified in Figures 3-1 through 3-13.

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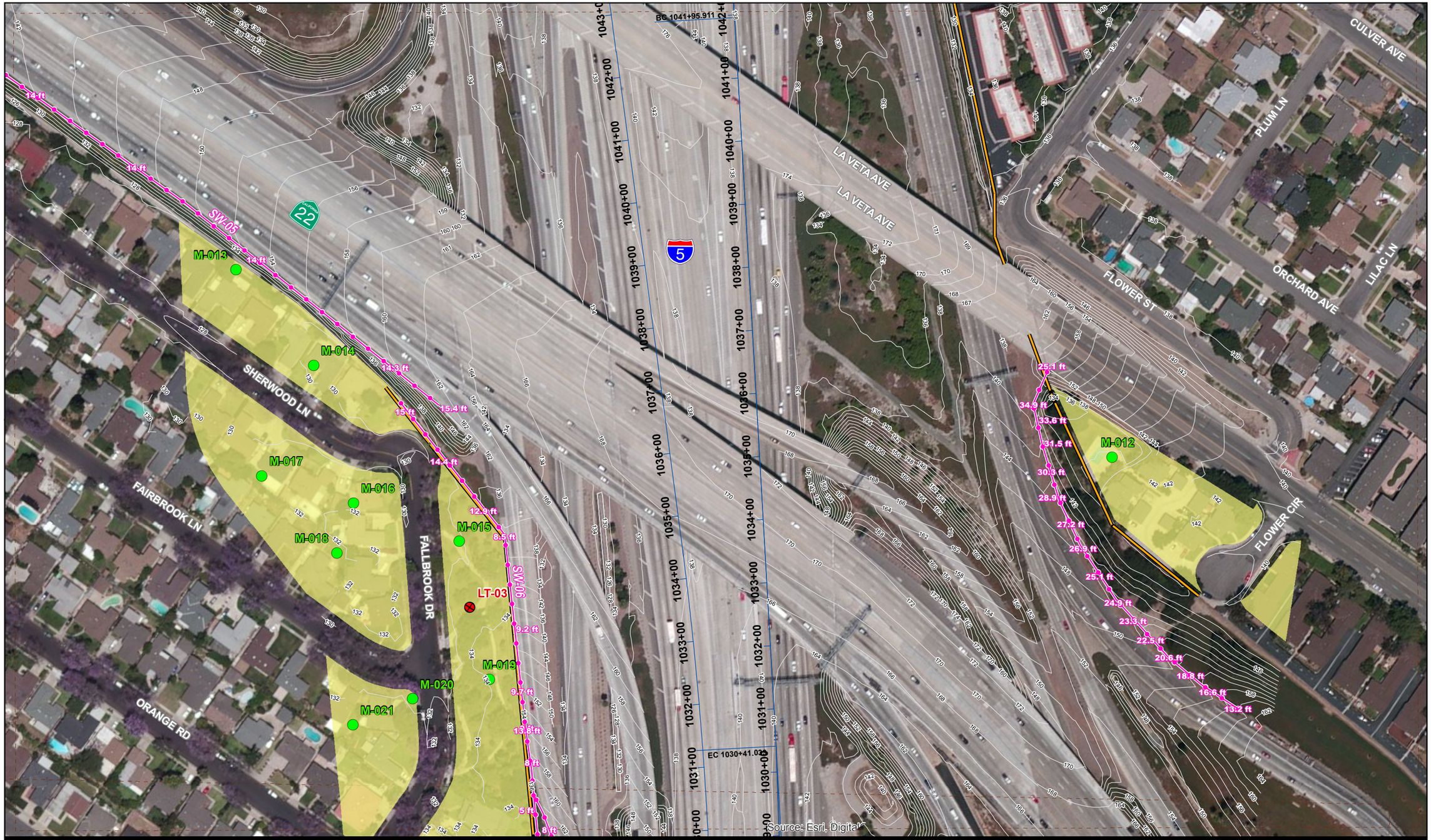


LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

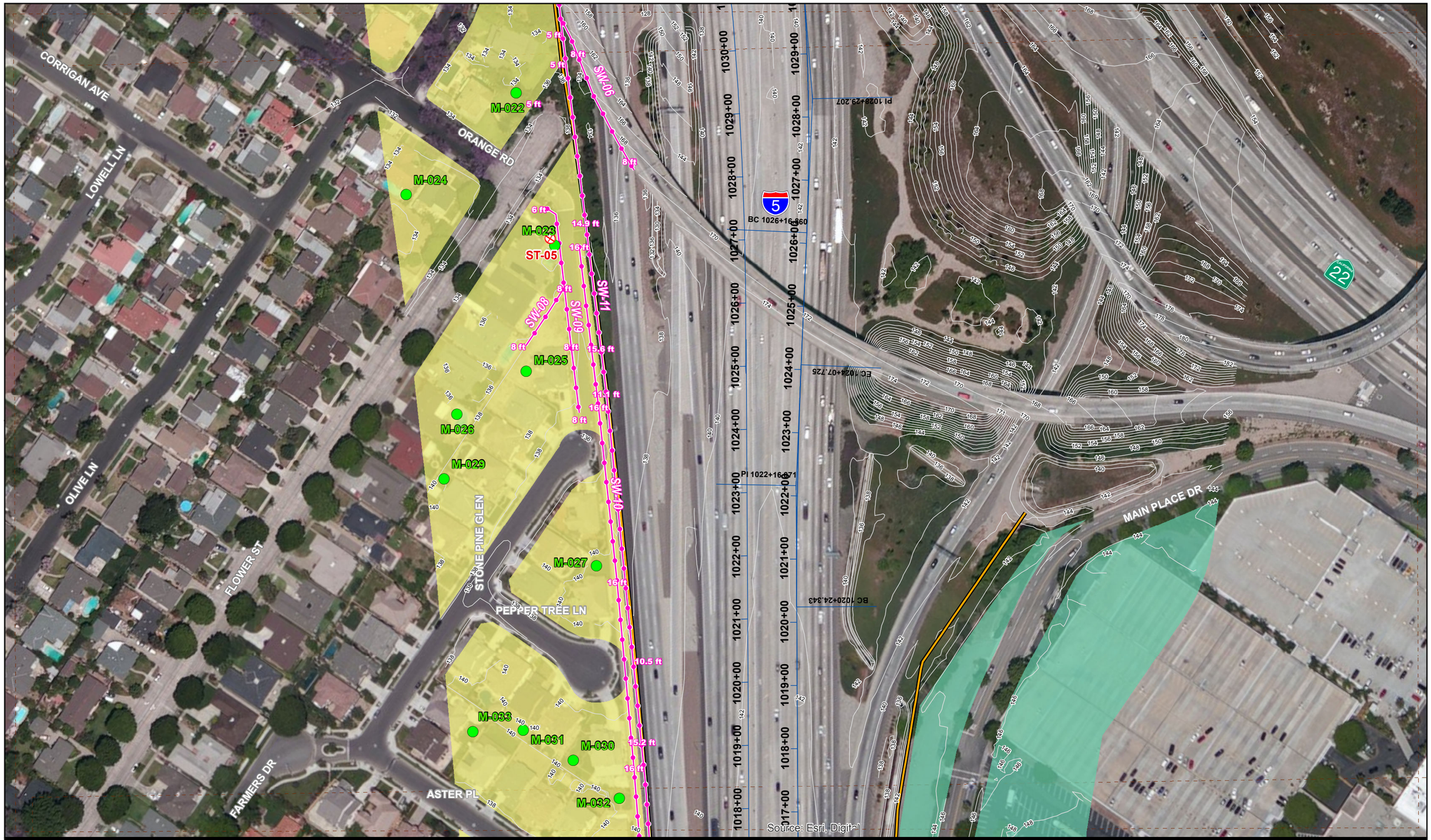
Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-1
Existing Conditions and Existing Soundwalls



LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-2
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-3
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-4
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-5
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-6
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-7
Existing Conditions and Existing Soundwalls

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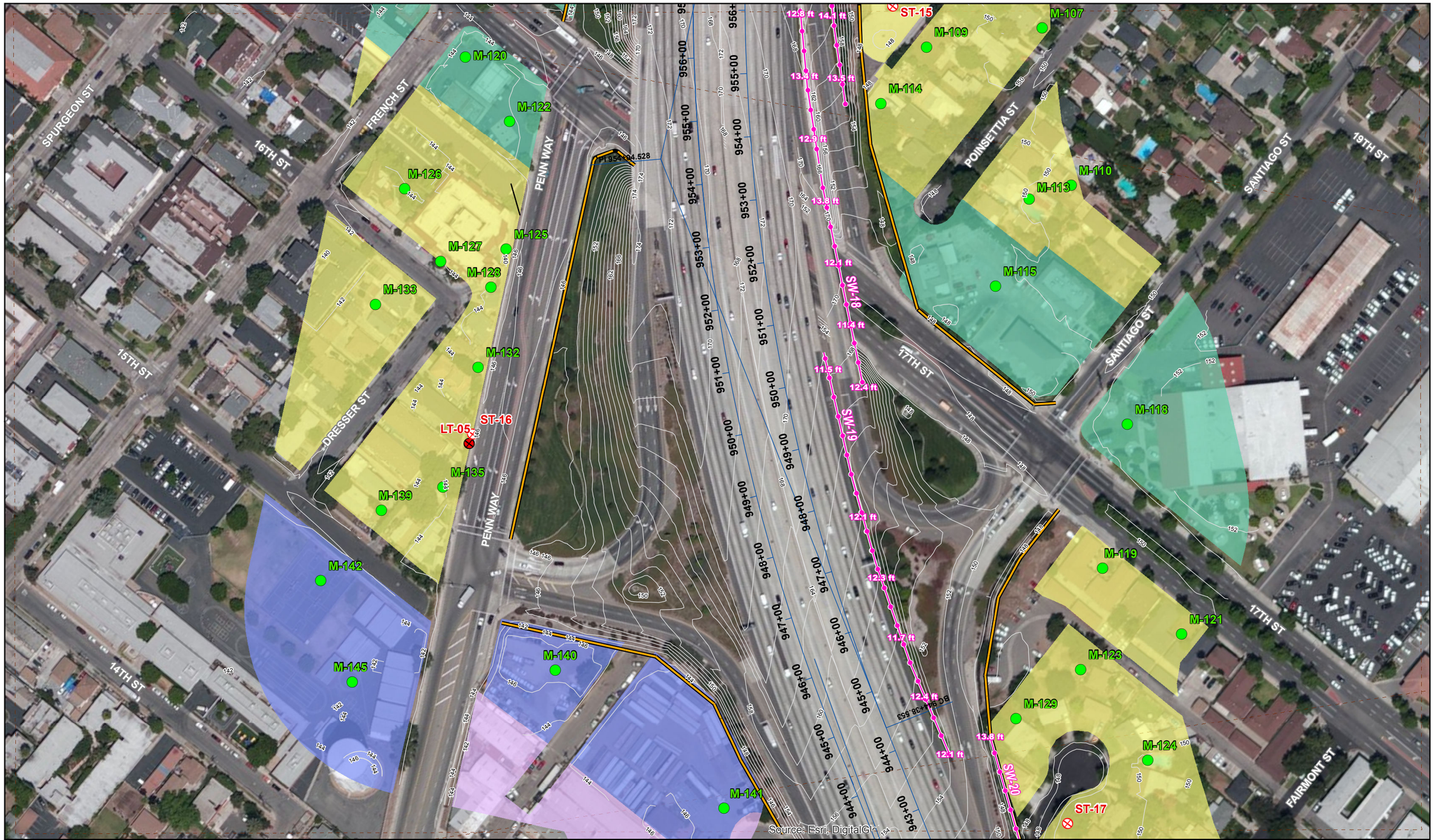

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-8
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-9
Existing Conditions and Existing Soundwalls

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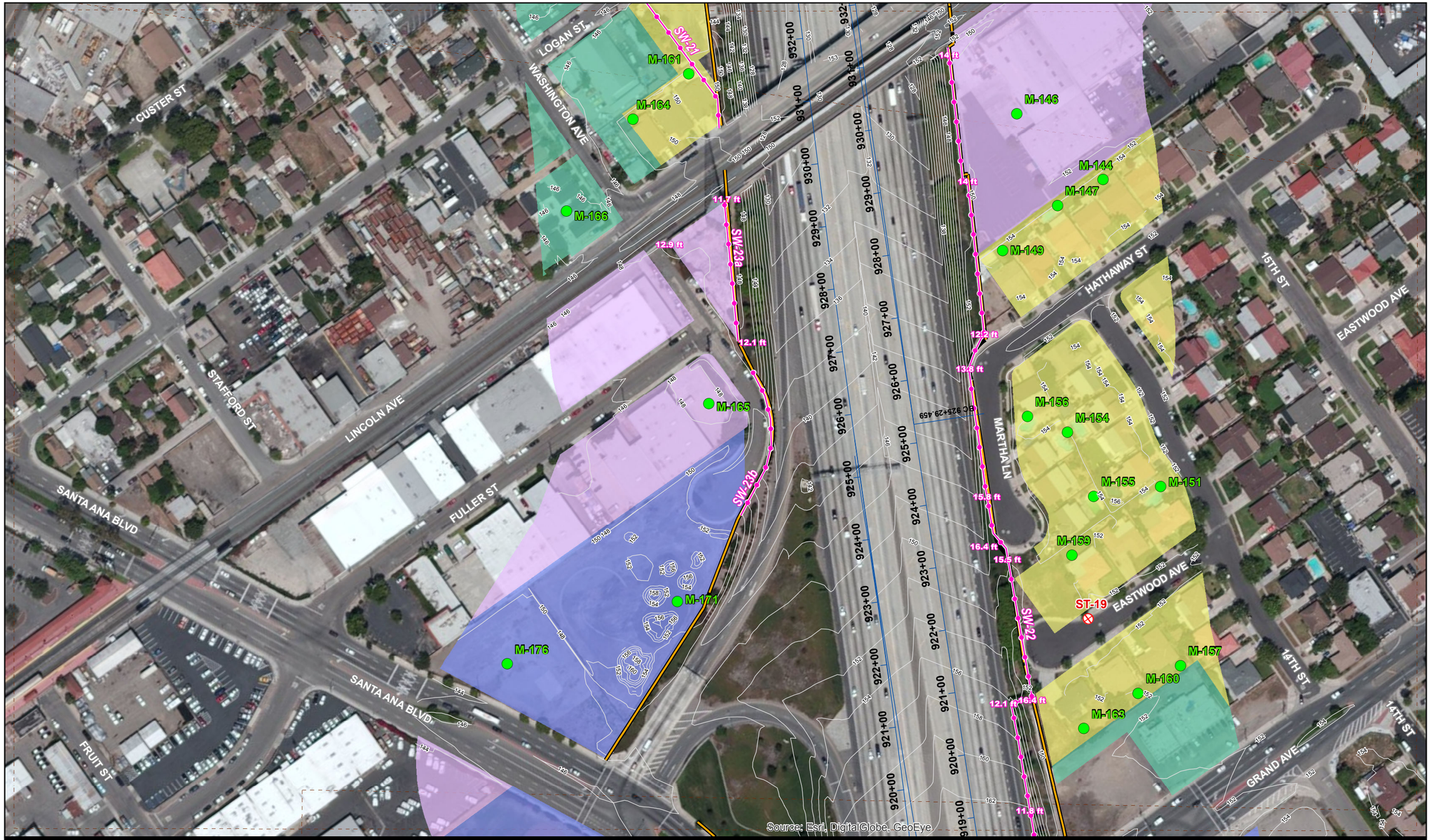

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-10
Existing Conditions and Existing Soundwalls

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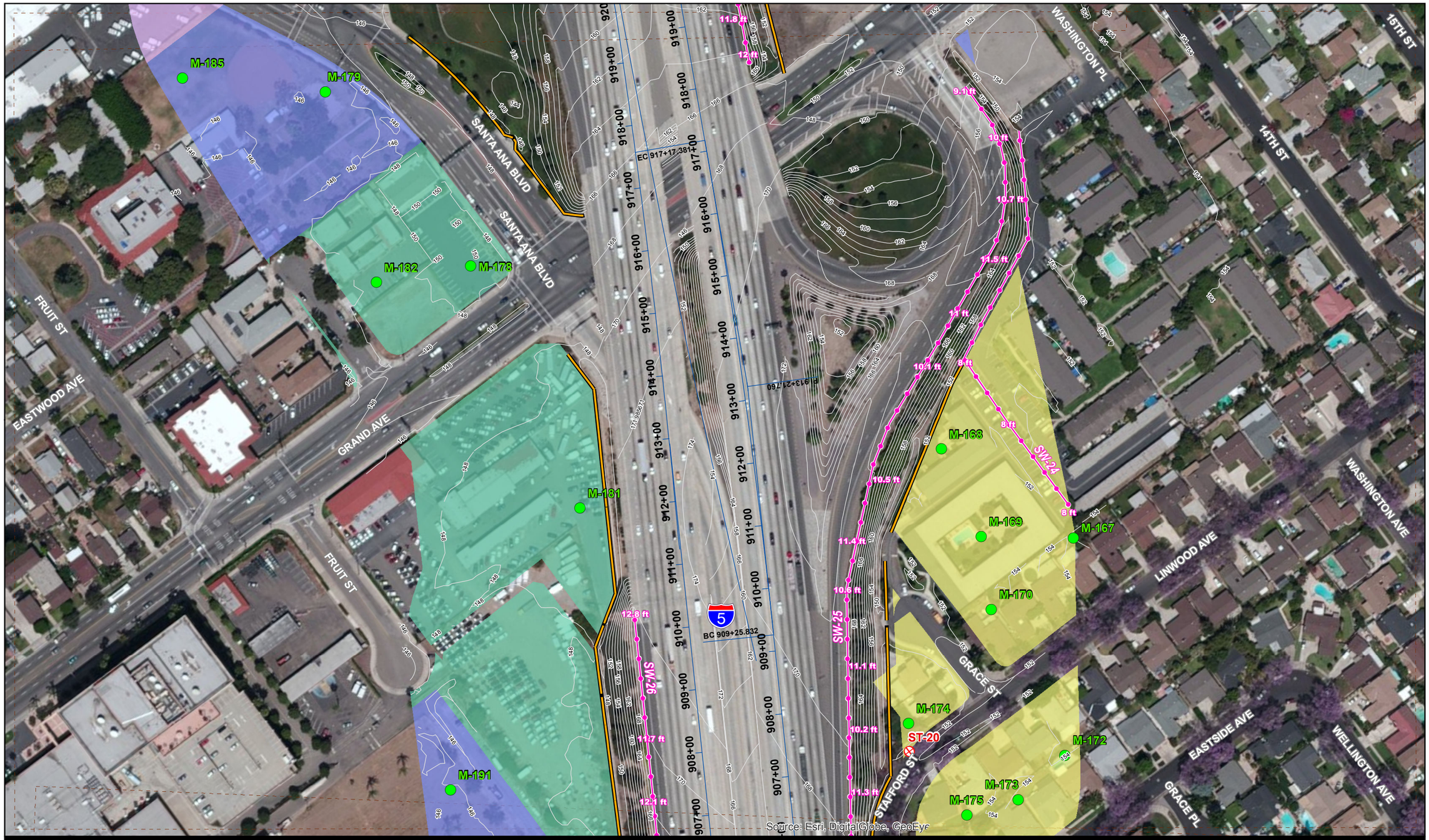

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-11
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-12
Existing Conditions and Existing Soundwalls

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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Existing Soundwall with Heights (ft)
- Centerline/Stations
- Contour Line
- Map Extent

Land Use

- Residential
- Public Facilities (Schools, Parks, Civic Buildings, Commercial Recreation, Parking)
- Hotels, Motels, Offices, Restaurants/Bars
- Industrial and Utilities

Figure 3-13
Existing Conditions and Existing Soundwalls

During the short-term measurements, field staff attended each meter. The sound-level meters were field calibrated before and after each use using a Larson Davis Model CAL200 calibrator (serial numbers 4214, 4637, 5768, and 6204) or Larson Davis Model CAL150 calibrator (serial number 2209). For each measurement, the meter was configured to log noise level data (average, minimum, maximum, and selected exceedance levels) on 1- or 5-minute intervals. The logged data were downloaded and evaluated following the field measurements.

Temperature, wind speed, and humidity were recorded manually during the short-term monitoring sessions using a Kestrel 3500 Weather Meter. During the short-term measurements, wind speeds typically ranged from 1 to 4 miles per hour (mph). Temperatures ranged from 22 to 35°C (72 to 95°F), with relative humidity typically 30 to 50%.

Traffic volumes on each side of the freeway were recorded using a video camera during short-term measurements. The videos were later reviewed and traffic classified according to five vehicle types. Vehicles were classified as automobiles, medium-duty trucks (with two axles and six wheels but not including dual pick-up trucks), heavy-duty trucks (with three or more axles), motorcycles, or buses. Field observations and measurement data were used to validate the accuracy of the traffic noise model and correct model geometry where needed.

5.2.2. Long -Term Measurements

Long-term monitoring was conducted at four locations. Instruments used for the measurements included Larson Davis Model 820 Class 1 Sound Level Meters (serial numbers 1298, 1573, and 1671) and Larson Davis System 824 Class I Sound Level Meters (serial numbers 2624 and 3007). The purpose of these measurements was to identify variations in sound levels throughout the day. The long-term sound level data were collected over four consecutive 24-hour periods, beginning Tuesday, October 16, 2012, and ending Thursday, October 25, 2012. All long-term measurement periods took place on a Tuesday, Wednesday, or Thursday. For each measurement, the meter was configured to log noise level data (average, minimum, maximum, and selected exceedance levels) on 1-hour intervals. The logged data were downloaded and evaluated following the field measurements.

5.3. Traffic Noise Levels Prediction Methods

Traffic noise levels were predicted using the FHWA Traffic Noise Model Version 2.5 (TNM 2.5). TNM 2.5 is a computer model based on two FHWA reports: FHWA-PD-96-009 and FHWA-PD-96-010 (FHWA 1998a, 1998b). Key inputs to the traffic noise model were the locations of roadways, shielding features (e.g., topography and buildings), noise barriers, ground type, and receivers.

Traffic noise was evaluated under existing conditions and for a design year of 2040. For the 2040 design year, future noise levels were predicted both build and no-build project conditions.

Noisiest-hour traffic volumes, vehicle classification percentages, and traffic speeds under existing and design-year (2040) conditions were provided by AECOM Traffic Engineers for input into the traffic noise model (shown in Tables A-14 through A-19 in Appendix A). The highest average traffic volumes on I-5 and on the crossing streets are predicted to occur during the a.m. and also during the p.m.; therefore, the higher of the two values of a.m. and p.m. peak hour traffic volumes were capped to LOS C per-lane volume assumptions in the approved workplan, shown in Table A-21 in Appendix A. The LOS C capped peak-hour volumes that were used in the model are shown in Tables A-22 through A-26 in Appendix A.

The ramp and connector traffic data were examined and have been capped at a maximum of 1,000 vph/lane for LOS C conditions for all alternatives. The number of lanes in the traffic noise model for a ramp is governed by the lowest number of lanes in the ramp. If an off ramp begins at one lane on the freeway and then widens to three lanes at its end point, only one lane's worth of traffic, capped at 1,000 vph/lane, is modeled. The number of lanes in the traffic noise model for a connector is governed by the total number of lanes on the connector. Traffic on the I-5 mainline was modeled at 105 km/hr (65 mph). Speeds of 64 km/h (40 mph) were used for all "on" and "off" ramps. Slower speeds of 40 km/h (25 mph) were used to model traffic on all loop ramps.

To validate the accuracy of the model, TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at 19 field measurement locations scattered throughout the corridor. For each measurement location, traffic volumes counted during the short-term measurement periods were normalized to 1-hour volumes. These normalized volumes were assigned to the corresponding project area roadway to simulate the noise source strength at the roadways during the actual measurement period. Traffic counts collected during short-term measurements and used in the calibration modeling

can be found in Tables C-1 through C-12 in Appendix C. Modeled and measured sound levels were then compared to determine the accuracy of the model and if additional model calibration was necessary.

5.4. Methods for Identifying Traffic Noise Impacts and Consideration of Abatement

Traffic noise impacts are considered to occur at receiver locations where predicted design-year noise levels are at least 12 dB greater than existing noise levels, or where predicted design-year noise levels approach (come within 1 dB) or exceed the NAC for the applicable activity category. Where traffic noise impacts are identified, noise abatement must be considered for reasonableness and feasibility as required by 23 CFR 772 and the Protocol.

According to the Protocol, abatement measures are considered acoustically feasible if a minimum noise reduction of 5 dB at an impacted receiver location is predicted with implementation of the abatement measures. Other factors that affect feasibility include topography, access requirements for driveways and ramps, presence of local cross streets, utility conflicts, other noise sources in the area, and safety considerations.

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

- The noise reduction design goal.
- The cost of noise abatement.
- The viewpoints of benefited receptors (including property owners and residents of the benefitted receptors).

23 CFR 772 requires that an acoustical design goal be applied to all noise abatement. The Protocol defines an acoustical design goal such that a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefitted receptors. For a wall to be considered reasonable, the 7-dB design goal must be achieved at one or more benefitted receptors. This design goal applies to any receptor and is not limited to impacted receptors.

Cost considerations for determining noise abatement reasonableness are evaluated by comparing reasonableness allowances and projected abatement costs. The 2011 base allowance of $55,000 per benefitted receiver was used. Total allowances are calculated

by multiplying the cost-per-residence by the number of benefited residences. To evaluate the viewpoints of benefitted receptors, a poll of the property owners and non-owner occupants of benefitted receptors is completed to determine whether they are in favor of or in opposition to the proposed noise abatement.

Chapter 6. Existing Noise Environment

6.1. Existing Land Uses

A field investigation was conducted to identify land uses (i.e., Activity Categories) that could be subject to traffic and construction noise impacts from the proposed project (see Table 2). Both single-family residences and multifamily residences were identified as Activity Category B land uses in the project area. Activity Category C land uses include schools (the Wallace R. Davis Elementary School), parks (e.g., William W. Eldridge Park and Saddleback View Park), and the Discovery Science Center. Activity Category E land uses include several hotels and motels (e.g., Motel 6 and the Red Roof Inn). The land use shown in Figures 3-1 through 3-13 is existing regional land use data provided by the Southern California Association of Governments (SCAG 2005). The land use at specific measurement sites and modeled receivers is provided in Table 3 (short-term measurement sites) and Table 4 (long-term measurement sites).

Existing land uses in the project area are described in further detail below:

- **From SR 57 to Main Street:** Land uses within this segment of the project include a mix of single and multi-family residential developments, commercial facilities, and a science museum. East of I-5 between SR 22 and Main Street, land use is dominated by commercial development but also includes a hotel and the Discovery Science Center. West of I-5 between SR 22 and Main Street, there is a large tract of residential development, which includes a neighborhood park area.

- **From Main Street to Grand Avenue:** Land use east of I-5 between Main Street and Grand Ave is dominated by residential development, but also includes commercial retail facilities near 17th Street and Lincoln Avenue. West of I-5 between Main Street and Lincoln Avenue is a mix of apartment complexes, single family homes, commercial facilities, and a school. Commercial facilities, a baseball field, and some residences exist west of I-5 between Lincoln Avenue and Grand Avenue.

- **From Grand Avenue to 4th Street:** Land use east and west of I-5 between Grand Avenue and 4th Street is dominated by residential land use (both single family homes and apartment complexes with outdoor pool areas), but also includes a few commercial areas, and a playground.

Table 3: Summary of Short-Term Measurements

Receptor ID	Address	Meter location	Land Uses/ Activity Category	Measurement Date	Start Time	Duration (minutes)	Measured $L_{eq(h)}$ (dBA)	Adjusted Peak-Hour $L_{eq(h)}$ (dBA)	Adjusted to Long-Term Site
ST-05	2847 Flower St, Santa Ana	Backyard	SFR / Activity Category B	Tuesday, 10/16/2012	4:49 p.m.	20	61.4	61.4	LT-03
ST-06	715 W Aster Pl, Santa Ana	Front Yard	SFR / Activity Category B	Tuesday, 01/21/2014	11:10 a.m.	10	62.2	62.9	LT-03
ST-07	427 W Jonquil Rd, Santa Ana	Vacant Lot Behind Backyard	SFR / Activity Category B	Tuesday, 01/21/2014	11:10 a.m.	10	64.7	65.4	LT-03
ST-08	2353 N Riverside Dr	Front Yard	SFR / Activity Category B	Tuesday, 01/21/2014	10:20 a.m.	10	61.1	64.6	LT-04
ST-09	2416 N. Bush Street, Santa Ana	Backyard	SFR / Activity Category B	Tuesday 9/24/2013	9:25 a.m.	15	60.8	66.1	LT-04
ST-10	2315 N. Bush Street, Santa Ana	Backyard	SFR / Activity Category B	Tuesday 9/24/2013	10:11 a.m.	15	60.9	64.4	LT-04
ST-11	305 E. 22nd Street, Santa Ana	Backyard	SFR / Activity Category B	Thursday 09/26/2013	11:24 a.m.	15	65.4	68.9	LT-04
ST-12	2057 Bush Street, Santa Ana	Backyard	SFR / Activity Category B	Tuesday, 01/21/2014	2:40 p.m.	10	62.5	64.8	LT-04
ST-13	2011 French Street, Santa Ana	Backyard	SFR / Activity Category B	Tuesday 9/24/2013	11:40 a.m.	15	67.6	69.1	LT-05
ST-14	Spurgeon Street, Santa Ana	Backyard	SFR, MFR/ Activity Category B	Tuesday 9/24/2013	3:05 p.m.	15	62.6	65.7	LT-05
ST-15	1725 Valencia Street, Santa Ana	Backyard	SFR / Activity Category B	Tuesday 9/24/2013	4:04 p.m.	15	57.4	61.2	LT-05
ST-16	515 E. 15th Street, Santa Ana	Cul-de-sac next to house	SFR, SCH / Activity Categories B, C	Tuesday, 01/21/2014	3:50 p.m.	10	70.0	73.1	LT-05
ST-17	1605 N Oakmont Place, Santa Ana	Front Yard	SFR / Activity Category B	Tuesday, 01/21/2014	4:30 p.m.	10	60.6	64.4	LT-05
ST-18	1329 Custer St, Santa Ana	Front Yard	SFR / Activity Category B	Tuesday, 01/21/2014	4:30 p.m.	10	61.7	65.5	LT-05

Table 3. Summary of Short Term Measurements (continued)

Receptor ID	Address	Meter location	Land Uses/ Activity Category	Measurement Date	Start Time	Duration (minutes)	Measured $L_{eq(h)}$ (dBA)	Adjusted Peak-Hour $L_{eq(h)}$ (dBA)	Adjusted to Long-Term Site
ST-19	1320 N Eastwood Ave, Santa Ana	Front Yard	SFR / Activity Category B	Wednesday, 10/24/2012	10:50 a.m.	20	65.5	67.0	LT-05
ST-20	1505 E Stafford St, Santa Ana	Front Yard	SFR / Activity Category B	Wednesday, 10/24/2012	10:08 a.m.	20	63.0	63.7	LT-06
ST-21	902 N. Wright Street, Santa Ana	Backyard	SFR / Activity Category B	Wednesday, 9/25/13	11:05 a.m.	15	65.5	65.8	LT-06
ST-22	Saddleback View Park	Swings/play area	REC / Activity Category C	Wednesday, 9/25/13	11:55 a.m.	15	66.6	66.9	LT-06
ST-23	703 Concord St, Santa Ana	Front Yard	SFR / Activity Category B	Tuesday, 10/9/2012	5:16 p.m.	20	64.8	71.1	LT-06

Table 4: Summary of Long-Term Monitoring

Monitoring Location	**LT-03** 2929 Fallbrook Dr, Santa Ana William W Eldridge Park Activity Category C		**LT-04** 157 E Edgewood Rd, Santa Ana Single-Family Residential Activity Category B		**LT-05** 1515 N Dresser St, Santa Ana Multi-Family Residential Activity Category B		**LT-06** 1616 E Fruit St, Santa Ana Single-Family Residential Activity Category B	
Hour Beginning	**Measured Leq(h) (dBA)**	**Difference from Noisiest Hour (dB)**	**Measured Leq(h) (dBA)**	**Difference from Noisiest Hour (dB)**	**Measured Leq(h) (dBA)**	**Difference from Noisiest Hour (dB)**	**Measured Leq(h) (dBA)**	**Difference from Noisiest Hour (dB)**
12:00 AM	61.9	4.4	53.2	9.5	64.7	6.1	58.8	6.4
1:00 AM	60.2	6.1	52.2	10.5	64.2	6.6	57.4	7.8
2:00 AM	59.5	6.8	51.3	11.4	62.3	8.5	56.3	8.9
3:00 AM	59.6	6.7	53.1	9.6	64	6.8	57.8	7.4
4:00 AM	62.9	3.4	54.9	7.8	67	3.8	60.6	4.6
5:00 AM	65.5	0.8	58.1	4.6	70.4	0.4	63.5	1.7
6:00 AM	65.6	0.7	57.8	4.9	**70.8**	0	65.1	0.1
7:00 AM	64.4	1.9	57.6	5.1	70.5	0.3	**65.2**	0
8:00 AM	64.7	1.6	56.9	5.8	69.1	1.7	64.5	0.7
9:00 AM	65.9	0.4	57.4	5.3	70	0.8	64.1	1.1
10:00 AM	66.1	0.2	59.2	3.5	69.3	1.5	64.5	0.7
11:00 AM	65.6	0.7	59.2	3.5	69.3	1.5	64.9	0.3
12:00 PM	65.6	0.7	58.9	3.8	69.7	1.1	64	1.2
1:00 PM	65.7	0.6	59.8	2.9	68.1	2.7	64.1	1.1
2:00 PM	65.9	0.4	60.4	2.3	68.3	2.5	64.5	0.7
3:00 PM	66.1	0.2	**62.7**	0	67.7	3.1	61.6	3.6
4:00 PM	**66.3**	0	58.1	4.6	67	3.8	60.2	5
5:00 PM	64.5	1.8	56.4	6.3	66.1	4.7	58.9	6.3
6:00 PM	77.3	-11	58.1	4.6	65.9	4.9	60.7	4.5
7:00 PM	66	0.3	57.6	5.1	67.2	3.6	63.4	1.8
8:00 PM	65.6	0.7	57	5.7	68.8	2	62.8	2.4
9:00 PM	64.8	1.5	56.1	6.6	69.6	1.2	62.4	2.8
10:00 PM	64.1	2.2	55.7	7	67.5	3.3	61.9	3.3
11:00 PM	62.5	3.8	55.2	7.5	66.9	3.9	60.8	4.4

As required by the Protocol, although all developed land uses are evaluated in this analysis, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. In general, an area of frequent human use is an area where people are exposed to traffic noise for an extended period of time on a regular basis. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential backyards and common use areas at multifamily residences.

Receivers M-142 and M-145 (Figure 3-8) represent exterior activity areas (playgrounds) at the Wallace R. Davis Elementary School on French Street in Santa Ana. As an exterior activity area/playground, these two receivers have been classified as Land Use Category C, and the exterior Land Use Category C Noise Abatement Criteria of 67 dBA was used as the basis for determining a noise impact at the Wallace R. Davis Elementary School. There are no other schools within the project limits.

The existing land uses within the project area are represented by a total of 202 modeled receivers, shown in Figures 3-1 through 3-13. Each modeled receiver location was classified according to the Activity Categories listed in Table 2 (Chapter 4 of this report). Activity Categories for each modeled receiver are listed in Table 6 (Chapter 7 of this report). Two receivers (M-042 and M-181) represent satellite/remote parking areas with no other buildings or land uses associated with the receiver, and were classified as non-noise sensitive Activity Category F. For other modeled receivers located within a parking area, Activity Categories were defined according to the overall land use (i.e. an office building or retail facility) of that property. For example, M-055 is located within the parking lot of an office building, and was therefore classified as Activity Category E.

6.1. Noise Measurement Results

The existing noise environment in the project area is characterized below based on short- and long-term noise monitoring. Twenty three measurement location sites were identified for the noise monitoring program and are shown in Figures 3-1 through 3-13. Of those 23 sites, short term measurements were conducted at 19 sites and long-term measurements were conducted at 4 sites. Field data sheets are provided in Appendix C.

6.1.1. Short-Term Monitoring

Table 3 summarizes the results of the 19 short-term noise measurement sites. For the 19 short-term sites, measured noise levels at Activity Category B Residential land uses ranged

from 57.4dBA $L_{eq(h)}$ in the front yard of a single-family residence on Oakmont Place in Santa Ana (ST-15) to 70.0 dBA $L_{eq(h)}$ in the cul-de-sac near 15th Street in Santa Ana (ST-16).

The objective of the short-term measurements was for model calibration, which do not need to be made during the worst noise hour. The short-term measurements were adjusted upward to the noisiest hour levels using the 24-hour data from the nearest long-term measurement site.

6.2.2 Long-Term Monitoring

Long-term monitoring was conducted at four locations. The purpose of these measurements was to describe variations in sound levels throughout the day for a larger area with a similar noise environment, rather than absolute sound levels at a specific time of day for a specific receptor of concern. The peak-hour noise levels were generally between the hours of 6:00 a.m. and 10:00 a.m., or between 4:00 p.m. and 7:00 p.m. Table 4 and Figure 4 summarize the results of the long-term monitoring.

As shown in Table 4, a large fluctuation in noise levels between peak and off-peak hours was observed during the long-term measurements. For example, the noise level at the 3:00 p.m. noisiest hour at site LT-04 is 62.7 dBA $L_{eq(h)}$, but the noise levels at 2:00 a.m. drop to 51.3 dBA $L_{eq(h)}$. For sites LT-04, LT-05, and LT-06 the $L_{eq(h)}$ noise levels for the noisiest hour are similar to the $L_{eq(h)}$ for the hours before and after the noisiest hour. This indicates the noise levels measured during the noisiest hour are representative of peak-hour traffic noise at sites LT-04, LT-05, and LT-06 Because the data indicated there were no measured hourly noise levels contaminated by secondary sources at sites LT-04, LT-05, and LT-06, no outliers were eliminated at those sites.

However, at site LT-03, the noisiest hour at 6:00 p.m. is 11 to 12 dB higher than the $L_{eq(h)}$ noise levels at 5:00 p.m. or 7:00 p.m. This isolated jump in noise levels is too high to be attributed to hourly changes in traffic volumes on the existing roadways along; the noise measurement during these time periods was likely contaminated by a secondary noise source. Therefore, the $L_{eq(h)}$ noise level measured at 6:00 p.m. at site LT-03 was eliminated as an outlier in determining the noisiest hour at this site. The noise level at 4:00 p.m. was used instead.

Figure 4: Long-Term Monitoring at Four Measurement Sites, October 17 - 25, 2012

6.2.3 Noise Model Calibration

In addition to characterizing the existing noise conditions within the project study area, the second purpose of the noise measurements was to validate the TNM noise model to existing conditions to ensure that the noise model predicts accurate noise levels within the project study area. TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at common field measurement locations.

The purpose of model calibration is to “fine-tune” the prediction model to actual site conditions that are not adequately accounted for by the model. Calibration is performed by algebraically adding a constant, or K-factor, to the noise level calculated in TNM 2.5. The magnitude of K-factors is initially determined by the difference between measured and modeled noise levels at specific points. Calibration factors may be positive or negative. Additional factors may be applied based upon the experience and judgment of the noise engineer performing the analysis. Section 5.4 of the TeNS, Calibrating the Prediction Model, provides guidance on the application of calibrations.

During the noise measurements conducted for the project, traffic data for use in the calibration process was collected at 19 monitoring sites located throughout the corridor. For site ST-05, access restrictions and a lack of good vantage points from which to view the travel lanes on all contributing roadway noise sources prohibited the collection of accurate traffic data concurrent with the measurement period. Traffic could not be counted on the multiple elevated ramp structures and overpasses contributing to existing noise levels at measurement sites surrounding the I-5/SR 57/SR 22 interchange. As a result, there was 1 short-term measurement site (ST-05) at which model calibration could not be completed.

Table 5 shows the measured ambient noise levels, the modeled noise levels using traffic counts and observed vehicle speeds during noise monitoring, the K-factor at each of the monitored locations, and the representative receptors. Because field data indicate the measurements were accurate and representative of existing noise environment, the TNM 2.5 model was calibrated based upon the K-factors calculated for all 18 sites shown in Table 5.

For the Existing, No-Build, and Build Alternative noise level predictions, the calibration K-factors were applied manually outside of the TNM model. The K-factors were also applied manually outside of the TNM model separately for each barrier height evaluated in the barrier analysis.

Table 5: Comparison of Measured and Predicted Sound Levels

Measurement Position	Measured Sound Level (dBA L_{eq})	Calculated Sound Level (dBA L_{eq}) *	K-factor (dB)	Representative Receivers
ST-06	62.2	56.6	5.6	M-030, M-031, M-032, M-033, M-034, M-035, M-036
ST-07	64.7	63.1	1.6	M-038, M-039, M-040, M-041, M-043, M-044, M-045, M-047, M-048
ST-08	61.1	55.2	5.9	M-049, M-050, M-051, M-052, M-053, M-054, M-056, M-058, M-060
ST-09	60.8	57.0	3.8	M-059, M-061, M-062
ST-10	60.9	58.5	2.4	M-063, M-064, M-066, M-067, M-068, M-069, M-071, M-072, M-074, M-076
ST-11	65.4	62.4	3.0	M-077, M-079, M-080, M-081, M-084, M-085, M-087
ST-12	62.5	63.8	-1.3	M-082, M-083, M-086, M-088, M-089, M-091, M-092, M-096
ST-13	67.6	64.6	3.0	M-090, M-093, M-094, M-095, M-097, M-099
ST-14	62.6	61.6	1.0	M-098, M-100, M-101, M-103, M-104, M-106, M-108, M-111, M-112, M-116, M-117
ST-15	57.4	58.7	-1.3	M-102, M-105, M-107, M-109, M-110, M-113, M-114, M-115
ST-16	70.0	67.7	2.3	M-125, M-126, M-127, M-128, M-132, M-133, M-135, M-139, M-142, M-145
ST-17	60.6	58.5	2.1	M-119, M-121, M-123, M-124, M-129, M-130, M-131, M-134, M-136, M-137, M-138
ST-18	61.7	60.8	0.9	M-148, M-150, M-152, M-153, M-158, M-161, M-162, M-164, M-166
ST-19	65.5	63.1	2.4	M-144, M-146, M-147, M-149, M-151, M-154, M-155, M-156, M-157, M-159, M-160, M-163
ST-20	63.0	62.6	0.4	M-167, M-168, M-169, M-170, M-172, M-173, M-174, M-175, M-177, M-180
ST-21	65.5	63.9	1.6	M-183, M-184, M-186, M-187, M-188, M-189, M-192, M-193, M-196, M-197
ST-22	66.6	64.5	2.1	M-190, M-191, M-194, M-195, M-198, M-199, M-202, M-204, M-208, M-209, M-210, M-211, M-212, M-213
ST-23	64.8	63.9	0.9	M-200, M-201, M-203, M-205, M-206, M-207

Note:
**Calculated sound levels were determined using TNM 2.5 noise model together with the traffic counts collected during noise measurement periods. Traffic count data collected during the measurements can be found in Tables C-1 through C-12 in Appendix C.*

The K-factors calculated for two sites, ST-06 and ST-08, are 5.6 and 5.9, respectively. These represent relatively high K-factors, with a difference of greater than 5 dBA between the predicted sound level and measured sound levels. Noise level measurements,

field surveys of existing features the TNM 2.5 model geometry, TNM 2.5 traffic data, and field measurement data were revisited and the area considered valid for these sites. Traffic counts were re-checked against the recorded videos. No inaccuracies in the TNM 2.5 model geometry or traffic data were identified, and field measurement data is considered valid for these sites. Therefore, the TNM 2.5 model was calibrated based upon the K-factors for sites ST-06 and ST-08. Site ST-06 is located behind two parallel sound walls of similar height (SW-10 and SW-11, shown in Figures 3-3 and 3-4). SW-10 consists of transparent barrier panels on top of a masonry block wall, however, TNM 2.5 does not account for differing barrier materials. Accordingly, the entire height of SW-10 (both the masonry block and transparent panels) was modeled the same. ST-08 is located along Riverside Drive, shielded by existing SW-11 and in close proximity to the Broadway Road overpass structure. While the calibration included the traffic volumes present on Broadway Road, the TNM 2.5 model did not account for potential reflections from the bridge deck and overpass structure.

Chapter 7. Future Noise Environment, Impacts, and Considered Abatement

This section discusses the predicted traffic noise level under existing and design year conditions (build and no-build), identifies traffic noise impacts, and considers noise abatement. The results of traffic noise impact and abatement analysis are contained in Table 6. This table includes the following for each modeled receiver:

- Location identifiers that corresponds to those used in Figures 5-1 through 5-13 (at the end of Chapter 7) of modeled receiver and measurement locations;
- Type of land use;
- Noise abatement category and criterion;
- Number of dwelling units represented by each modeled receiver, if applicable;
- Worst-hour noise levels for existing, design year no build, and design year build conditions;
- Change in noise levels including:
    - Design year No-Build Condition versus existing conditions, and
    - Design year Build Condition versus design year No-Build Condition; and
- Traffic noise impact conclusions ("approach or exceed NAC", "substantial increase", or both).

Predicted traffic noise levels and traffic noise impacts, if any, are discussed based on modeling results. If traffic noise impacts are identified, noise abatement is considered. A discussion of noise abatement options identified in 23 CFR 772 is provided. Typically, abatement in the form of sound walls is evaluated and discussed in detailed. The results of the noise barrier evaluation are also contained in Table 6. This table includes the following for each sound wall:

- Sound Wall identifiers that corresponds to those used in Figures 5-1 through 5-13 (at end of Chapter 7) of modeled sound wall locations;
- Predicted noise levels and insertion loss at different sound wall heights for all receivers shielded by the sound wall under evaluation;
- Number of benefitted receivers;

Table 6: Predicted Future 2040 Worst-Hour Noise Levels, Barrier Analysis & Insertion Loss

Receiver I.D.	Land Use [1]	Activity Category	NAC	Number of Dwelling Units	Existing Noise Level $L_{eq(h)}$, dBA	Future No Build $L_{eq(h)}$, dBA	Future Build $L_{eq(h)}$, dBA [2]	Impact Type	Sound wall No.	H = 6 ft		H = 8 ft		H = 10 ft		H = 12 ft		H = 14 ft		H = 16 ft		H = 18 ft		H = 20 ft		H = 22 ft		H = 24 ft	
										$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.
M-012 [a]	MFR	B	67	4	64.2	66.2	64.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-013 [a]	SFR	B	67	3	60.6	60.6	60.6	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-014 [a]	SFR	B	67	3	50.2	50.3	50.4	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-015 [a]	REC	C	67	3	70.4	70.6	70.9	A/E	SW-06 New	- -	- -	72.1	-1.2 [e]	71.5	-0.6 [e]	70.7	0.2	70.3	0.6	70	0.6	69.9	1.0	69.8	1.1	69.7	1.2	69.7	1.2
M-016 [a]	SFR	B	67	3	56.6	56.7	56.8	None	SW-06 New	- -	- -	56.8	0.0	56.8	0.0	56.7	0.1	56.7	0.1	56.6	0.1	56.6	0.2	56.5	0.3	56.4	0.4	56.3	0.5
M-017 [a]	SFR	B	67	5	54.1	54.2	54.3	None	SW-06 New	- -	- -	54.0	0.3	54.0	0.3	54	0.3	53.9	0.4	53.9	0.3	53.8	0.5	53.8	0.5	53.7	0.6	53.7	0.6
M-018 [a]	SFR	B	67	2	61.4	61.5	61.6	None	SW-06 New	- -	- -	61.4	0.2	61.4	0.2	61.5	0.1	61.5	0.1	61.4	0.1	61.3	0.3	61.1	0.5	61.0	0.6	60.8	0.8
M-019 [a]	REC	C	67	3	73.6	73.8	74.1	A/E	SW-06 New	- -	- -	73.9	0.2	73.8	0.3	73.8	0.3	73.8	0.3	73.8	0.0	73.8	0.3	73.7	0.4	73.7	0.4	73.7	0.4
M-020 [a]	SFR	B	67	1	69.8	70.0	70.0	A/E	SW-06 New	- -	- -	69.9	0.1	69.9	0.1	69.8	0.2	69.8	0.2	69.8	0.2	69.7	0.3	69.6	0.4	69.5	0.5	69.4	0.6
M-021 [a]	SFR	B	67	3	60.3	60.4	60.4	None	SW-06 New	- -	- -	60.4	0.0	60.4	0.0	60.3	0.1	60.4	0.0	60.3	0.1	60.2	0.2	60	0.4	59.6	0.8	58.7	1.7
M-022 [a]	SFR	B	67	2	61.7	61.8	62.0	None	SW-06 New	- -	- -	61.8	0.2	61.8	0.2	61.8	0.2	61.8	0.2	61.7	0.1	61.7	0.3	61.7	0.3	61.7	0.3	61.7	0.3
M-023 [a]	SFR	B	67	2	60.2	60.3	60.4	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-024 [a]	SFR	B	67	3	54.0	54.1	54.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-025 [a]	SFR	B	67	3	58.0	58.2	58.4	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-026 [a]	SFR	B	67	3	53.6	53.7	53.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-027 [a]	SFR	B	67	4	62.5	62.6	62.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-028 [b]	RET	F	N/A	0	72.3	72.4	73.1	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-029 [a]	SFR	B	67	3	58.2	58.3	58.4	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-030	SFR	B	67	2	65.5	65.6	65.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-031	SFR	B	67	4	61.3	61.4	61.7	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-032	SFR	B	67	2	64.3	64.4	64.7	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-033	SFR	B	67	3	61.1	61.3	61.6	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-034	SFR	B	67	3	63.5	63.6	64.0	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-035	SFR	B	67	4	61.4	61.5	61.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-036	SFR	B	67	3	61.4	61.5	61.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-037 [b]	RET	F	N/A	0	73.7	73.7	74.1	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-038	SFR	B	67	1	64.6	64.7	65.1	None	SW-11 New	- -	- -	68.0	-2.9 [d]	68.0	-2.9 [d]	66.7	-1.6 [d]	65.8	-0.7 [d]	64.9	-0.2 [d]	64.2	0.9	63.5	1.6	62.9	2.2	62.4	2.7
M-039	SFR	B	67	4	57.9	58.0	58.3	None	SW-11 New	- -	- -	60.5	-2.2 [d]	60.8	-2.5 [d]	60.0	-1.7 [d]	59.3	-1.0 [d]	58.2	-0.2 [d]	57.3	1.0	56.9	1.4	56.4	1.9	56.3	2.0
M-040	SFR	B	67	2	60.8	61.0	61.3	None	SW-11 New	- -	- -	64.7	-3.4 [d]	64.4	-3.1 [d]	63.2	-1.9 [d]	62.2	-0.9 [d]	61.1	-0.1 [d]	60.5	0.8	60.2	1.1	59.7	1.6	59.4	1.9
M-041	SFR	B	67	3	66.7	66.9	67.2	A/E	SW-11 New	- -	- -	72.1	-4.9 [d]	70.6	-3.4 [d]	69.1	-1.9 [d]	68.0	-0.8 [d]	67.0	-0.1 [d]	66.2	1.0	65.5	1.7	64.7	2.5	64.1	3.1
M-042 [b]	PKG	E	72	0	76.4	76.4	76.3	A/E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-043	SFR	B	67	4	65.8	65.9	66.2	A/E	SW-11 New	- -	- -	70.6	-4.4 [d]	68.8	-2.6 [d]	67.8	-1.6 [d]	66.7	-0.5 [d]	66.0	-0.1 [f]	65.0	1.2	64.5	1.7	63.9	2.3	63.0	3.2
M-044	SFR	B	67	4	56.9	57.0	57.4	None	SW-11 New	- -	- -	59.4	-2.0 [d]	59.4	-2.0 [d]	59.0	-1.6 [d]	58.0	-0.6 [d]	56.9	0.1	56.5	0.9	56.4	1.0	56.9	0.5	57.5	-0.1 [f]
M-045	SFR	B	67	1	67.5	67.5	68.3	A/E	SW-11 New	- -	- -	72.2	-3.9 [d]	70.8	-2.5 [d]	69.5	-1.2 [d]	68.7	-0.4 [d]	67.9	-0.4 [f]	67.4	0.9	66.9	1.4	66.4	1.9	66.1	2.2
M-046 [b]	MOT	E	72	2	69.7	69.6	69.7	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-047	SFR	B	67	1	65.3	65.2	66.7	A/E	SW-11 New	- -	- -	69.6	-2.9 [e]	68.7	-2.0 [e]	67.9	-1.2 [e]	67.4	-0.7 [e]	66.9	-1.7 [f]	66.6	0.1	66.4	0.3	66.2	0.5	66.0	0.7
M-048	SFR	B	67	1	61.7	61.6	63.1	None	SW-11 New	- -	- -	65.3	-2.2 [e]	64.7	-1.6 [e]	64.1	-1.0 [e]	63.7	-0.6 [e]	63.3	-1.7 [f]	63.0	0.1	62.8	0.3	62.6	0.5	62.4	0.7
M-049	SFR	B	67	1	67.9	67.6	69.4	A/E	SW-11 New	- -	- -	72.7	-3.3 [e]	72.2	-2.8 [e]	71.7	-2.3 [e]	71.4	-2.0 [e]	71.1	-1.7 [f]	70.9	-1.5 [f]	70.7	-1.3 [f]	70.6	-1.2 [f]	70.5	-1.1 [f]
M-050	SFR	B	67	2	69.5	69.2	71.1	A/E	SW-11 New	- -	- -	74.8	-3.7 [e]	74.3	-3.2 [e]	73.9	-2.8 [e]	73.6	-2.5 [e]	73.4	-2.3 [f]	73.3	-2.2 [f]	73.1	-2.0 [f]	73.0	-1.9 [f]	73.0	-1.9 [f]
M-051	SFR	B	67	2	70.7	70.5	71.0	A/E	SW-11 New	- -	- -	74.4	-3.4 [e]	73.6	-2.6 [e]	73.1	-2.1 [e]	72.6	-1.6 [e]	72.3	-1.3 [f]	72.0	-1.0 [f]	71.7	-0.7 [f]	71.5	-0.5 [f]	71.4	-0.4 [f]
M-052	SFR	B	67	3	68.7	68.4	68.7	A/E	SW-11 New	- -	- -	71.5	-2.8 [e]	70.3	-1.6 [e]	69.4	-0.7 [e]	68.7	0.0	67.9	0.8	67.4	1.3	66.9	1.8	66.1	2.6	65.6	3.1
M-053	SFR	B	67	2	68.0	67.7	68.1	A/E	SW-11 New	- -	- -	70.7	-2.6 [e]	69.6	-1.5 [e]	68.4	-0.3 [e]	67.9	0.2	67.0	1.1	66.3	1.8	65.9	2.2	65.8	2.3	65.5	2.6
M-054	SFR	B	67	10	56.0	56.0	56.3	None	SW-11 New	- -	- -	56.2	0.1	56.1	0.2	55.9	0.4	55.4	0.9	54.9	1.4	54.5	1.8	54.0	2.3	53.5	2.8	53.2	3.1
M-055 [b]	OFF	E	72	0	69.0	69.0	69.2	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-056	SFR	B	67	3	69.9	69.5	69.6	A/E	SW-11 New	- -	- -	72.0	-2.4 [e]	71.3	-1.7 [e]	70.6	-1.0 [e]	69.7	-0.1 [e]	69.2	0.4	68.7	0.9	68.3	1.3	68.1	1.5	67.8	1.8
M-057 [c]	INST	C	67	4	77.3	77.2	77.5	A/E	SW-A New	68.8	8.7	67.3	10.2	66.1	11.4	65.0	12.5	64.2	13.3	63.5	14.0	62.9	14.6	62.2	15.3	61.7	15.8	61.4	16.1
M-058	SFR	B	67	2	67.4	67.2	67.5	A/E	SW-11 New	- -	- -	69.7	-2.2 [e]	68.7	-1.2 [e]	67.8	-0.3 [e]	66.7	0.8	66.0	1.5	65.5	2.0	64.9	2.6	64.5	3.0	64.1	3.4
M-059	SFR	B	67	2	67.8	68.0	68.2	A/E	SW-15b New	- -	- -	- -	- -	- -	- -	- -	- -	68.0	0.2	68.0	0.2	68.0	0.2	68.0	0.2	68.0	0.2	68.0	0.2
M-060	SFR	B	67	3	67.6	67.5	67.8	A/E	SW-11 New	- -	- -	68.0	-0.2 [d]	67.7	0.1	67.2	0.6	66.7	1.1	66.3	1.5	65.8	2.0	65.4	2.4	64.9	2.9	64.6	3.2

Table 6: Predicted Future 2040 Worst-Hour Noise Levels, Barrier Analysis & Insertion Loss

Receiver I.D.	Land Use [1]	Activity Category	NAC	Number of Dwelling Units	Existing Noise Level $L_{eq(h)}$, dBA	Future No Build $L_{eq(h)}$, dBA	Future Build $L_{eq(h)}$, dBA [2]	Impact Type	Sound wall No.	H = 6 ft		H = 8 ft		H = 10 ft		H = 12 ft		H = 14 ft		H = 16 ft		H = 18 ft		H = 20 ft		H = 22 ft		H = 24 ft	
										$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.
M-061	SFR	B	67	5	58.8	59.1	59.1	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-062	SFR	B	67	2	65.2	65.2	65.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-063	SFR	B	67	4	55.9	56.0	56.0	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-064	SFR	B	67	4	60.1	60.0	60.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-065 [b]	OFF	E	72	0	69.3	69.3	69.2	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-066	SFR	B	67	4	57.6	57.6	57.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-067	SFR	B	67	6	64.4	64.4	64.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-068	SFR	B	67	3	59.5	59.6	59.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-069	SFR	B	67	2	63.4	63.4	63.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-070 [b]	OFF	E	72	0	71.0	71.2	71.1	A/E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-071	SFR	B	67	2	57.7	57.8	58.1	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-072	SFR	B	67	2	56.7	56.8	57.2	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	57.0	0.2	56.8	0.4	57.2	0.0	56.3	0.9	56.2	1.0	56.2	1.0
M-073 [b]	SFR	B	67	2	58.5	58.7	58.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-074	SFR	B	67	3	55.2	55.4	55.6	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	54.9	0.7	54.6	1.0	54.5	1.1	54.1	1.5	53.9	1.7	54.0	1.6
M-075 [b]	RET	F	N/A	0	60.8	60.9	60.9	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-076	SFR	B	67	4	63.5	63.5	63.9	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	64.4	-0.5 [e]	63.7	0.2	63.2	0.7	62.7	1.2	62.3	1.6	62.0	1.9
M-077	SFR	B	67	1	67.1	67.1	67.5	A/E	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	68.1	-0.6 [e]	67.3	0.2	66.6	0.9	65.5	2.0	64.8	2.7	64.2	3.3
M-078 [b]	COM	E	72	0	66.9	67.0	67.0	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-079	SFR	B	67	3	58.7	58.8	59.1	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	59.0	0.1	58.6	0.5	57.6	1.5	57.1	2.0	56.7	2.4	56.4	2.7
M-080	SFR	B	67	4	62.4	62.6	62.8	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	62.9	-0.1 [e]	62.9	-0.1 [e]	62.7	0.1	62.6	0.2	62.4	0.4	62.2	0.6
M-081	SFR	B	67	1	57.2	57.3	57.7	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	57.6	0.1	57.2	0.5	57.4	0.3	56.8	0.9	56.3	1.4	55.9	1.8
M-082	SFR	B	67	2	54.8	54.8	55.1	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-083	SFR	B	67	1	62.1	62.2	62.5	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-084	SFR	B	67	2	67.5	67.7	68.1	A/E	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	68.3	-0.2 [e]	67.4	0.7	66.7	1.4	66.0	2.1	65.4	2.7	64.9	3.2
M-085	SFR	B	67	2	57.4	57.6	57.9	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	57.9	0.0	57.4	0.5	56.9	1.0	56.5	1.4	56.5	1.4	56.6	1.3
M-086	MFR	B	67	2	58.4	58.5	58.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-087	SFR	B	67	4	66.1	66.3	66.6	A/E	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	66.8	-0.2 [e]	66.6	0.0	66.6	0.0	66.3	0.3	66.1	0.5	65.9	0.7
M-088	SFR	B	67	2	64.1	64.3	64.7	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-089	SFR	B	67	3	59.7	59.9	59.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-090	SFR	B	67	2	68.5	68.6	69.0	A/E	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	69.7	-0.7 [e]	68.6	0.4	67.9	1.1	66.8	2.2	66.1	2.9	65.6	3.4
M-091	INST	C	67	1	50.0	50.2	50.6	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-092	REC	C	67	1	49.9	50.1	50.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-093	SFR	B	67	5	59.7	59.9	60.2	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	60.2	0.0	59.5	0.7	59.1	1.1	58.8	1.4	58.9	1.3	58.5	1.7
M-094	SFR	B	67	4	60.8	61.0	61.3	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	61.4	-0.1 [e]	60.8	0.5	60.2	1.1	59.9	1.4	59.6	1.7	59.3	2.0
M-095	SFR	B	67	2	65.6	65.7	66.1	A/E	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	66.2	-0.1 [e]	65.5	0.6	65.8	0.3	65.4	0.7	64.9	1.2	64.4	1.7
M-096	SFR	B	67	2	60.1	60.3	60.7	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-097	SFR	B	67	2	68.8	69.0	69.3	A/E	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	69.5	-0.2 [e]	68.5	0.8	67.8	1.5	67.0	2.3	66.4	2.9	65.9	3.4
M-098	MFR	B	67	1	63.1	63.4	63.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-099	SFR	B	67	5	65.5	65.7	66.0	A/E	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	66.0	0.0	65.4	0.6	64.7	1.3	64.2	1.8	63.7	2.3	63.2	2.8
M-100	SFR	B	67	2	64.3	64.7	65.0	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-101	MFR	B	67	2	59.6	59.9	60.2	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table 6: Predicted Future 2040 Worst-Hour Noise Levels, Barrier Analysis & Insertion Loss

Receiver I.D.	Land Use [1]	Activity Category	NAC	Number of Dwelling Units	Existing Noise Level $L_{eq(h)}$, dBA	Future No Build $L_{eq(h)}$, dBA	Future Build $L_{eq(h)}$, dBA [2]	Impact Type	Sound wall No.	H = 6 ft		H = 8 ft		H = 10 ft		H = 12 ft		H = 14 ft		H = 16 ft		H = 18 ft		H = 20 ft		H = 22 ft		H = 24 ft	
										$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.
M-102	SFR	B	67	4	56.1	56.3	56.7	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	56.7	0.0	56.4	0.3	56.2	0.5	56.1	0.6	55.9	0.8	55.8	0.9
M-103	MFR	B	67	1	57.4	57.7	58.0	None	SW-16b New	58.1	-0.1 [e]	58	0.0	57.9	0.1	57.8	0.2	57.7	0.3	57.7	0.3	57.7	0.3	57.6	0.4	57.6	0.4	57.6	0.4
M-104	MFR	B	67	1	64.5	64.8	65.1	None	SW-16b New	66.5	-1.4 [e]	65.5	-0.4 [e]	64.9	0.2	64.3	0.8	63.8	1.3	63.5	1.6	63.0	2.1	62.7	2.4	62.5	2.6	62.5	2.6
M-105	SFR	B	67	4	59.0	59.1	59.4	None	SW-15a New	- -	- -	- -	- -	- -	- -	- -	- -	59.4	0.0	59.3	0.1	59.1	0.3	59.1	0.3	59.0	0.4	58.9	0.5
M-106	MFR	B	67	2	65.4	65.7	66.0	A/E	SW-16b New	66.8	-0.8 [e]	66	0.0	65.4	0.6	64.8	1.2	64.4	1.6	63.9	2.1	63.5	2.5	63.0	3.0	62.7	3.3	62.7	3.3
M-107	SFR	B	67	3	55.1	55.2	55.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-108	MFR	B	67	1	66.0	66.3	66.5	A/E	SW-16b New	67.1	-0.6 [e]	66.5	0.0	66	0.5	65.6	0.9	65.2	1.3	65.0	1.5	64.7	1.8	64.5	2.0	64.3	2.2	64.3	2.2
M-109	SFR	B	67	2	59.2	59.3	59.6	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-110	SFR	B	67	2	56.7	56.8	57.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-111	MFR	B	67	1	59.3	59.7	59.9	None	SW-16b New	60.4	-0.5 [e]	59.4	0.5	57.9	2.0	57.3	2.6	56.9	3.0	56.6	3.3	56.4	3.5	56.2	3.7	56.1	3.8	56.1	3.8
M-112	MOT	E	72	1	68.5	68.9	69.0	None	SW-16b New	69.1	-0.1 [e]	69	0.0	68.9	0.1	68.8	0.2	68.7	0.3	68.6	0.4	68.6	0.4	68.5	0.5	68.5	0.5	68.5	0.5
M-113	SFR	B	67	2	56.6	56.8	57.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-114	SFR	B	67	3	63.1	63.3	63.5	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-115	GAS	F	N/A	0	67.6	67.9	68.1	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-116	SFR	B	67	2	63.4	63.7	63.8	None	SW-16b New	63.8	0.0	63.8	0.0	63.7	0.1	63.7	0.1	63.7	0.1	63.7	0.1	63.7	0.1	63.7	0.1	63.7	0.1	63.7	0.1
M-117	RET	F	N/A	0	70.5	70.8	70.9	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-118 [b]	COM	E	72	0	71.1	71.3	71.4	A/E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-119	MFR	B	67	3	68.7	69.0	69.0	A/E	SW-19, SW-20 New	--	--	--	--	--	--	69	0.0	69.0	0.0	69.0	0.0	69.0	0.0	69.0	0.0	68.9	0.1	68.9	0.1
M-120 [b]	GAS	F	N/A	0	75.8	76.1	76.2	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-121	MFR	B	67	2	68.4	68.7	68.8	A/E	SW-19, SW-20 New	--	--	--	--	--	--	68.8	0.0	68.7	0.1	68.7	0.1	68.7	0.1	68.7	0.1	68.7	0.1	68.7	0.1
M-122 [b]	GAS	F	N/A	0	77.3	77.6	77.7	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-123	SFR	B	67	2	66.8	66.9	67.6	A/E	SW-19, SW-20 New	--	--	--	--	--	--	67.6	0.0	67.0	0.6	66.6	1.0	66.3	1.3	66.1	1.5	65.9	1.7	65.8	1.8
M-124	SFR	B	67	4	62.9	63.1	63.4	None	SW-19, SW-20 New	--	--	--	--	--	--	63.3	0.1	62.7	0.7	62.2	1.2	62.9	0.5	62.2	1.2	61.8	1.6	61.8	1.6
M-125	MFR	B	67	4	68.1	68.4	68.4	A/E	SW-C New	66.9	1.5	66.8	1.6	66.7	1.7	66.7	1.7	66.6	1.8	66.6	1.8	66.6	1.8	66.6	1.8	66.6	1.8	66.5	1.9
M-126	SFR	B	67	1	60.6	60.8	61.4	None	SW-C New	61.1	0.3	61.1	0.3	60.9	0.5	60.7	0.7	60.4	1.0	60.1	1.3	59.8	1.6	59.5	1.9	59.3	2.1	59.0	2.4
M-127	MFR	B	67	4	58.7	58.9	59.2	None	SW-C New	58.1	1.1	57.9	1.3	57.8	1.4	57.7	1.5	57.6	1.6	57.5	1.7	57.4	1.8	57.3	1.9	57.2	2.0	57.2	2.0
M-128	MFR	B	67	4	68	68.2	68.4	A/E	SW-C New	67.4	1.0	67.3	1.1	67.2	1.2	67.2	1.2	67.2	1.2	67.2	1.2	67.1	1.3	67.1	1.3	67.1	1.3	67.1	1.3
M-129	SFR	B	67	3	70.0	70.1	70.6	A/E	SW-19, SW-20 New	--	--	--	--	--	--	70.6	0.0	70.1	0.5	69.8	0.8	69.6	1.0	69.4	1.2	69.3	1.3	69.2	1.4
M-130	SFR	B	67	3	57.2	57.4	57.6	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-131	SFR	B	67	4	58.1	58.3	58.8	None	SW-19, SW-20 New	--	--	--	--	--	--	58.3	0.5	58.6	0.2	58.9	-0.1 [f]	59.1	-0.3 [f]	59.1	-0.3 [f]	58.9	-0.1 [f]	58.9	-0.1 [f]
M-132	SFR	B	67	4	63.6	63.7	64.2	None	SW-C New	63.7	0.5	63.5	0.7	63.1	1.1	62.7	1.5	62.6	1.6	62.5	1.7	62.5	1.7	62.4	1.8	62.4	1.8	62.4	1.8
M-133	SFR	B	67	5	52.8	53	53.4	None	SW-C New	51.8	1.6	51.5	1.9	51.0	2.4	50.7	2.7	50.5	2.9	50.3	3.1	50.2	3.2	50.0	3.4	49.9	3.5	49.8	3.6
M-134	SFR	B	67	1	67.0	67.0	67.9	A/E	SW-19, SW-20 New	--	--	--	--	--	--	68	-0.1 [e]	66.7	1.2	66.0	1.9	65.2	2.7	64.1	3.8	63.6	4.3	63.5	4.4
M-135	SFR	B	67	2	71.1	71.4	71.4	A/E	SW-C New	71.0	0.4	71.0	0.4	70.9	0.5	70.8	0.6	70.8	0.6	70.8	0.6	70.8	0.6	70.8	0.6	70.7	0.7	70.7	0.7
M-136	SFR	B	67	3	58.8	58.9	59.4	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-137	SFR	B	67	4	64.3	64.5	64.7	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-138	SFR	B	67	5	61.7	61.8	62.2	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-139	SFR	B	67	2	55.9	56	56.5	None	SW-C New	55.1	1.4	54.8	1.7	54.4	2.1	54.3	2.2	54.1	2.4	54.0	2.5	53.9	2.6	53.9	2.6	53.8	2.7	53.8	2.7
M-140 [b]	IND	F	N/A	0	68.4	68.6	68.6	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-141 [b]	IND	F	N/A	0	70.8	71.0	71.6	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-142	SCH	C	67	2	60.0	60.2	60.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-143 [b]	IND	F	N/A	0	63.0	63.1	63.1	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

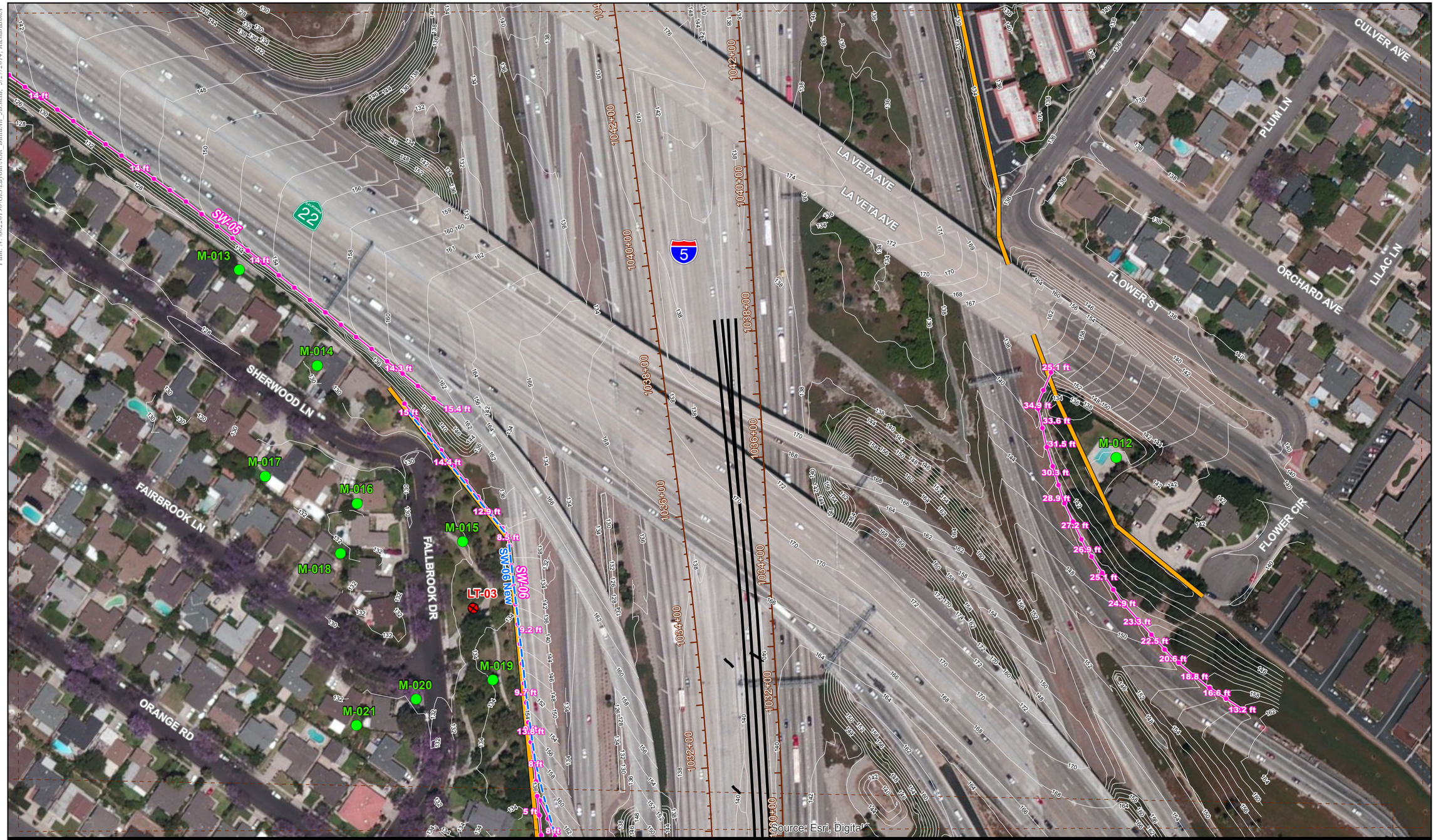
Table 6: Predicted Future 2040 Worst-Hour Noise Levels, Barrier Analysis & Insertion Loss

Receiver I.D.	Land Use [1]	Activity Category	NAC	Number of Dwelling Units	Existing Noise Level $L_{eq(h)}$, dBA	Future No Build $L_{eq(h)}$, dBA	Future Build $L_{eq(h)}$, dBA [2]	Impact Type	Sound wall No.	H = 6 ft		H = 8 ft		H = 10 ft		H = 12 ft		H = 14 ft		H = 16 ft		H = 18 ft		H = 20 ft		H = 22 ft		H = 24 ft	
										$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.
M-144	SFR	B	67	2	57.3	57.3	57.5	None	SW-22 New	- -	- -	- -	- -	- -	- -	57.4	0.1	56.9	0.6	56.7	0.8	57.5	0.0	56.9	0.6	56.5	1.0	56.1	1.4
M-145	SCH	C	67	2	53.5	53.6	53.8	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-146	IND	F	N/A	0	69.3	69.5	69.7	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-147	SFR	B	67	2	61.3	61.3	61.6	None	SW-22 New	- -	- -	- -	- -	- -	- -	61.1	0.5	60.7	0.9	60.3	1.3	60.2	1.4	59.6	2.0	59.2	2.4	59.0	2.6
M-148	SFR	B	67	1	69.4	69.5	69.4	A/E	SW-E New	65.9	3.5	65.0	4.4	64.4	5.0	64.0	5.4	64.0	5.4	63.9	5.5	63.7	5.7	63.5	5.9	63.3	6.1	63.1	6.3
M-149	SFR	B	67	2	66.2	66.2	66.5	A/E	SW-22 New	- -	- -	- -	- -	- -	- -	66.6	-0.1 [e]	65.8	0.7	65.1	1.4	64.4	2.1	63.8	2.7	63.1	3.4	62.5	4.0
M-150	IND	F	N/A	0	56.6	56.7	56.9	N/A	SW-E New	56.7	0.2	56.7	0.2	56.9	0.0	56.7	0.2	56.8	0.1	56.8	0.1	56.9	0.0	56.8	0.1	56.7	0.2	56.7	0.2
M-151	SFR	B	67	5	60.4	60.5	60.9	None	SW-22 New	--	--	--	--	--	--	60.5	0.4	60.7	0.2	60.3	0.6	59.6	1.3	59.3	1.6	59.0	1.9	58.8	2.1
M-152	SFR	B	67	1	63.6	63.7	63.5	None	SW-E New	60.0	3.5	59.4	4.1	59.2	4.3	59.2	4.3	59.2	4.3	59.0	4.5	59.0	4.5	58.7	4.8	58.8	4.7	59.2	4.3
M-153	SFR	B	67	1	59.9	60.0	60.2	None	SW-E New	60.1	0.1	60.0	0.2	59.8	0.4	59.6	0.6	59.6	0.6	60.1	0.1	59.7	0.5	59.4	0.8	59.3	0.9	59.5	0.7
M-154	SFR	B	67	2	61.2	61.3	61.5	None	SW-22 New	--	--	--	--	--	--	61.8	-0.3 [e]	61.5	0.0	60.7	0.8	59.8	1.7	59.4	2.1	59.0	2.5	58.6	2.9
M-155	SFR	B	67	2	60.8	60.9	61.0	None	SW-22 New	--	--	--	--	--	--	60.5	0.5	60.6	0.4	60.6	0.4	60.9	0.1	60.8	0.2	60.3	0.7	59.9	1.1
M-156	SFR	B	67	2	67.5	67.5	67.9	A/E	SW-22 New	--	--	--	--	--	--	69.6	-1.7 [e]	68.4	-0.5 [e]	67.4	0.5	66.6	1.3	65.8	2.1	65.1	2.8	64.4	3.5
M-157	SFR	B	67	2	63.5	63.5	63.7	None	SW-22 New	--	--	--	--	--	--	63.7	0.0	63.4	0.3	63.2	0.5	62.9	0.8	62.8	0.9	62.6	1.1	62.5	1.2
M-158	SFR	B	67	2	55.8	55.9	55.9	None	SW-E New	54.2	1.7	53.7	2.2	53.3	2.6	52.9	3.0	52.5	3.4	52.1	3.8	51.7	4.2	51.5	4.4	51.2	4.7	51.1	4.8
M-159	SFR	B	67	2	66.4	66.5	66.8	A/E	SW-22 New	--	--	--	--	--	--	68.4	-1.6 [e]	67.3	-0.5 [e]	66.7	0.1	66.3	0.5	66.1	0.7	65.7	1.1	65.3	1.5
M-160	SFR	B	67	2	66.9	67.0	67.2	A/E	SW-22 New	--	--	--	--	--	--	67.2	0.0	66.9	0.3	66.7	0.5	66.5	0.7	66.4	0.8	66.3	0.9	66.2	1.0
M-161	SFR	B	67	2	66.1	66.2	66.3	A/E	SW-E New	62.3	4.0	61.5	4.8	60.9	5.4	61.1	5.2	61.1	5.2	60.9	5.4	60.4	5.9	59.9	6.4	59.4	6.9	59.1	7.2
M-162	SFR	B	67	2	58.6	58.7	59.0	None	SW-E New	59.6	-0.6 [f]	59.7	-0.7 [f]	59.2	-0.2 [f]	59.0	0.0	59.9	-0.9 [f]	59.9	-0.9 [f]	59.6	-0.6 [f]	59.2	-0.2 [f]	58.9	0.1	58.7	0.3
M-163	SFR	B	67	2	69.5	69.6	69.8	A/E	SW-22 New	--	--	--	--	--	--	69.9	-0.1 [e]	69.6	0.2	69.3	0.5	69.1	0.7	69.0	0.8	68.8	1.0	68.7	1.1
M-164	SFR	B	67	2	57.4	57.6	57.7	None	SW-E New	57.5	0.2	57.3	0.4	57.3	0.4	57.4	0.3	57.8	-0.1	57.7	0.0	57.6	0.1	57.3	0.4	57.1	0.6	56.9	0.8
M-165 [b]	COM	E	72	2	73.1	73.1	73.2	A/E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-166	MFR	B	67	3	53.0	52.5	52.6	None	SW-E New	52.4	0.2	52.3	0.3	52.3	0.3	52.2	0.4	52.1	0.5	52.1	0.5	52.0	0.6	52.0	0.6	51.8	0.8	51.8	0.8
M-167	SFR	B	67	2	55.0	55.1	55.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-168	REC	C	67	2	59.2	59.3	59.5	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-169	REC	C	67	4	51.5	51.6	52.0	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-170	SFR	B	67	2	54.4	54.5	54.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-171 [b]	VAC	G	N/A	0	73.2	73.2	73.7	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-172	SFR	B	67	2	55.7	55.9	56.2	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-173	SFR	B	67	2	59.6	59.7	59.9	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-174	SFR	B	67	2	62.8	62.9	63.1	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-175	SFR	B	67	5	58.9	59.1	59.3	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-176 [b]	VAC	G	N/A	0	71.1	69.3	69.5	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-177	SFR	B	67	5	60.6	60.8	61.0	None	SW-25 New	--	--	--	--	61.4	-0.4 [e]	60.8	0.2	60.7	0.3	60.5	0.5	60.2	0.8	60.1	0.9	60	1.0	59.9	1.1
M-178 [b]	COM	E	72	0	75.2	74.9	75.0	A/E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-179 [b]	REC	C	67	4	74.3	72.8	72.9	A/E	SW-D New	68.7	4.2	67.2	5.7	65.9	7.0	65.2	7.7	64.4	8.5	64.0	8.9	63.6	9.3	63.3	9.6	63.0	9.9	62.8	10.1
M-179 [b]	REC	C	67	4	74.3	72.8	72.9	A/E	SW-F New	72.0	0.9	71.9	1.0	71.9	1.0	71.8	1.1	71.7	1.2	71.7	1.2	71.7	1.2	71.7	1.2	71.7	1.2	71.6	1.3
M-180	SFR	B	67	4	57.2	57.4	57.5	None	SW-25 New	--	--	--	--	57.5	0.0	57.2	0.3	56.9	0.6	56.9	0.6	56.7	0.8	56.6	0.9	56.5	1.0	56.4	1.1
M-181 [b]	RET	F	N/A	0	74.9	75.1	75.4	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-182 [b]	PKG	E	72	0	69.2	69.3	69.5	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-182 [b]	PKG	E	72	0	69.2	69.3	69.5	None	SW-F New	68.9	0.6	68.8	0.7	68.8	0.7	68.7	0.8	68.7	0.8	68.7	0.8	68.7	0.8	68.6	0.9	68.6	0.9	68.6	0.9
M-183	SFR	B	67	3	60.9	61.1	61.4	None	SW-25 New	--	--	--	--	62.2	-0.8 [e]	60.9	0.5	60.1	1.3	59.5	1.9	59	2.4	58.5	2.9	58.1	3.3	57.7	3.7
M-184	SFR	B	67	4	59.4	59.5	59.8	None	SW-25 New	--	--	--	--	60.0	-0.2 [e]	59.3	0.5	58.9	0.9	58.3	1.5	57.8	2.0	57.3	2.5	56.9	2.9	56.6	3.2
M-185 [b]	REC	C	67	3	67.9	66.7	66.9	A/E	SW-D New	65.2	1.7	64.5	2.4	63.8	3.1	63.0	3.9	62.5	4.4	62.0	4.9	61.6	5.3	61.3	5.6	60.8	6.1	60.6	6.3
M-185 [b]	REC	C	67	3	67.9	66.7	66.9	A/E	SW-F New	65.1	1.8	65.0	1.9	64.8	2.1	64.6	2.3	64.5	2.4	64.4	2.5	64.3	2.6	64.3	2.6	64.2	2.7	64.2	2.7
M-186	SFR	B	67	1	66.4	66.5	66.6	A/E	SW-25 New	--	--	--	--	67.0	-0.4 [e]	66.3	0.3	65.6	1.0	65	1.6	64.4	2.2	63.9	2.7	63.5	3.1	63.1	3.5
M-187	SFR	B	67	4	59.1	59.3	59.5	None	SW-25 New	--	--	--	--	59.8	-0.3 [e]	59.4	0.1	59.2	0.3	58.8	0.7	58.4	1.1	58	1.5	57.6	1.9	57.3	2.2
M-188	SFR	B	67	3	54.1	54.2	54.3	None	SW-25 New	--	--	--	--	54.7	-0.4 [e]	54.3	0.0	54.1	0.2	53.9	0.4	53.7	0.6	53.5	0.8	53.4	0.9	53.3	1.0
M-189	SFR	B	67	2	66.2	66.5	66.5	A/E	SW-26 New	--	--	--	--	--	--	66.6	-0.1 [e]	65.9	0.6	65.3	1.2	64.7	1.8	64.2	2.3	63.7	2.8	63.3	3.2
M-190	SFR	B	67	2	65.8	66.1	66.2	A/E	SW-26 New	--	--	--	--	--	--	66.2	0.0	65.6	0.6	65.2	1.0	64.9	1.3	64.6	1.6	64.4	1.8	64.2	2.0
M-191	VAC	G	N/A	0	67.4	67.7	68.0	N/A	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table 6: Predicted Future 2040 Worst-Hour Noise Levels, Barrier Analysis & Insertion Loss

Receiver I.D.	Land Use [1]	Activity Category	NAC	Number of Dwelling Units	Existing Noise Level $L_{eq(h)}$, dBA	Future No Build $L_{eq(h)}$, dBA	Future Build $L_{eq(h)}$, dBA [2]	Impact Type	Sound wall No.	H = 6 ft		H = 8 ft		H = 10 ft		H = 12 ft		H = 14 ft		H = 16 ft		H = 18 ft		H = 20 ft		H = 22 ft		H = 24 ft	
										$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.	$L_{eq}(h)$	I.L.
M-192	SFR	B	67	2	65.2	65.3	65.5	None	SW-25 New	--	--	--	--	66.2	-0.7 [e]	65.3	0.2	64.5	1.0	63.9	1.6	63.3	2.2	62.8	2.7	62.3	3.2	61.9	3.6
M-193	SFR	B	67	1	66.6	66.7	66.9	A/E	SW-25 New	--	--	--	--	67.3	-0.4 [e]	66.5	0.4	65.7	1.2	65	1.9	64.4	2.5	63.8	3.1	63.3	3.6	62.7	4.2
M-194	SFR	B	67	2	67.7	68.0	68.2	A/E	SW-26 New	--	--	--	--	--	--	68.5	-0.3 [e]	67.6	0.6	66.9	1.3	66.1	2.1	65.6	2.6	65	3.2	64.4	3.8
M-195	SFR	B	67	4	58.8	58.8	58.9	None	SW-25 New	--	--	--	--	59.2	-0.3 [e]	58.9	0.0	58.8	0.1	58.7	0.2	58.6	0.3	58.5	0.4	58.4	0.5	58.4	0.5
M-196	SFR	B	67	5	61.3	61.5	61.7	None	SW-26 New	--	--	--	--	--	--	61.7	0.0	60.9	0.8	60.7	1.0	60.3	1.4	59.8	1.9	59.4	2.3	59	2.7
M-197	SFR	B	67	3	59.7	59.8	60.0	None	SW-25 New	--	--	--	--	60.8	-0.8 [e]	60.1	-0.1 [e]	59.7	0.3	59.5	0.5	59.4	0.6	59.2	0.8	58.9	1.1	58.8	1.2
M-198	SFR	B	67	2	67.0	67.3	67.6	A/E	SW-26 New	--	--	--	--	--	--	67.9	-0.3 [e]	66.9	0.7	66.2	1.4	65.4	2.2	64.8	2.8	64.2	3.4	63.6	4.0
M-199	SFR	B	67	8	61.2	61.4	61.6	None	SW-26 New	--	--	--	--	--	--	61.6	0.0	60.6	1.0	60.1	1.5	59.6	2.0	59.2	2.4	58.9	2.7	58.5	3.1
M-200	SFR	B	67	3	61.4	61.5	61.7	None	SW-25 New	--	--	--	--	62.3	-0.6 [e]	61.8	-0.1 [e]	61.5	0.2	61.2	0.5	61	0.7	60.8	0.9	60.6	1.1	60.4	1.3
M-201	SFR	B	67	5	60.5	60.6	60.9	None	SW-25 New	--	--	--	--	61.6	-0.7 [e]	61.1	-0.2 [e]	60.8	0.1	60.5	0.4	60.2	0.7	60	0.9	59.8	1.1	59.6	1.3
M-202	REC	C	67	6	68.0	68.3	68.6	A/E	SW-26 New	--	--	--	--	--	--	69.1	-0.5 [e]	68.2	0.4	67.3	1.3	66.6	2.0	65.9	2.7	65.3	3.3	64.8	3.8
M-203	SFR	B	67	2	65.6	65.6	65.8	None	SW-25 New	--	--	--	--	66.1	-0.3 [e]	65.9	-0.1 [e]	65.7	0.1	65.6	0.2	65.5	0.3	65.4	0.4	65.3	0.5	65.3	0.5
M-204	SFR	B	67	6	57.7	57.9	58.1	None	SW-26 New	--	--	--	--	--	--	58.6	-0.5 [e]	57.4	0.7	56.7	1.4	56.1	2.0	55.6	2.5	55.2	2.9	54.8	3.3
M-205	SFR	B	67	3	58.3	58.4	58.5	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-206	SFR	B	67	3	55.5	55.6	55.7	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-207	SFR	B	67	3	65.3	65.3	65.4	None	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
M-208	SFR	B	67	6	59.3	59.5	59.7	None	SW-26 New	--	--	--	--	--	--	60.2	-0.5 [e]	59.2	0.5	58.3	1.4	57.7	2.0	57.1	2.6	56.6	3.1	56.1	3.6
M-209	SFR	B	67	1	67.2	67.5	67.7	A/E	SW-26 New	--	--	--	--	--	--	68.5	-0.8 [e]	67.8	-0.1 [e]	66.9	0.8	66.2	1.5	65.6	2.1	65	2.7	64.5	3.2
M-210	SFR	B	67	1	60.9	61.1	61.3	None	SW-26 New	--	--	--	--	--	--	62.2	-0.9 [e]	61.4	-0.1 [e]	60.7	0.6	60.2	1.1	59.9	1.4	59.6	1.7	59.3	2.0
M-211	SFR	B	67	3	57.3	57.6	58.2	None	SW-26 New	--	--	--	--	--	--	58.5	-0.3 [e]	58.1	0.1	57.9	0.3	57.7	0.5	57.6	0.6	57.5	0.7	57.5	0.7
M-212	SFR	B	67	4	58.2	58.5	59.4	None	SW-26 New	--	--	--	--	--	--	59.6	-0.2 [e]	59.3	0.1	59.2	0.2	59.1	0.3	59	0.4	58.9	0.5	58.9	0.5
M-213	MFR	B	67	2	59.1	59.4	59.9	None	SW-26 New	--	--	--	--	--	--	60	-0.1 [e]	59.9	0.0	59.8	0.1	59.7	0.2	59.7	0.2	59.5	0.4	59.4	0.5

Notes:
Pink shading indicates noise levels approach or exceed (A/E) the NAC.
1 SFR - Single-family residential; MFR - Multi-family residential; MH - Mobile home; REC – Recreational Area; SCH - School; MOT - Hotel/Motel; COM - Commercial/parking; INST - Institutional Structure; VAC - Vacant land; OFF – Office; RET – Retail Facility; PKG – Parking Area, no other land use associated; GAS – Gas Station Retail Facility; IND – Industrial
dBA Leq = equivalent continuous sound level measured in A-weighted decibels
H = height
NAC = Noise Abatement Criterion
N/A = not applicable
I.L. = Insertion Loss
- - = Intentionally Left Blank
* Receptors M-179, M-182, and M-185 are shown twice to reflect data for two sound walls (SW-D New and SW-F New).
a) Calibration factor not assigned since accurate traffic counts could not be obtained at an appropriate measurement site.
b) Calibration factor not assigned since receptor site does not experience frequent human use and would not benefit from noise abatement.
c) Nearest short-term calibration measurement sites not applicable to receiver site. Geometry and configuration of improvements at nearby ST sites differ significantly from that of receiver. ST-09 is located behind existing sound wall in a neighborhood and is blocked from M-057; ST-08 is located across freeway and behind existing sound wall in a separate neighborhood and is not representative of M-057 site.
Insertion Loss Notes:
d) Negative insertion loss is due to reflection and other effects of two closely-spaced parallel walls.
e) Negative insertion loss is result of modeled wall height that is lower than existing wall height.
f) Negative insertion loss is due to reflection and other effects of building or other structures and modeled soundwall.



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LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-1
Noise Measurement, Noise Modeling and Sound Wall Locations

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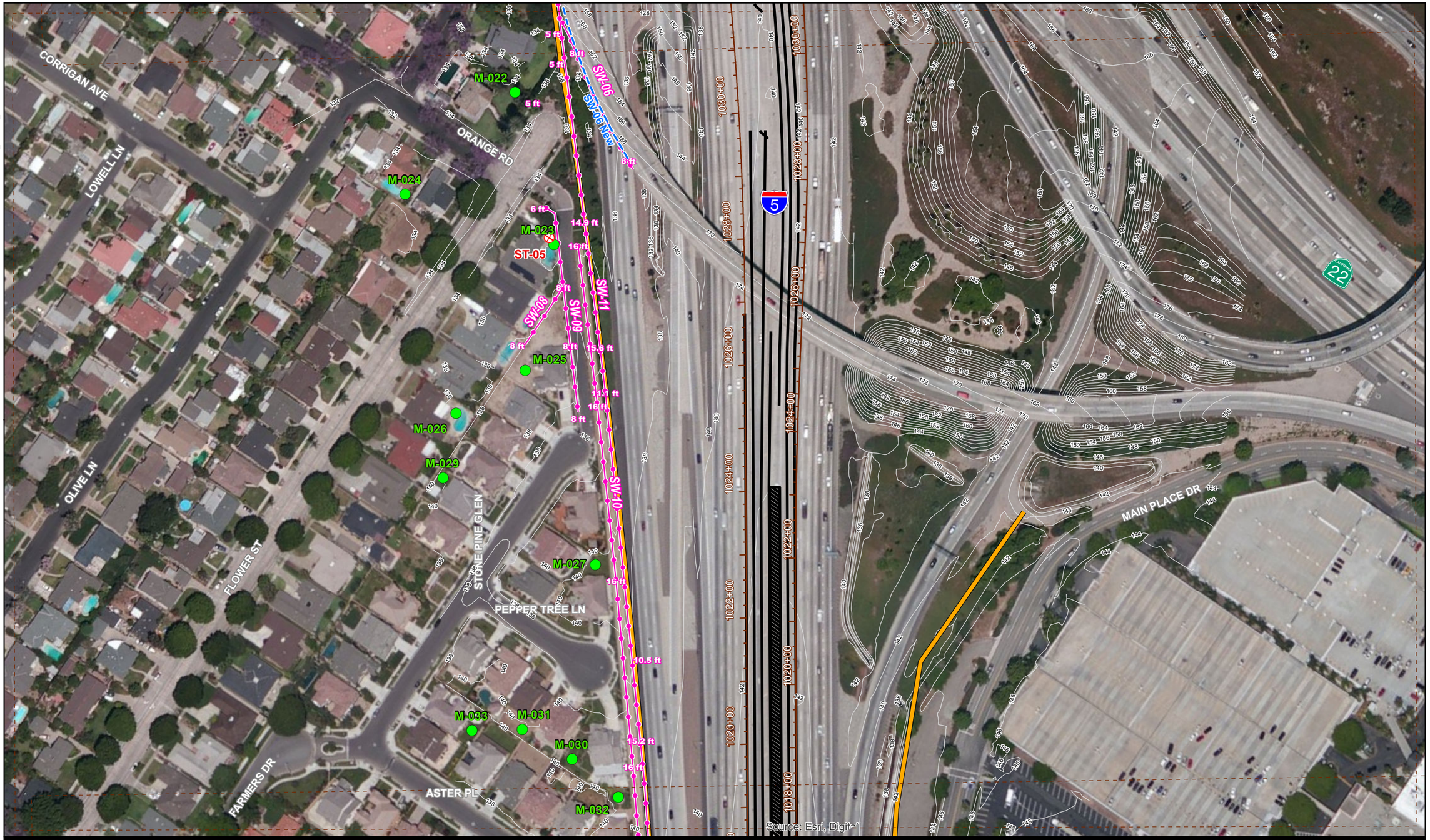


LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

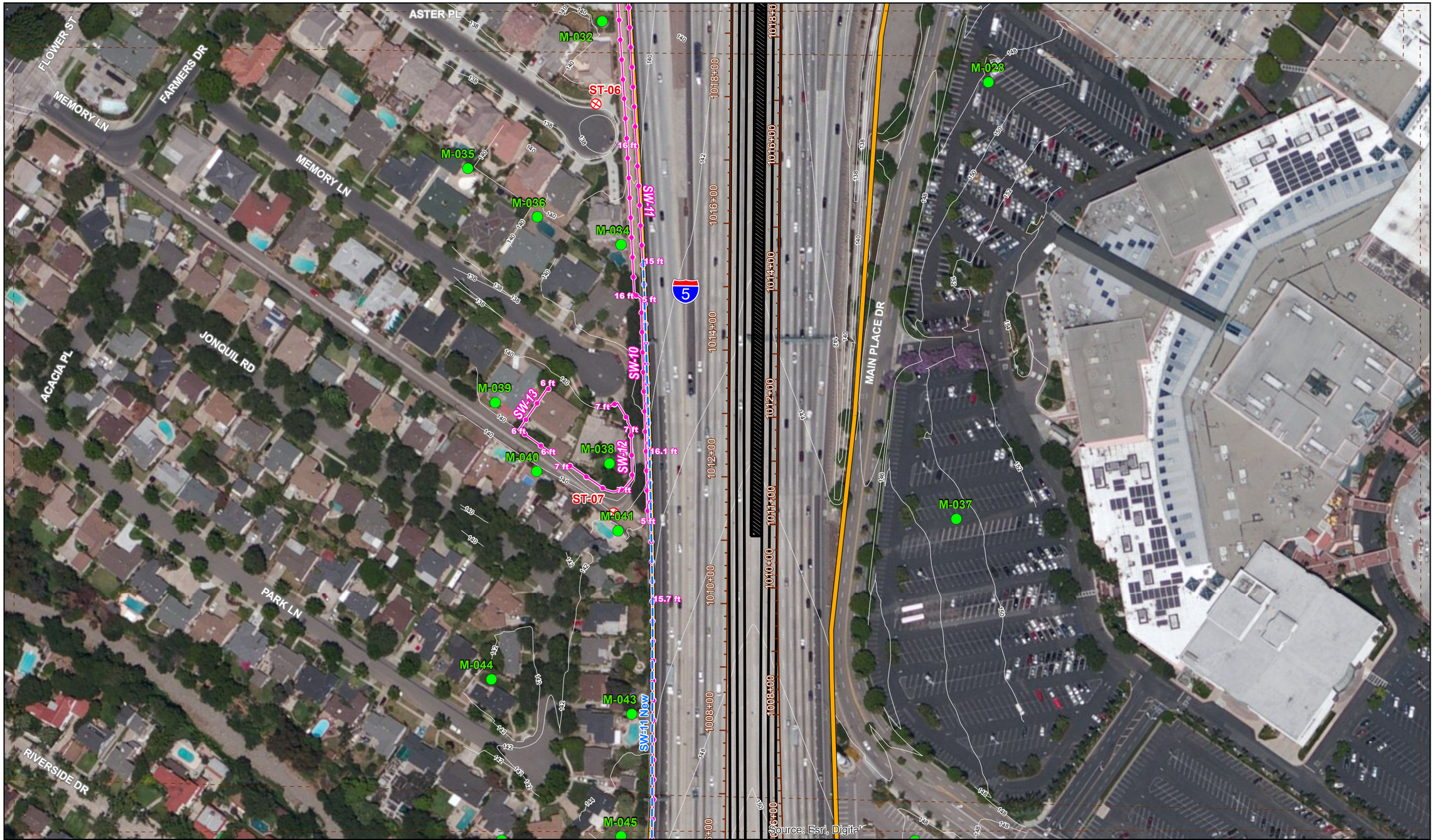
0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-2
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 5/27/2014, Richardson4



LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

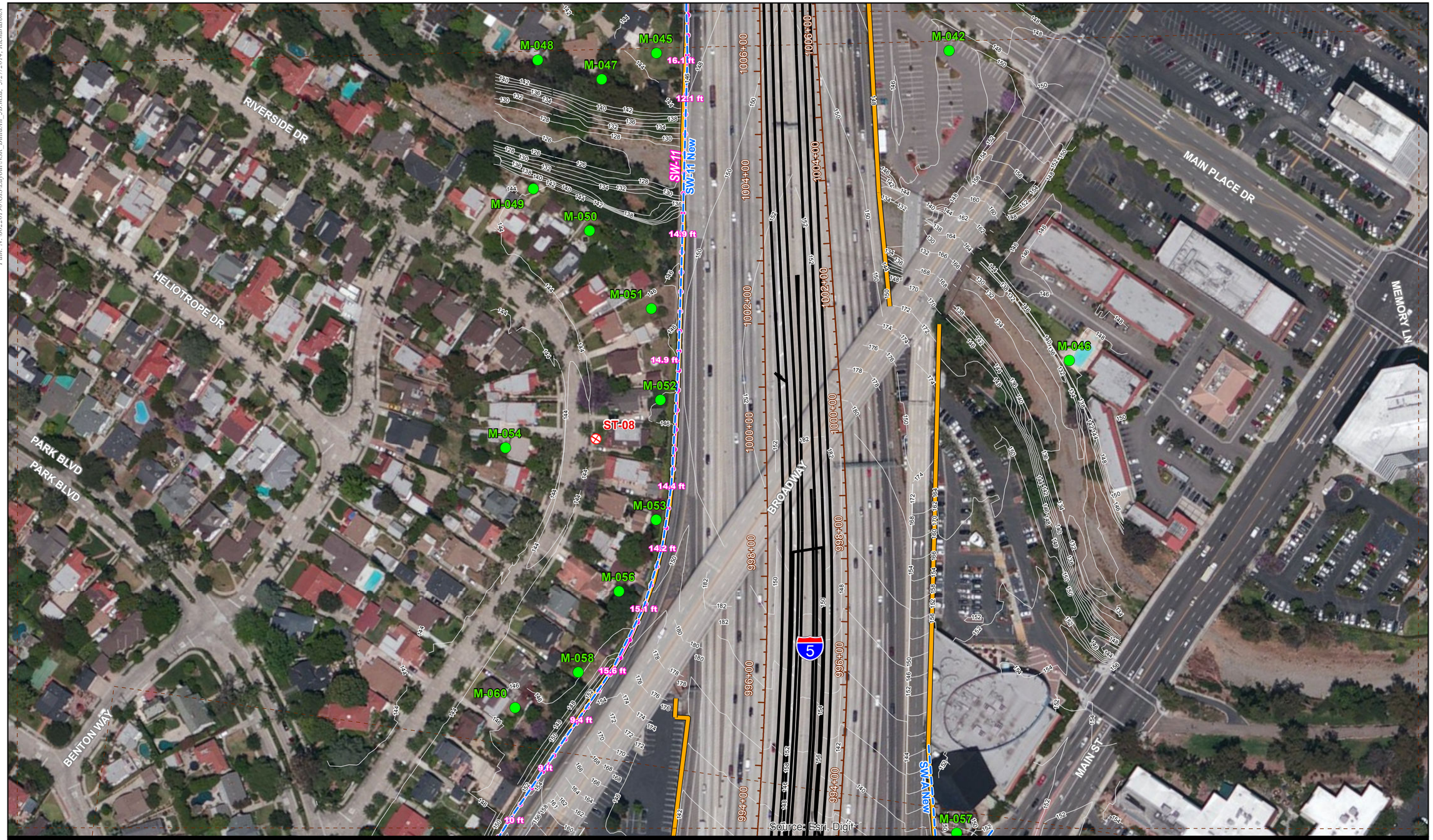
0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-3
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 5/27/2014, Richardson4



LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-4
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 5/27/2014, Richardson4

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-5
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 5/27/2014, Richardson4

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-6
Noise Measurement, Noise Modeling and Sound Wall Locations

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

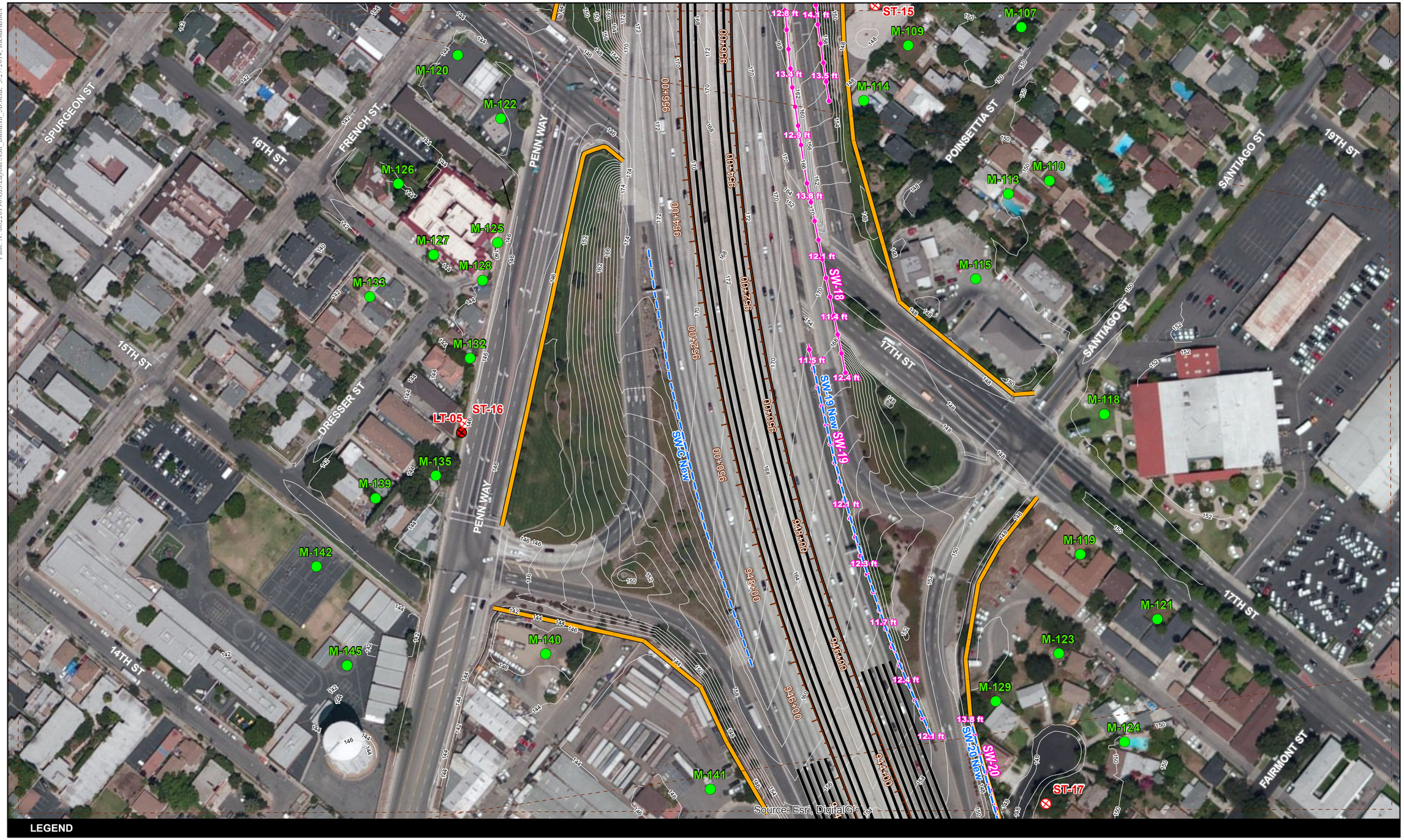
Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-7
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 5/27/2014, Richardson4

Path: N:\60220190\GIS\Layout\NSR_Build Alt_5B.mxd, 5/27/2014, Richardson4



LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-8
Noise Measurement, Noise Modeling and Sound Wall Locations

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

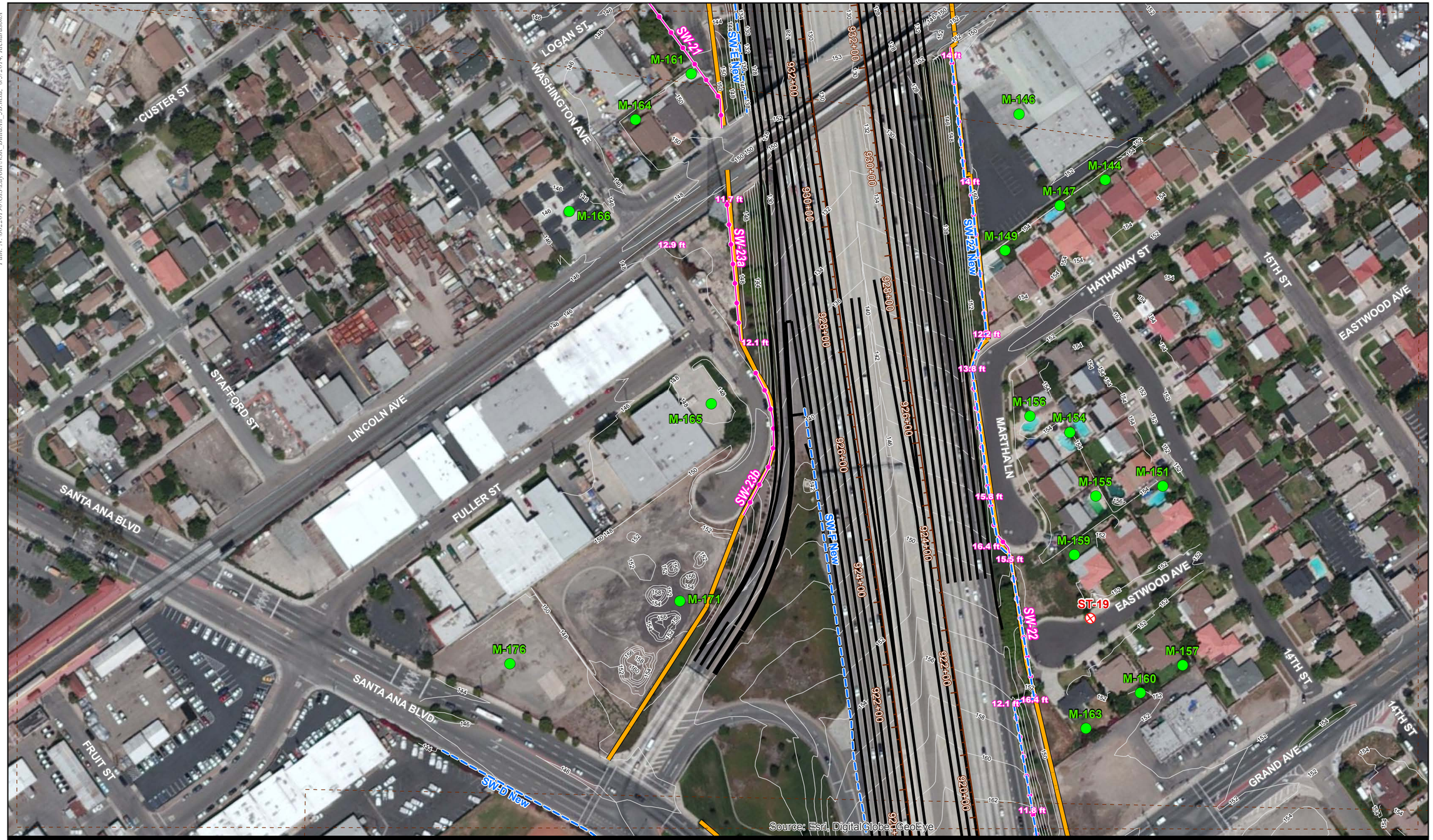
Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-9
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 5/27/2014, Richardson4

Path: N:\60220190\GIS\Layout\NSR_Build Alt_5B.mxd, 6/5/2014, RichardsonA



LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

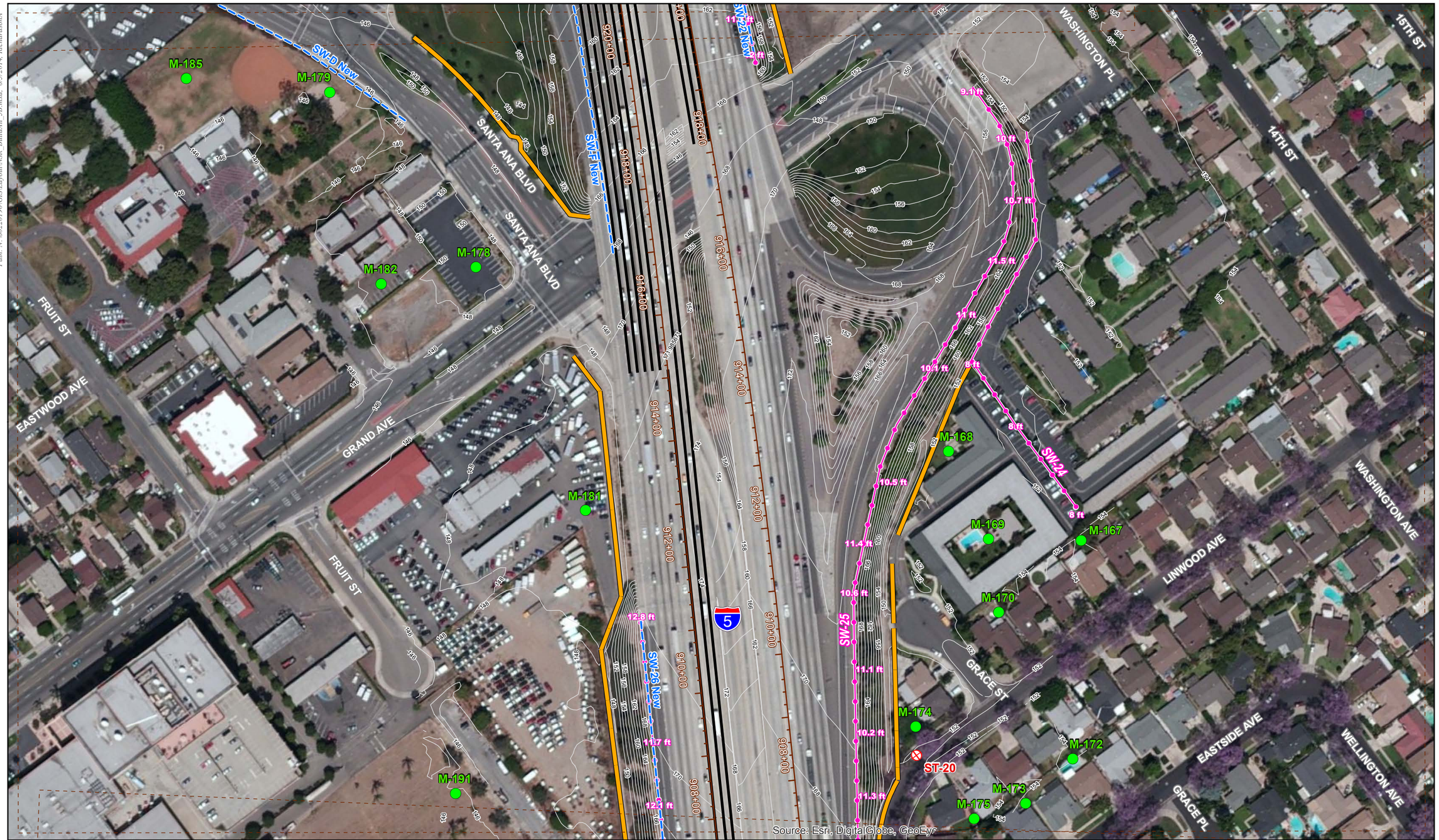
0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-10
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 6/5/2014, RichardsonA



LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-11
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_BuildAlt_5B.mxd, 5/27/2014, Richardson4

LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

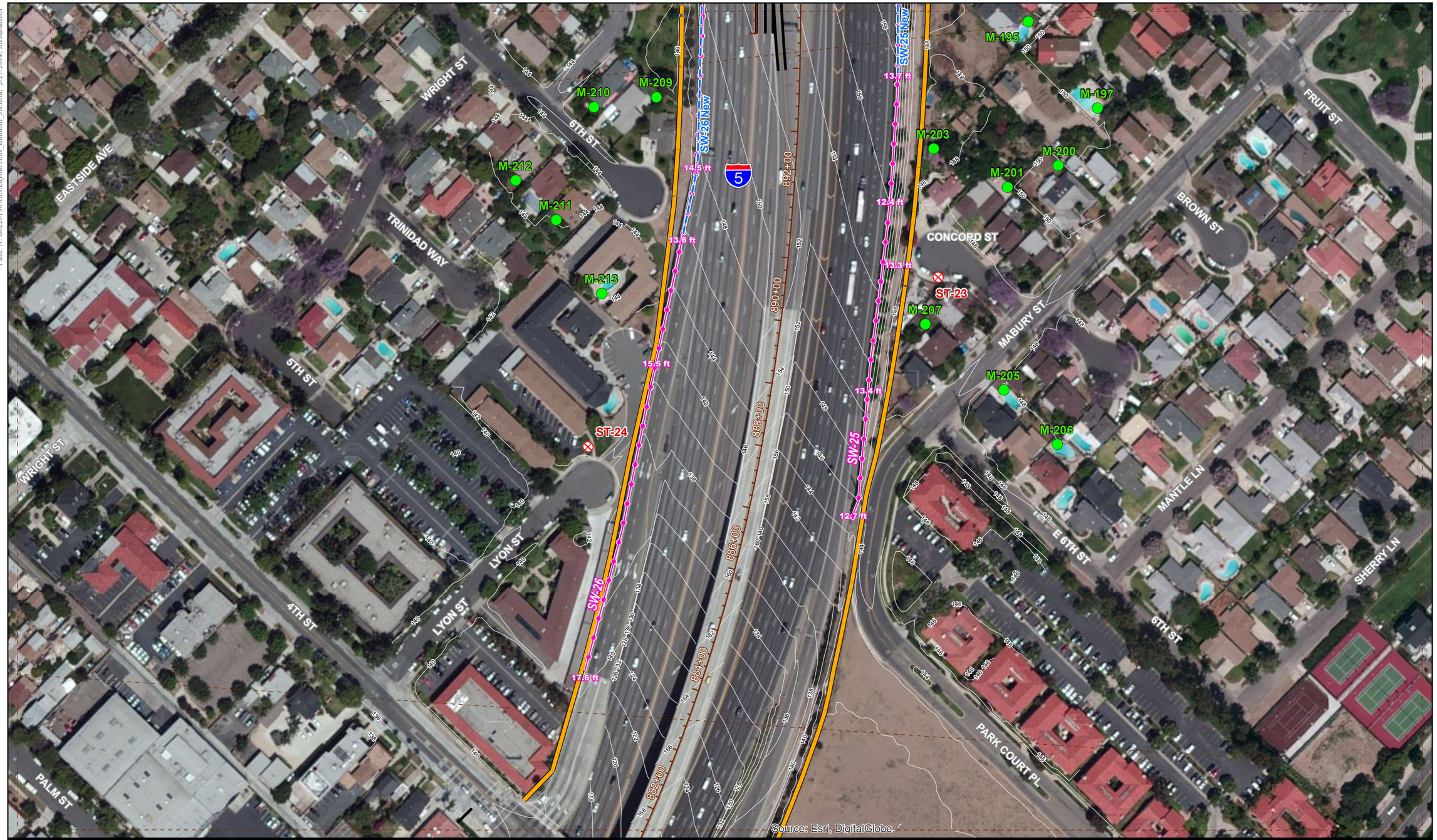
0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-12
Noise Measurement, Noise Modeling and Sound Wall Locations

Path: N:\60220190\GIS\Layout\NSR_Build Alt_5B.mxd, 5/27/2014, Richardson4



LEGEND

Source: AECOM 2012; SCAG Land Use 2005; Aerials Express 2010

0 50 100 200 Feet

Scale: 1 inch = 150 Feet

- Short Term Measurement Loc.
- Long Term Measurement Location
- Modeling Locations
- Modeled Sound Wall
- Existing Soundwall with Heights (ft)
- Build Alternative 5B
- Existing ROW
- Contour Line
- Stations
- Map Extent

Figure 5-13
Noise Measurement, Noise Modeling and Sound Wall Locations

Tables 7 through Table 9 show the reasonable allowance calculations for each acoustically feasible sound wall that meets the 7 dB design goal.

7.1. Future Noise Environment and Impacts

Table 6 summarizes the traffic noise modeling results for existing conditions and the 2040 Build and No-Build alternatives. An impact type of "A/E" shown in Table 6 indicates the noise level is predicted to approach within 1 dB or exceed the NAC at that receiver. Predicted noise levels were rounded to one decimal place when determining noise impacts. Noise levels which approach or exceed the NAC at that receiver are shown in bold text. Predicted design-year traffic noise levels for the build condition are compared to existing conditions and to design-year no-build conditions. The comparison to existing conditions is included in the analysis to identify traffic noise impacts under 23 CFR 772. The comparison to no-build conditions indicates the direct effect of the project.

Currently within the project limits, there are nearly continuous sound walls on both the east and west sides of I-5. It is assumed that the existing sound walls would remain in place under the no build and build conditions. Therefore, the predicted noise levels under the build condition were modeled with the existing sound walls at existing heights. Accordingly, the existing, no-build condition, and build condition noise levels shown in Table 6 represent the predicted noise levels with the existing sound walls in place.

As shown in Table 6, no-build condition noise levels at 20 modeled receivers are predicted to decrease compared to the modeled noise levels under existing conditions, and build condition noise levels at 10 modeled receivers are predicted to decrease compared to the modeled noise levels under no-build conditions. Of these, 6 are predicted to decrease more than 0.5 dB compared to the existing and no-build conditions. The decrease in sound levels under the Build Alternative can be attributed to changes in traffic volumes on the roadways surrounding the receivers. For example, noise levels at M-179 decrease by 1.4 dBA from the existing conditions to the no-build condition. This decrease in noise levels is because the traffic volumes on Santa Ana Boulevard and/or Grand Avenue under the existing conditions are higher than they are under the build condition. If the existing and future $L_{eq(h)}$'s are within +/- 1.0 dB of each other, the difference can also be attributed to minor fluctuations that occur during TNM model run calculations.

Table 7: Summary of Reasonableness Determination Data – SW-A New

Barrier ID: SW-A New										
Predicted Sound Level without Barrier										
Receiver(s): M-057										
Design Year Noise Level dBA Leq(h): 77.5										
Design Year Noise Level Minus Existing Noise Level: 0.3										
Design Year With Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**	**18-Foot Barrier**	**20-Foot Barrier**	**22-Foot Barrier**	**24-Foot Barrier**
Barrier Noise Reduction, dB	8.7	10.2	11.4	12.5	13.3	14	14.6	15.3	15.8	16.1
Number of Benefited Residences	4	4	4	4	4	4	4	4	4	4
Reasonable Allowance Per Benefited Residence	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000
Total Reasonable Allowance	$220,000	$220,000	$220,000	$220,000	$220,000	$220,000	$220,000	$220,000	$220,000	$220,000

Note: NF - Not feasible. Barrier does not provide 5 dB noise reduction.
NA - Not applicable. Barrier not evaluated at this height because it is shorter than existing barrier height.
(a) An NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.
(b) Minimum barrier height that achieves the 7 dB design goal.

Table 8: Summary of Reasonableness Determination Data for SW-E New

Barrier ID: SW-E New										
Predicted Sound Level without Barrier										
Receivers M-148, M-150, M-152, M-153, M-158, M-161, M-162, M-164, and M-166										
Design Year Noise Level dBA Leq(h): 52.6 to 69.4										
Design Year Noise Level Minus Existing Noise Level: 0.0 to 0.3										
Design Year With Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**	**18-Foot Barrier (b)**	**20-Foot Barrier**	**22-Foot Barrier**	**24-Foot Barrier**
Barrier Noise Reduction, dB	NA	NA	0.0 to 5.4	0.0 to 5.4	0.0 to 5.4	0.0 to 5.5	0.0 to 5.9	0.0 to 6.4	0.0 to 6.9	0.0 to 7.2
Number of Benefited Residences	0	0	3	3	3	3	3	3	3	3
Reasonable Allowance Per Benefited Residence	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000
Total Reasonable Allowance	NF	NF	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000

Note: NF - Not feasible. Barrier does not provide 5 dB noise reduction.
NA - Not applicable. Barrier not evaluated at this height because it is shorter than existing barrier height.
(a) An NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.
(b) Minimum barrier height that achieves the 7 dB design goal.

Table 9: Summary of Reasonableness Determination Data for SW-D New

Barrier ID: SW-D New										
Predicted Sound Level without Barrier										
Receivers:M-179 and M-185										
Design Year Noise Level dBA Leq(h): 66.9 to 72.9										
Design Year Noise Level Minus Existing Noise Level: 0.1 to 0.2										
Design Year With Barrier	**6-Foot Barrier**	**8-Foot Barrier**	**10-Foot Barrier**	**12-Foot Barrier**	**14-Foot Barrier**	**16-Foot Barrier**	**18-Foot Barrier**	**20-Foot Barrier**	**22-Foot Barrier**	**24-Foot Barrier**
Barrier Noise Reduction, dB	1.7 to 4.2	2.4 to 5.7	3.1 to 7.0	3.9 to 7.7	4.4 to 8.5	4.9 to 8.9	5.3 to 9.3	5.6 to 9.6	6.1 to 9.9	6.3 to 10.1
Number of Benefited Residences	0	4	4	4	4	4	7	7	7	7
Reasonable Allowance Per Benefited Residence	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000
Total Reasonable Allowance	NF	NF	$220,000	$220,000	$220,000	$220,000	$385,000	$385,000	$385,000	$385,000

Note: NF - Not applicable. Barrier not evaluated at this height because it is shorter than the existing barrier, or barrier does not provide 5 db of noise reduction.
NA - Not applicable. Barrier not evaluated at this height because it is shorter than the existing barrier height.
(a) An NADR will be prepared that will identify noise barrier construction cost information and the noise barriers that are reasonable from a cost perspective.
(b) Minimum barrier height that achieves the 7 dB design goal.

Modeling results also indicate that predicted traffic noise levels for the 2040 design-year build condition approach or exceed the NAC of 67 dBA $L_{eq(h)}$ for Activity Category B land uses at 45 modeled receptors and eight modeled Category C receivers. Build condition noise levels are also predicted to exceed the NAC of 72 dBA $L_{eq(h)}$ for at 4 Activity Category E land uses. The receivers where predicted noise levels approach or exceed the NAC are not focused around any specific locations within the project area, they are scattered throughout the corridor on both sides of I-5.

Therefore, traffic noise impacts are predicted to occur at Activity Category B, C, and E land uses within the project area. When compared to the existing noise levels, future traffic noise levels for the 2040 design-year build conditions are generally predicted to stay the same or increase by one to two dB. While the increases in noise levels caused by the proposed project are small and imperceptible, the existing noise levels are high enough that the NAC is already exceeded at many locations. As shown in Table 3 and Table 4, both the short-term measurements and long-term monitoring of the existing noise levels support this.

Because traffic noise impacts are predicted to occur, noise abatement must be considered.

7.2. Preliminary Noise Abatement Analysis

In accordance with 23 CFR 772, noise abatement is considered where 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; and
- Acoustically insulating public-use or nonprofit institutional structures.

All of these abatement options have been considered. However, because of the configuration and location of the project, abatement in the form of noise barriers is the only abatement that is considered to be practical.

Receiver M-042 represents a commercial parking lot and there are no outdoor areas of frequent human use that would benefit from a reduced noise level. Receiver M-118

represents the parking/display area of a car dealership, a land use which would generate a secondary on-site land use. M-165 and M-178 represent office buildings and there are no outdoor areas of frequent human use that would benefit from a reduced noise level. Receiver M-070 represents the parking area for an office complex, at which there are no outdoor areas of frequent human use that would benefit from a reduced noise level. Therefore, abatement is not considered for receivers M-042, M-070, M-118, M-165, and M-178.

Within the project limits, I-5 currently has near-continuous sound walls along the right-of-way on both sides of the freeway. Most of the impacted receivers are already shielded by an existing sound wall. At these locations, the feasibility of increased height and/or length of the existing sound walls was evaluated. Several impacted receiver locations were not shielded by an existing sound wall. For these receivers, potential locations for new sound walls were identified and the feasibility of those walls was evaluated. The new sound wall locations evaluated were assigned an alphabetic ID number (i.e., SW-A New and SW-D New), while the numbered sound walls indicate evaluation of an existing sound wall.

A total of 15 sound walls were evaluated for feasibility based on achievable noise reduction. In addition, acoustical design goal of 7 dB of noise reduction at one or more benefitted receivers was applied. The results of the sound wall evaluation are shown in Table 6. The barriers identified in Table 6 are shown in Figures 5-1 through 5-13.

Sound walls were evaluated ranging in height from 6 to 16 feet in two-foot increments. Sound walls that were not feasible or achieve the 7 dB design goal at 16 feet were evaluated at heights up to 24 feet in two foot increments.

Because it is assumed the existing sound walls would remain in place under the build conditions, the future build condition noise levels shown in Table 6 represent noise levels modeled with the existing walls at their existing heights. To determine the insertion loss for both new and higher existing walls, the noise-level-with-barrier at each height was compared to the build condition that included the existing sound walls. As a result, the insertion loss represents the noise reduction that could be achieved by each incremental increase in wall height and/or length. By basing insertion loss on the incremental increase in noise reduction, this approach evaluated the feasibility and reasonableness (i.e. the 7 dB design goal) of implementing a new wall or modifying an existing wall compared to leaving the wall in place at its existing dimensions.

In evaluating modifications to existing sound walls, the minimum height considered and shown in Table 6 represents the existing height of the existing sound wall. While the existing sound walls vary in height (i.e. SW-11, SW-22, and SW-25), the heights provided in Table 6 are continuous heights along the entire length of the existing barrier. This analysis evaluated a single-height wall starting at the minimum height of the existing wall (e.g. 6 feet for a wall that currently varies 6 to 12 feet in height), ranging up to 16 or 24 feet in two-foot increments. As a result, the predicted build noise levels at receivers in close proximity to the existing maximum-height wall segments may be higher than those predicted with the single-height barrier being evaluated. For example, existing SW-11 varies from approximately 9 to 16 feet in height. Near receiver M-050, existing SW-11 is 15 feet tall. When modeled at a single height of 12 feet, SW-11 is 3 feet shorter near receiver M-050, resulting in predicted-with-barrier noise level that is 2.5 dB higher than with the existing barrier (Table 6).

The following sound walls were analyzed to shield the sensitive receiver location that would be exposed to traffic noise levels approaching or exceeding the NAC for the Build Alternative:

- **SW-06 New**: Modifications to an existing sound wall located on the west side of I-5 between Sherwood Lane and Flower Street along the existing ROW line was analyzed to shield 8 receivers M-015 through M-022 (Figure 5-1). The existing sound wall is 913 feet long and varies approximately 8 to 15 feet in height. As shown in Table 6, the maximum height evaluated (24 feet) for SW-06 did not achieve a minimum of 5 dB noise reduction.
- **SW-11 New:** Modifications to a 2,243 foot segment of an existing sound wall 4,176 feet in length located on the west side of I-5 between Flower Street and Broadway along the existing ROW line was analyzed to shield 18 receivers (M-038 through M-041, M-043 through M-045, and M-047 through M-054, M-056, M-058, and M-060). SW-11 is shown in Figure 5-3. The existing sound wall varies approximately 9 to 16 feet in height. As shown in Table 6, the maximum height evaluated (24 feet) for SW-11 did not achieve a minimum of 5 dB noise reduction.
- **SW-A New:** A new sound wall 386 feet in length located on the east side of I-5 near Main Street along the on-ramp edge of pavement at the Discovery Science Center was analyzed to shield receiver M-057 (Figure 5-4 and 5-5). As shown in Table 6, the minimum feasible height of 6 feet also achieves the 7 dB design goal.
- **SW-15a New:** Modifications to a 1,848 foot segment of an existing sound wall 3,629 feet in length located along the existing ROW line between Edgewood

Road and 17th Street was analyzed to shield 18 receivers (M-072, M-074, M-076, M-077, M-079 through M-081, M-084, M-085, M-087, M-090, M-093 through M-095, M-097, M-099, M-102, and M-105). SW-15a is shown in Figure 5-6 and 5-7. The existing sound wall varies approximately 13 to 16 feet in height. As shown in Table 6, the maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.

- **SW-15b New:** Modifications to a 343 foot segment of an existing sound wall 3,629 feet in length located along the existing ROW line between Edgewood Road and 17th Street was analyzed to shield receiver M-059. SW-15b is shown in Figure 5-5. The existing wall in this area is approximately 15 feet in height at this location. As shown in Table 6, the maximum wall height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.
- **SW-16b New:** Modifications to a 387-foot long segment of an existing sound wall located on the west side of I-5 along the existing ROW line between Main Street and 17th Street was analyzed to shield 7 receivers (M-103, M-104, M-106, M-108, M-111, M-112, and M-116). The existing SW-16 is 1,887 feet in length and varies approximately 7 to 16 feet in height. SW-16b is shown in Figure 5-7. As shown in Table 6, the maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.
- **SW-19 New and SW-20 New:** Modifications to two existing sound walls located on the northeast side of I-5 between Lincoln Ave and 17th Street were analyzed to shield 7 receivers (M-119, M-121, M-123, M-124, M-129, M-131, and M-134). Existing SW-19 is 639 feet in length and is approximately 12 feet in height (shown in Figure 5-8). SW-20 is 1,075 feet long and is approximately 14 feet in height (shown in Figures 5-8 and 5-9). A 475 foot-long segment of existing SW-20 was evaluated, while the entire 639-foot length of SW-19 was evaluated. The insertion loss indicated at each perturbation height in Table 6 is based upon modeling a combined SW-19 and SW-20 at the specified height. As shown in Table 6, the maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.
- **SW-C New:** A new sound wall located on the west side of I-5 was evaluated to shield 8 receivers (M-125, M-126, M-127, M-128, M-132, M-133, M-135, and M-139,), shown in Figure 5-8. New SW-C New is located along the I-5 western edge of pavement and is 701 feet in length. The insertion loss indicated at each perturbation height in Table 6 is based upon modeling SW-C New at the specified height. The maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.

- **SW-22 New:** Modifications to an existing sound wall located on the northeast side of I-5 along the residential property line between Lincoln Avenue and Grand Avenue was analyzed to shield 11 receivers (M-144, M-147, M-149, M-151, M-154, M-155, M-156, M-157, M-159, M-160, and M-163). SW-22 is shown in Figures 5-10 and 5-11. The existing sound wall is 1,314 feet in length and varies from approximately 12 to 16 feet in height. The maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.
- **SW-25 New:** Modifications to a 999 foot-long segment of an existing sound wall located on the northeast side of I-5 along the edge of pavement between Grand Avenue and Park Court Place was analyzed to shield 14 receivers (M-177, M-180, M-183, M-184, M-186 through M-188, M-192, M-193, M-195, M-197, M-200, M-201, and M-203). SW-25 is shown in Figure 5-12 and 5-13. The existing height of SW-25 varies from approximately 9 feet to 14 feet. As shown in Table 6, the maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.
- **SW-D New:** A new sound wall approximately 472 feet long located on private property west of I-5 along the edge of pavement of Santa Ana Boulevard was evaluated to shield 2 receivers (M-179 and M-185 shown in Figures 5-10 and 5-11). Sound walls within the ROW and closer to I-5 were also evaluated to shield these receivers, however, sound walls within the ROW did not achieve any noise reduction for these two impacted receivers. As shown in Table 6, the minimum feasible height of SW-D New is 8 feet. The minimum height at which the 7 dB design goal is achieved is 10 feet at receiver M-179.
- **SW-F New**: A new sound wall approximately 1,013 feet long located on the west side of I-5 along the edge of pavement between Lincoln Avenue and Grand Avenue was analyzed to shield 3 receivers (M-179, M-182, and M-185, shown in Figure 5-11). As shown in Table 6, the maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.
- **SW-26 New:** Modifications to a 1,887-foot long segment of an existing 2,586-foot long sound wall located on the west side of I-5 along the edge of pavement between Grand Avenue and 4th Street were analyzed to shield 14 receivers (M-189, M-190, M-194, M-196, M-198, M-199, M-202, M-204, and M-208 through M-213). SW-26 is shown in Figure 5-11 through 5-13. As shown in Table 6, the maximum height evaluated (24 feet) did not achieve a minimum of 5 dB noise reduction.
- **SW-E New:** A new 941 foot-long sound wall located on the west side of I-5 along the top of slope was evaluated to shield 9 receivers (M-148, M-150, M-152,

M-153, M-158, M-161, M-162, M-164, and M-166,). New SW-E New is shown in Figures 5-9 and 5-10. As shown in Table 6, the minimum feasible height at which the 7 dB design goal is achieved is 24 feet at receiver M-161.

7.3. Feasibility and Reasonable Allowance

For each sound wall found to be both acoustically feasible and able to achieve the 7 dB design goal, reasonable cost allowances were calculated. A total of 15 sound walls were evaluated in areas adjacent to impacted residences. The results of the modeling analysis indicate that the following 12 sound walls would not be acoustically feasible: SW-06 New, SW-11 New, SW-15a New, SW-15b New, SW-16b New, SW-19 New, SW-20 New, SW-22 New, SW-25 New, SW-26, SW-C New, and SW-F New.

Of the 15 sound walls analyzed, three were capable of reducing noise levels by 5 dBA or more and are, therefore, considered feasible. The following three feasible sound walls achieved the 7 dB design goal for at least one benefitted receiver and are, therefore, considered reasonable: SW-A New, SW-D New, and SW-E New.

Tables 7 through 9 summarize the calculated noise reductions and reasonable allowances for each barrier height for the three sound walls found to be feasible and to achieve the 7 dB noise reduction design goal. The reasonableness allowances included in Table 7 through 9 were calculated using a base allowance of $55,000 per benefitted receiver. Tables B-1 through B-3 provided in Appendix B compare the predicted noise reductions by barrier height for each feasible barrier achieving the 7 dB design goal.

For any sound wall to be considered reasonable from a cost perspective the estimated cost of the sound wall should be equal to or less than the total cost allowance calculated for the wall. The cost calculations of the sound walls should include all items appropriate and necessary for construction of the wall, such as traffic control, drainage, modification, and retaining walls. Construction cost estimates are not provided in this NSR, but are presented in the NADR. The NADR is a design responsibility and is prepared to compile information from the NSR, other relevant environmental studies, and design considerations into a single, comprehensive document before public review of the project. The NADR is prepared by the project engineer after completion of the NSR and prior to publication of the draft environmental document. The NADR includes noise abatement construction cost estimates that have been prepared and signed by the project engineer based on site-specific conditions. Construction cost estimates in the NADR are compared to the reasonableness allowances to identify which wall configurations are reasonable from a cost perspective.

7.4. NEPA and CEQA Considerations

Section 7 of the Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol) explains in detail how Caltrans' policies and procedures apply (23 Code of Federal Regulations [CFR] 772). It also explains how traffic noise impacts are evaluated under CEQA and NEPA. Based on Section 7 of the Protocol, this NSR contains existing noise levels and future predicted noise levels for the no-build and future build conditions. All data, analysis, and information needed to satisfy the requirements of NEPA and/or CEQA have already been provided in this NSR. This allows the produced data to be used under CEQA or NEPA if either of these Acts apply during the environmental phase of the proposed project.

7.5. Conclusion

Based on the studies so far accomplished, Caltrans intends to consider noise abatement measures in the form of barrier(s) at locations, with respective lengths and heights as shown in this Noise Study Report. The design of noise barriers presented in this report is preliminary and has been conducted at a level appropriate for environmental review and not for final design of the proposed project. If pertinent parameters change substantially during the final project design, preliminary noise barrier designs may be modified or eliminated from the final project. A final decision on the construction of the noise abatement will be made upon completion of the public involvement process and the final project design process.

Chapter 8. Construction Noise

Two types of short-term noise impacts would occur during project construction. The first type would be from construction crew commutes and the transport of construction equipment and materials to the project site and would incrementally raise noise levels on access roads leading to the site. The pieces of heavy equipment for grading and construction activities will be moved on site, will remain for the duration of each construction phase, and will not add to the daily traffic volume in the project vicinity. A high single-event noise exposure potential at a maximum level of 87 dBA L_{max} from trucks passing at 50 ft will exist. However, the projected construction traffic will be minimal when compared to existing traffic volumes on I-5, and other affected streets, and its associated long-term noise level change will not be perceptible. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would be less than substantial.

The second type of short-term noise impact is related to noise generated during roadway construction. Construction is conducted in discrete steps, each of which has its own mix of equipment and consequently its own noise characteristics. These various sequential phases would change the character of the noise generated and the noise levels along the project alignment as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 11 lists typical construction equipment noise levels (L_{max}) recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor.

Typical noise levels at 50 ft from an active construction area range up to 90 dBA L_{max} during the noisiest construction phases. The site preparation phase, which includes grading and paving, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Table 10. Construction Equipment Noise

Rock drills	83–99	96
Jackhammers	75–85	82
Pneumatic tools	78–88	85
Pumps	74–84	80
Scrapers	83–91	87
Haul trucks	83–94	88
Cranes	79–86	82
Portable generators	71–87	80
Rollers	75–82	80
Dozers	77–90	85
Tractors	77–82	80
Front-end loaders	77–90	86
Hydraulic backhoe	81–90	86
Hydraulic excavators	81–90	86
Graders	79–89	86
Air compressors	76–89	86
Trucks	81–87	86

Source: *Noise Control for Buildings and Manufacturing Plants*, Bolt, Beranek & Newman, 1987.
dBA = A-weighted decibels
ft = feet
L_{max} = maximum instantaneous sound level

Construction of the proposed project is expected to require the use of earthmovers, bulldozers, water trucks, and pickup trucks. Noise associated with the use of construction equipment is estimated between 79 and 89 dBA Lmax at a distance of 50 ft from the active construction area for the grading phase. As seen in Table 11, the maximum noise level generated by each earthmover is assumed to be approximately 86 dBA Lmax at 50 ft from the earthmover in operation. Each bulldozer would generate approximately 85 dBA Lmax at 50 ft. The maximum noise level generated by water trucks and pickup trucks is approximately 86 dBA Lmax at 50 ft from these vehicles. Each doubling of the sound source with equal strength increases the noise level by 3 dBA. Each piece of construction equipment operates as an individual point source. The worst case composite noise level at the nearest residence during this phase of construction would be 90 dBA Lmax (at a distance of 50 ft from an active construction area).

The closest sensitive receptor locations are located within 50 ft from the project construction areas. Therefore, these receptor locations may be subject to short-term noise levels reaching 90 dBA L_{max} or higher generated by construction activities within the project area. Construction noise is regulated by Caltrans' Standard Specifications in Section 14-8.02, "Noise Control. The nighttime noise level from the contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dBA at a distance of 50 ft. The contractor should use an alternative warning method instead of a sound signal unless required by safety laws. In addition, the contractor shall equip all internal combustion engines with the manufacturer-recommended mufflers and shall not operate any internal combustion engine on the job site without the appropriate muffler.

Chapter 9. References

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Southern California Association of Governments

2005 Land use GIS overlay.

Appendix A Traffic Data

Table A-1: I-5 Main and Ramp - Traffic Volumes Summary for Northbound and Southbound

				Existing Volumes				2040 Volumes (No Project)				2040 Volume (Project (5B))			
				Ramp Volume		Mainline Volume		Ramp Volume		Mainline Volume		Ramp Volume		Mainline Volume	
Ramp	Type	VDS	Post-mile	AM (Veh/Hr)	PM (Veh/Hr)	AM (Veh/Hr)	PM (Veh/Hr)	AM (Veh/Hr)	PM (Veh/Hr)	AM (Veh/Hr)	PM (Veh/Hr)	AM (Veh/Hr)	PM (Veh/Hr)	AM (Veh/Hr)	PM (Veh/Hr)
Northbound															
4th	On	n/a		571	933	11583	9466	575	935	12433	10629	575	935	12433	10629
Grand	Off	1209763	31.9	664	576	10920	8890	665	690	11768	9939	665	690	11768	9939
Grand	On	1205220	31.9	498	658	11417	9548	500	660	12268	10599	500	660	12268	10599
17th	Off	n/a		723	481	10694	9067	725	515	11543	10084	725	515	11543	10084
HOV exit to ML (at 17th)	On	n/a		363	249	11057	9316	450	380	11993	10464	450	431	11993	10515
17th (loop ramp)	On	1205255	32.5	302	509	11359	9825	305	510	12298	10974	326	569	12319	11084
17th (slip ramp)	On	n/a		49	263	11408	10088	50	265	12348	11239	54	296	12373	11380
Main/Broadway	Off	n/a		955	466	10453	9622	1015	470	11333	10769	1015	470	11358	10910
Main	On	1205281	33.2	839	1301	11292	10923	1145	1615	12478	12384	1196	1810	12501	12497
N5 to W22	Fwy- off	1210020	33.8	2067	2008	9225	8915	2070	2250	10408	10134	2070	2250	10395	10119
N5 to N57	Fwy- off	1205315	34.2	1803	1206	7423	7708	2400	1305	8008	8829	2426	1402	7969	8717
22 E/W to 5N	Fwy- on	1212015	34.4	1821	2356	9244	10064	1850	2425	9858	11254	1852	2528	9821	11245
Southbound															
Off to 22 WB	Fwy-off	n/a		642	779	8121	6967	645	780	9800	8210	665	801	10069	8323
5S off to La Veta	Off	1212017	34.4	679	426	7442	6541	680	465	9120	7745	690	475	9379	7848
S5 to E22	Fwy-off	1212018	34.4	2168	1681	5275	4860	2280	1685	6840	6060	2290	1695	7089	6153
Broadway/Main	Off	1210002	33.3	644	613	4631	4247	645	715	6195	5345	858	796	6231	5357
On from 22 EB	Fwy-on	1212173	R10.35	886	899	5517	5146	890	900	7085	6245	890	900	7121	6257
On from 57 SB	Fwy-on	1205286	33.2	3309	3369	8826	8515	3760	3790	10845	10035	3760	3790	10881	10047
Main	On	1205271	33	759	825	9585	9340	760	825	11605	10860	760	825	11641	10872
17th	Off	1205244	32.25	290	351	9295	8989	340	380	11265	10480	376	392	11265	10480
17th	On	1205239	32.25	807	716	10102	9705	905	720	12170	11200	905	720	12170	11200
Grand	Off	1209778	32	462	379	9640	9326	465	405	11705	10795	465	405	11705	10795
Mainline to HOV 5 SB	ML to HOV	n/a		340	277	9300	9049	340	280	11365	10515	340	280	11365	10515
Grand	On	1209777	32	494	856	9794	9905	660	975	12025	11490	660	975	12025	11490
4th	Off	1209731	31.23	733	476	9061	9429	735	480	11290	11010	735	480	11290	11010

Table A-2: Existing Volumes Northbound & Southbound Mainline

Ramp	Type	Ramp Volume (Veh/Hr)	No. of Lanes	LOS C Ramp Volume (Veh/Hr)	Truck (Veh/Hr)	Auto (Veh/Hr)	MT (Veh/Hr)	HT (Veh/Hr)	Mainline Volume (Veh/Hr)	No. of Lanes	LOS C Mainline Volume (Veh/Hr)	Truck (Veh/Hr)	Auto (Veh/Hr)	MT (Veh/Hr)	HT (Veh/Hr)
Northbound Mainline															
4th	On	933	2	933	37	896	28	9	11583	5	9250	509	8741	324	185
Grand	Off	664	1	664	27	637	20	7	10920	5	9250	509	8741	324	185
Grand	On	658	1	658	26	632	20	7	11417	5	9250	509	8741	324	185
17th	Off	723	1	723	29	694	22	7	10694	5	9250	509	8741	324	185
HOV exit to ML (at 17th)	On	363	1	363	15	348	11	4	11057	6	11057	608	10449	387	221
17th (loop ramp)	On	509	1	509	20	489	15	5	11359	5	9250	509	8741	324	185
17th (slip ramp)	On	263	1	263	11	252	8	3	11408	5	9250	509	8741	324	185
Main/Broadway	Off	955	1	955	38	917	29	10	10453	5	9250	509	8741	324	185
Main	On	1301	1	1000	40	960	30	10	11292	5	9250	509	8741	324	185
N5 to W22	Fwy- off	2067	2	2000	80	1920	60	20	9225	5	9225	507	8718	323	185
N5 to N57	Fwy- off	1803	2	1803	72	1731	54	18	7708	4	7400	407	6993	259	148
22 E/W to 5N	Fwy- on	2356	2	2000	80	1920	60	20	10064	2	3700	204	3497	129	74
Southbound Mainline															
Off to 22 WB	Fwy-off	779	1	779	31	748	23	8	7523	5	7523	414	7109	263	151
5S off to La Veta	Off	679	1	679	27	652	20	7	8763	5	8763	482	8281	307	175
S5 to E22	Fwy-off	2168	2	2000	80	1920	60	20	8121	5	8121	447	7675	284	163
Broadway/Main	Off	644	1	644	26	618	19	6	7442	6	7442	409	7033	260	149
On from 22 EB	Fwy-on	899	2	899	36	863	27	9	5275	3	5275	290	4985	185	106
On from 57 SB	Fwy-on	3369	1	1000	40	960	30	10	4631	4	4631	255	4376	162	93
Main	On	825	1	825	33	792	25	8	5517	6	5517	303	5213	193	110
17th	Off	351	1	351	14	337	11	4	8826	5	8826	485	8341	309	177
17th	On	807	1	807	32	775	24	8	9585	5	9250	509	8741	324	185
Grand	Off	462	1	462	18	444	14	5	9295	5	9250	509	8741	324	185
Mainline to HOV 5 SB	ML to HOV	340	1	340	14	326	10	3	10102	5	9250	509	8741	324	185
Grand	On	856	1	856	34	822	26	9	9640	5	9250	509	8741	324	185
4th	Off	733	2	733	29	704	22	7	9300	5	9250	509	8741	324	185

Table A-3: 2040 Volumes Northbound & Southbound Mainline (No Project)

Northbound Mainline															
Ramp	Type	Ramp Volume (Veh/Hr)	No. of Lanes	LOS C Ramp Volume (Veh/Hr)	Truck (Veh/Hr)	Auto (Veh/Hr)	MT (Veh/Hr)	HT (Veh/Hr)	Mainline Volume (Veh/Hr)	No. of Lanes	LOS C Mainline Volume (Veh/Hr)	Truck (Veh/Hr)	Auto (Veh/Hr)	MT (Veh/Hr)	HT (Veh/Hr)
4th	On	935	2	935	37	898	28	9	12433	5	9250	509	8741	324	185
Grand	Off	690	1	690	28	662	21	7	11768	5	9250	509	8741	324	185
Grand	On	660	1	660	26	634	20	7	12268	5	9250	509	8741	324	185
17th	Off	725	1	725	29	696	22	7	11543	5	9250	509	8741	324	185
HOV exit to ML (at 17th)	On	450	1		0	0	0	0	11993	6	11100	611	10490	388	222
17th (loop ramp)	On	510	1	510	20	490	15	5	12298	5	9250	509	8741	324	185
17th (slip ramp)	On	265	1	265	11	254	8	3	12348	5	9250	509	8741	324	185
Main/Broadway	Off	1015	1	1000	40	960	30	10	11333	5	9250	509	8741	324	185
Main	On	1615	1	1000	40	960	30	10	12478	5	9250	509	8741	324	185
N5 to W22	Fwy- off	2250	2	2000	80	1920	60	20	10408	5	9250	509	8741	324	185
N5 to N57	Fwy- off	2400	2	2000	80	1920	60	20	8829	4	7400	407	6993	259	148
22 E/W to 5N	Fwy- on	2425	2	2000	80	1920	60	20	11254	2	3700	204	3497	129	74
Southbound Mainline															
Off to 22 WB	Fwy-off	0	1	0	0	0	0	0	8125	5	8125	447	7678	284	163
5S off to La Veta	Off	0	1	0	0	0	0	0	10445	5	9250	509	8741	324	185
S5 to E22	Fwy-off	780	2	780	31	749	23	8	9800	5	9250	509	8741	324	185
Broadway/Main	Off	680	1	680	27	653	20	7	9120	6	9120	502	8618	319	183
On from 22 EB	Fwy-on	2280	2	2000	80	1920	60	20	6840	3	5550	305	5245	194	111
On from 57 SB	Fwy-on	715	1	715	29	686	21	7	6195	4	6195	341	5854	217	124
Main	On	900	1	900	36	864	27	9	7085	6	7085	390	6695	248	142
17th	Off	3790	1	1000	40	960	30	10	10845	5	9250	509	8741	324	185
17th	On	825	1	825	33	792	25	8	11605	5	9250	509	8741	324	185
Grand	Off	380	1	380	15	365	11	4	11265	5	9250	509	8741	324	185
Mainline to HOV 5 SB	ML to HOV	905	1	905	36	869	27	9	12170	5	9250	509	8741	324	185
Grand	On	465	1	465	19	446	14	5	11705	5	9250	509	8741	324	185
4th	Off	340	2	340	14	326	10	3	11365	5	9250	509	8741	324	185

Table A-4: 2040 Volumes Northbound & Southbound Mainline (With Project 5B)

Ramp	Type	Ramp Volume (Veh/Hr)	No. of Lanes	LOS C Ramp Volume (Veh/Hr)	Truck (Veh/Hr)	Auto (Veh/Hr)	MT (Veh/Hr)	HT (Veh/Hr)	Mainline Volume (Veh/Hr)	No. of Lanes	LOS C Mainline Volume (Veh/Hr)	Truck (Veh/Hr)	Auto (Veh/Hr)	MT (Veh/Hr)	HT (Veh/Hr)
Northbound Mainline															
4th	On	935	2	935	37	898	28	9	12433	5	9250	509	8741	324	185
Grand	Off	690	1	690	28	662	21	7	11768	5	9250	509	8741	324	185
Grand	On	660	1	660	26	634	20	7	12268	5	9250	509	8741	324	185
17th	Off	725	1	725	29	696	22	7	11543	5	9250	509	8741	324	185
HOV exit to ML (at 17th)	On	450	1		0	0	0	0	11993	6	11100	611	10490	388	222
17th (loop ramp)	On	569	1	569	23	546	17	6	12319	5	9250	509	8741	324	185
17th (slip ramp)	On	296	1	296	12	284	9	3	12373	5	9250	509	8741	324	185
Main/Broadway	Off	1015	1	1000	40	960	30	10	11358	5	9250	509	8741	324	185
Main	On	1810	1	1000	40	960	30	10	12501	5	9250	509	8741	324	185
N5 to W22	Fwy- off	2250	2	2000	80	1920	60	20	10395	5	9250	509	8741	324	185
N5 to N57	Fwy- off	2426	2	2000	80	1920	60	20	8717	4	7400	407	6993	259	148
22 E/W to 5N	Fwy- on	2528	2	2000	80	1920	60	20	11245	2	3700	204	3497	129	74
Southbound Mainline															
Off to 22 WB	Fwy-off	0	1	0	0	0	0	0	8125	5	8125	447	7678	284	163
5S off to La Veta	Off	0	1	0	0	0	0	0	10734	5	9250	509	8741	324	185
S5 to E22	Fwy-off	801	2	801	32	769	24	8	10069	5	9250	509	8741	324	185
Broadway/Main	Off	690	1	690	28	662	21	7	9379	6	9379	516	8863	328	188
On from 22 EB	Fwy-on	2290	2	2000	80	1920	60	20	7089	3	5550	305	5245	194	111
On from 57 SB	Fwy-on	858	1	858	34	824	26	9	6231	4	6231	343	5888	218	125
Main	On	900	1	900	36	864	27	9	7121	6	7121	392	6729	249	143
17th	Off	3790	1	1000	40	960	30	10	10881	5	9250	509	8741	324	185
17th	On	825	1	825	33	792	25	8	11641	5	9250	509	8741	324	185
Grand	Off	392	1	392	16	376	12	4	11265	5	9250	509	8741	324	185
Mainline to HOV 5 SB	ML to HOV	905	1	0	0	0	0	0	12170	5	9250	509	8741	324	185
Grand	On	465	1	465	19	446	14	5	11705	5	9250	509	8741	324	185
4th	Off	340	2	340	14	326	10	3	11365	5	9250	509	8741	324	185

Table A-5: Adjusted Peak Hour Approach/Departure Volumes – LOS C Existing AM Hours

Intersection		North Leg		South Leg		East Leg		West Leg		Northwest Leg		Southeast Leg	
		Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure
1	Main / La Veta	1128	1169	995	1279	885	833	824	551	--	N/A	--	N/A
2	Main / Memory	2510	1910	2204	2588	776	776	520	736	--	N/A	--	N/A
3	Main / Edgewood / I-5	1242	1234	576	1356	207	221	144	51	--	N/A	693	N/A
4	Broadway / Santa Clara	1378	270	480	1454	64	701	503	0	--	N/A	--	N/A
5	Main / Santa Clara / I-5	1358	607	940	1827	0	839	606	77	446	N/A	--	N/A
6	Main / 17th	1247	884	951	1452	1655	1454	1460	1523	--	N/A	--	N/A
7	Penn / 17th	0	0	504	1516	3790	2504	3302	3576	--	N/A	--	N/A
8	Santiago / 17th	325	153	723	302	1039	901	1213	1944	--	N/A	--	N/A
9	Penn / I-5 SB Ramp	811	264	243	273	290	807	0	0	--	N/A	--	N/A
10	Main / 4th	2166	2032	2028	2150	336	142	126	332	--	N/A	--	N/A
11	Grand / 4th	1288	961	897	1309	661	571	613	618	--	N/A	--	N/A
12	I-5 SB Ramp / 4th	1466	0	0	1306	1438	1480	1364	1482	--	N/A	--	N/A
13	I-5 NB Ramp / 4th	0	3426	2928	0	6276	5910	4446	4314	--	N/A	--	N/A
14	Cabrillo / 4th	780	317	321	647	733	803	969	1036	--	N/A	--	N/A
15	Tustin / 4th	1512	837	596	902	1249	1267	580	931	--	N/A	--	N/A
16	Main / 1st	1045	912	961	1084	1008	1437	1487	1068	--	N/A	--	N/A
17	Grand / 1st	1334	858	739	1418	911	1047	1282	943	--	N/A	--	N/A
18	I-5 SB Ramp / 1st	0	0	0	7134	6294	4752	10632	5040	--	N/A	--	N/A
19	Cabrillo / 1st	382	371	8	82	934	612	792	1051	--	N/A	--	N/A
20	Tustin / 1st	1394	978	0	0	1630	1098	1076	2024	--	N/A	--	N/A
21	I-5 Ramp / Santa Ana	924	988	0	0	2756	1542	1246	2396	--	N/A	--	N/A
22	Grand / Santa Ana	2104	1021	961	1491	305	244	732	1346	--	N/A	--	N/A
23	Mabury / Elk / 1st	1025	0	338	228	840	1772	1016	1219	--	N/A	--	N/A
24	Lyon / 1st	234	42	486	748	2388	2032	1978	2264	--	N/A	--	N/A
25	Cabrillo / State Fund	3882	1926	2004	3324	0	0	84	720	--	N/A	--	N/A
26	Cabrillo / Xerox Center	3324	2004	2226	2292	0	0	102	1356	--	N/A	--	N/A
27	Golden Circle / 4th	72	282	510	1206	5286	4392	4692	4680	--	N/A	--	N/A
28	Golden Circle / 1st	342	678	696	780	6048	3720	3744	5652	--	N/A	--	N/A
29	SR-55 SB Ramps / 4th	38	0	0	278	348	120	282	269	--	N/A	--	N/A
30	SR-55 NB Ramps / 4th	0	1680	1646	0	3608	1450	1098	3222	--	N/A	--	N/A

Table A-6: Adjusted Peak Hour Approach/Departure Volumes – LOS C Existing PM Hours

Intersection		North Leg		South Leg		East Leg		West Leg		Northwest Leg		Southeast Leg	
		Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure
1	Main / La Veta	1177	1241	1503	1307	885	976	772	813	--	N/A	--	N/A
2	Main / Memory	1351	1354	1315	1505	382	463	617	343	--	N/A	--	N/A
3	Main / Edgewood / I-5	1599	1241	1022	1556	249	187	65	314	--	N/A	363	N/A
4	Broadway / Santa Clara	1268	641	996	1339	126	812	402	0	--	N/A	--	N/A
5	Main / Santa Clara / I-5	1553	996	1506	1819	0	1278	749	88	373	N/A	--	N/A
6	Main / 17th	1097	1294	1366	1057	1445	1744	1672	1485	--	N/A	--	N/A
7	Penn / 17th	0	0	892	1162	2944	3592	3816	2898	--	N/A	--	N/A
8	Santiago / 17th	179	219	481	509	1238	1182	1747	1735	--	N/A	--	N/A
9	Penn / I-5 SB Ramp	579	442	437	209	351	716	0	0	--	N/A	--	N/A
10	Main / 4th	2066	2174	2142	2058	390	316	300	350	--	N/A	--	N/A
11	Grand / 4th	986	1742	1534	996	928	603	632	739	--	N/A	--	N/A
12	I-5 SB Ramp / 4th	952	0	0	932	1738	1438	1390	1710	--	N/A	--	N/A
13	I-5 NB Ramp / 4th	0	1866	670	0	3112	1616	1428	1728	--	N/A	--	N/A
14	Cabrillo / 4th	430	562	767	257	1121	786	842	1555	--	N/A	--	N/A
15	Tustin / 4th	1010	1176	978	536	1095	1451	967	887	--	N/A	--	N/A
16	Main / 1st	1054	1015	1013	958	1381	1287	1280	1468	--	N/A	--	N/A
17	Grand / 1st	1011	1575	1400	862	904	1063	1282	1097	--	N/A	--	N/A
18	I-5 SB Ramp / 1st	0	0	0	2294	1946	2478	4192	1366	--	N/A	--	N/A
19	Cabrillo / 1st	444	557	66	12	744	950	1238	973	--	N/A	--	N/A
20	Tustin / 1st	996	1644	4	6	1258	1162	1756	1202	--	N/A	--	N/A
21	I-5 Ramp / Santa Ana	168	380	0	0	340	402	565	291	--	N/A	--	N/A
22	Grand / Santa Ana	1045	1941	1764	967	263	296	899	767	--	N/A	--	N/A
23	Mabury / Elk / 1st	843	0	460	219	683	2096	1443	1114	--	N/A	--	N/A
24	Lyon / 1st	140	90	910	728	2238	2890	2716	2296	--	N/A	--	N/A
25	Cabrillo / State Fund	1542	4602	3978	2094	0	0	1224	48	--	N/A	--	N/A
26	Cabrillo / Xerox Center	2094	3978	3342	2664	0	0	1524	318	--	N/A	--	N/A
27	Golden Circle / 4th	144	106	580	280	2166	1954	1746	2296	--	N/A	--	N/A
28	Golden Circle / 1st	822	804	426	372	4176	5724	5646	4170	--	N/A	--	N/A
29	SR-55 SB Ramps / 4th	1390	0	0	1842	2398	2524	2904	2326	--	N/A	--	N/A
30	SR-55 NB Ramps / 4th	0	1119	543	0	1687	1223	1300	1188	--	N/A	--	N/A

Table A-7: Adjusted Peak Hour Approach/Departure Volumes – LOS C 2040 No Build AM

Intersection		North Leg		South Leg		East Leg		West Leg		Northwest Leg		Southeast Leg	
		Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure
1	Main / La Veta	2420	2440	2130	2680	1790	1740	1670	1150	0	N/A	0	N/A
2	Main / Memory	2690	2040	2370	2750	800	830	540	780	0	N/A	0	N/A
3	Main / Edgewood / I-5	1325	1275	620	1435	215	240	155	60	0	N/A	695	N/A
4	Broadway / Santa Clara	1435	285	505	1505	65	725	510	0	0	N/A	0	N/A
5	Main / Santa Clara / I-5	1455	640	1005	1915	0	875	605	85	450	N/A	0	N/A
6	Main / 17th	1335	945	1020	1555	1775	1560	1565	1635	0	N/A	0	N/A
7	Penn / 17th	0	0	540	1630	4060	2680	3540	3830	0	N/A	0	N/A
8	Santiago / 17th	355	170	780	325	1115	975	1305	2085	0	N/A	0	N/A
9	Penn / I-5 SB Ramp	900	300	270	310	345	905	0	0	0	N/A	0	N/A
10	Main / 4th	2300	2150	2150	2290	380	170	150	370	0	N/A	0	N/A
11	Grand / 4th	1340	1020	935	1370	730	615	675	675	0	N/A	0	N/A
12	I-5 SB Ramp / 4th	1480	0	0	1360	1570	1570	1490	1610	0	N/A	0	N/A
13	I-5 NB Ramp / 4th	0	3480	3150	0	6600	6420	4860	4710	0	N/A	0	N/A
14	Cabrillo / 4th	915	355	380	740	800	895	1060	1165	0	N/A	0	N/A
15	Tustin / 4th	2355	1050	935	1345	1375	1770	645	1145	0	N/A	0	N/A
16	Main / 1st	1110	975	1020	1165	1120	1590	1655	1175	0	N/A	0	N/A
17	Grand / 1st	616	407	342	667	451	511	633	458	0	N/A	0	N/A
18	I-5 SB Ramp / 1st	0	0	0	7560	6930	5250	11460	5580	0	N/A	0	N/A
19	Cabrillo / 1st	450	415	20	95	1035	685	875	1185	0	N/A	0	N/A
20	Tustin / 1st	2170	1090	0	0	1820	1450	1200	2650	0	N/A	0	N/A
21	I-5 Ramp / Santa Ana	465	665	0	0	1535	795	725	1265	0	N/A	0	N/A
22	Grand / Santa Ana	2185	1065	1000	1550	320	255	765	1400	0	N/A	0	N/A
23	Mabury / Elk / 1st	1090	0	360	250	935	1930	1130	1335	0	N/A	0	N/A
24	Lyon / 1st	250	60	520	820	2660	2250	2200	2500	0	N/A	0	N/A
25	Cabrillo / State Fund	4470	2250	2340	3900	0	0	90	750	0	N/A	0	N/A
26	Cabrillo / Xerox Center	3720	2340	2580	2700	0	0	120	1380	0	N/A	0	N/A
27	Golden Circle / 4th	120	300	600	1350	5790	4830	5130	5160	0	N/A	0	N/A
28	Golden Circle / 1st	390	810	750	810	6690	4110	4170	6270	0	N/A	0	N/A
29	SR-55 SB Ramps / 4th	39	0	0	329	399	220	381	270	0	N/A	0	N/A
30	SR-55 NB Ramps / 4th	0	1690	1650	0	4110	2400	2050	3720	0	N/A	0	N/A

Table A-8: Adjusted Peak Hour Approach/Departure Volumes – LOS C Existing 2040 No Build PM

Intersection		North Leg		South Leg		East Leg		West Leg		Northwest Leg		Southeast Leg	
		Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure
1	Main / La Veta	1205	1275	1535	1335	915	1005	800	840	0	N/A	0	N/A
2	Main / Memory	1380	1385	1340	1540	400	475	640	360	0	N/A	0	N/A
3	Main / Edgewood / I-5	1630	1275	1045	1590	260	195	75	325	0	N/A	375	N/A
4	Broadway / Santa Clara	1330	695	1045	1430	155	890	485	0	0	N/A	0	N/A
5	Main / Santa Clara / I-5	1580	1040	1540	1945	0	1385	900	95	445	N/A	0	N/A
6	Main / 17th	1120	1340	1400	1095	1545	1845	1785	1570	0	N/A	0	N/A
7	Penn / 17th	0	0	950	1250	3140	3820	4070	3090	0	N/A	0	N/A
8	Santiago / 17th	190	235	510	545	1320	1260	1865	1845	0	N/A	0	N/A
9	Penn / I-5 SB Ramp	585	470	450	225	380	720	0	0	0	N/A	0	N/A
10	Main / 4th	2080	2190	2150	2080	440	360	340	380	0	N/A	0	N/A
11	Grand / 4th	1030	1835	1595	1050	1015	650	695	800	0	N/A	0	N/A
12	I-5 SB Ramp / 4th	970	0	0	990	1890	1530	1510	1850	0	N/A	0	N/A
13	I-5 NB Ramp / 4th	0	1880	860	0	3230	1820	1550	1940	0	N/A	0	N/A
14	Cabrillo / 4th	540	655	960	310	1215	885	915	1780	0	N/A	0	N/A
15	Tustin / 4th	1355	1445	1310	690	1195	1765	1060	1020	0	N/A	0	N/A
16	Main / 1st	1060	1055	1020	1000	1600	1460	1490	1655	0	N/A	0	N/A
17	Grand / 1st	234	371	323	204	226	261	319	266	0	N/A	0	N/A
18	I-5 SB Ramp / 1st	0	0	0	2300	2160	2860	4580	1580	0	N/A	0	N/A
19	Cabrillo / 1st	555	640	80	15	860	1105	1425	1160	0	N/A	0	N/A
20	Tustin / 1st	1000	1920	20	10	1460	1290	2050	1310	0	N/A	0	N/A
21	I-5 Ramp / Santa Ana	180	433	0	0	380	440	636	322	0	N/A	0	N/A
22	Grand / Santa Ana	1125	2100	1895	1055	300	335	1005	835	0	N/A	0	N/A
23	Mabury / Elk / 1st	895	0	485	250	795	2355	1675	1245	0	N/A	0	N/A
24	Lyon / 1st	150	110	990	840	2600	3310	3150	2630	0	N/A	0	N/A
25	Cabrillo / State Fund	1950	5610	4980	2490	0	0	1260	90	0	N/A	0	N/A
26	Cabrillo / Xerox Center	2580	4770	4140	3150	0	0	1530	330	0	N/A	0	N/A
27	Golden Circle / 4th	160	120	660	310	2360	2140	1900	2510	0	N/A	0	N/A
28	Golden Circle / 1st	930	930	450	450	4860	6570	6540	4830	0	N/A	0	N/A
29	SR-55 SB Ramps / 4th	740	0	0	1035	1390	1360	1525	1260	0	N/A	0	N/A
30	SR-55 NB Ramps / 4th	0	1135	570	0	1865	1270	1360	1390	0	N/A	0	N/A

Table A-9: Adjusted Peak Hour Approach/Departure Volumes – LOS C 2040 5B AM Peak Hour

Intersection		North Leg		South Leg		East Leg		West Leg		Northwest Leg		Southeast Leg	
		Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure
1	Main / La Veta	1216	1231	1078	1352	895	872	841	575	0	N/A	0	N/A
2	Main / Memory	2668	2022	2324	2724	800	818	540	768	0	N/A	0	N/A
3	Main / Edgewood / I-5	1310	1250	587	1319	214	237	0	0	0	N/A	695	N/A
4	Broadway / Santa Clara	1510	285	505	1573	65	732	510	0	0	N/A	0	N/A
5	Main / Santa Clara / I-5	1324	609	992	1827	0	904	612	85	497	N/A	0	N/A
6	Main / 17th	1264	932	1020	1505	1778	1555	1565	1635	0	N/A	0	N/A
7	Penn / 17th	0	0	582	1630	4056	2702	3530	3836	0	N/A	0	N/A
8	Santiago / 17th	355	170	780	336	1115	975	1316	2085	0	N/A	0	N/A
9	Penn / I-5 SB Ramp	900	320	270	310	365	905	0	0	0	N/A	0	N/A
10	Main / 4th	2300	2150	2150	2290	380	170	150	370	0	N/A	0	N/A
11	Grand / 4th	1340	1020	935	1370	730	615	675	675	0	N/A	0	N/A
12	I-5 SB Ramp / 4th	1480	0	0	1360	1570	1570	1490	1610	0	N/A	0	N/A
13	I-5 NB Ramp / 4th	0	3480	3150	0	6600	6420	4860	4710	0	N/A	0	N/A
14	Cabrillo / 4th	915	355	380	740	800	895	1060	1165	0	N/A	0	N/A
15	Tustin / 4th	2355	1050	935	1345	1375	1770	645	1145	0	N/A	0	N/A
16	Main / 1st	1110	975	1020	1165	1120	1590	1655	1175	0	N/A	0	N/A
17	Grand / 1st	616	407	342	667	451	511	633	458	0	N/A	0	N/A
18	I-5 SB Ramp / 1st	0	0	0	7560	6930	5250	11460	5580	0	N/A	0	N/A
19	Cabrillo / 1st	450	415	20	95	1035	685	875	1185	0	N/A	0	N/A
20	Tustin / 1st	2170	1090	0	0	1820	1450	1200	2650	0	N/A	0	N/A
21	I-5 Ramp / Santa Ana	465	665	0	0	1535	795	725	1265	0	N/A	0	N/A
22	Grand / Santa Ana	2185	1065	1000	1550	320	255	765	1400	0	N/A	0	N/A
23	Mabury / Elk / 1st	1090	0	360	250	935	1930	1130	1335	0	N/A	0	N/A
24	Lyon / 1st	250	60	520	820	2660	2250	2200	2500	0	N/A	0	N/A
25	Cabrillo / State Fund	4470	2250	2340	3900	0	0	90	750	0	N/A	0	N/A
26	Cabrillo / Xerox Center	3720	2340	2580	2700	0	0	120	1380	0	N/A	0	N/A
27	Golden Circle / 4th	120	300	600	1350	5790	4830	5130	5160	0	N/A	0	N/A
28	Golden Circle / 1st	390	810	750	810	6690	4110	4170	6270	0	N/A	0	N/A
29	SR-55 SB Ramps / 4th	39	0	0	329	399	220	381	270	0	N/A	0	N/A
30	SR-55 NB Ramps / 4th	0	1690	1650	0	4110	2400	2050	3720	0	N/A	0	N/A

Table A-10: Adjusted Peak Hour Approach/Departure Volumes – LOS C 2040 5B PM Peak Hour

Intersection		North Leg		South Leg		East Leg		West Leg		Northwest Leg		Southeast Leg	
		Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure
1	Main / La Veta	1212	1393	1666	1348	915	1018	806	840	0	N/A	0	N/A
2	Main / Memory	1273	1399	1315	1407	400	469	640	353	0	N/A	0	N/A
3	Main / Edgewood / I-5	1495	1250	879	1564	259	194	0	0	0	N/A	375	N/A
4	Broadway / Santa Clara	1357	695	1045	1453	155	894	485	0	0	N/A	0	N/A
5	Main / Santa Clara / I-5	1553	878	1481	1915	0	1511	904	95	461	N/A	0	N/A
6	Main / 17th	1101	1282	1400	1082	1527	1879	1785	1570	0	N/A	0	N/A
7	Penn / 17th	0	0	962	1250	3100	3896	4138	3054	0	N/A	0	N/A
8	Santiago / 17th	190	235	510	583	1320	1260	1903	1845	0	N/A	0	N/A
9	Penn / I-5 SB Ramp	585	477	450	225	387	720	0	0	0	N/A	0	N/A
10	Main / 4th	2080	2190	2150	2080	440	360	340	380	0	N/A	0	N/A
11	Grand / 4th	1030	1835	1595	1050	1015	650	695	800	0	N/A	0	N/A
12	I-5 SB Ramp / 4th	970	0	0	990	1890	1530	1510	1850	0	N/A	0	N/A
13	I-5 NB Ramp / 4th	0	1880	860	0	3230	1820	1550	1940	0	N/A	0	N/A
14	Cabrillo / 4th	540	655	960	310	1215	885	915	1780	0	N/A	0	N/A
15	Tustin / 4th	1355	1445	1310	690	1195	1765	1060	1020	0	N/A	0	N/A
16	Main / 1st	1060	1055	1020	1000	1600	1460	1490	1655	0	N/A	0	N/A
17	Grand / 1st	234	371	323	204	226	261	319	266	0	N/A	0	N/A
18	I-5 SB Ramp / 1st	0	0	0	2300	2160	2860	4580	1580	0	N/A	0	N/A
19	Cabrillo / 1st	555	640	80	15	860	1105	1425	1160	0	N/A	0	N/A
20	Tustin / 1st	1000	1920	20	10	1460	1290	2050	1310	0	N/A	0	N/A
21	I-5 Ramp / Santa Ana	180	433	0	0	380	440	636	322	0	N/A	0	N/A
22	Grand / Santa Ana	1125	2100	1895	1055	300	335	1005	835	0	N/A	0	N/A
23	Mabury / Elk / 1st	895	0	485	250	795	2355	1675	1245	0	N/A	0	N/A
24	Lyon / 1st	150	110	990	840	2600	3310	3150	2630	0	N/A	0	N/A
25	Cabrillo / State Fund	1950	5610	4980	2490	0	0	1260	90	0	N/A	0	N/A
26	Cabrillo / Xerox Center	2580	4770	4140	3150	0	0	1530	330	0	N/A	0	N/A
27	Golden Circle / 4th	160	120	660	310	2360	2140	1900	2510	0	N/A	0	N/A
28	Golden Circle / 1st	930	930	450	450	4860	6570	6540	4830	0	N/A	0	N/A
29	SR-55 SB Ramps / 4th	740	0	0	1035	1390	1360	1525	1260	0	N/A	0	N/A
30	SR-55 NB Ramps / 4th	0	1135	570	0	1865	1270	1360	1390	0	N/A	0	N/A

Table A-11: Adjusted Peak Hour Approach/Departure Volumes – LOS C Existing

	Intersection		1	3	4	5	7	8	9	21	22
			Main / La Veta	Main / Edgewood / I-5	Broadway / Santa Clara	Main / Santa Clara / I-5	Penn / 17th	Santiago / 17th	Penn / I-5 SB Ramp	I-5 Ramp / Santa Ana	Grand / Santa Ana
Existing	North Leg	Approach	1177	1599	1378	1553	0	325	811	924	2104
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1177	1599	1378	1553	0	325	811	924	2104
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	1241	1241	641	996	0	219	442	988	1941
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1241	1241	641	996	0	219	442	988	1941
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	South Leg	Approach	1503	1022	996	1506	892	723	437	0	1764
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1503	1022	996	1506	892	723	437	0	1764
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	1307	1556	1454	1827	1516	509	273	0	1491
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1307	1556	1454	1827	1516	509	273	0	1491
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	East Leg	Approach	885	249	126	0	3790	1238	351	2756	305
		Truck	0	0	0	0	0	0	0	0	0
		Auto	885	249	126	0	3790	1238	351	2756	305
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	976	221	812	1278	3592	1182	807	1542	296
		Truck	0	0	0	0	0	0	0	0	0
		Auto	976	221	812	1278	3592	1182	807	1542	296
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	West Leg	Approach	824	144	503	749	3816	1747	0	1246	899
		Truck	0	0	0	0	0	0	0	0	0
		Auto	824	144	503	749	3816	1747	0	1246	899
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	813	314	0	88	3576	1944	0	2396	1346

Table A-11: Adjusted Peak Hour Approach/Departure Volumes – LOS C Existing

	Intersection		1	3	4	5	7	8	9	21	22
			Main / La Veta	Main / Edgewood / I-5	Broadway / Santa Clara	Main / Santa Clara / I-5	Penn / 17th	Santiago / 17th	Penn / I-5 SB Ramp	I-5 Ramp / Santa Ana	Grand / Santa Ana
		Truck	0	0	0	0	0	0	0	0	0
		Auto	813	314	0	88	3576	1944	0	2396	1346
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	Northwest Leg	Approach	0	0	0	446	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	446	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	0	0	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	Southeast Leg	Approach	0	693	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	693	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	0	0	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0

Table A-12: Adjusted Peak Hour Approach/Departure Volumes – LOS C No Build 2040

	Intersection		1	3	4	5	7	8	9	21	22
			Main / La Veta	Main / Edgewood / I-5	Broadway / Santa Clara	Main / Santa Clara / I-5	Penn / 17th	Santiago / 17th	Penn / I-5 SB Ramp	I-5 Ramp / Santa Ana	Grand / Santa Ana
2040 No Build	North Leg	Approach	2420	1630	1435	1580	0	355	900	465	2185
		Truck	0	0	0	0	0	0	0	0	0
		Auto	2420	1630	1435	1580	0	355	900	465	2185
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	2440	1275	695	1040	0	235	470	665	2100
		Truck	0	0	0	0	0	0	0	0	0
		Auto	2440	1275	695	1040	0	235	470	665	2100
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	South Leg	Approach	2130	1045	1045	1540	950	780	450	0	1895
		Truck	0	0	0	0	0	0	0	0	0
		Auto	2130	1045	1045	1540	950	780	450	0	1895
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	2680	1590	1505	1945	1630	545	310	0	1550
		Truck	0	0	0	0	0	0	0	0	0
		Auto	2680	1590	1505	1945	1630	545	310	0	1550
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	East Leg	Approach	1790	260	155	0	4060	1320	380	1535	320
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1790	260	155	0	4060	1320	380	1535	320
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	1740	240	890	1385	3820	1260	905	795	335
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1740	240	890	1385	3820	1260	905	795	335
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	West Leg	Approach	1670	155	510	900	4070	1865	0	725	1005
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1670	155	510	900	4070	1865	0	725	1005
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0

Table A-12: Adjusted Peak Hour Approach/Departure Volumes – LOS C No Build 2040											
	Intersection		1	3	4	5	7	8	9	21	22
			Main / La Veta	Main / Edgewood / I-5	Broadway / Santa Clara	Main / Santa Clara / I-5	Penn / 17th	Santiago / 17th	Penn / I-5 SB Ramp	I-5 Ramp / Santa Ana	Grand / Santa Ana
		Departure	1150	325	0	95	3830	2085	0	1265	1400
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1150	325	0	95	3830	2085	0	1265	1400
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	Northwest Leg	Approach	0	0	0	450	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	450	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	0	0	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	Southeast Leg	Approach	0	695	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	695	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	0	0	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0

Table A-13: Adjusted Peak Hour Approach/Departure Volumes – LOS C Build 2040

	Intersection		1	3	4	5	7	8	9	21	22
			Main / La Veta	Main / Edgewood / I-5	Broadway / Santa Clara	Main / Santa Clara / I-5	Penn / 17th	Santiago / 17th	Penn / I-5 SB Ramp	I-5 Ramp / Santa Ana	Grand / Santa Ana
2040 5B	North Leg	Approach	1216	1495	1510	1553	0	355	900	465	2185
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1216	1495	1510	1553	0	355	900	465	2185
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	1393	1250	695	878	0	235	477	665	2100
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1393	1250	695	878	0	235	477	665	2100
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	South Leg	Approach	1666	879	1045	1481	962	780	450	0	1895
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1666	879	1045	1481	962	780	450	0	1895
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	1352	1564	1573	1915	1630	583	310	0	1550
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1352	1564	1573	1915	1630	583	310	0	1550
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	East Leg	Approach	915	259	155	0	4056	1320	387	1535	320
		Truck	0	0	0	0	0	0	0	0	0
		Auto	915	259	155	0	4056	1320	387	1535	320
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	1018	237	894	1511	3896	1260	905	795	335
		Truck	0	0	0	0	0	0	0	0	0
		Auto	1018	237	894	1511	3896	1260	905	795	335
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	West Leg	Approach	841	0	510	904	4138	1903	0	725	1005
		Truck	0	0	0	0	0	0	0	0	0
		Auto	841	0	510	904	4138	1903	0	725	1005
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0

Table A-13: Adjusted Peak Hour Approach/Departure Volumes – LOS C Build 2040

	Intersection		1	3	4	5	7	8	9	21	22
			Main / La Veta	Main / Edgewood / I-5	Broadway / Santa Clara	Main / Santa Clara / I-5	Penn / 17th	Santiago / 17th	Penn / I-5 SB Ramp	I-5 Ramp / Santa Ana	Grand / Santa Ana
		Departure	840	0	0	95	3836	2085	0	1265	1400
		Truck	0	0	0	0	0	0	0	0	0
		Auto	840	0	0	95	3836	2085	0	1265	1400
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	Northwest Leg	Approach	0	0	0	497	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	497	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	0	0	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
	Southeast Leg	Approach	0	695	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	695	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0
		Departure	0	0	0	0	0	0	0	0	0
		Truck	0	0	0	0	0	0	0	0	0
		Auto	0	0	0	0	0	0	0	0	0
		MT	0	0	0	0	0	0	0	0	0
		HT	0	0	0	0	0	0	0	0	0

Table A-14: Freeway Mainline LOS Summary – Existing Conditions – HOV Lane Alternative Analysis Locations

Map Ref #	Locations		Lanes		AM Peak Hour				PM Peak Hour			
			ML	Aux	Speed	Volume	Density1	LOS	Speed	Volume	Density1	LOS
1	SR-57 between Chapman off-ramp and SR-22 off- ramp	SB	3	0	43	7,323	>45.0	F	55	7,523	67.4	F
2	I-5 between Chapman on-ramp and SR-22 off-ramp	SB	5	2	47	8,763	30.2	D	65	7,746	26	C
5	I-5 between Main on-ramp and 17th/Penn off-ramp	SB	5	1	38	9,585	34.6	D	59	9,340	33.2	D
6	I-5 between 17th on-ramp and Santa Ana off-ramp	SB	5	1	49	10,102	38.2	E	61	9,705	35.4	E
8	I-5 between Grand on-ramp and Fourth off-ramp	SB	5	1	43	9,794	36	E	59	9,905	36.8	E
9	I-5 between Fourth off-ramp and First Street on-ramp	SB	5	1	39	9,061	31.7	D	57	9,429	33.7	D
8	I-5 between Fourth on-ramp and Grand off-ramp	NB	5	1	62	11,583	>45.0	F	43	9,466	33.9	D
6	I-5 between Grand Ave on-ramp and 17th off-ramp	NB	5	1	63	10,920	>45.0	F	39	8,890	30.8	D
5	I-5 between 17th on-ramp and Main/Broadway off- ramp	NB	5	1	36	11,408	>45.0	F	23	10,088	38.1	E
4	I-5 between Main on-ramp and SR-22 exit	NB	4	1	68	9,225	>45.0	F	62	8,915	>45.0	F
2	I-5 between SR-22 on-ramp and Chapman off-ramp	NB	5	1	69	9,244	32.6	D	66	10,064	37.9	E
1	SR-57 between Chapman off-ramp and Chapman on- ramp	NB	3	0	64	7,273	60.3	F	51	6,069	39.1	E

**This table is from the approved Final Traffic Report (Table 3-1).

Table A-15: HOV LOS Summary – Existing (2011) Conditions

Map Ref #	Location		# of Lanes	AM Peak Hour				PM Peak Hour			
				Speed1	Volume	Capacity (V/C)	LOS	Speed1	Volume	Capacity (V/C)	LOS
1	SR-57 north of I-5 HOV merge	SB	1	45	1,245	0.66	C	49	1,498	0.79	D
2	I-5 north of SR-57 HOV merge	SB	1	51	1,058	0.56	C	61	902	0.47	B
3	I-5 at SR-57 HOV merge	SB	1	32	*2,303*	*1.21*	*F*	*50*	*2,400*	*1.26*	*F*
4	I-5 between SR-57 HOV merge and Main HOV off-ramp2	SB	1	32	1,550	0.82	D	50	1,550	0.82	D
5	I-5 between Main HOV off-ramp and HOV entrance south of Lincoln overcrossing	SB	1	60	1,406	0.74	D	63	1,485	0.78	D
7	I-5 between HOV entrance and Grand HOV on-ramp	SB	1	57	*1,746*	*0.92*	*E*	*57*	*1,762*	*0.93*	*E*
8	I-5 between Grand HOV on-ramp and SR-55 HOV diverge	SB	2	55	2,016	0.53	C	56	1,996	0.53	C
9	I-5 south of SR-55 HOV diverge	SB	1	53	1,246	0.66	C	52	1,379	0.73	D
11	SR-55 south of I-5 HOV diverge	SB	1	53	769	0.4	B	52	618	0.33	B
11	SR-55 south of I-5 HOV merge	NB	1	54	486	0.26	A	42	804	0.42	B
9	I-5 south of SR-55 HOV merge	NB	1	63	1,127	0.59	C	38	1,319	0.69	C
8	I-5 between SR-55 HOV merge and Grand HOV off-ramp	NB	2	61	1,613	0.42	B	49	2,123	0.56	C
7	I-5 at HOV lane merge (2 to 1 lane)	NB	1	62	1,308	0.69	C	*48*	*1,882*	*0.99*	*E*
6	I-5 between HOV lane merge and HOV lane exit north of Lincoln overcrossing	NB	1	65	1,308	0.69	C	*56*	*1,882*	*0.99*	*E*
5	I-5 between HOV exit and Main HOV off-ramp	NB	1	69	945	0.5	B	*58*	*1,633*	*0.86*	*D*
4	I-5 between Main HOV on-ramp and SR-57 diverge	NB	1	63	996	0.52	C	*56*	*1,947*	*1.02*	*F*
2	I-5 north of SR-57 diverge	NB	1	64	594	0.31	B	59	1,305	0.69	C
1	SR-57 north of I-5 HOV diverge	NB	1	62	399	0.21	A	57	642	0.34	B

**This table is from the approved Final Traffic Report (Table 3-3).

Table A-16: Freeway Mainline LOS Summary – Future Year (2040) Conditions – No Build

Map Ref #	Locations		Lanes		AM Peak Hour			PM Peak Hour		
			GP	Aux	Volume	Density1	LOS	Volume	Density1	LOS
1	SR-57 between Chapman off-ramp and SR-22 off-ramp	SB	3	0	8,005	>45.0	F	8,125	>45.0	F
2	I-5 between Chapman on-ramp and SR-22 off-ramp	SB	5	2	10,445	41.1	E	8,990	31.3	D
5	I-5 between Main on-ramp and 17th/Penn off-ramp	SB	5	1	11,605	>45.0	F	10,860	>45.0	F
6	I-5 between 17th on-ramp and Santa Ana off-ramp	SB	5	1	12,170	>45.0	F	11,200	>45.0	F
8	I-5 between Grand on-ramp and Fourth off-ramp	SB	5	1	12,025	>45.0	F	11,490	>45.0	F
9	I-5 between Fourth off-ramp and First Street on-ramp	SB	5	1	11,290	>45.0	F	11,010	>45.0	F
8	I-5 between Fourth on-ramp and Grand off-ramp	NB	5	1	12,433	>45.0	F	10,629	42.8	E
6	I-5 between Grand Ave on-ramp and 17th off-ramp	NB	5	1	11,768	>45.0	F	9,939	37	E
5	I-5 between 17th on-ramp and Main/Broadway off-ramp	NB	5	1	12,348	>45.0	F	11,239	>45.0	F
4	I-5 between Main on-ramp and SR- 22 exit	NB	4	1	10,408	>45.0	F	10,134	>45.0	F
2	I-5 between SR-22 on-ramp and Chapman off-ramp	NB	5	1	9,858	36.5	E	11,254	>45.0	F
1	SR-57 between Chapman off-ramp and Chapman on-ramp	NB	3	0	8,140	>45.0	F	6,740	>45.0	F

**This table is from the approved Final Traffic Report (Table 4-27).

Table A-17: HOV LOS Summary – Future Year (2040) Conditions – No Build

Map Ref #	Location		# of Lanes	AM Peak Hour			PM Peak Hour		
				Vol.	Capacity (V/C)	LOS	Vol.	Capacity (V/C)	LOS
1	SR-57 north of I-5 HOV merge	SB	1	1,276	0.67	C	1,597	0.84	D
2	I-5 north of SR-57 HOV merge	SB	1	1,209	0.64	C	1,048	0.55	C
3	I-5 at SR-57 HOV merge	SB	1	*2,485*	*1.31*	*F*	*2,645*	*1.39*	*F*
4	I-5 between SR-57 HOV merge and Main HOV off-ramp1	SB	1	1,550	0.82	D	1,550	0.82	D
5	I-5 between Main HOV off-ramp and HOV entrance south of Lincoln overcrossing	SB	1	1,406	0.74	D	1,485	0.78	D
7	I-5 between HOV entrance and Grand HOV on-ramp	SB	1	*1,746*	*0.92*	*E*	*1,765*	*0.93*	*E*
8	I-5 between Grand HOV on-ramp and SR-55 HOV diverge	SB	2	2,061	0.54	C	2,020	0.53	C
9	I-5 south of SR-55 HOV diverge	SB	1	1,292	0.68	C	1,402	0.74	D
11	SR-55 south of I-5 HOV diverge	SB	1	769	0.4	B	618	0.33	B
11	SR-55 south of I-5 HOV merge	NB	1	575	0.3	B	988	0.52	C
9	I-5 south of SR-55 HOV merge	NB	1	1,260	0.66	C	1,477	0.78	D
8	I-5 between SR-55 HOV merge and Grand HOV off-ramp	NB	2	1,835	0.48	B	2,465	0.65	C
7	I-5 at HOV lane merge (2 to 1 lane)	NB	1	1,500	0.79	D	*2,140*	*1.13*	*F*
6	I-5 between HOV lane merge and HOV lane exit north of Lincoln overcrossing	NB	1	1,500	0.79	D	*1,900*	*1*	*F*
5	I-5 between HOV exit and Main HOV off-ramp	NB	1	1,050	0.55	C	*1,649*	*0.87*	*D*
4	I-5 between Main HOV on-ramp and SR-57 diverge	NB	1	1,105	0.58	C	*1,964*	*1.03*	*F*
2	I-5 north of SR-57 diverge	NB	1	355	0.19	A	1,316	0.69	C
1	SR-57 north of I-5 HOV diverge	NB	1	750	0.39	B	648	0.34	B

**This table is from the approved Final Traffic Report (Table 4-28).

Table A-18: Freeway Mainline LOS Summary – Future Year (2040) Conditions – HOV Lane Alternatives 5B

Map Ref #	Locations		Lanes		AM Peak Hour			PM Peak Hour		
			GP	Aux	Volume	Density1	LOS	Volume	Density1	LOS
1	SR-57 between Chapman off- ramp and SR-22 off-ramp	SB	3	0	8,005	>45.0	F	8,125	>45.0	F
2	I-5 between Chapman on-ramp and SR-22 off-ramp	SB	5	2	10,734	43.9	E	9,124	32	D
5	I-5 between Main on-ramp and 17th/Penn off-ramp	SB	5	1	11,641	>45.0	F	10,872	>45.0	F
6	I-5 between 17th on-ramp and Santa Ana off-ramp	SB	5	1	12,170	>45.0	F	11,200	>45.0	F
8	I-5 between Grand on-ramp and Fourth off-ramp	SB	5	1	12,025	>45.0	F	11,490	>45.0	F
9	I-5 between Fourth off-ramp and First Street on-ramp	SB	5	1	11,290	>45.0	F	11,010	>45.0	F
8	I-5 between Fourth on-ramp and Grand off-ramp	NB	5	1	12,433	>45.0	F	10,629	42.8	E
6	I-5 between Grand Ave on-ramp and 17th off-ramp	NB	5	1	11,768	>45.0	F	9,939	37	E
5	I-5 between 17th on-ramp and Main/Broadway off-ramp	NB	5	1	12,373	>45.0	F	11,380	>45.0	F
4	I-5 between Main on-ramp and SR-22 exit	NB	4	1	10,501	>45.0	F	10,565	>45.0	F
2	I-5 between SR-22 on-ramp and Chapman off-ramp	NB	5	1	9,927	37.8	E	11,691	>45.0	F
1	SR-57 between Chapman off- ramp and Chapman on-ramp	NB	3	0	8,140	>45.0	F	6,740	>45.0	F

**This table is from the approved Final Traffic Report (Table 4-44).

Table A-19: HOV LOS Summary – Future Year (2040) Conditions - HOV Lane Alternative 5B

Map Ref #	Location		# of Lanes	AM Peak Hour			PM Peak Hour		
				Vol.	Capacity (V/C)	LOS	Vol.	Capacity (V/C)	LOS
1	SR-57 north of I-5 HOV merge	SB	1	*1,975*	*1.04*	*F*	*1,840*	*0.97*	*E*
2	I-5 north of SR-57 HOV merge	SB	1	1,320	0.69	C	1,255	0.66	C
3	I-5 at SR-57 HOV merge	SB	2	3,295	0.87	D	2,960	0.78	D
4	I-5 between SR-57 HOV merge and Main HOV off-ramp	SB	2	3,295	0.87	D	2,960	0.78	D
5	I-5 between Main HOV off-ramp and HOV entrance south of Lincoln overcrossing	SB	2	3,295	0.87	D	2,960	0.78	D
7	I-5 between HOV entrance and Grand HOV on-ramp	SB	2	*3,635*	*0.96*	*E*	3,240	0.85	D
8	I-5 between Grand HOV on-ramp and SR-55 HOV diverge	SB	2	*3,950*	*1.04*	*F*	3,495	0.92	E
9	I-5 south of SR-55 HOV diverge	SB	1	*2,295*	*1.21*	*F*	*2,570*	*1.35*	*F*
11	SR-55 south of I-5 HOV diverge	SB	1	*1,655*	*0.87*	*D*	925	0.49	B
11	SR-55 south of I-5 HOV merge	NB	1	740	0.39	B	1,395	0.73	D
9	I-5 south of SR-55 HOV merge	NB	1	1,595	0.84	D	*2,170*	*1.14*	*F*
8	I-5 between SR-55 HOV merge and Grand HOV off-ramp	NB	2	2,335	0.61	C	*3,565*	*0.94*	*E*
7	I-5 at HOV lane merge (2 to 1 lane)	NB	2	2,000	0.53	C	3,240	0.85	D
6	I-5 between HOV lane merge and HOV lane exit north of Lincoln overcrossing	NB	2	2,000	0.53	C	3,240	0.85	D
5	I-5 between HOV exit and Main HOV off-ramp	NB	2	1,550	0.41	B	2,860	0.75	D
4	I-5 between Main HOV on-ramp and SR-57 diverge	NB	2	1,550	0.41	B	2,860	0.75	D
2	I-5 north of SR-57 diverge	NB	1	836	0.44	B	*1,958*	*1.03*	*F*
1	SR-57 north of I-5 HOV diverge	NB	1	750	0.39	B	1,030	0.54	C

**This table is from the approved Final Traffic Report (Table 4-46).

Table A-20: Main Lane and Aux - TNM Traffic Input applying peak-hour traffic assumptions – Existing

Traffic Report		Comparison with WorkPlan		Percentage			Type	Percentage			Type
Max	Per lane	ML	Aux	0.945 Auto	0.035 MT	0.02 HT	ML or HOV or Aux	0.945 Auto	0.035 MT	0.02 HT	ML or HOV or Aux
7,523	2508	1,850	1,500	1748	65	37	ML	1418	53	30	Aux
8,763	1252	1,252	1,252	1183	44	25	ML	1183	44	25	Aux
9,585	1598	1,598	1,500	1510	56	32	ML	1418	53	30	Aux
10,102	1684	1,684	1,500	1591	59	34	ML	1418	53	30	Aux
9,905	1651	1,651	1,500	1560	58	33	ML	1418	53	30	Aux
9,429	1572	1,572	1,500	1486	55	31	ML	1418	53	30	Aux
11,583	1931	1,850	1,500	1748	65	37	ML	1418	53	30	Aux
10,920	1820	1,820	1,500	1720	64	36	ML	1418	53	30	Aux
11,408	1901	1,850	1,500	1748	65	37	ML	1418	53	30	Aux
9,225	1845	1,845	1,500	1744	65	37	ML	1418	53	30	Aux
10,064	1677	1,677	1,500	1585	59	34	ML	1418	53	30	Aux
7,273	2424	1,850	1,500	1748	65	37	ML	1418	53	30	Aux

Table A-21
Peak-Hour Traffic Assumptions – Work Plan

I-5 Main Lanes Volume	1,850 vph/lane	1850
N.B. Auxiliary Lane Volume	1,500 vph	1500
HOV Lane Volume	1,500 vph (no heavy trucks)	1500
Ramp Volume	1,000 vph/lane, or predicted future volume (whichever is less)	1000
I-5 Truck Percentage	5.5% (3.5% medium, 2% heavy)	
Ramps Truck Percentage	4% (3% medium, 1% heavy)	
I-5 Main Lane Speed	105 km/h (65 mph)	65
Ramp Speed	64 km/h (40 mph)	40
Loop Ramp Speed	40 km/h (25 mph)	25

Table A-22: Existing – HOV Lanes - TNM Traffic Input Applying Peak-Hour Traffic Assumptions

	Peak Lane Hourly	Speed
SR-57 north of I-5 HOV merge	1498	65
I-5 north of SR-57 HOV merge	1058	65
I-5 at SR-57 HOV merge	1500	65
I-5 between SR-57 HOV merge and Main HOV off-ramp2	1500	65
I-5 between Main HOV off-ramp and HOV entrance south of Lincoln overcrossing	1485	65
I-5 between HOV entrance and Grand HOV on-ramp	1500	65
I-5 between Grand HOV on-ramp and SR-55 HOV diverge	1008	65
I-5 south of SR-55 HOV diverge	1379	65
SR-55 south of I-5 HOV diverge	769	65
SR-55 south of I-5 HOV merge	804	65
I-5 south of SR-55 HOV merge	1319	65
I-5 between SR-55 HOV merge and Grand HOV off-ramp	1062	65
I-5 at HOV lane merge (2 to 1 lane)	1500	65
I-5 between HOV lane merge and HOV lane exit north of Lincoln overcrossing	1500	65
I-5 between HOV exit and Main HOV off-ramp	1500	65
I-5 between Main HOV on-ramp and SR-57 diverge	1500	65
I-5 north of SR-57 diverge	1305	65
SR-57 north of I-5 HOV diverge	642	65

Table A-23: Main Lane and Aux - TNM Traffic Input applying peak-hour traffic assumptions – No Build 2040

ML	SR-57 between Chapman off-ramp and SR-22 off-ramp		I-5 between Chapman on-ramp and SR-22 off-ramp		I-5 between Main on-ramp and 17th/Penn off-ramp		I-5 between 17th on-ramp and Santa Ana off-ramp		I-5 between Grand on-ramp and Fourth off-ramp		I-5 between Fourth off-ramp and First Street on-ramp		I-5 between Fourth on-ramp and Grand off-ramp		I-5 between Grand Ave on-ramp and 17th off-ramp		I-5 between 17th on-ramp and Main/Broadway off-ramp		I-5 between Main on-ramp and SR- 22 exit		I-5 between SR-22 on-ramp and Chapman off-ramp		SR-57 between Chapman off-ramp and Chapman on-ramp	
	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed
Auto	1748	65	1410	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65
MT	65	60	52	66	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
HT	37	55	30	65	37	65	37	65	37	65	37	65	37	65	37	65	37	65	37	65	37	65	37	65
Aux																								
Auto	1418	65	1410	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65
MT	53	60	52	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65
HT	30	65	30	5	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65

Table A-24: HOV Lanes - TNM Traffic Input Applying Peak-Hour Traffic Assumptions (Auto) – No Build (4-28)

	Peak Lane Hourly	Speed
I-5 north of SR-57 HOV merge	1209	65
I-5 at SR-57 HOV merge	1500	65
I-5 between SR-57 HOV merge and Main HOV off-ramp2	1500	65
I-5 between Main HOV off-ramp and HOV entrance south of Lincoln overcrossing	1485	65
I-5 between HOV entrance and Grand HOV on-ramp	1500	65
I-5 between Grand HOV on-ramp and SR-55 HOV diverge	1031	65
I-5 south of SR-55 HOV diverge	1402	65
SR-55 south of I-5 HOV diverge	769	65
SR-55 south of I-5 HOV merge	988	65
I-5 south of SR-55 HOV merge	1477	65
I-5 between SR-55 HOV merge and Grand HOV off-ramp	1233	65
I-5 at HOV lane merge (2 to 1 lane)	1500	65
I-5 between HOV lane merge and HOV lane exit north of Lincoln overcrossing	1500	65
I-5 between HOV exit and Main HOV off-ramp	1500	65
I-5 between Main HOV on-ramp and SR-57 diverge	1500	65
I-5 north of SR-57 diverge	1316	65
SR-57 north of I-5 HOV diverge	750	65

Table A-25: Main lanes and Aux - TNM Traffic Input applying peak-hour traffic assumptions (5B)

ML	SR-57 between Chapman off-ramp and SR-22 off-ramp		I-5 between Chapman on-ramp and SR-22 off-ramp		I-5 between Main on-ramp and 17th/Penn off-ramp		I-5 between 17th on-ramp and Santa Ana off-ramp		I-5 between Grand on-ramp and Fourth off-ramp		I-5 between Fourth off-ramp and First Street on-ramp		I-5 between Fourth on-ramp and Grand off-ramp		I-5 between Grand Ave on-ramp and 17th off-ramp		I-5 between 17th on-ramp and Main/Broadway off-ramp		I-5 between Main on-ramp and SR- 22 exit		I-5 between SR-22 on-ramp and Chapman off-ramp		SR-57 between Chapman off-ramp and Chapman on-ramp	
	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed	Per lane hourly volume	Speed
Auto	1748	65	1449	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65	1748	65	1564	65	1748	65
MT	65	65	54	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	58	65	65	65
HT	37	65	31	65	37	65	37	65	37	65	37	65	37	65	37	65	37	65	37	65	33	65	37	65
Aux																								
Auto	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65	1418	65
MT	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65	53	65
HT	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65	30	65

Table A-26: HOV Lanes - TNM Traffic Input Applying Peak-Hour Traffic Assumptions (Auto) – 5B (4-46)

	Peak Lane Hourly	Speed
I-5 north of SR-57 HOV merge	1320	65
I-5 at SR-57 HOV merge	3000	65
I-5 between SR-57 HOV merge and Main HOV off-ramp2	3000	65
I-5 between Main HOV off-ramp and HOV entrance south of Lincoln overcrossing	3000	65
I-5 between HOV entrance and Grand HOV on-ramp	3000	65
I-5 between Grand HOV on-ramp and SR-55 HOV diverge	3000	65
I-5 south of SR-55 HOV diverge	1500	65
SR-55 south of I-5 HOV diverge	1500	65
SR-55 south of I-5 HOV merge	1395	65
I-5 south of SR-55 HOV merge	1500	65
I-5 between SR-55 HOV merge and Grand HOV off-ramp	3000	65
I-5 at HOV lane merge (2 to 1 lane)	3000	65
I-5 between HOV lane merge and HOV lane exit north of Lincoln overcrossing	3000	65
I-5 between HOV exit and Main HOV off-ramp	2860	65
I-5 between Main HOV on-ramp and SR-57 diverge	2860	65
I-5 north of SR-57 diverge	1500	65
SR-57 north of I-5 HOV diverge	1030	65

Appendix B Noise Barrier Analysis Tables

****Please refer to the CD on the back cover of this report for TNM analysis files and model results****

Table B-1. Analysis of Barrier SW-A	Position	Total Number of Benefited Receivers
	M-057	
Number of Units Represented	4	
Existing Traffic Noise Level (dBA Leq[h])	**77.3**	
Design Year with Project Traffic Noise Level (dBA Leq[h])	**77.5**	
Design Year with Project minus Existing Traffic Noise Level (dBA Leq[h])	0.2	
6-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	**68.8**	
Predicted Noise Reduction (dB)	8.7	
Number of Benefited Receivers	4	4
8-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	**67.3**	
Predicted Noise Reduction (dB)	10.2	
Number of Benefited Receivers	4	4
10-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	**66.1**	
Predicted Noise Reduction (dB)	11.4	
Number of Benefited Receivers	4	4
12-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	65	
Predicted Noise Reduction (dB)	12.5	
Number of Benefited Receivers	4	4
14-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	64.2	
Predicted Noise Reduction (dB)	13.3	
Number of Benefited Receivers	4	4
16-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.5	
Predicted Noise Reduction (dB)	14.0	
Number of Benefited Receivers	4	4
18-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	62.9	
Predicted Noise Reduction (dB)	14.6	
Number of Benefited Receivers	4	4
20-Foot Barrier [b]		
Design Year with Project Traffic Noise Level (dBA Leq[h])	62.2	
Predicted Noise Reduction (dB)	15.3	
Number of Benefited Receivers	4	4
22-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	61.7	
Predicted Noise Reduction (dB)	15.8	
Number of Benefited Receivers	4	4
24-Foot Barrier		
Design Year with Project Traffic Noise Level (dBA Leq[h])	61.4	
Predicted Noise Reduction (dB)	16.1	
Number of Benefited Receivers	4	4

Notes: NA - Not applicable, wall not evaluated at this height because it is lower than the height of the e

a Traffic noise levels that approach or exceed 67 dBA Leq(h) are shown in bold.

b 14-foot-high barrier breaks the line of sight to an 11.5-foot truck stack.

Table B-2. Analysis of Barrier - SW-D	Position M-179	Position M-185	Total Number of Benefited Receivers
Number of Units Represented	4	3	
Existing Traffic Noise Level (dBA Leq[h])	74.3	**67.9**	
Design Year with Project Traffic Noise Level (dBA Leq[h])	72.9	**66.9**	
Design Year with Project minus Existing Traffic Noise Level (dBA Leq[h])	-1.4	-1	
6-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	68.7	65.2	
Predicted Noise Reduction (dB)	4.2	1.7	
Number of Benefited Receivers	0	0	0
8-Foot Barrier [b]			
Design Year with Project Traffic Noise Level (dBA Leq[h])	67.2	64.5	
Predicted Noise Reduction (dB)	5.7	2.4	
Number of Benefited Receivers	4	0	4
10-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	65.9	63.8	
Predicted Noise Reduction (dB)	7	3.1	
Number of Benefited Receivers	4	0	4
12-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	65.2	63	
Predicted Noise Reduction (dB)	7.7	3.9	
Number of Benefited Receivers	4	0	4
14-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	64.4	62.5	
Predicted Noise Reduction (dB)	8.5	4.4	
Number of Benefited Receivers	4	0	4
16-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	64	62	
Predicted Noise Reduction (dB)	8.9	4.9	
Number of Benefited Receivers	4	0	4
18-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.6	61.6	
Predicted Noise Reduction (dB)	9.3	5.3	
Number of Benefited Receivers	4	3	7
20-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.3	61.3	
Predicted Noise Reduction (dB)	9.6	5.6	
Number of Benefited Receivers	4	3	7
22-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	63	60.8	
Predicted Noise Reduction (dB)	9.9	6.1	
Number of Benefited Receivers	4	3	7
24-Foot Barrier			
Design Year with Project Traffic Noise Level (dBA Leq[h])	62.8	60.6	
Predicted Noise Reduction (dB)	10.1	6.3	
Number of Benefited Receivers	4	3	7

Notes: NA - Not applicable, wall not evaluated at this height because it is lower than the height of the existing wall.

a Traffic noise levels that approach or exceed 67 dBA Leq(h) are shown in bold.

b 12-foot-high barrier breaks the line of sight to an 11.5-foot truck stack.

Table B-3. Analysis of Barrier - SW-E	Position									Total Number of Benefited Receivers
	M-148	M-150	M-152	M-153	M-158	M-161	M-162	M-164	M-166	
Number of Units Represented	1	0	1	1	2	2	2	2	3	
Existing Traffic Noise Level (dBA Leq[h])	**69.4**	56.6	63.6	59.9	55.8	**66.1**	58.6	57.4	53.0	
Design Year with Project Traffic Noise Level (dBA Leq[h])	**69.4**	56.9	63.5	60.2	55.9	**66.3**	59.0	57.7	52.6	
Design Year with Project minus Existing Traffic Noise Level (dBA Leq[h])	0.0	0.3	-0.1	0.3	0.1	0.2	0.4	0.3	-0.4	
6-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	65.9	56.7	60.0	60.1	54.2	62.3	59.6	57.5	52.4	
Predicted Noise Reduction (dB)	3.5	0.2	3.5	0.1	1.7	4.0	-0.6	0.2	0.2	
Number of Benefited Receivers	0	0	0	0	0	0	0	0	0	0
8-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	65.0	56.7	59.4	60.0	53.7	61.5	59.7	57.3	52.3	
Predicted Noise Reduction (dB)	4.4	0.2	4.1	0.2	2.2	4.8	-0.7	0.4	0.3	
Number of Benefited Receivers	0	0	0	0	0	0	0	0	0	0
10-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	64.4	56.9	59.2	59.8	53.3	60.9	59.2	57.3	52.3	
Predicted Noise Reduction (dB)	5.0	0.0	4.3	0.4	2.6	5.4	-0.2	0.4	0.3	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3
12-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	64.0	56.7	59.2	59.6	52.9	61.1	59.0	57.4	52.2	
Predicted Noise Reduction (dB)	5.4	0.2	4.3	0.6	3.0	5.2	0.0	0.3	0.4	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3
14-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	64.0	56.8	59.2	59.6	52.5	61.1	59.9	57.8	52.1	
Predicted Noise Reduction (dB)	5.4	0.1	4.3	0.6	3.4	5.2	-0.9	-0.1	0.5	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3
16-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.9	56.8	59.0	60.1	52.1	60.9	59.9	57.7	52.1	
Predicted Noise Reduction (dB)	5.5	0.1	4.5	0.1	3.8	5.4	-0.9	0.0	0.5	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3
18-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.7	56.9	59.0	59.7	51.7	60.4	59.6	57.6	52.0	
Predicted Noise Reduction (dB)	5.7	0.0	4.5	0.5	4.2	5.9	-0.6	0.1	0.6	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3
20-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.5	56.8	58.7	59.4	51.5	59.9	59.2	57.3	52.0	
Predicted Noise Reduction (dB)	5.9	0.1	4.8	0.8	4.4	6.4	-0.2	0.4	0.6	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3
22-Foot Barrier										
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.3	56.7	58.8	59.3	51.2	59.4	58.9	57.1	51.8	
Predicted Noise Reduction (dB)	6.1	0.2	4.7	0.9	4.7	6.9	0.1	0.6	0.8	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3
24-Foot Barrier [b]										
Design Year with Project Traffic Noise Level (dBA Leq[h])	63.1	56.7	59.2	59.5	51.1	59.1	58.7	56.9	51.8	
Predicted Noise Reduction (dB)	6.3	0.2	4.3	0.7	4.8	7.2	0.3	0.8	0.8	
Number of Benefited Receivers	1	0	0	0	0	2	0	0	0	3

Notes: NA - Not applicable, wall not evaluated at this height because it is lower than the height of the existing wall.

a Traffic noise levels that approach or exceed 67 dBA Leq(h) are shown in bold.

b 24-foot-high barrier partially breaks the line of sight to an 11.5-foot truck stack.

Appendix C Noise Measurement Documentation: Field Datasheets, Photographs, and Sound Level Meter Calibration Certificates & Traffic Count Data Used for Calibration Sites

PROJECT: OCTA I-5 HOV PROJECT #: 60220190

DATE: 10/16/12 10/17/12 ENGINEER/ANALYST: PELLOS / LAWRANCE

Receptor ID: LT-03 SLM Model: 820 BLACK (SN: 1671) Calibrator Model: 200 (SN: 5768) Data File: ____

MEASUREMENT INFORMATION

Start Time: ~~14:00~~ 15:00 10/17/12 Stop Time: 16:25 10/18/12

Principal Source(s): TRAFFIC ON I-5

Other Source(s): TRAFFIC ON SR-22 ; TRAFFIC ON RESIDENTIAL ROAD (FALLBROOK ST.) ACTIVITY IN PARK AND ADJACENT RESIDENCES

Average Observed Noise Level: ____

Maximum L_{eq} Observed: ____ Source(s): ____

Minimum L_{eq} Observed: ____

Comments: LANDSCAP.

TRAFFIC COUNT DATA

Start Time: ____ Stop Time: ____

Direction: ____ Speed: ____

Autos	Med. Trucks	Heavy Trucks

Direction: ____ Speed: ____

Autos	Med. Trucks	Heavy Trucks

PROJECT: OCTA HOV LANES **PROJECT #:** 60220190

DATE: 10/16/12 **ENGINEER/ANALYST:** PELLOS / LAWRANCE

ST-04

Receptor ID: LT-03 SLM Model: 820 (SN: 1671) Calibrator Model: 200 (SN: 5768) Data File: ___

LOCATION

Location Description: ACROSS FROM 2932 FALLBROOK ST. IN COLONEL WILLIAM W. ELDRIDGE PARK IN SANTA ANA

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: 51 ft Overall Roadway Width: 40' Lane Widths: 12'

Is Parking Allowed along Street: YES Width of Parking Lane: 8'

Distance from barriers: 62ft Barrier Type: CONCRETE WALL Barrier Height: 20'

Location Comments: MICROPHONE WAS HUNG FROM A TREE IN THE PARK.

METEOROLOGY

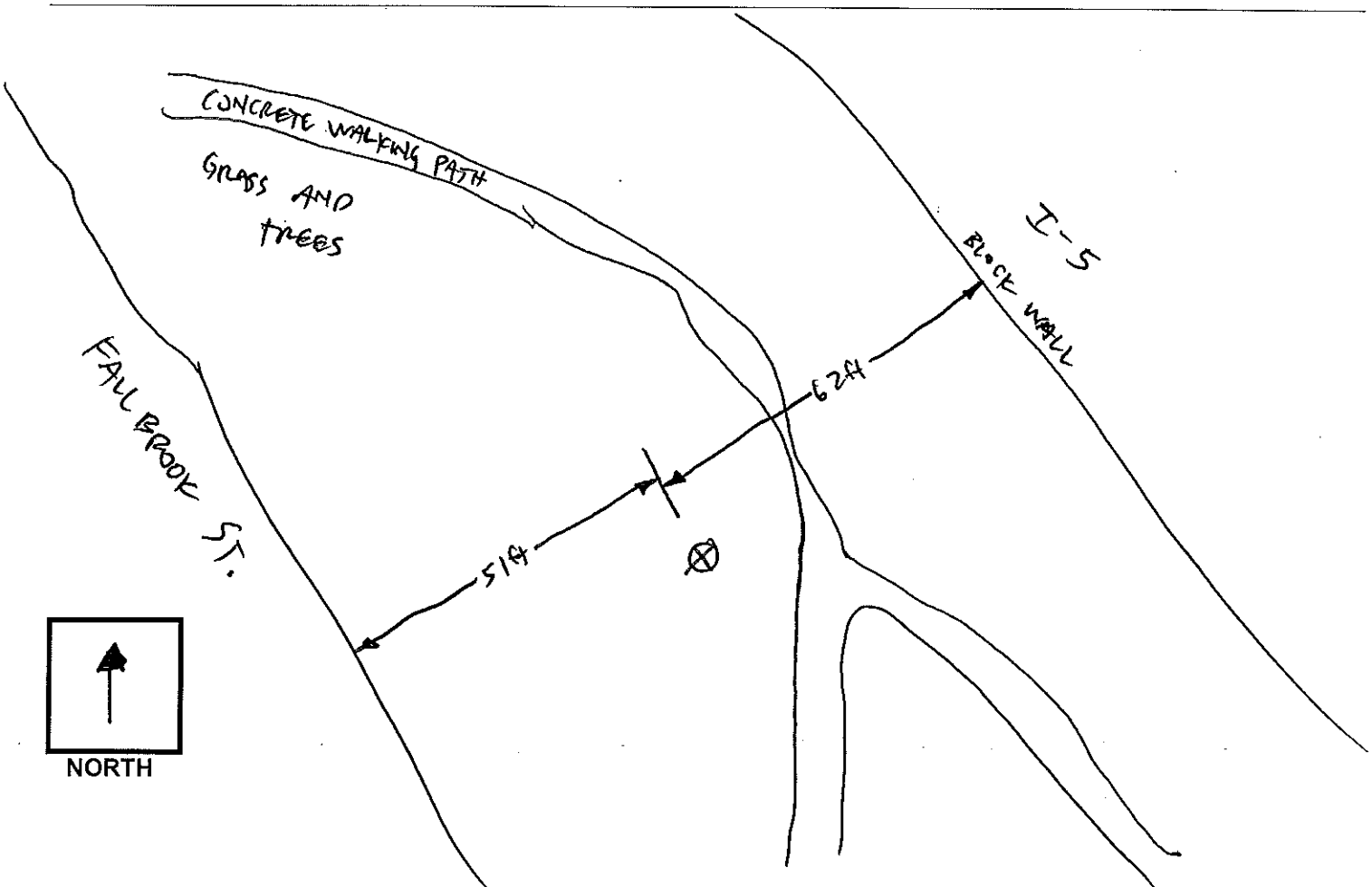
Temperature: 90°F Wind Speed: 1.5mph

Wind Direction: W Other (gusts, etc.): 2.5mph

Meteorological Comments: SUNNY LIGHT BREEZE LOW HUMIDITY 33%

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



PROJECT: OCTA I-5 HOV PROJECT #: 60220190

DATE: 23 Oct 2012 TUES ENGINEER/ANALYST: J GOODSON

Receptor ID: CT-04 ST-09 SLM Model: 820 (SN: SAC1298) Calibrator Model: 200 (SN: 6204) Data File: 113.9/113.6

MEASUREMENT INFORMATION (BLACK BOX ENSR 1)

Start Time: 4:08 pm Stop Time: 4:20

Principal Source(s): I-5 traffic

Other Source(s):

TIME IS NOT PROPERLY SET ON METER

Average Observed Noise Level:

Maximum L_{eq} Observed: Source(s):

Minimum L_{eq} Observed:

Comments:

TRAFFIC COUNT DATA

Start Time: Stop Time:

Direction: Speed:

Autos	Med. Trucks	Heavy Trucks

Direction: Speed:

Autos	Med. Trucks	Heavy Trucks

PROJECT: OCTA I-5 HOV **PROJECT #:** 60220190

DATE: 23 OCT 2012 (TUE) **ENGINEER/ANALYST:** GOODSON - T

Receptor ID: CT-04 SLM Model: 820 (SN: 1298) Calibrator Model: 200 (SN: 6204) Data File: ____

SAC

LOCATION

Location Description: Edgewood Dr @ N Main St, inside vacant lot at 6' on top of private ~~fence~~ wall for pool (6 foot)

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: 60' (Edgewood) Overall Roadway Width: 2 lane Lane Widths: std

Is Parking Allowed along Street: ____ Width of Parking Lane: ____

Distance from barriers: 54' Barrier Type: 30+ ft brick wall Barrier Height: 30+'

Location Comments: House with pool enclosed in compound with walls on either side, plus 30' I-5 wall 53' away

METEOROLOGY

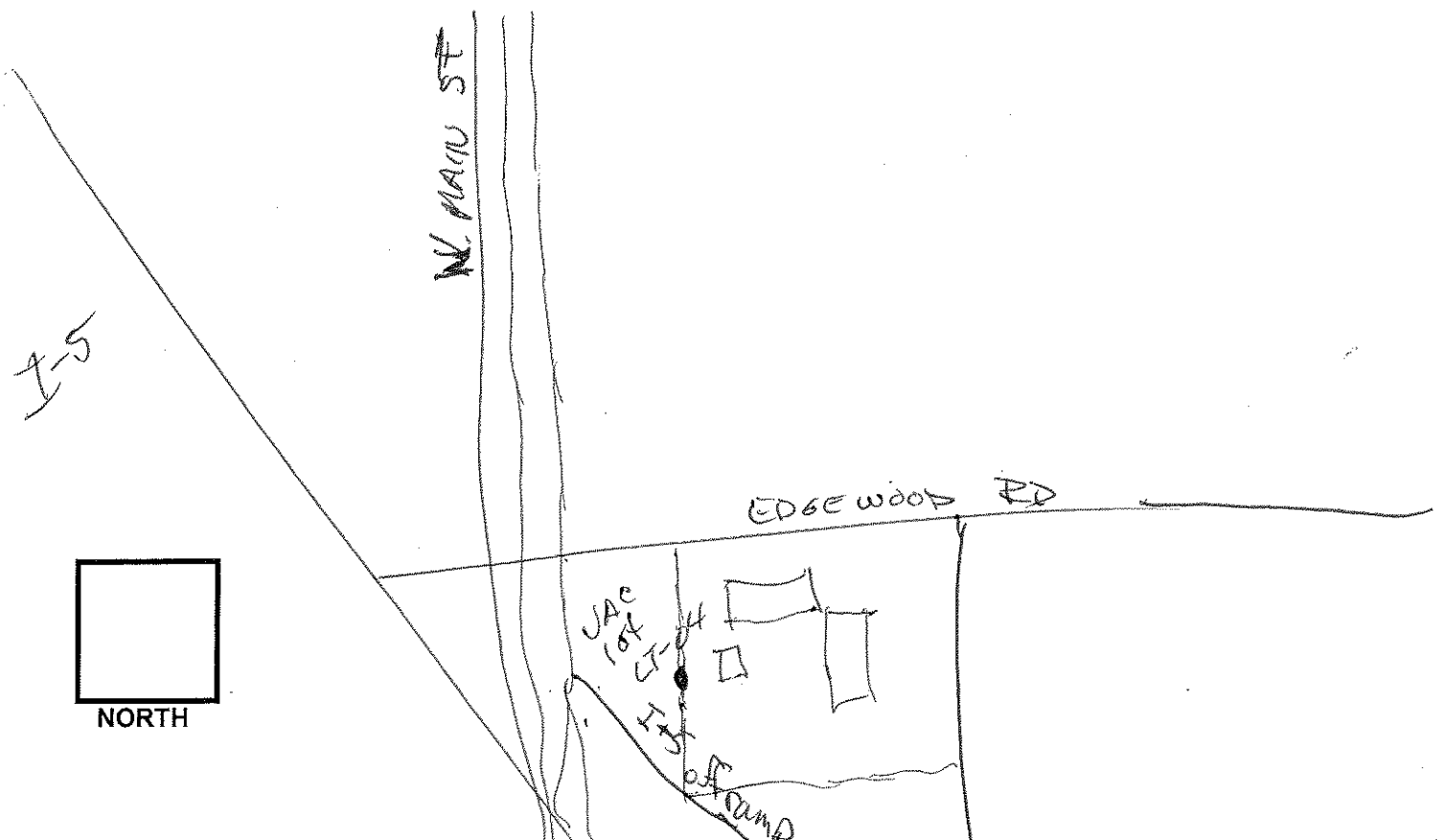
Temperature: 79°F 30% Wind Speed: 1-2 mpl

Wind Direction: VAR Other (gusts, etc.): ____

Meteorological Comments: SUNNY, WARM, CLEAR, DRY

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



25 OCT 2012 (THURS)

REV

PROJECT: OCTA I-5 **PROJECT #:** 60220190

DATE: ~~24 OCT 2012 (TUES)~~ **ENGINEER/ANALYST:** GOODSON J

10/24 Receptor ID: LT-05 SLM Model: 820 (SN: 1573) Calibrator Model: 200 (SN: 4637) Data File: ____

MEASUREMENT INFORMATION

3:43 4 PM Start Time: ~~[illegible]~~ Stop Time: 4:20 10/25/12

Principal Source(s): traffic noise on SANTA ANA BLVD and I-5

Other Source(s): NONE

Average Observed Noise Level: ____

Maximum L_{eq} Observed: ____ Source(s): ____

Minimum L_{eq} Observed: ____

Comments: ALONG ~~Santa Ana Blvd~~ PENN WAY @ intersection with I-5 ON ramp

TRAFFIC COUNT DATA

Start Time: ____ Stop Time: ____

Direction: ____ Speed: ____

Autos	Med. Trucks	Heavy Trucks

Direction: ____ Speed: ____

Autos	Med. Trucks	Heavy Trucks

PROJECT: OCTA I-5 HOV PROJECT #: 60220190

DATE: ~~23~~ 25 OCT 2012 (~~Tues~~ Thurs) ENGINEER/ANALYST: GOODSON, T

Receptor ID: LT-05 SLM Model: 820 (SN: 1573) Calibrator Model: 200 (SN: 4637) Data File: ____

LOCATION

Location Description: adjacent to noise wall on west side of Santa Ana Blvd.

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: 10 ft. Overall Roadway Width: ____ Lane Widths: ____

Is Parking Allowed along Street: no Width of Parking Lane: ____

Distance from barriers: over/on top of Barrier Type: cone wall Barrier Height: 5'

Location Comments: Location of LT-05 MOVED due to SECURITY and ACCESS ISSUES to a secure location further southeast along PENN Way. Microphone located at top of wall along PENN edge of residence backyard.

METEOROLOGY

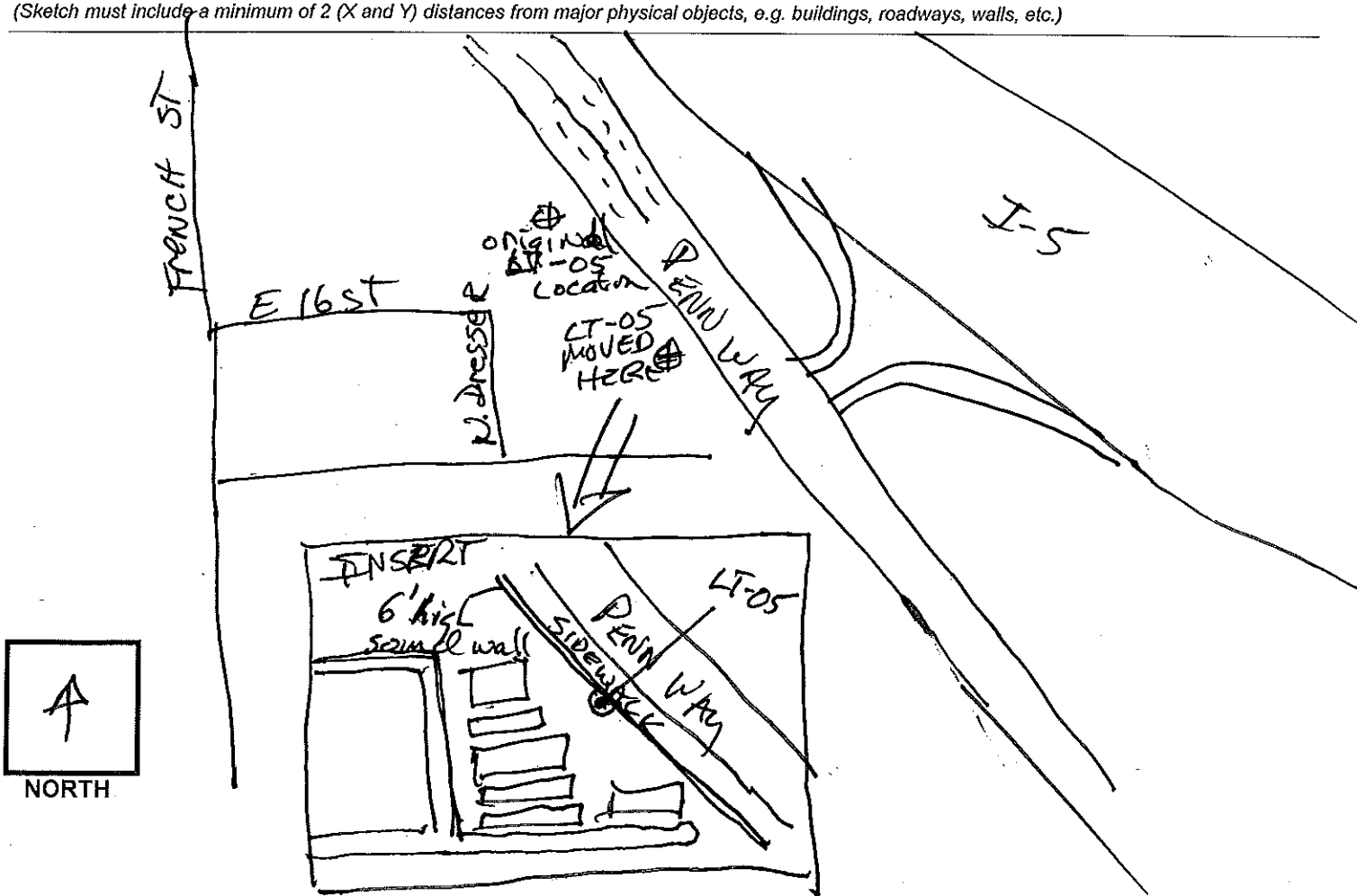
Temperature: 81°F 34% hum Wind Speed: 2

Wind Direction: var SSW Other (gusts, etc.): ____

Meteorological Comments: SUNNY Clear, Dry breezy

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



PROJECT: OCTA I-5 HOV PROJECT #: 60220190

DATE: 10/23/2012 (TUES) ENGINEER/ANALYST: Goodson, J.

Receptor ID: ST-06 SLM Model: ~~200~~ 820 (SN: 1671) Calibrator Model: 200 (SN: 5768) Data File: ST-21

MEASUREMENT INFORMATION

Start Time: 10:41 AM 10/23/12 Stop Time: 10:00 10/24/12 24-hour

Principal Source(s): I-5 traffic

Other Source(s): None

Average Observed Noise Level:

Maximum L_{eq} Observed: Source(s):

Minimum L_{eq} Observed:

Comments: before calibration 114.3

TRAFFIC COUNT DATA

Start Time: Stop Time:

Direction: Speed:

Autos	Med. Trucks	Heavy Trucks

Direction: Speed:

Autos	Med. Trucks	Heavy Trucks

PROJECT: OCTA I-5 HOV **PROJECT #:** 60220190

DATE: 10/23/2012 **ENGINEER/ANALYST:** GOODSON J

Receptor ID: LT-06 SLM Model: 820 (SN: 1671) Calibrator Model: 200 (SN: 5763) Data File: ____

LOCATION

Location Description: Near I-5 (elevated), berm w/ sound wall; off E. Fruit St. @ Concord cul-de-sac, backyard of adjacent house to map location (LT-06)

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: 30' (I-5) Overall Roadway Width: (I-5) Lane Widths: ____

Is Parking Allowed along Street: yes on cul-de-sac Width of Parking Lane: parallel

Distance from barriers: 30' Barrier Type: berm/wall Barrier Height: 20'

Location Comments: off cul-de-sac of Concord, off E. Fruit St. inside Caltrans ROW fence chain-link.

METEOROLOGY at start 10:41 AM

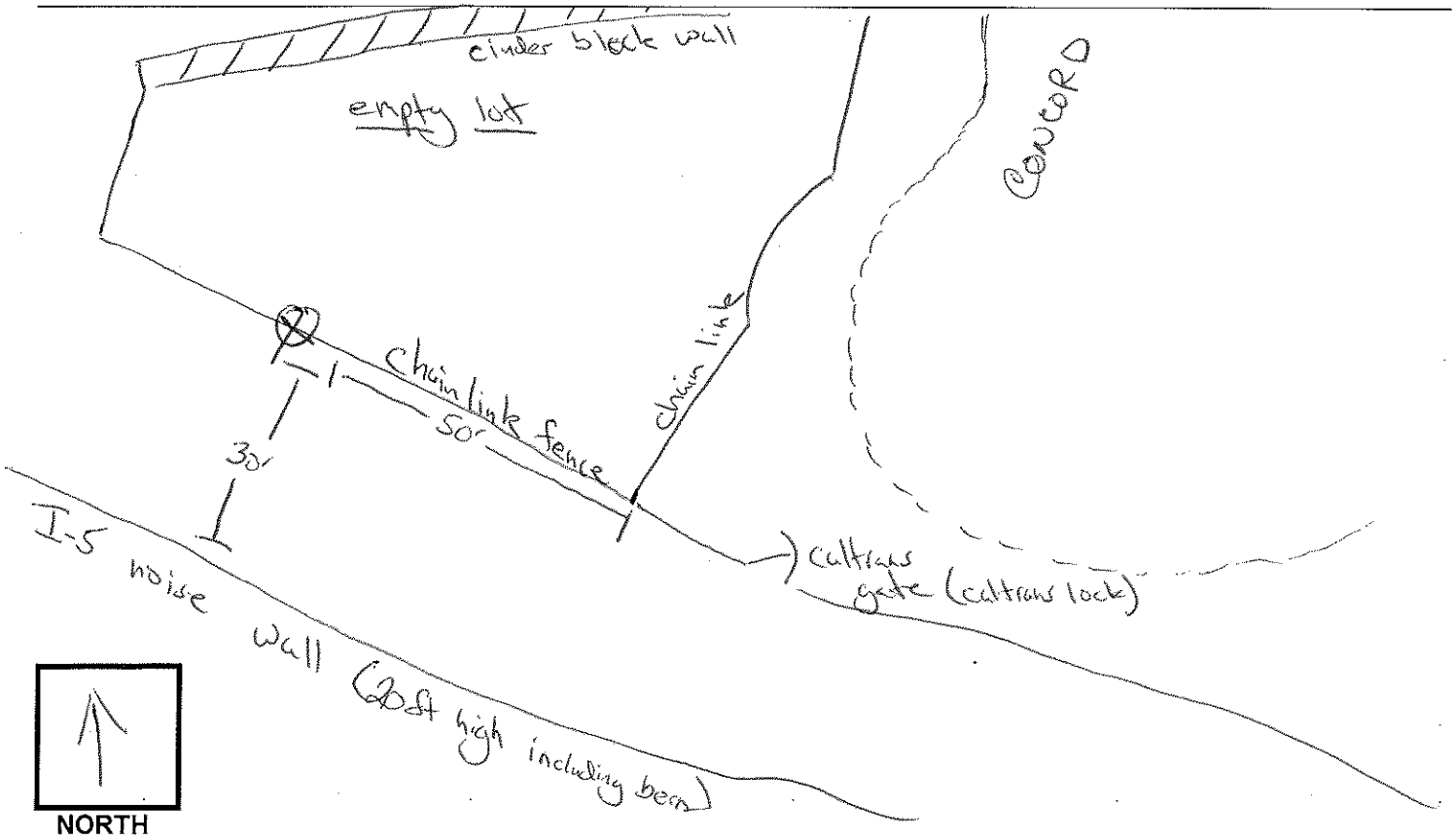
Temperature: 69°F, hum 58% Wind Speed: 1-4 mph

Wind Direction: ____ Other (gusts, etc.): None

Meteorological Comments: Clear w/ some high white clouds, breezy, dry skies and pavement

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



REV

PROJECT: OCTA I-5 HOV **PROJECT #:** 60220190

DATE: 16 OCT 2012 (TUES) **ENGINEER/ANALYST:** GOODSON J

Receptor ID: ST-5 SLM Model: 824 (SN: A3007) Calibrator Model: 150 (SN: 2209) Data File: 13

LOCATION

Location Description: 2847 Flower St @ corner of W. Orange RD In back yard (walled) near pool as shown on map figure

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: 50 ft Overall Roadway Width: oversized collector Lane Widths: 4

Is Parking Allowed along Street: yes Width of Parking Lane:

Distance from barriers: 5' Barrier Type: 6' brick sound wall owner Barrier Height: 6'

Location Comments:

METEOROLOGY

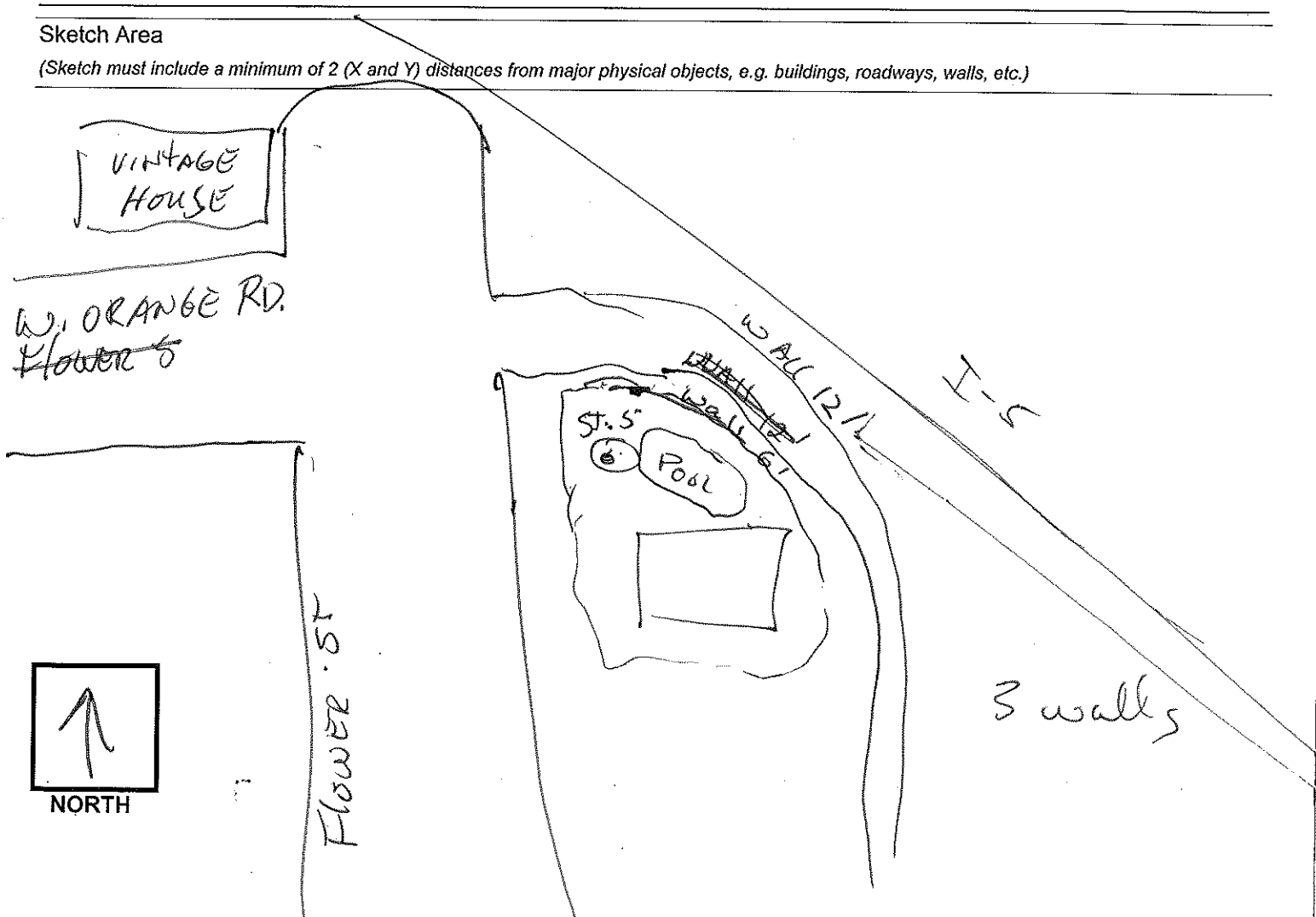
Temperature: Wind Speed:

Wind Direction: Other (gusts, etc.):

Meteorological Comments:

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



PROJECT: OCTA I-5 HOV **PROJECT #:** 60220190

DATE: 16 OCT 2012 (TUES) **ENGINEER/ANALYST:** GOODSON, J

Receptor ID: ST-5 SLM Model: 824 (SN: 4300 7) Calibrator Model: 150 (SN: 2209) Data File: 13

MEASUREMENT INFORMATION 115.1 / 114.3

Start Time: ~~4:34~~ pm Stop Time: ~~4:54~~ pm Restart in backyard 4:48pm – 5:08pm

Principal Source(s): Traffic Noise (#13 in 824 queue)

Other Source(s): Owner talking

Average Observed Noise Level: 62

Maximum L_{eq} Observed: ~~60~~ 64 Source(s): Traffic on I-5 (heavy)

Minimum L_{eq} Observed: 59 Traffic on W. Orange / Flower (occasional)

Comments:

Disregard #12 (4:34 – 4:54 pm) in front yard — owner came home and moved to backyard by pool

TRAFFIC COUNT DATA

Start Time: _____ Stop Time: _____ use same as for ST-01

Direction: _____ Speed: _____

Autos	Med. Trucks	Heavy Trucks

Direction: _____ Speed: _____

Autos	Med. Trucks	Heavy Trucks

FHWA Traffic Noise Model Calibration Datasheet

AECOM

Project: I-5 HOV Date: 1/21/14 Analyst: Jamie Group SLM: 824

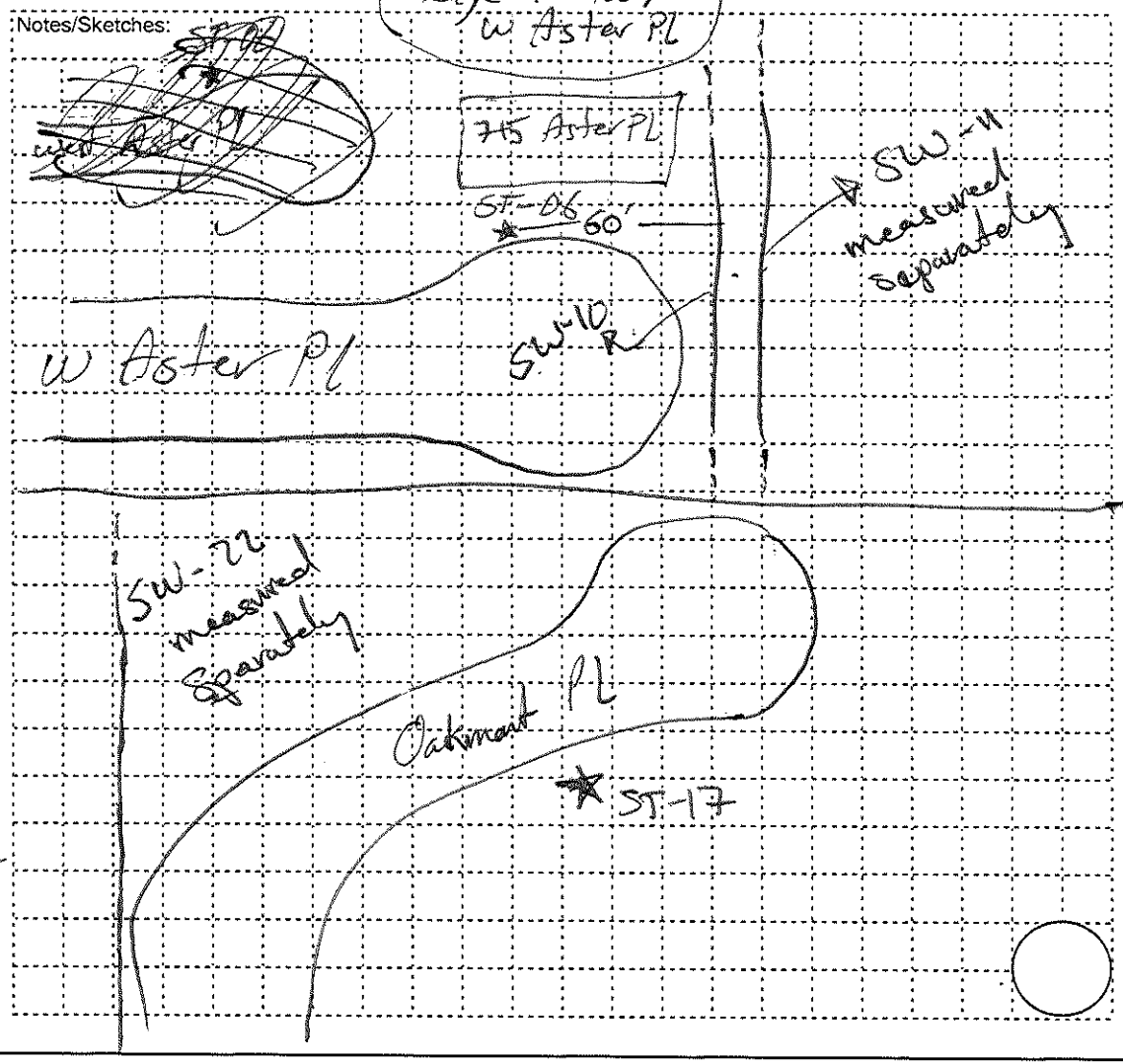
Cal #: 1, 2 Offset A: 0 Offset B: 0 Temp: 82°F Hum: 41 Wind: 3-4 mph Sky: Clear

Roadway Name: I5 NB/SB Location On Site: ST06 edge of Coldspace W Aster Pl and ST-17

Site:	ST06	ST17
Cal #:	1	2
Time:	10:55	4:30p
Duration:	10 Min	10 min
Auto:	video	video
Med:	~	~
Hvy:	~	~
★ Leq:	62.1	60.8
Lmax:	65.7	67.7
Distance to CL:	60 feet from wall	Edge of Oakmont Pl
Mic Elev ~ Road:	Level	Level
Number of Lanes:	I5 NB/SB	I5 NB/SB
Posted Speed:	65	65
Observed Speed:	Recorded separately	Recorded
Road Type:	Paved	Paved
Road Grade:	Level	Elevated
Road Condition:	Good	Good
Intv. Ground Type:	Soundwall	Building/Soundwall 22
Site Topography:	Level	Varying

Photos
ST06 1-4 (a-d) ST17 (a-d)
stored x2

Notes/Sketches:



★ Reading for entire measurement duration.

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JPR	Date: 01/21/14
Site ID: ST-07	Address: 427W Sonquil Rd, Santa Ana	
Land Use: Single Family Residential		

SLM: LD 824	S/N: A3007	Temp: 76.9°F	
Calibrator: Cal200	S/N:	Wind: 0.2mph	
Calibration Reference: 114.0	Before: 114.1 @ 11:00am	Humidity: 35.9%	
	After:	Cloud Cover: sunny, partly cloudy	

Start: 11:10	Leq05min:	Lmax:
Stop: 11:20	Leq10min:	Lmin:
Total: 10 min	Leq15min:	L10:
	Leq20min:	L90:

Notes:

- SLM ≈ 63 ft from SW-11.
- SW-11 breaks LOS to top of truck stacks @ this location. can't see any vehicles on top of wall
- Started SLM @ 10:55-ish - kept running thru 11:10-11:20 to coincide w/ traffic counts
- Stored as Data File 1
- SLM time set is 1 hr ahead (daylight savings). Date is OK. Reset time after Rec #1 was stored w/ time 1 hr ahead.
- Stored as Rec #1

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): IM, JPR	Date: 01/21/2014
Site ID: ST-08	Address: 2353 Riverside Dr., Orange	
Land Use: Single-Family Residential		

SLM: LD824	S/N:	Temp: 68.9°F	
Calibrator: CAL200	S/N: 4214	Wind: 0-1 mph	
Calibration Reference: 114	Before: 114.0 @ 9:58 am	Humidity: 38.4	
	After:	Cloud Cover: sunny, slightly cloudy	

Start: 10:20	Leq05min:	Lmax:
Stop: 10:30.	Leq10min:	Lmin:
Total: 10 min	Leq15min:	L10:
	Leq20min:	L90:

Notes:

- SLM started @ 10:01. Msrmnt data to use 10:20-10:30 am. Street sweeper went by @ 10:02-10:03

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRietz	Date: Tues. 09/24/2013
Site ID: ST-09	Address: 2416 N Bush St	
Land Use: S.F. Residential, accross Edgewood St from Discovery Science		

SLM: LD820	S/N: 1298		Temp: 77.2°F
Calibrator: CAL200	S/N: 6204		Wind: calm/none - 0-1mph
Calibration Reference: 114.0	Before: 114.1 (8:20am)		Humidity: 41.4%
	After:		Cloud Cover: Clear - sun is in shade

Start: 08:45	Leq05min: 60.9	int 1	Lmax: 66.3, 64.3, 64.3, 64.2, 65.4, 64.3		
Stop: 09:45	Leq10min: 60.9	int 2	Lmin: 58.3, 58.2, 57.3, 58.6, 58.7, 58.8		
Total: 60 mins.	Leq15min: 60.9	int 3	L10: 62.2, 62.0, 62.3, 62.1, 61.8, 62.6		
	Leq20min: 60.8	int 4	L90: 59.4, 59.5, 59.4, 59.2, 59.3, 60.[illegible]		
	Leq25min 60.6	int 5			
	Leq 30min 61.3	9:10am int 6			
	Leq 35min 60.9	int 7			
	Leq 40min 60.9	int 8			
Traffic vols 9:25-9:40	Leq 45min 60.4	int 9 @ 9:25			
	Leq 50 60.7	int 10 @ 9:30			
	Leq 55 61.3	int 11 @ 9:35			
	Leq 60 60.3	int 12 @ 9:40			

int 1	int 2	int 3	int 4	int 5	int 6
int 7	int 8	int 9	int 10	int 11	int 12
66.8	65.4	64.3	63.7	68.6	66.8
58.4	57.7	57.9	57.6	57.4	57.7
62.0	62.7	61.5	62.0	63.4	61.6
59.3	61.7	59.2	61.3	59.0	58.9

↑ Traffic count video taking longer to set up. Extended msrmnt period to ensure coinciding sim data + traffic video

Notes:

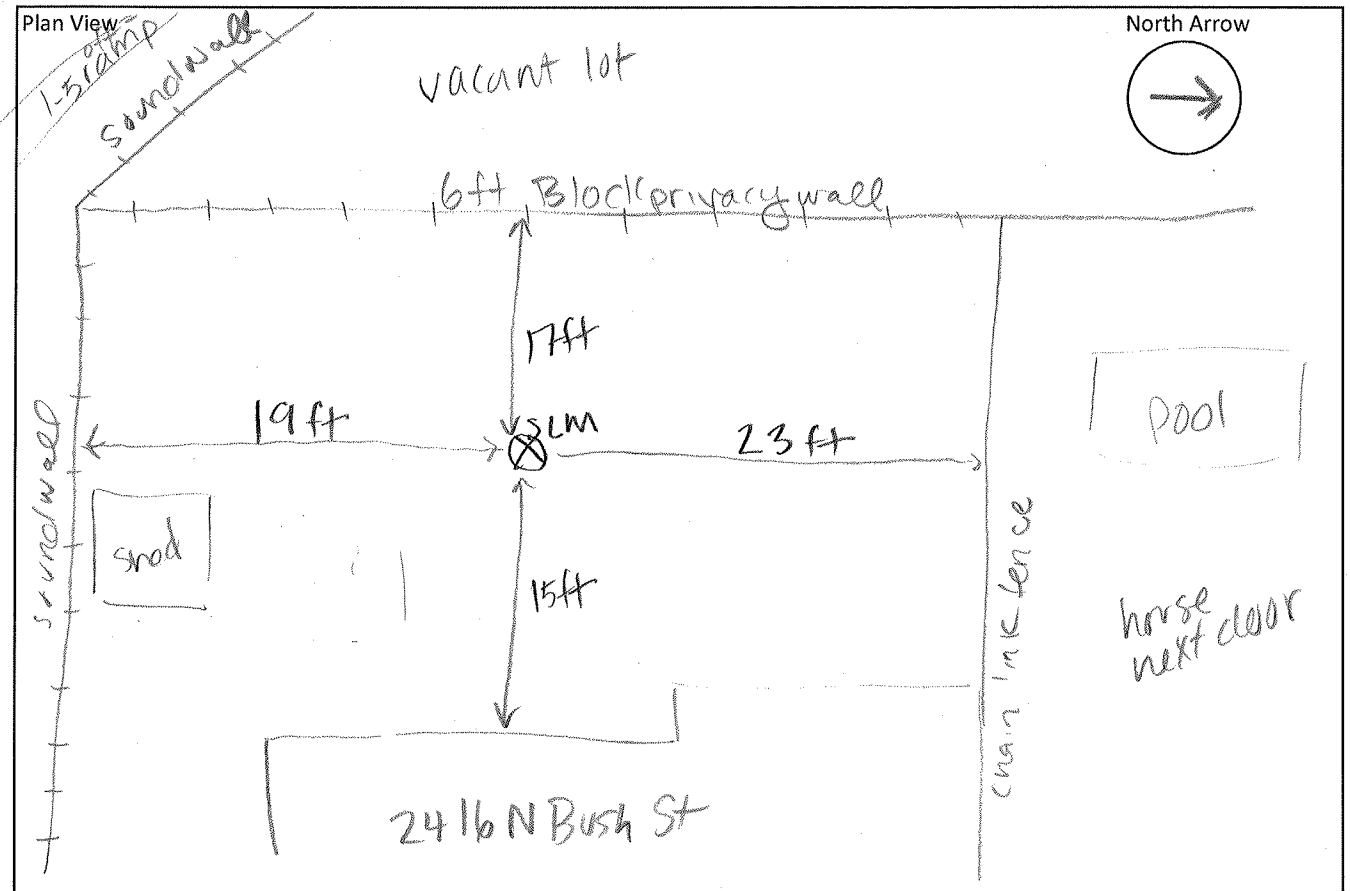
- Spoke w/ homeowner at 5:30 pm on 09/23. Got permission to do measurement in back yard area.
- Int 1 - throwaway. Nearby car alarm (in front of house on Bush St) went off - Didn't change measured
- Traffic noise is steady, constant background. No lulls during measurement. Traffic background = 60-62 dBA
- Back yard has bird coop (doves? ≈ 12 of them). Birds cooing, but not very loudly. Not really adding to instantaneous noise level.
- H. Truck passby (on I-5?) ≈ 62.3
- Bus stopping nearby (Edgewood?). Can hear brake squeal. ≈ 58.6-59.3 dBA.
- Backyard has no direct line of sight to I-5 or ramps. Masonry block wall covered by vines, also 6-6ft privacy wall another sides of yard. SW is approx 15 ft tall.
- Helicopter passby ≈ 63-64 dBA @ 9:01 - small plane passby directly overhead ≈ 62-63 dBA @ 9:15 not directly overhead
- H truck accelerating 61-62 dBA
- Pics 1-7 on Kodak camera

Noise Monitoring Data Sheet:
Site Sketch

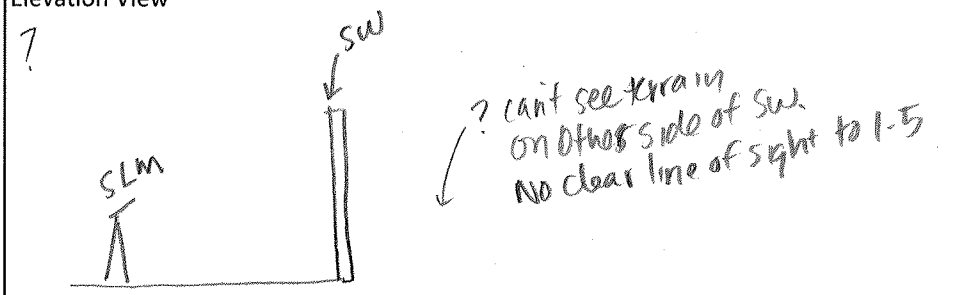
Project: OCTA I-5 HOV Lane Improvements	Operator(s): J Ruetz	Date/Time: Tues 09/24
Site ID: ST-09	Address: 2416 N Bush St	
Land Use: S.F. Residential - in center of Backyard area		

Notes:

Plan View



Elevation View



Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRietz	Date: Tues. 09/24/2013
Site ID: ST-10	Address: 2315 N Bush St	
Land Use: Residential, Single Family (SF)		

SLM: LD 820	S/N: 1298	Temp: 83.9	
Calibrator: Cal 200	S/N: 6204	Wind: light breeze 0-2 mph	
Calibration Reference: 114.0	Before: 114.1 (@8:20am)	Humidity: 42%	
	After:	Cloud Cover: clear + sunny, SLM in shade	

Start: 09:55 am	Leq05min: 59.2	Int14	Lmax:	65.0 (Int14)	62.0 (Int15)	62.7 (Int16)	63.0 (Int17)	62.4 (Int18)	69.0 (Int19)	62.[illegible] (Int20)
Stop: 10:30 am	Leq10min: 59.6	Int15	Lmin:	57.2	57.6	57.7	58.7	59.1	59.1	58.[illegible]
Total: 35 mins	Leq15min: 60.0	Int16	L10:	60.2	60.7	61.0	61.7	61.8	62.0	62.[illegible]
	Leq20min: 60.7 10:10am	Int17	L90:	58.1	58.3	59.0	59.7	59.6	60.1	59.[illegible]
	Leq 25 60.7	Int18	10:15							
	Leq 30 61.8	Int19	10:20							
	Leq 35 60.8	Int20	10:25							
	(61.9 = Int21 = partial)									

↑ Started SLM @ + had to wait for traffic cameras to set up.

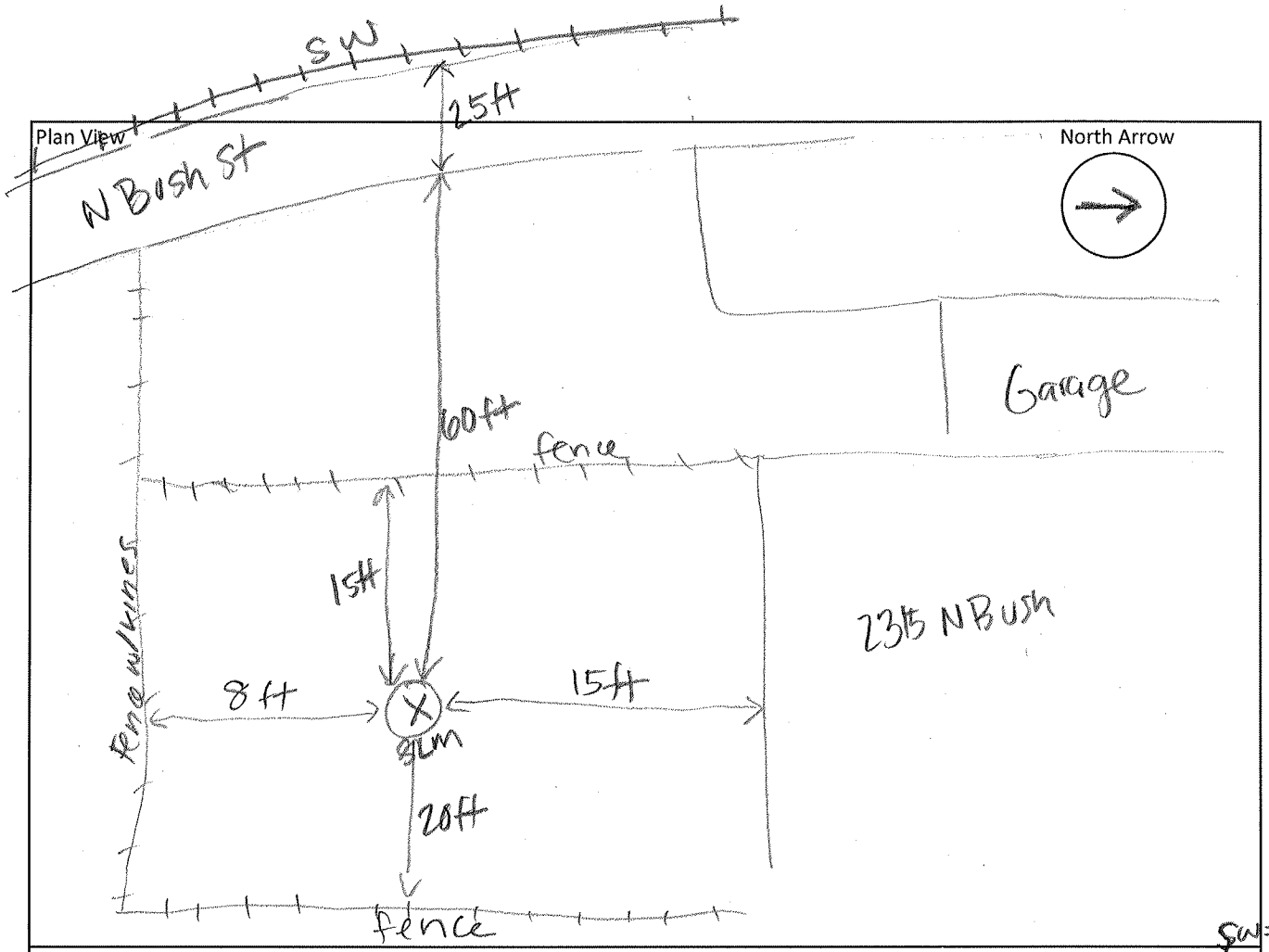
— Int 17-20 coincide w/ traffic videos

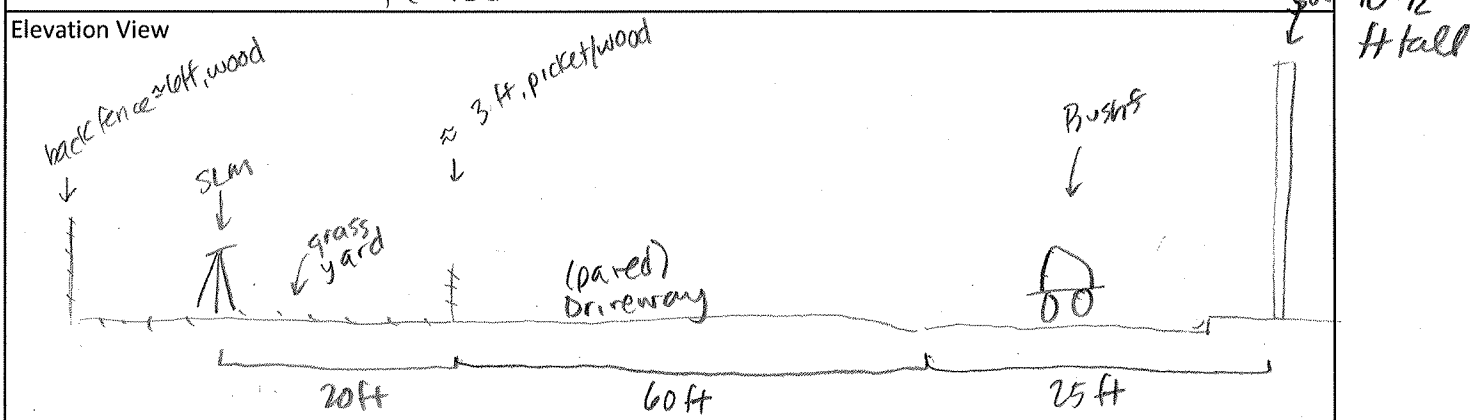
Notes:
- Knocked on door + spoke w/ homeowner yesterday evening. Have permission to set up SLM in yard. No one was home.
- Pics 8-15 on Kodak camera taken through maintenance access door in SW. Someone happened to be spraying weeds w/ door unlocked + open. Took some pics to show topo. I-5 is depressed - below grade of house & base wall elevation by ≈ 20 ft. Hard to tell by naked eye how much though.
- Pics 16-22 on Kodak camera show SLM set up
- Highway noise is dominant background. Constant stream, no lull during msrmnt. ≈ 60.6 - 61.3 dBA
- SLM is set up in side/backyard area. BBQ, table + chairs = exterior activity area
- Existing soundwall - no clear line of sight to I-5. Can't see any tops of vehicles behind SW

Noise Monitoring Data Sheet:
Site Sketch

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRuiz	Date/Time: Tues 09/24/2013
Site ID: ST-10	Address: 2315 N Bush St, Santa Ana	
Land Use: S.F. Residential		

Notes:





Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): J Rietz	Date: Tues. 09/24/13
Site ID: ST-11	Address: 306 E 22nd St	
Land Use: S.F. Residential		

SLM: LD820	S/N: 1298		Temp:
Calibrator: CAL200	S/N:		Wind:
Calibration Reference: 114.0	Before: 114.1 (@8:20am)		Humidity:
	After:		Cloud Cover:

Start:	14:26	Leq05min:	69.5 Int43@14:26	Lmax:	43 87.3,	44 76.8,	45 70.9,	46 69.6,	47 69.2
Stop:	14:51	Leq10min:	63.9 Int44@14:31	Lmin:	61.1,	60.6,	61.1,	61.6,	61.9
Total:	30 min	Leq15min:	64.1 Int45@14:36	L10:	67.6,	64.3,	65.7,	65.4,	64.8
		Leq20min:	63.8 Int46@14:41	L90:	61.5,	61.5,	62.0,	62.1,	62.4
		Leq25	63.8 Int47@14:46						

Notes:

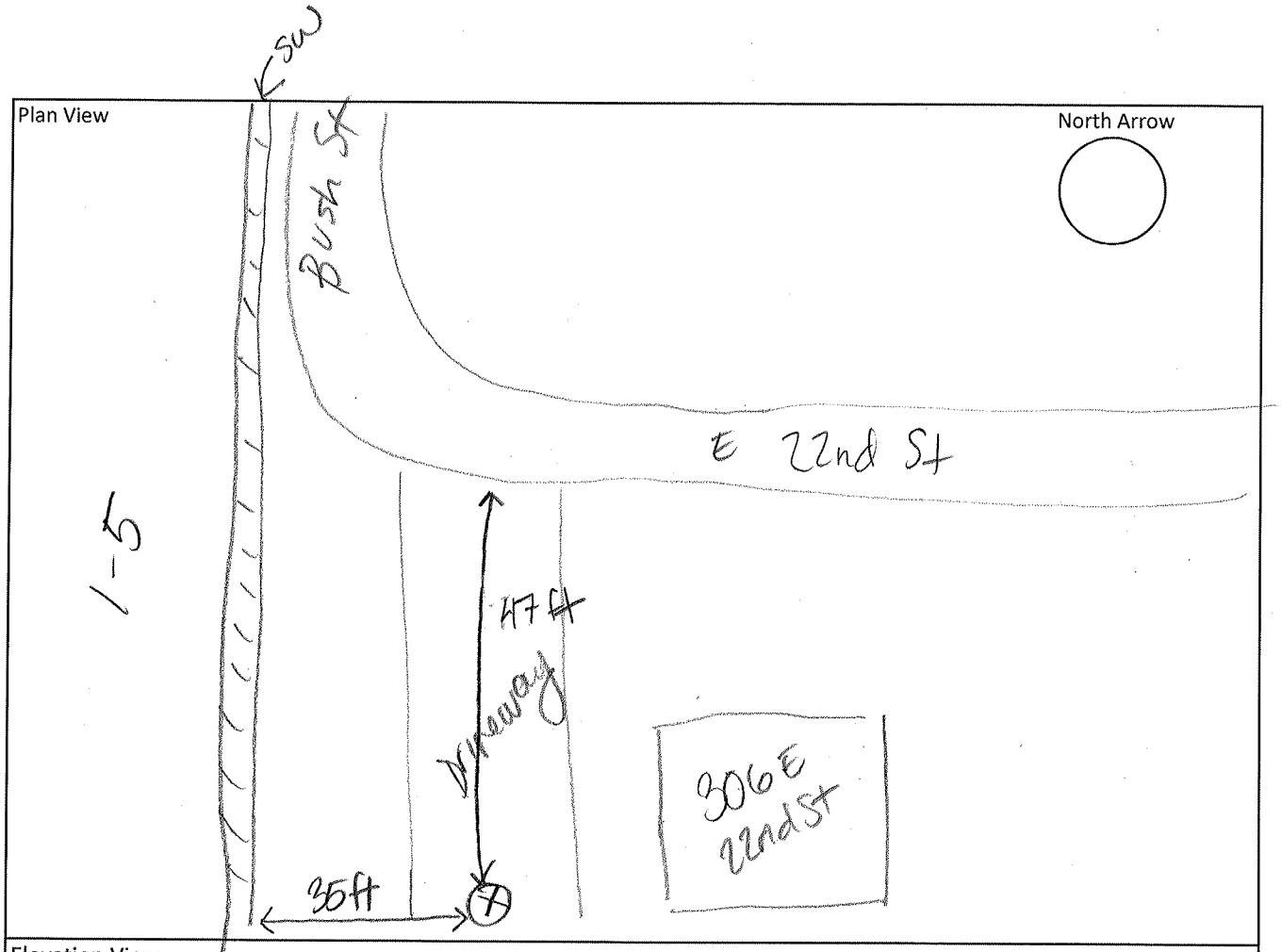
- Helicopter passby directly overhead 69-70dBA, 63dBA when not directly overhead
- Int43 - contaminated by dog barking
- Int 44 - car revving on local rd (22nd St/Bush curve) ≈80dBA. Was of short duration.
- jet passby @ high altitude ≈63.0dBA
- homeowner stated ≈15 minutes prior to msrmnt, there was an accident on I-5. Collision could be heard loud + clear, as well as stand-still traffic afterwards.
- Car on driveway ≈71dBA. (lots of traffic helicopters still circling area - nearly entire msrmnt there is a helicopter in background)
- Car horn on I-5 (laid on horn for 5+ second) ≈64.2dBA
- Motorcycle on I-5 ≈67.0dBA
- loud truck stack on I-5 ≈69.2dBA
- Pics 44-40
- Spoke w/ homeowner - backyard not a possability, dogs. But he let me set up SLM in driveway right on side of house. There are some chairs + a gazebo/ezup, so it appears to be an exterior activity area

Noise Monitoring Data Sheet:
Site Sketch

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JPietz	Date/Time: Tues 09/24/13
Site ID: ST-11	Address: 306 E 22nd St	
Land Use: Residential		

Notes:

Plan View



Elevation View

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JPR	Date: 01/21/14
Site ID: ST-12	Address: 2057 N Bush St	
Land Use: Single family res @ meter-neighborhood has both SF + MF		

SLM: LD 824	S/N: A2624		Temp: 76.4	
Calibrator: CAL200	S/N:		Wind: 0-1 mph	
Calibration Reference: 114.0	Before:		Humidity: 34.3%	
	After:		Cloud Cover: partially cloudy	

Start: 2:40	Leq05min:	Lmax:
Stop: 2:50	Leq10min:	Lmin:
Total: 10 min	Leq15min:	L10:
	Leq20min:	L90:

Videos
- Fwy - 10mins
- Main St, ramp = 15mins

↑ Notes for video processing

SB Main St - South of Buffalo St.
Autos = 250 (15 mins)
MTrucks = 3 (15 mins)
Buses = 2 (15 mins)
HTrucks = Ø

Notes:

- Started SLM several minutes early
- Background SPL ≈ 63-64 dBA
- SLM set up on side walk - set back 15-20 ft from sandwall. Residence backyard would have meter w/in 5-6 ft of sandwall too close
- airplane passby overhead ≈ 67-68 dBA @ 2:01 pm
- local traffic on N Bush St:
  Autos = 5 Speed = 20
  MTrucks = Ø
  HTrucks = Ø
- stored on SLM as file #3 — 1:55 to 2:05. traffic video fail issue - re-doing msrmnt.
- car passby on Bush St - 63.1 dBA
- SB on-ramp - ramp meter turned on. Cars coming to a stop B4 merging onto SB I-5

- Stored as Data File #

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRietz	Date: Tues 09/24/13
Site ID: ST-13 (Sheet 1 of 2)	Address: 2011 French St, Santa Ana	
Land Use: S.F. Residential		

SLM:	LD820	S/N:	1298	Temp:	
Calibrator:	Cal200	S/N:		Wind:	
Calibration Reference:	114.0	Before:	114.1 (@8:20am)	Humidity:	
		After:		Cloud Cover:	

Start:	10:56	Leq05min:	67.3	Int22			Lmax:	69.3 (22), 69.3 (23), 69.7 (24), 69.9 (25), 71.1 (26), 69.1 (27)			
Stop:		Leq10min:	66.7	Int23			Lmin:	63.9, 63.9, 65.1, 64.9, 63.5, 64.4			
Total:		Leq15min:	67.5	Int24			L10:	68.5, 68.0, 68.7, 68.6, 68.6, 68.0			
		Leq20min:	67.3	Int25			L90:	66.1, 65.3, 66.2, 65.8, 65.6, 65.6			
		leq25	67.2	Int26	@11:16			28	29	30	31
		leq30	66.9	Int27	@11:21			70.7, 64.6, 68.8	69.9, 64.8, 68.7	69.9, 64.8, 69.0	70.6, 64.7, 68.9
		leq35	67.6	Int28	@11:26			66.3	66.2	66.4	66.3
		leq40	67.4	Int29	@11:31						
		leq45	67.9	Int30	@11:36						
		leq50	67.7	Int31	@11:41						

SLM started before traffic video counts. Had to wait for counts to start.

Traffic 15-minute video started @11:40. See Data Sheet 2 of 2

see sheet 2

Notes:

- Unable to get access to backyard of any 1st-row houses behind SW. 306-20th St is under construction, not desireable msrmnt spot. 1st row yard on South side of cul-de-sac is actually a house that fronts French St. Knocked on door last night around 4:30pm-5:00pm - no response. No one home this morning either. Decided to place SLM on maint. access path w/in State Row, directly on the other side of the backyard fence. Msrmnt location is representative & really close to noise in backyard of French St.
- Existing SW blocks LOS to I-5. Can see OH lighting & signs, but not any tops of vehicles/trucks.
- I-5 traffic dominates background. Traffic is constant & steady during msrmnt, no lulls. Background I-5 traffic ≈ 65.5-66.0 dBA
- Heavier vehicle (semi truck?) pass by ≈ 68.6 dBA, 69.5 dBA
- Pics 24-31 @ SLM

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRietz	Date: Tues 09/24/31
Site ID: ST-13 (Sheet 2 of 2)	Address: 2011 French St, Santa Ana	
Land Use: SF Residential		

SLM: LD 820	S/N: 1298	Temp: 86.1 °F	
Calibrator: Cal 200	S/N:	Wind: light breeze, 2-3 mph	
Calibration Reference: 114.0	Before: 114.1 (@8:20am)	Humidity: 36.7	
	After:	Cloud Cover: clear + sunny	

Start: 10:56 am	Leq05min: 67.7 11:41 - int 31	Lmax: 70.6 (31), 69.3 (32), 70.7 (33), 69.5 (34)	
Stop: 12:01 pm	Leq10min: 67.4 11:46 - int 32	Lmin: 64.7, 65.4, 65.1, 64.9	
Total:	Leq15min: 67.6 11:51 int 33	L10: 68.9, 68.5, 68.9, 68.5	
	Leq20min: 67.4 11:56 int 34	L90: 66.3, 66.2, 66.3, 66.0	

*Traffic Video covers 11:40 - 11:55am. Coincides w/ Intervals 31-33

Notes:

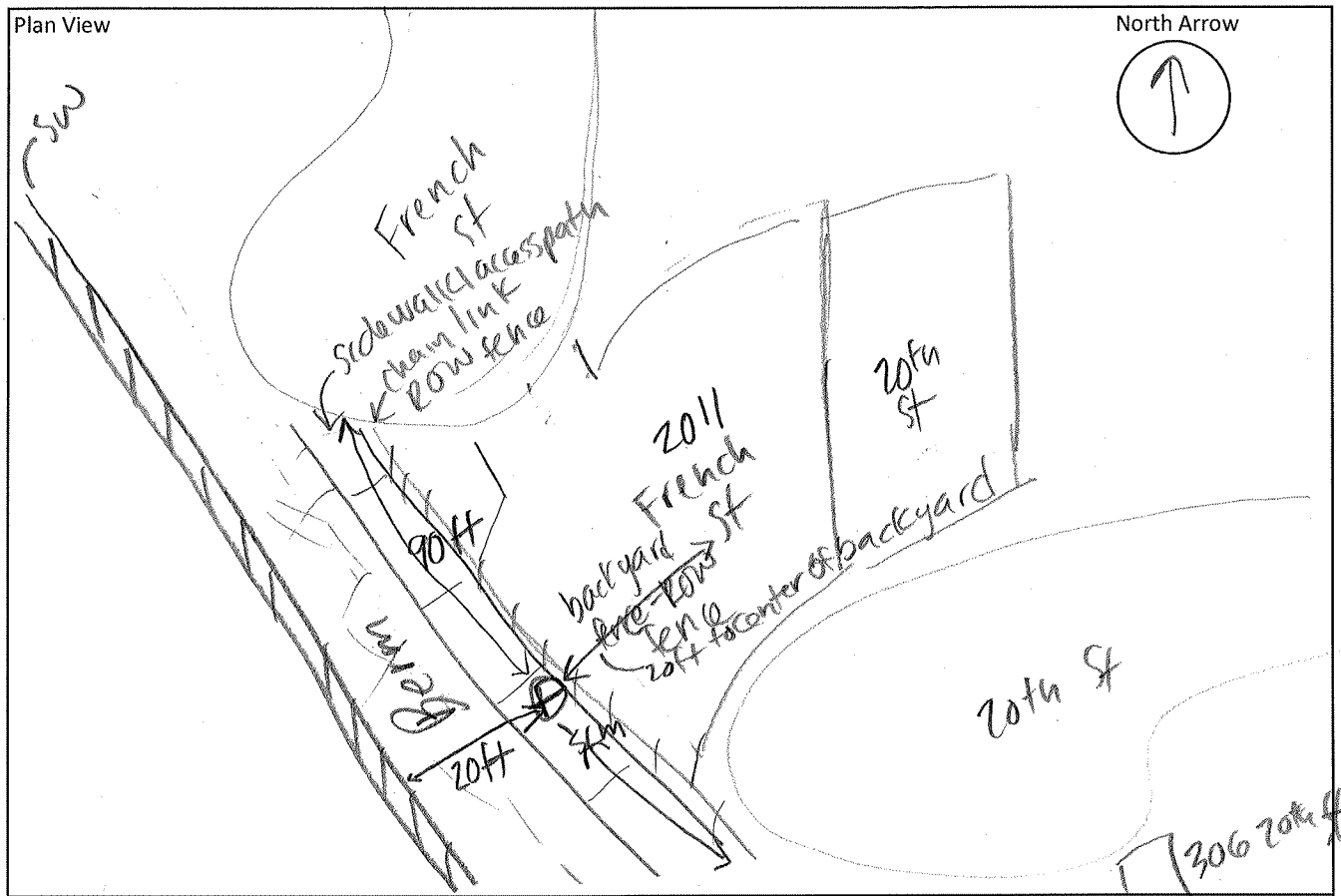
*see notes on Sheet 1

Noise Monitoring Data Sheet:
Site Sketch

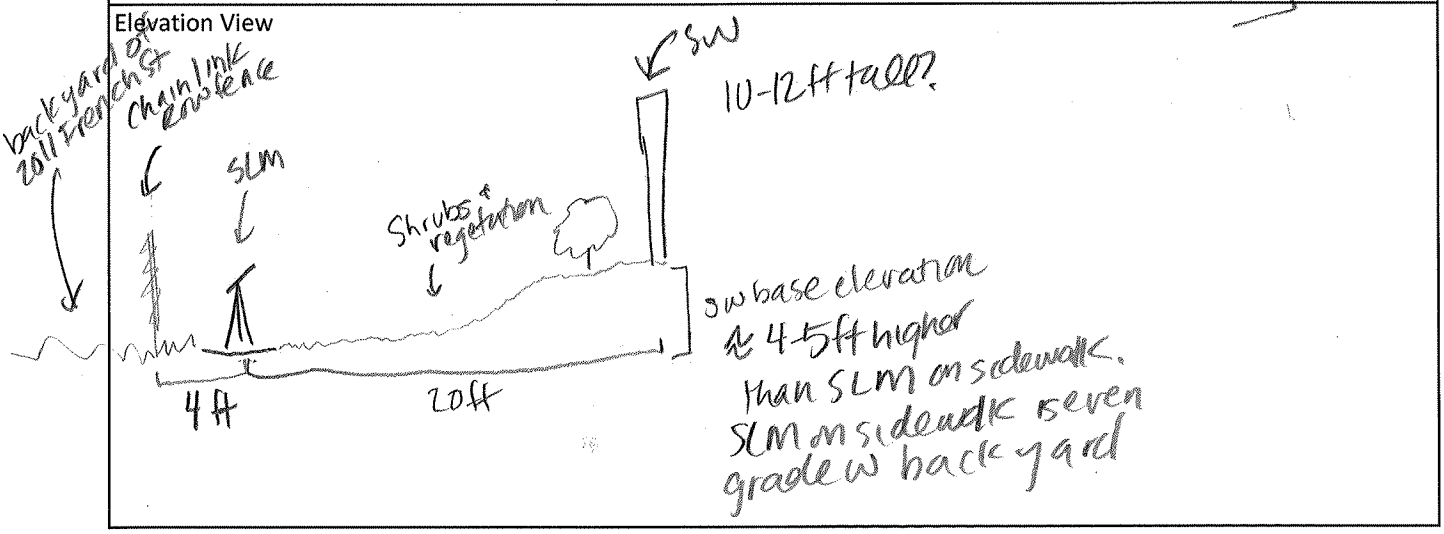
Project: OCTA I-5 HOV Lane Improvements	Operator(s): J Rietz	Date/Time: Tues 09/24/13
Site ID: ST-13	Address: 2011 French St, Santa Ana	
Land Use: S.F. Residential		

Notes:

Plan View



Elevation View



Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRietz	Date: 09/24/2013
Site ID: ST-14	Address: Spurgeon St, Santa Ana	
Land Use: Residential-Mixed MF + SF		

SLM:	LD820	S/N:	1298	Temp:	88.6 °F
Calibrator:	Cal 200	S/N:		Wind:	light, 0-1 mph
Calibration Reference:	114.0 dBA	Before:	114.1 dBA	Humidity:	34.8%
		After:		Cloud Cover:	clear, sunny

Start:	15:05	Leq05min:	63.5 int 49 @ 15^{05}	Lmax:	49: 67.0,	50: 66.0,	51: 64.7,	52: (66.7)
Stop:	15:20	Leq10min:	62.5 int 50 @ 15^{10}	Lmin:	59.2,	59.7,	57.6,	(60.3)
Total:	15 minutes	Leq15min:	61.7 int 51 @ 15^{15}	L10:	65.0,	63.8,	62.9,	(65.1)
		Leq20min:	(63.0 int 52 @) 15^{20} - Partial	L90:	61.5,	61.0,	59.7,	(61.1)

(Partial 3:49)

Notes:

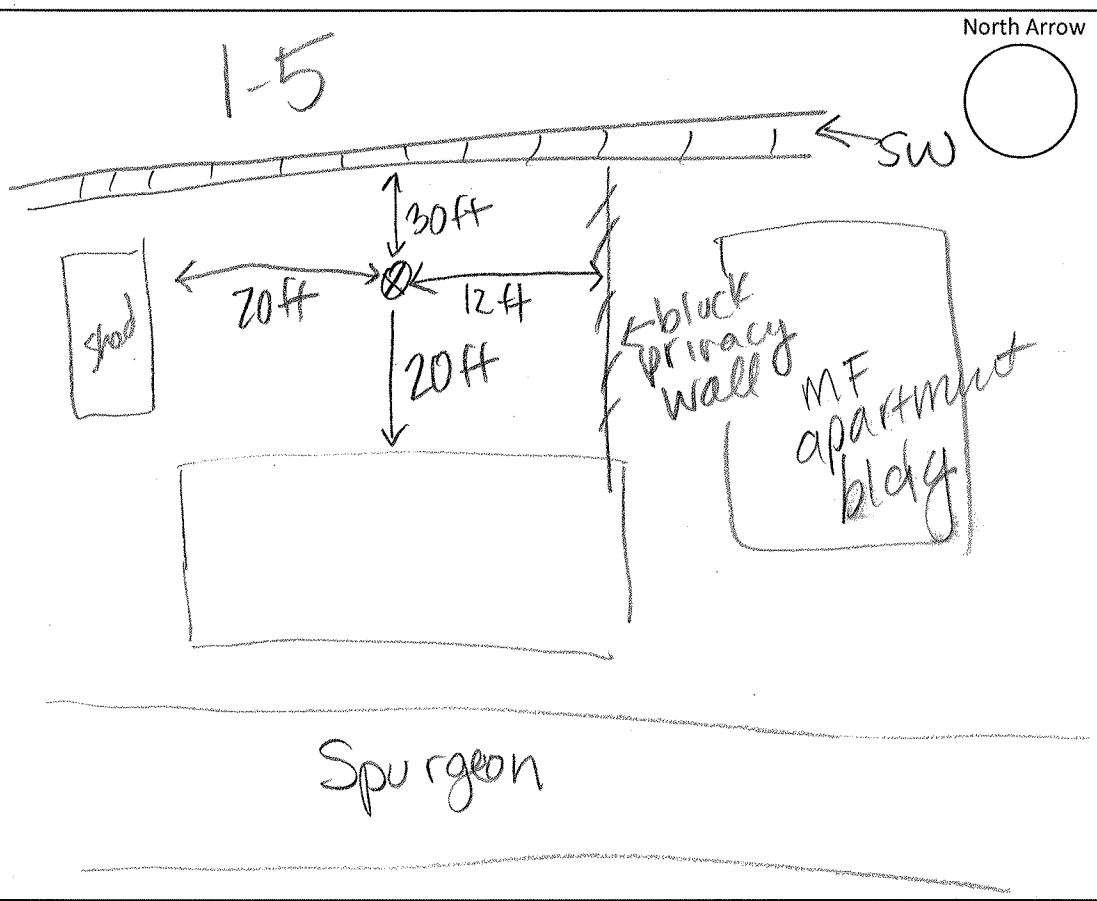
- SLM is in center of patio/backyard area. House is vacant + for sale.
- No helicopters audible or visible
- H truck passby on EB I-5 ≈ 64-65 dBA
- low-altitude small prop plane passby ≈ 61.3 dBA, directly overhead
- traffic was steady/constant, no lulls

Noise Monitoring Data Sheet:
Site Sketch

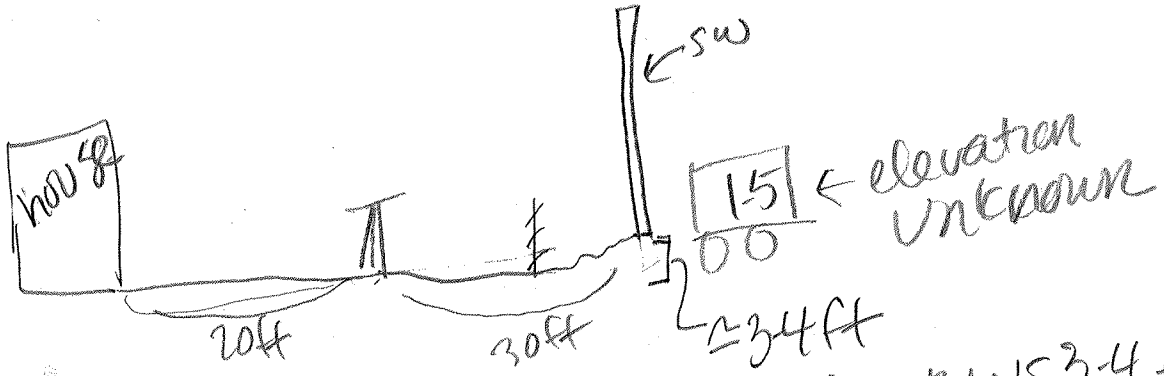
Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRietz	Date/Time: Tues 09/24/2013
Site ID: ST-14	Address: Spurgeon St, Santa Ana	
Land Use: Residential-mixed SF+MF		

Notes:

Plan View



Elevation View



wall base elevation 15 3-4 ft above SCM yard elevation

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRietz	Date: Tues 09/24/2013
Site ID: ST-15	Address: 1725 Valencia St, Santa Ana	
Land Use: Residential-S.F.		

SLM: LD820	S/N: 1298		Temp:		
Calibrator: CAL200	S/N:		Wind:		
Calibration Reference: 114.0	Before: 114.1 dBA @8:20 am		Humidity:		
	After:		Cloud Cover:		

Start: 15:59	Leq05min: 56.2 int 53@15:59	Lmax:	53: 60.2	54: 61.3	55: 73.5	56: 66.9
Stop: 16:19	Leq10min: 57.8 int 54@16:04	Lmin:	53.7	55.2	54.0	53.5
Total:	Leq15min: 58.0 int 55@16:09	L10:	57.8	59.0	60.0	57.1
	Leq20min: 56.2 int 56@16:14	L90:	54.6	56.3	54.4	54.5
	(57.0 int 57@16:19 = partial)					

Traffic Videos = 16:04-16:19 coincides w/ intervals 54-56

Notes:

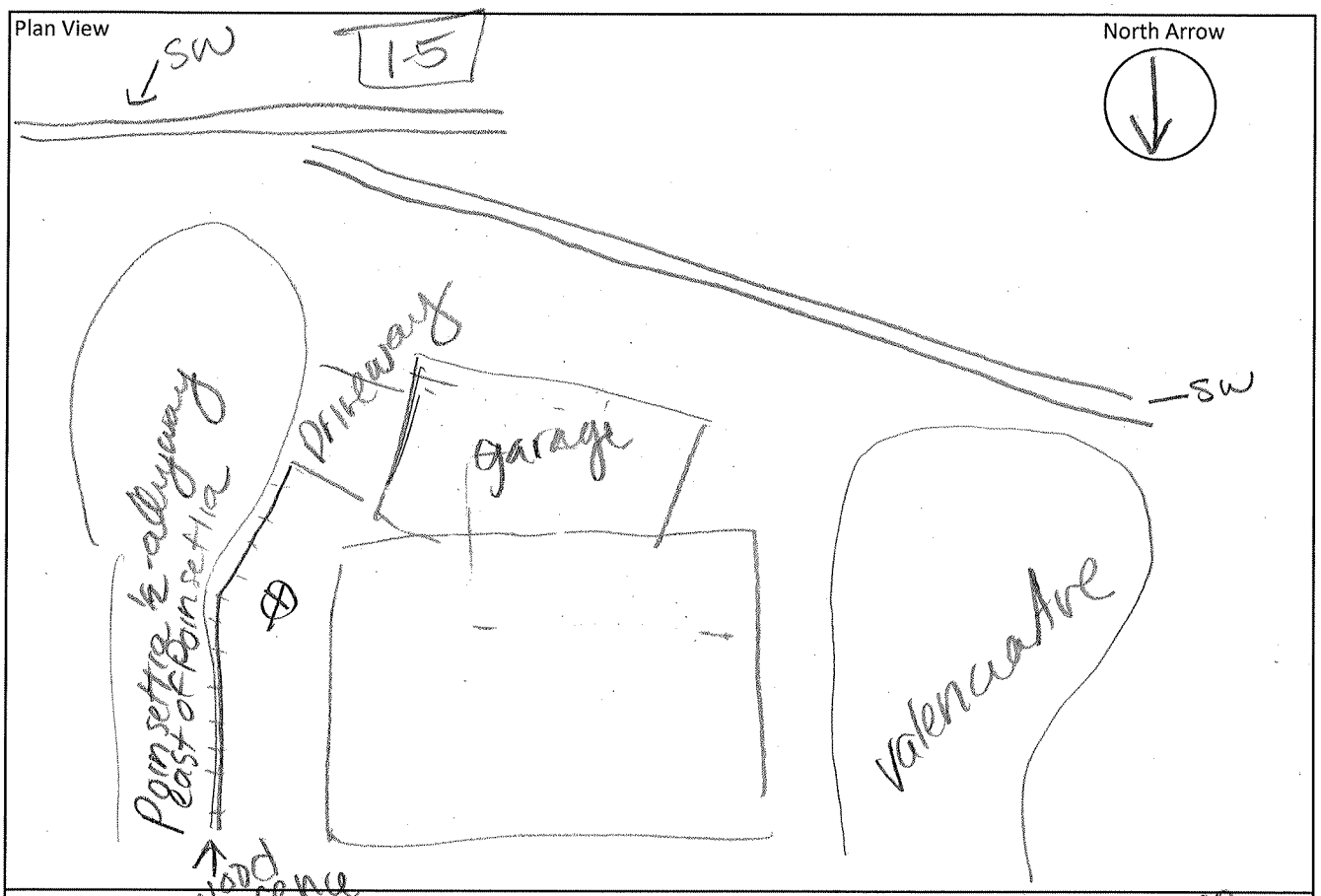
- helicopter passby 57-58.5 dBA
- Spoke w/ home owner - got permission to do msrmnt in yard. Side yard closest to I-5 houses AC unit + is on - placed SLM in back/alley yard where BBQ etc is.
- Pics 50-54 @ SLM
- Jet passby - high altitude, on take-off ≈ 61.8-62.3 (62.3 when overhead)

Noise Monitoring Data Sheet:
Site Sketch

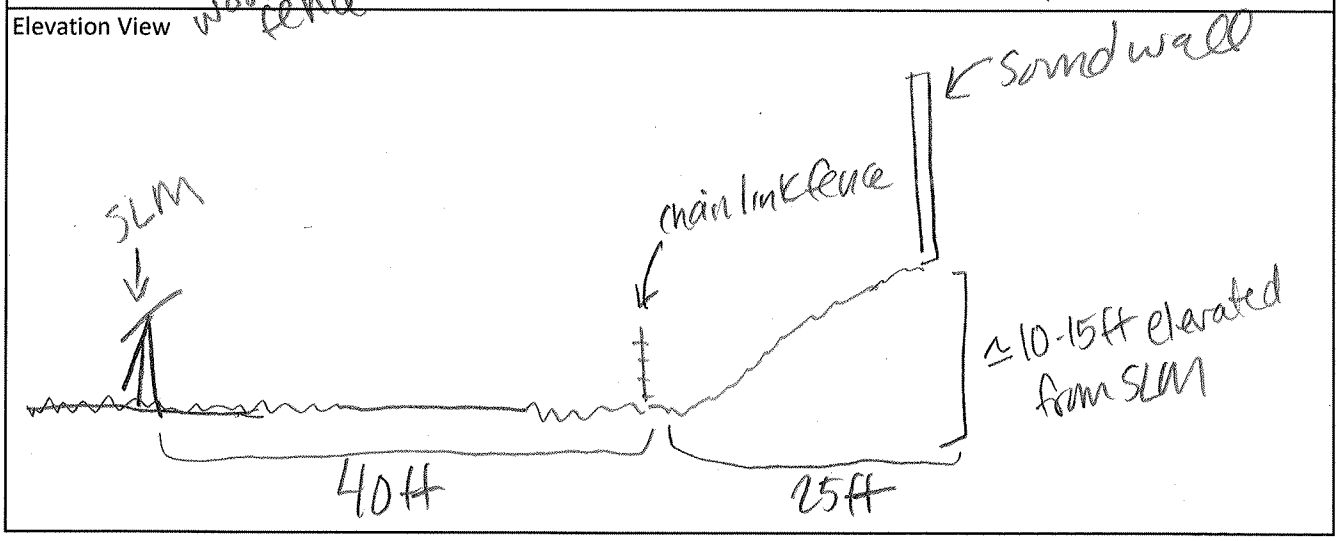
Project: OCTA I-5 HOV Lane Improvements	Operator(s): J Rietz	Date/Time: Tues. 09/24/13
Site ID: ST-15	Address: Valencia	
Land Use: S.F. Residential		

Notes:

Plan View



Elevation View



Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JPR, JM	Date: 01/21/2014
Site ID: ST-16	Address: Near M-132 on Pennway	
Land Use: Single & Multi-Fam Residential		

SLM: LD 824	S/N: A2624		Temp:
Calibrator: CQ200	S/N:		Wind:
Calibration Reference: 114.0	Before:		Humidity:
	After:		Cloud Cover:

Start: 3:50	Leq05min:	Lmax:
Stop: 4:00	Leq10min:	Lmin:
Total: 10 min	Leq15min:	L10:
	Leq20min:	L90:

Notes:

- SLM is on sidewalk along Pennway - there is a wood fence around invines next to SLM (NOT a block wall)
- SLM is on Pennway between 2 traffic lights - light @ 17th & light @ on/off ramp to SB I-5. Accel/decel. traffic
- School bus passby on Pennway ≈ 80.3 dBA

FHWA Traffic Noise Model Calibration Datasheet

AECOM

Project: I-5 HOV Date: 1/21/14 Analyst: Jamie Group SLM: 824

Cal #: 1, 2 Offset A: 0 Offset B: 0 Temp: 82°F Hum: 41 Wind: 3-4 mph Sky: Clear

Roadway Name: I5 NB/SB Location On Site: ST06 and ST-17

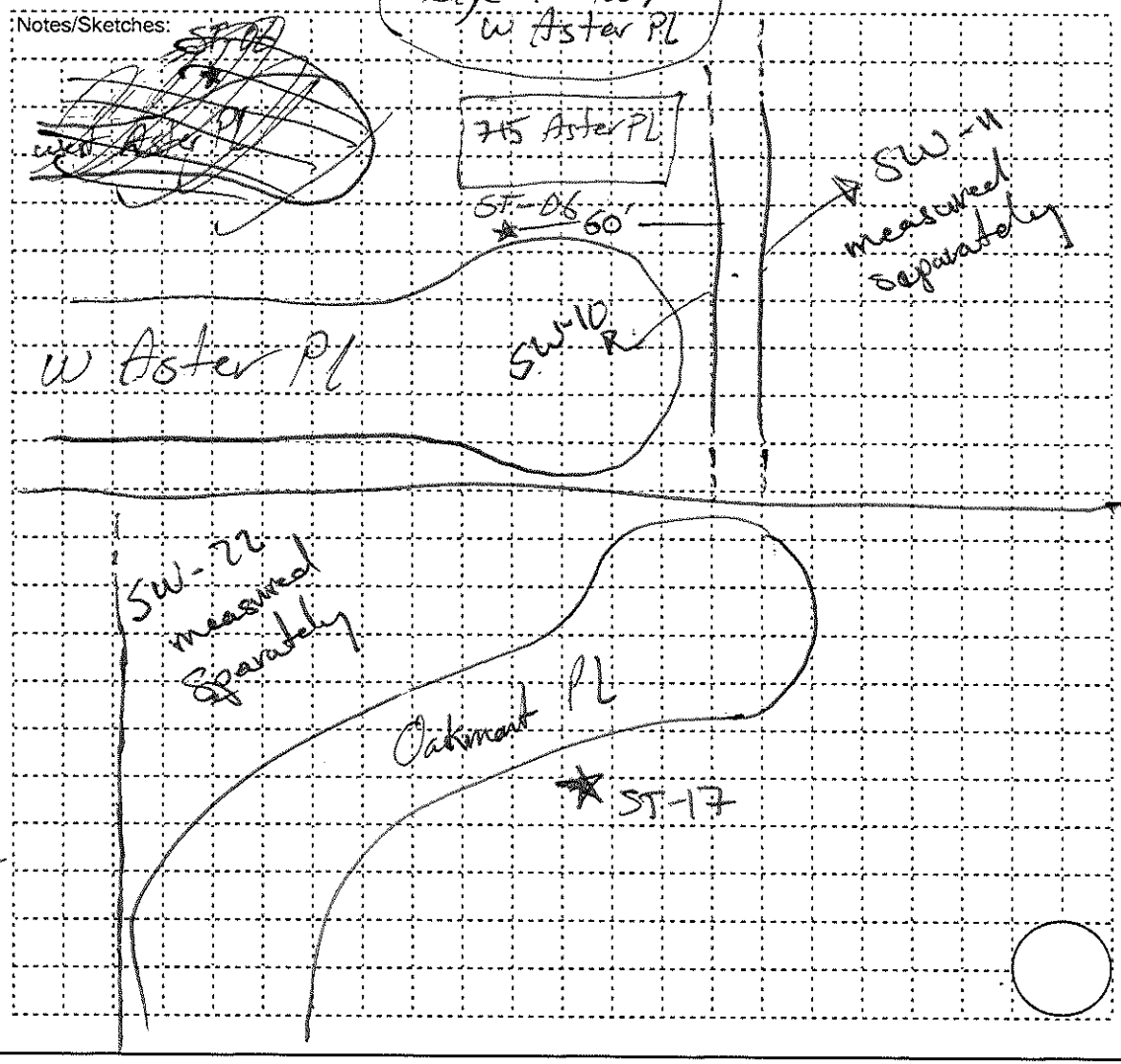
Site:	ST06	ST-17
Cal #:	1	2
Time:	10:55	4:30p
Duration:	10 Min	10 min
Auto:	video	video
Med:	~	~
Hvy:	~	~
★ Leq:	62.1	60.8
Lmax:	65.7	67.7
Distance to CL:	60 feet from wall	Edge of Oakmont PL
Mic Elev ~ Road:	Level	Level
Number of Lanes:	I5 NB/SB	I5 NB/SB
Posted Speed:	65	65
Observed Speed:	Recorded separately	Recorded
Road Type:	Paved	Paved
Road Grade:	Level	Elevated
Road Condition:	Good	Good
Intv. Ground Type:	Soundwall	Building/Soundwall 22
Site Topography:	Level	Varying

Photos

ST06 1-4 (a-d) ST-17 (a-d)

stored x2

Notes/Sketches:



★ Reading for entire measurement duration.

Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JPR	Date: 01/21/2014
Site ID: ST-18	Address: 1329 Custer	
Land Use: Single-Fam Residential, Auto shop accross st. on Custer		

SLM:	LD 824	S/N:	A 2624	Temp:	73.2 °F
Calibrator:	Cal 200	S/N:		Wind:	Ø-2mph
Calibration Reference:	114.Ø	Before:		Humidity:	
		After:		Cloud Cover:	cloudy

Start:	4:30	Leq05min:	Lmax:
Stop:	4:40	Leq10min:	Lmin:
Total:		Leq15min:	L10:
		Leq20min:	L90:

Notes:
- I-5 both directions - clear LOS from SLM
- NB I-5 is going much slower than SB
- Background traffic on I-5 ≈ 62-63 (SPL) dBA
- Airplane passby overhead ≈ 66.2 dBA @ 4:40
- File No. 6

PROJECT: OCTA I-5 HOV LANES **PROJECT #:** 60220190

DATE: 10/24/12 **ENGINEER/ANALYST:** PELLOS

Receptor ID: ST-19 SLM Model: 824 (SN: 4262 4) Calibrator Model: 200 (SN: 4214) Data File: 2

MEASUREMENT INFORMATION

Start Time: 10:[redacted]50 Stop Time: 11:[redacted]10 10:48 - 10:49 MISTAKENLY STARTED

Principal Source(s): TRAFFIC on I-5

Other Source(s): TRAFFIC on N. EASTWOOD. DOG BARKING (SMALL)

Average Observed Noise Level: 65 dBA

Maximum L_{eq} Observed: 68 dBA Source(s): ~~[redacted]~~ HEAVY TRUCK ON I-5

Minimum L_{eq} Observed: 63 dBA

Comments:

68 dBA HEAVY TRUCK I-5 @ 11:07

68 dBA DOG BARKING @ 11:10

DATA FILE #2

MEASUREMENT @ 11:46 WAS A MISTAKE

TRAFFIC COUNT DATA

Start Time: 10:50 Stop Time: 11:10 N. EASTWOOD

Direction: Both Speed: 15

Autos	Med. Trucks	Heavy Trucks
1		

Direction: _____ Speed: _____

Autos	Med. Trucks	Heavy Trucks

PROJECT: OCTA I-5 HOV LANES PROJECT #: 60220190

DATE: 10/24/12 ENGINEER/ANALYST: PELLOS

Receptor ID: ST-19 SLM Model: 824 (SN: 42624) Calibrator Model: 200 (SN: 4214) Data File: 2

LOCATION

Location Description: IN CUL-DE-SAC OF N. EASTWOOD AVE. IN PARALLEL W/ BACKYARD OF 1320 N. EASTWOOD AND ACROSS THE STREET FROM 1313 N. EASTWOOD

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: 3ft Overall Roadway Width: 40 Lane Widths: 12

Is Parking Allowed along Street: YES Width of Parking Lane: 8

Distance from barriers: 96ft Barrier Type: CONCRETE Barrier Height: 15ft

Location Comments: SOUND WALL ENDS TO THE SOUTH FOR FREEWAY ONRAMP TO THE NORTH

METEOROLOGY

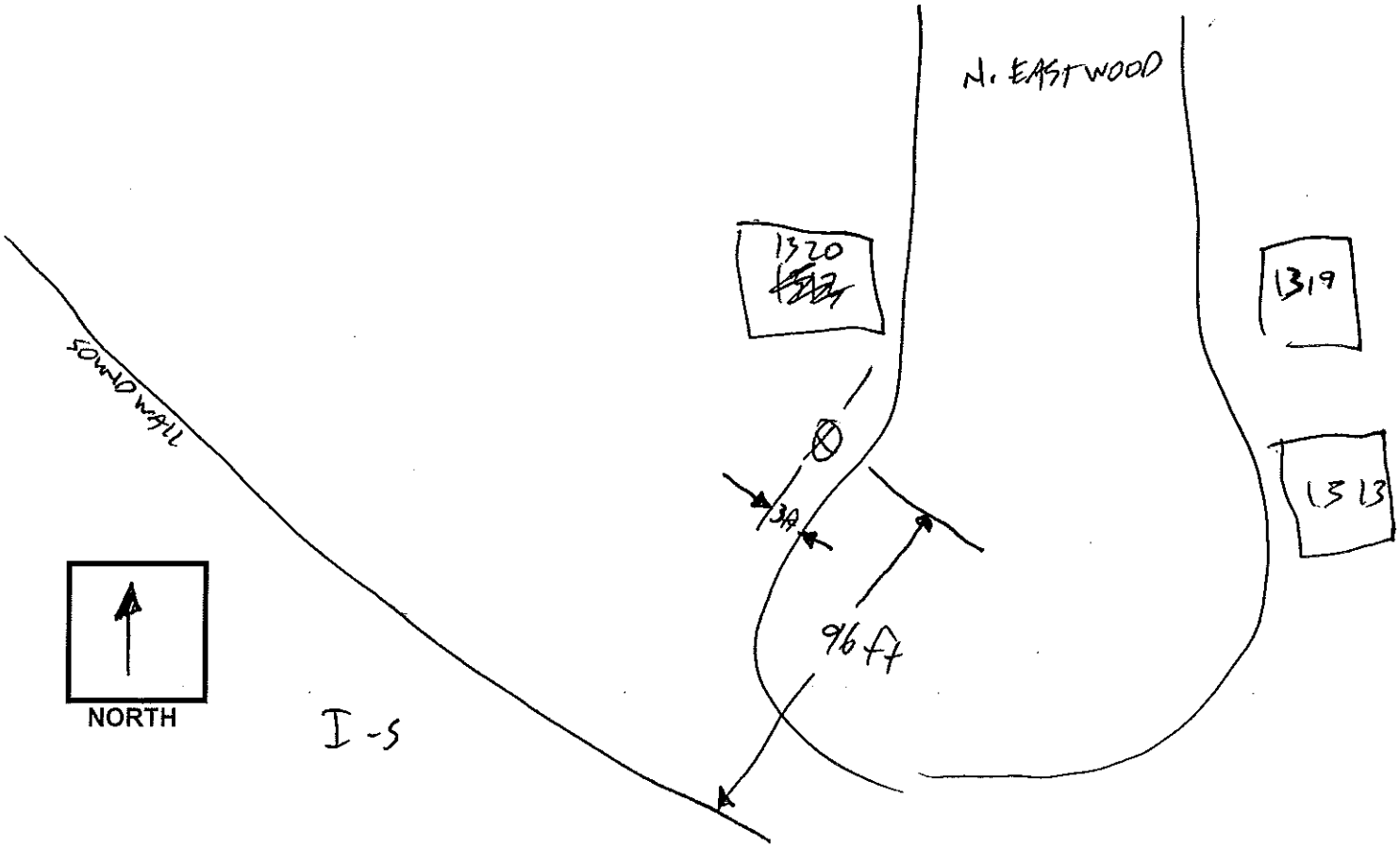
Temperature: 72°F Wind Speed: 1-4 mph

Wind Direction: W Other (gusts, etc.):

Meteorological Comments: 50% HUMIDITY SUNNY

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



PROJECT: OCTA I-5 HOV LANES **PROJECT #:** 60220190

DATE: 10/24/12 **ENGINEER/ANALYST:** PELLOS

Receptor ID: ST-20 SLM Model: 824 (SN: 42624) Calibrator Model: 200 (SN: 4214) Data File: 1

MEASUREMENT INFORMATION

Start Time: 10:08 Stop Time: 10:30

Principal Source(s): TRAFFIC ON I-5

Other Source(s): BIRD VOCALIZATIONS ; TRAFFIC ON LINWOOD AVE

Average Observed Noise Level: 63

Maximum L_{eq} Observed: 67 dBA Source(s): @ VAN ON LINWOOD @ 10:13

Minimum L_{eq} Observed: 59

Comments: 66 dBA POSTAL TRUCK 10:14

DATA FILE #1

TRAFFIC COUNT DATA

Start Time: 10:08 Stop Time: 10:30 LINWOOD AVE

Direction: BOTH Speed: 25 mph

Autos	Med. Trucks	Heavy Trucks
1111		

Direction: _____ Speed: _____

Autos	Med. Trucks	Heavy Trucks

PROJECT: OCTA I-5 HOV LANES **PROJECT #:** 60220190

DATE: 10/24/12 **ENGINEER/ANALYST:** PELLOS

Receptor ID: ST-20 SLM Model: 824 (SN: 42624) Calibrator Model: 200 (SN: 4214) Data File: 1

LOCATION

Location Description: ACROSS FROM 1505 ~~N. EL PORTOZANO~~ E. STAFFORD ST; IN LINE WITH THE BACK YARD OF 1406 GRACE

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: 4 ft Overall Roadway Width: 40 ft Lane Widths: 12

Is Parking Allowed along Street: YES Width of Parking Lane: 8

Distance from barriers: 50 ft Barrier Type: CONCRETE / EARTH BERM Barrier Height: 25 ft

Location Comments: RESIDENTS NOT HOME NO ACCESS BACKYARD

METEOROLOGY

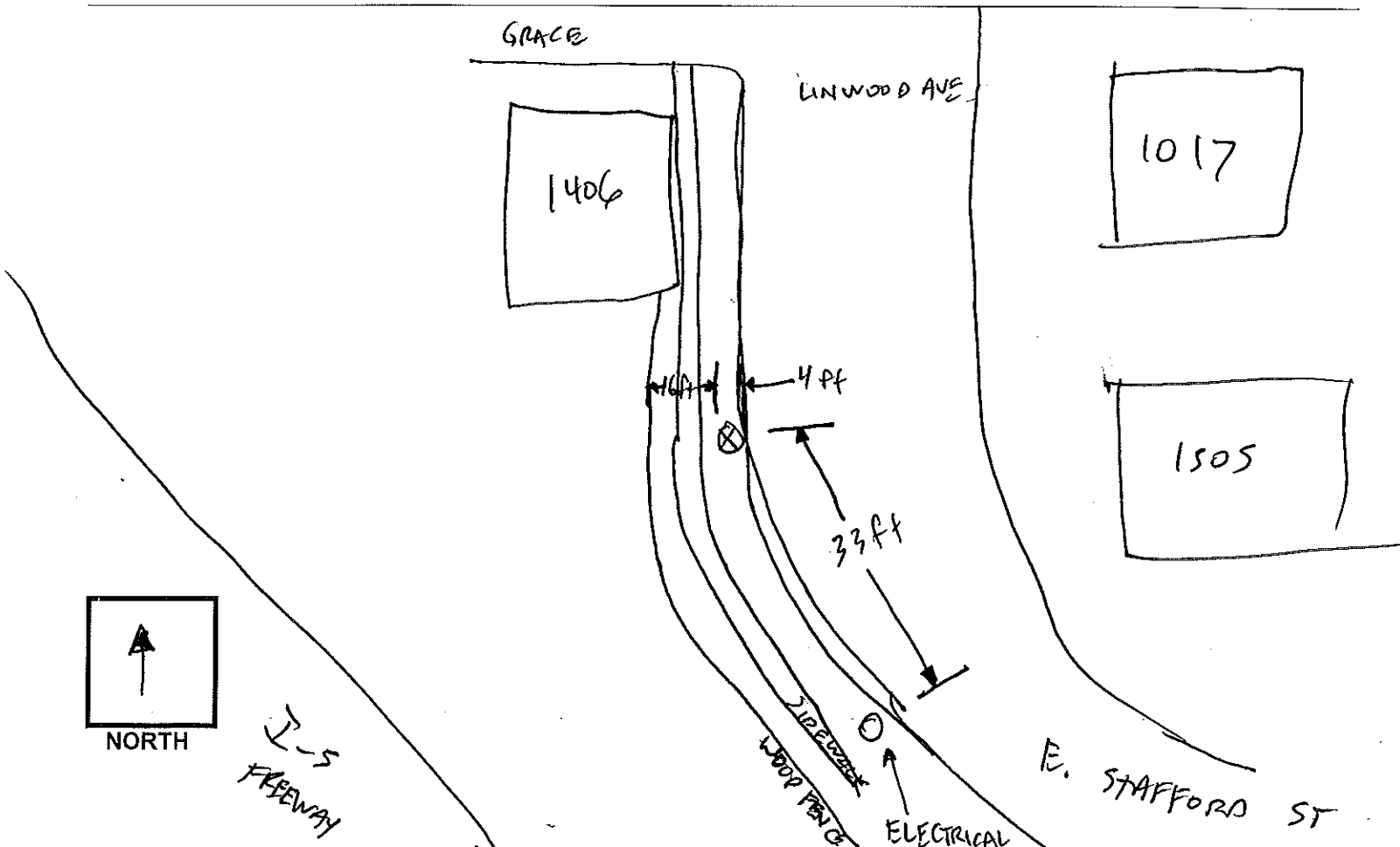
Temperature: 72°F Wind Speed: 1-4 mph

Wind Direction: W Other (gusts, etc.):

Meteorological Comments: MOSTLY SUNNY LIGHT BREEZE

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JPietz, JMirise	Date: Weds 09/25/2013
Site ID: ST-21	Address: 902 N Wright St	
Land Use: Single Fam. Residential		

SLM: LD 820	S/N: 1298		Temp: 82°F
Calibrator: Cal 200	S/N:		Wind: windy 6-7mph
Calibration Reference: 114.0	Before: 114.1 (11:05 on 09/25)		Humidity: 50-61%
	After: 114.2		Cloud Cover: Sunny/Clear

Start: 11:05 am	Leq05min: 65.9 Int 58		Lmax: 58 69.8, 59 68.0, 60 68.0
Stop: 11:20 am	Leq10min: 65.4 Int 59		Lmin: 62.9, 62.5, 62.6
Total: 15 mins	Leq15min: 65.3 Int 60		L10: 67.0, 66.6, 66.7
	Leq20min:		L90: 64.5, 64.0, 63.7

Traffic video recorded from top level of parking struct @ 4th st. 11:05-11:20 coincides w/ msrmnt

Notes:

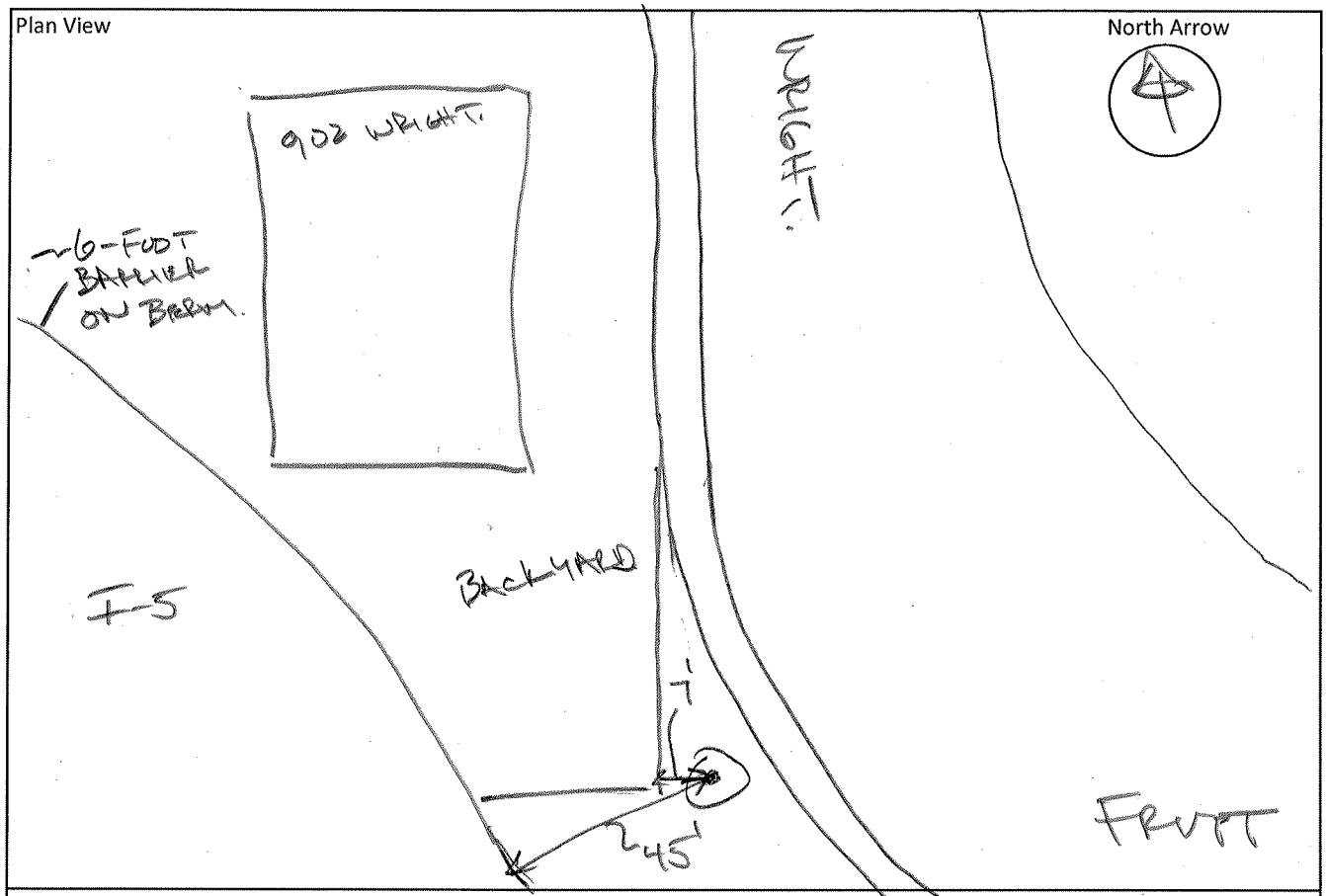
- Knocked on door, didn't have access to the backyard. Gate is locked. Placed SLM immediately south of the backyard fence. While not in the backyard, SLM is measuring same noise, rep. of backyard for 902 N Wright
- H truck passby on I-5 ≈ 66.3 dBA
- Traffic constant, no lulls during msrmnt
- car passby on Fruit/Safford ≈ 65.8 dBA
- SW @ this site is on top of a berm - not very tall from Res side. ≈ 8 ft. LOS is broken - can't see truck stacks or anything
- Pics 55-57 on Kodak Camera

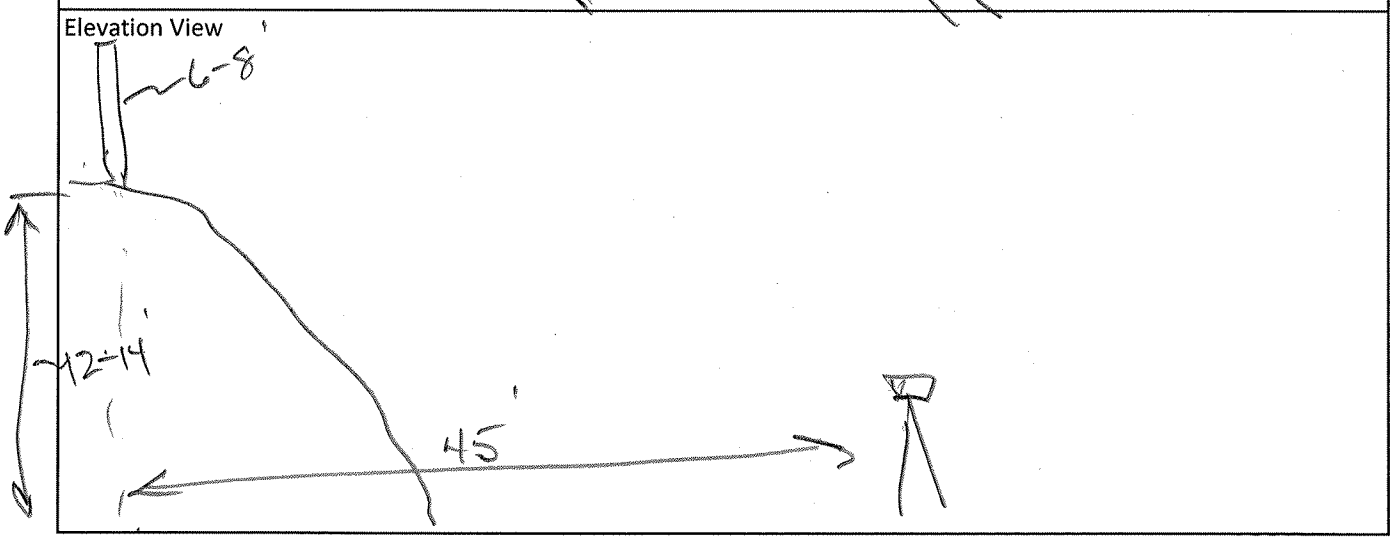
≈ 7 cars passed by on Fruit/Safford during msrmnt.

Noise Monitoring Data Sheet:
Site Sketch

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JR / JM	Date/Time: 9/25/13 – 11:06 a.m.
Site ID: ST-21	Address: 902 WRIGHT (ST.?)	
Land Use: SINGLE-FAMILY RESIDENTIAL		

Notes: CONSTRUCTION IN VICINITY OF OLD ST-21 SITE. MOVED NW TO CLEANER LOCATION.





Noise Monitoring Data Sheet:
Accoustic Data

Project: OCTA I-5 HOV Lane Improvements	Operator(s): JRuetz, JMirise	Date: Weds 09/25/2013
Site ID: ST-22	Address: Saddleback View Park	
Land Use: Park w/in SF Res neighborhood		

SLM: LD 820	S/N: 1298	Temp: 79.4°F	
Calibrator: Cal 200	S/N:	Wind: grsty - max 6.7 mph	
Calibration Reference: 114.0	Before: 114.2	Humidity: 53.9	
	After:	Cloud Cover: clear + sunny	

Start: 11:36	Leq05min: 66.8	int 62	Lmax:	62 69.5	63 68.6	64 68.7	65 68.9	66 70.3	67 69.		
Stop: 12:10	Leq10min: 66.4	int 63	Lmin:	64.2	63.9	62.2	63.1	61.5	62.6		
Total:	Leq15min: 66.4	int 64	L10:	68.0	67.7	67.8	67.6	68.0	67.9		
	Leq20min: 66.3	int 65	L90:	65.4	65.0	64.7	65.0	64.9	65.0		
	Leq25 66.7	int 66 @ 11:56 am									
	Leq30 66.6	int 67 @ 12:01 pm		69.2	62.7						
	Leq35 66.6	int 68 @ 12:06 pm		68.0	64.7						

Traffic recorded from top level of parking garage @ 4th St. 11:40 to 11:55

→ Video camera malfunction. Re-started measurement period + left SLM running. New video 11:55 thru 12:10. Coincides w/ intervals 66-68

Notes:

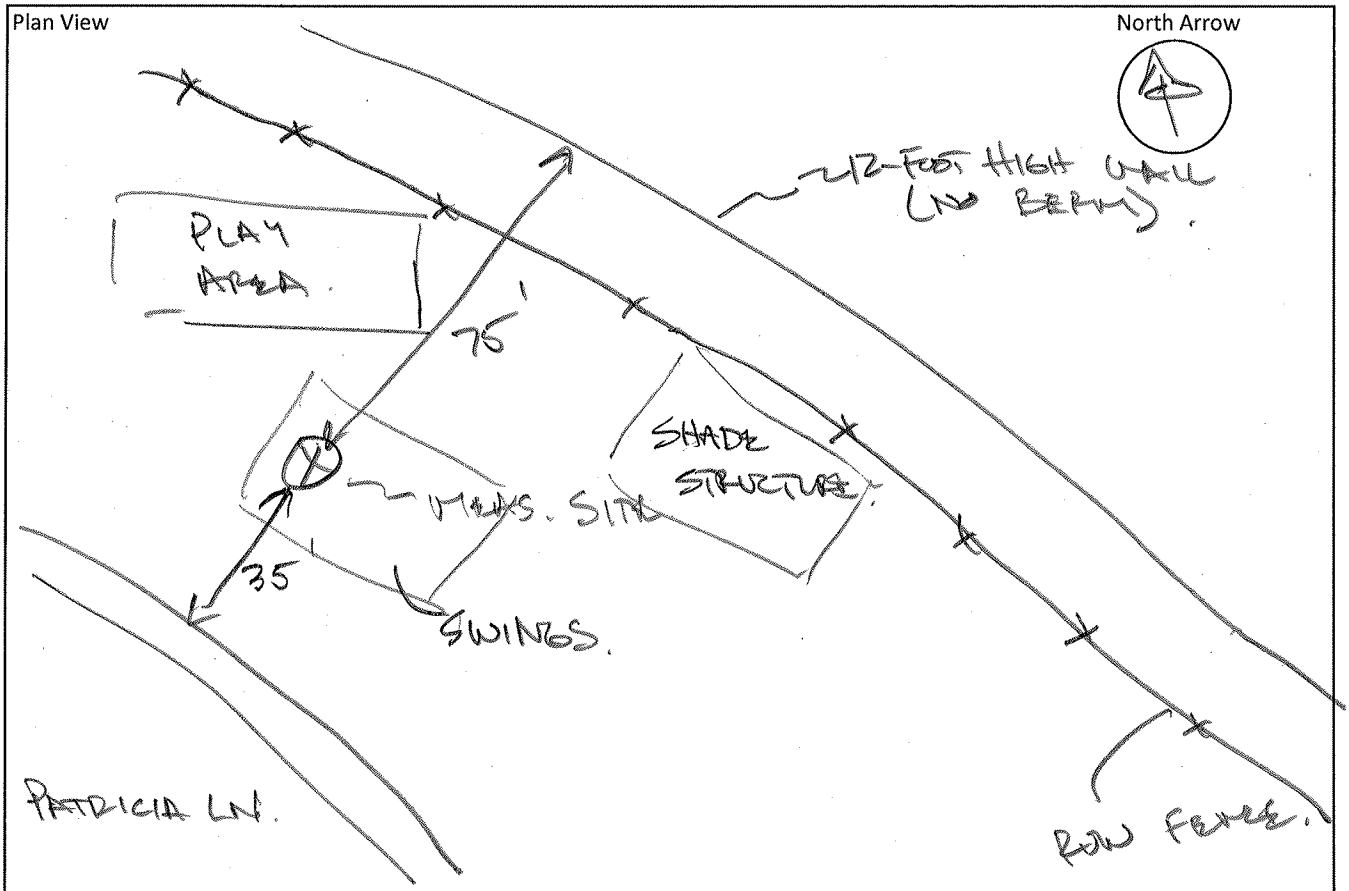
- Recs 58-63 on Kodak Camera
- H truck passby on I-5 ≈ 68.6 dBA
- SLM set up w/in playground area of park. Right at swing set. Also includes jungle gym + picnic bench. Rest of park is just a walking path
- Traffic noise dominates background - pretty loud. Lowest ≈ 65.8 (just cars, no trucks)
- Motorcycle passby on I-5 ≈ 67.8 dBA
- Traffic is constant steady flow during measurement. No lulls.
- SW is 6-8 ft tall on top of berm. Berm is 4-6 ft tall.
- NB I-5 traffic speeds slowing, per traffic count team (Daryl Harris)
- 12:09 = train whistle in background. ≈ 68.3 dBA.

Noise Monitoring Data Sheet:
Site Sketch

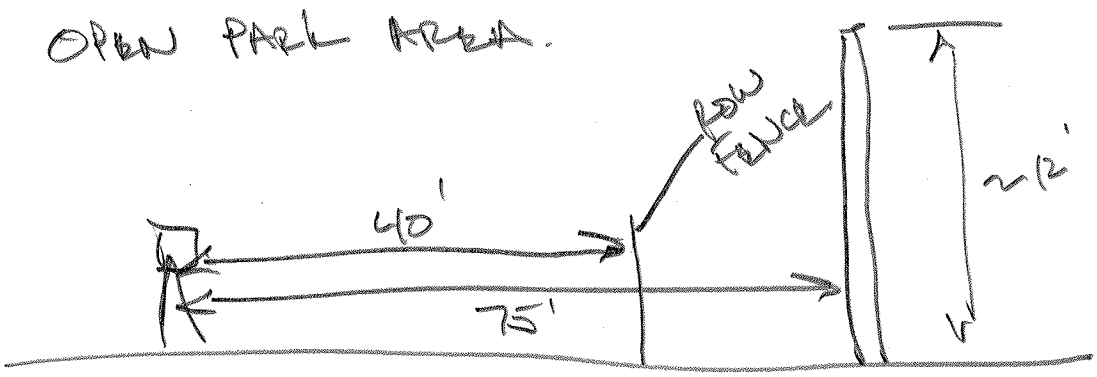
Project: OCTA I-5 HOV Lane Improvements	Operator(s): JR / JM	Date/Time: 9/25/13 – 11:40 a.m.
Site ID: ST-22	Address: 621 N. PATRICIA LN. / SADDLEBACK VIEW PARK.	
Land Use: PARK.		

Notes: SAME AS PREVIOUS LOCATION.

Plan View



Elevation View



PROJECT: OCTA I-5 HOV LANES **PROJECT #:** 60220190

DATE: 10/9/12 **ENGINEER/ANALYST:** PELLUS

Receptor ID: ST-23 SLM Model: 820 (SN: 1671) Calibrator Model: 200 (SN: 5768) Data File: ____

MEASUREMENT INFORMATION

Start Time: 17:16 Stop Time: 17:41

Principal Source(s): TRAFFIC ON I-5

Other Source(s): TRAFFIC ON MASBURY ST.; DOGS IN NEIGHBORHOOD;

Average Observed Noise Level: 59

Maximum L_{eq} Observed: 76 dBA Source(s): DOG BARKING AT NEIGHBOR 17:17-17:18

Minimum L_{eq} Observed: 57

Comments: 75dBA DOG BARKING

75dBA DOG BARKING 17:35-17:38

TRAFFIC COUNT DATA

Start Time: ____ Stop Time: ____

Direction: ____ Speed: ____

Autos	Med. Trucks	Heavy Trucks
TRAFFIC ON I-5 IS BEING VIDEO TAPED		

Direction: ____ Speed: ____

Autos	Med. Trucks	Heavy Trucks

PROJECT: OCTA I-5 HOV LANES **PROJECT #:** 60220190

DATE: 10/9/12 **ENGINEER/ANALYST:** PELLOS

Receptor ID: ST-23 SLM Model: 820 (SN: 1671) Calibrator Model: 200 (SN: 5768) Data File: ___

LOCATION

Location Description: 703 CONCORD ST. IN CUL-DE-SAC NEAR INTERSECTION ON CONCORD ST AND MASURY ST.

(Sketch meter location below and take at least 2 photographs of meter location)

Distance from edge of roadway: IN ROAD Overall Roadway Width: 30 ft Lane Widths: 10 ft

Is Parking Allowed along Street: YES Width of Parking Lane: 50 ft

Distance from barriers: 6.6 ft Barrier Type: CONCRETE SOUND WALL Barrier Height: 18 ft

Location Comments: EQUIDISTANT FROM SOUNDWALL TO THE BACKYAND OF ADJACENT RESIDENCES. OWNERS NOT AVAILABLE FOR ACCESS. ADJACENT RESIDENT HAS ADDITIONAL CONCRETE WALL 6.5 ft TALL AROUND PROPERTY

METEOROLOGY

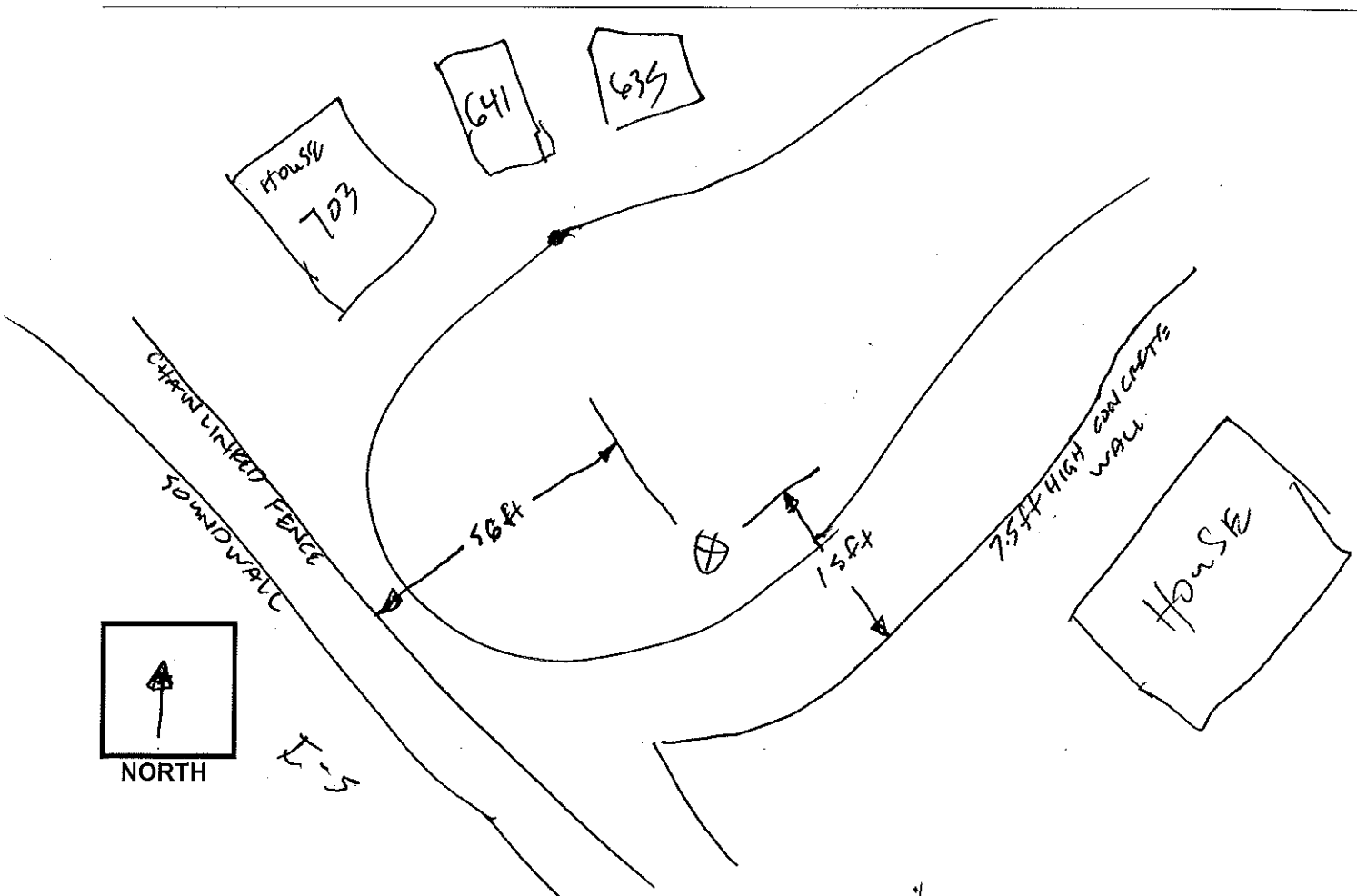
Temperature: 73°F Wind Speed: 1.3 mph

Wind Direction: SW Other (gusts, etc.): 4.5 mph

Meteorological Comments: PARTLY CLOUDY

Sketch Area

(Sketch must include a minimum of 2 (X and Y) distances from major physical objects, e.g. buildings, roadways, walls, etc.)



LT-03

LT-03
N 33.77783°
W 117.87700°
IMG_0491.JPG
319° NW
10/16/2012 2:20:48 PM

LT-03
N 33.77800°
W 117.87700°
IMG_0492.JPG
221° SW
10/16/2012 2:21:11 PM

LT-03

LT-03
N 33.77800°
W 117.87717°
IMG_0493.JPG
146° SE
10/16/2012 2:21:33 PM

LT-03
N 33.77783°
W 117.87733°
IMG_0494.JPG
65° ENE
10/16/2012 2:21:52 PM

LT-03

LT-03
N 33.77783°
W 117.87717°
IMG_0495.JPG
294° WNW
10/16/2012 2:22:07 PM

LT-03
N 33.77767°
W 117.87733°
IMG_0496.JPG
292° WNW
10/16/2012 2:30:26 PM

LT-03

LT-03
N 33.77783°
W 117.87717°
IMG_0497.JPG
199° SSW
10/16/2012 2:30:29 PM

LT-03
N 33.77783°
W 117.87717°
IMG_0498.JPG
138° SE
10/16/2012 2:30:33 PM

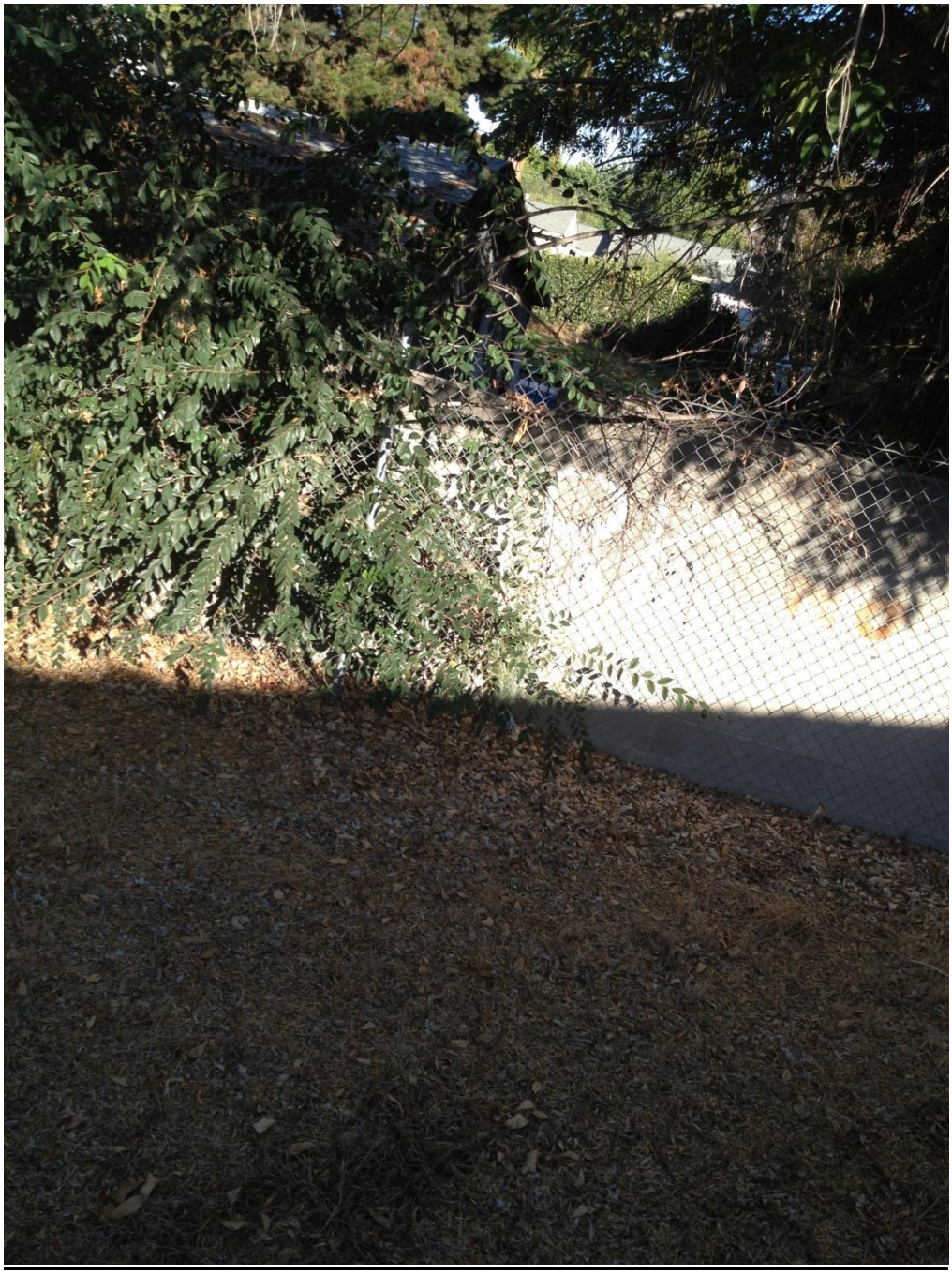
LT-04

LT-04

LT-04

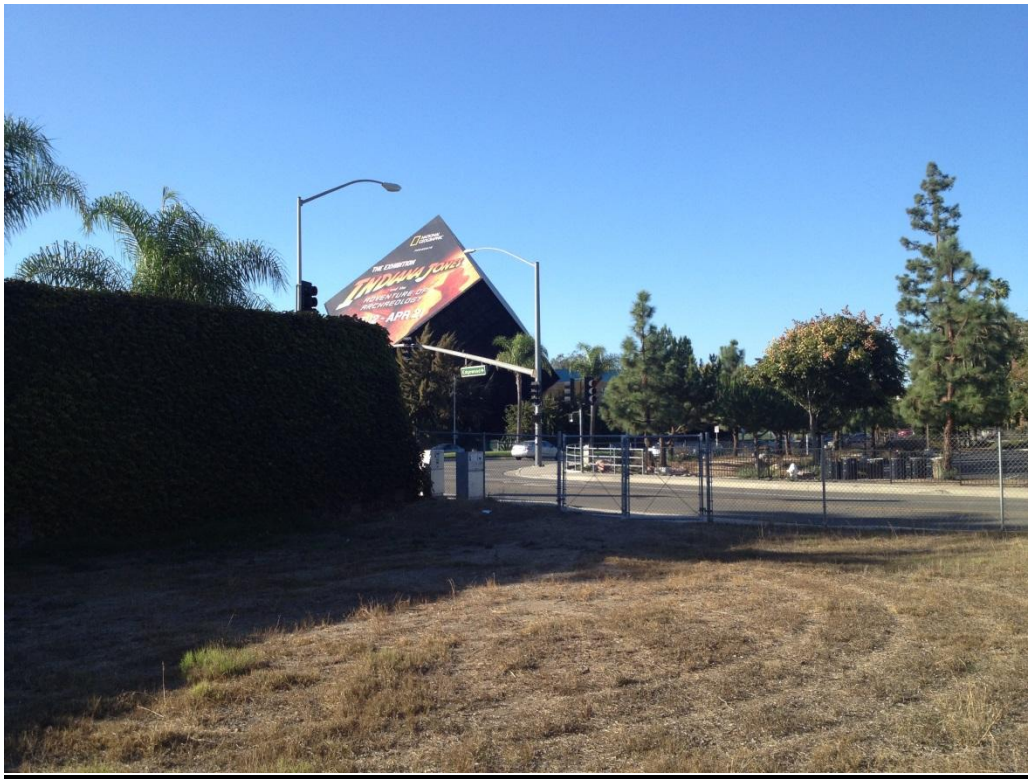
LT-04

LT-04



LT-04

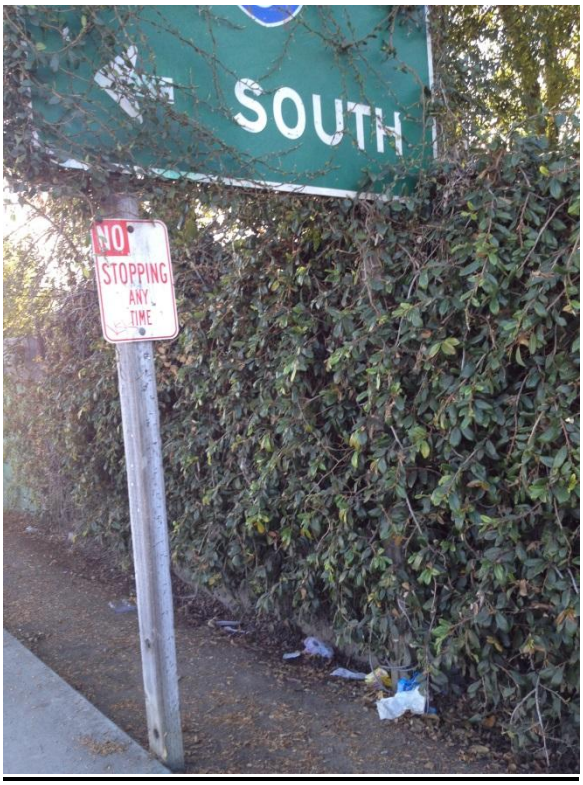
LT-04


THE EXHIBITION
INDIANA JONES
AND THE
ADVENTURE OF
ARCHAEOLOGY

LT-05

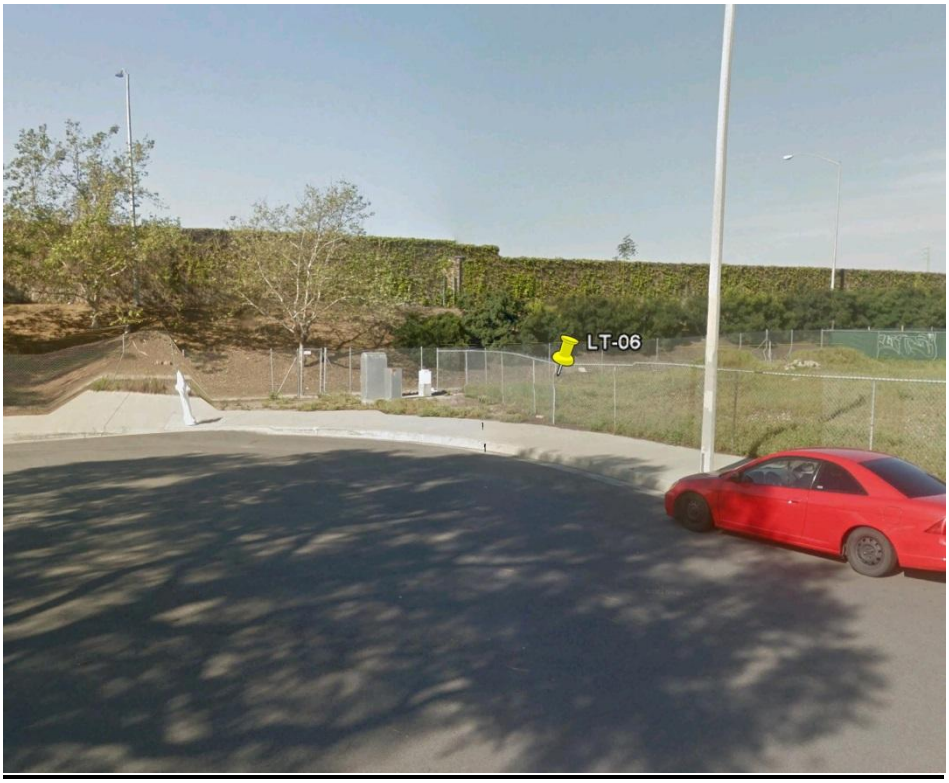
LT-05

LT-05



LT-05

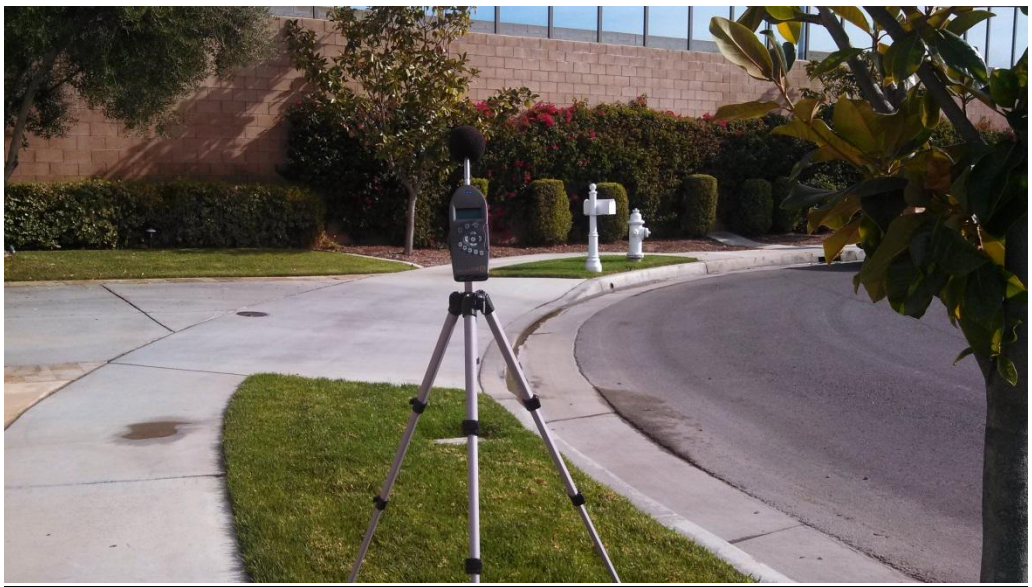
LT-06



ST-05

ST-05

ST-06

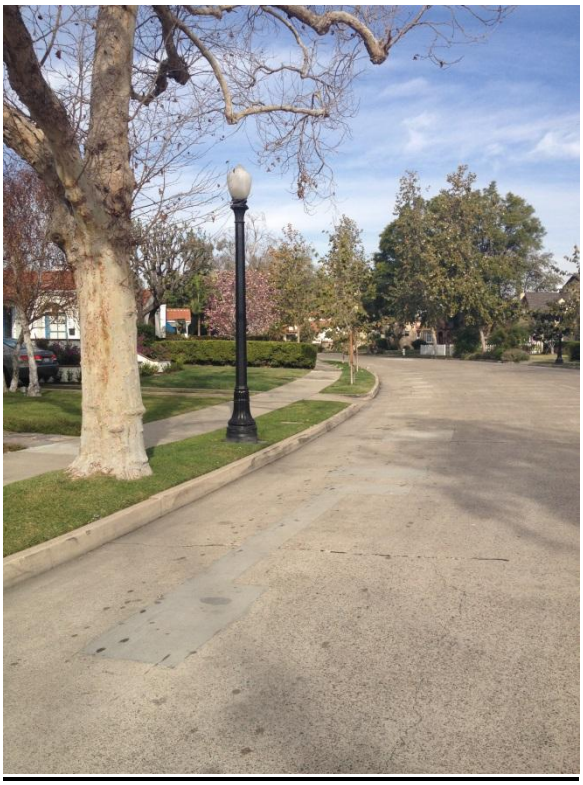


ST-06

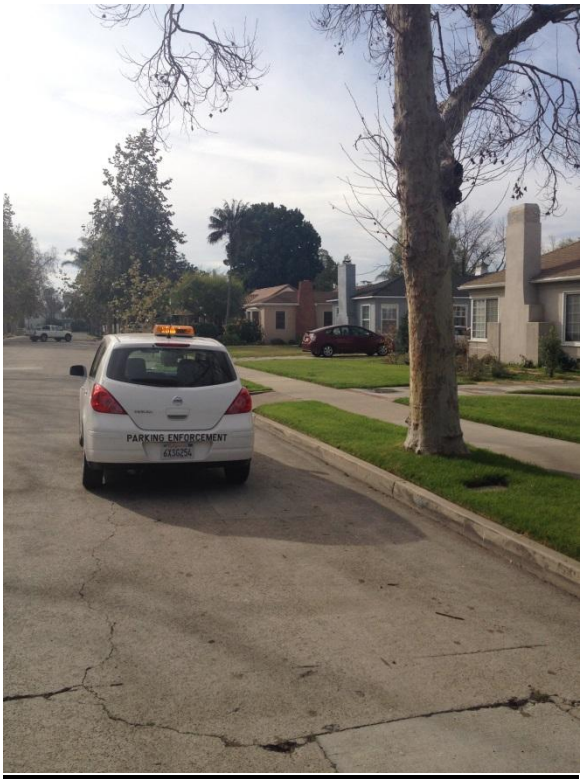
ST-07

ST-07

ST-08



ST-08



ST-08

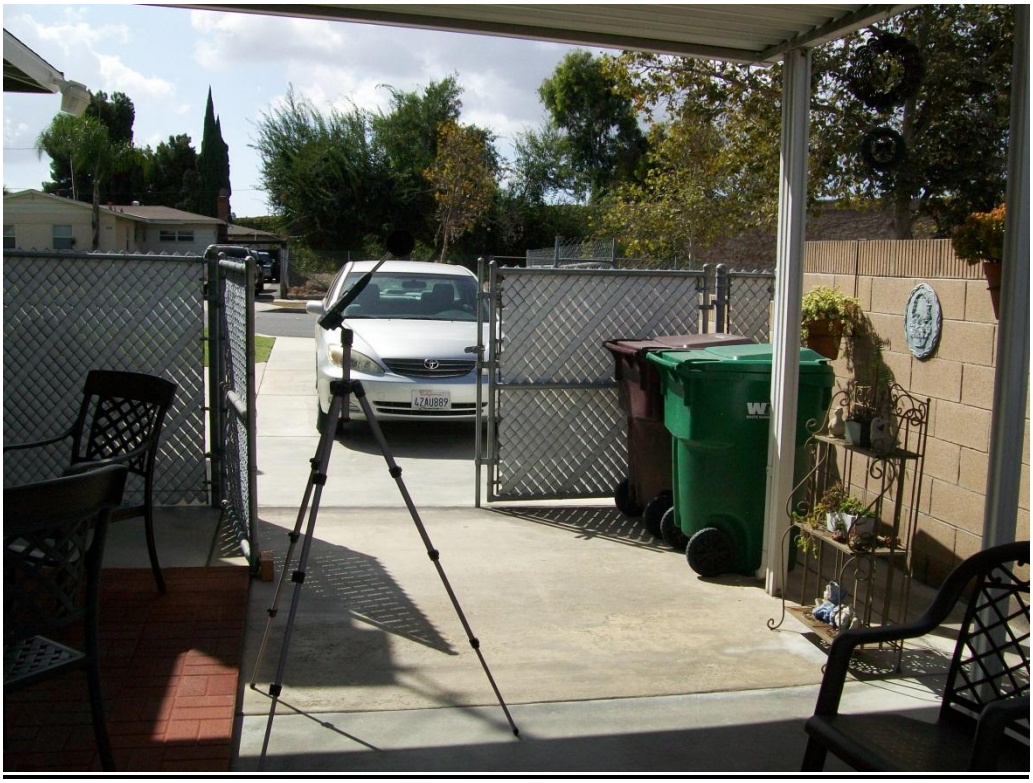
ST-09

ST-09

ST-10

ST-10

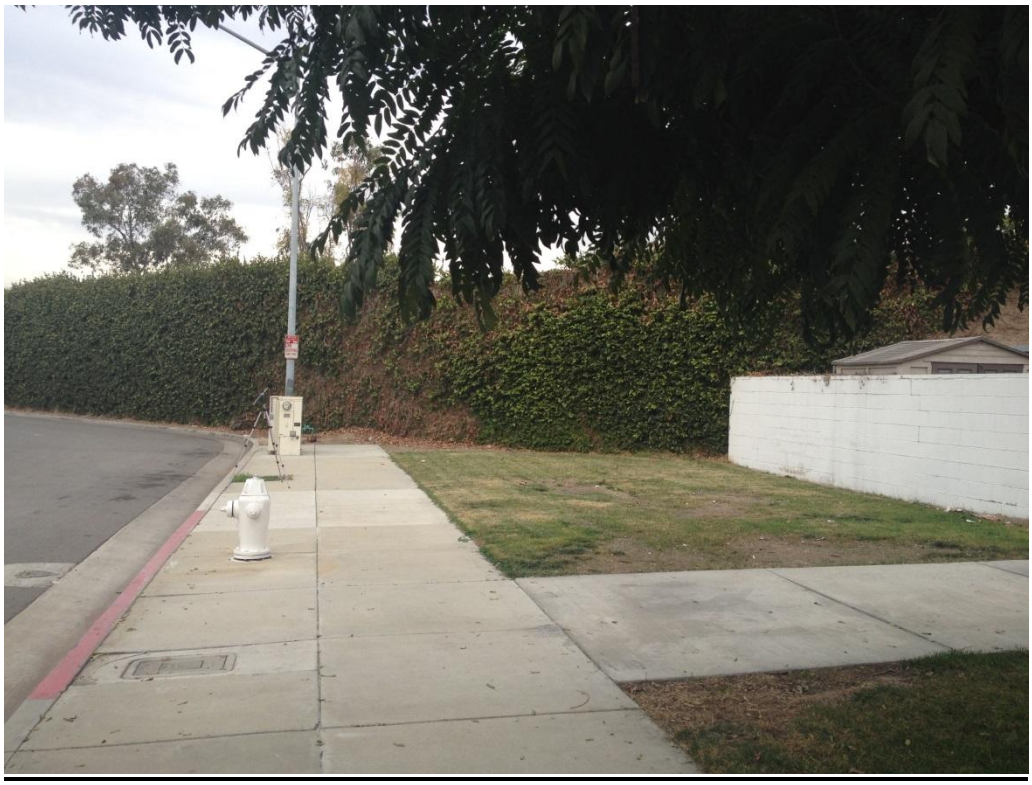
ST-11



ST-11

ST-12

ST-12



ST-13

ST-13

ST-14

ST-14

ST-15

ST-15

ST-16

ST-16

ST-16

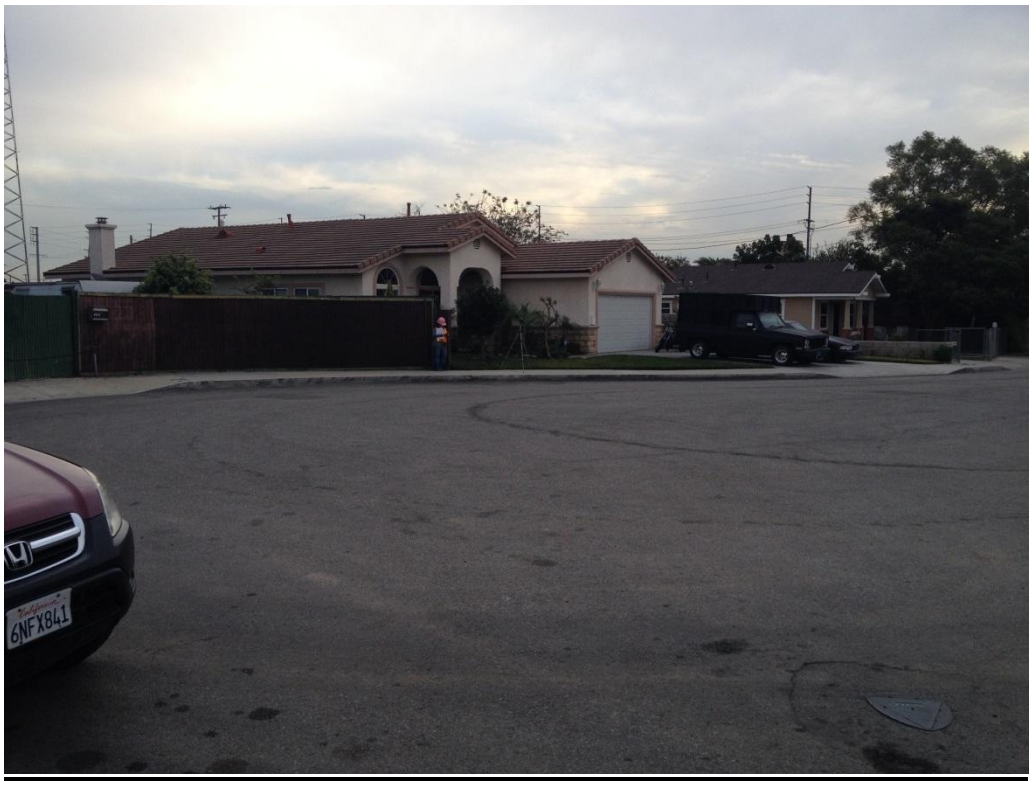
ST-16

ST-17

ST-17

ST-18

ST-18



ST-21

ST-21

ST-22

ST-22

ST-23

ST-23
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W 117.84433°
IMG_0499.JPG
247° WSW
10/17/2012 9:34:27 AM

ST-23
N 33.75117°
W 117.84433°
IMG_0500.JPG
322° NW
10/17/2012 9:34:37 AM

ST-23

ST-23
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W 117.84433°
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10/17/2012 9:34:58 AM

ST-23
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W 117.84450°
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119° ESE
10/17/2012 9:35:12 AM

ST-23

ST-23
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W 117.84433°
IMG_0503.JPG
187° S
10/17/2012 9:35:22 AM

ST-23
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W 117.84433°
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81° E
10/17/2012 9:35:30 AM

ST-23

ST-23
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ST-23
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N 33.75117°
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IMG_0506.JPG
51° NE
10/17/2012 9:36:03 AM

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155568

Instrument Model CAL200, Serial Number 6204, was calibrated on 27FEB2012. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 27FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
PCB	1502C02FJ15PSIA	1429	12 Months	17AUG2012	3396448761.00
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Before: 114.04 dB, 94.06 dB, 1000.4 Hz @ sea level.
After: Refer to Certificate of Measured Output.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Larson Davis CAL200 Acoustic Calibrator, SN: 6204
Certificate of Measured Output

Performance at Reference Conditions

Nominal Level (dB SPL):	94	114
Measured Level (dB SPL):	**94.01**	**114.01**
Expanded Uncertainty (dB):	0.153	0.152
Level Error Limit (dB):	±0.35	±0.35
Nominal Frequency (Hz):	1000	1000
Measured Frequency (Hz):	**1000.4**	**1000.3**
Expanded Uncertainty (Hz):	0.2	0.2
Frequency Error Limit (Hz):	±10.0	±10.0
Measured Distortion (%):	0.58	0.34
Expanded Uncertainty (%):	0.25	0.25
Distortion Limit (%):	2.0	2.0

The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity.

Environmental Conditions

Temperature (°C):	24	24
Relative Humidity (%):	23	23
Static Pressure (kPa):	101.2	101.2

Reference Microphone

Model: Larson Davis 2559
Serial Number: 2506
Open Circuit Sensitivity: 12.315 mV/Pascal
Uncertainty: 0.130 dB

Influence of Static Pressure

Nominal Level (dB SPL): 114

Nominal Pressure (kPa)	Pressure (kPa)	Level Change (dB)	Frequency Change (Hz)	Distortion (%)
108.0	107.9	-0.01	0.00	0.34
101.3	101.3	0.00	0.00	0.34
92.0	92.0	0.00	-0.00	0.35
83.0	83.0	-0.02	0.00	0.37
74.0	74.1	-0.07	0.00	0.40
65.0	65.0	-0.16	0.00	0.43
Expanded Uncertainty:	1.0	0.04	0.20	0.25
Limit:		±0.30	±10.0	2.0

Reference microphone corrections applied.

Environmental Conditions

Temperature (°C):	24
Relative Humidity (%):	22

Reference Microphone

Model: Larson Davis 2559
Serial Number: 2506

Static pressure was measured with a calibrated Motorola pressure sensor MPX2100AP.
Temperature and humidity was measured with a calibrated Fluke 1620A sensor.
Expanded uncertainty of environmental measurements: 0.3 °C, 3 %RH, 1.0 kPa
Uncertainty values are given at 95% confidence level (k = 2).

A Sound Level Meter can be calibrated to a level (L) defined as: L = measured level + pressure sensitivity
or if a Sound Level Meter is calibrated using the nominal level, the adjustments to data (X) are defined as:
X = measured level - nominal level - pressure sensitivity

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155785

Instrument Model 824, Serial Number A2624, was calibrated on 02MAR2012. The instrument meets factory specifications per Procedure D0001.8046, IEC 61672-1:2002 Class 1; IEC 60651-2001, 60804-2000 and ANSI S1.4-1983 Type 1 1/3, 1/1 Oct. Filters; S1.11-1986 Type 1C; IEC61260-am1-2001 Class 1 .

Instrument found to be in calibration as received: YES
Date Calibrated: 02MAR2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 31 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.
Tested with PRM902 S/N 2589

Signed:
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-155557

Instrument Model 820, Serial Number 1298, was calibrated on 24FEB2012. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: NO
Date Calibrated: 24FEB2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0589 / 0103	12 Months	08DEC2012	2011-152462

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 26 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

See "As Received" data.
Tested with PRM828 S/N 1852.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-152522

Instrument Model 820, Serial Number 1573, was calibrated on 12DEC2011. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 12DEC2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	21MAR2012	2011-141059

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 26 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with PRM828-2608

Signed: Ron Harris
Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-153098

Instrument Model CAL200, Serial Number 5768, was calibrated on 22DEC2011. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 22DEC2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
PCB	1502C02FJ15PSIA	1429	12 Months	17AUG2012	3396448761.00
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-152989

Instrument Model CAL150B, Serial Number 2209, was calibrated on 20DEC2011. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 20DEC2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
PCB	1502C02FJ15PSIA	1429	12 Months	17AUG2012	3396448761.00
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2010-127859

Instrument Model 824, Serial Number 3007, was calibrated on 24MAR2010. The instrument meets factory specifications per Procedure D0001.8046, IEC 61672-1:2002 Class 1; IEC 60651-2001, 60804-2000 and ANSI S1.4-1983 Type 1 1/3, 1/1 Oct. Filters; S1.11-1986 Type 1C; IEC61260-am1-2001 Class 1 .

Instrument found to be in calibration as received: YES
Date Calibrated: 24MAR2010
Calibration due: 24MAR2011

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	15JAN2011	2010-125658

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.
Tested with PRM902 S/N 3132

Signed:
Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2000 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-152791

Instrument Model 820, Serial Number 1671, was calibrated on 20DEC2011. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 20DEC2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	21MAR2012	2011-141059

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with PRM828-2436

Signed: Ron Harris

Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-152794

Instrument Model 820, Serial Number 1665, was calibrated on 20DEC2011. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 20DEC2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900 / 2239	0608 / 0110	12 Months	14DEC2012	20111-152639

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with PRM828-2609

Signed: Ron Harris

Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-152529

Instrument Model CAL200, Serial Number 4637, was calibrated on 12DEC2011. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 12DEC2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Larson Davis	2559	2506	12 Months	24MAY2012	18309-1
PCB	1502C02FJ15PSIA	1429	12 Months	17AUG2012	3396448761.00
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2010-134370

Instrument Model CAL200, Serial Number 4214, was calibrated on 21SEP2010. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 21SEP2010
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2504	12 Months	29SEP2010	16910-1
PCB	1502B02FJ15PSIA	1342	12 Months	23NOV2010	3341845067
Larson Davis	2900	0661	12 Months	02APR2011	2010-128279
Hewlett Packard	34401A	3146A10352	12 Months	12AUG2011	4877885
Larson Davis	PRM915	0112	12 Months	09SEP2011	2010-133976
Larson Davis	PRM902	0480	12 Months	09SEP2011	2010-133975
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2011	SM090910

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2000 Certified

Table C-1. Traffic Count Data used for Calibration at Sites ST-06 and ST-07

Calibration Site ID	ST-06, ST-07
Date:	1/21/2014
Time Start	11:10 AM
Time Stop	11:20 AM
Count Duration	10 min

		10 minute Count from 11:10am to 11:20am (Veh/10 minutes)					Normalized Volumes (Veh/Hr)					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 main travel lanes	SB	737	49	42	3	0	4422	294	252	18	0	68	62	59	59	N/A
I-5 travel lanes from SR-22/57	SB	370	35	20	2	0	2220	210	120	12	0	61	57	52	57	N/A
I-5 HOV lane	SB	123	0	0	1	0	738	0	0	6	0	63	N/A	N/A	58	N/A
I-5 main travel lanes	NB	1199	54	63	2	1	7194	324	378	12	6	66	60	59	60	63
I-5 HOV lane	NB	121	0	0	1	0	726	0	0	6	0	69	N/A	N/A	62	N/A
I-5 off ramp to WB SR-22	NB	116	6	1	0	0	696	36	6	0	0	32	28	25	N/A	N/A

Table C-2. Traffic Count Data used for Calibration at Site ST-08

Site ID	ST-08
Date:	1/21/2014
Time Start	10:20 AM
Time Stop	10:30 AM
Duration	10 min

		10 minute Count from 10:20am to 10:30am (Veh/10 minutes)					Normalized Volumes (Veh/Hr)					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 main travel lanes	SB	786	28	31	1	2	4716	168	186	6	12	69	67	62	67	68
I-5 HOV lane	SB	136	3	0	0	3	816	18	0	0	18	65	64	N/A	N/A	65
I-5 Off ramp to Broadway	SB	94	0	0	0	0	564	0	0	0	0	36	N/A	N/A	N/A	N/A
I-5 main travel lanes	NB	1295	2	115	4	1	7770	12	690	24	6	66	60	54	64	65
I-5 HOV lane	NB	117	0	0	5	0	702	0	0	30	0	68	N/A	N/A	67	N/A
Broadway	NB	27	0	0	0	0	162	0	0	0	0	44	N/A	N/A	N/A	N/A
Broadway	SB	39	0	0	0	0	234	0	0	0	0	42	N/A	N/A	N/A	N/A

Table C-3. Traffic Count Data used for Calibration at Site ST-09

Calibration Site ID	ST-09
Date:	9/24/2013
Time Start	9:25 AM
Time Stop	9:40 AM
Duration	15 mins

		15 minute Counts					Hourly Volumes					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
WB Edgewood RT onto NB Main St	WB to NB	65	2	0	1	0	260	8	0	4	0	20	15	N/A	15	N/A
Main St, south of Edgewood	NB & SB	417	6	1	1	0	1668	24	4	4	0	27	27	27	27	N/A
Main St, north of Edgewood	NB & SB	482	8	1	2	0	1928	32	4	8	0	27	27	27	27	N/A
NB I-5 Off-ramp to Main St	NB	134	2	0	0	0	536	8	0	0	0	37.3	42.7	N/A	N/A	N/A
NB I-5 Off-ramp to Broadway	NB	16	0	0	0	0	64	0	0	0	0	51.4	N/A	N/A	N/A	N/A
NB I-5 On-Ramp from Main St	NB	128	3	0	0	1	512	12	0	0	4	31.2	21.4	N/A	N/A	26.2
I-5 ML	NB	2029	55	65	9	0	8116	220	260	36	0	43.4	39.7	33.5	39.7	N/A
I-5 ML	SB	952	64	75	16	9	3808	256	300	64	36	45.7	27.2	26.4	45.7	45.7

Table C-4. Traffic Count Data used for Calibration at Site ST-10

Calibration Site ID	ST-10
Date:	9/24/2013
Time Start	10:12 AM
Time Stop	10:27 AM
Duration	15 min

		15 minute Counts					Hourly Volumes					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	SB	1950	81	70	0	7	7800	324	280	0	28	64	60	58	N/A	62
I-5 ML	NB	1923	69	72	6	5	7692	276	288	24	20	61	55	50	52	61
NB I-5 Off-ramp to Main St	NB	126	2	1	0	0	504	8	4	0	0	60	60	60	N/A	N/A
NB I-5 On-ramp from Santa Clara/Main St	NB	161	3	3	0	1	644	12	12	0	4	25	25	25	N/A	25
Main St	NB & SB	339	7	1	8	1	1356	28	4	32	4	48	48	48	48	48
Santa Clara - RT onto SB Main St	SB Main St	20	1	0	0	0	80	4	0	0	0	5	5	N/A	N/A	N/A
Santa Clara - LT onto NB Main St	NB Main St	19	2	0	0	0	76	8	0	0	0	5	5	N/A	N/A	N/A

Table C-5. Traffic Count Data used for Calibration at Site ST-11

Calibration Site ID ST-11
Date: 9/30/2013
Time Start 11:24 AM
Time Stop 11:39 AM
Duration 15 mins

		15 minute Counts					Hourly Volumes					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	NB	2186	55	67	9	0	8744	220	268	36	0	74	70	69	70	N/A
I-5 ML	SB	2091	61	81	8	0	8364	244	324	32	0	67	57	49	58	N/A

Table C-6. Traffic Count Data used for Calibration at Site ST-12

Site ID	ST-12
Date:	1/21/2014
Time Start	2:40 PM
Time Stop	2:50 PM
Duration	10 min

		10 minute Count from 2:40pm to 2:50pm (Veh/10 minutes)					Normalized Volumes (Veh/Hr)					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	NB	1191	8	86	5	1	7146	48	516	30	6	69	66	63	66	65
I-5 HOV	NB	198	0	0	0	0	1188	0	0	0	0	69	N/A	N/A	N/A	N/A
I-5 ML	SB	1046	1	44	4	3	6276	6	264	24	18	72	68	60	65	66
I-5 HOV	SB	174	0	0	0	0	1044	0	0	0	0	72	N/A	N/A	N/A	N/A
SB I-5 On-ramp from Main St	SB	70	0	0	1	0	420	0	0	6	0	35	N/A	N/A	25	N/A
Main St	NB/SB (combined)	358	1	1	2	1	2148	6	6	12	6	35	31	28	31	32

Table C-7. Traffic Count Data used for Calibration at Site ST-13

Calibration Site ID ST-13
Count Location 1 camera: Looking southeast along the SB I-5 on ramp from Main St
Time Start 11:40 AM
Time Stop 11:55 AM
Duration 15 mins

		15 minute Counts					Hourly Volumes					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	SB	1590	57	64	6	0	6360	228	256	24	0	57	55	52	55	N/A
I-5 ML	NB	1788	73	84	10	0	7152	292	336	40	0	66	63	61	63	N/A

Table C-8. Traffic Count Data used for Calibration at Site ST-14

Calibration Site ID	ST-14
Date:	9/24/2013
Time Start	3:09 PM
Time Stop	3:24 PM
Duration	15 min

		15 minute Counts					Hourly Volumes					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	SB	2149	37	26	7	8	8596	148	104	28	32	60	57	55	51	60
SB I-5 On-Ramp from Main St	SB	165	0	0	0	0	660	0	0	0	0	65	N/A	N/A	N/A	N/A
I-5 ML	NB	2019	67	52	6	17	8076	268	208	24	68	68	65	60	63	68

Table C-9. Traffic Count Data used for Calibration at Site ST-15

Calibration Site ID ST-15
Date: 9/24/2013
Time Start 4:04 PM
Time Stop 4:19 PM
Duration 15 mins

			15 minute Counts					Hourly Volumes					Vehicle Speeds				
Roadway	Direction	# Lanes	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	NB	7	2609	63	44	15	0	10436	252	176	60	0	68	66	64	66	N/A
I-5 ML	SB	7	2542	29	30	10	0	10168	116	120	40	0	68	66	64	66	N/A
17th Ave	EB	3	346	6	1	1	0	1384	24	4	4	0	44	42	40	41	N/A
17th Ave	WB	3	457	8	1	3	0	1828	32	4	12	0	40	36	34	34	N/A
NB I-5 On-Ramp from 17th	NB	1	63	1	0	0	0	252	4	0	0	0	46	44	N/A	N/A	N/A

Table C-10. Traffic Count Data used for Calibration at Site ST-16

Site ID	ST-16
Date:	1/21/2014
Time Start	3:50 PM
Time Stop	4:00 PM
Duration	10 mins

		10 minute Count from 3:50pm to 4:00pm (Veh/10 minutes)					Normalized Volumes (Veh/Hr)					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	SB	1440	10	37	6	10	8640	60	222	36	60	67	65	63	65	64
I-5 ML	NB	1345	3	64	0	14	8070	18	384	0	84	30	31	31	N/A	30
I-5 HOV	NB	287	0	0	2	0	1722	0	0	12	0	65	N/A	N/A	63	N/A
I-5 HOV	SB	182	0	0	3	0	1092	0	0	18	0	68	N/A	N/A	66	N/A
SB I-5 Off-ramp to Penn Way	SB	64	0	4	0	1	384	0	24	0	6	40	N/A	30	N/A	38
SB I-5 On-ramp from Penn Way	SB	78	0	1	1	1	468	0	6	6	6	41	N/A	30	35	36
Penn Way	NB	29	1	3	0	0	174	6	18	0	0	30	27	25	N/A	N/A
Penn Way	SB	15	0	1	1	0	90	0	6	6	0	30	N/A	25	28	N/A

Table C-11. Traffic Count Data used for Calibration at Site ST-17 and ST-18

Site ID ST-17, ST-18
Date: 1/21/2014
Time Start 4:30 PM
Time Stop 4:40 PM
Duration 10 min

		10 minute Count from 4:30pm to 4:40pm (Veh/10 minutes)					Normalized Volumes (Veh/Hr)					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	SB	1433	10	33	2	5	8598	60	198	12	30	31	27	29	29	31
I-5 ML	NB	1313	15	5	2	56	7878	90	30	12	336	35	31	28	31	34
I-5 HOV	NB	289	0	0	0	0	1734	0	0	0	0	50	N/A	N/A	N/A	N/A
I-5 HOV	SB	183	0	0	0	0	1098	0	0	0	0	71	N/A	N/A	N/A	N/A

Table C-12. Traffic Count Data used for Calibration Sites ST-19 and ST-20

Calibration Site ID ST-19 and ST-20
Date: 10/24/2012
Time Start 4:36 PM
Time Stop 4:51 PM
Duration 15 mins

		15 minute Counts					Hourly Volumes					Vehicle Speeds				
Roadway	Direction	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos	Autos	M Trucks	H Trucks	Buses	Motos
I-5 ML	SB	1788	36	42	0	0	7152	144	168	0	0	62	60	58	N/A	N/A
I-5 ML HOV	SB	267	0	0	0	0	1069	0	0	0	0	64	N/A	N/A	N/A	N/A
I-5 ML HOV	NB	292	0	0	0	0	1166	0	0	0	0	69	66	63	64	69
I-5 ML	NB	1950	39	129	0	0	7800	156	516	0	0	67	65	63	N/A	N/A

Appendix D Top of Soundwall Elevations

Appendix D
Top of Sound Wall Elevations

Existing Wall ID	Coordinates (bottom)		Ground Elevation (ft)	Top of Wall Elevation (ft)	Wall Height (ft)
	X	Y			
Existing SW-04	6,068,327.50	2,231,103.20	159.79	13.16	172.95
	6,068,279.00	2,231,102.20	156.38	16.57	172.95
	6,068,235.50	2,231,103.80	154.2	18.75	172.95
	6,068,191.50	2,231,108.00	152.38	20.56	172.94
	6,068,152.00	2,231,114.80	150.5	22.45	172.95
	6,068,112.00	2,231,123.80	149.7	23.25	172.95
	6,068,076.00	2,231,134.80	148	24.94	172.94
	6,068,028.50	2,231,152.50	147.88	25.06	172.94
	6,067,982.00	2,231,174.00	146	26.94	172.94
	6,067,944.50	2,231,194.50	145.76	27.19	172.95
	6,067,906.50	2,231,220.00	144.03	28.91	172.94
	6,067,872.00	2,231,245.80	142.67	30.28	172.95
	6,067,836.50	2,231,276.20	141.49	31.45	172.94
	6,067,810.50	2,231,302.80	139.36	33.58	172.94
	6,067,794.00	2,231,321.00	138.08	34.87	172.95
	6,067,783.50	2,231,376.80	147.86	25.08	172.94
Existing SW-05	6,066,031.00	2,230,832.80	139.03	14	153.03
	6,066,049.50	2,230,834.00	139.33	14	153.33
	6,066,072.00	2,230,833.50	139.65	14	153.65
	6,066,112.50	2,230,832.20	140.12	14	154.12
	6,066,160.00	2,230,831.20	140.89	14	154.89
	6,066,208.50	2,230,830.20	141.9	14	155.9
	6,066,258.00	2,230,829.00	142.88	14	156.88
	6,066,303.00	2,230,828.00	143.77	14	157.77
	6,066,339.50	2,230,827.50	145.24	14	159.24
	6,066,405.50	2,230,825.80	146.86	14	160.86
	6,066,468.50	2,230,824.50	148.41	14	162.41
	6,066,524.50	2,230,822.20	149.73	14	163.73

	6,066,582.00	2,230,818.00	151.25	14	165.25
	6,066,645.00	2,230,813.50	152.91	14	166.91
	6,066,720.00	2,230,808.20	154.95	14.43	169.38
	6,066,820.00	2,230,801.50	157.36	14.3	171.66
	6,066,919.50	2,230,794.50	159.9	14.3	174.2
	6,067,019.00	2,230,784.00	160.06	15.38	175.44
Existing SW-06	6,066,974.00	2,230,747.00	131.82	14.98	146.8
	6,067,069.50	2,230,717.00	132.55	14.4	146.95
	6,067,165.00	2,230,687.80	133.99	12.95	146.94
	6,067,216.00	2,230,672.80	138.54	8.49	147.03
	6,067,312.50	2,230,562.20	146.15	9.23	155.38
	6,067,377.50	2,230,486.50	151.58	9.73	161.31
	6,067,416.00	2,230,442.80	155.6	8.96	164.56
	6,067,454.00	2,230,401.80	158.26	8	166.26
	6,067,498.50	2,230,362.00	161.63	8	169.63
	6,067,537.50	2,230,330.50	163.74	8	171.74
	6,067,580.00	2,230,300.00	165.61	8	173.61
	6,067,608.00	2,230,282.00	166.26	8	174.26
	6,067,655.50	2,230,254.50	168.93	8	176.93
	6,067,699.00	2,230,232.50	168.79	8	176.79
Existing SW-07	6,067,495.00	2,230,339.00	134.94	5	139.94
	6,067,524.00	2,230,301.20	136.49	5	141.49
	6,067,522.00	2,230,226.00	135.05	5	140.05
Existing SW-08	6,067,631.00	2,230,097.20	135.01	6	141.01
	6,067,648.00	2,230,097.50	136.02	6	142.02
	6,067,722.50	2,230,007.50	139.59	8	147.59
	6,067,723.00	2,229,960.80	138.44	8	146.44
	6,067,722.00	2,229,897.50	138.67	8	146.67
Existing SW-09	6,067,723.00	2,230,007.00	139.61	8	147.61
	6,067,782.00	2,229,936.00	138.61	8	146.61
	6,067,850.50	2,229,854.50	137.24	8	145.24
Existing SW-10	6,067,706.50	2,230,075.20	135.7	16	151.7
	6,067,870.50	2,229,879.50	137.2	16	153.2
	6,068,046.50	2,229,663.80	138.15	16	154.15

	6,068,229.50	2,229,431.80	139.1	16	155.1
	6,068,378.00	2,229,239.00	139.9	16	155.9
	6,068,520.00	2,229,048.50	140.7	16	156.7
	6,068,532.00	2,229,049.20	140.7	5	145.7
	6,068,736.00	2,228,765.00	144.2	5	149.2
Existing SW-11	6,067,418.50	2,230,440.00	136	13.75	149.75
	6,067,694.00	2,230,112.50	136	14.94	150.94
	6,067,822.50	2,229,959.20	136.36	15.61	151.97
	6,067,869.00	2,229,904.00	138	11.06	149.06
	6,068,137.50	2,229,574.00	140	10.54	150.54
	6,068,217.50	2,229,473.00	140	15.24	155.24
	6,068,501.00	2,229,101.00	141.29	14.97	156.26
	6,068,676.50	2,228,857.80	142	16.06	158.06
	6,068,810.50	2,228,666.80	143.99	15.67	159.66
	6,069,025.50	2,228,345.00	145.98	16.07	162.05
	6,069,056.50	2,228,292.80	148	12.14	160.14
	6,069,167.00	2,228,109.00	149	14.85	163.85
	6,069,269.00	2,227,937.20	150	14.92	164.92
	6,069,367.00	2,227,763.00	150	14.4	164.4
	6,069,408.00	2,227,672.00	150	14.17	164.17
	6,069,434.50	2,227,575.50	150	15.15	165.15
	6,069,445.50	2,227,466.50	152	15.64	167.64
	6,069,445.50	2,227,465.20	152.87	10.58	163.45
	6,069,442.50	2,227,379.50	154	9.36	163.36
	6,069,439.00	2,227,279.50	154.6	8.99	163.59
	6,069,436.50	2,227,179.80	153.04	10.03	163.07
	6,069,437.00	2,227,128.20	151.67	10	161.67
	6,069,436.50	2,227,101.00	150.87	10	160.87
	6,069,437.00	2,227,066.20	149.02	10	159.02
	6,069,437.50	2,227,020.00	147	10	157
	6,069,438.50	2,226,967.50	145.29	10	155.29
	6,069,439.00	2,226,944.20	144.62	10	154.62
	6,069,442.00	2,226,922.00	143.95	10	153.95
	6,069,443.00	2,226,917.50	143.85	10	153.85

Appendix D
Top of Sound Wall Elevations

Existing SW-12	6,068,585.50	2,228,767.00	140	7	147
	6,068,653.50	2,228,767.00	140.89	7	147.89
	6,068,666.00	2,228,771.00	140.89	7	147.89
	6,068,677.00	2,228,784.50	140.89	7	147.89
	6,068,679.50	2,228,805.00	140.89	7	147.89
	6,068,633.00	2,228,870.20	140.89	7	147.89
	6,068,623.00	2,228,875.50	140.89	7	147.89
	6,068,622.50	2,228,877.80	140.89	7	147.89
	6,068,593.50	2,228,891.50	140.89	7	147.89
	6,068,586.00	2,228,882.00	140.89	7	147.89
	6,068,588.00	2,228,880.50	140.89	7	147.89
Existing SW-13	6,068,491.00	2,228,849.50	140.97	6	146.97
	6,068,488.50	2,228,849.50	140.97	6	146.97
	6,068,487.00	2,228,769.20	140	6	146
	6,068,544.50	2,228,768.00	140	6	146
Existing SW-15	6,071,667.50	2,224,213.00	159.38	13.51	172.89
	6,071,596.00	2,224,282.50	162.12	14.08	176.2
	6,071,526.00	2,224,353.80	164	13.94	177.94
	6,071,458.50	2,224,427.50	162.45	15.29	177.74
	6,071,396.00	2,224,505.80	161.83	14.02	175.85
	6,071,287.50	2,224,673.80	157.63	14.06	171.69
	6,071,192.00	2,224,849.20	154.39	14.45	168.84
	6,071,107.00	2,225,016.50	151.36	14.18	165.54
	6,071,109.50	2,225,076.50	150	15.31	165.31
	6,071,032.50	2,225,233.80	150	15.31	165.31
	6,070,999.00	2,225,301.20	150	13.94	163.94
	6,070,871.00	2,225,572.20	148	14.98	162.98
	6,070,754.50	2,225,848.80	146.96	15.36	162.32
	6,070,595.50	2,226,322.20	148.28	15.43	163.71
	6,070,586.00	2,226,376.50	148	15.68	163.68
	6,070,470.00	2,226,701.20	148	15.64	163.64
	6,070,463.00	2,226,737.50	148	15.61	163.61
	6,070,463.00	2,226,800.50	148	15.65	163.65
	6,070,466.50	2,226,946.50	150	14.87	164.87

	6,070,462.00	2,226,954.00	150	14.87	164.87
	6,070,463.00	2,226,988.50	150	14.87	164.87
	6,070,450.00	2,226,989.00	150	14.87	164.87
	6,070,451.00	2,227,017.00	150	14.87	164.87
	6,070,463.50	2,227,017.00	150	14.87	164.87
	6,070,468.50	2,227,162.50	150.87	14.2	165.07
	6,070,468.00	2,227,162.80	150.88	15.43	166.31
	6,070,390.50	2,227,164.50	150.96	15.58	166.54
	6,070,318.00	2,227,167.20	154	14.13	168.13
	6,070,276.50	2,227,232.00	154	14.04	168.04
	6,070,245.50	2,227,279.80	153.22	14.74	167.96
	6,070,246.50	2,227,339.00	152.97	14.89	167.86
Existing SW-16	6,070,257.00	2,225,948.50	146	15.62	161.62
	6,070,366.00	2,225,781.00	146	15.24	161.24
	6,070,475.00	2,225,613.20	144.54	15.04	159.58
	6,070,619.50	2,225,375.80	146	13.75	159.75
	6,070,715.00	2,225,175.50	146	14.34	160.34
	6,070,788.00	2,225,025.00	147.86	13.57	161.43
	6,070,821.50	2,225,014.20	150	13.36	163.36
	6,070,863.50	2,224,926.00	153	14.49	167.49
	6,070,906.50	2,224,836.00	156	13.47	169.47
	6,070,951.00	2,224,746.50	158	13.48	171.48
	6,070,996.00	2,224,657.20	162	10.34	172.34
	6,071,043.50	2,224,569.00	164	9.18	173.18
	6,071,144.50	2,224,396.50	168	6.92	174.92
	6,071,192.00	2,224,323.20	169.94	6.8	176.74
Existing SW-17	6,070,821.50	2,224,706.20	145.99	5	150.99
	6,070,868.50	2,224,703.80	146	5	151
	6,070,940.00	2,224,703.50	148.05	5	153.05
	6,070,962.00	2,224,656.50	148.05	5	153.05
	6,070,986.50	2,224,606.20	149.54	5	154.54
	6,071,001.50	2,224,580.80	147.26	5	152.26
	6,071,000.00	2,224,578.00	148.11	5	153.11
	6,070,961.00	2,224,578.20	147.67	5	152.67

	6,070,923.50	2,224,579.20	147.16	6	153.16
	6,070,884.00	2,224,580.80	146.66	6	152.66
	6,070,851.00	2,224,581.20	146.25	6	152.25
	6,070,823.50	2,224,581.80	146	6	152
	6,070,823.50	2,224,585.50	146	6	152
Existing SW-18	6,071,995.00	2,223,849.80	166	12.42	178.42
	6,071,919.00	2,223,915.00	169	11.39	180.39
	6,071,843.00	2,223,980.00	170	12.09	182.09
	6,071,767.00	2,224,044.80	168.08	13.84	181.92
	6,071,691.00	2,224,110.20	168.02	12.93	180.95
	6,071,620.00	2,224,180.20	166.48	13.39	179.87
	6,071,554.50	2,224,253.80	166.18	12.8	178.98
Existing SW-19	6,072,458.50	2,223,475.50	154	12.13	166.13
	6,072,370.50	2,223,522.50	156.55	12.37	168.92
	6,072,284.50	2,223,573.80	159.85	11.7	171.55
	6,072,201.50	2,223,629.50	161.83	12.26	174.09
	6,072,120.00	2,223,687.50	163.99	12.06	176.05
	6,072,041.00	2,223,748.20	166	11.58	177.58
	6,071,933.50	2,223,837.50	168	11.49	179.49
Existing SW-20	6,073,433.50	2,223,052.50	150	14.06	164.06
	6,073,333.50	2,223,055.00	150	14.05	164.05
	6,073,297.50	2,223,060.00	150	13.94	163.94
	6,073,263.00	2,223,071.50	150	13.78	163.78
	6,073,239.00	2,223,084.00	150	13.84	163.84
	6,073,064.50	2,223,181.80	148.51	14.46	162.97
	6,072,889.50	2,223,278.80	148	14.45	162.45
	6,072,715.00	2,223,376.50	148	14.07	162.07
	6,072,631.50	2,223,431.00	148	13.92	161.92
	6,072,551.00	2,223,490.50	148	13.81	161.81
	6,072,491.50	2,223,536.50	148	13.77	161.77
Existing SW-22	6,074,670.00	2,222,271.50	164	11.99	175.99
	6,074,618.50	2,222,297.00	162	11.82	173.82
	6,074,529.00	2,222,341.20	158.17	12.13	170.3
	6,074,464.50	2,222,373.00	156	12.12	168.12

	6,074,479.00	2,222,403.20	151.33	16.43	167.76
	6,074,273.00	2,222,505.50	151.41	15.47	166.88
	6,074,249.50	2,222,501.00	150.52	16.36	166.88
	6,074,177.50	2,222,535.50	150.14	15.77	165.91
	6,073,997.50	2,222,633.00	152	13.77	165.77
	6,073,980.50	2,222,656.50	152	12.01	164.01
	6,073,967.00	2,222,684.00	152	12.23	164.23
	6,073,756.50	2,222,805.50	150	14.04	164.04
	6,073,752.00	2,222,798.50	150	14.05	164.05
	6,073,577.50	2,222,899.50	150	14.03	164.03
Existing SW-23	6,073,748.00	2,222,362.80	148	12.14	160.14
	6,073,560.50	2,222,476.20	148	11.7	159.7
	6,073,558.50	2,222,365.50	148	12.87	160.87
Existing SW-24	6,075,547.50	2,222,241.50	133.9	8	141.9
	6,075,386.50	2,222,244.00	142.57	8	150.57
	6,075,267.50	2,222,248.80	152	8	160
Existing SW-25	6,077,218.50	2,220,273.50	144.98	12.69	157.67
	6,077,208.50	2,220,295.50	145.99	12.37	158.36
	6,077,162.00	2,220,355.50	148	12.68	160.68
	6,077,099.50	2,220,433.50	150	13.41	163.41
	6,077,039.50	2,220,513.20	152	13.31	165.31
	6,076,980.50	2,220,594.00	154	13.27	167.27
	6,076,919.00	2,220,673.00	156	12.41	168.41
	6,076,790.50	2,220,826.00	156.2	13.74	169.94
	6,076,653.00	2,220,971.50	158	13.85	171.85
	6,076,605.00	2,221,019.80	159.88	10.84	170.72
	6,076,509.50	2,221,110.00	160	11.39	171.39
	6,076,434.50	2,221,176.00	162	10.16	172.16
	6,076,279.00	2,221,301.50	162.48	11.43	173.91
	6,076,198.50	2,221,360.80	164	10.85	174.85
	6,076,116.50	2,221,418.00	164	11.67	175.67
	6,076,033.50	2,221,473.50	165.97	10.11	176.08
	6,075,948.00	2,221,526.00	166	10.54	176.54
	6,075,863.00	2,221,578.00	166	11.21	177.21

	6,075,779.50	2,221,633.50	166.7	11.19	177.89
	6,075,699.00	2,221,692.50	168	11.33	179.33
	6,075,618.50	2,221,751.50	170	10.21	180.21
	6,075,537.50	2,221,810.80	170	11.15	181.15
	6,075,440.50	2,221,881.80	170.51	10.63	181.14
	6,075,388.00	2,221,941.80	170.31	11.38	181.69
	6,075,325.50	2,222,019.80	170	10.47	180.47
	6,075,274.50	2,222,105.50	168.41	10.4	178.81
	6,075,235.50	2,222,197.80	168.05	10.14	178.19
	6,075,201.00	2,222,291.50	166	11.04	177.04
	6,075,165.00	2,222,384.80	164	11.46	175.46
	6,075,104.50	2,222,463.00	162	10.71	172.71
	6,075,015.50	2,222,507.00	158	9.98	167.98
	6,074,928.00	2,222,514.00	154	9.06	163.06
Existing SW-26	6,075,274.00	2,221,586.00	171.03	12.8	183.83
	6,075,435.00	2,221,486.20	170	11.74	181.74
	6,075,520.50	2,221,434.20	168.11	12.06	180.17
	6,075,606.00	2,221,382.00	166.21	12.47	178.68
	6,075,691.00	2,221,329.50	164.06	13.15	177.21
	6,075,709.00	2,221,318.20	162.93	11.38	174.31
	6,075,774.00	2,221,277.80	160.2	12.98	173.18
	6,075,858.50	2,221,223.80	158.27	13.16	171.43
	6,075,941.00	2,221,167.50	156.41	12.49	168.9
	6,076,021.50	2,221,108.50	155.18	12.21	167.39
	6,076,101.00	2,221,047.80	154.22	11.99	166.21
	6,076,179.00	2,220,984.80	152.78	12.5	165.28
	6,076,472.00	2,220,713.00	150	14.02	164.02
	6,076,661.50	2,220,502.80	147	14.53	161.53
	6,076,722.50	2,220,403.00	145.73	13.6	159.33
	6,076,827.50	2,220,233.50	142	15.48	157.48
	6,077,081.00	2,219,803.00	140	17.59	157.59

Appendix E TNM 2.5 Modeled Noise Barrier Tables

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-06 New	8	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		72.1	1.8	8	-6.2	0.0	72.1
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.8	0	8	-8	0.0	56.8
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		54	0.4	8	-7.6	0.0	54.0
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61.4	0	8	-8	0.0	61.4
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.9	0.3	8	-7.7	0.0	73.9
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.9	0.6	8	-7.4	0.0	69.9
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		60.4	0.2	8	-7.8	0.0	60.4
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.8	0.8	8	-7.2	0.0	61.8
SW-06 New	10	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		71.5	2.4	8	-5.6	0.0	71.5
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.8	0	8	-8	0.0	56.8
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		54	0.4	8	-7.6	0.0	54.0
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61.4	0	8	-8	0.0	61.4
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.8	0.4	8	-7.6	0.0	73.8
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.9	0.6	8	-7.4	0.0	69.9
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		60.4	0.2	8	-7.8	0.0	60.4
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.8	0.8	8	-7.2	0.0	61.8
SW-06 New	12	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		70.7	3.2	8	-4.8	0.0	70.7
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.7	0.1	8	-7.9	0.0	56.7
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		54	0.4	8	-7.6	0.0	54.0
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61.5	-0.1	8	-8.1	0.0	61.5
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.8	0.4	8	-7.6	0.0	73.8
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.8	0.7	8	-7.3	0.0	69.8
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		60.3	0.3	8	-7.7	0.0	60.3
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.8	0.8	8	-7.2	0.0	61.8
SW-06 New	14	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		70.3	3.6	8	-4.4	0.0	70.3
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.7	0.1	8	-7.9	0.0	56.7
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		53.9	0.5	8	-7.5	0.0	53.9
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61.5	-0.1	8	-8.1	0.0	61.5
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.8	0.4	8	-7.6	0.0	73.8
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.8	0.7	8	-7.3	0.0	69.8
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		60.4	0.2	8	-7.8	0.0	60.4
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.8	0.8	8	-7.2	0.0	61.8
SW-06 New	16	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		70	3.9	8	-4.1	0.0	70.0
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.6	0.2	8	-7.8	0.0	56.6
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		53.9	0.5	8	-7.5	0.0	53.9
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61.4	0	8	-8	0.0	61.4
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.8	0.4	8	-7.6	0.0	73.8
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.8	0.7	8	-7.3	0.0	69.8
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		60.3	0.3	8	-7.7	0.0	60.3
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.7	0.9	8	-7.1	0.0	61.7
SW-06 New	18	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		69.9	4	8	-4	0.0	69.9
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.6	0.2	8	-7.8	0.0	56.6
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		53.8	0.6	8	-7.4	0.0	53.8
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61.3	0.1	8	-7.9	0.0	61.3
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.8	0.4	8	-7.6	0.0	73.8
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.7	0.8	8	-7.2	0.0	69.7
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		60.2	0.4	8	-7.6	0.0	60.2
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.7	0.9	8	-7.1	0.0	61.7
SW-06 New	20	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		69.8	4.1	8	-3.9	0.0	69.8
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.5	0.3	8	-7.7	0.0	56.5
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		53.8	0.6	8	-7.4	0.0	53.8
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61.1	0.3	8	-7.7	0.0	61.1
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.7	0.5	8	-7.5	0.0	73.7
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.6	0.9	8	-7.1	0.0	69.6

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		60	0.6	8	-7.4	0.0	60.0
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.7	0.9	8	-7.1	0.0	61.7
SW-06 New	22	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		69.7	4.2	8	-3.8	0.0	69.7
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.4	0.4	8	-7.6	0.0	56.4
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		53.7	0.7	8	-7.3	0.0	53.7
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		61	0.4	8	-7.6	0.0	61.0
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.7	0.5	8	-7.5	0.0	73.7
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.5	1	8	-7	0.0	69.5
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		59.6	1	8	-7	0.0	59.6
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.7	0.9	8	-7.1	0.0	61.7
SW-06 New	24	M-015	570	0	0	73.9	66	73.9	10	Snd Lvl		69.7	4.2	8	-3.8	0.0	69.7
SW-06 New		M-016	571	3	0	56.8	66	56.8	10	----		56.3	0.5	8	-7.5	0.0	56.3
SW-06 New		M-017	572	5	0	54.4	66	54.4	10	----		53.7	0.7	8	-7.3	0.0	53.7
SW-06 New		M-018	573	2	0	61.4	66	61.4	10	----		60.8	0.6	8	-7.4	0.0	60.8
SW-06 New		M-019	574	0	0	74.2	66	74.2	10	Snd Lvl		73.7	0.5	8	-7.5	0.0	73.7
SW-06 New		M-020	575	1	0	70.5	66	70.5	10	Snd Lvl		69.4	1.1	8	-6.9	0.0	69.4
SW-06 New		M-021	576	3	0	60.6	66	60.6	10	----		58.7	1.9	8	-6.1	0.0	58.7
SW-06 New		M-022	577	2	0	62.6	66	62.6	10	----		61.7	0.9	8	-7.1	0.0	61.7
SW-11 New	8	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		66.4	1.1	8	-6.9	1.6	68.0
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		58.9	1	8	-7	1.6	60.5
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		63.1	1.7	8	-6.3	1.6	64.7
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		70.5	6.1	8	-1.9	1.6	72.1
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		69	4.4	8	-3.6	1.6	70.6
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		57.8	1.4	8	-6.6	1.6	59.4
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		70.6	7.2	8	-0.8	1.6	72.2
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		68	5.7	8	-2.3	1.6	69.6
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		63.7	5.6	8	-2.4	1.6	65.3
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		66.8	4.3	8	-3.7	5.9	72.7
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		68.9	4.4	8	-3.6	5.9	74.8
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		68.5	7	8	-1	5.9	74.4
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		65.6	9.2	8	1.2	5.9	71.5
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		64.8	10.7	8	2.7	5.9	70.7
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		50.3	-0.2	8	-8.2	5.9	56.2
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		66.1	5.6	8	-2.4	5.9	72.0
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		63.8	4.6	8	-3.4	5.9	69.7
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		62.1	1.6	8	-6.4	5.9	68.0
SW-11 New	10	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		66.4	1.1	8	-6.9	1.6	68.0
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		59.2	0.7	8	-7.3	1.6	60.8
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		62.8	2	8	-6	1.6	64.4
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		69	7.6	8	-0.4	1.6	70.6
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		67.2	6.2	8	-1.8	1.6	68.8
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		57.8	1.4	8	-6.6	1.6	59.4
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		69.2	8.6	8	0.6	1.6	70.8
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		67.1	6.6	8	-1.4	1.6	68.7
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		63.1	6.2	8	-1.8	1.6	64.7
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		66.3	4.8	8	-3.2	5.9	72.2
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		68.4	4.9	8	-3.1	5.9	74.3
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		67.7	7.8	8	-0.2	5.9	73.6
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		64.4	10.4	8	2.4	5.9	70.3
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		63.7	11.8	8	3.8	5.9	69.6
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		50.2	-0.1	8	-8.1	5.9	56.1
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		65.4	6.3	8	-1.7	5.9	71.3
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		62.8	5.6	8	-2.4	5.9	68.7
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		61.8	1.9	8	-6.1	5.9	67.7

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-11 New	12	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		65.1	2.4	8	-5.6	1.6	66.7
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		58.4	1.5	8	-6.5	1.6	60.0
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		61.6	3.2	8	-4.8	1.6	63.2
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		67.5	9.1	8	1.1	1.6	69.1
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		66.2	7.2	8	-0.8	1.6	67.8
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		57.4	1.8	8	-6.2	1.6	59.0
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		67.9	9.9	8	1.9	1.6	69.5
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		66.3	7.4	8	-0.6	1.6	67.9
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		62.5	6.8	8	-1.2	1.6	64.1
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		65.8	5.3	8	-2.7	5.9	71.7
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		68	5.3	8	-2.7	5.9	73.9
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		67.2	8.3	8	0.3	5.9	73.1
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		63.5	11.3	8	3.3	5.9	69.4
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		62.5	13	8	5	5.9	68.4
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		50	0.1	8	-7.9	5.9	55.9
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		64.7	7	8	-1	5.9	70.6
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		61.9	6.5	8	-1.5	5.9	67.8
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		61.3	2.4	8	-5.6	5.9	67.2
SW-11 New	14	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		64.2	3.3	8	-4.7	1.6	65.8
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		57.7	2.2	8	-5.8	1.6	59.3
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		60.6	4.2	8	-3.8	1.6	62.2
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		66.4	10.2	8	2.2	1.6	68.0
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		65.1	8.3	8	0.3	1.6	66.7
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		56.4	2.8	8	-5.2	1.6	58.0
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		67.1	10.7	8	2.7	1.6	68.7
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		65.8	7.9	8	-0.1	1.6	67.4
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		62.1	7.2	8	-0.8	1.6	63.7
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		65.5	5.6	8	-2.4	5.9	71.4
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		67.7	5.6	8	-2.4	5.9	73.6
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		66.7	8.8	8	0.8	5.9	72.6
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		62.8	12	8	4	5.9	68.7
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		62	13.5	8	5.5	5.9	67.9
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		49.5	0.6	8	-7.4	5.9	55.4
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		63.8	7.9	8	-0.1	5.9	69.7
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		60.8	7.6	8	-0.4	5.9	66.7
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		60.8	2.9	8	-5.1	5.9	66.7
SW-11 New	16	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		63.3	4.2	8	-3.8	1.6	64.9
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		56.6	3.3	8	-4.7	1.6	58.2
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		59.5	5.3	8	-2.7	1.6	61.1
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		65.4	11.2	8	3.2	1.6	67.0
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		64.4	9	8	1	1.6	66.0
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		55.3	3.9	8	-4.1	1.6	56.9
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		66.3	11.5	8	3.5	1.6	67.9
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		65.3	8.4	8	0.4	1.6	66.9
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		61.7	7.6	8	-0.4	1.6	63.3
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		65.2	5.9	8	-2.1	5.9	71.1
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		67.5	5.8	8	-2.2	5.9	73.4
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		66.4	9.1	8	1.1	5.9	72.3
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		62	12.8	8	4.8	5.9	67.9
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		61.1	14.4	8	6.4	5.9	67.0
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		49	1.1	8	-6.9	5.9	54.9
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		63.3	8.4	8	0.4	5.9	69.2
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		60.1	8.3	8	0.3	5.9	66.0
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		60.4	3.3	8	-4.7	5.9	66.3

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-11 New	18	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		62.6	4.9	8	-3.1	1.6	64.2
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		55.7	4.2	8	-3.8	1.6	57.3
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		58.9	5.9	8	-2.1	1.6	60.5
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		64.6	12	8	4	1.6	66.2
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		63.4	10	8	2	1.6	65.0
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		54.9	4.3	8	-3.7	1.6	56.5
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		65.8	12	8	4	1.6	67.4
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		65	8.7	8	0.7	1.6	66.6
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		61.4	7.9	8	-0.1	1.6	63.0
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		65	6.1	8	-1.9	5.9	70.9
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		67.4	5.9	8	-2.1	5.9	73.3
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		66.1	9.4	8	1.4	5.9	72.0
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		61.5	13.3	8	5.3	5.9	67.4
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		60.4	15.1	8	7.1	5.9	66.3
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		48.6	1.5	8	-6.5	5.9	54.5
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		62.8	8.9	8	0.9	5.9	68.7
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		59.6	8.8	8	0.8	5.9	65.5
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		59.9	3.8	8	-4.2	5.9	65.8
SW-11 New	20	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		61.9	5.6	8	-2.4	1.6	63.5
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		55.3	4.6	8	-3.4	1.6	56.9
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		58.6	6.2	8	-1.8	1.6	60.2
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		63.9	12.7	8	4.7	1.6	65.5
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		62.9	10.5	8	2.5	1.6	64.5
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		54.8	4.4	8	-3.6	1.6	56.4
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		65.3	12.5	8	4.5	1.6	66.9
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		64.8	8.9	8	0.9	1.6	66.4
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		61.2	8.1	8	0.1	1.6	62.8
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		64.8	6.3	8	-1.7	5.9	70.7
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		67.2	6.1	8	-1.9	5.9	73.1
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		65.8	9.7	8	1.7	5.9	71.7
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		61	13.8	8	5.8	5.9	66.9
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		60	15.5	8	7.5	5.9	65.9
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		48.1	2	8	-6	5.9	54.0
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		62.4	9.3	8	1.3	5.9	68.3
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		59	9.4	8	1.4	5.9	64.9
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		59.5	4.2	8	-3.8	5.9	65.4
SW-11 New	22	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		61.3	6.2	8	-1.8	1.6	62.9
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		54.8	5.1	8	-2.9	1.6	56.4
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		58.1	6.7	8	-1.3	1.6	59.7
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		63.1	13.5	8	5.5	1.6	64.7
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		62.3	11.1	8	3.1	1.6	63.9
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		55.3	3.9	8	-4.1	1.6	56.9
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		64.8	13	8	5	1.6	66.4
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		64.6	9.1	8	1.1	1.6	66.2
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		61	8.3	8	0.3	1.6	62.6
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		64.7	6.4	8	-1.6	5.9	70.6
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		67.1	6.2	8	-1.8	5.9	73.0
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		65.6	9.9	8	1.9	5.9	71.5
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		60.2	14.6	8	6.6	5.9	66.1
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		59.9	15.6	8	7.6	5.9	65.8
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		47.6	2.5	8	-5.5	5.9	53.5
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		62.2	9.5	8	1.5	5.9	68.1
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		58.6	9.8	8	1.8	5.9	64.5
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		59	4.7	8	-3.3	5.9	64.9

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-11 New	24	M-038	594	1	0	67.5	66	67.5	10	Snd Lvl		60.8	6.7	8	-1.3	1.6	62.4
SW-11 New		M-039	595	4	0	59.9	66	59.9	10	----		54.7	5.2	8	-2.8	1.6	56.3
SW-11 New		M-040	596	2	0	64.8	66	64.8	10	----		57.8	7	8	-1	1.6	59.4
SW-11 New		M-041	597	3	0	76.6	66	76.6	10	Snd Lvl		62.5	14.1	8	6.1	1.6	64.1
SW-11 New		M-043	599	4	0	73.4	66	73.4	10	Snd Lvl		61.4	12	8	4	1.6	63.0
SW-11 New		M-044	600	4	0	59.2	66	59.2	10	----		55.9	3.3	8	-4.7	1.6	57.5
SW-11 New		M-045	601	1	0	77.8	66	77.8	10	Snd Lvl		64.5	13.3	8	5.3	1.6	66.1
SW-11 New		M-047	603	1	0	73.7	66	73.7	10	Snd Lvl		64.4	9.3	8	1.3	1.6	66.0
SW-11 New		M-048	604	1	0	69.3	66	69.3	10	Snd Lvl		60.8	8.5	8	0.5	1.6	62.4
SW-11 New		M-049	605	1	0	71.1	66	71.1	10	Snd Lvl		64.6	6.5	8	-1.5	5.9	70.5
SW-11 New		M-050	606	2	0	73.3	66	73.3	10	Snd Lvl		67.1	6.2	8	-1.8	5.9	73.0
SW-11 New		M-051	854	2	0	75.5	66	75.5	10	Snd Lvl		65.5	10	8	2	5.9	71.4
SW-11 New		M-052	855	3	0	74.8	66	74.8	10	Snd Lvl		59.7	15.1	8	7.1	5.9	65.6
SW-11 New		M-053	856	2	0	75.5	66	75.5	10	Snd Lvl		59.6	15.9	8	7.9	5.9	65.5
SW-11 New		M-054	857	10	0	50.1	66	50.1	10	----		47.3	2.8	8	-5.2	5.9	53.2
SW-11 New		M-056	858	3	0	71.7	66	71.7	10	Snd Lvl		61.9	9.8	8	1.8	5.9	67.8
SW-11 New		M-058	859	2	0	68.4	66	68.4	10	Snd Lvl		58.2	10.2	8	2.2	5.9	64.1
SW-11 New		M-060	860	3	0	63.7	66	63.7	10	----		58.7	5	8	-3	5.9	64.6
SW-A New	6	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		68.8	8	8	0	0.0	68.8
SW-A New	8	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		67.3	9.5	8	1.5	0.0	67.3
SW-A New	10	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		66.1	10.7	8	2.7	0.0	66.1
SW-A New	12	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		65	11.8	8	3.8	0.0	65.0
SW-A New	14	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		64.2	12.6	8	4.6	0.0	64.2
SW-A New	16	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		63.5	13.3	8	5.3	0.0	63.5
SW-A New	18	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		62.9	13.9	8	5.9	0.0	62.9
SW-A New	20	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		62.2	14.6	8	6.6	0.0	62.2
SW-A New	22	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		61.7	15.1	8	7.1	0.0	61.7
SW-A New	24	M-057	854	1	0	76.8	66	76.8	10	Snd Lvl		61.4	15.4	8	7.4	0.0	61.4
SW-15b New	14	M-059	615	2	0	64.3	66	64.3	10	----		64.2	0.1	8	-7.9	3.8	68.0
SW-15b New	16	M-059	615	2	0	64.3	66	64.3	10	----		64.2	0.1	8	-7.9	3.8	68.0
SW-15b New	18	M-059	615	2	0	64.3	66	64.3	10	----		64.2	0.1	8	-7.9	3.8	68.0
SW-15b New	20	M-059	615	2	0	64.3	66	64.3	10	----		64.2	0.1	8	-7.9	3.8	68.0
SW-15b New	22	M-059	615	2	0	64.3	66	64.3	10	----		64.2	0.1	8	-7.9	3.8	68.0
SW-15b New	24	M-059	615	2	0	64.3	66	64.3	10	----		64.2	0.1	8	-7.9	3.8	68.0
SW-15a New	14	M-072	628	2	0	54.8	66	54.8	10	----		54.6	0.2	8	-7.8	2.4	57.0
SW-15a New		M-074	630	3	0	53.9	66	53.9	10	----		50.3	3.6	8	-4.4	2.4	52.7
SW-15a New		M-076	632	4	0	72.8	66	72.8	10	Snd Lvl		62	10.8	8	2.8	2.4	64.4
SW-15a New		M-077	633	1	0	80.1	66	80.1	10	Snd Lvl		65.1	15	8	7	3.0	68.1
SW-15a New		M-079	635	3	0	56.1	66	56.1	10	----		56	0.1	8	-7.9	3.0	59.0
SW-15a New		M-080	636	4	0	62	66	62	10	----		59.9	2.1	8	-5.9	3.0	62.9
SW-15a New		M-081	637	1	0	55.9	66	55.9	10	----		54.6	1.3	8	-6.7	3.0	57.6
SW-15a New		M-084	640	2	0	75	66	75	10	Snd Lvl		65.3	9.7	8	1.7	3.0	68.3
SW-15a New		M-085	641	2	0	57.4	66	57.4	10	----		54.9	2.5	8	-5.5	3.0	57.9
SW-15a New		M-087	643	4	0	68.5	66	68.5	10	Snd Lvl		63.8	4.7	8	-3.3	3.0	66.8
SW-15a New		M-090	646	2	0	79.9	66	79.9	10	Snd Lvl		66.7	13.2	8	5.2	3.0	69.7
SW-15a New		M-093	649	5	0	58.9	66	58.9	10	----		57.2	1.7	8	-6.3	3.0	60.2
SW-15a New		M-094	650	4	0	61.1	66	61.1	10	----		58.4	2.7	8	-5.3	3.0	61.4
SW-15a New		M-095	651	2	0	72	66	72	10	Snd Lvl		63.2	8.8	8	0.8	3.0	66.2
SW-15a New		M-097	653	2	0	79.3	66	79.3	10	Snd Lvl		66.5	12.8	8	4.8	3.0	69.5
SW-15a New		M-099	655	5	0	72.4	66	72.4	10	Snd Lvl		63	9.4	8	1.4	3.0	66.0
SW-15a New		M-102	658	4	0	59.7	66	59.7	10	----		58	1.7	8	-6.3	-1.3	56.7
SW-15a New		M-105	661	4	0	63.2	66	63.2	10	----		60.7	2.5	8	-5.5	-1.3	59.4
SW-15a New		M-072	628	2	0	54.8	66	54.8	10	----		54.4	0.4	8	-7.6	2.4	56.8
SW-15a New		M-074	630	3	0	53.9	66	53.9	10	----		50.6	3.3	8	-4.7	2.4	53.0

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-15a New	16	M-076	632	4	0	72.8	66	72.8	10	Snd Lvl		61.3	11.5	8	3.5	2.4	63.7
SW-15a New		M-077	633	1	0	80.1	66	80.1	10	Snd Lvl		64.3	15.8	8	7.8	3.0	67.3
SW-15a New		M-079	635	3	0	56.1	66	56.1	10	----		55.6	0.5	8	-7.5	3.0	58.6
SW-15a New		M-080	636	4	0	62	66	62	10	----		59.9	2.1	8	-5.9	3.0	62.9
SW-15a New		M-081	637	1	0	55.9	66	55.9	10	----		54.2	1.7	8	-6.3	3.0	57.2
SW-15a New		M-084	640	2	0	75	66	75	10	Snd Lvl		64.4	10.6	8	2.6	3.0	67.4
SW-15a New		M-085	641	2	0	57.4	66	57.4	10	----		54.4	3	8	-5	3.0	57.4
SW-15a New		M-087	643	4	0	68.5	66	68.5	10	Snd Lvl		63.6	4.9	8	-3.1	3.0	66.6
SW-15a New		M-090	646	2	0	79.9	66	79.9	10	Snd Lvl		65.6	14.3	8	6.3	3.0	68.6
SW-15a New		M-093	649	5	0	58.9	66	58.9	10	----		56.5	2.4	8	-5.6	3.0	59.5
SW-15a New		M-094	650	4	0	61.1	66	61.1	10	----		57.8	3.3	8	-4.7	3.0	60.8
SW-15a New		M-095	651	2	0	72	66	72	10	Snd Lvl		62.5	9.5	8	1.5	3.0	65.5
SW-15a New		M-097	653	2	0	79.3	66	79.3	10	Snd Lvl		65.5	13.8	8	5.8	3.0	68.5
SW-15a New		M-099	655	5	0	72.4	66	72.4	10	Snd Lvl		62.4	10	8	2	3.0	65.4
SW-15a New		M-102	658	4	0	59.7	66	59.7	10	----		57.7	2	8	-6	-1.3	56.4
SW-15a New		M-105	661	4	0	63.2	66	63.2	10	----		60.6	2.6	8	-5.4	-1.3	59.3
SW-15a New	18	M-072	628	2	0	54.8	66	54.8	10	----		54.8	0	8	-8	2.4	57.2
SW-15a New		M-074	630	3	0	53.9	66	53.9	10	----		51.8	2.1	8	-5.9	2.4	54.2
SW-15a New		M-076	632	4	0	72.8	66	72.8	10	Snd Lvl		60.8	12	8	4	2.4	63.2
SW-15a New		M-077	633	1	0	80.1	66	80.1	10	Snd Lvl		63.6	16.5	8	8.5	3.0	66.6
SW-15a New		M-079	635	3	0	56.1	66	56.1	10	----		54.6	1.5	8	-6.5	3.0	57.6
SW-15a New		M-080	636	4	0	62	66	62	10	----		59.7	2.3	8	-5.7	3.0	62.7
SW-15a New		M-081	637	1	0	55.9	66	55.9	10	----		54.4	1.5	8	-6.5	3.0	57.4
SW-15a New		M-084	640	2	0	75	66	75	10	Snd Lvl		63.7	11.3	8	3.3	3.0	66.7
SW-15a New		M-085	641	2	0	57.4	66	57.4	10	----		53.9	3.5	8	-4.5	3.0	56.9
SW-15a New		M-087	643	4	0	68.5	66	68.5	10	Snd Lvl		63.6	4.9	8	-3.1	3.0	66.6
SW-15a New		M-090	646	2	0	79.9	66	79.9	10	Snd Lvl		64.9	15	8	7	3.0	67.9
SW-15a New		M-093	649	5	0	58.9	66	58.9	10	----		56.1	2.8	8	-5.2	3.0	59.1
SW-15a New		M-094	650	4	0	61.1	66	61.1	10	----		57.2	3.9	8	-4.1	3.0	60.2
SW-15a New		M-095	651	2	0	72	66	72	10	Snd Lvl		62.8	9.2	8	1.2	3.0	65.8
SW-15a New		M-097	653	2	0	79.3	66	79.3	10	Snd Lvl		64.8	14.5	8	6.5	3.0	67.8
SW-15a New		M-099	655	5	0	72.4	66	72.4	10	Snd Lvl		61.7	10.7	8	2.7	3.0	64.7
SW-15a New		M-102	658	4	0	59.7	66	59.7	10	----		57.5	2.2	8	-5.8	-1.3	56.2
SW-15a New		M-105	661	4	0	63.2	66	63.2	10	----		60.4	2.8	8	-5.2	-1.3	59.1
SW-15a New	20	M-072	628	2	0	54.8	66	54.8	10	----		53.9	0.9	8	-7.1	2.4	56.3
SW-15a New		M-074	630	3	0	53.9	66	53.9	10	----		52.3	1.6	8	-6.4	2.4	54.7
SW-15a New		M-076	632	4	0	72.8	66	72.8	10	Snd Lvl		60.3	12.5	8	4.5	2.4	62.7
SW-15a New		M-077	633	1	0	80.1	66	80.1	10	Snd Lvl		62.5	17.6	8	9.6	3.0	65.5
SW-15a New		M-079	635	3	0	56.1	66	56.1	10	----		54.1	2	8	-6	3.0	57.1
SW-15a New		M-080	636	4	0	62	66	62	10	----		59.6	2.4	8	-5.6	3.0	62.6
SW-15a New		M-081	637	1	0	55.9	66	55.9	10	----		53.8	2.1	8	-5.9	3.0	56.8
SW-15a New		M-084	640	2	0	75	66	75	10	Snd Lvl		63	12	8	4	3.0	66.0
SW-15a New		M-085	641	2	0	57.4	66	57.4	10	----		53.5	3.9	8	-4.1	3.0	56.5
SW-15a New		M-087	643	4	0	68.5	66	68.5	10	Snd Lvl		63.3	5.2	8	-2.8	3.0	66.3
SW-15a New		M-090	646	2	0	79.9	66	79.9	10	Snd Lvl		63.8	16.1	8	8.1	3.0	66.8
SW-15a New		M-093	649	5	0	58.9	66	58.9	10	----		55.8	3.1	8	-4.9	3.0	58.8
SW-15a New		M-094	650	4	0	61.1	66	61.1	10	----		56.9	4.2	8	-3.8	3.0	59.9
SW-15a New		M-095	651	2	0	72	66	72	10	Snd Lvl		62.4	9.6	8	1.6	3.0	65.4
SW-15a New		M-097	653	2	0	79.3	66	79.3	10	Snd Lvl		64	15.3	8	7.3	3.0	67.0
SW-15a New		M-099	655	5	0	72.4	66	72.4	10	Snd Lvl		61.2	11.2	8	3.2	3.0	64.2
SW-15a New		M-102	658	4	0	59.7	66	59.7	10	----		57.4	2.3	8	-5.7	-1.3	56.1
SW-15a New		M-105	661	4	0	63.2	66	63.2	10	----		60.4	2.8	8	-5.2	-1.3	59.1
SW-15a New		M-072	628	2	0	54.8	66	54.8	10	----		53.8	1	8	-7	2.4	56.2
SW-15a New		M-074	630	3	0	53.9	66	53.9	10	----		52.6	1.3	8	-6.7	2.4	55.0

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-15a New	22	M-076	632	4	0	72.8	66	72.8	10	Snd Lvl		59.9	12.9	8	4.9	2.4	62.3
SW-15a New		M-077	633	1	0	80.1	66	80.1	10	Snd Lvl		61.8	18.3	8	10.3	3.0	64.8
SW-15a New		M-079	635	3	0	56.1	66	56.1	10	----		53.7	2.4	8	-5.6	3.0	56.7
SW-15a New		M-080	636	4	0	62	66	62	10	----		59.4	2.6	8	-5.4	3.0	62.4
SW-15a New		M-081	637	1	0	55.9	66	55.9	10	----		53.3	2.6	8	-5.4	3.0	56.3
SW-15a New		M-084	640	2	0	75	66	75	10	Snd Lvl		62.4	12.6	8	4.6	3.0	65.4
SW-15a New		M-085	641	2	0	57.4	66	57.4	10	----		53.5	3.9	8	-4.1	3.0	56.5
SW-15a New		M-087	643	4	0	68.5	66	68.5	10	Snd Lvl		63.1	5.4	8	-2.6	3.0	66.1
SW-15a New		M-090	646	2	0	79.9	66	79.9	10	Snd Lvl		63.1	16.8	8	8.8	3.0	66.1
SW-15a New		M-093	649	5	0	58.9	66	58.9	10	----		55.9	3	8	-5	3.0	58.9
SW-15a New		M-094	650	4	0	61.1	66	61.1	10	----		56.6	4.5	8	-3.5	3.0	59.6
SW-15a New		M-095	651	2	0	72	66	72	10	Snd Lvl		61.9	10.1	8	2.1	3.0	64.9
SW-15a New		M-097	653	2	0	79.3	66	79.3	10	Snd Lvl		63.4	15.9	8	7.9	3.0	66.4
SW-15a New		M-099	655	5	0	72.4	66	72.4	10	Snd Lvl		60.7	11.7	8	3.7	3.0	63.7
SW-15a New		M-102	658	4	0	59.7	66	59.7	10	----		57.2	2.5	8	-5.5	-1.3	55.9
SW-15a New		M-105	661	4	0	63.2	66	63.2	10	----		60.3	2.9	8	-5.1	-1.3	59.0
SW-15a New	24	M-072	628	2	0	54.8	66	54.8	10	----		53.8	1	8	-7	2.4	56.2
SW-15a New		M-074	630	3	0	53.9	66	53.9	10	----		53	0.9	8	-7.1	2.4	55.4
SW-15a New		M-076	632	4	0	72.8	66	72.8	10	Snd Lvl		59.6	13.2	8	5.2	2.4	62.0
SW-15a New		M-077	633	1	0	80.1	66	80.1	10	Snd Lvl		61.2	18.9	8	10.9	3.0	64.2
SW-15a New		M-079	635	3	0	56.1	66	56.1	10	----		53.4	2.7	8	-5.3	3.0	56.4
SW-15a New		M-080	636	4	0	62	66	62	10	----		59.2	2.8	8	-5.2	3.0	62.2
SW-15a New		M-081	637	1	0	55.9	66	55.9	10	----		52.9	3	8	-5	3.0	55.9
SW-15a New		M-084	640	2	0	75	66	75	10	Snd Lvl		61.9	13.1	8	5.1	3.0	64.9
SW-15a New		M-085	641	2	0	57.4	66	57.4	10	----		53.6	3.8	8	-4.2	3.0	56.6
SW-15a New		M-087	643	4	0	68.5	66	68.5	10	Snd Lvl		62.9	5.6	8	-2.4	3.0	65.9
SW-15a New		M-090	646	2	0	79.9	66	79.9	10	Snd Lvl		62.6	17.3	8	9.3	3.0	65.6
SW-15a New		M-093	649	5	0	58.9	66	58.9	10	----		55.5	3.4	8	-4.6	3.0	58.5
SW-15a New		M-094	650	4	0	61.1	66	61.1	10	----		56.3	4.8	8	-3.2	3.0	59.3
SW-15a New		M-095	651	2	0	72	66	72	10	Snd Lvl		61.4	10.6	8	2.6	3.0	64.4
SW-15a New		M-097	653	2	0	79.3	66	79.3	10	Snd Lvl		62.9	16.4	8	8.4	3.0	65.9
SW-15a New		M-099	655	5	0	72.4	66	72.4	10	Snd Lvl		60.2	12.2	8	4.2	3.0	63.2
SW-15a New		M-102	658	4	0	59.7	66	59.7	10	----		57.1	2.6	8	-5.4	-1.3	55.8
SW-15a New		M-105	661	4	0	63.2	66	63.2	10	----		60.2	3	8	-5	-1.3	58.9
SW-16b New	6	M-103	659	0	0	57.2	66	57.2	10	----		57.1	0.1	8	-7.9	1.0	58.1
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		65.5	4.8	8	-3.2	1.0	66.5
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		65.8	4.2	8	-3.8	1.0	66.8
SW-16b New		M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		66.1	3.8	8	-4.2	1.0	67.1
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		59.4	3.3	8	-4.7	1.0	60.4
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		68.1	1	8	-7	1.0	69.1
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.8	0.1	8	-7.9	1.0	63.8
SW-16b New	8	M-103	659	0	0	57.2	66	57.2	10	----		57	0.2	8	-7.8	1.0	58.0
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		64.5	5.8	8	-2.2	1.0	65.5
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		65	5	8	-3	1.0	66.0
SW-16b New		M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		65.5	4.4	8	-3.6	1.0	66.5
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		58.4	4.3	8	-3.7	1.0	59.4
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		68	1.1	8	-6.9	1.0	69.0
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.8	0.1	8	-7.9	1.0	63.8
SW-16b New	10	M-103	659	0	0	57.2	66	57.2	10	----		56.9	0.3	8	-7.7	1.0	57.9
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		63.9	6.4	8	-1.6	1.0	64.9
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		64.4	5.6	8	-2.4	1.0	65.4
SW-16b New		M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		65	4.9	8	-3.1	1.0	66.0
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		56.9	5.8	8	-2.2	1.0	57.9
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.9	1.2	8	-6.8	1.0	68.9

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-16b New		M-103	659	0	0	57.2	66	57.2	10	----		56.8	0.4	8	-7.6	1.0	57.8
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		63.3	7	8	-1	1.0	64.3
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		63.8	6.2	8	-1.8	1.0	64.8
SW-16b New	12	M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		64.6	5.3	8	-2.7	1.0	65.6
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		56.3	6.4	8	-1.6	1.0	57.3
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.8	1.3	8	-6.7	1.0	68.8
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-16b New		M-103	659	0	0	57.2	66	57.2	10	----		56.7	0.5	8	-7.5	1.0	57.7
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		62.8	7.5	8	-0.5	1.0	63.8
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		63.4	6.6	8	-1.4	1.0	64.4
SW-16b New	14	M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		64.2	5.7	8	-2.3	1.0	65.2
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		55.9	6.8	8	-1.2	1.0	56.9
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.7	1.4	8	-6.6	1.0	68.7
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-16b New		M-103	659	0	0	57.2	66	57.2	10	----		56.7	0.5	8	-7.5	1.0	57.7
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		62.5	7.8	8	-0.2	1.0	63.5
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		62.9	7.1	8	-0.9	1.0	63.9
SW-16b New	16	M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		64	5.9	8	-2.1	1.0	65.0
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		55.6	7.1	8	-0.9	1.0	56.6
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.6	1.5	8	-6.5	1.0	68.6
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-16b New		M-103	659	0	0	57.2	66	57.2	10	----		56.7	0.5	8	-7.5	1.0	57.7
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		62	8.3	8	0.3	1.0	63.0
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		62.5	7.5	8	-0.5	1.0	63.5
SW-16b New	18	M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		63.7	6.2	8	-1.8	1.0	64.7
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		55.4	7.3	8	-0.7	1.0	56.4
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.6	1.5	8	-6.5	1.0	68.6
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-16b New		M-103	659	0	0	57.2	66	57.2	10	----		56.6	0.6	8	-7.4	1.0	57.6
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		61.7	8.6	8	0.6	1.0	62.7
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		62	8	8	0	1.0	63.0
SW-16b New	20	M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		63.5	6.4	8	-1.6	1.0	64.5
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		55.2	7.5	8	-0.5	1.0	56.2
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.5	1.6	8	-6.4	1.0	68.5
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-16b New		M-103	659	0	0	57.2	66	57.2	10	----		56.6	0.6	8	-7.4	1.0	57.6
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		61.5	8.8	8	0.8	1.0	62.5
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		61.7	8.3	8	0.3	1.0	62.7
SW-16b New	22	M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		63.3	6.6	8	-1.4	1.0	64.3
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		55.1	7.6	8	-0.4	1.0	56.1
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.5	1.6	8	-6.4	1.0	68.5
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-16b New		M-103	659	0	0	57.2	66	57.2	10	----		56.6	0.6	8	-7.4	1.0	57.6
SW-16b New		M-104	660	0	0	70.3	66	70.3	10	Snd Lvl		61.5	8.8	8	0.8	1.0	62.5
SW-16b New		M-106	662	0	0	70	66	70	10	Snd Lvl		61.7	8.3	8	0.3	1.0	62.7
SW-16b New	24	M-108	664	0	0	69.9	66	69.9	10	Snd Lvl		63.3	6.6	8	-1.4	1.0	64.3
SW-16b New		M-111	667	0	0	62.7	66	62.7	10	----		55.1	7.6	8	-0.4	1.0	56.1
SW-16b New		M-112	668	0	0	69.1	66	69.1	10	Snd Lvl		67.5	1.6	8	-6.4	1.0	68.5
SW-16b New		M-116	672	2	0	62.9	66	62.9	10	----		62.7	0.2	8	-7.8	1.0	63.7
SW-25 New		M-177	733	5	0	63	66	63	10	----		61	2	8	-6	0.4	61.4
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		57.1	2.6	8	-5.4	0.4	57.5
SW-25 New		M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		60.6	5.5	8	-2.5	1.6	62.2
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		58.4	2.5	8	-5.5	1.6	60.0

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-25 New	10	M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		65.4	5.3	8	-2.7	1.6	67.0
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		58.2	1.7	8	-6.3	1.6	59.8
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		53.1	1.3	8	-6.7	1.6	54.7
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		64.6	5.5	8	-2.5	1.6	66.2
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		65.7	6	8	-2	1.6	67.3
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		57.1	0.8	8	-7.2	2.1	59.2
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		59.2	2.1	8	-5.9	1.6	60.8
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		61.4	1.8	8	-6.2	0.9	62.3
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		60.7	4	8	-4	0.9	61.6
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		65.2	2.4	8	-5.6	0.9	66.1
SW-25 New	12	M-177	733	5	0	63	66	63	10	----		60.4	2.6	8	-5.4	0.4	60.8
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		56.8	2.9	8	-5.1	0.4	57.2
SW-25 New		M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		59.3	6.8	8	-1.2	1.6	60.9
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		57.7	3.2	8	-4.8	1.6	59.3
SW-25 New		M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		64.7	6	8	-2	1.6	66.3
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		57.8	2.1	8	-5.9	1.6	59.4
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		52.7	1.7	8	-6.3	1.6	54.3
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		63.7	6.4	8	-1.6	1.6	65.3
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		64.9	6.8	8	-1.2	1.6	66.5
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		56.8	1.1	8	-6.9	2.1	58.9
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		58.5	2.8	8	-5.2	1.6	60.1
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		60.9	2.3	8	-5.7	0.9	61.8
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		60.2	4.5	8	-3.5	0.9	61.1
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		65	2.6	8	-5.4	0.9	65.9
SW-25 New	14	M-177	733	5	0	63	66	63	10	----		60.3	2.7	8	-5.3	0.4	60.7
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		56.5	3.2	8	-4.8	0.4	56.9
SW-25 New		M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		58.5	7.6	8	-0.4	1.6	60.1
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		57.3	3.6	8	-4.4	1.6	58.9
SW-25 New		M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		64	6.7	8	-1.3	1.6	65.6
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		57.6	2.3	8	-5.7	1.6	59.2
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		52.5	1.9	8	-6.1	1.6	54.1
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		62.9	7.2	8	-0.8	1.6	64.5
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		64.1	7.6	8	-0.4	1.6	65.7
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		56.7	1.2	8	-6.8	2.1	58.8
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		58.1	3.2	8	-4.8	1.6	59.7
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		60.6	2.6	8	-5.4	0.9	61.5
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		59.9	4.8	8	-3.2	0.9	60.8
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		64.8	2.8	8	-5.2	0.9	65.7
SW-25 New	16	M-177	733	5	0	63	66	63	10	----		60.1	2.9	8	-5.1	0.4	60.5
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		56.5	3.2	8	-4.8	0.4	56.9
SW-25 New		M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		57.9	8.2	8	0.2	1.6	59.5
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		56.7	4.2	8	-3.8	1.6	58.3
SW-25 New		M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		63.4	7.3	8	-0.7	1.6	65.0
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		57.2	2.7	8	-5.3	1.6	58.8
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		52.3	2.1	8	-5.9	1.6	53.9
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		62.3	7.8	8	-0.2	1.6	63.9
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		63.4	8.3	8	0.3	1.6	65.0
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		56.6	1.3	8	-6.7	2.1	58.7
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		57.9	3.4	8	-4.6	1.6	59.5
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		60.3	2.9	8	-5.1	0.9	61.2
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		59.6	5.1	8	-2.9	0.9	60.5
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		64.7	2.9	8	-5.1	0.9	65.6
SW-25 New		M-177	733	5	0	63	66	63	10	----		59.8	3.2	8	-4.8	0.4	60.2
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		56.3	3.4	8	-4.6	0.4	56.7

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-25 New	18	M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		57.4	8.7	8	0.7	1.6	59.0
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		56.2	4.7	8	-3.3	1.6	57.8
SW-25 New		M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		62.8	7.9	8	-0.1	1.6	64.4
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		56.8	3.1	8	-4.9	1.6	58.4
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		52.1	2.3	8	-5.7	1.6	53.7
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		61.7	8.4	8	0.4	1.6	63.3
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		62.8	8.9	8	0.9	1.6	64.4
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		56.5	1.4	8	-6.6	2.1	58.6
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		57.8	3.5	8	-4.5	1.6	59.4
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		60.1	3.1	8	-4.9	0.9	61.0
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		59.3	5.4	8	-2.6	0.9	60.2
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		64.6	3	8	-5	0.9	65.5
SW-25 New	20	M-177	733	5	0	63	66	63	10	----		59.7	3.3	8	-4.7	0.4	60.1
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		56.2	3.5	8	-4.5	0.4	56.6
SW-25 New		M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		56.9	9.2	8	1.2	1.6	58.5
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		55.7	5.2	8	-2.8	1.6	57.3
SW-25 New		M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		62.3	8.4	8	0.4	1.6	63.9
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		56.4	3.5	8	-4.5	1.6	58.0
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		51.9	2.5	8	-5.5	1.6	53.5
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		61.2	8.9	8	0.9	1.6	62.8
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		62.2	9.5	8	1.5	1.6	63.8
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		56.4	1.5	8	-6.5	2.1	58.5
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		57.6	3.7	8	-4.3	1.6	59.2
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		59.9	3.3	8	-4.7	0.9	60.8
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		59.1	5.6	8	-2.4	0.9	60.0
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		64.5	3.1	8	-4.9	0.9	65.4
SW-25 New	22	M-177	733	5	0	63	66	63	10	----		59.6	3.4	8	-4.6	0.4	60.0
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		56.1	3.6	8	-4.4	0.4	56.5
SW-25 New		M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		56.5	9.6	8	1.6	1.6	58.1
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		55.3	5.6	8	-2.4	1.6	56.9
SW-25 New		M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		61.9	8.8	8	0.8	1.6	63.5
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		56	3.9	8	-4.1	1.6	57.6
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		51.8	2.6	8	-5.4	1.6	53.4
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		60.7	9.4	8	1.4	1.6	62.3
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		61.7	10	8	2	1.6	63.3
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		56.3	1.6	8	-6.4	2.1	58.4
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		57.3	4	8	-4	1.6	58.9
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		59.7	3.5	8	-4.5	0.9	60.6
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		58.9	5.8	8	-2.2	0.9	59.8
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		64.4	3.2	8	-4.8	0.9	65.3
SW-25 New	24	M-177	733	5	0	63	66	63	10	----		59.5	3.5	8	-4.5	0.4	59.9
SW-25 New		M-180	736	4	0	59.7	66	59.7	10	----		56	3.7	8	-4.3	0.4	56.4
SW-25 New		M-183	739	3	0	66.1	66	66.1	10	Snd Lvl		56.1	10	8	2	1.6	57.7
SW-25 New		M-184	740	4	0	60.9	66	60.9	10	----		55	5.9	8	-2.1	1.6	56.6
SW-25 New		M-186	742	1	0	70.7	66	70.7	10	Snd Lvl		61.5	9.2	8	1.2	1.6	63.1
SW-25 New		M-187	743	4	0	59.9	66	59.9	10	----		55.7	4.2	8	-3.8	1.6	57.3
SW-25 New		M-188	744	3	0	54.4	66	54.4	10	----		51.7	2.7	8	-5.3	1.6	53.3
SW-25 New		M-192	748	2	0	70.1	66	70.1	10	Snd Lvl		60.3	9.8	8	1.8	1.6	61.9
SW-25 New		M-193	749	1	0	71.7	66	71.7	10	Snd Lvl		61.1	10.6	8	2.6	1.6	62.7
SW-25 New		M-195	751	4	0	57.9	66	57.9	10	----		56.3	1.6	8	-6.4	2.1	58.4
SW-25 New		M-197	753	3	0	61.3	66	61.3	10	----		57.2	4.1	8	-3.9	1.6	58.8
SW-25 New		M-200	756	3	0	63.2	66	63.2	10	----		59.5	3.7	8	-4.3	0.9	60.4
SW-25 New		M-201	757	5	0	64.7	66	64.7	10	----		58.7	6	8	-2	0.9	59.6
SW-25 New		M-203	759	2	0	67.6	66	67.6	10	Snd Lvl		64.4	3.2	8	-4.8	0.9	65.3

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-D New	6	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		68.7	4.2	8	-3.8	0.0	68.7
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		65.2	1.7	8	-6.3	0.0	65.2
SW-D New	8	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		67.2	5.7	8	-2.3	0.0	67.2
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		64.5	2.4	8	-5.6	0.0	64.5
SW-D New	10	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		65.9	7	8	-1	0.0	65.9
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		63.8	3.1	8	-4.9	0.0	63.8
SW-D New	12	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		65.2	7.7	8	-0.3	0.0	65.2
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		63	3.9	8	-4.1	0.0	63.0
SW-D New	14	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		64.4	8.5	8	0.5	0.0	64.4
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		62.5	4.4	8	-3.6	0.0	62.5
SW-D New	16	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		64	8.9	8	0.9	0.0	64.0
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		62	4.9	8	-3.1	0.0	62.0
SW-D New	18	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		63.6	9.3	8	1.3	0.0	63.6
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		61.6	5.3	8	-2.7	0.0	61.6
SW-D New	20	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		63.3	9.6	8	1.6	0.0	63.3
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		61.3	5.6	8	-2.4	0.0	61.3
SW-D New	22	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		63	9.9	8	1.9	0.0	63.0
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		60.8	6.1	8	-1.9	0.0	60.8
SW-D New	24	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl		62.8	10.1	8	2.1	0.0	62.8
SW-D New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl		60.6	6.3	8	-1.7	0.0	60.6
SW-E New	6	M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		65	3.5	8	-4.5	0.9	65.9
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.8	0	8	-8	0.9	56.7
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		59.1	3.5	8	-4.5	0.9	60.0
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		59.2	0	8	-8	0.9	60.1
SW-E New		M-158	714	2	0	54.9	66	54.9	10	----		53.3	1.6	8	-6.4	0.9	54.2
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		61.4	4	8	-4	0.9	62.3
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		58.7	-0.9	8	-8.9	0.9	59.6
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.6	0.2	8	-7.8	0.9	57.5
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.5	0	8	-8	0.9	52.4
SW-E New	8	M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		64.1	4.4	8	-3.6	0.9	65.0
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.8	0	8	-8	0.9	56.7
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		58.5	4.1	8	-3.9	0.9	59.4
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		59.1	0.1	8	-7.9	0.9	60.0
SW-E New		M-158	714	2	0	54.9	66	54.9	10	----		52.8	2.1	8	-5.9	0.9	53.7
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		60.6	4.8	8	-3.2	0.9	61.5
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		58.8	-1	8	-9	0.9	59.7
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.4	0.4	8	-7.6	0.9	57.3
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.4	0.1	8	-7.9	0.9	52.3
SW-E New	10	M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		63.5	5	8	-3	0.9	64.4
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		56	-0.2	8	-8.2	0.9	56.9
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		58.3	4.3	8	-3.7	0.9	59.2
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		58.9	0.3	8	-7.7	0.9	59.8
SW-E New		M-158	714	2	0	54.9	66	54.9	10	----		52.4	2.5	8	-5.5	0.9	53.3
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		60	5.4	8	-2.6	0.9	60.9
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		58.3	-0.5	8	-8.5	0.9	59.2
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.4	0.4	8	-7.6	0.9	57.3
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.4	0.1	8	-7.9	0.9	52.3
SW-E New	12	M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		63.1	5.4	8	-2.6	0.9	64.0
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.8	0	8	-8	0.9	56.7
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		58.3	4.3	8	-3.7	0.9	59.2
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		58.7	0.5	8	-7.5	0.9	59.6
SW-E New		M-158	714	2	0	54.9	66	54.9	10	----		52	2.9	8	-5.1	0.9	52.9
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		60.2	5.2	8	-2.8	0.9	61.1
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		58.1	-0.3	8	-8.3	0.9	59.0

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.5	0.3	8	-7.7	0.9	57.4
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.3	0.2	8	-7.8	0.9	52.2
SW-E New		M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		63.1	5.4	8	-2.6	0.9	64.0
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.9	-0.1	8	-8.1	0.9	56.8
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		58.3	4.3	8	-3.7	0.9	59.2
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		58.7	0.5	8	-7.5	0.9	59.6
SW-E New	14	M-158	714	2	0	54.9	66	54.9	10	----		51.6	3.3	8	-4.7	0.9	52.5
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		60.2	5.2	8	-2.8	0.9	61.1
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		59	-1.2	8	-9.2	0.9	59.9
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.9	-0.1	8	-8.1	0.9	57.8
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.2	0.3	8	-7.7	0.9	52.1
SW-E New		M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		63	5.5	8	-2.5	0.9	63.9
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.9	-0.1	8	-8.1	0.9	56.8
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		58.1	4.5	8	-3.5	0.9	59.0
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		59.2	0	8	-8	0.9	60.1
SW-E New	16	M-158	714	2	0	54.9	66	54.9	10	----		51.2	3.7	8	-4.3	0.9	52.1
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		60	5.4	8	-2.6	0.9	60.9
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		59	-1.2	8	-9.2	0.9	59.9
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.8	0	8	-8	0.9	57.7
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.2	0.3	8	-7.7	0.9	52.1
SW-E New		M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		62.8	5.7	8	-2.3	0.9	63.7
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		56	-0.2	8	-8.2	0.9	56.9
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		58.1	4.5	8	-3.5	0.9	59.0
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		58.8	0.4	8	-7.6	0.9	59.7
SW-E New	18	M-158	714	2	0	54.9	66	54.9	10	----		50.8	4.1	8	-3.9	0.9	51.7
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		59.5	5.9	8	-2.1	0.9	60.4
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		58.7	-0.9	8	-8.9	0.9	59.6
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.7	0.1	8	-7.9	0.9	57.6
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.1	0.4	8	-7.6	0.9	52.0
SW-E New		M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		62.6	5.9	8	-2.1	0.9	63.5
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.9	-0.1	8	-8.1	0.9	56.8
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		57.8	4.8	8	-3.2	0.9	58.7
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		58.5	0.7	8	-7.3	0.9	59.4
SW-E New	20	M-158	714	2	0	54.9	66	54.9	10	----		50.6	4.3	8	-3.7	0.9	51.5
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		59	6.4	8	-1.6	0.9	59.9
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		58.3	-0.5	8	-8.5	0.9	59.2
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.4	0.4	8	-7.6	0.9	57.3
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		51.1	0.4	8	-7.6	0.9	52.0
SW-E New		M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		62.4	6.1	8	-1.9	0.9	63.3
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.8	0	8	-8	0.9	56.7
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		57.9	4.7	8	-3.3	0.9	58.8
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		58.4	0.8	8	-7.2	0.9	59.3
SW-E New	22	M-158	714	2	0	54.9	66	54.9	10	----		50.3	4.6	8	-3.4	0.9	51.2
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		58.5	6.9	8	-1.1	0.9	59.4
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		58	-0.2	8	-8.2	0.9	58.9
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56.2	0.6	8	-7.4	0.9	57.1
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		50.9	0.6	8	-7.4	0.9	51.8
SW-E New		M-148	704	1	0	68.5	66	68.5	10	Snd Lvl		62.2	6.3	8	-1.7	0.9	63.1
SW-E New		M-150	706	0	0	55.8	66	55.8	10	----		55.8	0	8	-8	0.9	56.7
SW-E New		M-152	708	1	0	62.6	66	62.6	10	----		58.3	4.3	8	-3.7	0.9	59.2
SW-E New		M-153	709	1	0	59.2	66	59.2	10	----		58.6	0.6	8	-7.4	0.9	59.5
SW-E New	24	M-158	714	2	0	54.9	66	54.9	10	----		50.2	4.7	8	-3.3	0.9	51.1
SW-E New		M-161	717	2	0	65.4	66	65.4	10	----		58.2	7.2	8	-0.8	0.9	59.1
SW-E New		M-162	718	2	0	57.8	66	57.8	10	----		57.8	0	8	-8	0.9	58.7

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-E New		M-164	720	2	0	56.8	66	56.8	10	----		56	0.8	8	-7.2	0.9	56.9
SW-E New		M-166	722	0	0	51.5	66	51.5	10	----		50.9	0.6	8	-7.4	0.9	51.8
SW-19&20 New		M-119	675	0	0	67.1	66	67.1	10	Snd Lvl		66.9	0.2	8	-7.8	2.1	69.0
SW-19&20 New		M-121	677	0	0	66.7	66	66.7	10	Snd Lvl		66.7	0	8	-8	2.1	68.8
SW-19&20 New		M-123	679	2	0	71.3	66	71.3	10	Snd Lvl		65.5	5.8	8	-2.2	2.1	67.6
SW-19&20 New	12	M-124	680	4	0	67.2	66	67.2	10	Snd Lvl		61.2	6	8	-2	2.1	63.3
SW-19&20 New		M-129	685	3	0	74.6	66	74.6	10	Snd Lvl		68.5	6.1	8	-1.9	2.1	70.6
SW-19&20 New		M-131	687	4	0	55.6	66	55.6	10	----		56.2	-0.6	8	-8.6	2.1	58.3
SW-19&20 New		M-134	690	1	0	79.8	66	79.8	10	Snd Lvl		65.9	13.9	8	5.9	2.1	68.0
SW-19&20 New		M-119	675	0	0	67.1	66	67.1	10	Snd Lvl		66.9	0.2	8	-7.8	2.1	69.0
SW-19&20 New		M-121	677	0	0	66.7	66	66.7	10	Snd Lvl		66.6	0.1	8	-7.9	2.1	68.7
SW-19&20 New		M-123	679	2	0	71.3	66	71.3	10	Snd Lvl		64.9	6.4	8	-1.6	2.1	67.0
SW-19&20 New	14	M-124	680	4	0	67.2	66	67.2	10	Snd Lvl		60.6	6.6	8	-1.4	2.1	62.7
SW-19&20 New		M-129	685	3	0	74.6	66	74.6	10	Snd Lvl		68	6.6	8	-1.4	2.1	70.1
SW-19&20 New		M-131	687	4	0	55.6	66	55.6	10	----		56.5	-0.9	8	-8.9	2.1	58.6
SW-19&20 New		M-134	690	1	0	79.8	66	79.8	10	Snd Lvl		64.6	15.2	8	7.2	2.1	66.7
SW-19&20 New		M-119	675	0	0	67.1	66	67.1	10	Snd Lvl		66.9	0.2	8	-7.8	2.1	69.0
SW-19&20 New		M-121	677	0	0	66.7	66	66.7	10	Snd Lvl		66.6	0.1	8	-7.9	2.1	68.7
SW-19&20 New		M-123	679	2	0	71.3	66	71.3	10	Snd Lvl		64.5	6.8	8	-1.2	2.1	66.6
SW-19&20 New	16	M-124	680	4	0	67.2	66	67.2	10	Snd Lvl		60.1	7.1	8	-0.9	2.1	62.2
SW-19&20 New		M-129	685	3	0	74.6	66	74.6	10	Snd Lvl		67.7	6.9	8	-1.1	2.1	69.8
SW-19&20 New		M-131	687	4	0	55.6	66	55.6	10	----		56.8	-1.2	8	-9.2	2.1	58.9
SW-19&20 New		M-134	690	1	0	79.8	66	79.8	10	Snd Lvl		63.9	15.9	8	7.9	2.1	66.0
SW-19&20 New		M-119	675	0	0	67.1	66	67.1	10	Snd Lvl		66.9	0.2	8	-7.8	2.1	69.0
SW-19&20 New		M-121	677	0	0	66.7	66	66.7	10	Snd Lvl		66.6	0.1	8	-7.9	2.1	68.7
SW-19&20 New		M-123	679	2	0	71.3	66	71.3	10	Snd Lvl		64.2	7.1	8	-0.9	2.1	66.3
SW-19&20 New	18	M-124	680	4	0	67.2	66	67.2	10	Snd Lvl		60.8	6.4	8	-1.6	2.1	62.9
SW-19&20 New		M-129	685	3	0	74.6	66	74.6	10	Snd Lvl		67.5	7.1	8	-0.9	2.1	69.6
SW-19&20 New		M-131	687	4	0	55.6	66	55.6	10	----		57	-1.4	8	-9.4	2.1	59.1
SW-19&20 New		M-134	690	1	0	79.8	66	79.8	10	Snd Lvl		63.1	16.7	8	8.7	2.1	65.2
SW-19&20 New		M-119	675	0	0	67.1	66	67.1	10	Snd Lvl		66.9	0.2	8	-7.8	2.1	69.0
SW-19&20 New		M-121	677	0	0	66.7	66	66.7	10	Snd Lvl		66.6	0.1	8	-7.9	2.1	68.7
SW-19&20 New		M-123	679	2	0	71.3	66	71.3	10	Snd Lvl		64	7.3	8	-0.7	2.1	66.1
SW-19&20 New	20	M-124	680	4	0	67.2	66	67.2	10	Snd Lvl		60.1	7.1	8	-0.9	2.1	62.2
SW-19&20 New		M-129	685	3	0	74.6	66	74.6	10	Snd Lvl		67.3	7.3	8	-0.7	2.1	69.4
SW-19&20 New		M-131	687	4	0	55.6	66	55.6	10	----		57	-1.4	8	-9.4	2.1	59.1
SW-19&20 New		M-134	690	1	0	79.8	66	79.8	10	Snd Lvl		62	17.8	8	9.8	2.1	64.1
SW-19&20 New		M-119	675	0	0	67.1	66	67.1	10	Snd Lvl		66.8	0.3	8	-7.7	2.1	68.9
SW-19&20 New		M-121	677	0	0	66.7	66	66.7	10	Snd Lvl		66.6	0.1	8	-7.9	2.1	68.7
SW-19&20 New		M-123	679	2	0	71.3	66	71.3	10	Snd Lvl		63.8	7.5	8	-0.5	2.1	65.9
SW-19&20 New	22	M-124	680	4	0	67.2	66	67.2	10	Snd Lvl		59.7	7.5	8	-0.5	2.1	61.8
SW-19&20 New		M-129	685	3	0	74.6	66	74.6	10	Snd Lvl		67.2	7.4	8	-0.6	2.1	69.3
SW-19&20 New		M-131	687	4	0	55.6	66	55.6	10	----		56.8	-1.2	8	-9.2	2.1	58.9
SW-19&20 New		M-134	690	1	0	79.8	66	79.8	10	Snd Lvl		61.5	18.3	8	10.3	2.1	63.6
SW-19&20 New		M-119	675	0	0	67.1	66	67.1	10	Snd Lvl		66.8	0.3	8	-7.7	2.1	68.9
SW-19&20 New		M-121	677	0	0	66.7	66	66.7	10	Snd Lvl		66.6	0.1	8	-7.9	2.1	68.7
SW-19&20 New		M-123	679	2	0	71.3	66	71.3	10	Snd Lvl		63.7	7.6	8	-0.4	2.1	65.8
SW-19&20 New	24	M-124	680	4	0	67.2	66	67.2	10	Snd Lvl		59.7	7.5	8	-0.5	2.1	61.8
SW-19&20 New		M-129	685	3	0	74.6	66	74.6	10	Snd Lvl		67.1	7.5	8	-0.5	2.1	69.2
SW-19&20 New		M-131	687	4	0	55.6	66	55.6	10	----		56.8	-1.2	8	-9.2	2.1	58.9
SW-19&20 New		M-134	690	1	0	79.8	66	79.8	10	Snd Lvl		61.4	18.4	8	10.4	2.1	63.5
SW-B&C New		M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		64.6	8.2	8	0.2	2.3	66.9
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		58.8	0.4	8	-7.6	2.3	61.1
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		54.6	2.8	8	-5.2	2.3	56.9

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-B&C New	6	M-128	684	0	0	72.2	66	71.2	10	Snd Lvl		64.7	6.5	8	-1.5	2.3	67.0
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		60.4	1.5	8	-6.5	2.3	62.7
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		49.5	1.1	8	-6.9	2.3	51.8
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		62.4	6.4	8	-1.6	2.3	64.7
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		52.8	0.8	8	-7.2	2.3	55.1
SW-B&C New	8	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		62.4	10.4	8	2.4	2.3	64.7
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		58.8	0.4	8	-7.6	2.3	61.1
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		54.2	3.2	8	-4.8	2.3	56.5
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		62.3	8.9	8	0.9	2.3	64.6
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		60.2	1.7	8	-6.3	2.3	62.5
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		49.2	1.4	8	-6.6	2.3	51.5
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		60.4	8.4	8	0.4	2.3	62.7
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		52.5	1.1	8	-6.9	2.3	54.8
SW-B&C New	10	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		60	12.8	8	4.8	2.3	62.3
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		58.6	0.6	8	-7.4	2.3	60.9
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		53.2	4.2	8	-3.8	2.3	55.5
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		61	10.2	8	2.2	2.3	63.3
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		59.7	2.2	8	-5.8	2.3	62.0
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		48.7	1.9	8	-6.1	2.3	51.0
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		59.2	9.6	8	1.6	2.3	61.5
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		52.2	1.4	8	-6.6	2.3	54.5
SW-B&C New	12	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		58.4	14.4	8	6.4	2.3	60.7
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		58.4	0.8	8	-7.2	2.3	60.7
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		52.4	5	8	-3	2.3	54.7
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		59.9	11.3	8	3.3	2.3	62.2
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		59.1	2.8	8	-5.2	2.3	61.4
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		48.4	2.2	8	-5.8	2.3	50.7
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		57.9	10.9	8	2.9	2.3	60.2
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		52	1.6	8	-6.4	2.3	54.3
SW-B&C New	14	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		57.2	15.6	8	7.6	2.3	59.5
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		58.1	1.1	8	-6.9	2.3	60.4
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		51.9	5.5	8	-2.5	2.3	54.2
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		57.9	13.3	8	5.3	2.3	60.2
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		58	3.9	8	-4.1	2.3	60.3
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		48.1	2.5	8	-5.5	2.3	50.4
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		56.9	11.9	8	3.9	2.3	59.2
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		51.7	1.9	8	-6.1	2.3	54.0
SW-B&C New	16	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		56	16.8	8	8.8	2.3	58.3
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		57.8	1.4	8	-6.6	2.3	60.1
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		51.3	6.1	8	-1.9	2.3	53.6
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		56.8	14.4	8	6.4	2.3	59.1
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		57.7	4.2	8	-3.8	2.3	60.0
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		47.9	2.7	8	-5.3	2.3	50.2
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		56	12.8	8	4.8	2.3	58.3
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		51	2.6	8	-5.4	2.3	53.3
SW-B&C New	18	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		55.1	17.7	8	9.7	2.3	57.4
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		57.5	1.7	8	-6.3	2.3	59.8
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		51.2	6.2	8	-1.8	2.3	53.5
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		55.8	15.4	8	7.4	2.3	58.1
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		57.5	4.4	8	-3.6	2.3	59.8
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		47.7	2.9	8	-5.1	2.3	50.0
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		55	13.8	8	5.8	2.3	57.3
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		50.8	2.8	8	-5.2	2.3	53.1
SW-B&C New		M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		54.5	18.3	8	10.3	2.3	56.8

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-B&C New	20	M-126	682	1	0	59.2	66	59.2	10	----		57.2	2	8	-6	2.3	59.5
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		51.4	6	8	-2	2.3	53.7
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		55.1	16.1	8	8.1	2.3	57.4
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		51	10.9	8	2.9	2.3	53.3
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		47.6	3	8	-5	2.3	49.9
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		54	14.8	8	6.8	2.3	56.3
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		49.7	3.9	8	-4.1	2.3	52.0
SW-B&C New	22	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		53.8	19	8	11	2.3	56.1
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		57	2.2	8	-5.8	2.3	59.3
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		51.1	6.3	8	-1.7	2.3	53.4
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		54.4	16.8	8	8.8	2.3	56.7
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		49.6	12.3	8	4.3	2.3	51.9
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		47.4	3.2	8	-4.8	2.3	49.7
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		53.3	15.5	8	7.5	2.3	55.6
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		49.3	4.3	8	-3.7	2.3	51.6
SW-B&C New	24	M-125	681	0	0	72.8	66	72.8	10	Snd Lvl		53.3	19.5	8	11.5	2.3	55.6
SW-B&C New		M-126	682	1	0	59.2	66	59.2	10	----		56.7	2.5	8	-5.5	2.3	59.0
SW-B&C New		M-127	683	0	0	57.4	66	57.4	10	----		50.7	6.7	8	-1.3	2.3	53.0
SW-B&C New		M-128	684	0	0	71.2	66	71.2	10	Snd Lvl		54	17.2	8	9.2	2.3	56.3
SW-B&C New		M-132	688	4	0	61.9	66	61.9	10	----		49.3	12.6	8	4.6	2.3	51.6
SW-B&C New		M-133	689	5	0	50.6	66	50.6	10	----		47.2	3.4	8	-4.6	2.3	49.5
SW-B&C New		M-135	691	2	0	68.8	66	68.8	10	Snd Lvl		52.5	16.3	8	8.3	2.3	54.8
SW-B&C New		M-139	695	2	0	53.6	66	53.6	10	----		49	4.6	8	-3.4	2.3	51.3
SW-22	12	M-144	857	2	0	56.3	66	56.3	10	----		55	1.3	8	-6.7	2.4	57.4
SW-22		M-147	855	2	0	61.2	66	61.2	10	----		58.7	2.5	8	-5.5	2.4	61.1
SW-22		M-149	854	2	0	70.6	66	70.6	10	Snd Lvl		64.2	6.4	8	-1.6	2.4	66.6
SW-22		M-151	707	5	0	59.4	66	59.4	10	----		58.1	1.3	8	-6.7	2.4	60.5
SW-22		M-154	710	2	0	64.8	66	64.8	10	----		59.4	5.4	8	-2.6	2.4	61.8
SW-22		M-155	711	2	0	59.4	66	59.4	10	----		58.1	1.3	8	-6.7	2.4	60.5
SW-22		M-156	712	2	0	75.3	66	75.3	10	Snd Lvl		67.2	8.1	8	0.1	2.4	69.6
SW-22		M-157	713	2	0	62.5	66	62.5	10	----		61.3	1.2	8	-6.8	2.4	63.7
SW-22		M-159	715	2	0	72.9	66	72.9	10	Snd Lvl		66	6.9	8	-1.1	2.4	68.4
SW-22		M-160	716	2	0	65.8	66	65.8	10	----		64.8	1	8	-7	2.4	67.2
SW-22		M-163	719	2	0	69.6	66	69.6	10	Snd Lvl		67.5	2.1	8	-5.9	2.4	69.9
SW-22	14	M-144	857	2	0	56.3	66	56.3	10	----		54.5	1.8	8	-6.2	2.4	56.9
SW-22		M-147	855	2	0	61.2	66	61.2	10	----		58.3	2.9	8	-5.1	2.4	60.7
SW-22		M-149	854	2	0	70.6	66	70.6	10	Snd Lvl		63.4	7.2	8	-0.8	2.4	65.8
SW-22		M-151	707	5	0	59.4	66	59.4	10	----		58.3	1.1	8	-6.9	2.4	60.7
SW-22		M-154	710	2	0	64.8	66	64.8	10	----		59.1	5.7	8	-2.3	2.4	61.5
SW-22		M-155	711	2	0	59.4	66	59.4	10	----		58.2	1.2	8	-6.8	2.4	60.6
SW-22		M-156	712	2	0	75.3	66	75.3	10	Snd Lvl		66	9.3	8	1.3	2.4	68.4
SW-22		M-157	713	2	0	62.5	66	62.5	10	----		61	1.5	8	-6.5	2.4	63.4
SW-22		M-159	715	2	0	72.9	66	72.9	10	Snd Lvl		64.9	8	8	0	2.4	67.3
SW-22		M-160	716	2	0	65.8	66	65.8	10	----		64.5	1.3	8	-6.7	2.4	66.9
SW-22		M-163	719	2	0	69.6	66	69.6	10	Snd Lvl		67.2	2.4	8	-5.6	2.4	69.6
SW-22	16	M-144	857	2	0	56.3	66	56.3	10	----		54.3	2	8	-6	2.4	56.7
SW-22		M-147	855	2	0	61.2	66	61.2	10	----		57.9	3.3	8	-4.7	2.4	60.3
SW-22		M-149	854	2	0	70.6	66	70.6	10	Snd Lvl		62.7	7.9	8	-0.1	2.4	65.1
SW-22		M-151	707	5	0	59.4	66	59.4	10	----		57.9	1.5	8	-6.5	2.4	60.3
SW-22		M-154	710	2	0	64.8	66	64.8	10	----		58.3	6.5	8	-1.5	2.4	60.7
SW-22		M-155	711	2	0	59.4	66	59.4	10	----		58.2	1.2	8	-6.8	2.4	60.6
SW-22		M-156	712	2	0	75.3	66	75.3	10	Snd Lvl		65	10.3	8	2.3	2.4	67.4
SW-22		M-157	713	2	0	62.5	66	62.5	10	----		60.8	1.7	8	-6.3	2.4	63.2
SW-22		M-159	715	2	0	72.9	66	72.9	10	Snd Lvl		64.3	8.6	8	0.6	2.4	66.7

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-22		M-160	716	2	0	65.8	66	65.8	10	----		64.3	1.5	8	-6.5	2.4	66.7
SW-22		M-163	719	2	0	69.6	66	69.6	10	Snd Lvl		66.9	2.7	8	-5.3	2.4	69.3
SW-22		M-144	857	2	0	56.3	66	56.3	10	----		55.1	1.2	8	-6.8	2.4	57.5
SW-22		M-147	855	2	0	61.2	66	61.2	10	----		57.8	3.4	8	-4.6	2.4	60.2
SW-22		M-149	854	2	0	70.6	66	70.6	10	Snd Lvl		62	8.6	8	0.6	2.4	64.4
SW-22		M-151	707	5	0	59.4	66	59.4	10	----		57.2	2.2	8	-5.8	2.4	59.6
SW-22		M-154	710	2	0	64.8	66	64.8	10	----		57.4	7.4	8	-0.6	2.4	59.8
SW-22	18	M-155	711	2	0	59.4	66	59.4	10	----		58.5	0.9	8	-7.1	2.4	60.9
SW-22		M-156	712	2	0	75.3	66	75.3	10	Snd Lvl		64.2	11.1	8	3.1	2.4	66.6
SW-22		M-157	713	2	0	62.5	66	62.5	10	----		60.5	2	8	-6	2.4	62.9
SW-22		M-159	715	2	0	72.9	66	72.9	10	Snd Lvl		63.9	9	8	1	2.4	66.3
SW-22		M-160	716	2	0	65.8	66	65.8	10	----		64.1	1.7	8	-6.3	2.4	66.5
SW-22		M-163	719	2	0	69.6	66	69.6	10	Snd Lvl		66.7	2.9	8	-5.1	2.4	69.1
SW-22		M-144	857	2	0	56.3	66	56.3	10	----		54.5	1.8	8	-6.2	2.4	56.9
SW-22		M-147	855	2	0	61.2	66	61.2	10	----		57.2	4	8	-4	2.4	59.6
SW-22		M-149	854	2	0	70.6	66	70.6	10	Snd Lvl		61.4	9.2	8	1.2	2.4	63.8
SW-22		M-151	707	5	0	59.4	66	59.4	10	----		56.9	2.5	8	-5.5	2.4	59.3
SW-22		M-154	710	2	0	64.8	66	64.8	10	----		57	7.8	8	-0.2	2.4	59.4
SW-22	20	M-155	711	2	0	59.4	66	59.4	10	----		58.4	1	8	-7	2.4	60.8
SW-22		M-156	712	2	0	75.3	66	75.3	10	Snd Lvl		63.4	11.9	8	3.9	2.4	65.8
SW-22		M-157	713	2	0	62.5	66	62.5	10	----		60.4	2.1	8	-5.9	2.4	62.8
SW-22		M-159	715	2	0	72.9	66	72.9	10	Snd Lvl		63.7	9.2	8	1.2	2.4	66.1
SW-22		M-160	716	2	0	65.8	66	65.8	10	----		64	1.8	8	-6.2	2.4	66.4
SW-22		M-163	719	2	0	69.6	66	69.6	10	Snd Lvl		66.6	3	8	-5	2.4	69.0
SW-22		M-144	857	2	0	56.3	66	56.3	10	----		54.1	2.2	8	-5.8	2.4	56.5
SW-22		M-147	855	2	0	61.2	66	61.2	10	----		56.8	4.4	8	-3.6	2.4	59.2
SW-22		M-149	854	2	0	70.6	66	70.6	10	Snd Lvl		60.7	9.9	8	1.9	2.4	63.1
SW-22		M-151	707	5	0	59.4	66	59.4	10	----		56.6	2.8	8	-5.2	2.4	59.0
SW-22		M-154	710	2	0	64.8	66	64.8	10	----		56.6	8.2	8	0.2	2.4	59.0
SW-22	22	M-155	711	2	0	59.4	66	59.4	10	----		57.9	1.5	8	-6.5	2.4	60.3
SW-22		M-156	712	2	0	75.3	66	75.3	10	Snd Lvl		62.7	12.6	8	4.6	2.4	65.1
SW-22		M-157	713	2	0	62.5	66	62.5	10	----		60.2	2.3	8	-5.7	2.4	62.6
SW-22		M-159	715	2	0	72.9	66	72.9	10	Snd Lvl		63.3	9.6	8	1.6	2.4	65.7
SW-22		M-160	716	2	0	65.8	66	65.8	10	----		63.9	1.9	8	-6.1	2.4	66.3
SW-22		M-163	719	2	0	69.6	66	69.6	10	Snd Lvl		66.4	3.2	8	-4.8	2.4	68.8
SW-22		M-144	857	2	0	56.3	66	56.3	10	----		53.7	2.6	8	-5.4	2.4	56.1
SW-22		M-147	855	2	0	61.2	66	61.2	10	----		56.6	4.6	8	-3.4	2.4	59.0
SW-22		M-149	854	2	0	70.6	66	70.6	10	Snd Lvl		60.1	10.5	8	2.5	2.4	62.5
SW-22		M-151	707	5	0	59.4	66	59.4	10	----		56.4	3	8	-5	2.4	58.8
SW-22		M-154	710	2	0	64.8	66	64.8	10	----		56.2	8.6	8	0.6	2.4	58.6
SW-22	24	M-155	711	2	0	59.4	66	59.4	10	----		57.5	1.9	8	-6.1	2.4	59.9
SW-22		M-156	712	2	0	75.3	66	75.3	10	Snd Lvl		62	13.3	8	5.3	2.4	64.4
SW-22		M-157	713	2	0	62.5	66	62.5	10	----		60.1	2.4	8	-5.6	2.4	62.5
SW-22		M-159	715	2	0	72.9	66	72.9	10	Snd Lvl		62.9	10	8	2	2.4	65.3
SW-22		M-160	716	2	0	65.8	66	65.8	10	----		63.8	2	8	-6	2.4	66.2
SW-22		M-163	719	2	0	69.6	66	69.6	10	Snd Lvl		66.3	3.3	8	-4.7	2.4	68.7
SW-26		M-189	745	2	0	71.9	66	71.9	10	Snd Lvl		64.5	7.4	8	-0.6	2.1	66.6
SW-26		M-190	746	2	0	69.7	66	69.7	10	Snd Lvl		64.1	5.6	8	-2.4	2.1	66.2
SW-26		M-194	750	2	0	76.5	66	76.5	10	Snd Lvl		66.4	10.1	8	2.1	2.1	68.5
SW-26		M-196	752	5	0	66.1	66	66.1	10	Snd Lvl		60.1	6	8	-2	1.6	61.7
SW-26		M-198	754	2	0	74.1	66	74.1	10	Snd Lvl		65.8	8.3	8	0.3	2.1	67.9
SW-26		M-199	755	8	0	63.2	66	63.2	10	----		59.5	3.7	8	-4.3	2.1	61.6
SW-26	12	M-202	758	0	0	78.6	66	78.6	10	Snd Lvl		67	11.6	8	3.6	2.1	69.1
SW-26		M-204	760	6	0	58.4	66	58.4	10	----		56.5	1.9	8	-6.1	2.1	58.6

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-26		M-208	764	6	0	59.3	66	59.3	10	----		58.1	1.2	8	-6.8	2.1	60.2
SW-26		M-209	765	1	0	72.2	66	72.2	10	Snd Lvl		66.4	5.8	8	-2.2	2.1	68.5
SW-26		M-210	766	1	0	62.3	66	62.3	10	----		60.1	2.2	8	-5.8	2.1	62.2
SW-26		M-211	767	3	0	56.6	66	56.6	10	----		56.4	0.2	8	-7.8	2.1	58.5
SW-26		M-212	768	4	0	57.6	66	57.6	10	----		57.5	0.1	8	-7.9	2.1	59.6
SW-26		M-213	769	0	0	57.9	66	57.9	10	----		57.9	0	8	-8	2.1	60.0
SW-26		M-189	745	2	0	71.9	66	71.9	10	Snd Lvl		63.8	8.1	8	0.1	2.1	65.9
SW-26		M-190	746	2	0	69.7	66	69.7	10	Snd Lvl		63.5	6.2	8	-1.8	2.1	65.6
SW-26		M-194	750	2	0	76.5	66	76.5	10	Snd Lvl		65.5	11	8	3	2.1	67.6
SW-26		M-196	752	5	0	66.1	66	66.1	10	Snd Lvl		59.3	6.8	8	-1.2	1.6	60.9
SW-26		M-198	754	2	0	74.1	66	74.1	10	Snd Lvl		64.8	9.3	8	1.3	2.1	66.9
SW-26		M-199	755	8	0	63.2	66	63.2	10	----		58.5	4.7	8	-3.3	2.1	60.6
SW-26	14	M-202	758	0	0	78.6	66	78.6	10	Snd Lvl		66.1	12.5	8	4.5	2.1	68.2
SW-26		M-204	760	6	0	58.4	66	58.4	10	----		55.3	3.1	8	-4.9	2.1	57.4
SW-26		M-208	764	6	0	59.3	66	59.3	10	----		57.1	2.2	8	-5.8	2.1	59.2
SW-26		M-209	765	1	0	72.2	66	72.2	10	Snd Lvl		65.7	6.5	8	-1.5	2.1	67.8
SW-26		M-210	766	1	0	62.3	66	62.3	10	----		59.3	3	8	-5	2.1	61.4
SW-26		M-211	767	3	0	56.6	66	56.6	10	----		56	0.6	8	-7.4	2.1	58.1
SW-26		M-212	768	4	0	57.6	66	57.6	10	----		57.2	0.4	8	-7.6	2.1	59.3
SW-26		M-213	769	0	0	57.9	66	57.9	10	----		57.8	0.1	8	-7.9	2.1	59.9
SW-26		M-189	745	2	0	71.9	66	71.9	10	Snd Lvl		63.2	8.7	8	0.7	2.1	65.3
SW-26		M-190	746	2	0	69.7	66	69.7	10	Snd Lvl		63.1	6.6	8	-1.4	2.1	65.2
SW-26		M-194	750	2	0	76.5	66	76.5	10	Snd Lvl		64.8	11.7	8	3.7	2.1	66.9
SW-26		M-196	752	5	0	66.1	66	66.1	10	Snd Lvl		59.1	7	8	-1	1.6	60.7
SW-26		M-198	754	2	0	74.1	66	74.1	10	Snd Lvl		64.1	10	8	2	2.1	66.2
SW-26		M-199	755	8	0	63.2	66	63.2	10	----		58	5.2	8	-2.8	2.1	60.1
SW-26	16	M-202	758	0	0	78.6	66	78.6	10	Snd Lvl		65.2	13.4	8	5.4	2.1	67.3
SW-26		M-204	760	6	0	58.4	66	58.4	10	----		54.6	3.8	8	-4.2	2.1	56.7
SW-26		M-208	764	6	0	59.3	66	59.3	10	----		56.2	3.1	8	-4.9	2.1	58.3
SW-26		M-209	765	1	0	72.2	66	72.2	10	Snd Lvl		64.8	7.4	8	-0.6	2.1	66.9
SW-26		M-210	766	1	0	62.3	66	62.3	10	----		58.6	3.7	8	-4.3	2.1	60.7
SW-26		M-211	767	3	0	56.6	66	56.6	10	----		55.8	0.8	8	-7.2	2.1	57.9
SW-26		M-212	768	4	0	57.6	66	57.6	10	----		57.1	0.5	8	-7.5	2.1	59.2
SW-26		M-213	769	0	0	57.9	66	57.9	10	----		57.7	0.2	8	-7.8	2.1	59.8
SW-26		M-189	745	2	0	71.9	66	71.9	10	Snd Lvl		62.6	9.3	8	1.3	2.1	64.7
SW-26		M-190	746	2	0	69.7	66	69.7	10	Snd Lvl		62.8	6.9	8	-1.1	2.1	64.9
SW-26		M-194	750	2	0	76.5	66	76.5	10	Snd Lvl		64	12.5	8	4.5	2.1	66.1
SW-26		M-196	752	5	0	66.1	66	66.1	10	Snd Lvl		58.7	7.4	8	-0.6	1.6	60.3
SW-26		M-198	754	2	0	74.1	66	74.1	10	Snd Lvl		63.3	10.8	8	2.8	2.1	65.4
SW-26		M-199	755	8	0	63.2	66	63.2	10	----		57.5	5.7	8	-2.3	2.1	59.6
SW-26	18	M-202	758	0	0	78.6	66	78.6	10	Snd Lvl		64.5	14.1	8	6.1	2.1	66.6
SW-26		M-204	760	6	0	58.4	66	58.4	10	----		54	4.4	8	-3.6	2.1	56.1
SW-26		M-208	764	6	0	59.3	66	59.3	10	----		55.6	3.7	8	-4.3	2.1	57.7
SW-26		M-209	765	1	0	72.2	66	72.2	10	Snd Lvl		64.1	8.1	8	0.1	2.1	66.2
SW-26		M-210	766	1	0	62.3	66	62.3	10	----		58.1	4.2	8	-3.8	2.1	60.2
SW-26		M-211	767	3	0	56.6	66	56.6	10	----		55.6	1	8	-7	2.1	57.7
SW-26		M-212	768	4	0	57.6	66	57.6	10	----		57	0.6	8	-7.4	2.1	59.1
SW-26		M-213	769	0	0	57.9	66	57.9	10	----		57.6	0.3	8	-7.7	2.1	59.7
SW-26		M-189	745	2	0	71.9	66	71.9	10	Snd Lvl		62.1	9.8	8	1.8	2.1	64.2
SW-26		M-190	746	2	0	69.7	66	69.7	10	Snd Lvl		62.5	7.2	8	-0.8	2.1	64.6
SW-26		M-194	750	2	0	76.5	66	76.5	10	Snd Lvl		63.5	13	8	5	2.1	65.6
SW-26		M-196	752	5	0	66.1	66	66.1	10	Snd Lvl		58.2	7.9	8	-0.1	1.6	59.8
SW-26		M-198	754	2	0	74.1	66	74.1	10	Snd Lvl		62.7	11.4	8	3.4	2.1	64.8
SW-26		M-199	755	8	0	63.2	66	63.2	10	----		57.1	6.1	8	-1.9	2.1	59.2

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-26	20	M-202	758	0	0	78.6	66	78.6	10	Snd Lvl		63.8	14.8	8	6.8	2.1	65.9
SW-26		M-204	760	6	0	58.4	66	58.4	10	----		53.5	4.9	8	-3.1	2.1	55.6
SW-26		M-208	764	6	0	59.3	66	59.3	10	----		55	4.3	8	-3.7	2.1	57.1
SW-26		M-209	765	1	0	72.2	66	72.2	10	Snd Lvl		63.5	8.7	8	0.7	2.1	65.6
SW-26		M-210	766	1	0	62.3	66	62.3	10	----		57.8	4.5	8	-3.5	2.1	59.9
SW-26		M-211	767	3	0	56.6	66	56.6	10	----		55.5	1.1	8	-6.9	2.1	57.6
SW-26		M-212	768	4	0	57.6	66	57.6	10	----		56.9	0.7	8	-7.3	2.1	59.0
SW-26		M-213	769	0	0	57.9	66	57.9	10	----		57.6	0.3	8	-7.7	2.1	59.7
SW-26	22	M-189	745	2	0	71.9	66	71.9	10	Snd Lvl		61.6	10.3	8	2.3	2.1	63.7
SW-26		M-190	746	2	0	69.7	66	69.7	10	Snd Lvl		62.3	7.4	8	-0.6	2.1	64.4
SW-26		M-194	750	2	0	76.5	66	76.5	10	Snd Lvl		62.9	13.6	8	5.6	2.1	65.0
SW-26		M-196	752	5	0	66.1	66	66.1	10	Snd Lvl		57.8	8.3	8	0.3	1.6	59.4
SW-26		M-198	754	2	0	74.1	66	74.1	10	Snd Lvl		62.1	12	8	4	2.1	64.2
SW-26		M-199	755	8	0	63.2	66	63.2	10	----		56.8	6.4	8	-1.6	2.1	58.9
SW-26		M-202	758	0	0	78.6	66	78.6	10	Snd Lvl		63.2	15.4	8	7.4	2.1	65.3
SW-26		M-204	760	6	0	58.4	66	58.4	10	----		53.1	5.3	8	-2.7	2.1	55.2
SW-26		M-208	764	6	0	59.3	66	59.3	10	----		54.5	4.8	8	-3.2	2.1	56.6
SW-26		M-209	765	1	0	72.2	66	72.2	10	Snd Lvl		62.9	9.3	8	1.3	2.1	65.0
SW-26		M-210	766	1	0	62.3	66	62.3	10	----		57.5	4.8	8	-3.2	2.1	59.6
SW-26		M-211	767	3	0	56.6	66	56.6	10	----		55.4	1.2	8	-6.8	2.1	57.5
SW-26		M-212	768	4	0	57.6	66	57.6	10	----		56.8	0.8	8	-7.2	2.1	58.9
SW-26		M-213	769	0	0	57.9	66	57.9	10	----		57.4	0.5	8	-7.5	2.1	59.5
SW-26	24	M-189	745	2	0	71.9	66	71.9	10	Snd Lvl		61.2	10.7	8	2.7	2.1	63.3
SW-26		M-190	746	2	0	69.7	66	69.7	10	Snd Lvl		62.1	7.6	8	-0.4	2.1	64.2
SW-26		M-194	750	2	0	76.5	66	76.5	10	Snd Lvl		62.3	14.2	8	6.2	2.1	64.4
SW-26		M-196	752	5	0	66.1	66	66.1	10	Snd Lvl		57.4	8.7	8	0.7	1.6	59.0
SW-26		M-198	754	2	0	74.1	66	74.1	10	Snd Lvl		61.5	12.6	8	4.6	2.1	63.6
SW-26		M-199	755	8	0	63.2	66	63.2	10	----		56.4	6.8	8	-1.2	2.1	58.5
SW-26		M-202	758	0	0	78.6	66	78.6	10	Snd Lvl		62.7	15.9	8	7.9	2.1	64.8
SW-26		M-204	760	6	0	58.4	66	58.4	10	----		52.7	5.7	8	-2.3	2.1	54.8
SW-26		M-208	764	6	0	59.3	66	59.3	10	----		54	5.3	8	-2.7	2.1	56.1
SW-26		M-209	765	1	0	72.2	66	72.2	10	Snd Lvl		62.4	9.8	8	1.8	2.1	64.5
SW-26		M-210	766	1	0	62.3	66	62.3	10	----		57.2	5.1	8	-2.9	2.1	59.3
SW-26		M-211	767	3	0	56.6	66	56.6	10	----		55.4	1.2	8	-6.8	2.1	57.5
SW-26		M-212	768	4	0	57.6	66	57.6	10	----		56.8	0.8	8	-7.2	2.1	58.9
SW-26		M-213	769	0	0	57.9	66	57.9	10	----		57.3	0.6	8	-7.4	2.1	59.4
SW-C New	6	M-125	681	0	0	64.7	66	64.7	10	----		64.6	0.1	8	-7.9	2.3	66.9
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		58.8	0.4	8	-7.6	2.3	61.1
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		55.8	0.7	8	-7.3	2.3	58.1
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		65.1	0.1	8	-7.9	2.3	67.4
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		61.4	0.5	8	-7.5	2.3	63.7
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		49.5	1.1	8	-6.9	2.3	51.8
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.7	0.2	8	-7.8	2.3	71.0
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		52.8	0.8	8	-7.2	2.3	55.1
SW-C New	8	M-125	681	0	0	64.7	66	64.7	10	----		64.5	0.2	8	-7.8	2.3	66.8
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		58.8	0.4	8	-7.6	2.3	61.1
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		55.6	0.9	8	-7.1	2.3	57.9
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		65	0.2	8	-7.8	2.3	67.3
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		61.2	0.7	8	-7.3	2.3	63.5
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		49.2	1.4	8	-6.6	2.3	51.5
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.7	0.2	8	-7.8	2.3	71.0
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		52.5	1.1	8	-6.9	2.3	54.8
SW-C New		M-125	681	0	0	64.7	66	64.7	10	----		64.4	0.3	8	-7.7	2.3	66.7
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		58.6	0.6	8	-7.4	2.3	60.9

SW	Height	Receiver										UNCALIBRATED				K-Factor	Calibrated
SW-C New	10	M-127	683	0	0	56.5	66	56.5	10	----		55.5	1	8	-7	2.3	57.8
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		64.9	0.3	8	-7.7	2.3	67.2
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		60.8	1.1	8	-6.9	2.3	63.1
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		48.7	1.9	8	-6.1	2.3	51.0
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.6	0.3	8	-7.7	2.3	70.9
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		52.1	1.5	8	-6.5	2.3	54.4
SW-C New	12	M-125	681	0	0	64.7	66	64.7	10	----		64.4	0.3	8	-7.7	2.3	66.7
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		58.4	0.8	8	-7.2	2.3	60.7
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		55.4	1.1	8	-6.9	2.3	57.7
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		64.9	0.3	8	-7.7	2.3	67.2
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		60.4	1.5	8	-6.5	2.3	62.7
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		48.4	2.2	8	-5.8	2.3	50.7
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.5	0.4	8	-7.6	2.3	70.8
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		52	1.6	8	-6.4	2.3	54.3
SW-C New	14	M-125	681	0	0	64.7	66	64.7	10	----		64.3	0.4	8	-7.6	2.3	66.6
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		58.1	1.1	8	-6.9	2.3	60.4
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		55.3	1.2	8	-6.8	2.3	57.6
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		64.9	0.3	8	-7.7	2.3	67.2
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		60.3	1.6	8	-6.4	2.3	62.6
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		48.2	2.4	8	-5.6	2.3	50.5
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.5	0.4	8	-7.6	2.3	70.8
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		51.8	1.8	8	-6.2	2.3	54.1
SW-C New	16	M-125	681	0	0	64.7	66	64.7	10	----		64.3	0.4	8	-7.6	2.3	66.6
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		57.8	1.4	8	-6.6	2.3	60.1
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		55.2	1.3	8	-6.7	2.3	57.5
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		64.9	0.3	8	-7.7	2.3	67.2
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		60.2	1.7	8	-6.3	2.3	62.5
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		48	2.6	8	-5.4	2.3	50.3
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.5	0.4	8	-7.6	2.3	70.8
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		51.7	1.9	8	-6.1	2.3	54.0
SW-C New	18	M-125	681	0	0	64.7	66	64.7	10	----		64.3	0.4	8	-7.6	2.3	66.6
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		57.5	1.7	8	-6.3	2.3	59.8
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		55.1	1.4	8	-6.6	2.3	57.4
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		64.8	0.4	8	-7.6	2.3	67.1
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		60.2	1.7	8	-6.3	2.3	62.5
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		47.9	2.7	8	-5.3	2.3	50.2
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.5	0.4	8	-7.6	2.3	70.8
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		51.6	2	8	-6	2.3	53.9
SW-C New	20	M-125	681	0	0	64.7	66	64.7	10	----		64.3	0.4	8	-7.6	2.3	66.6
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		57.2	2	8	-6	2.3	59.5
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		55	1.5	8	-6.5	2.3	57.3
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		64.8	0.4	8	-7.6	2.3	67.1
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		60.1	1.8	8	-6.2	2.3	62.4
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		47.7	2.9	8	-5.1	2.3	50.0
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.5	0.4	8	-7.6	2.3	70.8
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		51.6	2	8	-6	2.3	53.9
SW-C New	22	M-125	681	0	0	64.7	66	64.7	10	----		64.3	0.4	8	-7.6	2.3	66.6
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----		57	2.2	8	-5.8	2.3	59.3
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----		54.9	1.6	8	-6.4	2.3	57.2
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----		64.8	0.4	8	-7.6	2.3	67.1
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----		60.1	1.8	8	-6.2	2.3	62.4
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----		47.6	3	8	-5	2.3	49.9
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl		68.4	0.5	8	-7.5	2.3	70.7
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----		51.5	2.1	8	-5.9	2.3	53.8

SW	Height	Receiver									UNCALIBRATED				K-Factor	Calibrated
SW-C New	24	M-125	681	0	0	64.7	66	64.7	10	----	64.2	0.5	8	-7.5	2.3	66.5
SW-C New		M-126	682	1	0	59.2	66	59.2	10	----	56.7	2.5	8	-5.5	2.3	59.0
SW-C New		M-127	683	0	0	56.5	66	56.5	10	----	54.9	1.6	8	-6.4	2.3	57.2
SW-C New		M-128	684	0	0	65.2	66	65.2	10	----	64.8	0.4	8	-7.6	2.3	67.1
SW-C New		M-132	688	4	0	61.9	66	61.9	10	----	60.1	1.8	8	-6.2	2.3	62.4
SW-C New		M-133	689	5	0	50.6	66	50.6	10	----	47.5	3.1	8	-4.9	2.3	49.8
SW-C New		M-135	691	2	0	68.9	66	68.9	10	Snd Lvl	68.4	0.5	8	-7.5	2.3	70.7
SW-C New		M-139	695	2	0	53.6	66	53.6	10	----	51.5	2.1	8	-5.9	2.3	53.8
SW-F New	6	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	72	0.9	8	-7.1	0.0	72.0
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.9	0.5	8	-7.5	0.0	68.9
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	65.1	1.8	8	-6.2	0.0	65.1
SW-F New	8	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.9	1	8	-7	0.0	71.9
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.8	0.6	8	-7.4	0.0	68.8
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	65	1.9	8	-6.1	0.0	65.0
SW-F New	10	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.9	1	8	-7	0.0	71.9
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.8	0.6	8	-7.4	0.0	68.8
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.8	2.1	8	-5.9	0.0	64.8
SW-F New	12	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.8	1.1	8	-6.9	0.0	71.8
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.7	0.7	8	-7.3	0.0	68.7
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.6	2.3	8	-5.7	0.0	64.6
SW-F New	14	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.7	1.2	8	-6.8	0.0	71.7
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.7	0.7	8	-7.3	0.0	68.7
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.5	2.4	8	-5.6	0.0	64.5
SW-F New	16	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.7	1.2	8	-6.8	0.0	71.7
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.7	0.7	8	-7.3	0.0	68.7
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.4	2.5	8	-5.5	0.0	64.4
SW-F New	18	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.7	1.2	8	-6.8	0.0	71.7
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.7	0.7	8	-7.3	0.0	68.7
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.3	2.6	8	-5.4	0.0	64.3
SW-F New	20	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.7	1.2	8	-6.8	0.0	71.7
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.6	0.8	8	-7.2	0.0	68.6
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.3	2.6	8	-5.4	0.0	64.3
SW-F New	22	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.7	1.3	8	-6.7	0.0	71.7
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.6	0.8	8	-7.2	0.0	68.6
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.2	2.7	8	-5.3	0.0	64.2
SW-F New	24	M-179	735	1	0	72.9	66	72.9	10	Snd Lvl	71.6	1.3	8	-6.7	0.0	71.6
SW-F New		M-182	854	0	0	69.4	66	69.4	10	Snd Lvl	68.6	0.8	8	-7.2	0.0	68.6
SW-F New		M-185	741	0	0	66.9	66	66.9	10	Snd Lvl	64.2	2.7	8	-5.3	0.0	64.2